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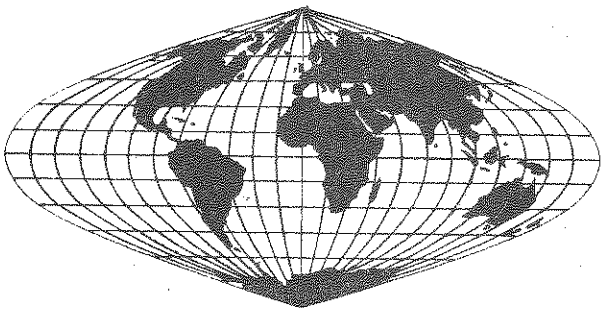
CORNELL/INTERNATIONAL AGRICULTURAL ECONOMICS STUDY

EQUITY AND COST IN THE ORGANIZATION OF PRIMARY HEALTH CARE IN JAVA, INDONESIA

Peter Berman



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After several decades of development, the achievements of rural health services in most developing countries have been disappointing. In general, services have not reached most of the population in need. Satisfactory improvements in health for poor rural populations have not been achieved. The 1970's saw increased recognition of this problem. The "primary health care" movement emerged in response to this problem. Its objective was to reorient health services so as to reach more people with appropriate and affordable services.

Medical researchers have often addressed the clinical and technological questions of primary health care, but have devoted less attention to the distributional and financial implications. A crucial motivation for this new approach is to reach more of the underserved with effective technology now available. This must be done in the most efficient way, to ensure the widest distribution of benefits with the resources available. Performance in terms of equity and cost must be studied.

Peter Berman's paper compares the equity and cost-efficiency performance of the three main components of Indonesia's rural health service system: district health centers, sub-centers and health posts, and voluntary village-level health workers. Indonesia has invested substantially in this system, including the training and nationwide placement of thousands of village-level health workers who are spearheading the primary health care approach. This paper explores which components of the Indonesian health system are most likely to reach the disadvantaged people of rural Java. It then examines whether improving the equity of service delivery is compatible with lowering costs per person served. The answers to these questions have important implications for the design and expansion of rural health services.

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At Cornell, Professors Jean-Pierre Habicht and Milton Barnett shared with me the pleasure of guiding Dr. Berman's academic program, field work and write-up. Ms. Lillian Thomas and Mr. Jim Spada prepared the figures. Ms. Carol Buckley at Johns Hopkins typed the manuscript to the specifications of this series.

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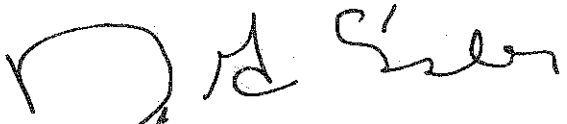

Daniel G. Sisler

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CHAPTER 1

INTRODUCTION: THE RELEVANCE OF EQUITY AND EFFICIENCY TO THE ORGANIZATION OF PRIMARY HEALTH CARE

To improve health in populations, health services must address significant health problems and provide efficacious technology of adequate quality for handling those problems. Services need to be used by large numbers of people who can benefit from the services and interventions they offer. They must be affordable enough to be made widely available.

Inexpensive and efficacious technology exists that could prevent most illness-related deaths in low income countries. However, the majority of those in need have not enjoyed the benefits of this technology. The failure to reach these people is not a fault of the technology itself, but rather of the way service delivery has been organized. To reach more of those in need with the beneficial technology available, the organization of health services must be improved.

This need was recognized in the call for a new approach to health service delivery put forward by the World Health Organization and the United Nations Childrens Fund at the Alma Ata conference in 1978 and endorsed by 134 national governments. This approach, called primary health care (PHC) was described as comprising:

> Essential health care made universally accessible to individuals and families in the community by means acceptable to them through their full participation and at a cost that the community and country can afford (WHO, 1978, p. 4).

This definition puts emphasis on the organization of services while maintaining concern for the choice of medical technology. The study presented here supports this emphasis by comparing the equity and efficiency of three widely used modes of service organization in less-developed countries (LDCs): health centers, sub-centers, and village health workers (VHWs).

Public health research in LDCs has focused on the determination of priority health problems and the efficacy of technology to solve those problems. This can be seen in the resources devoted to intervention experiments. These studies have shown that available curative and preventive care technology can be adequately provided in the rural areas of LDCs. This technology has significantly improved health status under controlled conditions (Gwatkin, Wilcox, and Wray, 1980). Studies have shown that such interventions are not expensive in <u>per capita</u> terms (Parker <u>et al.</u>, 1978).

Meanwhile, health services have developed rapidly in LDCs, emphasizing clinic-based curative care. Ironically,the basic unit of most LDC public health services--the "integrated" or "community" health center--was designed to emphasize preventive and educational services. This emphasis has not been realized in practice. The curative services dominating rural health care in most poor countries have not been successful in improving the health status of populations and have failed to reach most of the people they were intended to serve. In general, this failure reflects both the inappropriate choice of technology as well as inadequate organization.

Technology and Organization in Primary Health Care: The "Mix of Services" and the "Delivery System"

Health care programs combine technology and organization in actual field activities. It is difficult to separate the two completely, since technology in part determines how services must be organized and organizational conditions determine which technologies are feasible. However, it is useful to distinguish between them in analyzing program effectiveness.

As defined at Alma-Ata, the PHC approach acknowledges continuing concern for the choice of medical technology in terms of its appropriateness to population health needs and its efficacy. The term "essential health care" refers mainly to the choice of technique in intervention. In the context of a health care unit, this might be referred to as the "mix of services" provided.

Determining the appropriate mix of services is based on identifying population health problems and setting priorities amongst them considering their biological feasibility of control. Once the health problems of a population are known, this is primarily a question of choosing amongst various technologies available for peventing and treating disease. The efficacy of these technologies should be verified in controlled clinical trials. Such trials are mainly concerned with identification of disease and application of the appropriate intervention. The Declaration of Alma-Ata provided general guidelines for the mix of services by stating that PHC should include at least:

> Education concerning prevailing health problems and methods of preventing and controlling them; promotion of food supply and proper nutrition, an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunization against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs ... (WHO, 1978, p. 16).

The mix of services interacts with service organization through the adaptation of medical technology to the constraints of field conditions. For example, the choice of technology may be determined by the limited training of paramedical personnel or the lack of equipment or drugs. The most desirable technology in a controlled setting must become technique that can be performed adequately, that is, to assure benefit, in a field setting 1/. While the primary concerns are still efficacy, some compromise must be made with the exigencies of field conditions.

The other components of the definition of PHC--acceptability, accessibility, participation, and cost--all refer primarily to the organization of services. PHC explicitly includes improving the distribution of services and lowering their cost in its goals. It is clearly understood that efficacious health technique will have little impact unless it is widely used and affordable enough to be extended to populations and maintained. There is a special emphasis on reaching people who have not previously benefitted from modern health care--the "all" in the slogan "Health For All By The Year 2000."

This concern with the distribution of services highlights the difference between efficacy and effectiveness. Efficacy refers mainly to benefits to individuals and results from the proper application of useful technology. Effectiveness refers to impact on a population. This requires both efficacy and widespread utilization of services by those in need. The organization of care--the "delivery system"--is the main determinant of service utilization.

The delivery system affects the distribution of services primarily through its accessibility and acceptability. The organization of services can differ in terms of the distance clients must travel to a source of care or the cost to the client (both direct and indirect) of a service contact. Similarly, some modes of organization may be more acceptable than others. This might reflect differences in indigenous illness concepts, how personnel interact with clients, or how well they are known to the surrounding communities. The cost of providing services will dictate the extent to which the delivery system can extend care to the population within the resources available. Other things being equal, lower cost services can be made available to more people for the same resources.

The choice of delivery system is also constrained by considerations related to the mix of services. For services to be effective, they must be organized to maintain adequate quality of care and hence efficacy. Personnel must have adequate training, supervision, supplies, and equipment. They must be able to utilize the selected technology properly.

1/ It is useful to distinguish technology from technique in health care. Technology refers to medical knowledge developed in determining the cause of disease and efficacious therapy. Technique refers to the adaptation of that therapy to different types of clinical conditions.

Delivery system design is also subject to the particular historical and institutional constraints of each country or region. In almost all LDCs, specific modes of health service organization already exist. Usually these delivery systems can be modified but not completely changed. More positively, there is great similarity in the health service organization of different countries, suggesting that analysis of delivery system characteristics in a few locations might have more general applicability.

An important conclusion of the Alma Ata conference was that effective primary health care must include both the appropriate mix of services and delivery system. Many countries have made significant changes in their health service programs in response to this new policy. There has been increasing emphasis on preventive services like immunization, prenatal and infant care, and rural water supply. This has usually been in addition to rather than instead of existing clinic-based curative care.

In terms of service organization, health ministries have moved rapidly to decentralize 2/ certain basic services through the use of small dispensaries, health posts, and village health workers (VHWs). Research on these programs has focused on questions of efficacy and outcome. Little has been done to explore the performance of different modes of health service organization within the public sector in terms of the distribution and cost objectives of PHC. For example, how much does increasing accessibility to services through decentralization increase utilization and do all groups in the population respond equally to improved access? Are there differences in acceptability for different types of health service organization? What types of organization are most efficient in providing specific types of services? How well can one assure quality of care (and hence, benefits) at different levels of organization in the delivery system?

A basic premise of this research is that it is useful to separate delivery system characteristics from those of the mix of services in analyzing the determinants of effective PHC. A separate understanding of how specific modes of service organization influence utilization and cost can then be combined with the determination of relevant technology and technique in the design of programs.

2/ The term "decentralization" can be interpreted in different ways. It is used in this study to signify the extension of services to more locations in a rural area, reducing the distance between potential clients and a source of care. It often implies greater familiarity of the population with service personnel. For example, health center services can be decentralized through use of sub-centers, health posts, mobile units, and VHWs. This does not imply, however, that these lower level units have authority to determine their own programs or receive independent budget allocations.

This study was designed to address these issues for three common types of service organization providing primary health care in rural Java--health centers, sub-centers/dispensaries, and village workers. Their performance is compared in terms of equity--their potential for reaching low income beneficiaries--and the public sector cost of operations. Low income people usually benefit the least from modern medical technology. More equitable modes of service organization are essential to meet PHC's goals of improved service distribution. However, improved equity may imply more costly modes of service delivery. A combined study of equity and cost addresses directly the issue of the feasibility of improved service distribution with limited resources. The comparison of health service organizational types focuses on the provision of basic curative care and maternal and child health/family planning services (MCH/FP).

Rural Java provides an excellent site for a study of this kind. Investments in the rural health care system have increased substantially in the last decade, so that staffing, supplies, and facilities are adequate at current levels of utilization. The Government of Indonesia has made a strong, public commitment to the PHC approach. They have backed this up with development of one of the most extensive systems of village-level health and nutrition workers in the world, extending certain primary care services to some 12,000 villages. In addition, primary care is being provided by health centers, sub-centers and health posts, and mobile health units. Despite these resources, there is evidence from previous studies that services are still underutilized, especially by low income beneficiaries, and that the government's recurrent cost burden for these services is substantial. Improving both the equity and efficiency of service delivery are matters of concern to health planners in Indonesia.

Objectives of This Study on Equity and Cost in the Organization of Primary Health Care in Java

The general objective of this study is to investigate how different types of service organization for primary health care perform in terms of reaching low income beneficiaries and the cost-efficiency of service provision. Significant equity and cost differences between health centers, sub-centers, and VHWs will be demonstrated. These will have clear implications for future investments. The study will show that it is both feasible and relevant to include considerations of equity and cost in planning primary health care activities.

The specific objectives of the study include:

1. A survey of health service units and local government in 26 sub-districts 3/ describing the primary health care delivery

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3/ Sub-districts (kecamatan) are administrative units with approximately 30-50,000 population. See Chapter 4 for further explanation of the civil administration in Java.

systems currently operating in rural Central Java. The description is in terms of the combinations of different organizational units, staffing patterns, levels of service utilization, and relative role of different parts within the sub-district delivery systems. These systems include rural health centers, sub-centers and health posts, mobile units, and village health workers.

2a. A detailed study in two sub-districts describing current levels of primary care service use and equity. This includes analysis of how the income levels of service users can be associated with overall utilization and use of specific types of service units, i.e., the study will determine whether different types of primary care organization perform differently in reaching low income beneficiaries.

2b. Calculating the total and averge costs of primary care visits to the health centers and sub-centers in the study area and assessing whether the observed costs suggest any structural differences in cost-efficiency in service delivery between the different types of units.

2c. Calculating the total and average costs of VHW activities and comparing these with the costs of appropriate clinic based services.

3. Assessing the relevance of the results on equity and cost for policy and planning. This includes discussion of the appropriateness of further research to support the results of this study and how these results could be incorporated in a broadly focussed multiple-objective planning framework for primary health care.

Outline of the Dissertation

This study begins (Chapter 2) by defining the concepts of coverage and equity in health service utilization and the descriptive measures that can be used to identify inequity in a health service system. Measurements of equity from actual service units simply enumerate the results of decisions by individuals and households to use services. Economic, sociological, and anthropological models of service utilization decisions are reviewed and their relevance for a more comprehensive analysis of equity and its determinants is discussed. Similarly, in Chapter 3 appropriate measures for analyzing service costs are defined. That chapter also describes the analytical techniques appropriate to determining structural differences in efficiency between different types of health service units.

The Indonesian context and the study design and methods are described in Chapter 4. Data collection in Indonesia was done in two parts. The first was a survey of 26 rural sub-districts to collect information on the organizational structure of health service delivery systems in rural Java. The different types and combinations of service units were enumerated and data were collected on the resources available in each district, utilization of different types of units and services, and geographical and economic characteristics of the areas. This part of the study (Chapter 5) describes the context of rural health services in Java and is used to demonstrate the importance of the different types of units in overall provision of services to the population.

The most important component of this research was the "intensive" study in two rural sub-districts in Central Java, Chapters 6, 7, and 8. Those sections compare health centers, sub-centers and health posts, and village-level health and nutrition workers in terms of their ability to reach low income beneficiaries and the total and average costs of the services they provide. Curative care and MCH/FP services were studied. Data were gathered at the health service units and at village level through a household survey.

The equity of overall service use for illness care and MCH/FP services (Chapter 7) is investigated first through the use of coverage measures for different income groups in the population. These figures on total utilization are then disaggregated for the different types of health service units, to determine whether certain types of units serve low income beneficiaries better than others. These descriptive data reflecting the results of individual decisions to use services are then analyzed further to verify the role of income levels in utilization decisions. Multivariate logistic regression models are estimated to predict the probability of individuals using specific types of service units based on their income, distance from the service, severity of illness, and age. The fit of the models and the strength of the income variable are discussed as further evidence of equity differences between different types of primary health care units.

In Chapter 8, data on the total costs of inputs for illness care and MCH/FP are developed from government records and a study of the time allocation of health workers. Dividing total cost by the total number of patient contacts, the average cost per out-patient contact for these services is computed for the health centers and sub-centers studied. In addition, the data from these units are used to estimate average cost curves for each type of unit. The curves demonstrate the implications of variability in utilization of services for average costs and permit comparison of the average costs of different types of units at current and projected levels of utilization. A similar analysis of total and average cost was done for the VHW program in the study area, for comparison with clinic-based services.

The results of this analysis are reviewed in Chapter 9. The study demonstrates that it is feasible and relevant to assess the equity and costs of alternative types of primary health care organization. In the

comparisons of different types of service organization, the more decentralized units proved more likely to reach low income beneficiaries, even controlling for the effect of other determinants of service utilization. Cost analysis showed that improved equity need not increase the average costs of services and, for VHW services, could substantially reduce average costs. However, increased equity probably implies an overall increase in service use which, while it reduces average costs, can substantially increase the total cost of services.

In addition to discussing the policy implications and further research invited by these findings, the last chapter proposes a broader framework for analysis of primary health care investments. The objectives of primary health care include not only improved equity and efficiency--the subjects of this study--but also improvements in the effectiveness of the services and increased community participation and self-reliance. Complex programs like primary health care are best analyzed explicitly in terms of multiple objectives. The study concludes with a discussion of techniques for analyzing investments with multiple objectives and examples of how this might be done in practice.

CHAPTER 2

SOURCES OF INEQUITY: MEASURES AND MODELS RELATING INCOME TO HEALTH SERVICE USE

"Health for all by the year 2000" is the goal of the primary health care approach promoted by the World Health Organization. This slogan reflects an emphasis on increasing overall health service utilization and on improving the distribution of services to those currently not benefitting from them. In general, individuals of low income and those living in remote locations have benefitted the least from modern health improvements (Djukanovic and Mach, 1978). "Health for all" requires that these individuals receive more services.

An equitable distribution of health care services has been defined as "... one in which illness ... is the major determinant of the allocation of resources ... equity is present when services are distributed on the basis of people's need for them" (Aday et al., 1980, p. 41). Income, ethnic group, or other individual or household factors should not determine utilization of the health care system, except as they influence the need for services.

This study is primarily concerned with factors affecting the distribution of modern health services within the public health system, as differentiated from private and indigenous care. Equity is assessed in terms of how household income affects the utilization of these services. In Aday's terms, an equitable health service system would be one in which income does not affect access to care. However, different parts of the health system tend to serve different income groups. Modern private health services may be used more by higher income individuals. For overall equity in service use to occur in practice, a stricter standard must be applied to the public sector of the health system. Since private services may be biased to higher income individuals, equity in overall service delivery implies that public sector services must be biased towards low income recipients.

Two approaches to analyzing equity in the public health system are used in this study. First, appropriate indicators reflecting equity in service utilization are measured for different income groups in the study population and broken down by types of service and modes of service organization. These indicators include various measures of utilization and coverage. This measured service utilization is the result of individual and household decision-making. Although these indicators are calculated for income groups, income is only one of many factors playing a role and it is often correlated with other important factors. The second part to assessing equity, then, is to analyze the factors determining

utilization for individuals and to assess whether income is a significant determinant independent of the other factors.

This chapter will discuss various measures of utilization and coverage appropriate to assessment of equity in health service delivery. The role of the health service delivery system and economic, sociological, and anthropological models of decision-making for service utilization will be reviewed. Their implications for analysis of equity will be discussed.

Measuring Equity: Utilization and Coverage

The study of equity is the study of utilization of services by specific groups in a population. A first step is definition of appropriate measures of utilization.

There are three relevant components of utilization measures: service outputs; individual health needs; and the characteristics of individuals, such as income. The simplest measures of utilization enumerate outputs of health services, for example: total number of patient contacts during a year or number of immunizations given. Such indicators tell us the level of activity of a health service but do not relate such activity to needs or specific groups of individuals.

Measures of service coverage relate utilization to needs. At the simplest level, outputs of services divided by the population--for example, patient contacts per capita--provide a rough estimate of utilization relative to need. This is based on the assumption that needs are constant between different populations or groups within populations. A stricter definition of coverage was provided in a recent WHO publication:

> The fundamental concept of coverage should relate the use of health services to the need for them: the numerator is the number of individuals ... that actually obtain the activity, and the denominator is the number of individuals ... that would benefit from obtaining the activity or program. It requires a defined population and a time period (WHO, 1978, p. 5).

In other words, if a certain population should, on technical grounds, use a specified type of health care activity, then coverge is the proportion of that population that has used the activity in a given geographic area and time period. Such measures of coverage express the proportion of the identifiable needs of a specific population that have been met by health services; for example, the percentage of children of a certain age and place who have completed a course of immunization.

Coverage measures can also be used to assess equity in service delivery by comparing coverge rates for different groups in a population. Since coverage measures the proportion of need met by services,

differences in coverge for different income groups imply that income as well as need is determining service use. When coverage of a population is 100 percent (all individuals needing services receive them) there is no inequity. Conversely, variation in coverage by income group measures the degree of inequity in service use. For example, when low income pregnant women have a lower rate of coverage with prenatal care than high income women, this indicates inequity in the distribution of prenatal care.

Determinants of Service Utilization: Individual, Household, and Delivery System Factors

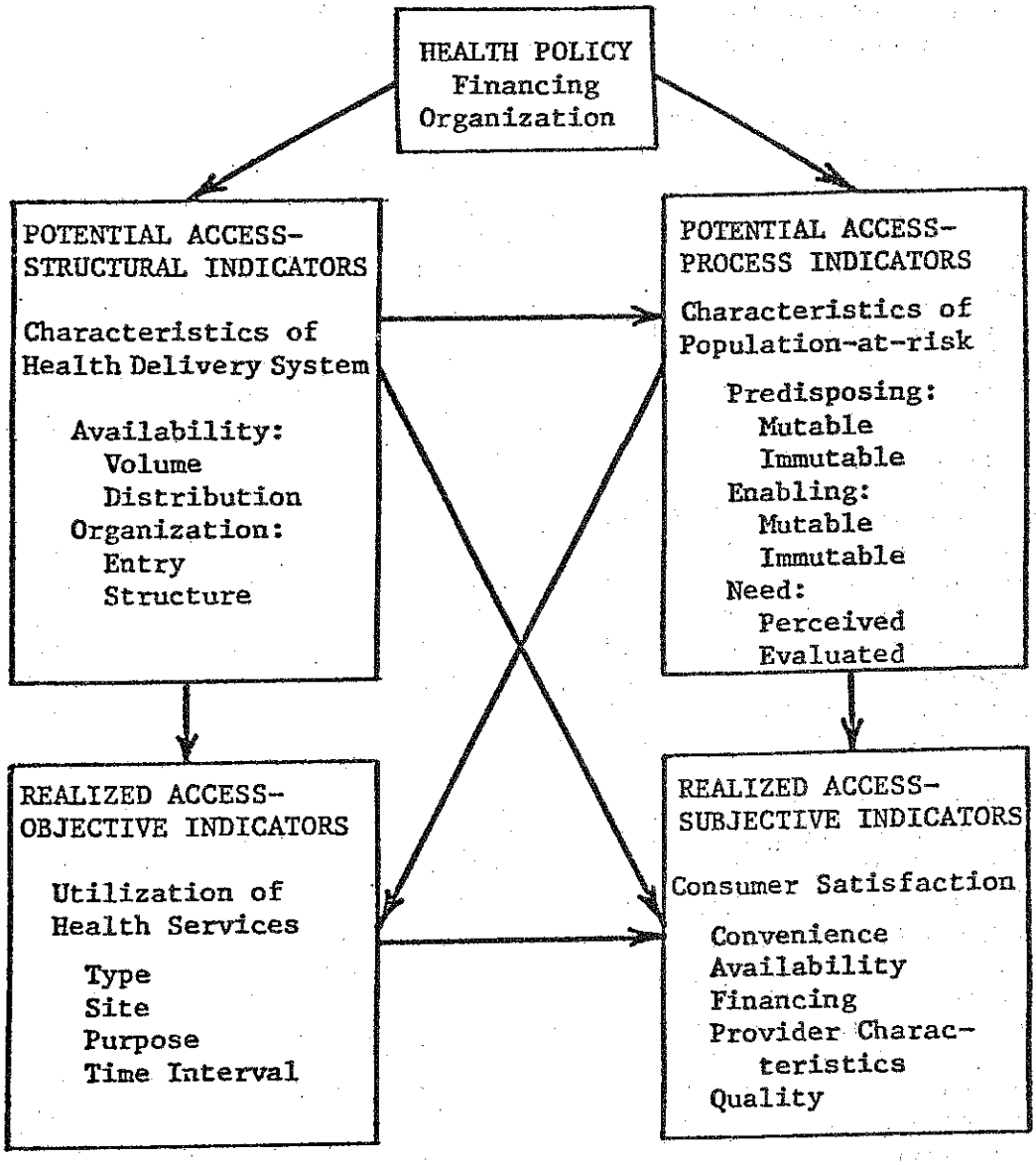
Measures of utilization and coverage aggregate the results of a large number of individual actions in seeking services. These indicators reflect one outcome (visits to services) of a decision process by individuals or households. The results of this process are affected by such factors as health needs, individual and household characteristics such as income or education, cultural characteristics such as health beliefs, and the availability of services.

Social scientists in various disciplines have tended to focus their attention on individual, household, and cultural characteristics as explainers of service utilization. Less attention has been given to service availability factors--the structure of the health service delivery system. This study compares equity in different types of primary health care organization. That is, it examines how delivery system characteristics interact with individual and household decision-making to produce the distribution of service benefits in an area.

In their 1980 book, Health Care in the U.S.: Equitable for Whom?, Aday et al. define utilization of services as "realized access" which they differentiate from "potential access." Realized access is a function of both individual and household characteristics and the characteristics of the delivery system. This is shown graphically in Figure 2-1. According to this model, health policy seeks to increase realized access (utilization) by reducing barriers at the level of potential access. Two principal methods for achieving this are through financing (e.g., reducing costs to users through insurance or subsidies) and organization (e.g., making access to service easier, less expensive, or more satisfying). Both of these methods can be operationalized through the delivery system or through individuals and households who may use the delivery system.

> Health policy may be seen as intended to affect directly characteristics of the delivery system, as by increasing the supply of physicians in an area, or programs may be directed to changing characteristics of the population-at-risk either directly (as by insurance coverage) or through the delivery system (for example, facilities may be relocated thereby reducing the travel time to care for area residents) ... The delivery system in turn may

Figure 2-1. FRAMEWORK FOR LINKING DELIVERY SYSTEM AND INDIVIDUAL AND HOUSEHOLD FACTORS AS DETERMINANTS OF SERVICE UTILIZATION



Source: Aday, et al., Health Care in the U.S.: Equitable for Whom, (Sage, Beverly Hills, California, 1980), p. 35.

> directly affect utilization patterns and the satisfaction of the consumers with the system. These effects are determined by the structure itself and not necessarily mediated by the properties of potential users. For example, members of pre-paid group practice plans are found to have lower hospital utilization rates than users of solo fee-for-service plans, and this difference seems to persist independent of the characteristics of consumers. On the other hand, the characteristics of the population may directly affect use and satisfaction independent of system properties (Aday et al., pp. 34-36).

Thus, Aday et al. argue that the structure of the health service delivery system itself is an important determinant of utilization and therefore, potentially, of equity. Delivery system structure affects utilization through two mechanisms: the allocation of resources, e.g., the quantity and type of services available and their distribution; and the characteristics of specific types of health service organization. These delivery system factors create a health service environment which is responded to by decisions at the individual and household level. It is important to note that Aday et al. emphasize not only the most commonly cited determinants of health service use such as cost, travel time, or education, but also consumer satisfaction. In a developing country, the role of consumer satisfaction could be interpreted much more broadly to include cultural factors relating to the decision to seek care and the perception of the benefits from care.

In the United States, extensive public sector involvement in the regulation of health services is relatively recent. This in part explains the belated recognition of the importance of delivery system factors in health service use. Health services have been produced by a large number of relatively autonomous providers (including physicians, group practices, hospitals, etc.) which have been able to choose their location and method of delivering care. Economic theory would argue that the availability and organization of services already reflects the interaction between individual and households factors (the demand side) and health service providers (the supply side). The effect of supply characteristics on demand becomes more important when public health policy becomes a significant factor determining the structure of the delivery system.

In developing countries, two factors argue for giving greater attention to the role of the delivery system in affecting utilization and hence both equity and outcomes. First, in most developing countries the public sector is a major provider of modern health care, especially in rural areas. In Indonesia, virtually all modern health care professionals in rural areas are primarily employed in the public health services although they then practice privately as well. The public sector determines much of the structure of the delivery system, often beginning at a very rudimentary level. In such cases, individuals and households are more likely to respond through their preferences to the system created in

their areas than to form a system through the cumulative effect of individual demand for services. In addition, many public health systems in developing countries are still in early stages of elaboration. The organization of delivery systems can still be significantly determined by public policy.

Pluralism in health care is a second reason for giving greater attention to delivery system factors. In rural areas of developing countries, traditional or indigenous health care preceded the introduction of modern services. Traditional care may not always provide efficacious treatment, especially for infectious disease, but it has developed to meet peoples' needs for acceptability and satisfaction, and usually is more accessible as well. The modern health service system must be organized in ways that encourage utilization if the benefits of allopathic medicine are to be widely felt. This argues for greater attention to the ways in which service organization in the modern sector interacts with individual and household factors.

This study examines how different types of primary health care organization in Java--health centers, sub-centers and health posts, and village-level health workers--influence the utilization behavior of clients from different income groups. This will be done by demonstrating that the effect of income on the decision to seek services is different for different types of service organization. The health service units studied are fixed factors in the environment, while the characteristics of individuals and households vary throughout the population. Thus, the inference that service organization influences equity is necessarily drawn from analysis of individual behavior.

The various social science disciplines have put forward different models of individual care-seeking behavior. These can be divided into two general types: economic models of the demand for health services and behavioral models of health service utilization. These two approaches differ in their theoretical frameworks and in their identification of important determinants of service use.

Economic Demand Models of Health Service Use

Economic models of the demand for goods are based on a theory of how individual human beings attain satisfaction or utility. In most modern applications of this theory, predictions about consumer behavior are derived from mathematical models which represent how individuals choose between different ways of maximizing their satisfaction based on their preferences, the prices of goods, and the resources available to them.

The typical theoretical demand model envisions an individual who is aware of all the possible means of achieving satisfaction, all their prices, and possesses a unique and consistent set of preferences evaluating the potential contribution of all goods to his satisfaction. He

chooses the combination of goods attainable with the resources available to him that will give him the greatest satisfaction.

Constrained by a necesary set of assumptions 1/, manipulation of the mathematical formulation of this abstract model of individual choice gives predictions about how consumption of particular goods will vary with changes in their prices, the prices of all other goods, and income. Preferences are usually assumed to remain constant. These predictions reflect the internal logic of this model of behavior, based on the assumptions.

In traditional demand theory, consumers are seen as deriving satisfaction through acquisition of purchased goods and services. Demand models predict the purchase of such goods and infer the satisfaction gained from their use. More recently, the theory of household production (see Lancaster, 1966) has sought to close this gap between what the model predicts (acquisition of goods) and the underlying factor motivating behavior (individual satisfaction). Household production models depict individuals and households as deriving satisfaction not directly from acquisition of goods themselves, but rather from the properties of goods.

> The chief technical novelty lies in breaking away from the traditional approach that goods are the direct objects of utility and, instead, supposing that it is the properties or characteristics of the goods from which utility is derived (Lancaster, p. 133).

Satisfaction is not purchased but rather "produced" in the household through both the acquisition of goods and the use of time. In empirical applications this reformulation of demand theory has had two major implications. First, it gives a greater role to the household as the unit of consumption and producer of satisfaction. In fact, it had long been noted that households were the main economic units of consumption. The household production theory also puts emphasis on the value of time in consumption decisions. This has had important implications for the study of health service consumption 2/.

Household production models are nonetheless derived from the same theoretical framework as traditional demand models, a framework that is quite different from those used by other social sciences. Most

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1/ See Henderson and Quandt (1971), Chapter 2, for a discussion of the mathematical formulation of the consumer's utility function and the derived conditions of demand for specific goods. That chapter also outlines the relevant assumptions which permit a unique mathematical solution and which define rationality in consumption.

2/ Grossman (1972) was an influential effort to apply this model to the demand for health care.

importantly, economic demand models are based in a universal and general theory of human motivation--that people seek to maximize their total satisfaction through choosing amongst all possible alternatives of consumption given the resources available to them. In explaining the use of health services, the theory underlying demand analysis explicitly tries to ask why people seek health care as opposed to other uses of their money and time. Utilization of health services, for example, represents a rational weighing of the satisfaction to be gained from health care against that to be gained from all other types of consumption. In contrast, other social science models looking at similar questions tend to isolate the treatment-seeking decision from other types of consumption. The question "why health care and not something else?" is rarely asked. This, more general, perspective on consumption behavior envisaged in demand analysis is appealing.

Another strength of economic demand analysis is the focus on variables that are manipulable by public policy. Techniques for affecting price and income constraints are well-developed and may work quite rapidly, whereas changing education of culturally-determined beliefs is more difficult and less immediate.

There is, of course, a negative side to this broad view of consumption decisions. In the most general form of the theory, there is little differentiation between different types of consumption. Candlelight dinners and open-heart surgery are both treated as utility-producing acts of consumption which are compared by consumers in terms of prices, income, and individual preferences. Clearly, not all goods consumed should be compared to all others in an overall calculation to maximize satisfaction. One can easily imagine consumption decisions which should be studied in isolation.

In addition to the theoretical problems of analyzing consumption in total, there are major limitations to our capacity to model each individual consumption decision. Empirical estimation of demand usually relies on some form of grouping expenditures into categories. The mathematical development of the theoretical model has developed to accommodate these requirements. In fact, despite the expansive theoretical framework underpinning demand analysis, it is ironic that the actual empirical work often resembles that of other social sciences, since the data are often not available to model full demand systems at the level of detail needed. This is especially true in LDCs.

Issues in Applying Economic Demand Models to Health

Whatever one's views about the relative merits of consumer theory in economics, the following are characteristics of health and the use of health services that require special attention in analyzing determinants of utilization:

1. Unlike most other consumption goods, health services are usually purchased to alleviate or prevent a negative condition (illness). They are often a response to need, especially in emergencies, rather than a choice to consume. These needs may also occur unpredictably.

2. Although consumers may choose to initiate the use of health services, they often have little or no control over the quantity of services they consume once in the care of the medical profession. The service user does not weigh each component of the total purchase of services--he is unable to make such determinations both because of ignorance as well as the organization of service delivery.

3. Related to (2), users of health services are often sheltered from the real costs of their consumption by insurance or subsidies. The actual price paid by the user may not accurately reflect the true cost of services.

The view of health care as a consumption good emphasizes the importance of prices and income as determinants of use and de-emphasizes other factors such as needs and cultural interpretations of illness, treatment, and cure. In developing countries these other elements take on greater significance than in the United States, where the health care options are more homogeneous and the populations served share common views about the causes of illness and appropriate treatment. Analysts of the economic determinants of service use in LDCs should be prepared to work within a wider analytical framework.

Results of Studies of Demand with Special Reference to Developing Countries

Demand studies emphasize the effect of prices and income on the consumption of health care. Research has focused on estimating price and income elasticities--the effect of changes in health service prices or consumer's income on the amount consumed. Both of these factors can be expected to influence both the overall utilization of services as well as equity in utilization. Differences in the income elasticity of service consumption for specific types of services can be used to demonstrate equity differences.

Studies of the demand for health services in the United States are reviewed in Joseph (1971) and Feldstein (1979, pp. 90-94). Most of these studies measured demand as expenditures on health services rather than the actual number of patient contacts. Expenditures reflect both quantity and quality of services used. In general, consumers respond as expected to the price and income signals of the medical market. Higher prices tend to discourage consumption as does lower income. However, there is some variation in the intensity of these effects. Feldstein summarized some of the results as follows:

> Generally, hospital and physician services are price inelastic 3/. The price elasticity for patient days varies from -.2 to -.7; for admissions the variation in price elasticity is from -.03 to -.5; and for physician visits the price elasticity varies from -.1 to -.2. The estimate of income elasticity for medical care expenditures is approximately one (+1.0). The statistical effect of income appears to have declined over time as more of the patient's bill is paid for by third party payors ... As the out-of-pocket price for medical services becomes smaller, the importance of income declines and time costs become an important determinant of medical use. The estimates of elasticity of demand with respect to time are surprisingly high: -.6 to -1 with respect to travel time to a public outpatient department (Feldstein, 1979, p. 91).

Consumers in the U.S. are not very sensitive to prices in using health services, are becoming less sensitive to income differences as third-party payments become more prevalent, but are quite sensitive to such indirect prices as time required in seeking care.

As mentioned above, time was introduced into the economic demand framework initially by household production theorists. Travel time could be a major determinant of service use in poor countries, where access to services is often difficult. Acton (1973) explored the effects on demand of time required for health service utilization in the U.S.--travel time, waiting time, and treatment time. Acton found that time had a significant effect on demand and that this effect became more important as price differences decreased through subsidies or insurance.

Relatively few studies of the demand for health services have been conducted in developing countries, and even these studies have tended to include a much broader range of variables than the prices and income measures which preoccupy most U.S.-based studies of demand. Akin et al. explain this broader focus:

> Conditions (in developing counries) are such that a large number of factors that can be taken as invariable across households in high income countries require the analyst's attention. The conditions of the dwelling unit, the

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3/ Elasticity refers to the percentage change in the dependent variable that would result from a given percentage change in an independent variable. For example, a price elasticity of .2 for total health expenditures indicates that, if price rises by 50 percent, total health expenditures will rise by 10 percent. Elastic relationships indicate a high level of responsiveness, while inelastic ones refer to a low level of responsiveness. This relationship can move in either a positive or negative direction.

> quality of the drinking water, the healthfulness of waste disposal methods, the condition of roads, the availability of transportation, the effects of weather change, the family structure, the varriability of beliefs and education ... may have significant bearing on health status and medical care use from village to village and household to household (Akin et al., 1983, p. 192).

Demand studies in LDCs have also acknowledged the pluralistic structure of the health care system by exploring differences in utilization of services in the traditional or indigenous health sector, informal services, the modern public sector, and modern private services 4/.

Despite this expanded view of factors affecting demand for health care in LDCs, public policy in the health sector in LDCs still operates primarily through the price mechanism. Among the main public health strategies for services in rural areas has been subsidization of the cash price of public services (which assumes significant price and income elasticity in demand) and decentralization of service organization (which assumes significant elasticity in terms of indirect prices such as travel time and cost). Thus, traditional demand concepts are still quite important for health policy in LDCs.

Heller (1975) presents the results of a study of the demand for medical services in Malaysia. The study looked at household expenditures for several different types of services, including in-patient and out-patient curative care, obstetrical care, and prenatal care. The demand model included both the household and environmental factors giving rise to health needs and the needs themselves leading to consumption of medical care. Heller also included the usual price and income variables in the study, with special attention to time and the imputed cost of time in using services.

In terms of the cash price of services, the findings showed that:

> the demand for outpatient and inpatient care is highly inelastic ... nevertheless, in their choice amongst medical alternatives, consumers are clearly responsive to the relative cash prices of private and public outpatient clinics (Heller, p. 75).

4/ Traditional or indigenous health care includes the diagnostic and treatment practices originating in the local culture, usually not based on Western scientific models of disease causation and treatment. The informal system includes a variety of unofficial, non-professional sources of (usually modern) treatment such as travelling drug vendors, local shops, etc.

That is, although cash price did not have a large overall effect on total consumption of care, it did prove important in the choice between different sources of care. This suggests that policies to reduce prices for modern public services can increase use, although not by a large amount.

Continuing, Heller reported that:

> ... results suggest the inelasticity of demand to the total time required for utilization. Yet ... household outpatient demand does prove sensitive to how the time required for utilization is spent. Travel time emerges as a deterrent factor. Among households using both government and private clinics, it is the relative transport time requirements that prove important in the choice of public rather than private clinic (Heller, p. 29).

In this case, policies to decentralize care affect consumption, but this effect is not very strong.

In terms of income effects, Heller wrote:

> ... an increase in cash income ... will have only a minor effect on the total quantity of outpatient care consumed ... it shifts the pattern of discretionary demand toward those services generally perceived ... as of higher quality, though also of higher price. At higher income levels, households clearly shift their demand from public to private outpatient clinics (Heller, p. 31). As income falls, households obtain a higher fraction of their total medical consumption, particularly outpatient care, from the public medical sector (Heller, p. 38). An increase in cash income ... will strongly increase the consumption of prenatal care and perhaps by inference the consumption of other preventive goods and services ... Cash income is not a barrier to access but clearly does influence the level and structure of per capita medical consumption (Heller, p. 31).

While income is not an important determinant of total consumption of health services, it is a significant factor in determining both the type of services consumed (curative versus preventive) as well as the source of services used (private versus public). Public services are more likely to be used by low income consumers.

These results suggest that price and income effects can influence service use, although not as much as one might expect from their emphasis in economic models of demand. Prices and income operate more to determine where consumers go for care rather than how much care they consume in total. In this way they may be important determinants of the equity of different components of the health care system. Low income consumers tend

to use public services, as do those who are sensitive to both cash price and travel time. Heller viewed his findings on prices and incomes as evidence that public sector efforts to provide accessible care to low income consumers were successful in Malaysia.

A more recent study by Akin et al. (1982) presents data from the Philippines collected between 1978 and 1981. The conceptual model used is similar to the one developed by Acton (1973), including time used in seeking services and expenses such as travel, drugs, etc. The health care actions were grouped into four categories: no treatment, traditional care, modern public care, and modern private care.

Unfortunately, many of the price variables were not well specified in the data. For example, information on waiting time, travel time, and cost were not available diretly from the households interviewed. Rather, these were estimated for the nearest of each category of service provider to each village. These village-level values were used for all the household observations from each village. This disguises the actual choices in determining time and cost faced by consumers. In fact, travel time and cost are inversely correlated for individuals. People do not always use the nearest source of a particular category of provider (see Chapter 6 for some examples from this study). Nonetheless, the Philippines study is an important effort to assess the effect of direct and indirect price variables and income on service use in the context of a pluralistic health service system.

Despite government subsidies for public services and relatively low cost and adaptable payment options for traditional services, the study found that the total cost to patients (including travel and lost wages) were "not trivial" (p. 264). Despite this, the authors concluded that consumers were not sensitive to prices in deciding to use health services.

> ... as large as the transport time and cash costs may often be, they do not prove very useful in most cases for explaining where patients seek care ... the lack of strong results for the time cost, transportation cost, drug cost, and visit price variables indicates that in many, if not most cases they are virtually irrelevant to the decision to seek a particualr kind of care (Akin et al., p. 265).

These conclusions contradict much of the descriptive data on service utilization from other studies. Although other researchers have found that price effects are small, they have still found them to be significant discriminators between different types of care providers.

The Philippines study also reported little effect of household asset ownership (analogous to income in this case) on total service consumption, although there was some tendency for better-off individuals to use private services for certain kinds of care.

> Except in the well-baby and immunization models, assets have the expected effects of increasing the probability of using private practitioners for outpatient visits, increasing the probability of modern deliveries, and increaseing the number of prenatal visits. In all cases, the asset effect is very small (Akin et al., p. 266).

They also reported that patients reporting illnesses perceived as serious showed little sensitivity to economic costs or assets in choosing to use services. And they found that low income patients did not tend to favor public services:

> While public clinics are definitely reaching some poor clients, the consumption patterns of the poorer outpatient group clearly indicate a preference for private practitioners as well as very little sensitivity to costs (p. 267).

The authors felt that these findings cast doubt on the usefulness of public sector subsidies for clinic-based care. They suggest that more public sector attention be devoted to outreach with preventive services as those currently using services seemed quite able to satisfy their needs regardless of price. Of the various types of services they studied--curative, prenatal, delivery, well-baby, and immunization--differences in utilization by income group were found only for some of the preventive services. These differences did not show up as significant in their multivariate analyses. They recommend that curative care be used to finance increased preventive care outreach services through the use of sliding scale fees for clinic patients.

Some caution must be used before drawing strong conclusions from these findings. First, some of the main variables of interest were not well specified. Second, there are some inconsistencies in their findings which could be explored further. For example, in the models of demand for certain kinds of preventive care, income has a negative effect on use, even though the tabulated data show a bias towards higher income users. This may reflect problems with the econometric specification. Third, rather than concluding that public sector efforts to subsidize services (both in terms of price and location) are futile, it might be more useful to understand why these efforts are more successful in some places than in others. Are there differences in the structure and organization of public services between Malaysia and the Philippines, say, that could account for the different findings? For example, are public services in the Philippines of such low quality compared to private care that the price difference is irrelevant?

Demand for Health Care: Summary

Economic models of the dmeand for health care have been significant in affecting health policy. There are at least two reasons for the

attention given to economic approaches to questions of service utilization. First, economic models are derived from a broad theory of consumer behavior whose internal logic has been rigorously developed both theoretically and empirically. Although this theory is vulnerable to the criticism of being inappropriate to health issues, its thorough empirical development and comprehensiveness are appealing. Second, economic models focus on variables which are most easily manipulated by policy. Direct and indirect health service prices and income constraints on utilization can be linked to financing, planning, and regulation of services.

The large role played by economic demand models is not based on particularly strong predictive power in the health sector. Cerainly, studies in the U.S. and in LDCs have found that consumers respond as the theory predicts to prices and income in choosing to consume health care. However, these effects have not been particularly large, and, in most cases have been more significant in determining the choice amongst alternative sources of health care rather than the overall consumption of health care.

Only a handful of demand studies have been done in LDCs. Two recent examples suggest that prices and income are not major determinants of total health service consumption. In both studies, income differences did affect the choice between public sector services and private services, with low income consumers more likely to use the public sector. The effect was particularly strong for discretionary services like preventive care for mothers and children.

In terms of price effects the results were mixed. The Malaysia study showed that consumers were significantly sensitive to both direct and indirect prices in choosing between public clinics, private practitioners, and hospitals. Travel time in particular was judged to be an important determinant of this choice. In the Philippines, the study showed little effect from price or travel time. In both studies, utilization of curative care was less responsible than discretionary preventive services to price differences.

Behavioral Models of Health Service Use

Economic demand models of health care consumption may be appealing for their policy relevance and their broad theoretical foundation. But they ignore many of the unique characteristics of the health sector.

> Economists have not, with few exceptions, considered the health behavior of the individual or family as a determinant of the utilization of various health services ... It would appear that these behavioral or predisposing variables are capable of explaining just as much of the variance in utilization of particular health services as the financial or enabling variables ... It seems shortsighted for economists to continue to ignore the

> possible explanatory powers of the behavioral variables particularly as there appears to be a limited payoff from the over-application of traditional consumer preference theory (Gross, 1972, p. 74).

An alternative can be found in the approaches of other social sciences in explaining health service use.

Demand analysis treats health service consumption as one component of total consumption, relating the decision to use services to all other consumption decisions. This leads to the emphasis on price and income, since these factors affect consumption in general. In contrast, other social sciences have generally looked at the decision to use health services without reference to other consumption decisions. Such models are referred to here as behavioral models of utilization, since they are concerned primarily with factors affecting only the use of services. These models focus on a narrower question--determinants of health service use only--although they examine a broader range of factors.

Sociological Models

Veeder (1975) reviews four of the better known sociological studies of determinants of health service utilization in the U.S. One of these that is widely referenced is by Anderson (1968). This framework was used in the health policy model described in Figure 2-1, of which Anderson was a co-author.

Anderson identified three groups of determinants of health service utilization: predisposing factors, including family composition, social structure, and health beliefs; enabling factors, including family resources and community resources (the delivery system); and need factors, including illness and the response to it. Veeder characterizes this model as emphasizing "family life cycle determinants" of service use, in contrast to the other models she reviews, which emphasize "psychological-motivational determinants" (Rosenstock, 1966) or "socio-environmental determinants" (Suchman, 1965). Veeder notes, however, that all the models are:

> ... similar in many respects ... Where the ... models differ most is in the importance given to individual beliefs concerning severity and susceptibility in determining utilization behavior. Where the models are in greatest agreement is in the importance of availability, accessibility (cost and distance) of health care services, and social group influences (family and peer), combined with demographic variables (Veeder, 1975, p. 106).

The results from Anderson's original 1968 study showed that the need variables were by far the most significant determinants of service use and that, in general, predisposing variables were more significant than

enabling ones. That is, health beliefs and practices and demographic and social factors appeared to be more important than the traditional economic variables. Anderson notes, however, that these factors are often associated with economic variabes at the household level. These results suggest that expanding utilization models beyond the traditional economic framework improves the explanatory power of empirical analysis.

A more recent study by Dutton (1978) attempted to assess the relative importance of three sets of factors in determining the lower level of service use by low income households. This study used multivariate analysis to assess the determinants of inequity in service use. The variables included financial factors, mainly prices and insurance coverage; belief and attitudinal factors associated with low service use by the poor (which she terms "culture of poverty" explanations); and health system structure, which might discourage utilization by the poor. Dutton found that:

> While the financial coverage and culture of poverty explanations together appear to provide a sufficient explanation for low rates of preventive use by the poor, they failed to account fully for income differentials in seeking symptomatic care.
>
> When variables representing the usual system of care were added to the model, the positive income trends were greatly reduced ... This suggests ... that use rates are low among the poor in part because of inadequacies in the health care systems they use.
>
> As successive groups of variables were added to the model, explanatory power originally attributed to income was reallocated to other variables ... Income-related factors, particularly type of health care system used, play a more important role than income itself in determining patterns of discretionary use (Dutton, p. 360).

Dutton's findings are particularly relevant to this study. Her model explicitly accounts for economic variables, social and attitudinal variables, and delivery system factors and indicates that all three play a significant role in determining equity in service use. As quoted above, her study also suggests that income can operate directly on health service use (through mechanisms elaborated primarily in economic theory) as well as indirectly through association with social and attitudinal variables.

Studies of social and economic factors affecting service use have been common in LDCs, although few of these have used multivariate techniques to isolate the effects of specific variables on utilization. King (1966) reported the now familiar decline in utilization rates with distance of residence from health services. A number of other published studies have presented tabulations of health service users in terms of distance or time travelled, income groups, education levels, indices of

health knowledge, attitudes, and practices, etc. [see for example Department of International Health (1976), Tribhuvan University (1977)]. These studies all show that locational factors such as distance and ease of access, demographic factors such as age and household structure, economic factors such as income and employment, attitudinal factors such as education level and cultural group can be significantly correlated with utilization of services. Unfortunately, the specification of these variables differs greatly between countries. Little effort has been made to remove confounding associations among variables or to assess the relative importance of one set of variables over others.

A 1976 study by Van Etten in Tanzania is an example of the type of work that has been done on these issues in LDCs. Van Etten focussed on three sets of factors expected to determine utilization of service in a rural area: access, including financial and geographic factors; morbidity factors such as type of illness, perception of illness, etc.; and "modernization" factors, primarily related to education, knowledge, and practices. He concluded that:

> Location of the health institution in relation to the patient's home appeared to be a determinant of utilization in the great majority of cases ... There were only slight differences in the types of diseases between the various health units ... the degree of severity of disease helps to account for the differences in utilization in only a small number of cases ... Utilization was different for specific age and sex categories ... Utilization is correlated with a relatively high socio-economic level and educational background (Van Etten, pp. 84-88).

Using tabulated data, Van Etten emphasized the importance of the accessibility of services, especially in terms of distance, in determining utilization.

> The suggestions based on our model, focussing on the health care delivery system, would point to the development of a highly decentralized system of health services, emphasizing simple frontline health care to be brought as near to the people as possible and run by auxiliary and other non-professional staff. A change in the delivery system itself, particularly in the structure of access to health care, will result in considerably increased utilization of health services. It is different from the modernization approach which seeks changes in the people's health behavior to be brought about by improvement in the socio-economic status or from centralizing the health care delivery (Van Etten, p. 89).

These conclusions rely in part on the data presented, but also to a large degree on the subjective valuations of the researcher on which factors are most important.

There is ample evidence from these sociological studies for expanding the range of enquiry beyond the traditional economic models of demand, especially in LDCs. Price and income factors are clearly confirmed as important determinants of utilization. Their role is complicated, however, by the association of income levels with other social, attitudinal, and need factors. Although sociological studies have taken an expansive view of the determinants of utilization in LDCs, they have not supported this with substantive theory or empirical testing of this theory in most cases. Most studies in LDCs have not addressed specific policy questions, but rather have sought to describe a broad range of health need, utilization, and service operations factors. The resulting policy prescriptions often seem ad hoc and lacking in theoretical or empirical support.

Anthropological Studies

Studies relevant to health and health care in LDCs have been part of the anthropologist's agenda since the 19th century and have taken many forms. Foster (1978) identifies four general areas of medical anthropology research: physical anthropology, ethnomedicine, studies of culture and personality, and studies specifically related to international public health concerns.

Much of the early work of anthropologists in this area was mainly descriptive and ethnographic--as Wellin (1978) has described it: "broad postulates for selecting and ordering data in response to certain questions" rather than theories "which explain in terms of a causal sequence and are testable." Areas of particular interest in planning and assessing public health services have included studies of indigenous beliefs and practices related to illness and health; the structure and functions of indigenous medicine; and the nature of pluralistic health beliefs and systems in which modern and indigenous ideas are interwoven.

More recent work by anthropologists like Fabrega (1974) and Kleinman (1980) has attempted to develop a systematic analysis of the social and cultural context in which physical dysfunction interacts with health perceptions, actions, and actors of various kinds. An essential step in this analysis is the distinction between disease and illness: with disease defined as the "malfunctioning of psychological or biological processes" and illness defined as the "psychosocial experience and meaning of perceived disease ... Sickness, as a 'natural' phenomenon is cast into a particular cultural form through the categories that are used to perceive, express, and valuate symptoms" (Kleinman, p. 72). This distinction permits researchers to separate the social, psychological, and cultural activity associated with illness from the biological determination of disease and to observe the interaction between the two.

Anthropologists like Kleinman see the main determinants of behavior related to health care in the "cultural system" surrounding disease, illness, and cure. This system, which he calls the "health care system" includes the social construction "clinical reality," defined as:

> ... the beliefs, expectations, norms, behaviors, and communicative transactions associated with sickness, health care seeking, practitioner-patient relationships, therapeutic activities, and evaluation of outcomes (Kleinman, p. 42).

Kleinman views an understanding of the health care system and the ways in which "clinical reality" can be constituted as essential to understanding the behavior of health service users. He acknowledges, however, that within the health care system individuals may give different meanings and have different responses to their situations and that these differences can be associated with social variables.

> The health care system is created by a collective view and shared pattern of usage operating on a local level, but seen and used somewhat differently by different social groups, families, and individuals. Social factors such as class, education, religious affiliation, ethnicity, occupation, and social network all influence the perception and use of health resources in the same locality and thereby influence the construction of distinctive clinical realities within the same health care system (Kleinman, p. 39).

Thus, Kleinman argues that cultural factors determine how disease and illness are perceived and that these perceptions determine care-seeking behavior. This behavior can also be associated with social variables.

To pursue this framework further, Kleinman identifies five "core clinical functions of the health care system." One of these is "the establishment of general criteria to guide the health care seeking process and to evaluate treatment approaches that exist prior to and independent of individual episodes of illness" (p. 71). It is these criteria which are most directly associated with service utilization:

> Those frameworks define which health problems are most important, most feared, and require most immediate action. In turn, therapeutic responses are similarly typed. The fit between categories of illness and types of care represents the applied structure of relevance within a sector of the local health system. The same structure is used to decide how long to continue one type of care and when to change to another (Kleinman, p. 80).

The process and categories proposed by Kleinman and other anthropologists developing these areas of research provide yet another link with analysis of equity in health service use. In Kleinman's view, health service use can be explained primarily through the cultural system surrounding disease and illness. That system defines what individuals experience and helps them identify appropriate responses. Research that helps identify and understand the workings of that system will contribute

greatly to explaining which individuals become patients and how they select treatment strategies. But Kleinman's research has also shown that "clinical reality" varies with social factors. While in Kleinman's view these social factors do not explain why people act differently, through their association with aspects of "clinical reality" they could provide some predictive power for how people will act under different circumstances. Kleinman lists determinants of care seeking behavior to include type and severity of symptoms, course of sickness, specific sickness labels and strategies they represent, evaluation of therapies, demographic characteristics, socio-economic characteristics, accessibility to treatment resources, etc. (p. 185). Anthropological research can explore not only the structure of "clinical reality" in different cultural settings, but also its association with other social factors. This is one way to link anthropological models like Kleinman's with current health policy concerns.

A recent paper by Young (1982) criticizes theorists like Kleinman for not adequately developing the link between the culturally-oriented explanatory models of individual behavior patterns and the higher socio-economic conditions which give that behavior legitimacy. In this view, while individual care-seeking behavior is determined by that person's or family's explanatory model of illness, the model itself is also partially determined by that person's position in society. Similarly, social structures determine to a large degree the options available to individuals in seeking care. This approach brings us back again to the role of socio-economic factors in determining utilization.

A Proposed Framework to Integrate Economic, Sociological, and Anthropological Models of Health Service Utilization in the Analysis of Equity

Analysis of equity includes complementary descriptive and analytical approaches. The equity performance of health services can be described by such indicators as the coverage of different income groups with equivalent services. More careful analysis is needed to verify that these indicators do reflect income differences in utilization (and not differences in need or location of residence, for example) and to determine the causes of measured inequity. Assessment of the determinants of equity implies reference to theories of how individuals and households decide to use health services.

The preceding review of economic, sociological, and anthropological approaches shows how these disciplines have each developed their own models for analyzing service utilization behavior, none of which is entirely satisfying for the analysis of equity. The economic approach is based on a general theory of consumption behavior. It gives explicit attention to income while ignoring important factors specific to health behavior. The sociological approach, as exemplified by Anderson's work, attempts to integrate almost all relevant factors and ends up with little

conceptual rigor. Anthropological studies provide a useful theoretical framework, but suggest that cultural factors may be enmeshed in other socio-economic differences and are difficult to measure. No single body of theory appears adequate to explain service utilization behavior. Furthermore, the various factors studied by the different disciplines may be correlated with income, which complicates empirical analysis of the causes of inequity.

To expand upon the information provided by coverage measures, analysis of equity is often done using multivariate regression analysis. The importance of the income variable in regression is evaluated in models predicting health service utilization behavior. The models also include a wide range of other factors that affect service use.

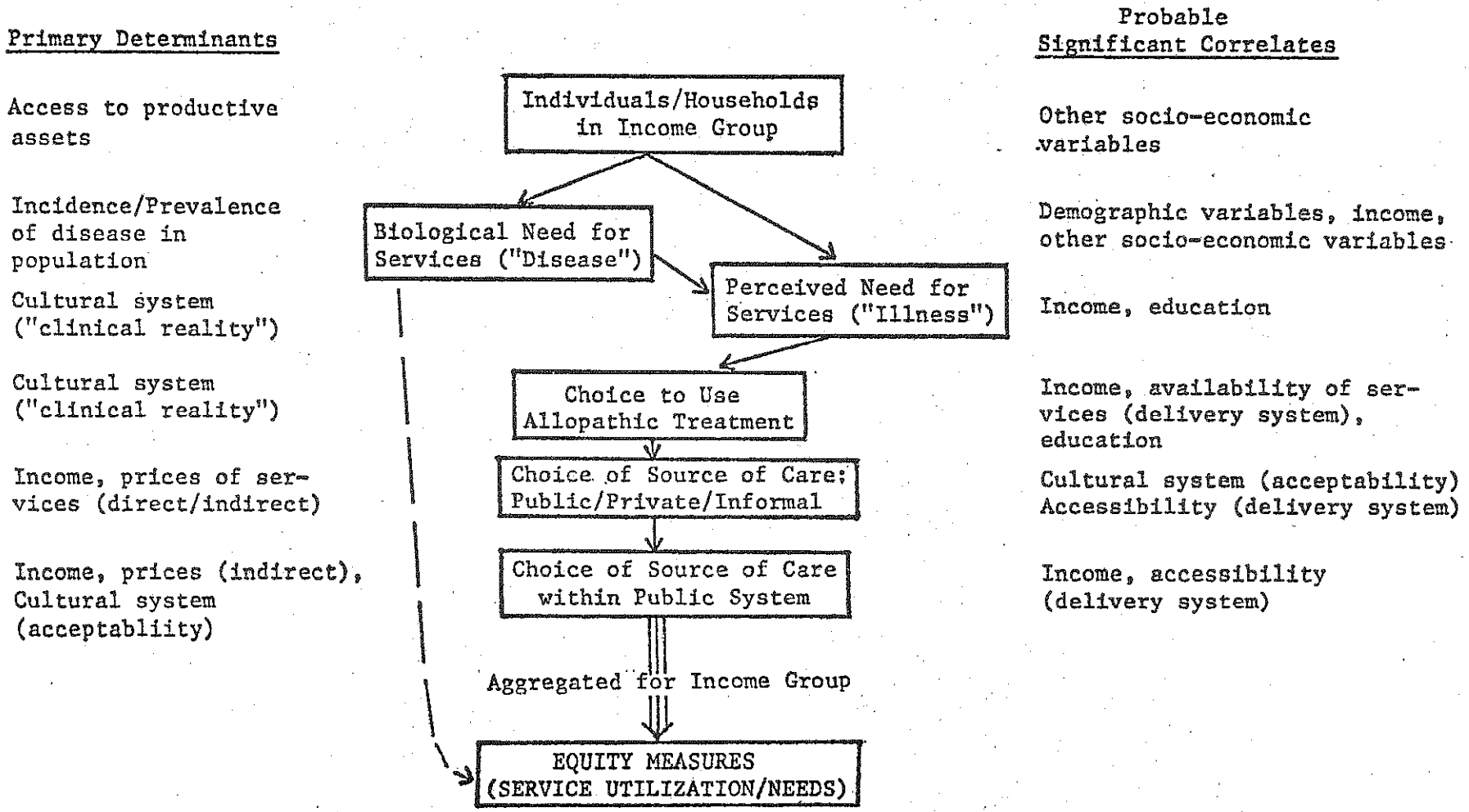
Regression analysis permits evaluation of the importance of one variable, income, while controlling for the effect of the other variables. Inferences from measured coverage differences for income groups are strengthened by showing income to be a significant determinant of service utilization controlling for other factors. This suggests that differences in these coverage measures are truly associated with income and not caused by, for example, a biased geographical distribution of income or income's association with some other factor. However, this alone should not be interpreted as strong evidence that income differences cause inequity.

Determining the causation of inequity is complicated both by the association of income with other causal factors and the cumulative effect of different stages of decision-making leading to service use by individuals and households. In other words, different factors associated with income may affect the probability of service use at various stages in the decision process. It is quite difficult to sort out these effects in single stage models using cross-sectional survey data.

Figure 2-2 presents a proposed framework for clarifying the role of economic, social, and cultural factors in determining service use. The framework integrates aspects of the theories of different disciplines by outlining stages in decision-making leading to health service utilization, including biologically-determined health needs, perceived health needs, and the choice of source of care. At each stage in the decision-making process, some factors are proposed as "primary determinants." Others are labelled "probable significant correlates," signifying that they may be confused with the primary determinants, especially when data measures only the final result of the decision process. Descriptive measures of equity are derived by aggregating the result of this process (service use by individuals) for income groups and comparing this to the group's estimated need for services. Regression models predicting service use (or demand) as a function of individual, household, and delivery system factors are based on the outcome of this decision process and may not adequately discriminate between the specific causes that operate at different stages.

As shown in the figure, the main direct effect of income in determining service use may be on the choice between modern public and

Figure 2-2. A PROPOSED FRAMEWORK LINKING STAGES IN DECISION-MAKING TO USE HEALTH SERVICES WITH KEY VARIABLES AND MEASURES OF EQUITY



private care and the choice amongst alternative sources of modern public care. At these stages, the usual economic variables, direct and indirect prices and income (or, more specifically, access to cash), play a primary role in service use decisions. Cultural factors are more important in the prior stages of identification of need and choice of appropriate treatment. These cultural factors may differ significantly by income groups.

An example may help illustrate the confusion in determining causes that results from the correlation of different factors with income and the multi-stage structure of decision-making. An early stage in the decision to use modern health services is the perception of need by individuals and the assessment of that need as appropriate to modern (allopathic) care. These decisions are primarily determined by the "cultural system" which gives rise to the "clinical reality" of the individual or household as defined by Kleinman (1980) above. However, different beliefs amongst individuals, while caused by differences in "clinical reality," may also be highly correlated with differences in income. For example, low income people may be more likely to identify certain health problems as appropriate to traditional medicine, whereas high income people would identify the same problems as appropriate for allopathic medicine. The behavioral difference (where they seek treatment) is caused by differences in belief. But it is also associated with differences in income and would appear as such in an equity analysis.

The distinction between the real cause and associated variables is significant. The response to income-caused inequity would be to reduce income-related constraints to utilization through price subsidies, improved transportation, different service hours, etc. These would have little or no effect on inequity caused by differences in the "clinical reality" of low and high income people. Belief-related differences in utilization may respond to health education.

This framework has several implications for analyzing equity. Descriptive measures of equity such as coverage rates are useful for evaluating the distributional performance of services. Such measures cannot be interpreted directly as demonstrating that income differences cause inequity. This is adequate for an initial analysis of health program performance. When the goal is improving equity, service modes that perform better in reaching the poor are more desirable than those that don't, other things being equal, regardless of the underlying causes of this performance. However, to the extent that planners want to design new health care systems or modify old ones to improve equity, it is desirable to know the causes of utilization patterns. Clarifying the causal mechanism of equity differences is a sounder basis for designing programs to reach the poor.

To date, research to analyze the causes of inequity in health service use in LDCs has not been adequate to discriminate amongst the theoretical frameworks of the different disciplines. Larger cross-sectional studies of service users have tended to downplay cultural factors and to emphasize

individual and household characteristics such as income, education, and accessibility of services. Smaller-scale anthropological studies have explored cultural factors but lack a large enough study population to gain adequate variability in other individual and household characteristics. The frameork proposed here suggests that these research strategies are studying different stages in the decision process that leads to service use. Conclusions about specific causes of service use from single stage cross-sectional studies can at best be received with a low level of confidence, since it is likely that there is significant multicollinearity amongst the different factors. Whereas multivariate analysis is useful in testing the significance of descriptive measures of equity, much additional work needs to be done to refine the analysis of the causes of measured equity. This problem should be addressed by a multi-disciplinary approach which explicitly examines the different stages in the decision-making process.

Unfortunately, it was not possible to develop an adequate empirical application of this integrated framework in the current study nor was it the goal of this research. Equity issues are just beginning to gain attention in LDC health planning. The first step is to determine whether inequity exists and to what extent it can be associated with the current delivery system structure.

The results presented below first examine equity in the use of modern public services using coverage measures for different income groups. These data determine that there is inequity in service use and that it is related to the organization of services. Multivariate analysis is then used to isolate the effect of household income on the choice of source of care amongst alternative modern public service units. The main objective is to identify an equity effect differentiating amongst units with the modern public sector and to explore the implications of this effect for policy. The review of measures and models in this chapter has shown that a significant income effect on service use can be ascribed to economic, social, and cultural factors. The analysis presented below will explore these various explanations to the extent permitted by the available data.

CHAPTER 3

MEASURES AND MODELS FOR ANALYZING THE EFFICIENCY OF RESOURCE USE IN HEALTH SERVICE DELIVERY

In 1981 the World Bank reported that the poorest nations were spending an average of $2.60 per capita on health care, approximately 1.1 percent of gross national product. This compared with figures of $19 per capita for middle income countries and $469 per capita for the industrialized nations, with some countries spending well over $1,000. A large proportion of the expenditure in LDCs (less-developed countries) was for sophisticated curative care in cities. Rural health services received a smaller proportion, although they are the main source of modern medical care for the majority of the population (Evans, et al., 1981).

Such statistics reflect major inequities in the allocation of health care resources in LDCs. Those services receiving the most financing are not benefiting most of the population. Even if resources were allocated more equitably, annual per capita expenditures of $2.60 would still be low. Reallocation of priorities in overall funding is one approach to increasing the resources available for extending primary health care. Improving the efficiency of service delivery is another. By reducing the cost of service delivery, adequate basic services can be made available to the largest number of people possible with the available resources.

This chapter reviews the concepts and measures usually used in analyzing the efficiency of health sector activities. Benefit-cost, cost-effectivensss, and averge cost measures for assessing project efficiency are reviewed. The various components of service costs are defined in the context of cost studies on LDC health services. The last section of the chapter reviews the possible sources of improved efficiency in health services and discusses the relevance of research using analysis of average costs and health service production functions.

The Efficiency of Health Programs: Objectives and Measures

Questions of efficiency are basically questions of comparing alternative ways of attaining some goal. Because resources are usually scarce, one naturally wants to attain that goal using the least amount of resources.

How one analyzes the efficiency of an activity or an investment depends, in large part, on how broadly or narrowly one defines the goal. All criteria for choosing amongst alternative activities or investments on the basis of efficiency begin by defining the goals of resource use.

Efficiency analysis is difficult when activities have several different goals simultaneously or when activities must be compared in terms of qualitatively different goals.

Three different criteria often used to assess the efficiency of activities in the health sector illustrate this problem. Benefit-cost analysis calculates the present value of the net financial return to society. By valuing benefits financially, health programs can be compared with any other type of activity or investment. The underlying goal is broad--increasing total income and, by assumption, overall social welfare 1/. Analysis of efficiency in reaching that goal requires comparison of activities that produce multiple and different benefits. These benefits must be expressed in similar units--present value in money--to be compared.

In contrast, cost-effectiveness analysis assesses the efficiency of alternative ways of attaining a more narrowly defined goal--a single type of benefit. The objective of a project, death reduction for example, does not need to be valued in any other terms. The activity which achieves this goal at the lowest cost is selected for investment. While this is appealing for its specificity, the criterion is unable to handle activities producing several different kinds of benefits simultaneously.

A third method, comparison of operating efficiency, identifies the least expensive means of producing specific project activities, without explicitly considering the objectives or benefits from those activities in the comparison. This may be appropriate when activities produce many different types of benefits and when it is unacceptable to value those beneifts in some common denominator. Analysis of operating efficiency is the most appropriate method for general PHC activities.

Benefit-Cost Analysis

The theory underlying benefit-cost analysis sees maximizing the net return to society's resources as a means of achieving the greatest total welfare. Net return is determined by calculating the net present value of the stream of current and future costs and benefits of a project. Benefits must be calculated in financial terms. The advantage is that qualitatively different benefits can be compared, since they are all considered in terms of their monetary value. The disadvantage, of course, is that some benefits are difficult or unpleasant to value in money terms. Benefit-cost analysis is one method of comparing activities with numerous and radically different outcomes. This wide applicability is purchased, as it were, by accepting the feasibility of valuing benefits and costs financially.

1/ Nath (1969) provides a trenchant critique of the social welfare assumptions supporting benefit-cost analysis and demonstrates that the link between total income gains and overall social welfare is weak at best.

Benefit-cost techniques have been most useful in the health sector in analyzing those health investments that have a very high or easily identified economic return. Griffith et al. (1971) present examples from Southeast Asia of the potential economic returns from control of malaria in regions currently not adequately cultivated because of the disease. The costs of malaria control were judged to be small compared to the future productivity of the regions.

Where benefit-cost methods do not perform as well is in evaluating the returns from individual health improvements. In seeking to value increased longevity or avoided disability, economists have tended to use estimates of future earnings as a measure of benefits. This results in assigning low values to health improvements for the elderly, the unemployed, and the poor. Thus, the potential in benefit-cost analysis for valuing benefits that differ qualitatively has not proved very satisfactory in the health sector for more than a partial assessment of efficiency. Measuring the efficiency of health programs in terms of their contribution to the total net income of society and the methodology for determining those benefits has not been appealing to health planners.

Cost-effectiveness Analysis

Analysis of cost-effectiveness developed as an alternative to benefit-cost analysis when benefits could not be valued in monetary terms. In the health sector, cost-effectiveness techniques are frequently used to assess efficiency. They have been called "the economist's contribution" to health sector analysis in developing countries (Abel-Smith, 1972).

Calculation of cost-effectiveness is described succinctly by Levin (1975). The main difference with benefit-cost analysis is that, in cost-effectiveness, the benefits are measured in their original units, not transformed into monetary returns. A ratio of costs to project outcomes provides the cost per unit of benefit or, inverted, the number of units of benefits per unit of cost. The most efficient investment alternative is the one which has the lowest cost per unit of benefit.

A significant limitation of cost-effectiveness analysis is its inability to account for more than one type of benefit at a time. Activities that produce more than one type of outcome (for example, reducing the number of deaths and preventing disability) can still only be compared in terms of a single indicator of benefits. In health care, cost-effectiveness is a powerful tool for analyzing the efficiency of different technologies for control or treatment of a specific disease, that is, where there are alternative techniques available for achieving a single type of benefit. A well-known example is Klarman's study comparing the cost-effectiveness of hemodialysis and transplantation for treatment of end-stage renal disease (Klarman, 1968).

Cost-effectiveness is not as useful in assessing the efficiency of more general disease control activities which have multiple outcomes, for

example, clinics versus mobile health units for curative care. The method might be used to determine the most efficient techniques to be used by such units, but it is unable to take account of more than one of the different kinds of benefits.

The limitations of cost-effectiveness analysis were recently illustrated in the controversial proposal for "selective primary health care" put forward by Walsh and Warren (1979). Walsh and Warren propose an interim health service strategy that would provide only those disease control techniques that are most cost-effective in reducing mortality. They argue that this would be the most efficient way to reduce the high death rates in developing countries. Unfortunately, all their examples of actual disease control programs include both death reducing and disability and discomfort reducing interventions: i.e., they are more general primary care programs. While it is appropriate to talk about the cost-effectiveness of techniques for disease control, one cannot then lump individual techniques together and call them an efficient program. Virtually every successful primary care program (all of which use some of these cost-effective techniques) combines death-reducing interventions with other activities designed to meet other needs. These other activities encourage utilization and thus the impact of the total package. Cost-effectiveness techniques cannot account for the multiple products of such complex disease control programs 2/.

Analysis of Operating Efficiency

A third alternative is to consider the efficiency of health care activities separately from the benefits they produce. This requires differentiation between service outcomes--measures of health improvements received by individuals--and service outputs--measures of the actions performed for individuals, without immediate measurement of benefits. For example, the outcomes of clinic-based curative care include deaths averted, avoidance of days of work lost, and reduced discomfort. The outputs of clinic-based care are the number of patients treated. Analysis of efficiency in the production of outputs avoids the problems of valuing outcomes or of producing several different outcomes in complex primary care activities.

The term operating efficiency (sometimes called cost-efficiency) is used here to denote analysis of the cost of producing output. This is analogous to the "technical efficiency" concept of engineering, which relates the inputs in a production process to units of output. In analysis of operating efficiency, inputs are counted in terms of their financial cost and the resulting total costs of operations are related to outputs. Comparing the operating efficiency of health program alternatives is appropriate when the activities being compared produce similar outputs and several different types of outcomes.

2/ See Berman, 1982, for a more detailed discussion of the Walsh and Warren paper and the problems of applying cost-effectiveness techniques in planning primary health care.

Another justification for separating outputs and outcomes is that outputs depend primarily on the activities themselves: the production process. Outcomes, on the other hand, depend not only on the production process, but also on the efficacy of medical technology, the quality of care 3/, and characteristics of beneficiaries such as the severity of the illness, the biological receptiveness of the patient to treatment or prevention and environmental influences on health which alter efficacy. This difference is shown graphically in Figure 3-1. In order to determine the most efficient way to organize services, it may be useful to exclude factors extraneous to the service process which affect benefits, such as the characteristics of patients.

Although use of the operating efficiency concept may make efficiency comparisons between primary care programs feasible, it is important to recall that health benefits not service outputs are the objective of programs. Comparison of alternative primary care programs in terms of operating efficiency should be accompanied by a reasonable supposition of comparable efficacy and quality of care, that is, potential outcomes. Otherwise, these aspects should be studied as well.

Operating Efficiency: Descriptive and Analytical Methods

Measures of the Costs of an Activity

The first step in determining service costs in multi-function health services is to identify a specific activity whose costs are to be calculated. This is usually selection of a specific function to be studied which has readily identifiable outputs, such as curative care or mother-and-child health care.

The total cost of an activity refers to the sum of the costs of all relevant inputs in the activity of interest. Total cost is often divided into several components. Fixed costs are the costs of those items whose quantity does not vary with the amount of output produced. For example, the prorated costs of construction of clinic buildings or purchase of permanent equipment remain stable, whether few or many patients attend the clinic. Variable costs are the costs of items whose quantity depends entirely on the amount of output produced. For example, use of drugs in a clinic should be directly related to the number of patients seen. If no patients are seen, no drugs will be used. A third category, semi-variable costs, is sometimes used. These are the costs of inputs whose quantity

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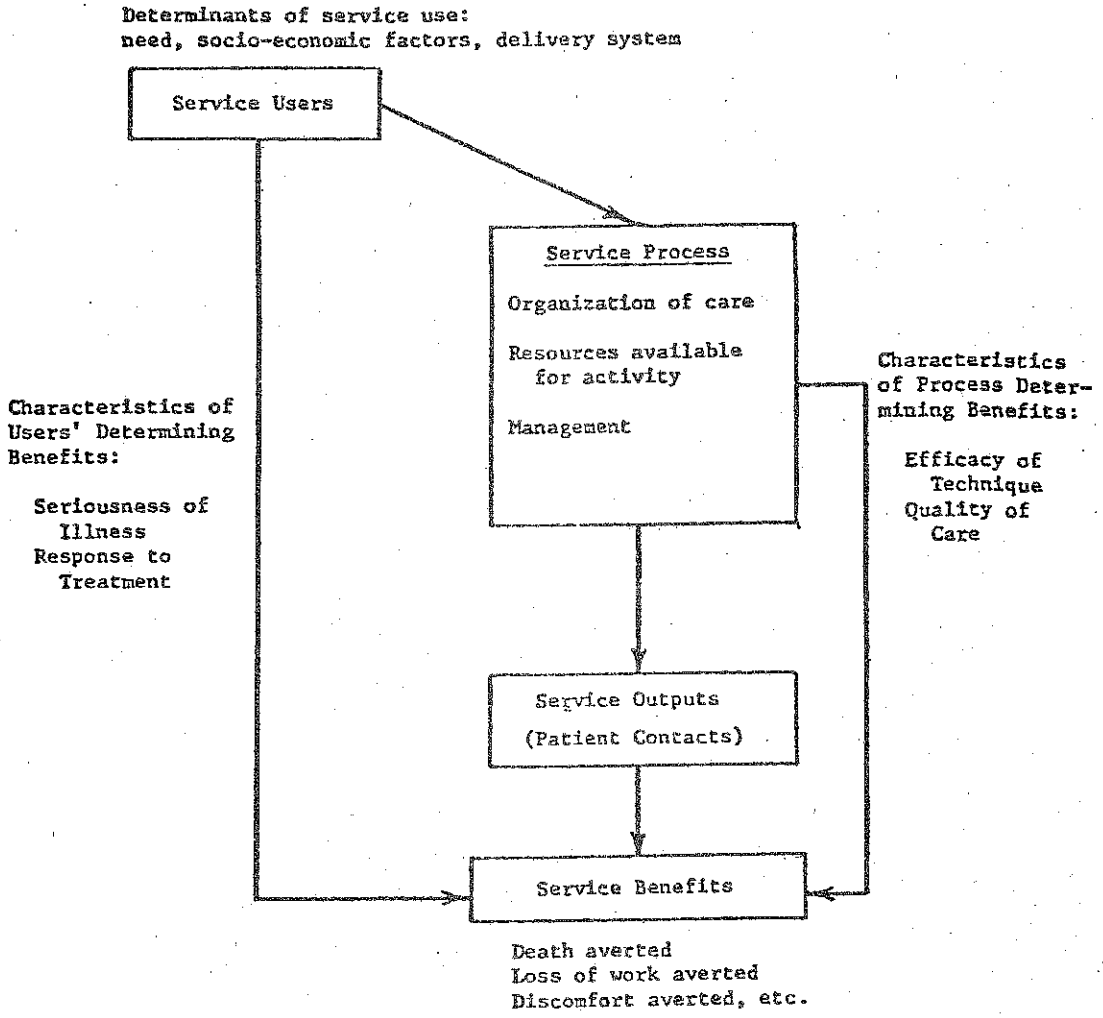
3/ The efficacy of medical technology can be defined as the biological effect of treatment under controlled conditions. Quality of care refers to the performance of treatment tasks according to the necessary technical specifications. Efficacious technology and adequate quality of care combine with the appropriate health needs to create positive treatment outcomes.

Figure 3-1. DETERMINANTS OF OUTPUTS AND OUTCOMES IN HEALTH SERVICES



depends only partially on the level of output. Semi-variable costs usually reflect inputs for which the need increases with output but which must be procured in fixed quantities. For example, clinic staff might be allocated to a specific function in response to the level of use of that activity. An increase in the average level of utilization would require more staff time, but this would not be directly related to each additional visit.

The principal indicator of operating efficiency of services is average cost. Average cost is the total cost of an activity divided by total output, or the cost per output. Another indicator often used is marginal cost, defined as the addition to total cost of an additional unit of output. In an activity with only fixed and variable costs, the marginal cost of an additional unit of output would equal the variable cost of that output.

The relationship between costs and output can be described by a total cost curve. Figure 3-2a shows a simple total cost curve determined by three elements: fixed cost, variable cost, and output. The vertical axis represents total cost and the horizontal axis total output. Line OA on the vertical axis reflects fixed cost, which occurs regardless of the level of output. The slope of line AE is equal to the variable cost per unit of output. At any level of output on the horizontal axis between O and D, the total cost of operations can be found at the corresponding point on the vertical axis. At point D the unit reaches its capacity, requiring additional fixed cost investments BC. Additional output can then be produced for the additional variable cost per output.

The total cost curve in Figure 3-2a can be translated into an average cost curve shown in Figure 3-2b. Average cost is shown on the vertical axis and output is shown on the horizontal axis. The average cost is simply total cost divided by total output. The slope of the curve depends on the size of variable costs relative to fixed costs. A low variable cost per output will result in a more steeply sloped curve, as fixed costs are amortized with increasing output. In the graph, OB represents the variable cost per output, which is approached asymptotically by the average cost curve as utilization increases. When capacity is reached at OD, new fixed cost investments result in increased average costs, although at a lower level than initially.

Figure 3-3 shows graphically the determinants of the total and average costs of health service outputs. Given the prices of inputs, total costs are shown to be primarily a function of the organization of the delivery system and management of services, which determine the total resources available and how they are combined in specific activities. Total costs also respond to the level of utilization through those inputs whose use increases with utilization of services (variable and semi-variable costs). Average costs respond much more to the level of service use, which generally corresponds to output. Service use affects average costs directly, as the denominator in the average cost calculation, and indirectly through the variable cost effect on total cost. In general, as

Figure 3-2. TOTAL AND AVERAGE COST CURVES FOR HEALTH FACILITIES

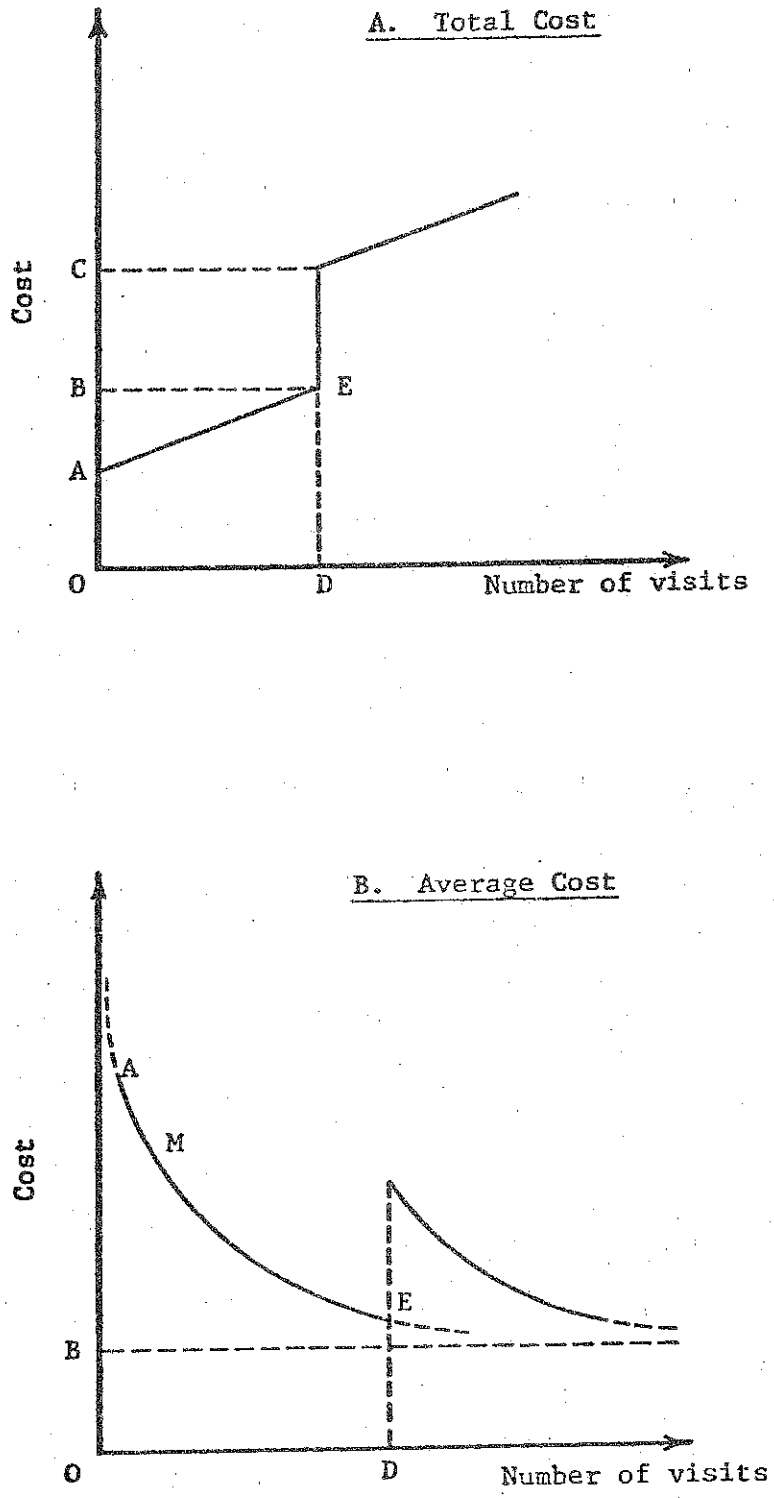
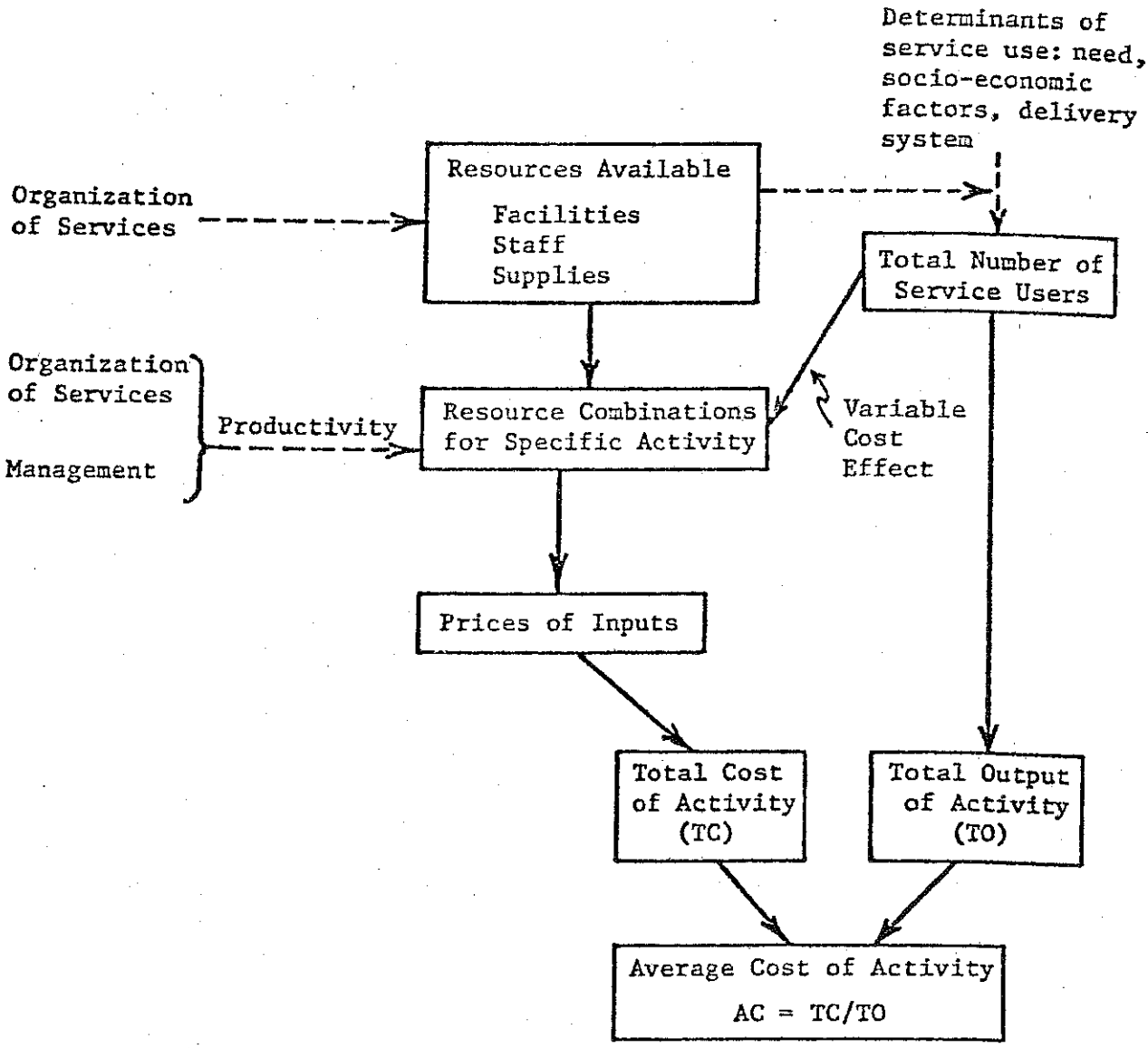


Figure 3-3. THE HEALTH SERVICE PRODUCTION PROCESS: DETERMINANTS OF THE TOTAL AND AVERAGE COSTS OF OUTPUT



average cost declines, total cost rises as a result of increased variable costs.

Thus, there are three sources of variation in average costs comparisons amongst health service units: the level of service use, the competence of service management, and structural differences in the organization of care. Comparing average costs for different types of service units does not permit much differentiation between these explanations. This is the main limitation of descriptive measures. These competing explanations of average cost differences can be isolated somewhat by aggregating measured costs over units with substantial variability in some factors (e.g., utilization and management) in order to examine differences in others (e.g., structural determinants of efficiency).

Analytical Approaches: Production and Cost Functions

Analysis of total and average costs provides one method for analyzing the efficiency of alternative health service delivery structures. If identical outputs can be produced by different types of health care units at significantly different average costs, then, other things being equal, the lower cost unit is more efficient. The "other things" refers to controlling for differences in average costs that might result from variations in utilization and management.

An alternative method for focusing on structural differences in efficiency is available from the economic theory of the firm: estimation of production and cost functions. These techniques have been used successfully in the United States and other developed countries to analyze efficiency in health service organization.

In general form, a production function specifies a physical relationship in which output is determined by the quantities of inputs to production, the characteristics of those inputs, and the methods and management used in combining them. To the extent that health care delivery can be characterized as a process of producing services (outputs) this framework can be applied. A cost function specifies the total costs of production as a function of the costs and quantity of the various inputs used.

Economic analysis has focused on the firm as the unit of production. Firms are viewed as atomized units choosing specific sets of inputs and combining them to produce output with the general goal of maximizing profit 4/. The level of output is determined by the quantity of inputs, their characteristics, management, and also by the prices of inputs and the

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4/ For a detailed discussion of the assumptions used in economic theory to derive these relationships, see Hibdon, 1969, or most other intermediate microeconomics textbooks.

market value of output, all of which combine to produce profit for the firm. In empirical analyses of production and cost data from actual firms, the observed production and cost relationships are assumed to reflect this rational calculus of profit maximization. Economic theory has derived descriptions of the points at which profit is maximized, given inputs and their prices. Thus, one can impute the characteristics of input combinations and their relative efficiency from the observed behavior of firms in acquiring and combining those inputs, supported by the assumptions of profit maximization.

These tools are useful for analyzing the efficiency of different types of production organization and the cost implications of efficiency differences. However, they assume profit maximizing behavior by the firm. This assumption is rarely appropriate in public sector health services.

Sources of Efficiency in the Organization of Services

Several sources of increased efficiency related to the structure of service organization have been carefully studied in the U.S. These organizational improvements are quite analogous to the changes expected to improve efficiency in LDC services. The two most important of these are the use of auxiliary personnel and economies of scale in service organization.

The use of auxiliary personnel increases efficiency by replacing higher cost manpower, usually physicians, with lower cost staff. Since lower cost auxiliary personnel can perform many of the routine tasks previously performed by physicians, the average manpower cost per patient served is reduced and each physician can treat a larger number of patients. In the U.S., this is often referred to as increasing the productivity of high cost, scarce physician time.

Two factors could cause economies of scale to occur in the organization of health care. Larger service units may be able to make more efficient use of fixed, indivisible inputs such as equipment and buildings. Increased efficiency might also result from specialization and division of labor in larger service units. In contrast, larger units might be neutral to scale or exhibit diseconomies of scale if division of labor does not lead to greater efficiency. Economies of scale may not exist if equipment or facilities are divisible or kept to a scale appropriate to each size of unit. Diseconomies of scale could also occur if larger units result in duplication of activities or inefficiency from poor management. Production functions and related techniques have been used to analyze these possible sources of efficiency in the delivery of medical care in the U.S., where private medical practice and often hospitals do behave as profit maximizing firms 5/.

5/ See Rafferty, 1974, Chapter 7, for a review of these issues and the results of research in the United States.

For example, the use of paramedical and other lower-level personnel in a physician's practice has been demonstrated to lower the average costs of physician visits. The lower cost personnel perform some of the routine tasks of history taking, physical examination, etc., permitting the practice to see more patients while maintaining quality and lowering average cost (Reinhardt, 1972; Reinhardt, 1973; and Smith, Miller, and Golladay, 1972).

Studies have also examined whether physicians are more productive in group practice and whether this form of organization leads to economies of scale. In general, these studies showed productivity gains for individual physicians and some economies of scale from a more efficient division of labor and provision of ancillary services in group practice (Reinhardt, 1972; Bailey, 1970; Rafferty, 1974). However, these gains were not as large as expected.

The PHC approach has led to two trends in the organization of services in rural areas of LDCs that are related to efficiency. Service delivery has been decentralized to reduce barriers to accessibility and acceptability. Decentralization of clinic-based services usually results in a delivery system with one larger health center supervising several smaller satellite sub-centers and dispensaries. Also, lower cost paramedics and village health workers are increasingly used in service delivery. Village health workers are expected to provide a large proportion of simple curative and preventive services at very low cost, leaving clinic-based services to work primarily as referral units.

While the primary justification of these innovations is improving the distribution of services, there are clearly related efficiency issues as well. What effect does the use of smaller, decentralized units have on the average cost of services? Alternatively, does the objective of improved distribution of services support or conflict with the need to reduce average cost? Does use of low-level village health workers increase the productivity of higher cost professional manpower in the system and reduce the average cost of services?

While the problems posed for LDC health policy are analogous to those studied in the U.S., it is not appropriate to study them with the same tools. In the U.S. health system, private practitioners can be viewed as profit-maximizing firms seeking to allocate their resources most efficiently. Comparison of different types of health service organization is based on the assumption that these units are efficient given their resources and input prices. Differences in overall efficiency can logically be ascribed to the type of organization.

In constrast, rural health services in LDCs are generally established and managed by the government. They are not usually free to determine their own production process, earn no profits for themselves, and generally meet none of the other assumptions of market conditions. There is a great deal of variation in the efficiency of their operations. In many cases they are underutilized. Any empirically estimated

production relationship would contain many sources of variation not related to the physical and managerial components of production and so would be hard to interpret. Another constraint in LDCs is the lack of data. Few countries have accurate data from a large enough sample of rural health units to permit estimation of production functions.

One alternative to analysis of production functions is determination of representative costs for different types of service units. To the extent that fixed, semi-variable, and variable cost components can be identified and measured, the average cost curves for different types of service units can be estimated. These will indicate how current and projected utilization will affect costs. Although units may be operating inefficiently, it is useful to know their current costs and the effect of expected changes in utilization on costs. Comparison of average cost curves for service units as they currently operate is the first step in describing any significant differences in efficiency. This is the approach taken in Chapter 8 below.

Cost Studies in LDCs

Given the limited health service resources in LDCs and the emphasis on multi-function units, it is astounding how little is known about the costs of the services they provide. Few detailed cost studies have been done. These have usually been conducted in different countries and years, making generalization of the results difficult.

An additional shortcoming of cost studies on LDC health services has been the absence of alternatives for comparison. Knowing the actual costs of services is important for planning budgetary requirements. Analysis of efficiency, however, requires comparison of the cost performance of different units. Comparing the costs of similar units can help identify inefficiencies in their operations. Comparing the costs of different types of units providing similar outputs can identify differences in efficiency associated with the organization of services.

Perhaps the most detailed study of health service costs in LDCs was published by Alexander et al. (1972), based on research done in India as part of the Johns Hopkins University study, The Functional Analysis of Health Needs and Services (Department of International Health, 1976). This was one of the first attempts to apply the time-motion study techniques of operations research to analysis of multi-function rural health centers. The study emphasized analysis of the productivity of clinic services by analyzing the allocation of space, work time, and supplies and equipment to specific functions.

The study computed the costs of services at rural health centers and sub-centers in two states in India. It demonstrated the feasibility of detailed cost studies of complex rural health units. The results showed

large variation in total costs and in the costs per patient contact for curative care and mother-and-child health care. No clear conclusion emerged about the relative efficiency of different types of health service units. Rather, the researchers focused on the potential for increasing efficiency through improved use of staff time and other resources.

The methods for "functional analysis" of health service activities and costs developed in the Department of International Health study have been applied in simplified form in more recent studies in Nepal. Tribhuvan University (1977) reported that the cost per outpatient contact at rural health posts was less than one half that for rural hospital outpatient visits (Rs. 2.50 versus Rs. 5.95 per outpatient visit), suggesting the fiscal advantage from decentralizing basic curative care. The total cost per treatment, including the time and travel cost of patients and their user fees, is of course much lower for the rural health posts than for hospitals.

Several other studies in LDCs have developed cost-accounting techniques for analyzing specific activities in multi-function units. These include Vogel et al. (1976) in Kenya and Robertson et al. (1977) in Colombia. Two previous studies in Indonesia, Budiono et al. (1979) and Gunawan et al. (1975), have calculated the costs of certain rural health services.

These studies have all used cost analysis to identify internal inefficiencies in the health units studied and have not compared different types of units to identify structural differences in efficiency. One significant study of that kind known to this author is Heller's work in Malaysia as part of World Bank study to estimate the costs of public sector services (Heller, 1975). Heller's study estimated the total and average costs of a variety of curative and preventive services at hospitals, health centers, and mobile dispensaries. In order to collect data on a larger sample of health units, the study used interviews with health workers to allocate costs amongst functions rather than the expensive and time-consuming operations research methods developed by the Johns Hopkins group.

The study reported that:

> The cost of rural services (clinic and mobile dispensary) is low compared with the cost of outpatient care in the hospital system. The staff and drug cost per outpatient visit in the health center is only one-third that in the district hospitals. Inclusion of capital cost does not narrow the differential ... The Rural Health System also exhibits high variance in the cost of a given service across institutions. This is partly explained by the fixed overhead cost in staff associated with the establishment of a center and variable utilization rates (Heller, pp. V.-VI.).

Unfortunately for the purposes of this study, Heller was more concerned with examining cost differences between hospitals and the rural clinic system rather than differences in costs between alternative units within the rural system. Of all the studies done to date, this one came closest to providing the data needed for such research.

A 1977 study by Gish and Walker compared the cost-efficiency and cost-effectiveness of air and land-based mobile clinics with fixed clinics in Botswana. This study computed the total costs of outpatient services for the different types of units and the corresponding average cost per patient contact. They reported that:

> Within certain categories of care there were large variations in cost-per-patient-contact ... This reflects the differences in time devoted to these by staff and (differences) in utilization rates between clinics ... utilization rates could be far higher without necessitating increases in staff, although there would be additional costs for drugs. If utilization rates were increased then the average cost-per-patient-contact would fall appreciably (Gish and Walker, pp. 104-105).

The Botswana project is one of the only cost studies in LDCs to compare the operating efficiency of different modes of organizing similar services. They reported almost identical average costs for outpatient services at fixed clinics and land-based mobile units. This was compared with average costs that were approximately double for mobile air services (Gish and Walker, p. 118).

Grosse et al. (1979) describe a "health development model" which would enable calculation of total and average costs for different types of rural health service units providing similar services. The model estimates utilization (service outputs), costs, and effectiveness (deaths and disability days averted) for different combinations of rural health units and programs including health centers, sub-centers, village health workers, and nutrition and water supply/sanitation programs. The published application of the model uses Indonesia as a case study. However, all the data used are hypothetical, making the paper an interesting example of how such a model could work, but not a source of useful estimates of actual costs and efficiency.

This review has suggested some conclusions about LDC cost studies. First, most of the research available has focused on the internal workings of a specific type of health service unit (usually health centers or hospitals) and has not sought to compare the efficiency of different types of units providing similar services. In other words, cost studies have not been used to evaluate policy alternatives related to the structure of rural services. Rather, they have addressed inefficiencies in management.

Second, cost data are difficult to collect. Records of expenditures in many LDCs are poorly kept and often require consultation with several

different departments and levels of government. Allocation of total costs amongst the various functions of complex rural health units is also difficult and time-consuming, whether operations research techniques or interviews are used as a basis for accounting.

Third, all studies report a great deal of variability of the measured total and average costs of individual health service units. There are several explanations for this. Rural services in LDCs have often been developed in fits and starts, leading to ad hoc location of service units and variability in resources available to units of similar type. Utilization is extremely irregular with similar units serving nearly identical populations reporting large differences in outputs. This may be related to quality of care differences, local knowledge and culture, or accessibility constraints. Finally, management skills vary considerably between units, resulting in large differences in efficiency.

Because of this variability in costs, larger studies are needed to derive representative cost estimates for different types of units. Heller's study is an example of such research. Planners and researchers should work on improving the recording of relevant expenditures and the methods for collecting cost data on rural health systems to foster research in this area.

CHAPTER 4

INDONESIA AND JAVA: RESEARCH SETTING, STUDY DESIGN, AND METHODS

To the tourist with a selective eye or restricted (and well-financed) itinerary, Indonesia and the island of Java can fulfill fantasies of paradise. Miles of empty beaches, tropical fruits and vegetation, and exotic customs fill photo albums and vacation stories. All true, but only a part of the tale.

Indonesia is the world's fifth most populous state with a population estimated at over 147 million in 1982. Its five major island groups and thousands of other, smaller islands stretch over 3,000 miles from west to east between mainland Southeast Asia and Australia. From north to south, land and water area are over 2,000 miles wide, straddling the equator.

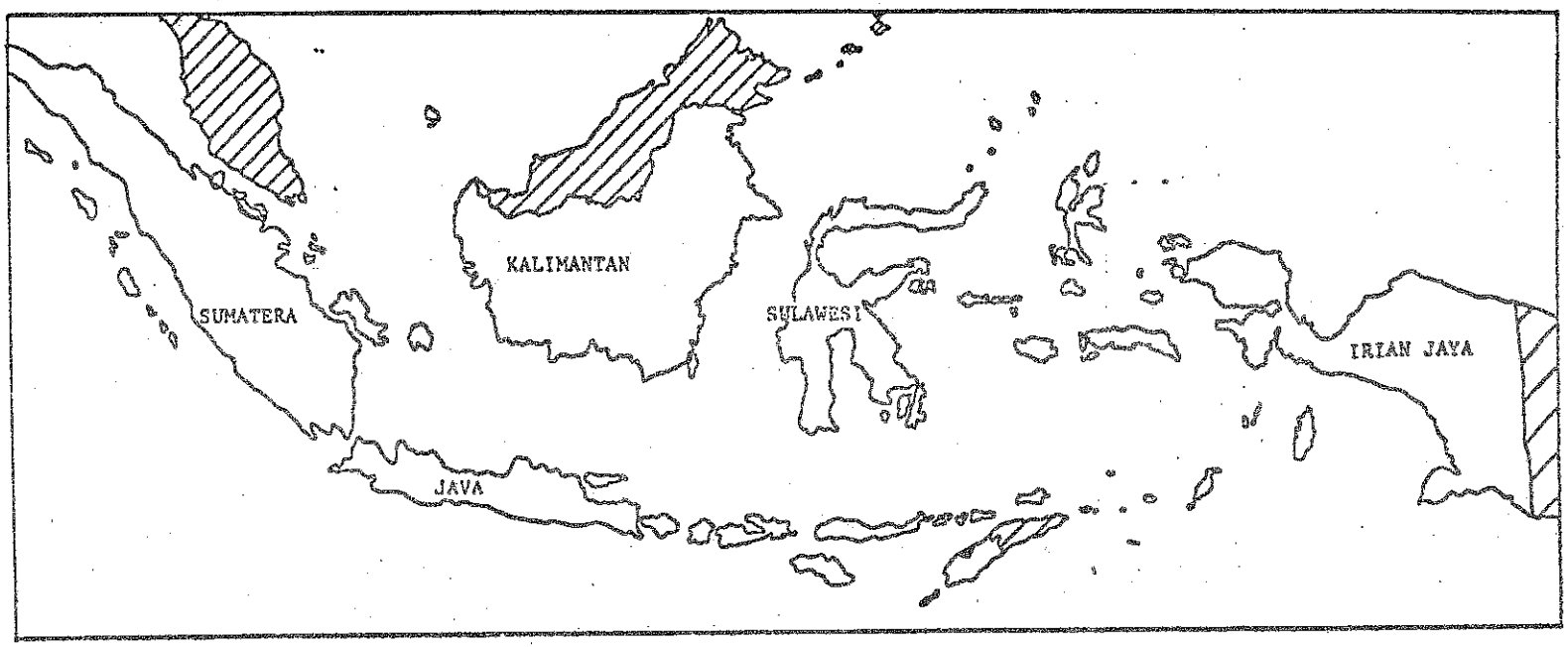
The island of Java is located along the southern edge of this archipelago (see Figure 4-1). It is shaped roughly like a rectangle, running approximately 600 miles from west to east and, on average, about 100 miles wide. The northern coast of the island is primarily a flat, densely populated, irrigated plain. Towards the middle of the island travelling north to south are mountains, mainly volcanic. In western Java, these are more densely packed to form a plateau punctuated by individual peaks. Moving eastward, individual volcanic cones rise out of the lowland plains to altitudes of 10,000 to 12,000 feet. The southern coast is irregular, with steep hills descending to the shore in some areas and smaller irrigated plains in others.

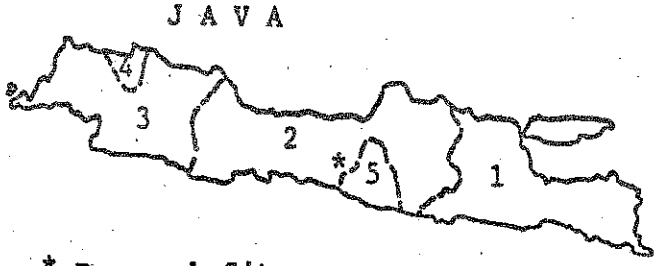
In 1982, the population of Java was over 91 million, 62 percent of the national total, although its land area is only about 50,000 square miles or about 7 percent of total land area. Java has some of the most densely populated agricultural regions in the world.

The principal crop throughout Java is rice, wherever land and water conditions permit. Intensive cultivation of rice on small, irrigated plots has been practiced for centuries and is still much in use, although high-yielding variety technologies have been widely adopted. Other staple food crops are mainly corn and cassava, grown seasonally or in areas without the land and water resources to support rice. Secondary food crops include soybeans, peanuts, and vegetables of various kinds. Sugarcane is grown extensively in the irrigated lowlands.

In the mountain areas such as the one in which this study was conducted, agricultural production is diverse. Rice is grown in irrigated terraces along the river and stream valleys. Corn and cassava are grown in areas that are not as well watered, or on the higher elevation and steeper

Figure 4-1. MAP OF INDONESIA AND JAVA





* Research Site

Provinces:
1 - East Java
2 - Central Java
3 - West Java
4 - Special Capital Territory Jakarta
5 - Special Territory Yogyakarta

slopes. Other field crops include soybeans and other legumes, tobacco, onions, peppers, and vegetables for urban markets. Mixed gardens and forest gardens are common, with fruit trees, vegetables and tubers at ground level, and coffee and trees for lumber and firewood. Where water and land are available, houses frequently have fish ponds.

Indonesia and Java have experienced rapid economic growth in recent years. In 1970, the World Bank estimated per capita GNP for Indonesia at $90, a figure comparable to other low income and densely populated countries like India and Bangladesh. By 1981, per capita GNP was estimated at $520, and Indonesia was ranked for the first time as a middle-income country by the World Bank (World Bank, 1982). Much of this gain can be attributed to windfall profits from the export of oil and natural gas products. Such additions to income accrue first to the national accounts and do not automatically reflect widespread welfare gains. However, the Government of Indonesia has used a significant proportion of these funds to promote both economic and social development in rural areas, and there have been real and widely distributed improvements in household income and welfare. A 1979 analysis of "growth patterns and social progress" in Indonesia commented that:

> ... the rapid overall growth of the economy has contributed to a considerable improvement in consumption of all income groups, including the very poor. The data further suggest that increases in per capita consumption were higher in Java than in the other islands and higher in urban areas than in rural areas. There is, however, no evidence that during the 1970-76 period overall income and wealth disparities have narrowed (World Bank, 1979, p. iv).

Investments in basic social services, including health services and education, are a significant part of government expenditures in rural areas.

Health and Health Care in Java

The general rise in income in Java has been accompanied by reductions in mortality. In the early 1970's, infant mortality was estimated to be between 130 and 144 deaths per 1,000 live births in Java (Rohde et al., 1978, p. 27). A recent study by the Ministry of Health reported an infant mortality rate of 104 from a national sample survey (Health Ecology Research Center, 1981). While experts differ over the extent and distribution of the decline in mortality, most agree that life expectancy has significantly increased during the last decade. For Java, average life expectancy at birth increased from 47.1 to 53.1 years between 1969 and 1978, about equal to the national average. However, this is still below the averages of 57 years for low income and 61 years for middle income countries globally (World Bank, 1982).

As in most poor countries, the bulk of severe illness and death can be found amongst children. Hull and Rohde (1978) estimated that 57 percent of all deaths were of children under five years of age.

The National Household Health Survey reported that monthly rates of illness incidence were about 16 percent for infants and 20 percent for children aged 1 to 4 years. In the usual pattern, incidence of illness drops to much lower rates for older children and young adults, then rises to 18 percent for adults between 45 and 55 and over 25 percent for those over 55 years of age (Health Ecology Research Center, 1981). The frequency of specific diseases reported in the national survey is presented in Table 4-1. Respiratory and gastro-intestinal infections comprise a significant proportion of the total. In addition, a national survey amongst preschoolers reported between 23 and 28 percent were below normal nutritional status on Java (World Bank, 1982). Rohde and Hull have estimated that these diseases combined with malnutrition account for two-thirds of all deaths of children under five.

Thus, while mortality has been declining in Java, the overall death rates are still high compared with countries at similar and even lower levels of income. Severe illness and death hits young children particularly hard. Most illness is caused by preventable and treatable infectious diseases. These diseases, combined with malnutrition, account for a high proportion of all deaths and especially those of children under five. Incidence of illness is also quite high for adults over 45 years of age. This group is less likely to suffer from gastro-intestinal disease, but more likely to have chronic illnesses of aging such as arthritis and rheumatism, as well as tuberculosis and other respiratory infections.

The Development of Modern Health Services

During the first 20 years after de facto Indonesian independence in 1948, the limited system of rural clinics for curative care and MCH services set up under the Dutch administration was maintained to the extent resources permitted. Almost all the routine health care in rural areas was provided by paramedics. With assistance from the newly formed United Nations agencies in the health and nutrition field as well as various bilateral donors, new programs were started to control infectious diseases such as yaws, smallpox, cholera, malaria, and plague. However, poor and deteriorating economic conditions in the late 1950's and early 1960's limited progress in extending services and required large inputs of emergency aid (Departemen Kesehatan, 1978). In general, health conditions and health services deteriorated during this period (World Bank, 1979).

Following the political upheaval in 1965-66, the first five-year plan of the new government was issued for the period 1968-73. This plan included a section on measures to improve health. Resources were still quite limited, with the health sector receiving approximately 2 percent of the national budget during that period.

TABLE 4-1. THE TEN MOST COMMON DIAGNOSES REPORTED IN THE NATIONAL HOUSEHOLD HEALTH SURVEY, INDONESIA, 1980

	Diagnosis	Total Cases	Percent
1.	Influenza (upper respiratory infection)	2,260	16.2
2.	Acute respiratory infection	1,272	9.1
3.	Bronchitis, emphysema, asthma	944	6.8
4.	Tuberculosis of the respiratory system	701	5.0
5.	Inflamed intestines and other diarrheas	686	4.9
6.	Skin and tissue infections	640	4.6
7.	Other digestive system diseases	504	3.6
8.	Hypertension	456	3.3
9.	Skin disease and lower skin tissue disease	444	3.2
10.	Disease of the muscles and connective tissues	442	3.2
11.	Other	5,596	40.1
	Total	13,945	100.0

Source: Health Ecology Research Center, 1981, p. 30.

As a result of the oil price increases of 1973 and later years, government resources expanded dramatically in Indonesia. In the 1970's, public expenditures on health activities increased substantially. The existing system of rural dispensaries and MCH clinics was reorganized. In many cases, these units were combined to form community health centers (PusKesMas) in each sub-district, sometimes with additional units located in villages. There were 1,058 health centers at the beginning of 1969 and about 5,000 in 1981. In addition, there are now some 10,400 sub-centers and health posts. Most regencies now have at least one hospital, with a total of 1,200 units and over 100,000 beds (World Bank, 1982). As of 1981, the Ministry of Health employed over 102,000 people, with at least 38,000 medical and paramedical personnel (World Bank, 1981).

Total government expenditures on health in Indonesia are difficult to document because of the large number of agencies involved. Central, provincial, and regency governments all contribute resources to health activities from a variety of routine, development, project, and foreign aid budgetary sources. The World Bank has estimated that during 1980/81 total public expenditures on health were approximately 444 billion rupiah or about U.S. $710,000,000. This averages to approximately $4.83 per capita. Private expenditures were estimated at about $8.59 per capita for an overall total of $13.42. Between 1974/75 and 1982/83 central government allocations to health experienced a real increase of 200 percent, an annual growth rate of 16 percent in real terms. Despite this increase in spending, health still receives only 4 percent of total central government expenditures compared with an average of 6 percent for developing countries as a whole (World Bank, 1982).

It has also proved quite difficult to determine the total amount of expenditures on specific activities. An analysis of spending in one province on Java in 1979 showed that three programs accounted for over 80 percent of total government spending. Medical care provided by hospitals received 37.6 percent, services through the rural health center system received 28.1 percent, and the communicable disease control program (much of which also functions through the rural health center system) received 16.6 percent of the total. In the rural health centers, approximately 21 percent of expenditures went to pay for personnel; 39 percent for drugs and materials; 29 percent for construction; and 11 percent for other expenditures. It is virtually impossible to determine from budget categories the proportion of total funds supporting the rural health system as opposed to funds supporting services in urban areas. However, it is likely that urban services still receive a majority of total expenditures, despite the special "Presidential Instruction" programs which account for over one quarter of Central Government spending on health and which have been directed almost exclusively to rural services (Ferster et al., 1980).

The Structure of Rural Health Services in Java

Government administration below the national level in Indonesia is divided into provinces, of which there are four on Java: West, Central,

and East Java, and the Special Area of Yogyakarta. Central Java province has a population of approximately 25 million and the Yogyakarta area about 2.8 million (World Bank, 1982). Provinces are composed of regencies (Kabupaten), which generally have populations of between 300,000 and 800,000 in the area studied. These consist of sub-districts (Kecamatan), with populations of between 30,000 and 60,000. The sub-district is the coordinating level for primary health care activities.

Several different modes of organization make up the rural health services of Java at the sub-district level and below. These include: sub-district community health centers (PusKesMas); smaller sub-centers (PusKesMas Pembantu); part-time health posts (Pos Kesehatan); mobile circulating health centers (PusKesMas Keliling); volunteer village-level health and nutrition "cadres" (Kader Kesehatan and Kader Gizi); and salaried village malaria workers (Juru Malaria Desa). Figure 4-2 shows how these units are organized under the supervision of the sub-district health center.

The health centers officially coordinate all public and private health services in the sub-district. They are similar in structure to those found in many LDCs (see Brockington, 1975 and Kleczkowski and Pibouleau, 1977). They are usually located in the sub-district town, near large markets. Officially, the responsibilities of the health center include fourteen "basic" tasks. These are listed in Table 4-2.

Almost all health centers in Java are managed by a physician, usually a recent medical school graduate fulfilling compulsory government service of three to five years. The staff includes nurses and assistant nurses who primarily provide illness care; midwives and assistant midwives who primarily provide mother and child health/family planning services (MCH/FP); other paramedics providing immunizations in the clinic and in the villages, hygiene and sanitation services, health education, etc.; supervisors and village workers in the malaria program; part or full time dental staff (nurse or dentist) and clerks and other helpers. All except the village malaria workers are based in the health center facility, which is usually a large building with office space, examination rooms, and storage for drugs and other supplies.

Sub-centers are smaller satellite clinics located in villages some distance from the sub-district town. They are usually along a paved road or near a sizable village market. They are staffed by between one and four paramedics, at least some of whom live at the sub-center. These units provide illness care, MCH/FP services or both. In addition, the paramedics at the sub-centers generally spend some of their time supporting other health center programs in the nearby villages, such as immunization or hygiene and sanitation activities.

Health posts are also located in villages far from the health center. These are usually one room in a village house. Most of them are open only one or two days out of five, in keeping with the five-day Javanese week. However, some posts are open every official working day (Monday through

Figure 4-2. STRUCTURE OF SUB-DISTRICT HEALTH SYSTEM IN JAVA

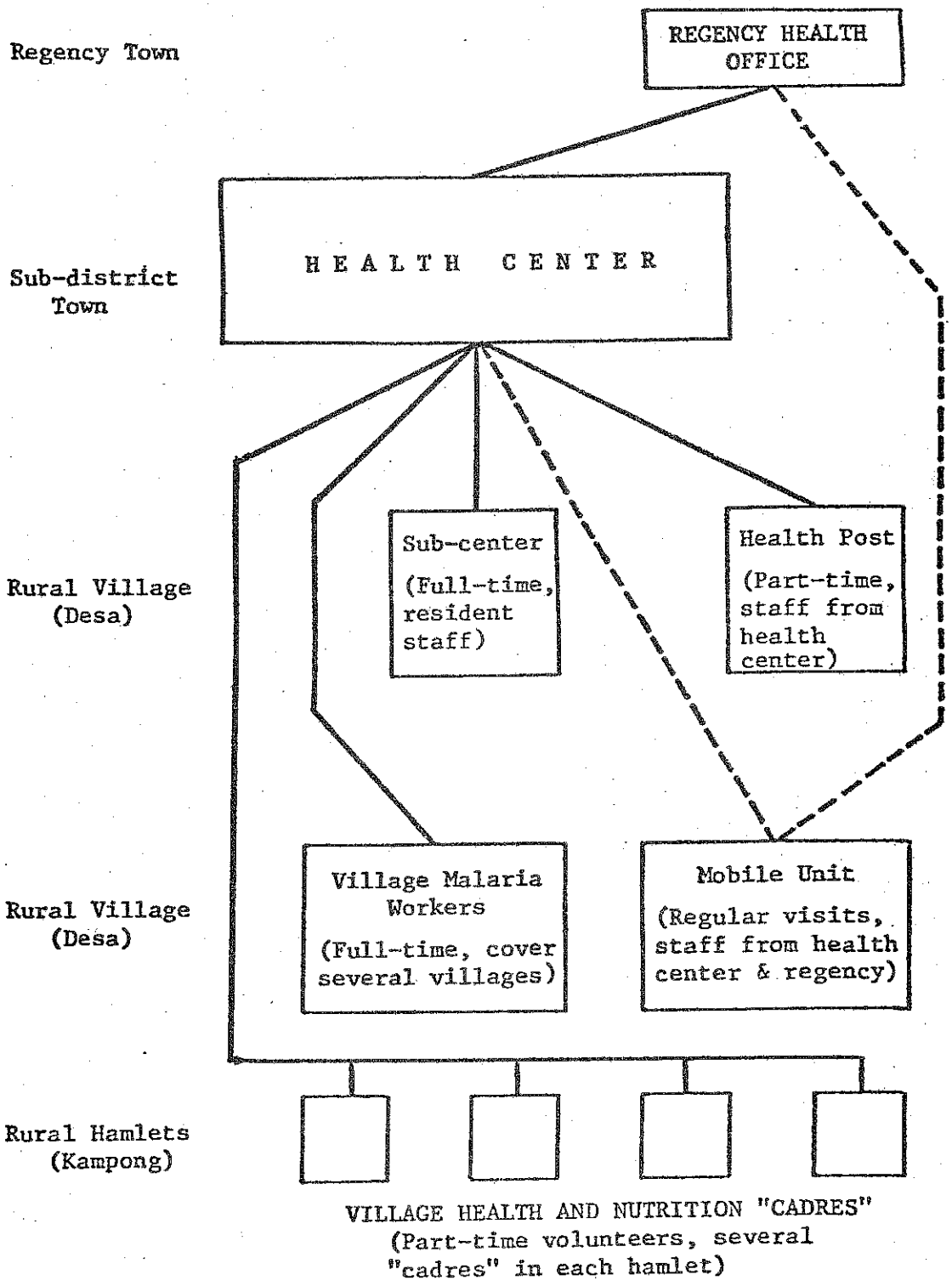


TABLE 4-2. THE BASIC PROGRAMS OF AN INDONESIAN HEALTH CENTER

1. Curative Care Services
2. Maternal-and-child Health
3. Family Planning
4. Nutrition
5. Hygiene and Sanitation
6. Communicable Disease Control
7. School Health
8. Health Education
9. Dental Care
10. Mental Health
11. Laboratory Services
12. Public Health Nursing
13. Recording, Reporting, and Evaluation
14. Civil Servants Health Insurance Services

Saturday in Indonesia). Unlike the sub-centers, the health posts are staffed by personnel who come each day from the health center. They do not live at the health post. In this study, this is the main feature distinguishing posts from sub-centers.

Mobile units have been added to the rural health system in some areas since 1976. Vehicles are stationed at the regency (Kabupaten) health office. They follow a schedule visiting different sub-districts and villages on specific days. They may travel with paramedical staff from the regency office or use only staff already working in the sub-districts they visit. The health center staff usually take advantage of the vehicle to send teams to a village to work on several different programs simultaneously. Thus, to varying degrees the mobile units augment the existing staff and supplies in a sub-district.

Mobile services are also provided as part of the national family planning program (Tim Medis Keliling - TMK). This program maintains its own staff at the sub-district level separate from the health center staff and also maintains a system of village-level posts for distributing contraceptives. Periodically, the MCH/FP staff from the health center join the family planning staff from the sub-district in mobile family planning clinics which visit individual villages for a day.

Village-level health and nutrition workers are volunteers given limited training by the health center staff. They live in their home villages and carry out specific tasks, usually as part of some larger health program.

There are over a half dozen formal government-sponsored programs using VHWs and many programs sponsored by non-governmental bodies. They generally fall into two groups. "Primary health care" programs (Pembangunan Kesehatan Masyarakat Desa - PKMD) include a broad range of health promotion activities, as well as basic treatment for common illnesses and referral to clinic care when needed. "Family nutrition improvement programs" (Usaha Perbaikan Gizi Keluarga - UPGK) are targeted specifically to children under five years of age (sometimes even only those under three), and pregnant and lactating women. Activities are mainly health and nutrition education, but may include diet supplementation and gardening. Both types of VHW program include monthly growth monitoring of children through group weighings and use of a growth chart 1/.

1/ The abbreviation "VHW" is used interchangably in the text to refer to village health and nutrition workers. To differentiate between these two types of workers, they will be explicitly called village health or village nutrition workers as needed. See Rohde and Northrup (1975) for a description of the village nutrition activities developed as part of the national nutrition program in Indonesia and Haliman and Williams (1983) and Suyadi, Sadjimin, and Rohde (1977) for a description of the village-level health workers' activities.

The malaria control program maintains a large number of salaried field workers living in villages. These are mainly retrained single task workers from earlier mass campaigns, such as those against smallpox and yaws. They go house-to-house enquiring about symptomatic malaria cases and take blood samples for analysis at the health center. Positive cases are then provided with medication and, in some areas, spraying or "fogging" to suppress vectors is also done. These malaria workers may also participate in other health center programs in their villages. Several supervisors and lab technicians support the program in each health center.

Research on Health and Health Services in Java

Despite the large increases in expenditures on health care in Java, little substantive research has been done on health, health service operations, and service users. Some recent data on mortality and morbidity from the National Household Health Survey were presented above.

The National Household Health Survey also collected information on service utilization. In a national sample, about 50 percent of all households were aware of the existence of a nearby health center or clinic of some type. Slightly more (almost 60 percent) knew of the practice of a paramedic, which may be confused with a government clinic. About 20 percent of households named health centers as their "main choice" of health care although almost 70 percent mentioned some modern medical practitioner in answer to this question. Eighteen percent of respondents mentioned self-treatment as a primary option and almost 9 percent mentioned indigenous practitioners. This study included both urban and rural households (Health Ecology Research Center, 1981).

Another recent study conducted in six rural villages near the city of Yogyakarta, Java and on the island of Lombok reported that approximately 19 percent of men and 17 percent of women used a health center, sub-center, or hospital as a source of primary care for a reported illness. However, reported use of indigenous practitioners was much higher, averaging about 20 percent in the Yogyakarta area. Similarly, approximately 46 percent of respondents preferred self-treatment as a first step in dealing with illness (Munir et al., 1982).

A study of the demand for health services in Karanganyar Regency, Central Java also found that 23 percent of illness cases consulted at a rural health center, with an additional 24 percent consulting a physician or paramedic privately or seeking treatment at a hospital. Thirty-six percent reported no treatment, 15 percent reported self-treatment, and only 3 percent reported use of indigenous practitioners (Gani, 1981). These studies suggest that approximately 20 percent of reported illness cases are seen by the public health system, and that a similar or somewhat higher percentage consult at private modern services. Survey data are probably unreliable at estimating the role of the indigenous health practitioners. The problems they treat may not be reported as illnesses and respondents may be reluctant to discuss use of indigenous care with interviewers not well-known to them.

Several recent studies examine services provided by the village-level health and nutrition cadres. Williams and Sirait (1980), Sukanto et al. (1981), Haliman and Williams (1983), and others have shown that village health and nutrition workers can significantly increase the coverage of modern curative and MCH services in rural areas. Services provided by VHWs were shown in some cases to reach more low income clients than clinic-based services, that is, they were more equitable. These studies are reviewed in more detail in Berman (1984).

Gani's study on the demand for services examined the influence of several individual and household factors on service utilization. Health needs and preferences expressed for specific types of treatments were the most important determinants in the choice of health care. The price of services was not found to be a major determinant. Income tended to be positively associated with total demand for services, physician use, and hospital use, but negatively associated with use of health centers. Distance from a source of care was a discouraging factor in utilization.

The study also compared service utilization in areas with village health cadres and those without. Gani reported:

> Areas with PKMD (village health cadre) program have a significantly higher preference for health center and areas without the PKMD program have a significantly higher preference for paramedic and traditional healer ... It seems tht the PKMD program has shifted people's preference from paramedic and traditional healer to health center (Gani, 1981, p. 170).

These studies exploring the performance of alternative types of health service organization suggest that VHW services do perform significantly differently in coverage and equity than clinic-based services. This hypothesis will be explored in greater detail in Chapter 7 below.

Indigenous Health Concepts and Practices in Java

As discussed in Chapter 2, research on utilization of primary health care in a developing country must acknowledge the importance of indigenous concepts of illness and treatment. It was not the objective of this study to investigate indigenous health concepts in Java. However, every effort was made to be aware of the role of these concepts in designing and conducting the research. Indigenous beliefs will sometimes be mentioned to explain the findings. A brief review of some of the relevant indigenous health concepts is presented here as background 2/.

2/ I am deeply indebted to Drs. Adriaan S. Rienks and Drs. Purwanta Iskandar for their insights into indigenous health practices in Java. Both colleagues shared most generously with me their comments, papers in draft, and interim research findings. I strongly recommend that readers interested in indigenous health care in Java seek out their work in its original form. Of course, I am solely responsible for any errors in the present text.

The Javanese have a rich and complex cosmology which frames their beliefs and behavior towards health and health care. This cosmology blends indigenous animist and mystical traditions with the Hindu, Islamic, and now even modern technological traditions which have successively taken root in Java. The indigenous health system is not fixed and constant. It is fluid, constantly changing relative to new conditions, and open to a variety of interpretations in different regions, for different social classes, and as a result of the creative efforts of powerful individuals. Nonetheless, much of this variability occurs within the parameters of commonly held beliefs.

To the Javanese, the condition of slamet is something to be attained and maintained if possible. Slamet has been defined as "the feeling of inner peace, social harmony, and economic prosperity" and contrasted to feelings of "nglamun, bingung, and ruwat (conditions of aimlessness, uncertainty, and unrest). In life, slamet (well-being) matters first, sehat (health) second, and sakit (illness) third" (Rienks and Iskandar, 1981, p. 76). These conditions are not unrelated, however. Aspects of one's existence, one's behavior, or the behavior of others can prevent one from attaining slamet and cause one to experience illness. Different perceptions about the cause of illness and its nature may lead to very different strategies of treatment.

There are many possible explanations in Javanese culture for why bad things (including illness) can happen to people. Illness might be caused by errors committed by parents when the child is not yet born; eating improper foods, or, in the case of infants, the mother eating improper foods, failure to follow appropriate behavior concerning rituals; failure to protect adequately against the negative effects of spirit forces; evil intentions of another person; aspiring to power or position that is not appropriate to one's fate; germs or infection; etc. This list of examples illustrates the variety of causes considered in Javanese folk diagnosis of illness. The sources may lie in the tangible world--alam nyata--or in other states of being believed to exist in Javanese cosmology: alam kandungan (the womb); alam kubur (the world beyond the grave); alam kelanggengan (the origin and destination, home of good spirits); and alam antara (the world in between where evil spirits reside) 3/.

The perception that illness has occurred and the perceived explanation for the illness are important determinants of what is done about it. (See Chapter 2 for a review of Kleinman's concept of "clinical reality.") Rienks and Iskandar have noted that, in the popular culture, villagers distinguish between two broad categories of illness: lara nemen or serious illness and lara mriang or simple illness.

3/ See Rienks and Iskandar (1981), Suparlan (1978), and Weiss (1977) for a more detailed and doubtless more accurate discussion of Javanese cosmology.

> The degree of seriousness is not measured in modern medical terms, but is related to the questions [sic] whether an explanation must be given with reference to cosmological notions or not. To give an example, someone who falls from a tree because the trunk was wet and slippery may suffer a major injury, but the case is still considered "simple" since stupidity and neglect and not improper social and religious behavior are involved (Rienks and Iskandar, 1981, p. 77).

The classification of a set of events (for example, symptoms) as illness and the perception of their cause determine how "serious" (in the sense above) the illness is perceived to be. This in turn affects the choice of therapy.

> Central to the distinction (between "serious" and "simple" illness) is the villagers' belief that only indigenous healers are competent in the case of "serious illness" while "simple illness" may be cured by self-therapy or selected aspects of the (health center) treatment (specific drugs, injections, operations) (Rienks and Iskandar, p. 77).

It is important to understand in this process that "serious" and "simple" illnesses can sometimes exhibit symptoms that would be classified as identical in modern medical terms, but are perceived as different in Javanese terms. It is not only the occurrence of some condition but also the social and cultural construction of that occurrence that determines behavior.

Research to explore the linkage between physical symptoms and illness perceptions, indigenous terminology, and treatment behavior is currently underway near Yogyakarta in Java. Some additional observations are availabe from the work of Rienks and Iskandar. They have noted that specific Javanese illness categories can sometimes be associated with stages in the life-cycle of individuals. For example, they describe in some detail the indigenous illness category sawan which is predominantly related to illnesses of children. Whether specific childhood symptoms are perceived as sawan, a "serious" illness, or as, say, diarrhea, a "simple" illness, will determine whether treatment is sought with an indigenous practitioner or at a clinic. The interpretation of events may occur in the early stages of illness (when it would affect treatment actions for the current illness) or may occur later following the success or failure of certain treatments (when it would discount or reinforce beliefs and affect future treatment strategies).

There are many types of sawan recognized in rural Java (see Rienks and Iskandar for a detailed listing and description). One type mentioned by respondents during this author's study was sawan mayat, "sawan like a corpse." This is characterized by pallor and weakness and was said to often affect pregnant women. The medical diagnosis for this illness might be anemia, which is very prevalent amongst Javanese women.

> Sawan mayat was said to be quite common. The method of treatment was to buy bunga sawan (a flower for treating sawan) in the market, bring them to Pak Bahruddin, who is the kyai (religious leader) in the village and request assistance ("minta tolong"). Pak Bahruddin assists by praying and conjuring an image in his mind of a corpse. The flowers are then returned, soaked in water, which is then drunk by the patient and some of water used for bathing. Cure results. Pak Carik (village official) explained "If you went to the clinic doctor, you couldn't be cured. Fever, sneezing, skin rashes, malaria, those you go to the clinic and ask for help ... Sawan cannot be cured by injection. (Field notes)

In another case, the local official told of his nephew with a different type of sawan. They first called the local paramedic to treat him. However, the paramedic refused, saying the nephew was "not sick." The implication here was that he was "sawan," which cannot be referred to as "sick." He was then taken to an indigenous practitioner and cured. Interestingly, the respondent felt that even a modern health care practitioner would apply the same interpretation to events as the "traditional" villagers.

Sawan is one of many indigenous illness categories. In broad terms it is perceived as being caused in children by "insufficient guidance by the family during the transition of the infant from the alam kandungan (womb) to the alam nyata (tangible reality)." Other illness categories mentioned by Rienks and Iskandar include kebendu, referring to physical deformities at birth caused by improper behavior on the part of the parents; kewalat, illness caused by giving offense to one's parents; kesiku, illness in adults caused by some type of ritual or social misbehavior; kesambet, illnesses caused by evil spirits.

> Folk diagnosis ... proceeds in an atmosphere of mutual consultation. Healer, relatives of the patient and/or patient discuss with each other the situation until agreement is reached. Besides the categories of lara nemen, or illnesses involving cosmological notions ... there exists an extensive knowledge of lara mriang or simple illnesses. The majority of these illnesses have only one defining symptom ... an indigenous healer and/or health center are only consulted in exceptional cases if home treatment has failed (Rienks and Iskandar, 1981, pp. 79-80).

These findings have important implications for the acceptability of modern health services to villagers. While there is a large component of illness that is perceived as appropriately treated by modern services, there remains a sizable gap between the perceptions of needs held by medical professionals and those held by villagers. A significant proportion of disease in the population will not be recognized as health

needs appropriate to modern care, although much of this disease may be treated through indigenous mechanisms. In terms of research methods, surveys will be biased in reporting of incidence, since much disease will not be defined in the terms being asked about. At pesent, we do not know how significant this bias is and how it relates to the socio-economic variables of interest in this study.

Just as perceptions of illness determine treatment behavior, so do perceptions of the qualities and powers of alternative sources of therapy. Most of the medical anthropological research in Indonesia has focused on the activities of the best known category of indigenous healers, called dukun in Java.

Suparlan (1978) has described the dukun as a mediator between the client who is sick (for example) and the sources of his sickness and means of relieving it.

> ... the client only has cultural knowledge consisting of belief and knowledge but not the ability of selecting and exercising certain categories of power for certain ends responding to a certain sickness ... (Suparlan, p. 213).

However, Geertz stressed the dukun's role as a parent-like advisor:

> Something of the quality of the relationship between the dukun and his client can be seen from the fact that the major alternative term of dukun is tiyang sepuh, which means ... "parent;" that the client is usually said to "beg pardon" ... from the dukun; and that the former is often held to be seeking "advice" and "good counsel" from the latter, "as one does from one's own parents" (Geertz, 1960, p. 96).

Rienks and Iskandar have argued that dukun are only one type of indigenous healer found in rural Java, and that there are many sources of treatment in the villages ranging from informal advisors to widely known and respected practitioners who are visited by patients from distant regions. They suggest that villagers can select their advisors (healers) based on their own perceptions of the qualities of those advisors, such as their wisdom, spiritual power, knowledge, etc. The system is flexible and democratic, with different healers perceived differently by each individual. The options might include informal advisors who receive no compensation, practitioners skilled in one particular type of therapy but not necessarily seen as competent for general advice, more respected individuals of greater wisdom and power who are compensated, and finally renowned workers of spiritual and healing powers.

Indigenous concepts of skill and power in healing (wisdom, spiritual ability, etc.) and western concepts (education, training, standard qualifications, etc.) may be quite different. This is relevant in the development of VHW programs, where the VHW is expected to bridge the

distance between indigenous health concepts and modern ones. Rienks and Iskandar have noted that the current selection procedures for VHWs emphasize literacy, youth, and activity in semi-official village organizations. None of these may lead to VHWs being respected as health workers in the indigenous framework. The same problem may also be faced by other professional health workers. While there are no easy solutions, ignoring this problem will simply result in increasing fragmentation between indigenous and modern treatment behavior.

A Case Study of Equity and Costs in the Organization of Primary Health Care in Java: Objectives, Study Design, and Methods

The general and specific objectives of this study are presented in Chapter 1. Briefly, the study compares three different modes of primary health care organization--health centers, sub-centers and health posts, and village-level health and nutrition workers--in terms of their performance in reaching low income clients and the costs to the public sector of the services they provide. One goal is to determine whether certain modes of health service organization are more likely to serve the needs of the lowest income group. This refers to the equity performance of services. A second goal is to assess the implications of different modes of service organization for the costs of providing services. This refers to the efficiency of services. These two goals are related to the extent that reducing the cost of basic services supports or conflicts with the objective of reaching the under-served low income group.

The research consists of two distinct studies. A "secondary data study" gathered information on the structure of rural health services in Central Java. The goal of this study was to provide a context for the detailed work on equity and efficiency in a smaller area. These data describe the presence and importance of different modes of organization in sub-district health service delivery systems.

The main research activity was a detailed study in two sub-districts in rural Central Java--Glagah and Beran in the regency of Gunungan 4/. Data on the equity and efficiency of the three modes of health service organization were collected in these areas. This study is referred to as the "intensive study."

The Secondary Data Study

Studying the income levels of health service users and the operating costs of specific service units in Java requires primary data

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4/ These are pseudonyms for administrative areas in Central Java.

collection--the information is not available from any secondary source. Because of limited resources only a relatively small area--two rural sub-districts--could be studied in detail, using primary data. The secondary data study provides a context for the data collected in Çlagah and Beran by describing the different combinations of primary health care units found in rural Central Java and the contribution made by each type of unit to total health service operations.

Data on the number and type of health service units in each sub-district, staffing, and total number of patient contacts are gathered at the province level in periodic reports from the sub-districts. Reported utilization data does not permit differentiation between units within the sub-districts, for example, between visits to health centers and sub-centers. Such data can be collected directly from the health services in each sub-district, however. More accurate information on current health service activities would be available at that level, along with data on the tasks of personnel in each area and other economic and environmental data from the sub-district offices.

A random sample of sub-districts in the whole province of Central Java would have required data collection in distant areas. The travel costs and time required for such an effort were too great, with no guarantee that an extensive sample would be representative. As an alternative, three regencies were selected near the city of Yogyakarta, where the author was based. The three regencies were chosen for their topography. One was a lowland coastal plain, quite densely populated, mainly a rice and sugar growing area. Transportation was well-developed. Topography in the second area was variable, with a densely populated lowland plain in the south, changing gradually into hills and low mountains in the north. In the northern area, agriculture gradually shifted to mixed cultivation of irrigated rice and dry field crops like corn and cassava. Transportation in the hilly area was not as good as in the lowlands. The third regency was a mountainous area with quite rugged terrain. It contained several volcanic peaks over 10,000 feet high and descended steeply into deep ravines and river valleys. For most of the villagers in this area, walking was the main form of transportation, although there are high quality roads linking the towns. Within these three regencies, 26 sub-districts were sampled randomly to provide a balance between lowland, hills, and mountain areas. Table 4-3 shows the distribution by topography of these sub-districts.

Each sub-district had a unique combination of primary health care units. In total, data was collected on 26 health centers, 15 sub-centers, 54 health posts, and 16 mobile health service units. A total of 685 full-time staff worked in these areas. The sub-districts' average population was about 36,100 and the average area of each was about 48 square kilometers.

The data were collected by a team of recently graduated public health nurses who were awaiting their posting to rural health centers in Java. Working in pairs, they visited each sub-district from one to three days,

TABLE 4-3. TOPOGRAPHICAL CLASSIFICATION OF SUB-DISTRICTS STUDIED IN THE SECONDARY DATA STUDY

Topography	Number of Sub-Districts
Low elevation, irrigated coastal plain	7
Coastal plain mixed with hilly region	8
Hilly region mixed with low elevation mountains	4
Mountainous region	7
Total	26

collecting data from health center and sub-district administration records and interviewing selected health personnel in each sub-district. The data included figures for 1982 on utilization of illness care and MCH/FP services for each type of unit, level of VHW activities, use of drugs and supplies, and salaries and tasks of all health personnel. The size of health service facilities was estimated as well. From the sub-district offices, information was collected on total area, area under cultivation by type of land, topography and altitude, road infrastructure, agricultural production, and population.

The Intensive Study in Glagah and Beran

The Study Sites

Several criteria were used in the selection of sites for the intensive study. Two sub-districts provide a sizable population (about 100,000) and several health service units of each type. It was desirable that the areas be contiguous and similar in terms of physical and environmental factors related to health service use such as topography, weather, agricultural patterns, etc. The availability of health service resources should be similar in the two areas.

An additional condition in site selection was for one of the sub-districts to have an active VHW program working in at least half of its villages. Most sub-districts on Java had some VHWs in a few villages, but these were usually part of pilot efforts receiving a great deal of attention. In a sub-district-wide VHW system, VHWs and their clients could be sampled randomly over a large area. The objective was to collect data on the utilization, operations, and costs of VHW activities when they were a routine part of the whole sub-district delivery system, not a small experiment. After an extensive search of regencies in the Yogyakarta-Central Java area, Glagah and Beran were selected.

Glagah and Beran are located in a mountainous area of Central Java province, about 1 1/2 hours drive from the nearest large city. As shown by the map in Figure 4-3, they are contiguous areas. The upper right-hand corner of the map corresponds to the peak of an 11,000 foot volcano. The two sub-districts run parallel down its slopes to a low point of around 1,500 feet. At the higher elevations the land is steeply sloped and cut by deep ravines channeling the run-off from the mountain. At the lower elevations, the slopes of the volcano meet another complex of hills and escarpments, creating quite rugged terrain.

Table 4-4 presents statistics on the two areas. Both districts have populations of approximately 50,000 and a similar number of villages (the sub-divisions shown in Figure 4-3). Population density is also similar. The main road in both areas is a national route linking the sub-districts with their own regency town and towns in neighboring regencies. Smaller paved roads are shown on the map. While Beran had more paved roads, new

Figure 4-3. GLAGAH AND BERAN SUB-DISTRICTS, JAVA, INDONESIA

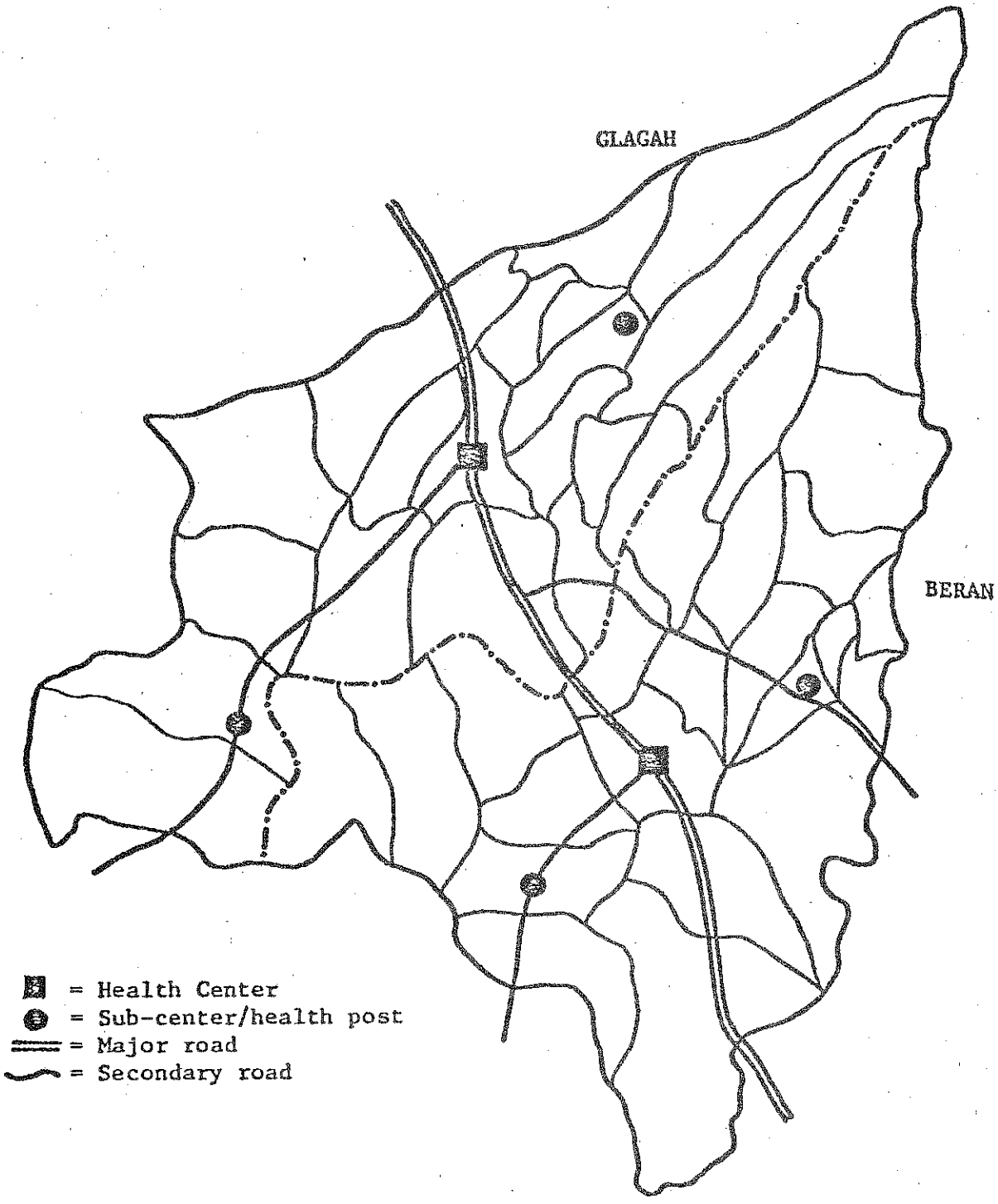

TABLE 4-4. BASIC STATISTICS--GLAGAH AND BERAN, 1981

	Glagah	Beran
Total population	50,100	53,465
Land area (km.^{2})	98.86	100.12
Population density (per km.^{2})	503	534
Number of villages	20	23
Km. of paved roads	11.5*	28
Area of cultivated lands	7,694 ha.	8,083 ha.
Number of health centers	1	1
Number of sub-centers/health posts	2	2
Total health personnel	24	26
Villages with VHWs	20	3
Total VHWs	over 800	about 30

*During the study period an additional 10 km. of road were paved.

Source: Sub-district records

road construction was underway in Glagah at the time of the study. Public transportation was available on the main road every day during daylight hours. On the secondary roads, public transport was only available on market days or for very limited periods on other days. Motorcycles were available for hire at major intersections at any time, although they were quite expensive. The number and type of health service units and total staff were quite similar. However, Glagah had a sub-district-wide VHW program covering all villages, whereas Beran had a few VHWs working in only 3 out of 23 villages.

Table 4-5 shows the breakdown of both areas' population by age and sex. Children under five made up approximately 13 percent of the total population. The distribution of other age and sex groups was quite similar between the two districts.

Because of the mountainous terrain, land use and land tenure patterns in the two areas were quite different from those reported in lowland Java. Table 4-6 shows the area under cultivation in each district and the proportion of total area in irrigated and unirrigated rice paddies and in dry fields given over to other crops. In Glagah, about 75 percent of total cultivated area was used for dry field crops. In Beran the figure is about 55 percent.

Land use classified as dry fields in these areas includes several types of cultivation systems. In most of Java, dry fields are known as tegal, and are usually planted with annual crops in monoculture or polyculture. These fields must be fertilized or left fallow for a period during the year, depending on weather and water availability. They are mainly used for growing staple foods like corn and cassava. In Glagah and Beran, tegal fields are also used for growing commercial crops such as cabbage, onions, peppers, and garlic. A recent study on mountain ecology near this area noted that "commercial cropping (on tegal fields) is especially important in those areas where the cultivation of staple crops is relatively less yielding because of a high altitude and consequently colder climate" (Hunink and Stoffers, 1982, p. 4).

In addition to field crops, mixed and forest gardens were often classified as tegal. These gardens are different from the house gardens which have been described in Java (Stoler, 1977), in that they are not located near the houses but usually at some distance from them. Mixed gardens include "an interculture of annuals, biennials, and perennials among which the annuals occupy an important place;" forest gardens include "an interculture of biennials and perennials, with very little or no annuals" (Hunink and Stoffer, p. 4). In Glagah and Beran, these types of cultivation systems were quite common, and included various fruit trees, coffee, cloves, tuber crops, legumes, other vegetables, and cultivation of trees for firewood and lumber. Some gardens also had large fish ponds. The simple classification of land as dry fields disguises complex production systems throughout the study site.

TABLE 4-5. POPULATION BY AGE AND SEX, GLAGAH AND BERAN, 1982

Age Group	Sex	GLAGAH		BERAN	
		Number	Percent	Number	Percent
0-4	M	3,395	6.8	3,430	6.4
	F	3,358	6.7	3,545	6.6
5-14	M	6,712	13.4	6,763	12.7
	F	6,813	13.6	6,786	12.7
15-24	M	4,623	9.2	5,116	9.6
	F	4,861	9.7	5,365	10.0
25-44	M	5,745	11.5	6,976	13.1
	F	5,782	11.5	7,015	13.1
45+	M	4,497	9.0	4,275	8.0
	F	4,334	8.7	4,194	7.8
TOTAL	M	24,974	49.8	26,560	49.7
	F	25,126	50.2	26,905	50.3
GRAND TOTAL		50,100	100.0	53,465	100.0

Source: Sub-district Statistical Offices

TABLE 4-6. GLAGAH AND BERAN: AREA CULTIVATED AND TYPE OF LAND

Type of Land	GLAGAH		BERAN	
	Ha.	Percent	Ha.	Percent
Irrigated rice land	1,866	24.3	1,538	19.0
Non-irrigated rice land	-	-	867	10.7
Dry fields	5,739	74.6	4,422	54.7
Other	89	1.2	1,256	15.5
Total area cultivated	7,694	100.0	8,083	99.9

Source: Sub-district Statistical Offices

Land tenure was more equitable than is usually reported from lowland Java, although most holdings were still so small that this may not reflect higher income or welfare. In lowland villages it is not uncommon to find high levels of landlessness. In a 1978 study, Hart reported 49 percent of households in a rice-growing village in northern Central Java owned no rice land (Hart, 1978). In Glagah and Beran, most households owned some agricultural land. Table 4-7 shows the distribution of various land tenure patterns for the two areas as enumerated in the 1980 census. Only about 5 percent of households were solely working land owned by others, whereas approximately 80 percent worked only land they themselves owned. Table 4-8 shows the distribution of landholdings by size. Despite the low levels of absolute landlessness, most households cultivate very small plots of land. Much of these holdings are in dry fields, which cannot be cultivated as intensively as irrigated rice fields.

Despite the similarities mentioned above, there are some important differences between the two sub-districts. Prior to the administrative reorganization of the 1950s in Java, Glagah and Beran were part of the same administrative unit, a kewedanaan. This unit contained the current sub-districts of Glagah and Beran and a third neighboring area. The town of Glagah was the administrative center of this unit. Glagah town is still much larger than its neighboring sub-district towns. The main market in Glagah functions as a larger regional market. Although markets in both Glagah and Beran are open two days in every five day market cycle (according to the Javanese calendar), the one in Beran is considerably smaller and less well-attended. The Glagah health center is located next to the busier market.

Health services have also developed differently in the two areas. As a previous administrative center, Glagah's clinic was upgraded to a health center around 1970. A full-time physician has been stationed there since that time. Beran only received its first physician in 1978 when its dispensary and MCH center were upgraded to health center status.

Currently, both sub-districts have similar levels of staff and facilities. Both are supervised by the same regency health office and are expected to refer cases to the same regency hospital. However, Glagah has been the site of several innovative rural health care projects. This is the source of the major difference in health services between the two areas, Glagah's VHW programs.

At the time of the study, every hamlet 5/ in every village in Glagah had some type of VHW. These workers had been trained as part of two

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5/ A hamlet (kebaon or dukuh) is a sub-village administrative unit. Hamlets are usually the traditional villages, which were combined to form today's administrative villages (desa). Community ties exist primarily amongst inhabitants of hamlets, who feel little affiliation with other hamlets in the administrative villages. VHW activities are usually organized by hamlets, with the VHWs in each hamlet forming a working team.

TABLE 4-7. LAND TENURE, GLAGAH AND BERAN, 1981

	Percent of All Households	
	Glagah	Beran
Farmers cultivating own land only	83	76
Farmers cultivating only land owned by others	4	6
Farmers cultivating both own land and land from others	13	18
Total households	8,896 (100%)	10,480 (100%)

Source: 1980 Census, Glagah and Beran

TABLE 4-8. LAND AREA CULTIVATED BY HOUSEHOLDS, GLAGAH AND BERAN

Area Cultivated	Percent of All Households	
	Glagah	Beran
< .25 ha.	40	38
.25 - .50 ha.	29	33
> .50 ha.	31	29
Total	8,896 (100%)	10,480 (100%)

Source: 1980 Census, Glagah and Beran

different projects. The village nutrition worker project, with workers in every hamlet, was developed as an experiment in innovative village-level nutrition education methods. It had been running for three years at the time of the study. The workers trained by this program performed most of the same tasks as workers in the national UPGK program described earlier, of which this activity was formally a part. However, much more attention was given to development and extension of appropriate nutrition education messages and materials than in the national program. There were between five and ten village nutrition workers in each hamlet, totalling over 800 in the sub-district as a whole and averaging one for every twelve households.

This was not a typical village nutrition program, as it was funded by a major international donor. Ample funds were available for developing educational materials, training, and supervision of VHW activities. It should be regarded as an example of how village nutrition workers might function under conditions of adequate funding, preparation, and supervision--not the routine conditions found in other sub-districts.

A second VHW program was sponsored by the provincial government along the lines of the PKMD program mentioned earlier. In five of Glagah's 20 villages, one village nutrition worker in each hamlet was given additional training to provide simple curative care for common illnesses and to organize environmental hygiene and sanitation activities in the hamlet. Prepackaged drugs were provided by the health center and sold at cost to villagers consulting the VHW. This program had been running for one year at the time of the study.

In contrast, only 3 of 23 villages in Beran had any VHW activities. Two of these had village nutrition workers trained as part of the national family planning program's effort to include nutrition activities. Their tasks were also similar to the national UPGK program. In one village that was particularly remote from the clinic-based services, the health center staff had trained both village health and village nutrition workers to provide curative and preventive services. There were no more than 30 village workers in Beran at the time of the study.

Data Collected and Methods

Data were collected at both the clinic level and the household level. At the clinics, this included a survey of patients using illness care and MCH/FP services, interviews with all health workers, a time-allocation study of health workers, collection of data on service costs, and recording of a variety of information on service utilization and use of materials and drugs. The household data included a survey of a sample of all households in each sub-district, a survey of VHWs in Glagah, and a supplemental survey of households reporting some service-related contact with VHWs in that district.

The data were gathered by students from Gajah Mada University in Yogyakarta. A team of four to six enumerators resided with the author in the home of a village nutrition worker for approximately eight months. Interviews were mostly conducted in Javanese. Question format was standardized through group training and role-playing, and the author participated in approximately 20 percent of the interviews. Enumerators were encouraged to have several family members present during household interviews and to allow discussion of responses.

Clinic-level data. The major component of data collection at the clinics was the survey of health service users. Illness care and MCH/FP patients were interviewed at both health centers, the three sub-centers, and the health post in Glagah. The sample size was approximately 10 percent of average monthly utilization at each unit in Beran and approximately 7.5 percent of average monthly utilization at each unit in Glagah. The difference was due to the higher level of use in Glagah. The samples of patients at each unit were balanced to reflect the average proportions of users attending on market days and non-market days. The enumerators were instructed to arrive at the time of each clinic's opening and stagger their selection of respondents regularly throughout the day. In practice this proved too difficult to manage, as patients arrived clustered around certain times and were treated and departed too quickly to permit such careful sampling during each day.

The data collected from patients included their personal characteristics; socio-economic data; the distance, time, and cost of travel to services; their complaint and previous treatment actions; and a variety of other information related to use of services. In addition, after the clinic closed the official diagnosis of each case and the amount of supplies and drugs given to each patient was recorded from the clinic's patient register.

Another objective was to determine the cost of outpatient illness care and MCH/FP services at the different health service units. A time-allocation study of all health workers was done as a basis for allocating input costs amongst the different health care functions. Health staff were asked to complete a daily activity form each day consecutively for a week, and then repeated the process again one week later. These forms divided their work time according to location (clinic or field); type of activity (direct treatment of patients, maintenance of facilities, record-keeping, etc.); and function (illness care, MCH/FP, support of village nutrition workers, etc.).

These data were supplemented by interviews with all health workers concerning their training, salaries and special allowances, and use of their work time. Other data collected from clinic records included utilization figures for all major clinic activities and reports on use of drugs and other supplies. Data on the costs of inputs to clinic services were collected from the central government, provincial government, regency government, and from sub-district health and local government officials.

Household-level data. The main vehicle for collecting data at the household-level was a sample survey of households in both sub-districts. This survey included data on the characteristics of individuals in the household; socio-economic data, including acces to land and an index of household possessions; incidence of illness (one month recall) and treatment actions undertaken in response to illness; and information on use of other health services not related to illness such as preventive care.

In addition to this survey, a second instrument was used with households in Glagah who reported some contact with a VHW during the previous month. This questionnaire included information about who was contacted by the VHW, where the contact occurred, and what its content was. All VHWs in the hamlets surveyed in Glagah were also interviewed about their background, training, and activities as VHWs.

The objectives of the village-level data collection were somewhat different in Glagah than in Beran because of the interest in the VHW program. The sample selection in Glagah had two goals. First, a sub-district wide sample of households was needed to investigate the relationship between income, illness incidence, and overall health service utilization. A second goal was to collect representative data on the activities and characteristics of the VHWs. Since the VHW program was organized by hamlets, this required a sub-district wide sample with hamlets as the unit of analysis. These dual objectives were resolved by a multi-stage random sample. Four villages were selected randomly and then one hamlet within each village was also chosen at random. Data on VHW activities (the outputs of VHW activities and characteristics of the individual workers) was collected from those four hamlets and can be used to represent the VHW project in the district. Within each hamlet, all households (in smaller hamlets) or randomly half of all households (in larger ones) were interviewed. The household data can be analyzed by hamlet (with reference to the VHW program) or aggregated to represent the whole sub-district. In the latter case, however, households from different hamlets must be weighted according to the relative probability of their being selected into the sample, since that was not constant across hamlets.

In Beran, the limited activities of VHWs were not studied. A sample of households for the district as a whole was drawn directly. Four villages and then a single hamlet within each village were sampled with probability proportional to the number of households. The same number of households was then selected randomly in each hamlet. Data from these households can be aggregated to form a valid sub-district sample of households.

Analysis of Equity in Glagah and Beran: Choice of Variables

Conceptual Issues in Selecting an Income Variable

Previous research and experience with LDC health services has shown that the benefits of modern health services are not enjoyed to the same extent by poor and better-off individuals. When users of services are classified by income group, low income people are generally not as well served as high income people.

This income bias in service use is a descriptive result that appears in cross-sectional data. It was argued in Chapter 2 that such observed inequity by income group results both from the direct effect of income on service use decisions as well as from the indirect effect of other cultural and social factors for which income acts as a proxy. Figure 2-2 presented a model of stages of decision-making leading to health service use. Cultural and morbidity factors play a more important role in the early stages of the model--those that determine whether illness occurs, is perceived as significant, and is perceived as appropriate to modern medical treatment. Income, especially access to disposable cash income, gains importance in the later stages of the model relating to the choice of a source of modern treatment and the selection of care providers within the modern public health care system. However, it is likely that income is also associated with the cultural and morbidity factors operating at earlier stages.

The inequity observed in cross-sectional data confounds these direct and proxy roles of income. Ideally, one would like research to operationalize a behavioral model which adequately specifies and differentiates these different factors, in order to ascertain which ones are most significant. However, that was not the objective of this study. Rather, this research seeks to describe the overall inequity in service use by income group and to explore its extent and characteristics within the use of modern public health services.

While it is not feasible in the present study to operationalize all factors contributing to the decision to use health services, we must still identify an appropriate measure of income for the descriptive analysis of equity. This measure must meet two conditions. It must accurately represent the direct effect of income on service use, which primarily results from the availability of disposable cash income in the household. And, it must retain the wider associations of income with the cultural, social, and morbidity factors that determine equity indirectly. These are more closely associated with household wealth or economic welfare, of which disposable cash income is an imperfect representation in societies where a significant proportion of economic life is not part of the cash market. Through these two aspects, the income variable used to analyze equity should capture both the direct effects of cash income as well as the indirect effects of cultural, social, and morbidity factors proxied by household wealth and economic welfare.

Practical Issues in Selecting an Income Variable

The best single variable for the equity analysis in this study would probably be some direct measure of household cash income. Nonetheless, we know that even current cash income ignores such factors as short-term fluctuations in earnings as agricultural product prices vary and access to cash that results from holding wealth in productive or non-productive assets that can be converted to money. Income is also almost impossible to measure satisfactorily in rural Java, where substantial portions of household production and consumption never enter the cash economy and so must be valued in some ad hoc fashion. Most studies referring to income in fact measure household cash expenditures and even these are subject to significant under-reporting.

There were other disadvantages to direct measures of income in this study. Interviews were done with rural households and with patients in the clinics in Glagah and Beran. We desired an income variable that could be measured in both sets of interviews and compared. However, clinic patients are often elderly dependents or young children accompanied by siblings. They would be unable to answer questions about income and it would be impossible to verify any answers from the clinic interviews. The clinic patient survey also had to be kept brief, since respondents were interviewed after waiting and treatment and would not tolerate a long and detailed questionnaire. Thus, it was decided that direct measurement of household income or expenditures would not be feasible.

Previous studies have collected multiple measures of income, wealth, and socio-economic status. The results are often more confusing than helpful. Socio-economic status (which combines income, wealth, prestige, and possibly other dimensions) is a complex concept. It seemed pointless to collect multiple imperfect measures of this variable and then be left to make a subjective choice between them, since inevitably they would not coincide perfectly 6/.

Other researchers in Java have recommended use of household access to productive assets--principally agricultural land--as a good indicator of income (Hart, 1978, Penny and Singarimbun, 1973). Access to land is primarily an indicator of household wealth, which is associated with cash income to the extent that agricultural produce is converted to cash in the market.

As another option, recent field studies have developed various indices of household goods--consumer durables or commonly owned consumption goods--to be proxy variables for income. Researchers have found that these indices correlate well with household income. Their reliability is easily checked in visits to the home (Hull, 1975, and Downey, 1984).

6/ See Hull, T. (1975) pp. 138-162 for an illuminating discussion of this problem and a comparison of different measures of socio-economic status in Java.

An index of household possessions had the initial advantage of being easy to measure in the clinics (even elderly patients or children would know of, say, a radio in their home). Closer investigation of the large variability in land types and land ownership in Glagah and Beran confirmed that a possessions index was the best measure to use.

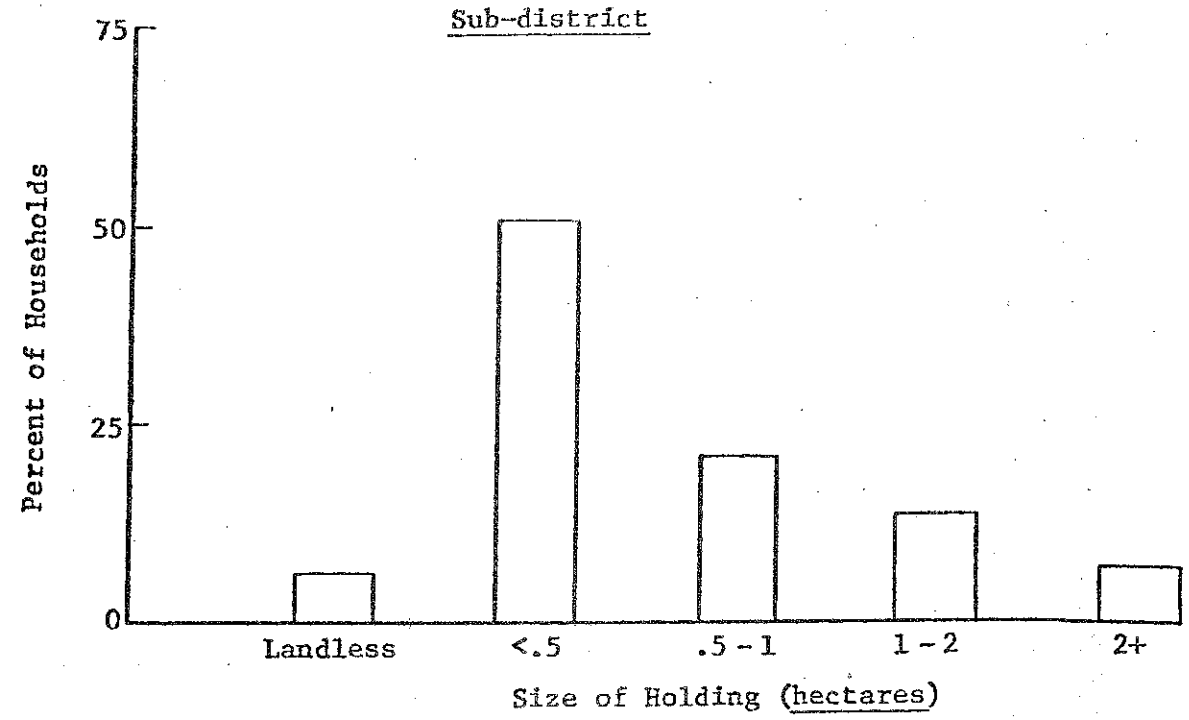
Land Ownership and Access

As mentioned above, about 80 percent of farming households in both Glagah and Beran worked only their own land and 5 percent were dependent solely on rented or share-cropped land. The proportion of all agricultural land rented or share-cropped was quite small. The household survey did include data on land ownership, share-cropping, and rental by types of land. However, calculation of access to land (including a proportion of land worked but not owned) by household varied only slightly from the amount of land owned per household. Hence, it was decided to look at ownership rather than access.

In Glagah and Beran, land ownership makes a poor indicator of wealth or income for the sub-districts as a whole because of the large variation in agricultural production systems between villages at high elevation on the slopes of the volcano and those lower down in the river valleys. Figures 4-4 and 4-5 show the overall size distribution of land ownership in Glagah and Beran in the top bar-charts, and the distribution in each of two villages in the bottom charts. Village 1 in each case is a low elevation village; village 2 a high elevation village. Both figures show clearly that the overall size distribution in each sub-district disguises significant variation. The low elevation villages have higher than average rates of landlessness and concentration of holdings in the smaller sizes. The high elevation villages have virtually no landlessness and much larger holdings on average.

This difference in land holding does not correspond to an absolute difference in income or welfare, since the type of land being owned is different. The low elevation villages have a significant proportion of their land in irrigated rice land. The high elevation villages have little irrigated rice land but larger holdings of dry fields. This can be seen in Table 4-9, which shows the mean area of land owned and the mean area of wet rice and dry field land owned for each district and each of the two villages. Local respondents indicated that they valued rice land more highly than dry fields. This probably reflects both the scarcity of rice land in the area and the preference they expressed for the security of producing rice for their own consumption rather than depending on cash income from dry field crops. It does not necessarily reflect a higher cash value of output per area from rice land. Clearly, use of land ownership as an income variable would require a complex weighting of different types of land and crops produced to come up with an accurate proxy. It was felt that this would not be feasible as part of this study. Thus, data on household land ownership was used mainly as a validating variable for the household possessions index.

Figure 4-4. GLAGAH: SIZE DISTRIBUTION OF LAND OWNERSHIP: DISTRICT AND TWO VILLAGES



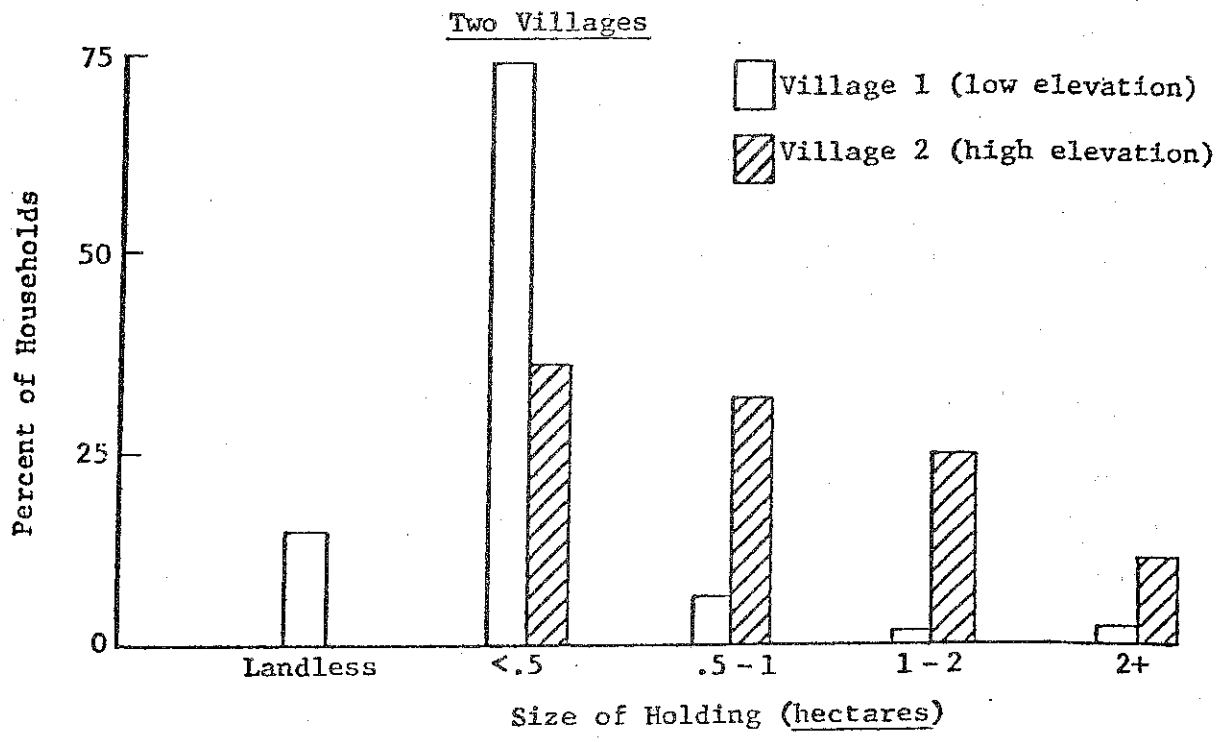


Figure 4-5. BERAN: SIZE DISTRIBUTION OF LAND OWNERSHIP: DISTRICT AND TWO VILLAGES

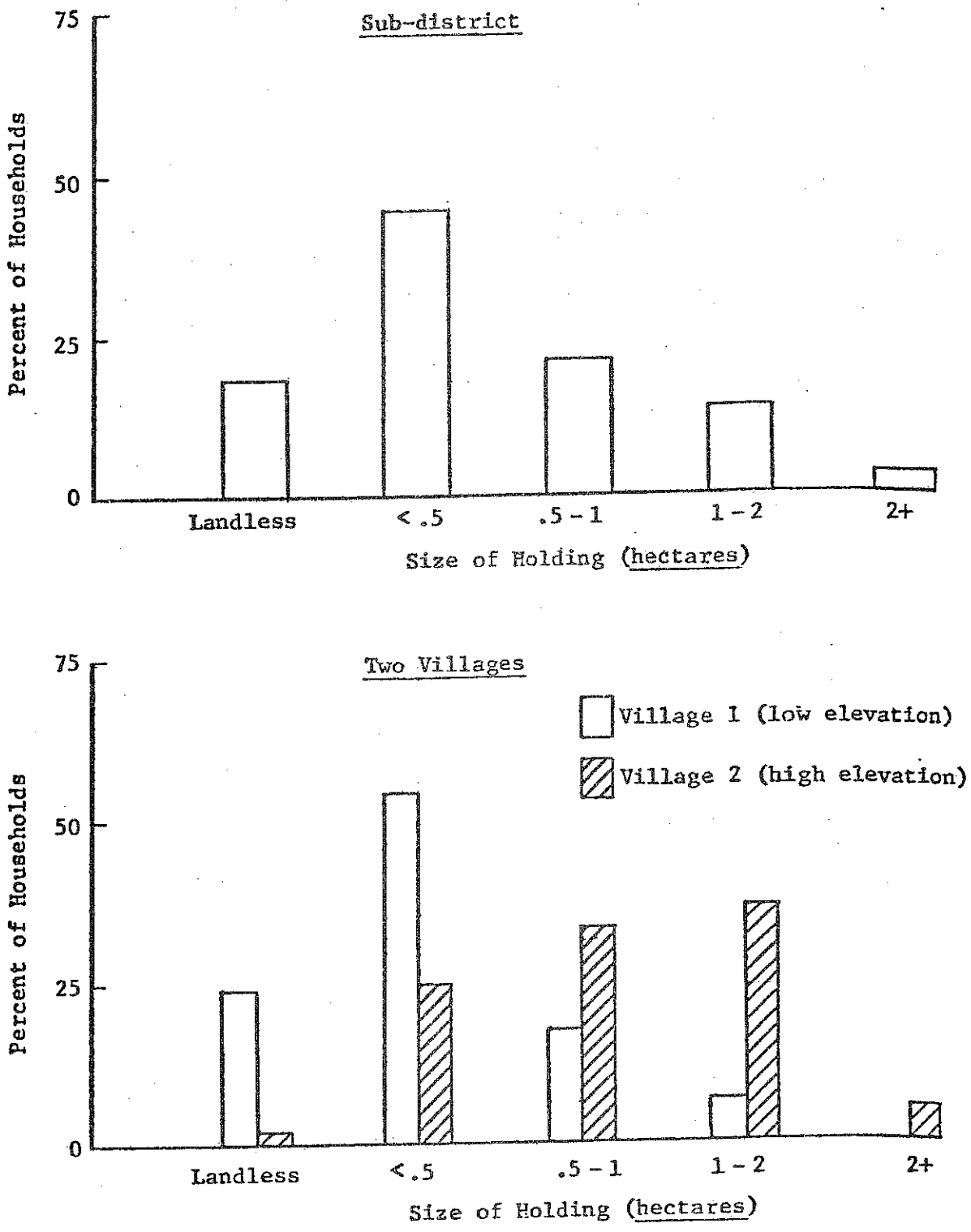


TABLE 4-9. VARIABILITY IN HOUSEHOLD LAND HOLDINGS BY TYPE OF LAND AND VILLAGE: GLAGAH AND BERAN

	Hectares per Household	
	Glagah	Beran
Whole Sub-district		
Mean land owned	.75	.58
Mean wet rice land	.06	.26
Mean dry fields	.69	.32
High Elevation Village		
Mean land owned	1.13	1.01
Mean wet rice land	.01	.30
Mean dry fields	1.12	.71
Low Elevation Village		
Mean land owned	.30	.34
Mean wet rice land	.09	.23
Mean dry fields	.21	.11

The Index of Household Possessions: Justification and Construction

The choice for an income variable was an index of possessions commonly found in homes in the study area. The various forms of the index are referred to as "income" throughout the study.

The index captures several characteristics of household income and wealth judged important in studying service use. All the items are usually purchased with cash and have a current cash value. Thus, the index is primarily related to household cash income, both current and past. Such access to cash was one important determinant of health service utilization that needs to be represented by the income variable, since cash expenditures are required for clinic visits, drugs, and sometimes transportation.

Also, our observations in households in the study area suggested that those owning more land and of higher social status tended to have more and better possessions in their homes. Possessions are both a form of consumption (reflecting cash expenditures) and a sign of wealth. By this association with wealth we assume that an index of household possessions embodies the desired associations with cultural, social, and morbidity factors affecting service use.

Thus, conceptually an index of household possessions had properties desired in an income variable. It had the added advantage of being feasible to measure in rural household and clinic interviews. Its appropriateness was confirmed by the experiences of other researchers in Java.

The index of household possessions used in the household and clinic surveys was constructed based on the results of a previous village study in the Yogyakarta area. This study measured an index of 16 different household goods as well as household income. Analysis of cross-tabulations from that study was used to select a shorter list of 9 household items which appeared to be associated with differences in income levels.

Scoring or scaling of the index was done in two ways. The primary method was to calculate a rupiah value of the index for each household based on the number of each item found in that household and an estimate of its average retail price. This price was determined from a survey of local markets. Table 4-10 lists the items used in the index and their prices. The total rupiah value of the index for each household is referred to as the HHPOSS index. An advantage of this method is that it gives a continuous variable with a wide range, theoretically permitting finer discrimination amongst households.

A second method of scoring was based on assuming a hierarchical relationship between the types of possessions in the household and income. Households were grouped according to whether they possessed certain types of items and not others, regardless of the quantity of each item possessed.

TABLE 4-10. ITEMS AND THEIR PRICES IN HHPOSS INDEX

	Item	Price (Rupiah)*
1	Simple oil lamp	750
2	Table/Chairs (set)	18,000
3	Pressure Lamp	7,500
4	Mattress	10,000
5	Radio	10,000
6	Bicycle	45,000
7	Watch	15,000
8	Sewing Machine	57,500
9	Motorcycle	700,000

* In 1981, U.S. $1.00 = 625 Rupiah

This is referred to as the ITMSCL index. Table 4-11 shows the definitions of the income groups used. This method gives a logical grouping of households but does not permit more detailed discrimination between them.

Indices of household possessions suffer from two weaknesses related to the size of the household. From one point of view, larger households need fewer major consumer durables per person, since they can take advantage of economies of scale. A good example might be a set of table and chairs, which would be adequate for a family of two or a family of six. This does not indicate that the individual in the smaller family is better-off, however. On the other hand, larger households may tend to have more consumer goods than smaller ones, scoring higher on the index, without necessarily being better off on a per capita basis. More people may require more of certain types of goods--lamps, for example.

The data from Glagah and Beran show a significant correlation between the HHPOSS index and household size ($r=.12$, $p=.02$ in Glagah; $r=.21$, $p=.002$ in Beran). To compensate for possible bias in the index towards larger households, a third version was calculated. The HHPOSS value for each household was divided by the number of adults (individuals over 15 years of age) in the household. The result is referred to as the POSS/ADLT index. POSS/ADLT values are not significantly correlated with household size in either Glagah or Beran.

One method of validating these indices was to correlate their values with measures of land owned by households. In both sub-districts, all three indices of household possessions were significantly positively correlated with household land ownership. In Glagah the simple correlation coefficient between HHPOSS and land ownership was $r=.39$ ($p < .0001$) and in Beran $r=.18$ ($p < .0063$). For individual villages, correlations ranged from .35 to over .50. The individual village figures correct somewhat for the variability in agricultural production systems between villages. Casual observation in villagers' homes also confirmed that these possessions were clearly related to the apparent prosperity of households.

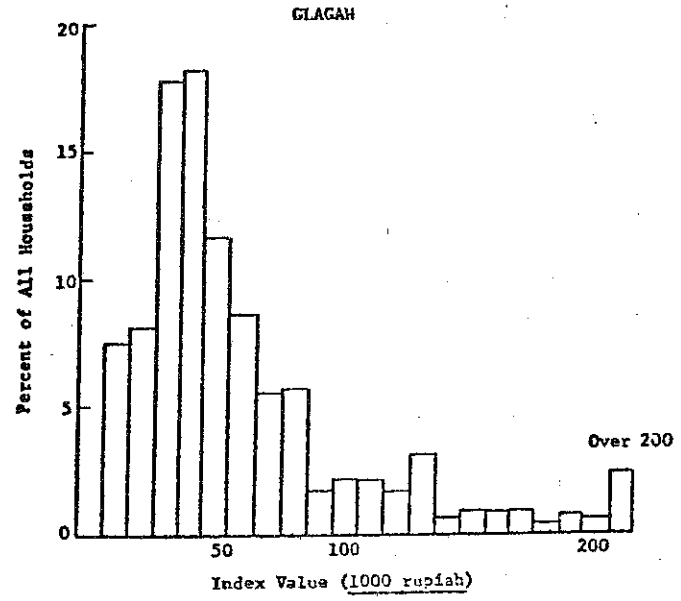
The overall distribution of the indices in the population surveyed in the two districts shows the approximate expected shape for a distribution of income. However, there are significant differences between the two areas that probably reflect the vagaries of random sampling. Figure 4-6 shows the size distribution of the HHPOSS index in Glagah and Beran and Figure 4-7 shows the distribution of the POSS/ADLT index. The expected distribution would have a sharp rise and mode at the lower values of the index, declining gradually to a long tail at the higher values. This can be seen most clearly in the data from Glagah for both the HHPOSS and POSS/ADLT measures. In Beran, however, the distribution is clearly shifted to the higher income levels, with the mode lower and to the right of that in Glagah.

A careful review of the data from individual villages suggests that this difference does not entirely reflect a real difference in overall

TABLE 4-11. DEFINITIONS OF THE ITMSCL GROUPS

Group		Possessions Reported in Household
Low ! ! ! ! ! ! ! ! V High	1 2 3 4	Reported only one set of Table/Chairs and/or one or more simple oil lamps Reported either only two or more sets of Table/Chairs and simple oil lamps--or-- at least one of items 3-7 in Table 4-10 Reported having two or three of types of items 3-7 in Table 4-10 but none of items 8 or 9 Reported possessing sewing machine or motorcycle or both--or--four or five of types of items 3-7

Figure 4-6. GLAGAH AND BERAN: SIZE DISTRIBUTION OF INDEX OF HOUSEHOLD POSSESSIONS (HHPOSS)



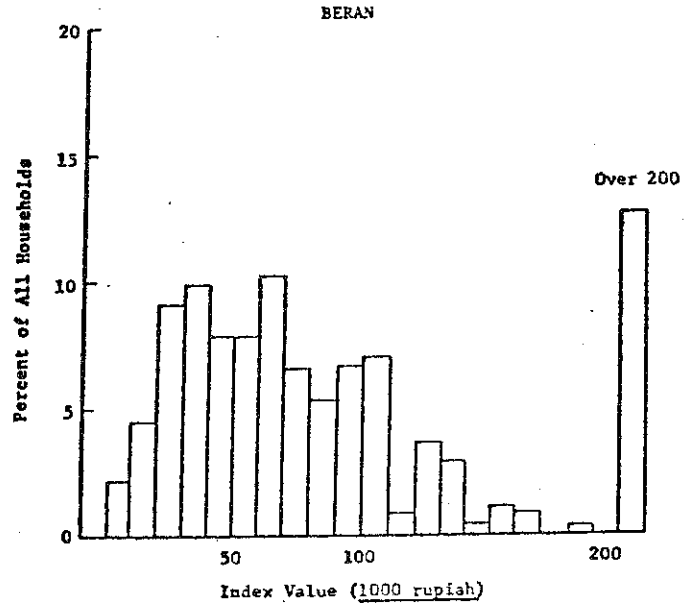
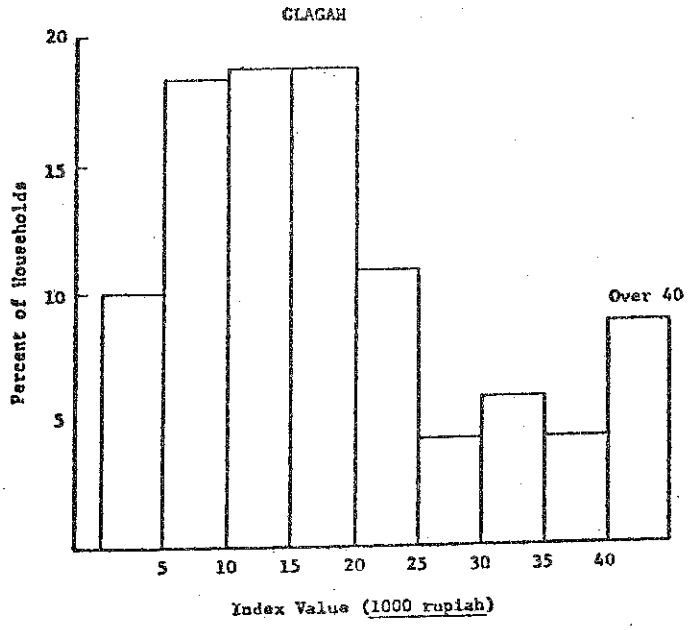
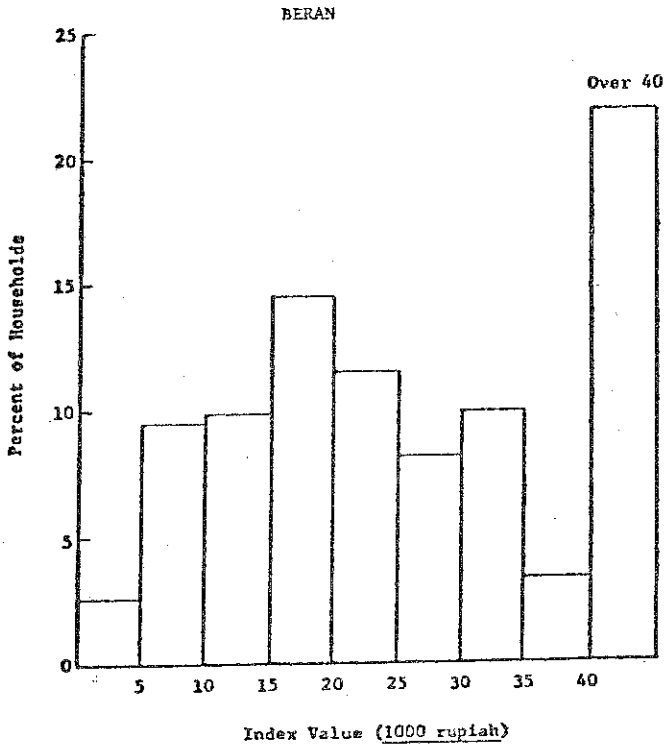


Figure 4-7. GLAGAH AND BERAN: SIZE DISTRIBUTION OF INDEX OF HOUSEHOLD POSSESSIONS (POSS/ADLT)





distribution of income in the two sub-districts. Rather, two of the villages sampled in Beran included unusually high numbers of retired civil servants and fairly well-off traders. In the total sample, 68 percent of household heads in Beran gave their primary occupation as farming compared with 89 percent in Glagah: 6.5 percent were current or former government employees in Beran compared with 1 percent in Glagah: and 7.4 percent were primarily traders in Beran compared with .6 percent in Glagah. These last two employment categories were more likely to have higher possessions scores. While it is impossible from the data to determine whether this difference is valid for the sub-districts as a whole, one would suppose that it is not, given their comparability in terms of other indicators.

The value of the indices will be used to analyze the relationship between income and health service utilization. The difference in distribution between the two sub-districts means that there will be fewer individuals at the lowest income level in Beran than in Glagah. Unfortunately, this combines with the overall smaller sample size in Beran. Table 4-12 shows the percentage of households falling into different income groups based on the three different indices of possessions.

Despite these differences between the two sub-districts, the indices perform as valid proxies for household income. This is confirmed by the results of previous studies, the overall distribution of the indices, and their association with the validating variable--land ownership. The analysis of health service use by income groups also proved quite robust to all the three versions of the index, as will be shown in Chapter 7.

TABLE 4-12. PERCENTAGES OF HOUSEHOLDS IN DIFFERENT SOCIOECONOMIC CLASSES, GLAGAH AND BERAN

Class	Value of Index (Rupiah)	Percent of Households Glagah	Beran
	n =	359	243
	HHPOSS Grouping		
Low	0 - 30,000	33.4	15.6
Middle	30 - 70,000	44.0	35.8
High	> 70,000	22.6	48.6
	POSS/ADLT Grouping		
Low - 1	0 - 10,000	28.6	11.9
2	10 - 20,000	36.9	24.3
3	20 - 40,000	25.3	32.9
High - 4	> 40,000	9.2	30.9
	ITMSCL Grouping		
Low - 1		26.2	13.6
2		36.8	37.4
3		30.4	27.6
High - 4		6.7	21.4

CHAPTER 5

THE STRUCTURE OF PRIMARY HEALTH SERVICE DELIVERY SYSTEMS AND THEIR UTILIZATION IN JAVA

Combinations of different types of health service organizations make up the government-sponsored rural health service system in Java 1/. These organizations include health centers, sub-centers, health posts, mobile units, and VHWs. This system is highly variable between sub-districts in terms of service organization--the types of units in each area and their staffing--and levels of utilization.

This study assesses the performance in distributing services and in the public sector cost of operations of some of these different types of service organization. Before analyzing these units, however, it is useful to ask how significant they are in the existing public sector health service delivery systems in rural Java 2/. If certain types of units are not present in sufficient quantities or are not providing a measurable proportion of services in rural areas, then their equity and efficiency performance will have limited importance, whatever it is. This chapter describes the relative importance of the different system parts within the overall sub-district systems. Specifically, data are presented on the frequency of the presence of different types of units and combinations of units in sub-district systems as well as on the allocation of resources amongst different units in a sub-district. The distribution of total service utilization amongst the various types of units is discussed as are trends in service use and environmental factors. These data on health service systems in Java provide a context for the more detailed studies on the equity and cost of services in two sub-districts presented in Chapters 6 and 7.

The secondary data survey described in Chapter 4 collected information from 26 rural sub-districts in three regencies in Central Java

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1/ This study focuses almost exclusively on services provided directly by or in cooperation with the government. Of course, primary health care is also provided by a broad range of indigenous, informal, and private sources. These are often as important or more important than those provided by the public sector. However, the objective of this study was to explore equity and cost in the government's primary health care programs. The exclusion of these other sources of care from much of the analysis which follows should not suggest that they are less significant than the services studied.

2/ The term "delivery system" is defined in Chapter 1.

and Yogyakarta provinces. These sub-districts were selected from three geographical strata: lowland irrigated coastal plains, which are densely populated and have fairly good transportation infrastructure (7 sub-districts); mixed lowland and hill areas with some irrigated and some dry land, lower population density, and somewhat poorer transportation (8 sub-districts); and upland and mountainous areas where access to services is much more difficult and population density even lower (11 sub-districts). This mix of areas represents fairly well the varied regions of Central Java and Yogyakarta.

The Organization of Delivery Systems: Sub-District Combinations of Service Units in Central Java and Yogyakarta

The various types of health service organization described in Chapter 4 can be found throughout Java. It would be unusual, however, to find all the different types of units operating in the same sub-district. Rather, each sub-district has a combination of some of the units. Only health centers are found in all areas.

Table 5-1 shows the frequency of the various health service units in the sub-districts studied. All 26 sub-districts had a health center and all were headed by a physician at the time of the survey. Thirty-five percent of the areas had at least one sub-center, whereas 81 percent had at least one part-time health post. Sixty-two percent reported some mobile unit visits from outside the sub-district. All 26 areas had some activities using VHWs. This reflects the emphasis placed on village-level workers in recent years and the rapid expansion of different programs training VHWs. Over half of the areas reported VHWs "active" in a majority of the hamlets in their sub-districts.

The health service units are combined in different ways in each sub-district. Table 5-2 shows the various combinations found in the survey in order of their frequency. All sub-districts had a health center, some VHW activities, and village-level malaria workers. Only one sub-district out of 26 had neither a sub-center nor health posts. What is most striking in this table is the variety of different combinations. In a study of 26 sub-districts, 10 different combinations of the various types of units were found. This probably reflects official efforts to distribute resources evenly amongst different districts over the years. New programs, such as mobile units, are often implemented in areas which have not received inputs from a previous program.

For each sub-district the number of each type of unit varied as well. In areas with sub-centers, about 60 percent had only one sub-center, while 20 percent had two and 20 percent had three sub-centers within the same sub-district. Sub-centers also differed in the types of services they provided: some provided only illness care services (43 percent), while others may have had MCH/FP services (7 percent) or both (50 percent). In sub-districts where health posts were available, their number ranged from

TABLE 5-1. THE DISTRIBUTION OF DIFFERENT DELIVERY SYSTEM COMPONENTS: 26 RURAL SUB-DISTRICTS

Sub-district Delivery System Includes:	Number of Sub-districts
Health Center	26 (100%)
Sub-center	9 (35%)
Health Post	21 (81%)
Mobile Unit Visits	16 (62%)
Village Health Workers	26 (100%)
Village Health Workers "active" in more than 50% of villages	15 (66%)*

* Data not available from two sub-districts.

TABLE 5-2. COMBINATIONS OF HEALTH SERVICE UNITS IN 26 SUB-DISTRICTS

Components of Delivery System*					Number of Sub-districts
HC		POST	MU	VHW	7 (27%)
HC		POST	MU		5 (19%)
HC		POST		VHW	4 (15%)
HC	SC	POST	MU		3 (12%)
HC	SC		MU		2 (8%)
HC	SC				1 (4%)
HC	SC	POST			1 (4%)
HC			MU	VHW	1 (4%)
HC	SC			VHW	1 (4%)
HC	SC	POST		VHW	1 (4%)
				TOTAL	26 (101%)

* HC = Health Center
SC = Sub-center
POST = Health Post
MU = Mobile Unit
VHW = Village-level health workers reported active in more than 50 percent of hamlets in that sub-district

one to six. Similar variability in the quantity of a specific type of unit can be shown for other components of these systems.

Public health services in the 26 sub-districts studied employed a total of 683 salaried personnel, most of whom worked full time. Table 5-3 shows the breakdown of these personnel by position. Each sub-district had one physician as head of the area's health services. The highest trained level of paramedics, nurses and midwives, accounted for 15.5 percent of all staff. Assistant nurses and assistant midwives added another 10.4 percent. These two levels of staff perform almost all the illness care and MCH/FP (mother and child health and family planning) tasks at health centers, sub-centers and health posts, and mobile units. On average they made up about 26 percent of all staff.

The category "other paramedics" includes personnel trained to manage some of the specialized public health programs. Each health center usually had one person in charge of immunization, and others who worked on hygiene and sanitation, school health, nutrition, or other areas. The village malaria program accounted for almost 30 percent of all personnel. This reflects the large number of village malaria workers extending the program to rural villages. Support staff such as laboratory personnel, drivers, clerks, etc., accounted for a quarter of all personnel.

The overall staffing of each sub-district and the individual health service units within the sub-districts is also variable. Table 5-4 shows the number of salaried personnel in each area and their distribution amongst health center, sub-centers, posts, and mobile units. For the total sub-district staff and each type of service unit the lowest and highest numbers of staff (or full-time staff equivalents) are given. The average number of staff for each type of unit is also shown. The percentages given for the mean number of personnel are taken only from those sub-districts where the specific type of unit is present and represent the proportion of all staff in those areas allocated to that type of unit.

About 14 percent of total staff time is devoted to the sub-centers, 7 percent to the posts, and 3 percent to the mobile units. However, total staff time includes all the personnel working on activities other than illness care and MCH/FP, which are the main tasks of the more highly trained paramedical staff and the main function of the service units operating below the health center level. Since illness care and MCH/FP paramedical personnel account for about 26 percent of total staff time on average and almost all the time devoted to sub-centers and health posts, it is clear that these units require a large proportion of the time of these more highly trained personnel.

To summarize, sub-district health service delivery systems are composed of several different types of service units which are combined in many different ways in rural Central Java. There is also much variation in the staffing of individual units and the sub-district level systems. Units providing illness care and MCH/FP services include the health centers, sub-centers, health posts, and mobile units. The units below the health

TABLE 5-3. TYPES OF HEALTH SERVICE PERSONNEL IN 26 RURAL SUB-DISTRICTS

Type of Staff	Number
Physician	26 (3.8%)
Nurse	59 (8.6%)
Midwife	47 (6.9%)
Assistant Nurse and Assistant Midwife	71 (10.4%)
Other Paramedics	88 (12.9%)
Malaria Workers	200 (29.3%)
Dental	20 (2.9%)
Support Staff	172 (25.2%)
Total	683 (100%)

TABLE 5-4. TOTAL PERSONNEL AND THEIR ALLOCATION BY TYPE OF HEALTH SERVICE UNIT IN 26 SUB-DISTRICTS

Type of Staff	Number of Sub-districts	Minimum	Maximum	Mean
Total Staff	26	14	49	26.4
Sub-center Staff	9	1	10	3.8 (14%)
Post*	21	.2	3.7	1.8 (7%)
Mobile Unit*	13	.1	1.9	.9 (3%)

*Full-time staff equivalents calculated based on 300 working days per year.

center account for a significant proportion of paramedical staff time, which is mainly used for illness care and MCH/FP services.

Utilization of Sub-District Health Services

Just as the organization of rural health services is highly variable, so is the extent to which those services are utilized by the population. Table 5-5 presents data on total utilization of services for illness care and MCH/FP, taken from the monthly and quarterly reports of the sub-district health services. The range of sub-district population is also given and per capita utilization rates for 1982 are calculated based on each sub-district's total population. Using the sub-district population as a denominator for utilization rates could be misleading in areas where large numbers of users came from or went to other districts.

The total number of patient contacts ranges from about 3,000 to over 26,000 for illness care and from 1,800 to over 33,000 for MCH/FP. This range far exceeds the variability in population size for the sub-districts studied. When per capita utilization rates are calculated, the minimum and maximum rates vary by a factor greater than ten for both illness care and MCH/FP.

It is likely that many different factors account for these large differences in utilization. These might include differences in the physical environment, perceived quality of services, history of service availability in an area, economic factors, etc. While most of these factors could not be examined in the secondary data study, some interesting findings on the role of the physical environment did emerge.

The 26 sub-districts were ranked according to five topographical categories, ranging from lowland coastal plain to higher altitude mountainous areas. These topographical categories are reasonably good proxies for the accessibility of services, with services in the lowland plain being the most accessible, and those in the upland mountainous area the least accessible. Accessibility reflects availability of roads and public transportation, as well as ease of access on foot.

When the average number of illness care contacts per capita was calculated for the sub-districts in each topographical category, there was a clear relationship between type of physical environment and rates of health service utilization. The lowland plain sub-districts reported per capita rates of .54 visits annually for illness care and the mountainous areas reported rates of .24 visits annually. Rates for the other areas declined steadily between the two extremes. The difference between all the group means was significant at $p < .02$. For MCH/FP services the relationship was not as clear or significant, although the lowland plain sub-districts still had the highest rates of utilization. These results suggest that physical ease of access is one important source of variation in service utilization rates. However, it may be less important for

TABLE 5-5. TOTAL UTILIZATION OF SERVICES IN 26 SUB-DISTRICTS

Statistic	Number of Sub-districts	Minimum	Maximum	Mean
Sub-district population	26	24,670	59,680	36,077
Total illness care contacts	25	2,990	26,570	13,669
Illness care contacts per capita, 1982	25	.075	.956	.403
Total MCH/FP contacts	23	1,770	33,470	11,447
MCH/FP contacts per capita, 1982	23	.06	.73	.312

discretionary services such as MCH/FP than for services responding to acute need, like illness care. Discretionary services may be used more by higher income clients who would be less responsive to accessibility constraints than lower income clients.

The proportion of total health service utilization for illness care and MCH/FP accounted for by health centers, sub-centers and health posts, and mobile units is examined in Table 5-6. That table shows the average number of contacts in a sub-district for each type of service. Average contacts are then broken down into the proportions of total service use (in each district) contributed by each type of health service unit. Only those districts having that type of unit were included in calculating the average percentage of total utilization for the unit. For example, the proportion of total contacts provided by sub-centers and health posts (the third row in Table 5-6) gives the average percentage of all health care visits accounted for by sub-centers and health posts in those districts with that type of unit. Therefore the percentages in the table do not sum to 100 percent. The number of sub-districts used in each calculation are given in parentheses. For some sub-districts, breakdowns of utilization were not available for the different types of units, and these were omitted from the analysis.

For illness care, health centers accounted for 75 percent of total utilization, ranging from 40 to 97 percent. In sub-districts with sub-centers and/or health posts, those types of units accounted for 21 percent of all contacts, ranging from 4 to 54 percent. Where there were mobile units operating, they averaged about 7 percent of total contacts, ranging from 2 to 15 percent. For MCH/FP, health centers averaged 59 percent of all contacts, ranging from 18 to 100 percent; sub-centers/posts provided 28 percent of contacts, with a range of 0 to 62 percent; and mobile units accounted for 15 percent on average, between 0 and 34 percent.

These figures demonstrate that, within the current configuration of health service units in rural sub-districts, units below the health center provide a significant proportion of all illness care and MCH/FP services. Sub-centers and health posts, the main fixed source of such services below the health center, on average provided for between 20 and 30 percent of all illness care and MCH/FP contacts. Mobile units accounted for 7 to 15 percent. These modes of health care organization are an important component of existing health service delivery systems.

The secondary data study also identified an interesting trend in the importance of health center and below-health-center units in meeting the total demand for illness care services. As per capita service utilization in a sub-district increases, so does the proportion of total service use fulfilled by the health center as compared to below-health-center units. That is, at lower overall levels of use, sub-centers and health posts meet a higher proportion of illness care service demand than they do when populations demand higher quantities of care.

TABLE 5-6. CONTRIBUTIONS TO TOTAL SERVICE UTILIZATION BY DIFFERENT TYPES OF SERVICE UNITS

Utilization Measure	Type of Contact (Number of Districts in Calculation)	
	Illness Care	MCH/FP
Mean total contacts, 1982	13,669 (25)	11,447 (23)
Health Center contacts: Mean percent of total	75.1% (24)	58.5% (20)
Sub-center and health post contacts: Mean percent of total	21% (21)	28.3% (16)
Mobile Unit contacts: Mean percent of total	7.4% (21)	15.1% (13)

There are several possible explanations for this trend. First, as shown earlier, higher levels of utilization are also associated with easier access, so that as access improves people may prefer to use the health centers. The sub-centers and health posts would be of greater significance in areas with more difficult access, which also have lower overall rates of service use. Moreover, in such areas the sub-health-center units would be providing an important source of care to people who might otherwise not be served at all.

A second explanation relates to trends in health service investment. In recent years, it appears that the Government of Indonesia has been strengthening the health centers with additional staff, facilities, and equipment and not been giving the same resources to the sub-health-center units. Thus, health centers benefitting from the higher level of investment may also be more heavily used, creating the observed association between increased total utilization and the importance of health centers. Were investment to be reoriented towards the sub-health-center units, they might also increase their contribution to total service utilization.

A third reason for the association of higher levels of use of health services with the greater role of the health centers might be a perception of higher quality of care at the health center than at sub-health-center units. As a population became more conscious of the availability and benefits of modern health care, they might tend to seek out that level of care perceived as higher quality. Some findings from Glagah and Beran on this and the other explanations are presented in Chapters 6 and 7.

Summary

The secondary data study demonstrated the great variability in the public sector rural health care system in Central Java and Yogyakarta. Each sub-district studied had its own combination of different service units and a specific staffing pattern, although all areas formally provide approximately the same range of services.

Health centers headed by a physician were the central coordinating units in all the areas studied. However, all areas also had some service units below the health center, including sub-centers, health posts, and mobile units. These were primarily staffed by paramedics, and their main tasks were illness care, MCH/FP, or both. VHWs were also found in every sub-district, with the majority of areas reporting active VHWs in over half the villages.

The sub-district health centers accounted for most of the personnel resources available in the sub-districts and produce most of the patient contacts for illness care and MCH/FP. The role of service units operating below the health center is also significant. Sub-centers, health posts, and mobile units on average accounted for up to 20 percent of total staff

and a much higher percentage of trained paramedical staff. They contributed an average of 30 to 40 percent of total patient contacts for the services studied. In some cases, their contribution to total utilization was well over 50 percent. Thus, services provided outside the health centers, especially those provided through sub-center and health posts, are major components of the current health service system in rural Java.

The secondary data study also showed that environmental factors and delivery system structure are associated with the utilization of services. Sub-districts in densely populated lowland plains with relatively good communications infrastructure had the highest rates of service use for both illness care and MCH/FP. Those in hilly and mountainous areas had lower rates. A strong relationship between environment (as a proxy for accessibility) and utilization was apparent for illness care services but less significant for discretionary MCH/FP services. Also, the relative importance of different types of health service organization in meeting the demand for care varied with service utilization rates. Where utilization was high, health centers met a higher proportion of demand. Where utilization was low, the sub-health-center units were relatively more important. Some of the possible explanations for this trend are examined in the data from Glagah and Beran below.

CHAPTER 6

UTILIZATION OF SERVICES AND POPULATION COVERAGE IN GLAGAH AND BERAN

The preceding chapter presented data on the structure of health service delivery systems and their performance in supplying services to the population. Such service utilization data represent not only the "production" activity of the health service units, but also the "consumption" behavior of individuals and households. Whatever the delivery system may offer, it is usually individual clients who decide to seek out its services.

This chaper presents results from the more detailed study of the utilization of delivery system components in Glagah and Beran. The use of services by individuals and households is described for illness care and MCH/FP and for the different modes of health service organization. Population coverage with the different services is estimated and broken down into the respective contributions of the different components of the delivery systems. Also, the effect of certain locational, household, and individual characteristics on treatment strategies is examined.

The Health Service Delivery Systems in Glagah and Beran

As in the sub-districts described in Chapter 5, the health services in Glagah and Beran are coordinated from a sub-district health center and combine several different types of units. Table 6-1 presents a description of the health service units in the two areas and their staffing.

The two sub-districts have different health service configurations. Glagah has one sub-center staffed by a single paramedic who provides only illness care. It is located approximately ten kilometers from the health center. The road from the sub-center to the sub-district town was not paved, although work was underway to pave it during the study. Public transportation to Glagah town was only available on market days (two out of every five days). During the rainy season, approximately October to April, road transportation was erratic.

In addition to this one sub-center, Glagah also had a single health post, located approximately eight kilometers from the town (in the opposite direction) on an unpaved mountain road. There was almost no public transportation available on this road. The post was opened once every five days (that village's market day) by one or two paramedics from the health center. It provided only illness care. A village official contributed a room in his home for the post.

TABLE 6-1. DESCRIPTION OF HEALTH SERVICE DELIVERY SYSTEMS AND STAFFING--GLAGAH AND BERAN, 1981

	Glagah		Beran	
	Number of Units	Staff	Number of Units	Staff
Health Centers	1	1 Physician	1	1 Physician
		3 Nurses/ paramedics		1 Nurse/ paramedic
		2 Midwives		2 Midwives
		5 Other paramedics		7 Other paramedics
		12 Other		11 Other
	Total = 23		Total = 22	
Sub-centers	1	1 Nurse/ paramedic	2	2 Nurse/ paramedics
				1 Midwife
				1 Other paramedic
Health Post (Once in 5 days)	1	1-2 Nurse/ paramedics from health center	0	
Village Health Workers	Approximately 800 (1/10-15 households in every village)		Less than 50, in only 3 villages	

In Beran there were two sub-centers and no health posts. Both sub-centers were located along paved roads next to large village markets. One was staffed by three paramedics, including a nurse, assistant nurse, and a midwife. Both illness care and MCH services (but not family planning) were provided. A separate building with two examination rooms had been constructed for this facility. The second sub-center was staffed by a single paramedic providing only illness care. He used a room in his home for examinations, although the government began building an annex to his house as we completed the study. Some public transportation was available during the day at both sub-centers.

A major difference between the two sub-districts was the development of village-level health workers. All twenty villages in Glagah had VHWs trained as part of two different programs. The first and largest of these efforts used village nutrition workers in a program that included use of innovative community education techniques, monthly growth monitoring of children under five years of age, oral rehydration and diet supplementation, and referral to the health center. This program had been running for three years at the time of the study. The second program in five of the twenty villages trained village health workers to provide simple illness care and health education, with an emphasis on environmental health. This activity began less than one year before the study. Where villages had both programs, the same individuals were trained as workers. Approximately 800 VHWs had been trained in Glagah--one for every twelve households.

Many different health and nutrition programs in Indonesia make use of VHWs and almost every sub-district has at least one village with these workers. In Beran, three villages had VHW nutrition activities as part of the national family planning program. These VHWs were not active and their activities were not studied. One village in Beran began VHW illness care activities one month before the survey. Some data are presented on this program below.

In addition to the different combinations of service units in the two sub-districts, there was some variation in the type of services provided at each level. This is shown in Table 6-2. Both health centers provided illness care and MCH/FP services, along with all the other services usually provided through health centers (see Table 4-2). In Glagah, the sub-center and post only provided illness care, whereas in Beran, one of the sub-centers had a full-time midwife and provided MCH services as well. VHWs were mainly active in Glagah. In all twenty villages they provided nutrition services somewhat comparable to the baby and young child care offered as part of MCH. In five villages, the VHWs also offered simple illness care.

Compared to the other sub-districts in the secondary data study, neither Glagah nor Beran have the most common health service configurations. They are both well above average in size of population. However, the number of staff and their allocation to the different parts of the delivery system are approximately at the mean for all sub-districts studied.

TABLE 6-2. AVAILABILITY OF ILLNESS CARE AND MCH/FP SERVICES AT DIFFERENT SERVICE UNITS, GLAGAH AND BERAN

	Illness Care	Mother-Child Health Family Planning
Health Center	G,B*	G,B
Sub-center 1	G,B	B
Sub-center 2	B	-
Post	G	-
VHWs	G (5 villages) B (1 village)	G (all villages) B (3 villages)

* G = Glagah
  B = Beran

Comparing Service Outputs from Different Modes of Health Service Organization: A Note on Technical Quality of Care

Identical or similar health care activities are often carried out at several different levels within the same delivery system. For example, well-baby care may be available at both a health center and sub-center. Similarly, illness care is provided by all clinics, and sometimes by VHWs. The utilization, equity, or efficiency of the different modes of health service organization must be measured in terms of such outputs. The question arises, however, to what extent should service outputs provided at different levels in the delivery system be compared? Is an illness care visit to a health center really the same as one to a sub-center or VHW? These are questions about the comparability of the quality of care of services.

There are two aspects of quality of care of interest in this study. The first relates to the technical quality of services, that is, whether services at different units are equally efficacious. The second relates to whether similar services from different sources are perceived by users as being of equal quality. This latter question of perceived quality of care will be discusssed in more detail in Chapter 7.

The goal of this study is to assess how the equity and efficiency of services varies with different modes of organization. Differences in equity or efficiency are more meaningful to the extent that the outputs of services are identical or sufficiently comparable in terms of quality of care.

The technical quality of services is determined by the inputs available (manpower, drugs, equipment) and the way those inputs are used to produce service outputs. A thorough analysis of the quality of health center, sub-center/health post, and VHW services would require assessments (see Habicht, 1979) which were beyond the resources available for this study. However, some insights into service quality can be gained from the data collected in Glagah and Beran and from our observation of health care workers.

The first important comparison of quality is between services provided at the health center and those at sub-health-center units like the sub-centers and health post. Illness care and MCH/FP services at health centers, sub-centers, and health post are almost entirely provided by paramedical workers at the nurse, midwife, or assistant nurse and midwife levels. There was no apparent difference between health center and lower-level units in the availability or training of these staff. The health center physicians rarely treated outpatients at the clinic. The doctors were sometimes available in case of emergency, but more often they were out of the clinic.

There also did not appear to be a significant difference in drug supplies at health centers and sub-centers. While the health centers had a

greater variety, the sub-centers seemed to have an adequate supply. Table 6-3 shows the average number of drugs received by illness care patients at the clinics in Glagah and Beran. In Glagah, health center patients received significantly fewer drugs than those at the sub-center or health post. In Beran, there was little difference in the number of drugs received.

There was substantial variation in the prescribing practices between the different units, but this appeared to be more a function of the biases of the different paramedics than a systematic difference in quality of care at health center and sub-center. Cases diagnosed as malaria at the clinics in Beran all received chloroquine. But they also received a variety of other drugs for relief of symptoms and dietary deficiencies as well as occasional antibiotics. Cases diagnosed as influenza all received symptomatic medicines and antibiotics. The main difference between health center and sub-centers was in the type of antibiotic (ampicillin and terramycin in the health center, tetracycline and penicillin/streptomycin in the sub-center). In general, most ailments were treated with a combination of antibiotics, symptomatic drugs, and dietary supplements. These items were available at both health centers and sub-centers.

Of special interest in this study are the services provided by the village-level health volunteers. These include treatment of a few common illnesses and a mix of village-level nutrition services. Illness care by VHWs is clearly different from that provided by paramedics, since the VHWs received only a few days training and are not permitted to dispense controlled drugs such as antibiotics. They mainly provide non-prescription medicines that are widely available commercially. While in some cases this may be preferable to the treatment provided at clinics, such as the use of oral rehydration for diarrhea cases rather than antibiotics, it is not appropriate to compare clinics and VHWs directly for illness care.

The nutrition "package" provided by the VHWs is quite similar to "baby and young child" services available at the clinics. In both cases, this consists mainly of periodic weighing of young children to identify disturbances in normal growth patterns. As in clinic services, VHWs also can provide some diet supplements to children and mothers, although the supplies available to them are much more limited. Information and education on feeding and child care is also provided at both levels. The major difference is that the clinic visits offer the possibility for a physical examination by a midwife or nurse and immediate treatment if needed. In most cases, this does not occur. Thus, village nutrition worker services can be compared to some extent with MCH/FP services at the clinics, although one has reservations about drawing this comparison too far.

TABLE 6-3. AVERAGE NUMBER OF DRUGS GIVEN TO ILLNESS CARE PATIENTS AT DIFFERENT HEALTH SERVICES UNITS, GLAGAH AND BERAN

Health Service Units	Number of Patients	Average Number of Drugs per Patient
	Glagah	
Health Center	76	3.6
Sub-center	17	4.1
Health Post	14	5.6
	Beran	
Health Center	56	4.3
Sub-center 1	13	3.2
Sub-center 2	14	4.2

Utilization Statistics from the Health Service Units

As in the secondary data study, statistics on the number of patient visits were collected from the health service units in Glagah and Beran. These are presented in Table 6-4.

Although both sub-districts have approximately the same population, Glagah reported twice the number of illness care and MCH/FP visits reported by Beran. Using the sub-district populations as a denominator, utilization rates in 1982 for illness care were .34 visits per capita in Glagah and .18 in Beran. For MCH/FP, the annual per capita rates were .29 and .10 respectively. These rates are below the mean for the twenty-six areas in the secondary data survey.

A larger number of illness care and MCH/FP visits were reported in Glagah than in Beran. Table 6-4 shows how these visits are distributed amongst the different delivery system components. The sub-center/health post level plays a greater role in providing services in Beran than in Glagah. This is appropriate given the larger number of staff and better facilities at that level in Beran. Interestingly, within Beran's lower utilization level, its sub-centers provided a larger number of visits in absolute terms than those of Glagah. This is consistent with the findings in Chapter 5 that, in sub-districts with overall lower utilization, sub-centers provide a greater proportion of services. Comparing again with the results of the secondary data study, the percentage of total illness care cases seen at the sub-center/post level was about average in Glagah. In Beran, the contribution of the sub-centers was close to the maximum measured for illness care and well above average for MCH/FP (see Table 5-6 for comparison). Despite superficial similarities, the functioning of health services in these two sub-districts is quite different (see Chapter 4 for more information on the sources of these differences).

Interviews with health service patients showed that data on the total number of visits disguises several important factors in service use. For example, Table 6-5 presents figures on the percentage of patients interviewed who reported their residence in a different sub-district. These data show a large influx of patients to the services in Glagah. Most of these came from Beran. Thus, the lower utilization of services in Beran reflects the loss of patients from Beran to services in Glagah. This can be partially explained by the historical difference in services between the two areas and the importance of the market in Glagah. Calculating utilization rates from clinic statistics based on the population of each district can be misleading.

Another factor distorting any relationship between the number of visits and the baseline population is multiple visits by individual patients. Table 6-6 shows the percentage of patients interviewed who were making their first visit for a particular problem (not necessarily their first visit ever to health services). The proportion of "new cases" was consistently lower for Glagah than for Beran. While this may reflect some

TABLE 6-4. TOTAL OUTPATIENT CONTACTS FOR DIFFERENT TYPES OF SERVICES AND AT DIFFERENT UNITS-- GLAGAH AND BERAN, 1981

	Glagah	Beran
Population	50,100	53,424
Total Outpatient Contacts	31,166	15,153
Illness Care Contacts		
Health Center	13,317 (78.6%)	4,881 (49.5%)
Sub-center/Post	3,632 (21.4%)	4,971 (50.5%)
Total	16,949 (100%)	9,852 (100%)
MCH/FP Contacts		
Health Center	14,217 (100%)	3,170 (59.8%)
Sub-centers	-	2,131 (40.2%)
Total	14,217 (100%)	5,301 (100%)
Contacts per capita, 1981		
Illness care	.34	.18
MCH/FP	.29	.10

TABLE 6-5. PERCENTAGE OF SERVICE USERS FROM OUTSIDE OF SUB-DISTRICTS

	Glagah	Beran
Illness Care		
Health Center	15.5	5.5
Sub-center	14.3	0
Total	15.0	3.7
MCH/FP		
Health Center	8.0	0
Sub-center	-	0
Total	8.0	0

TABLE 6-6. PERCENTAGE OF FIRST-TIME VISITORS (NEW CASES) FOR DIFFERENT SERVICES AND LOCATIONS

	Glagah	Beran
Illness Care		
Health Center	68.3	78.2
Sub-center	87.5	100.0
Total	73.8	97.5
MCH/FP		
Health Center	15.5	33.3
Sub-center	-	17.7
Total	15.5	28.0

difference in the quality of care, it also implies that for the same number of visits fewer cases are served in Glagah than in Beran.

Table 6-7 presents figures on the number of "new cases" per capita seen by the services in Glagah and Beran during 1982. That is, the utilization figures have been corrected for users of services from outside the sub-districts and multiple visits. These corrected figures are called "local coverage." The significant difference in overall utilization for the two sub-districts for both illness care and MCH/FP is still apparent, although not as large as the unadjusted figures. Also, the greater role of sub-center services in Beran is still evident. These figures should not be compared directly with the results of the secondary data study where such adjustments were not possible.

Utilization and Coverage of Services: Household Data

Morbidity in Glagah and Beran

In the household survey, respondents were asked to identify all individuals who had been ill during the month before the interview. For each person reported ill, they described the illness, gave their own subjective ranking of its seriousness, and described actions taken to deal with the illness.

The descriptions of illness reported in the survey included a range of terms describing symptoms and diseases of both the modern and traditional variety. These have been grouped into "symptom categories" and are presented in Table 6-8.

The rank orders and frequencies of illness in the two sub-districts are quite similar. In both areas the four most frequently mentioned categories were respiratory illness, "malaria," gastro-intestinal illness, and a general category, "don't feel well." These categories accounted for 79.2 percent of all illness in Glagah and 73.4 percent in Beran. As is frequently noted of morbidity surveys in LDCs, chronic illness, especially that associated with old age, tend not to be reported (Belcher et al., 1976).

The incidence of illness in the two sub-districts was different. Glagah had a monthly incidence rate of 150 cases per thousand population while Beran had a rate of 250 cases per thousand. The survey instruments and interviewers were the same in both districts. The survey was conducted from September to December, 1981--the months around the beginning of the rainy season. Typically, the onset of the rainy season is associated with an increase in respiratory infections and a general increase in illness, according to health personnel and villagers. This seasonal effect may explain some of the difference. Figure 6-1 shows the monthly incidence

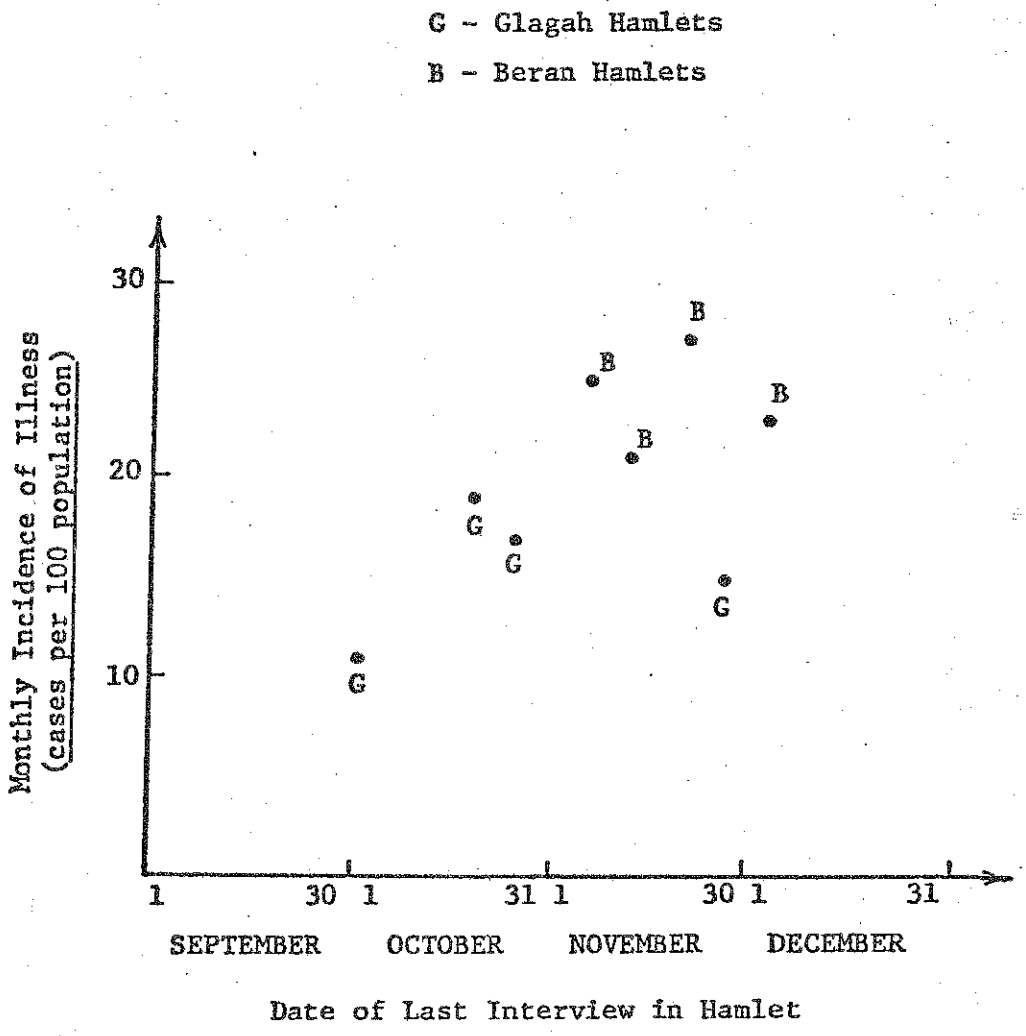
TABLE 6-7. ESTIMATED "LOCAL COVERAGE" WITH ILLNESS CARE AND MCH/FP--GLAGAH AND BERAN, 1981

	Glagah	Beran
Population	50,100	53,424
Illness care: new cases per thousand population, 1981		
Health Center	155	68
Sub-center	55	93
Total	210	161
MCH/FP: new cases per thousand population, 1981		
Health Center	40	19
Sub-center	-	6
Total	40	25

TABLE 6-8. ILLNESSES REPORTED BY SYMPTOM CATEGORIES: GLAGAH AND BERAN HOUSEHOLD SURVEY

Symptom Category	GLAGAH Number of Cases	GLAGAH Percent of Total	GLAGAH Rank	BERAN Number of Cases	BERAN Percent of Total	BERAN Rank
Respiratory	123	47.5	1	108	36.0	1
Gastro-intestinal	20	7.7	4	24	8.0	4
Malaria	27	10.4	3	50	16.7	2
"Aches/Pains"	7	2.7	8	10	3.3	8
Accidents	6	2.3	9	7	2.3	10
Skin Disease	15	5.8	5	22	7.3	5
Dental	5	1.9	10	15	5.0	6
Other infections	10	3.9	6	8	2.7	9
Eye	5	1.9	10	5	1.7	11
"Don't feel well"	34	13.1	2	38	12.7	3
Other	9	3.5	7	13	4.3	7
All	259	100		300	100	
Annual Incidence Rate per capita		1.73			2.97	

Figure 6-1. INCIDENCE OF ILLNESS IN SURVEY HAMLETS - SEASONAL EFFECTS



measured in each of the eight hamlets surveyed plotted against the date of the last interview in that hamlet. All of the Beran hamlets had a higher incidence than the Glagah hamlets. One of the Glagah hamlets was surveyed later than the first three Beran hamlets; i.e., at a time when seasonal effects should have raised the incidence of illness. This hamlet still had a lower rate of illness. While it is difficult to reach a definitive conclusion about the different incidence rates with so few observations, these data suggest both a seasonal difference and possibly a real difference in the frequency of illness in the two sub-districts.

Table 6-9 shows the frequency of illness and the monthly incidence rates for different age groups in the two sub-districts. Despite the difference in the absolute level of incidence, there is little variation in the proportion of cases in each age group. As expected, incidence rates are high for children under five years of age, decline significantly for adolescents and young adults, and rise again for the older age categories.

To provide some further detail on the age distribution of illness, Table 6-10 shows the percentage of illness cases in each age group that fell into the four most frequent symptom categories. Table 6-11 presents the monthly incidence rates by age group for the same reported illnesses. It is interesting to note the different rates of illness amongst children under five; with Glagah reporting higher rates of respiratory illness and Beran reporting more gastro-intestinal symptoms. In terms of overall incidence for specific symptom categories, the rates for "malaria" and gastro-intestinal illness in Beran were double their counterparts in Glagah.

Table 6-12 shows the incidence of illness for four income classes using the POSS/ADLT index, which corrects for variations in household size (see Chapter 4 for an explanation of this index). With the exception of the lower-middle group in Glagah, both sub-districts show a positive correlation between income and the probability of illness. This finding contradicts the usual expectation that poorer families experience more illness.

One explanation for this is that poorer households tend to have fewer children. Table 6-13 shows the average number of children under five years of age in households in the four POSS/ADLT groups. In both sub-districts, the lower income households have fewer children on average.

An alternative explanation may be that poorer families are more reluctant to admit illness to survey interviewers. Despite our efforts to the contrary, respondents sometimes viewed us as an extension of the government health system. Illness can be interpreted as a sign that all is not well in the village. Some respondents may fear a bad impression of their village if they report illness. Also, in a survey of this type, respondents often report only those illnesses they think are of interest to the interviewer. Poorer families may be less likely to classify their illnesses as "modern," i.e., relevant to the formal health system, and thus

TABLE 6-9. THE DISTRIBUTION OF ILLNESS BY AGE GROUPS: GLAGAH AND BERAN

Age Group	Number of Cases		Monthly Age-Specific Incidence Rate	
	Glagah	Beran	Glagah	Beran
0 - 5	48 (18.3%)	48 (15.9%)	.22	.33
6 - 15	53 (20.2%)	65 (21.5%)	.09	.17
16 - 25	44 (16.8%)	41 (13.6%)	.12	.18
26 - 45	63 (24.1%)	80 (26.5%)	.15	.30
> 45	54 (20.6%)	68 (22.5%)	.25	.37
All	262 (100%)	302 (100%)	.15	.25

TABLE 6-10. FREQUENCY OF THE FOUR LARGEST SYMPTOM CATEGORIES BY AGE GROUP: GLAGAH AND BERAN

Age Group	SYMPTOM CATEGORY				
	Respiratory	Malaria	Gastro-Intestinal	Don't Feel Well	Total
			GLAGAH		
0 - 5	69%	4%	10%	2%	100%
6 - 15	31%	9%	15%	15%	100%
16 - 25	48%	23%	7%	14%	100%
26 - 45	43%	8%	5%	22%	100%
> 45	44%	11%	4%	11%	100%
			BERAN		
0 - 5	32%	13%	21%	13%	100%
6 - 15	30%	27%	6%	13%	100%
16 - 25	27%	24%	6%	15%	100%
26 - 45	44%	13%	6%	10%	100%
> 45	41%	10%	6%	15%	100%

TABLE 6-11. AGE-SPECIFIC INCIDENCE RATES FOR THE FOUR LARGEST SYMPTOM CATEGORIES, GLAGAH AND BERAN

	INCIDENCE (cases per capita per month in age group)							
	Respiratory		"Malaria"		Gastro-Intestinal		Don't Feel Well	
Age Group	G*	B	G	B	G	B	G	B
0 - 5	.15	.10	.01	.04	.01	.07	.005	.04
6 - 15	.03	.05	.01	.04	.01	.01	.01	.02
16 - 25	.06	.05	.03	.04	.01	.02	.02	.03
26 - 45	.07	.13	.01	.04	.01	.02	.03	.03
> 45	.12	.15	.03	.04	.01	.02	.03	.05
All	.07	.09	.02	.04	.01	.02	.02	.03

* G = Glagah, B = Beran

TABLE 6-12. INCIDENCE OF ILLNESS FOR DIFFERENT INCOME GROUPS

Income (POSS/ADLT)		Number of Individuals	Incidence Per Capita Annually	Number of Cases
		GLAGAH		
LOW	1	521	1.45	63
	2	645	2.14	115
	3	450	1.31	49
HIGH	4	182	2.24	34
All		1,813	1.73	261
		BERAN		
LOW	1	159	1.89	25
	2	314	2.79	73
	3	387	3.13	101
HIGH	4	362	3.41	103
All		1,222	2.97	302

TABLE 6-13. AVERAGE NUMBER OF UNDER-FIVES IN HOUSEHOLDS FOR DIFFERENT INCOME GROUPS (POSS/ADLT)

Income		Glagah		Beran	
		Number of Under-fives	Standard Deviation	Number of Under-fives	Standard Deviation
LOW	1	.50	(.45)	.55	(.40)
	2	.57	(.47)	.51	(.46)
	3	.73	(.59)	.66	(.53)
HIGH	4	.72	(.50)	.63	(.59)
F-test for difference between group means		$p < .10$		n.s.	

would not mention such illnesses 1/. Incidence calculations using other versions of the possessions index (representing income) gave similar results.

Respondents were also asked to describe their illnesses as severe (berat), moderate (sedang), or mild (ringan). The frequencies of these responses are given in Table 6-14. About 20 percent of illnesses were classified as serious and there was little difference in the proportions between the two sub-districts.

Use of "Traditional" and "Modern" Treatments for Illness

Respondents in the household survey who reported illness in the previous month were asked to provide information on how they dealt with the illness. Their actions were classified as follows:

1. No treatment (dibiarkan);
2. Self-medication (mengobati sendiri);
3. Aided by family members (minta tolong keluarganya sendiri);
4. Aided by neighbors or friends (minta tolong tetangga2/teman2);
5. Aided by traditional practitioner (minta tolong dukun/ kasepuhan);
6. Aided by village health worker (minta tolong kader di desa);
7. Sought treatment at a sub-center or health post (ke PusKesMas Pembantu);
8. Sought treatment at a health center (ke PusKesMas);
9. Some other treatment. Almost all the responses in this group referred to treatment by a private "modern" medical practitioner.

Up to three different treatment actions were noted for each illness case.

Figure 6-2 shows the frequency of the different types of treatment actions reported. On average, about 1.3 treatment actions were reported for each illness. Treatment in the home, by neighbors and friends, and traditional practitioners might be referred to as "traditional" methods

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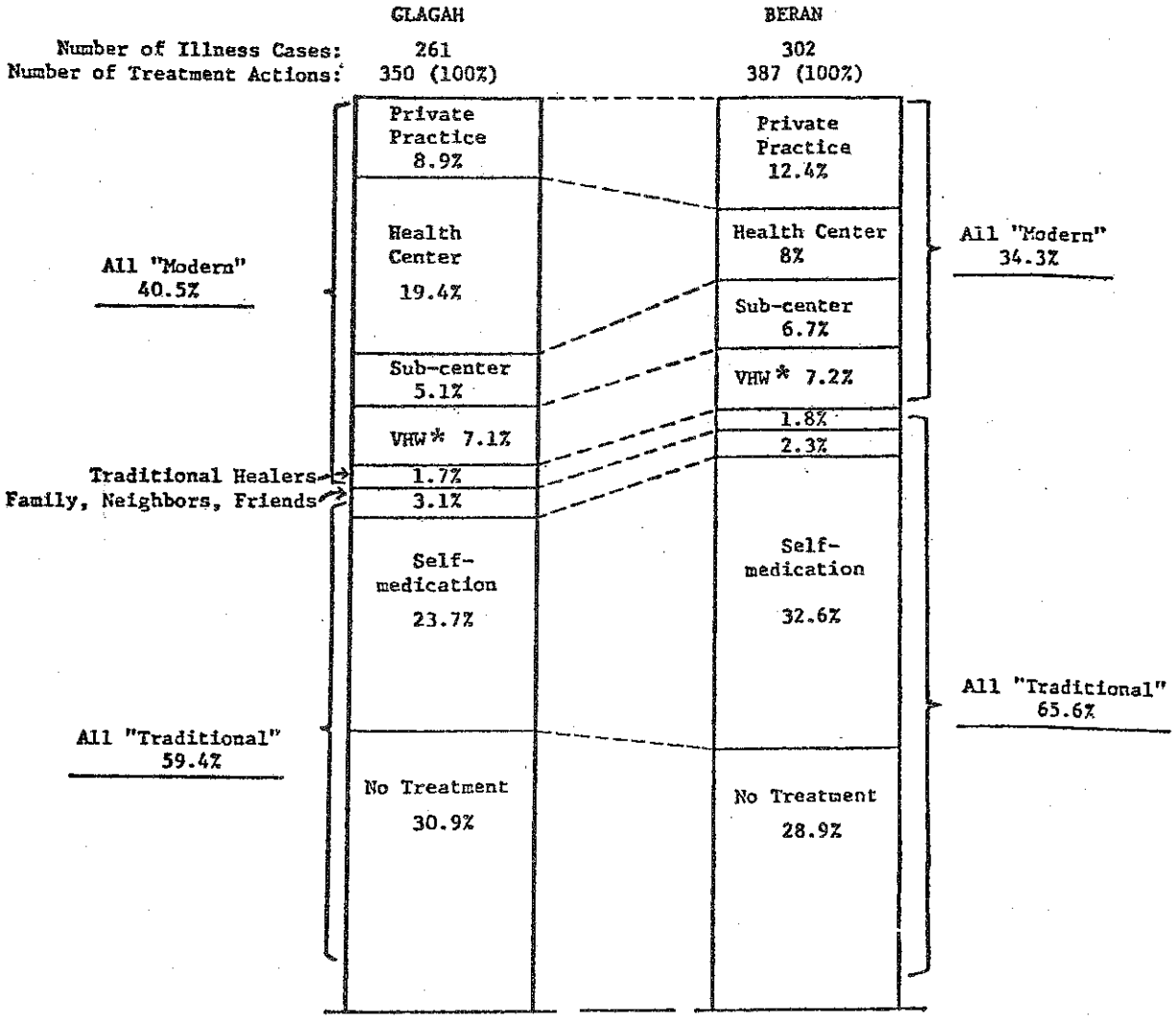
1/ See Table 7-12 for a breakdown of the reported perceived severity of illness by income groups. There was little difference reported in the proportions of illnesses perceived as severe for low and high income patients.

TABLE 6-14. SELF-ASSESSMENT OF SEVERITY OF ILLNESS: GLAGAH AND BERAN HOUSEHOLD SURVEY

Severity Score	Glagah	Beran
Severe	52 (20%)	68 (23%)
Moderate	103 (40%)	134 (45%)
Mild	100 (39%)	93 (32%)
Total	255 (100%)	295 (100%)

Figure 6-2. BREAKDOWN OF TREATMENT ACTIONS REPORTED BY INDIVIDUALS



*VHW - Village Health Workers

and VHWs, clinic services and private practice might be referred to as "modern" methods. Private practice included visits to the local paramedics and physicians as well as hospitals at the regency and province levels.

In Beran, a higher proportion of treatment actions were reported in the traditional category, especially self-medication, than in Glagah. For the modern sector treatments, patients in Glagah reported a higher frequency of using health center services, whereas in Beran private visits were a higher proportion of treatments. An anomaly is that the proportion of VHW contacts (these are contacts for illness care) were approximately the same in both areas, despite the difference in programs. Only one of the hamlets surveyed in each area had VHWs providing illness care. In Beran, this hamlet had just begun a VHW illness care program. The workers were very active as they had just completed training one month before the survey. This was the only hamlet in Beran with VHW illness care and so was not at all representative. In contrast, one quarter of the villages in Glagah had VHWs providing illness care for at least one year.

The household survey recorded several treatments for each illness. Most of the users of "modern" services reported some "traditional" treatment behavior as well, even if only the use of home remedies or consulting with family members. There was little multiple use of clinic facilities within the modern sector. Less then 1 percent of illness cases reported using both health center and sub-center services and less than 3 percent reported using both modern public and modern private services for the same illness. This indicates that there is little realized referral of cases amongst modern treatment units.

Health Center and Sub-center Utilization for Illness Care and MCH/FP Services

Respondents were asked whether any household member had contact with the clinic-based public health services in the last month and, if so, for what type of services. The services included illness care, pregnancy care, assistance at delivery, baby and young child care, family planning, and malaria services. In addition, the survey in Glagah asked about contact with different aspects of the VHW program. Several other types of health services were not specifically asked about, but could have been included in the category "other." These include hygiene and sanitation services and immunization. The immunization program had only recently begun in Glagah and not yet started in Beran, so that coverage was very low at the time of this study.

Approximately the same proportion of households in the two sub-districts reported receiving some health service: 22 percent of households in Glagah and 25 percent in Beran. For individuals, the proportion of reported illness cases that sought treatment from the health services at least once is an estimate of the population coverage of illness care activities. This is presented in Table 6-15. In Glagah, 29.3 percent

TABLE 6-15. ESTIMATED "LOCAL COVERAGE" WITH ILLNESS CARE--RESULTS OF THE HOUSEHOLD SURVEY

	Glagah	Beran
Population surveyed	1,789	1,222
Number of illnesses	259	302
Percent of all cases to services	29.3%	17.9%
Total number of cases to services	76 (100%)	54 (100%)
Number of cases to health center	61 (80.3%)	28 (51.9%)
Number of cases to sub-center/post	15 (19.7%)	26 (48.1%)

of all reported illnesses were treated by the health services. In Beran, only 17.9 percent received some treatment. These data confirm the difference in utilization rates reported in the health service statistics.

Table 6-15 also shows the proportion of cases treated by the health services at the health center and at the sub-center/health post level. In Glagah, 80 percent of all illness cases treated by the services went to the health center. In Beran, the sub-centers played a much more important role, treating 48 percent of all cases that reached the health services. This confirms the difference in utilization patterns noted in the health service statistics. The similarity in the mix of illness, the age distribution of illness, and the perceived severity of illness reinforces the conclusion that differences in utilization patterns in the two areas may be due to the different delivery system structures.

Table 6-16 relates the reported number of MCH/FP contacts to estimates of the target populations for those services: women aged 15 to 45 for pregnancy care and family planning; and children under five for baby and young child care. For both pregnancy and family planning services, women in Glagah reported over twice the contacts reported from Beran. For baby and young child services, Beran reported a slightly higher rate of contact. However, this includes two households in the sample with a large number of contacts, probably overstating the true population rate. Data are not available on whether MCH users in Beran went to the health center or to the sub-center. In Glagah, no MCH services were available at the sub-center level.

These data confirm most of the conclusions drawn from the health service statistics. There is a significant difference in utilization rates for both illness care and MCH/FP services between the two sub-districts, with Glagah having higher utilization than Beran. Controlling for incidence of illness this higher utilization rate in Glagah reflects higher coverage with illness care. Similarly, controlling for the size of the appropriate target populations, coverge with MCH/FP is higher in Glagah. This latter estimate assumes similar rates of pregnancy in the two sub-districts. The data on illness care also indicate a significant difference in how curative services are used. Patients in Glagah tend to use the health center more and the sub-centers less. Patients in Beran, while using all curative services less, tend to favor the sub-centers over the health center. This corresponds with the differences in delivery system structure noted earlier.

Village-level Health Worker Services in Glagah

Coverage with clinic-based illness care and MCH/FP services takes place through the actions of each individual patient, who must seek out and receive the service. In contrast, the village-level health worker often seeks out the client directly or provides services within minutes of the client's home.

TABLE 6-16. POPULATION UTILIZATION RATES FOR MCH/FP SERVICES, GLAGAH AND BERAN

Type of Contact	Monthly Utilization Rates Glagah	Beran
Pregnancy contacts per 1,000 women aged 16-45	32.8	15.9
Baby/young child contacts per 1,000 children under 5	91.3	95.9
Family planning contacts per 1,000 women 16-45	32.7	11.9
MCH/FP contacts per 1,000 population	26.2	17.2

VHWs in Glagah provided the following different types of service:

1. Extension. This is mainly health and nutrition education, provided in groups or in the client's home.

2. Growth Monitoring. Every month a weighing session is held for children under five in each hamlet. The session includes weighing the child and marking the weight on a growth chart, advising the mother on the progress of the child, and sometimes a supplementary meal or provision of diet supplements and oral rehydration solution. If necessary, children are referred to clinic services.

3. Simple medical care. In one of the four hamlets studied, VHWs had been trained to provide simple care for common illnesses. These included symptomatic medicines for headache, flu, and arthritis; first aid for minor cuts and accidents; oral rehydration and deworming; and drug treatment for malaria, Vitamin A deficiency, and skin diseases.

4. Referral to clinic services.

VHW contacts for the different types of services listed above were recalled for the month preceding the survey interview. Frequently, households reported several different types of contact, for example, attendance at the monthly weighing, a VHW visit to their home to provide nutrition education, and a referral to the health center. On average, two-thirds of all households received some input from the VHW in the preceding month. This can be contrasted with the 21 percent of households in Glagah and the 25 percent of households in Beran who reported some kind of contact with the health center or sub-center, not including the VHW program.

The main target group for VHW activities is children under five years of age. Table 6-17 shows the percentage of households with at least one child under five who reported a VHW contact for weighing or extension or both. This table shows the effective targetting of VHW activities, as on average 84 percent of households with under-fives reported at least one VHW contact. Table 6-18 presents the total number of children under five in each hamlet and the percentage of those children weighed by the VHW in the previous month. On average, 71 percent of all under-fives were weighed during the month preceding the survey, varying from 52 percent to 88 percent in the four hamlets.

In one of the four hamlets surveyed in Glagah, VHWs were also providing simple medical care. Of 68 illness cases reported in the household survey in that hamlet, 32 percent (22 cases) reported some contact with the VHW for medicine or referral, of which six cases then consulted at a health center or sub-center. This contrasts with the 26 percent of all cases (18 cases) who went directly to a health center or sub-center without consulting the VHW.

TABLE 6-17. COVERAGE OF HOUSEHOLDS WITH CHILDREN UNDER FIVE WITH VHW SERVICES--GLAGAH

Village	Number of Households with Under-fives	Percent of Households with Under-fives with VHW Contact	Percent with VHW Contact for:	
			Extension	Weighing
1	40	85	30	83
2	32	91	75	91
3	43	86	65	77
4	56	75	56	63
Total	169	84	59	78

TABLE 6-18. COVERAGE OF CHILDREN UNDER FIVE WITH VHW-RUN WEIGHING ACTIVITIES--GLAGAH

Village	Total Under-fives	Percent Weighed Last Month
1	49	80
2	41	88
3	57	67
4	61	52
Total	216	71

Coincidentally, one of the hamlets surveyed in Beran had just started that sub-district's only VHW illness care activities. Use rates of VHWs there were even higher, with 39 percent (28 cases) of all cases reporting contact with a VHW, of which six cases also consulted a clinic. In contrast, 30 percent of all cases went only to a clinic. Since this program only began in the month before the survey, it is too soon to predict how well such high levels of coverage will be maintained. These data suggest the high potential for coverage with VHW illness care services.

As mentioned earlier, the results presented above show VHW coverage under unusual circumstances of intensive management--not a routine level of activity. One must also consider that the program had been running for several years at the time of this study. The high levels of activity recorded, even with some special stimulus, are a credit to the program and its participants.

In terms of the VHWs' referral role, patients interviewed at the health center and sub-centers were asked whether they had consulted with a VHW before coming to the center. None of the sub-center patients mentioned a prior VHW contact, while 6.5 percent of the health center patients mentioned having previously consulted a VHW. Of those who did, eight out of ten were attending the health center for MCH/FP services, as one would expect given the focus of the VHW program in most of the Glagah villages. Thus, while referral by VHWs to clinic-based illness care is still small (2.7 percent of all patients interviewed), for MCH/FP it is larger (10 percent of all patients interviewed).

Household and Individual Factors Affecting Health Service Use

Distance, Travel Time, and Travel Cost

The accessibility of services to the population is one of the major factors affecting utilization. Accessibility is determined by physical geographic conditions; transportation infrastructure, the ability of individuals to afford the time and cost of travel and the services themselves, and even the scheduling of service hours.

Glagah and Beran are physically similar, both composed of rough mountainous terrain, running parallel from the peak of an 11,000 foot volcano down to rugged hills and deep valleys of 1,500 foot elevation. However, there is much variation in topography from village to village. The two sub-districts had three all weather roads at the time of the study. Other roads were often impassable during the rainy season. Readers are referred to the map in Figure 4-3 for more detail.

The difficult physical environment of the two areas increases the importance of physical access to services in determining utilization. Due to the uneven terrain, simple indicators of access such as distance to

services must be used with caution. The effect of distance varies with one's location.

Table 6-19 shows a breakdown of patients interviewed at the health centers and sub-centers by the distance they travelled. Most of the patients come from within three kilometers of the clinic buildings, as is usually reported in studies of this type. There is little difference in the geographic distribution of patients for illness care and MCH/FP in the two sub-districts. The catchment area of sub-centers is less than the health centers for illness care in both areas as well.

Figures 6-3 and 6-4 are maps displaying the percentage of all health center users from within the sub-district for each village in the two areas. Almost all the villages with the highest proportions of users are either near the health center or located along a road to the health center. The concentric circles on the maps indicate a radius of three and six kilometers respectively. Given the uneven topography, these circles only approximate true distance. As Reinke has noted, the area between the inner and outer circles is much larger than that contained by the inner circle alone. Assuming a uniform distribution of population, per capita utilization rates in the outlying area would be much lower than the simple difference in the overall percentage of users indicates (Reinke, no date).

Table 6-20 presents another measure of physical accessibility--one-way travel time. The results are similar to those for the distance travelled. Between 75 and 90 percent of all service users travelled one hour or less. In Glagah, most sub-center users travelled less time than health center users. In Beran this was reversed for the group travelling 1/2 hour or less, although when those travelling 1/2 to 1 hour are included, the proportions are about the same.

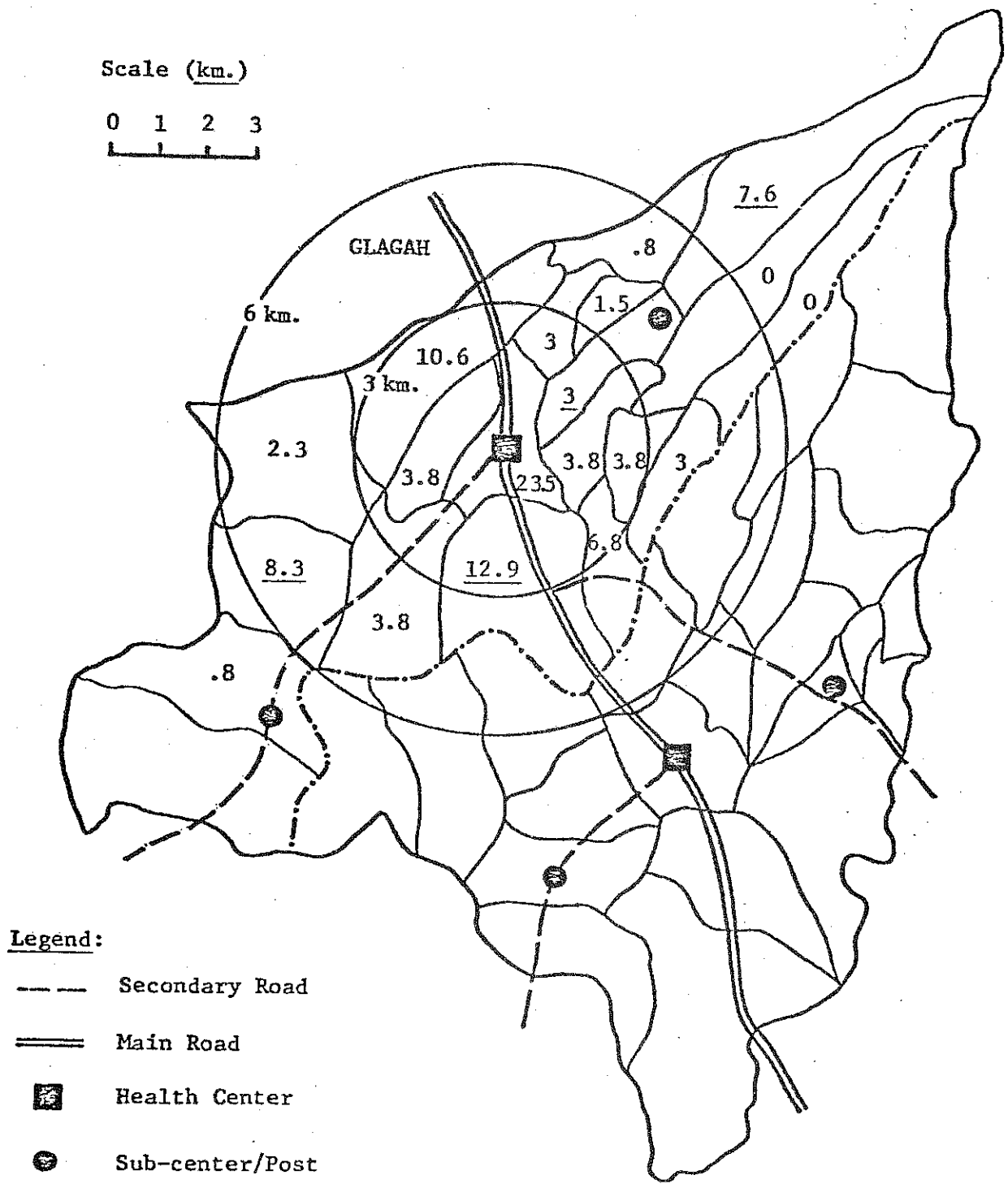
Time travelled to the source of services reflects the combined effect of several factors, including distance, availability of transport, and income. Virtually all patients interviewed at the health centers travelled by one of three modes: walking, minibuses, or motorcycles. Motorcycles were available for hire as public transport (ojek) as well as owned and used by individuals. Table 6-21 shows the mean distance reported, mean travel time, and mean expenditure on transportation for the three modes of travel. It is clear that use of the minibuses results in lower travel time for greater distances than walking in both areas. The average one-way cost was about 70 Rupiah ($0.12). A clinic visit cost 150 Rupiah ($0.25), which includes medicines if they are available. For comparison, agricultural laborers in Glagah and Beran were paid about 500 Rupiah ($0.83) for a full day of work.

The household survey data provide some additional examples of how distance influences service utilization. The survey was conducted in four randomly selected hamlets in each sub-district. The health service utilization behavior of each hamlet's population reflects not only individual and household factors, but also a particular physical location, i.e., proximity to roads, difficulty of terrain, distance to health center and sub-centers, etc.

TABLE 6-19. CLINIC VISITS TABULATED BY DISTANCE TRAVELLED

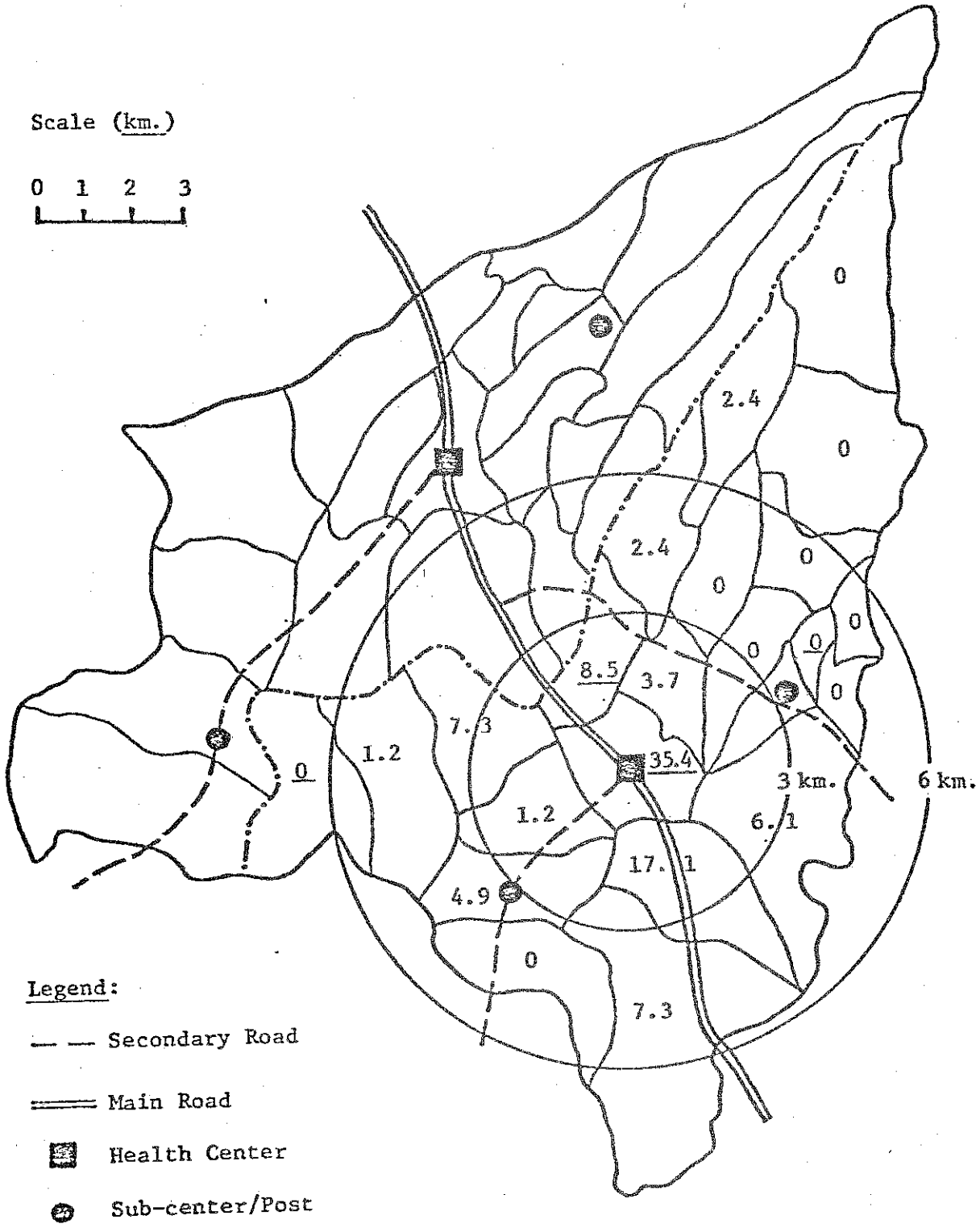
	Health Center		Sub-Center		Total
	Illness Care	MCH/FP	Illness Care	MCH/FP	
Glagah: Percent of Patients by One-Way Distance Travelled					
<3 km.	58%	58%	87%	-	63%
3-6 km.	28%	33%	12%	-	27%
>6 km.	13%	9%	0	-	9%
n =	75	80	31		186
Beran: Percent of Patients by One-Way Distance Travelled					
<3 km.	48%	53%	66%	50%	53%
3-6 km.	38%	29%	34%	28%	34%
>6 km.	14%	15%	0	21%	12%
n =	56	34	27	14	131

Figure 6-3. PERCENTAGE OF HEALTH CENTERS USERS FROM EACH VILLAGE - GLAGAH (n = 132)



NOTE: The hamlets surveyed are indicated by underlined numbers.

Figure 6-4. PERCENTAGE OF HEALTH CENTER USERS FROM EACH VILLAGE - BERAN (n = 82)



NOTE: The hamlets surveyed are indicated by underlined numbers.

TABLE 6-20. TRAVEL TIME TO ILLNESS CARE AND MCH/FP SERVICES

Time Travelled One-Way	Percent of Patients for Each Type of Service				
	Health Center		Sub-Centers		
	Ill Care	MCH/FP	Ill Care	MCH/FP	All
		Glagah			
up to 1/2 hour	61%	60%	71%	-	62%
1/2 - 1 hour	20%	17%	10%	-	17%
1 - 2 hours	14%	16%	15%	-	15%
more than 2 hours	6%	9%	3%	-	7%
n =	74	79	31	-	184
		Beran			
up to 1/2 hour	67%	50%	48%	36%	56%
1/2 - 1 hour	22%	24%	37%	43%	29%
1 - 2 hours	7%	21%	15%	14%	13%
more than 2 hours	4%	-	-	7%	2%
n =	58	32	27	14	131

TABLE 6-21. AVERAGE TIME AND COST OF TRAVEL TO HEALTH CENTER FOR DIFFERENT TYPES OF TRANSPORTATION

Type of Travel	n	Mean Distance (Kilometers)	Mean Travel Time (Hours)	Mean Travel Cost (Rupiah)
		Glagah		
Walk	127 (69%)	2.8	1.1	0
Minibus	50 (27%)	4.3	.7	77
Motorcycle	5 (3%)	4.0	.5	-*
		Beran		
Walk	78 (60%)	3.0	.9	0
Minibus	49 (37%)	4.8	.8	63
Motorcycle	3 (2%)	1.7	.5	-*

*Motorcycles were both owned privately and available for hire. It was not possible to attribute accurate costs for the use of motorcycles, but those costs are assumed to be greater than the use of public transport.

Table 6-22 describes briefly the location of four of the hamlets studied and shows the proportion of illness cases that sought treatment at the health center or sub-center. These hamlets provided the most striking example of how location determines choice of clinic. For other hamlets, the differences in accessibility between alternative sources of treatment were not as stark.

Table 6-23 presents a similar example for MCH/FP services in the two sub-districts. For these hamlets, the health center was the only accessible source of MCH/FP services. The decline in utilization rates at the greater distances is dramatic.

Access to services is also affected by patients' ability to combine care-seeking with other activities. In both sub-district towns, markets were held twice every five days. The health center in Glagah is just next to the main market, which is also the larger market of the two. In Beran, the health center is located about 500 meters from the market. In Glagah, one of the regular market days was known as the "big" market, the other as the "little" market. Average attendance for illness care services on non-market days was 36 patients. On "big" market days it was 121 patients and on "little" market days 63 patients. Thus, patients are much more likely to seek services when they are planning to be near the clinic for other reasons.

Severity of Illness and Age of Patient

Respondents reporting illness in the household survey were asked to assess their illnesses as severe (Rank = 1), moderate (Rank = 2), or mild (Rank = 3). Table 6-24 presents the mean "severity score" for those reporting different sources of treatments. (Note that a high score indicates the illness was assessed as less severe.) In both sub-districts on average, respondents who sought treatment from health center, sub-center, or private practitioner considered their illnesses more severe than those who sought treatment through "traditional" remedies.

Another factor that might influence service use is the age of the patient. It was felt that, because of the cash expenditures required to procure modern services, households might be more likely to seek those services for some members rather than others. Table 6-25 shows the proportion of sick individuals using different types of treatments. Because of the relatively small number of illness cases, health center and sub-center users are combined in a single category--"modern public" services.

Table 6-25 shows that in both sub-districts, children under five years of age have the highest percentage of clinic use and adults 26 to 45 years old have the lowest. For private services (mainly paramedic and physician visits and some hospital use), the ranks are reversed, with children having the lowest level of use and adults 26 to 45 the highest. These results suggest that there is some influence of age of patient on

TABLE 6-22. EXAMPLES OF HOW VILLAGE LOCATION INFLUENCES CHOICE OF CLINICS

Village	Description of Location	No. of Cases	Percent to HC	Percent to SC
	Glagah			
1	Located just off main road less than 1 km. from the health center	59	46	0
2	Located on unpaved village road about 5 km. from the health center but only 1 km. from the health post. However, post only open one in five days.	76	18	18
	Beran			
1	Located off paved road, 2 km. from sub-center, but 10 km. from health center	57	0	12
2	Located in sub-district town, about 1 km. from health center	95	14	0

TABLE 6-23. PROBABILITY OF USING MCH/FP SERVICES AT THE HEALTH CENTER FOR THE VILLAGES NEAREST AND FARTHEST FROM THE CENTER

	Village Nearest to Health Center	Village Farthest from Health Center
	Glagah	
Population surveyed	398	386
Number of MCH/FP visits in last month	17	3
MCH/FP visits per 1,000	42.7	7.8
	Beran	
Population surveyed	353	312
Number of MCH/FP visits in last month	12	3
MCH/FP visits per 1,000	34	9.6

TABLE 6-24. AVERAGE SEVERITY OF ILLNESS SCORE FOR DIFFERENT TYPES OF TREATMENT

Type of Treatment	Mean Severity Score* (n in parentheses) Glagah	Beran
None, home remedy, traditional only	2.34 (152)	2.16 (201)
Health Center	1.83 (57)	1.75 (28)
Sub-center/health post	1.89 (18)	1.78 (23)
Private practice	1.77 (29)	2.02 (45)
All	2.19 (256)	2.09 (295)

*Lower score means illness considered more severe.

TABLE 6-25. TREATMENT ACTIONS FOR DIFFERENT AGE GROUPS

Type of Treatment	Percent of Patients in Group Using Treatment Age Group				
	0-5	6-15	16-25	25-45	over 45
		Glagah			
None, home remedy, traditional only	60	62	65	63	65
Modern public (HC and SC)	35	28	28	16	24
Modern private	4	9	7	21	11
All	99	99	100	100	100
n =	48	53	43	63	54
		Beran			
None, home remedy, traditional only	73	70	63	66	71
Modern public (HC and SC)	23	16	20	10	17
Modern private	4	14	18	24	12
All	100	100	101	100	100
n =	48	63	40	80	66

choice of treatment. The frequency of use of "traditional" remedies was about the same for all age groups.

Summary

Several perspectives on health service utilization and coverage in Glagah and Beran were provided in this chapter. The utilization records of the health centers, sub-centers, and health post indicated a large difference in both the overall levels of utilization and in the distribution of those patient contacts within the two delivery systems. The services in Glagah reported twice the patient contacts as those in Beran, and those contacts were mainly at the health center, not at the sub-center and post. The lower level of contacts in Beran showed up mainly in low health center use, with the two sub-centers in that area having higher utilization than those in Glagah. These differences were found in both illness care and MCH/FP services.

Rough estimates of population coverage with illness care and MCH/FP services were made by relating utilization figures to the populations of the two areas. However, the patient survey data indicated two serious problems with this method. First, many more patients at the Glagah health center were coming from outside that district than in Beran. In fact, many were coming from Beran. This reflects the different economic importance and history of the two towns. Second, patients in Glagah were far more likely to use services several times for the same problem. This may reflect a higher quality of care in Glagah than in Beran. The utlization data were corrected for these differences. Although this revision reduced the large difference in utilization between the two sub-districts, Glagah still had a significantly higher utilization rate than Beran. The different levels of use for health centers and sub-centers were still apparent.

Data on incidence of illness and the mix of reported illnesses was presented from the household survey in the two sub-districts. Beran had a higher incidence rate, reflecting seasonal factors and a possible real difference as well. The mix of different types of illness was approximately the same in the two areas. Incidence rates by age followed the expected "U"-shaped pattern. There was a positive correlation between incidence of illness and socio-economic status in both sub-districts. This probably reflects the higher number of young children found in high income households, since young children tend to have more illness. Both areas had the same proportions of illnesses assessed severe, moderate, and mild by respondents. These similarities in the correlates of illness strengthen the equity analysis in Chapter 7 by showing little difference in the characteristics of ill individuals in the two sub-districts.

Approximately the same percentage of households reported some contact in the previous month with the public health service. When

individual contacts were related to specific target groups (illness cases for illness care, age cohorts of women and children for MCH/FP), services in Glagah had significantly higher coverage. Utilization data from the households supported the analysis of the health service data showing that patients in Glagah used the health center more, whereas those in Beran tended to use the sub-centers.

The VHW program studied in Glagah showed very high rates of coverage--reaching 67 percent of all households with some service during the previous month and weighing 71 percent of all children under five.

The household survey data were also used to examine factors affecting access to services. The familiar effect of declining utilization rates with increasing distance was shown, with similar results for the related factor, travel time. The option of substituting travel expenditures for travel time was demonstrated with data from the health service patients.

In addition to these factors, illnesses assessed as more severe by respondents were more likely to be brought to "modern" services. Illnesses of young children had a higher probability of being taken to the public clinics, while those of adults were more likely to be brought to private practitioners.

In sum, this chapter has provided a detailed description of two health service delivery systems and their utilization. Despite similarities in overall structure, major differences in utilization were shown. In addition, characteristics of location, households, and individuals were shown to be significantly related to overall utilization of services and to the choice of service units within the public sector.

CHAPTER 7

EQUITY IN THE UTILIZATION OF PRIMARY HEALTH CARE IN GLAGAH AND BERAN

Attaining "Health for All by the Year 2000" requires extending the benefits of modern health care to people currently not served. Low income people in the rural areas of LDCs benefit less from modern health care than their better-off neighbors or than people living in urban areas. To reach these people, primary health care must be organized in ways accessible and acceptable to them. This task falls primarily to the public sector, since private health services have not met this large unfulfilled need.

Equity in health service use occurs when utilization is determined primarily by the need for care, and not by individual characteristics such as income. However, different parts of the health service system tend to reach different groups in the population. Private health care is often accessible primarily to better-off individuals. In such cases, public health services bear a special responsibility for reaching low income beneficiaries. To assure equity in health service coverage for the population as a whole, public services might actually need to be biased towards low income patients. That is, some inequity (a bias towards underserved groups) might have to be built into some parts of the health service system to correct inherent biases in other parts.

This chapter examines the effect of income on utilization of modern health services in Glagah and Beran. Three questions are investigated. First, is income an important determinant of health service utilization? That is, is there inequity by income groups in service use? Second, can any differences in utilization for different income classes be associated with different modes of health service organization such as health centers, sub-centers, VHWs, and private services? Are the poor more likely to use some types of service organization than others? And third, can "income biases" in service utilization provide guidance for developing strategies to improve the social distribution of services?

The data on equity in service use are presented in two parts. The first section provides measures of utilization and coverage with illness care and MCH/FP services for the different income classes. These results show descriptively the size and pattern of differences in service use by income. The second section presents multivariate logit regression models predicting the probability of individual use of specific sources of treatment. These models validate the descriptive data on equity by demonstrating income as a determinant of utilization behavior controlling for other important factors. The estimated regression models are also used to explore the implications of equity differences for the utilization behavior of low and high income beneficiaries. The policy implications of these findings are discussed at the end of the chapter.

Causes of Inequity in Glagah and Beran

The goals of this study relative to equity are mainly descriptive: to show the extent of income-related inequity and its association with the organization of priamry health care. An analytical model of the factors causing health service utilization is implicit in this enquiry. If there is inequity by income group, how does income influence health service use?

Chapter 2 reviewed economic, sociological, and anthropological approaches to the study of health service utilization. Those approaches were synthesized in a multi-stage model of the determinants of service use behavior in the last section of that chapter. That model must now be adapted to the data available from Glagah and Beran.

Service use is determined by three sets of factors: need, accessibility, and acceptability. Need includes both the biological need for care as well as the perception of need on the part of the potential patient.

Accessibility refers to the income and price factors determining service use. Treatment usually requires a direct outlay of cash for care, drugs, and possibly transportation. Indirect costs are borne for the time required for travel and waiting. Income affects accessibility to the extent that potential clients can afford these direct and indirect costs at all. These costs also act as prices in affecting patients' choices to use services and, if they use them, to select a particular source of treatment. Distance to services, topography, availability of transportation, and clinic hours are all descriptive of accessibility and act as prices in the choice of treatment options.

Acceptability refers to the qualitative characteristics of particular modes of treatment that influence utilization. These include the perceived quality of services; whether they are considered appropriate or efficacious for the perceived need; whether services are pleasant, familiar, and reassuring to use; prestige value; etc. These factors are mainly "cultural" or "social" in that they depend on people's beliefs and social context.

These different sets of factors combine to produce the utilization of services that is the main indicator for equity in this study. It was not possible to collect complete data on each of these determining factors in Glagah and Beran. In addition, some factors are closely associated with income, so that one cannot always distinguish clearly between them in the analysis which follows.

Need and acceptability factors are the most difficult to measure in a large cross-sectional survey. Need was measured by enquiring about illness during the previous month in the household interview. It was not possible to do a medical examination. Thus, reported need reflects some unspecified combination of biological need and perceived need, the latter

determined by cultural factors. Similarly, general questions about the reasons for preference for particular sources of treatment do not give useful results in surveys in Java. Acceptability is implicit in the reported treatment behavior, not explicitly measured in the responses of those interviewed. Some insight into the perceived quality of service is drawn from analyzing treatment behavior in association with the perceived seriousness of illness.

Accessibility factors were measured more directly. These include the distance travelled to each source of care and household income, as measured by the index of possessions. Since the cash price of health center and sub-center services was the same, distance represents the indirect prices of use such as travel time and travel cost. There was little difference in waiting time between the two levels of care. Distance is expected to act as a typical price variable, that is, greater distances will discourage service use.

Interpretation of the meaning of income effects in this study is more complex, since equity is defined in terms of income but results from the interaction of need, accessibility, and acceptability factors. One effect of income is that poorer households are less able to afford the direct and indirect costs of using services. Low income individuals should be less likely to use health services and should be more responsive to distance. They are expected to prefer nearer sources of care within an overall lower level of utilization.

Perceived need and acceptability factors are also expected to differ between high and low income respondents. Health beliefs and preferences for particular characteristics of services such as size, formality, hours, etc., were not measured in the survey. However, it is argued here that they are reflected in different patterns of service utilization behavior for different income classes. The multivariate analysis in this chapter permits separation of income and price effects 1/ in the choice of source of treatment. Some of the observed income effect reflects the direct constraint of income on service consumption, and some reflects income's association with differences in need perception and acceptability. That is, the effect of income differences in producing different rates and patterns of service utilization includes the direct effect of income on purchasing power. It also includes the indirect associations of socio-economic status with health-related beliefs, perceptions, and preferences. These factors are hypothesized to operate together in determining the equity of service utilization.

It is not the goal of this study to refine understanding of the causes of inequity beyond this point. Such more detailed enquiry along the

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1/ The main price effect measured was the distance from residence to services, representing the cash or time price of travel. Services fees were constant for the different clinic-based outpatient services.

lines described in Figure 2-2 would be useful if the descriptive results presented here prove to have significant relevance for policy and planning.

Service Utilization and Coverage for Different Income Classes in Glagah and Beran

This section shows the utilization of services and coverage for the individual illness cases reported in the household survey grouped by income classes. Income is represented by two versions of the index of household possessions: the ITMSCL index and the POSS/ADLT index. The construction and justification of these indices of household possessions are described in Chapter 4.

Tables 7-1 and 7-2 show the proportion of illness cases in each socio-economic group making at least one visit to a helth center or sub-center/health post. Using both the ITMSCL and POSS/ADLT indices, it was found that individuals in the lowest social class had the lowest level of health service use. As income increases, so does the level of coverage with clinic services for illness care.

Table 7-3 presents the percentage of households in each income group that reported at least one MCH/FP contact in the month preceding the interview. Again there is a trend of increasing service use from low to high income class. These utilization figures combine pregnancy care, baby and young child care, and family planning visits. The number of individual MCH/FP contacts for each type of service reported in the household survey is too small to calculate reliable estimates of coverage for specific target groups such as children under five or women aged 15-45. Table 7-4 shows the number of individual contacts for all three types of services by the POSS/ADLT groups and the rate of contacts per 1,000 population in each group. These figures also include some cases of multiple visits for a single type of service. The positive association between social class and service use is still apparent.

These tabulations of income groups and service use support the hypothesis that poorer households use fewer clinic-based health services relative to their needs. Tables 7-5 and 7-6 address the question of how this income bias in service use relates to different components of the delivery system.

For the ITMSCL and POSS/ADLT indices, those illness cases reporting at least one clinic visit were divided into those using the health center and those using the sub-centers. For both sub-districts and both income class groupings, the highest class patients tended to use mainly health centers and reported little or no use of sub-centers.

In contrast, the lowest class patients favored the sub-centers and tended not to use the health centers. Table 7-7 shows the proportion of

TABLE 7-1. INDIVIDUAL ILLNESS CASES AND USE OF CLINIC SERVICES BY INCOME CLASS--ITMSCL GROUPING

ITMSCL		Number of Individuals	Number of Cases	Percent Using Clinic
		Glagah		
LOW	1	435	51	24
	2	638	113	29
	3	576	71	31
HIGH	4	164	26	33
All		1,813*	261	29
		Beran		
LOW	1	130	27	11
	2	455	109	17
	3	338	85	19
HIGH	4	299	81	20
All		1,222	302	18

*This and following aggregated sub-district data from the Glagah household survey are weighted sums of the observations from the four hamlets in Glagah. See Chapter 4 on sampling for details.

TABLE 7-2. INDIVIDUAL ILLNESS CASES AND USE OF CLINIC SERVICES BY INCOME CLASS--POSS/ADLT GROUPING

POSS/ADLT		Number of Individuals	Number of Cases	Percent Using Clinic
		Glagah		
LOW	1	521	63	16
	2	645	115	37
	3	450	49	22
HIGH	4	182	34	38
All		1,813	261	29
		Beran		
LOW	1	159	25	12
	2	314	73	15
	3	387	101	18
HIGH	4	362	103	22
All		1,222	302	18

TABLE 7-3. PERCENTAGE OF HOUSEHOLDS BY INCOME CLASS REPORTING AT LEAST ONE MCH/FP CONTACT IN PRECEDING MONTH

	Income Class			
	LOW 1	2	3	HIGH 4
		POSS/ADLT Scale		
Glagah	6	8	12	12
n =	(101)	(133)	(91)	(33)
Beran	3	3	8	8
n =	(29)	(59)	(80)	(75)
		ITMSCL Scale		
Glagah	7	5	14	13
n =	(92)	(132)	(109)	(24)
Beran	3	3	3	17
n =	(33)	(91)	(67)	(52)

TABLE 7-4. UTILIZATION RATES FOR MCH/FP SERVICES FOR DIFFERENT INCOME CLASSES

POSS/ADLT Group	Population	Total MCH/FP Contacts	MCH/FP Contacts per 1,000 Population
		Glagah	
1	521	8	15.4
2	645	20	31.0
3	450	17	37.8
4	182	5	27.5
		Beran	
1	159	1	6.3
2	314	2	6.4
3	387	6	15.5
4	362	12	33.2

TABLE 7-5. USE OF HEALTH SERVICES BY TYPE OF CLINIC AND INCOME CLASS--ITMSCL GROUPING

ITMSCL	Number of Cases	Percent with Health Center Visit	Percent with Sub-center Visit
		Glagah	
1	51	12	14
2	113	27	5
3	71	22	8
4	26	33	0
		Beran	
1	27	0	11
2	109	6	12
3	85	7	12
4	81	20	0

TABLE 7-6. USE OF HEALTH SERVICES BY TYPE OF UNIT AND INCOME CLASS--POSS/ADLT GROUPING

POSS/ADLT	Number of Cases	Percent with Health Center Visit	Percent with Sub-center Visit
		Glagah	
1	63	6	10
2	115	29	10
3	49	20	2
4	34	22	0
		Beran	
1	25	0	12
2	73	7	8
3	101	7	11
4	103	16	6

TABLE 7-7. PROBABILITY OF USING HEALTH CENTER OR SUB-CENTER FOR INDIVIDUALS USING CLINICS

	Probability of Using:					
	Glagah			Beran		
POSS/ADLT	n	HC	SC	n	HC	SC
1	10	40%	60%	3	0	100%
2	45	73%	27%	11	45%	55%
3	11	91%	9%	18	39%	61%
4	13	100%	0	22	73%	27%

HC = health center
SC = sub-center

patients using clinic services in each group who used the health center or sub-center. Within their lower overall level of utilization, poorer patients tend to use the sub-centers. Higher levels of utilization by better-off patients are accompanied by a tendency to use health centers.

Thus, descriptive measures of equity show that low income cases use fewer health services relative to need than those from better-off households. Low income cases also appear to favor the smaller sub-centers over the district-level health centers when they do seek treatment, while higher income cases were more likely to use the larger units. Overall, service utilization is biased away from the poor, although some modes of service delivery appear to be used proportionally more by the poor than others.

A Multivariate Model for Assessing Equity Effects in Service Use

Tables 7-1 through 7-4 above demonstrate the bias towards better-off patients of illness care and MCH/FP services in Beran and Glagah. However, as shown in Chapter 6, other factors such as distance, age, and perception of illness are also associated with unequal coverage. These factors may be associated with income as well. Simply tabulating coverage rates for different groups in the population does not enable one to assess the net effect of income on utilization. These net effects can be analyzed in a multivariate model predicting health service use in which all the relevant factors are included.

This section has two goals. The first is to determine whether income affects the utilization of modern public health services independent of other locational, household, and individual factors and, if so, what is the direction and strength of that effect? In addition, we seek to determine the direction and strength of such an independent income effect on utilization within the modern public health system, that is, in the choice between use of health centers or sub-centers.

Variables Used in the Analysis

Income. Income affects health service utilization directly by determining a household's ability to pay for services and the secondary costs of using them, such as transportation and drugs. Low income households who are less able to afford transportation, may also be less willing to devote the time of productive household members to travel and waiting for health services.

Income also combines with other determinants of utilization, such as distance and travel time. The disutility of cash and time expenditures may be greater for low income households than for those with higher income. Differences in income may also be reflected in the perceived seriousness of illnesses brought to services. Lower income patients may use services only

for cases they perceive as more serious on average than those taken to services by higher income patients.

As mentioned above, income is also associated with a variety of belief and attitudinal factors that affect utilization behavior. These include perceptions of illness and the acceptability of different modes of health service organization.

The income variable in the regression equations is the POSS/ADLT version of the index of household possessions.

Distance as Price. The cost to patients of using services is made up of two components: monetary expenditures and time (Acton, 1973, Heller, 1976).

In Glagah and Beran, the fee for an illness care visit to a public clinic was 150 Rupiah, about 25 U.S. cents in 1981. This included the cost of medicines provided by the clinic pharmacy. Health center visits cost the same as sub-center visits. The clinic fees for MCH/FP visits varied, although they were never more than 150 Rupiahs. Repeat visits for baby care or to check contraceptive use were sometimes charged only 50 or 100 Rupiah ($.08 - $.16). Patients receiving medicines from a VHW were charged approximately their cost, usually 25 to 50 Rupiah ($.04 - $.08), with no charge for the service.

The cost of a private practice visit varied considerably, depending on the practitioner and the services provided. A visit to the home practice of a paramedic cost between 500 and 1,000 Rupiah ($.80 - $1.60). Several of the local paramedics also did home visits when requested. Such a visit might cost 1,000 to 2,000 Rupiah ($1.60 - $3.20), depending on the distance and time required to make the visit. The physician in Glagah charged about 2,000 Rupiah for a private consultation, whereas the physician in Beran charged only 1,000 to 1,500 Rupiah. Sometimes medicines would be provided as part of these private visits, but occasionally they would have to be purchased separately.

As shown in Chapter 6, the distance that patients had to travel to receive services interacts with the availability of transportation and their willingness and ability to pay for it to produce some combination of monetary or time costs. Money and time are substitute constituents of the price of travel to services. Another cost is the time spent waiting to be treated. Interviews with patients indicated little difference in average waiting time between the health centers and sub-centers. No data are available on waiting time for private practice visits.

The household survey did not include data on exact expenditures for services or on travel time and costs for individual service visits. However, since our main interest is in use of modern public services--health centers and sub-centers--this is not a serious omission. The cash price of an outpatient visit was the same for health center and sub-centers in both sub-districts. Since there is no variation in cash price, this variable will have no effect on utilization.

Similarly, we know the distance to health center and sub-center from each hamlet surveyed. Since household interviews were clustered by hamlet, we know the distance travelled by users of services. Travel time is a function of both distance and income, in that money can be substituted for time in the hiring of transportation. Thus, we shall argue that the major price determining modern public service use is the distance patients must travel. For poorer patients, distance works as a price mainly in terms of travel time to services and loss of income that may result. For better-off patients, distance is associated with higher transportation expenditures.

The distance to the nearest service point is used as a health service price variable. In analysis of the choice between health center and sub-center services, the ratio of their distances will be used.

Perceived Severity of Illness. Respondents reporting illness cases in the household survey were asked to rank them according to their own judgement of the seriousness of the illness. These rankings are included in the regressions as the "severity" variable. Illnesses ranked as severe were coded as "1," those as moderate were coded as "2," and illnesses described as mild were coded as "3."

The severity ranking can be used as a proxy variable for the perceived quality of care in the models describing the choice between alternative sources of treatment. Patients should bring illnesses they consider more serious to sources of care they consider higher quality.

Age of Patient. The descriptive analysis of determinants of service use in Chapter 6 indicated that the age of patients was associated with type of treatment. This will be included in the model as well.

Acceptability of Services. Potential users of health services make judgements about the technical appropriateness of specific types of treatment for their problem, the quality of care they may receive, whether they feel at ease in a particular care setting or with specific health personnel, etc. These judgements determine the acceptability of specific treatment options. Acceptability of services is represented in the regression models by the perceived severity of illness variable and income. The severity of cases brought to services reflects people's perceptions of the quality and potential benefits from treatment. Income is expected to capture differences in health beliefs and treatment strategies associated with household wealth and status.

It was apparent in Glagah and Beran that people frequently made distinctions between health problems that were appropriately treated in the "modern" health system and those that were not. Such indigenous illness classifications might or might not be related to biological aspects of disease. Recent anthropological research in a nearby region in Java has described how illnesses of children with seemingly identical diarrhea symptoms might be diagnosed as entirely different according to indigenous categories. One diagnosis might lead to treatment at a health

center, whereas another would require treatment by a traditional healer (Rienks and Iskandar, 1981). These indigenous categories clearly influence service use and are very hard to evaluate in a survey.

It is often assumed that smaller, decentralized health service units such as sub-centers are less formal and imposing than the larger health centers. This is felt to encourage poorer patients, who may feel out of place or embarrassed in using the larger facilities. In contrast, richer patients may desire to use the larger units and private medical practice as an expression of their prestige. Our observations in the health centers and sub-centers of Glagah and Beran confirmed that the smaller units maintained a more familiar atmosphere. Patients seemed to know the paramedics better, lines were shorter and less formal, and ancillary functions like registration and record-keeping were less imposing.

The prestige of using health centers or private practice and the cultural acceptability of sub-centers are probably strongly associated with income. The effect of any income variable in the model includes these factors.

Table 7-8 presents descriptive statistics on the independent and dependent variables used in the regresion analyses which follow.

Methods: Logit Analysis

Specification of a multivariate model was based in large part on the choice of dependent variables. There were two possibilities: measures of the actual frequency of service use by individuals or a binomial variable categorizing individuals according to whether they ever used a specific source of care for their reported illness. While the survey did record multiple contacts of respondents with specific sources of treatment, such contacts were the exception, not the rule. And no more than three contacts for any illness were recorded.

The binomial dependent variable was coded as "1" if an individual consulted a health center once or more than once for their illness, and "0" if they did not consult a health center--regardless of what other sources of care they used. This avoids the problem of having incomplete data on the total number of contacts reported in the household survey, since only three contacts were recorded. It also focuses more clearly on the choice of source of care rather than the quantity used.

There are three principal methods of using binary dependent variables in regression analysis (Maddala, 1983, Amemiya, 1981). The simplest is the linear probability model, which treats the limited dependent variable as any other dependent variable in an ordinary least squares equation. Several problems arise with this approach. Since the dependent variable takes only two values, the residuals are heteroscedastic, and the resulting coefficient estimates are inefficient, though they remain unbiased. The estimated regression is a straight line

TABLE 7-8. DESCRIPTIVE STATISTICS ON VARIABLES USED IN REGRESSIONS

Variable	Glagah n	Glagah Number = 1	Glagah Number = 0	Beran n	Beran Number = 1	Beran Number = 0
Dependent Variables						
Limited Model						
HC=1, SC=0	79	64	15	51	28	23
Full Models						
SC=1, other=0	245	17	228	291	23	268
HC=1, other=0	245	60	185	291	28	263
Private=1 Other=0	245	26	219	291	45	246

	Glagah n	Glagah Mean	Glagah Range	Glagah s.e.	Beran n	Beran Mean	Beran Range	Beran s.e.
Independent Variables								
Distance ratio (HC/SC)	75	3.0	.1-7	3.0	51	1.9	.16-5	1.5
Distance-HC (km.)	245	5.5	1-9	2.8	291	6.0	1-12	4.5
Distance-SC (km.)	245	4.2	1-10	3.3	291	4.5	2-6	1.4
POSS/ADLT (Rupiah '000s)	245	24.7	.3-283	34.8	291	49	1.5-531	66.6
Severity*	245	2.2	1-3	.75	291	2.1	1-3	.73
Patient age (years)	245	26.7	0-95	21	291	28.7	0-90	22.7

*The "severity" variable was coded as 1 = illness perceived as severe and 3 = illness perceived as mild.

connecting points equal at the y-axis to zero and one and passing beyond them. The y-values predicted by the regression can be interpreted as probabilities. However, probabilities greater than one or less than zero may also be predicted although they cannot be interpreted.

A second approach uses grouped data in which the zero-one dependent variables for individual observations are summed for each group and divided by the number of individuals in the group to give a group probability. Weighted least squares can then be used with the groups as the observations. The resulting estimates are unbiased and efficient when the weighting scheme is correct, although there is some discussion in the literature about how to choose the correct weighting scheme when the true group variances are unknown. Regardless of this point, a large number of groups and observations is needed to use this procedure. These were not available for this study.

The third technique involves transforming the dependent variable according to a specified probability density function and then estimating the transformed model. The two most commonly used functions are the normal distribution and the logistic function (called probit and logit analysis respectively). Lengthy discussions in the literature on the relative merits of the two forms can be summarized as follows:

> Because the cumulative normal distribution and the logistic distribution are very close to each other, we are not likely to get very different results using ... the logit or probit method unless the samples are large (so that we have enough observations at the tails) (Maddala, 1983, p. 23).

In addition, the logit form is simpler to compute and to use for prediction.

The logit model is specified as:

$$P_i = F(Z_i) = F(BX) = \frac{1}{1 + e^{-(BX)}}$$

where P_i is the probability that the "i"th individual will make a certain choice given the vector of independent variables X; B (beta) is a vector of constants; and e is the base of natural logarithms. Unlike the linear probability model, the logit model is non-linear and must be estimated using maximum likelihood methods.

Several applications of the estimated regression models are relevant to this study. First, the regression coefficients can be evaluated for their signs and statistical significance tests of difference from zero can be applied. This enables us to assess whether each independent variable has a separable effect on the dependent variable and the direction of such an effect.

Second, the estimated regression can be used to predict the probability of individual choice--the dependent variable--based on the values of the independent variables. The estimated values of (BX) for the "i"th individual could also be used to compute a predicted probability for that individual. This pedicted probability can be used to assess the fit of the model by comparing predicted values with the observed choices. It will be used here to predict the probability of health service utilization by "typical" low and high income individuals at different distances from health services.

Income as a Determinant of Utilization: Regression Results

Three sets of regression results are presented in this section. The first addresses the general question of whether income is an important determinant of modern public health service use. While the data presented in the first part of this chapter indicate that it is, the regression analysis will allow us to assess its effect while controlling for other variables associated with utilization.

The other two sets of results address the question of whether overall inequities in service use by income operate equally for different components of the delivery system or whether they can be associated with specific modes of health service organization. These issues are first examined using a sub-sample of the illness case data--only those cases that used either the health centers or sub-centers. The implications of these results are then explored for the whole population of illness cases recorded.

Income as a Determinant of Clinic Use

Tables 7-1 through 7-4 above showed that lower income individuals were less likely to use health centers and sub-centers than higher income individuals--both for illness care and MCH/FP. This effect was unambiguous using the ITMSCL index and not quite monotonic using the POSS/ADLT index although in both cases and both districts the poorest group had the lowest utilization rates.

Table 7-9 presents the results of a logistic regression on a dependent variable signifying at least one visit to any clinic for the reported illness. A value of one in the dependent variable represents use of a health center or sub-center, while zero represents use of any other type of services. The observations are all illness cases reported in the household survey in the two sub-districts. The independent variables were the distance to the nearest clinic in kilometers, income represented by the POSS/ADLT index value in rupiah, the self-assessment of severity score, and patient age in years. The regression predicts the probability of individual illness cases using clinic services.

TABLE 7-9. REGRESSION RESULTS: USE OF ANY PUBLIC CLINIC

Dependent Variable: 1 = use of any public clinic
0 = no use of any public clinic

Independent Variables	Estimated Coefficients (s.e.) Glagah	Beran
Distance to nearest clinic	-.350*** (.118)	.185** (.103)
Income	.007* (.004)	.004*** (.002)
Severity rank	-.887*** (.207)	-.970*** (.233)
Patient Age	-.019*** (.008)	-.005 (.007)
Constant	2.069*** (.588)	-.844 (.684)
n =	245	291
Clinic users	75	51

*** - p < .05
** - p < .10
* - p < .20

Significance levels in this and subsequent tables with regression results are based on "chi-squared" tests of each estimated regression coefficient. The probabilities represent the confidence of the test of the coefficient being different from zero.

The estimated regression coefficients support most of the relationships determined from the tabulated analysis. In both regressions, income has a positive sign. That is, the probability of using clinic services increases with income or there is an overall bias in public clinic use towards higher income patients. The coefficient on income was significant at $p < .20$ in both areas, and in Beran at $p < .05$. These results confirm the inequity in clinic use even controlling for the influence of distance, severity, and patient age.

Perceived severity of illness (coded as 1 = severe and 3 = mild) is strongly associated with clinic use, with illnesses felt to be more severe increasing the probability of clinic use significantly. This suggests that patients perceive clinic services as a resource in treating serious illness. Patient age is negatively associated with probability of clinic use, although the coefficient is only of significant size for Glagah. This supports the previous observaiton of higher utilization rates for children. Finally, the coefficient on distance has contradicting signs in the two areas, although we would expect a negative sign. The counterintuitive positive coefficient for Beran may reflect the unusually high levels of use observed in the most distant village surveyed. This was the hamlet that had just started the VHW illness care program mentioned in Chapter 6. Consciousness of health needs and services was unusually high at the time of the survey.

Income as a Determinant of the Choice of Clinic

The data presented in Tables 7-5 through 7-7 suggest that poorer patients are more likely to use sub-centers for illness care, whereas better-off patients are more likely to use the health centers. What factors could cause this difference?

We have seen that, overall, the poor are less likely to use health services. In addition, utilization rates decline as distance to a source of care increases. It is posited here that these two aspects, income and distance as a health service price, combine with acceptability factors to affect the choice of clinic for different income classes.

For those living close to the health centers, i.e., where distance is not a significant factor, poorer patients will demand less services than better-off patients. For those living farther from the health center but perhaps closer to the sub-centers, poorer patients, if they seek care, will be more likely to use the sub-centers in response to the distance constraint. Better-off patients should be less constrained by price and income factors. They have the option of choosing sub-center or health center, even where the latter would be significantly more expensive. Two additional factors might lead them to choose the health centers over sub-centers: first, they might perceive them as offering services of higher quality; and second, there may be some prestige associated with using the larger, more central clinic headed by a physician, even though, as we have noted, the physicians rarely treated patients. In contrast, poorer patients may feel more at ease in the less formal sub-centers.

These hypotheses concerning the determinants of utilization suggest certain patterns of behavior that we should observe in the data. As the distance from patients' residence to the nearest health center increases relative to distance to the nearest sub-center (i.e., as patients are relatively closer to the sub-center) lower income patients should use the sub-centers more than higher income patients. Poorer patients should begin to do this when the sub-center is only marginally closer than the health center and show increased preference for the sub-center as its distance relative to the health center decreases. In addition, if perceived quality of care is an important factor, we should see a higher proportion of illnesses considered more severe brought to the health centers. If this is not the case, one might by inference give more weight to the prestige factors in determining choice of clinic.

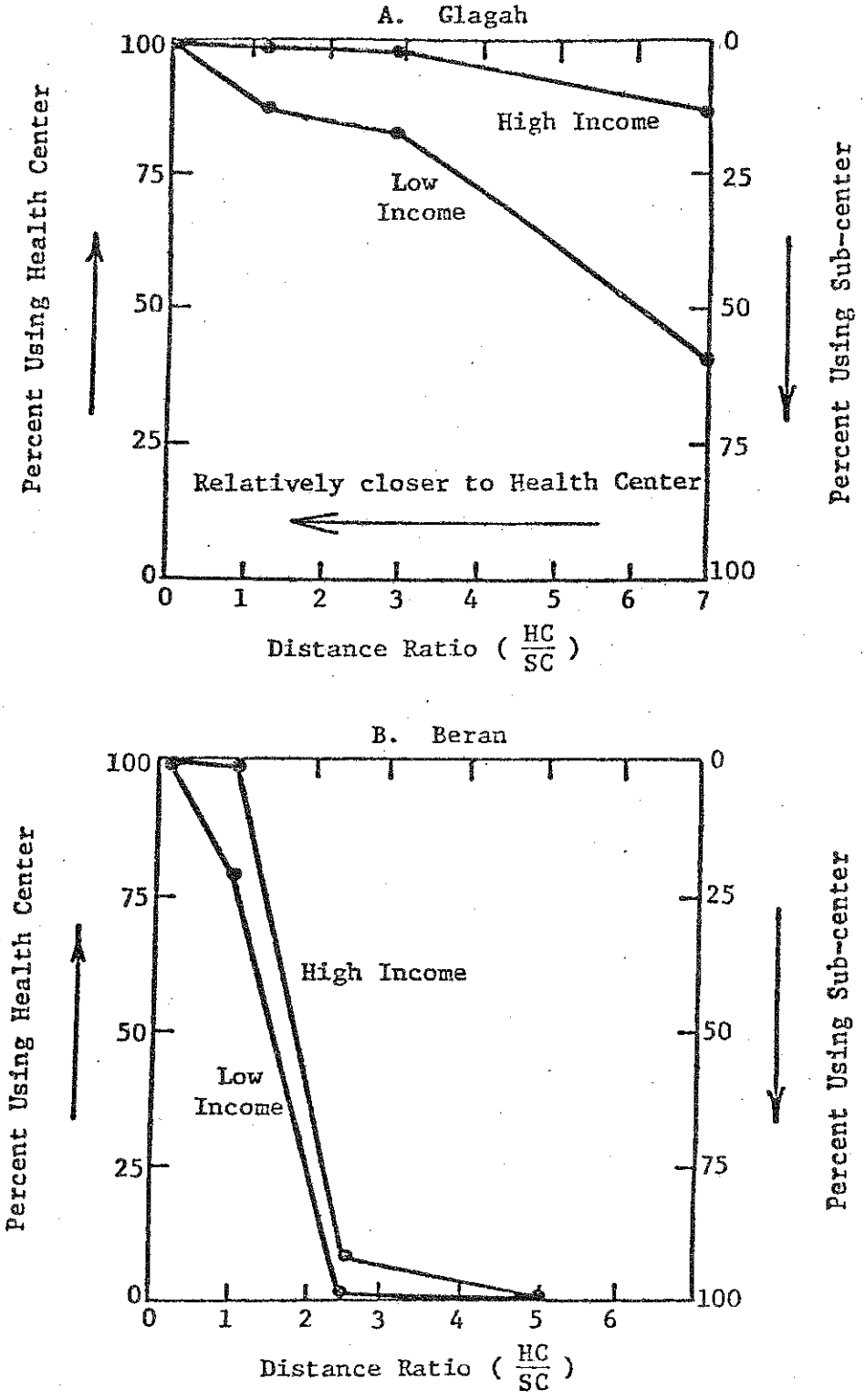
These hypotheses were evaluated in two ways. First, only illness cases reporting some clinic use (either health center or sub-center) were analyzed. These will be referred to below as the "limited" models. Analysis of this sub-sample of data focuses on the choice of clinic, since it uses only information from those who used modern public services and chose either a health center or sub-center. The second set of models (the "full" models) use all the reported illness cases. These models assess the importance of the various determinants of utilization with a sample of illnesses representing the whole sub-district's population. They assess the choice of a particular type of clinic versus any other source of care. While they gain information from the whole population of illness cases (and thus are more appropriate for deriving predictions about how changes in the delivery system might influence utilization) they do not focus as clearly on the choice between public sector alternatives.

Health Service Users and the Choice of Clinic: The "Limited" Models

This section presents data from those illness cases recorded in the household survey who reported at least one contact with either a health center or sub-center/health post.

The effect of distance on the choice between two treatment options is a function of both the absolute distance to treatment and the relative difference in distance between the alternatives. In order to clarify this effect, the distance variable was defined as the ratio of the distances (distance to health center divided by distance to sub-center) to the nearest health center and sub-center. Within the two sub-districts, the absolute distances were similar. Patients close to the health center tended to be between 5 and 10 kilometers from the nearest sub-center. The distances to the health center for those living close to a sub-center were similar. Figure 7-1 presents graphically the proportion of patients in the two lowest ("Low Income") and two highest ("High Income") POSS/ADLT groups who used either the health center or sub-center. The horizontal axes represent the distance ratio, with the left-hand side closest to the health center and farthest from the sub-center while the right-hand side is closest to the sub-center and farthest from the health center. There were

Figure 7-1. PERCENTAGE OF CLINIC ILLNESS CARE PATIENTS USING HEALTH CENTER OR SUB-CENTER BY INCOME GROUP AND DISTANCE RATIO



four levels of the distance ratio observed in each sub-district, representing the location of the four hamlets surveyed. The vertical axes in the graphs show the percentage of clinic users in each group. The percentage using the health center can be read from bottom to top (left-side axis) while the percentage using the sub-centers can be read from top to bottom (right-side axis).

These figues show the expected relationship between income, distance, and the choice of health center or sub-center. In the hamlets closest to the health center, all patients using clinic services from both income groups used the health center. As the distance ratio increases (hamlets relatively closer to the sub-center/health post) the lower income patients begin shifting to the sub-centers, while higher income patients continued to use the health centers. In those hamlets relatively closest to the sub-centers, the proportion of low income patients using those facilities is still higher.

Although both graphs support our hypotheses, the pattern of service use appears somewhat different in the two sub-dictricts. The data from Glagah show a strong differentiation between health center and sub-center users, with higher income patients using little or no sub-center services. In contrast, the data from Beran show a weaker difference in the pattern of use for the two income groups. At the two intermediate levels of the distance ratio a higher proportion of poorer patients use the sub-centers and the difference with higher income patients is not large. At the extremes of the distance ratio, all patients in both classes used the nearest source of care. These different patterns can be related to the structure of the delivery systems in the two districts. As shown in Chapter 6, in terms of staffing and facilities Glagah has a strong health center and weaker sub-center and health post while Beran has a weaker health center and stronger sub-centers. This is reflected in the district level utilization data. This difference in structure may also explain the different patterns of utilization observed in Figure 7-1. The more developed sub-center level in Beran may be more attractive at the margin to higher income patients than its weaker counterpart in Glagah.

Glagah and Beran lie at the extremes of the proportion of total service use accounted for by sub-centers when compared with the secondary data sample of 26 rural sub-districts in Chapter 5. Glagah has a low proportion of total contacts at the sub-centers, while Beran has a high proportion. The difference in the pattern of service use by low and high income patients is apparent despite this large difference in the importance of the sub-center/health post levels. This strengthens the finding of a real difference in utilization patterns by income class.

Table 7-10 presents the results of a logit regression model using the restricted sample of clinic users from both districts. In this model, the dependent variable equalled one if the individuals used a health center, and equalled zero if they used a sub-center. That is, the model predicts the probability of an individual using the health center, from a sample of all individuals who reported illness and used public clinics. The

TABLE 7-10. REGRESSION RESULTS: PROBABILITY OF HEALTH CENTER USE FOR HEALTH CENTER AND SUB-CENTER USERS ONLY

Dependent Variable: 1 = Health Center Use
0 = Sub-center Use

Independent Variables	Estimated Coefficients (s.e.) Glagah	Beran
Distance ratio (HC/SC)	-.593*** (.176)	-5.05*** (1.93)
Income	.096*** (.057)	.085* (.079)
Patient Age	-.018* (.019)	-.010 (.034)
Severity	-.756* (.778)	-.415 (1.18)
Constant	4.35** (2.48)	6.79* (4.14)
n =	79	51
Health Center users	64	28
Sub-center users	15	23

*** - p .05
** - p .10
* - p .20

independent variables are the distance ratio, income (the POSS/ADLT index), patient age, and perceived illness severity.

The positive sign on the income coefficient further strengthens the finding of a significant income effect determining choice of clinic. Both sub-districts showed a positive and significant coefficient on the income variable (p .05 in Glagah, p .20 in Beran), supporting the contention that the probability of choosing health center services increases with income even when other factors are controlled for. The negative coefficient for the distance ratio indicates a strong independent effect of the relative distance to clinics on use.

The coefficients on the perceived severity of illness ranking suggest that patients may not perceive a large difference in quality of care between health center and sub-center. While both coefficients had a negative sign, indicating a tendency to take more serious cases to the health center, the estimated regression coefficient in Glagah was barely significant at the p .20 level and the coefficient for Beran cannot be considered as significantly different from zero. If a strong difference in health center and sub-center quality were perceived, one would expect patients to bring more severe cases to the unit seen as of better quality. This apparent lack of perceived quality difference may indicate that prestige and other acceptability factors are more important in the choice of clinic.

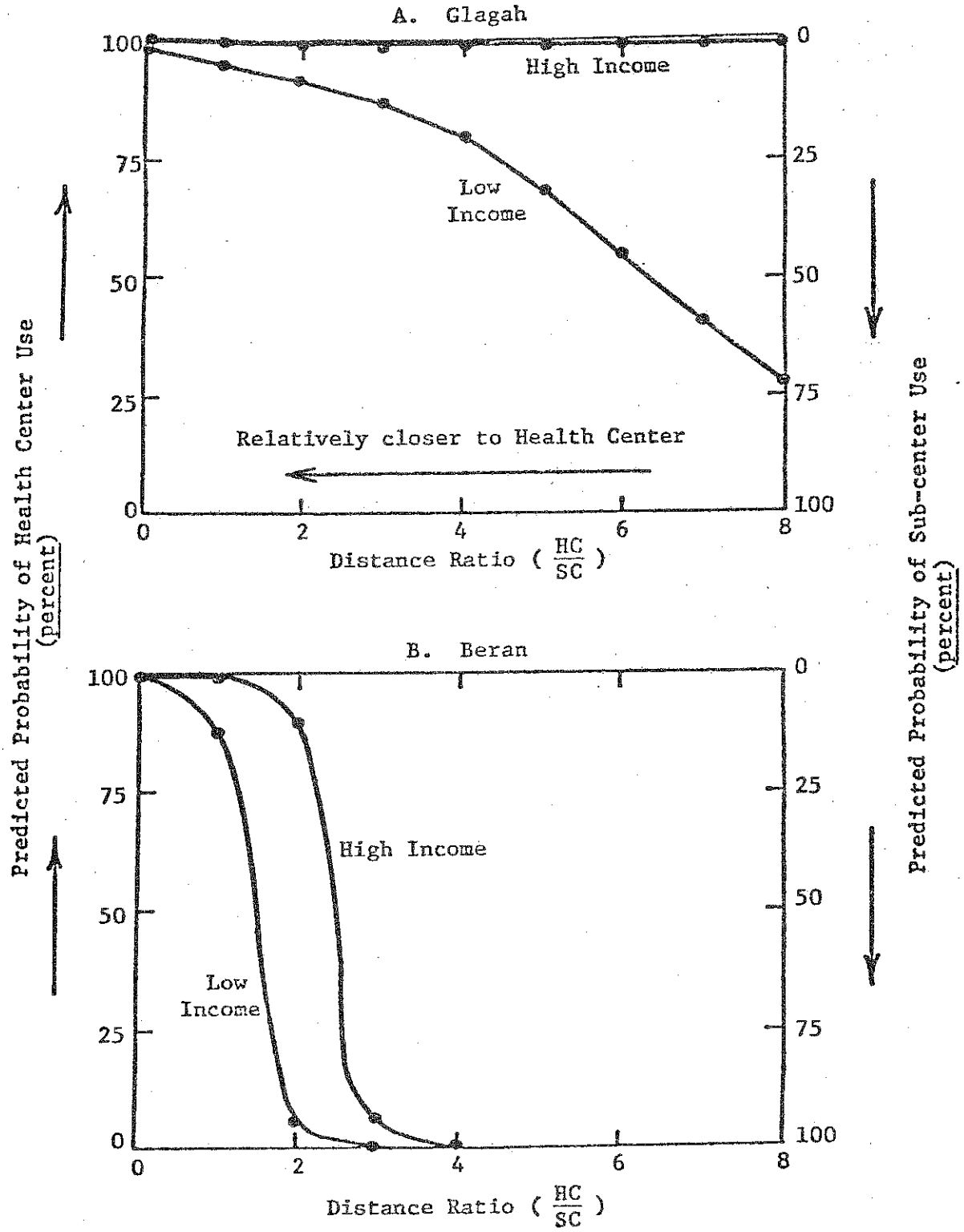
Figure 7-2 shows the probabilities predicted by the regression model of two hypothetical individuals' using health center or sub-center as the distance ratio increases. These predictions are calculated from the estimated regression coefficients, using the mean values for the POSS/ADLT, patient age, and other health center use variables for the two income groups used in Figure 7-1. This shows graphically the behavioral implications of the estimated regression model. It is clear how well these regressions fit the relationships presented in Figure 7-1. They predict precisely the behavioral pattern hypothesized and observed.

Health Service Users and the Choice of Clinic: The "Full" Models

The regression results from the "limited" models statistically validate the tabulated data on clinic users and support our hypotheses about the factors determining the choice of clinic. But they do not enable us to make strong inferences about the behavior of the districts' populations as a whole. The limited sample of only those individuals who used modern public clinics excludes information available on those using all other sources of treatment: private practice, traditional remedies, etc. The full models presented below use data from all illness case respondents. These cases are a statistically valid sample of each sub-district's population of illness cases at the time of the study.

Our findings thus far suggest that lower and higher income individuals behave differently in seeking modern clinic care and that this

Figure 7-2. PROBABILITY OF HEALTH CENTER USE PREDICTED BY LOGIT REGRESSION FOR HIGH AND LOW INCOME INDIVIDUALS WHO USED ANY CLINIC



difference is strongly associated with the type of service unit they use. One would expect to see this difference in the relationship between use of a specific source of care and the distance patients must travel. Figure 7-3 presents two hypothetical graphs showing how this relationship might look.

The first graph (A) shows the probability of health center use by low and high income patients as distance to the health center increases. One would expect that higher income individuals would use more health center services at all distances, and would come to the health center from farther away than lower income individuals. In the second graph (B), the significant income effect we have observed would result in a relationship opposite to that for the health center. Lower income patients might be expected to have higher levels of utilization at all distances and to keep going to the sub-center at greater distances than higher income individuals. One might call this a strong effect, as it includes not only the influence of income and distance/price, but also the supposed preference of lower income patients for sub-centers and higher income patients for the health center. Can we observe this effect in the data?

Figures 7-4 and 7-5 show the percentage of patients in each income group using the health center and sub-centers plotted against the distance in kilometers to each source of care. Again, there are four distance observations in each graph, representing the four hamlets surveyed in each sub-district. Figure 7-4 with the data from Glagah seems to show the strong relationship just discussed. Figure 7-5 from Beran is not as clear. The health center use graph (7-5a) shows the right configuration but the sub-center graph (7-5b) shows no clear relationship. The distance to sub-centers from the hamlets surveyed in Beran only varies from 2 to 6 kilometers.

Three regression models were run for each sub-district: a sub-center use model, a health center use model, and a private practice use model. Private practice includes private use of paramedics, physician, or hospital. Our main interest here is the determinants of health center and sub-center use. The private practice model was run for comparison. The dependent variables equalled one if the individual reported at least one contact with that particular source of care (health center, sub-center, or private practice) and zero if there was no contact. These models predict the probability of an individual's using a specific treatment source, regardless of what other types of treatment they may also have used. The independent variables in the models were the absolute distances in kilometers, income (POSS/ADLT), patient age in years, and the severity ranking.

Table 7-11 presents the regression results from Glagah and Beran. Sub-center and health center models show the expected negative coefficient on the distance variables. The distance variable in Beran for the private practice regression is also negative although for Glagah it is positive but not significantly different from zero. In general, distance is shown to be an important factor in discouraging service use.

Figure 7-3. HYPOTHETICAL UTILIZATION CURVES FOR HEALTH CENTER AND SUB-CENTER

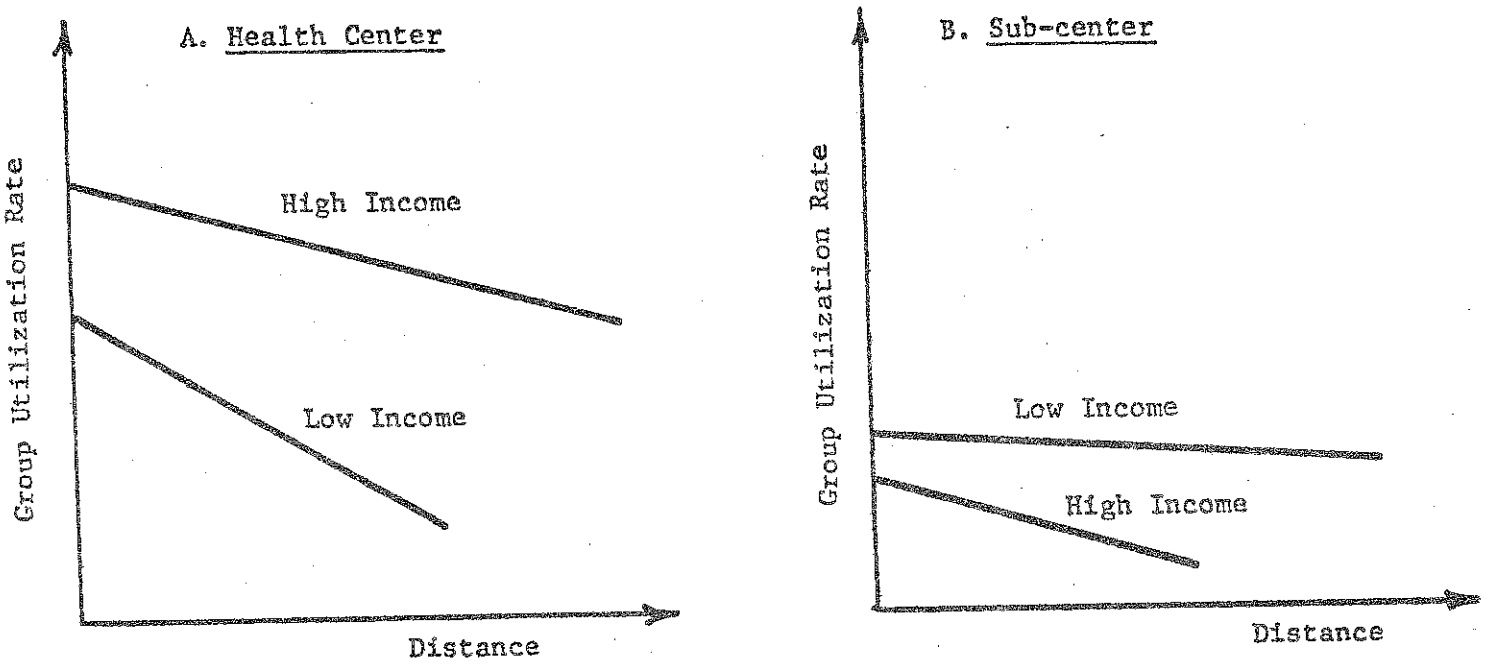
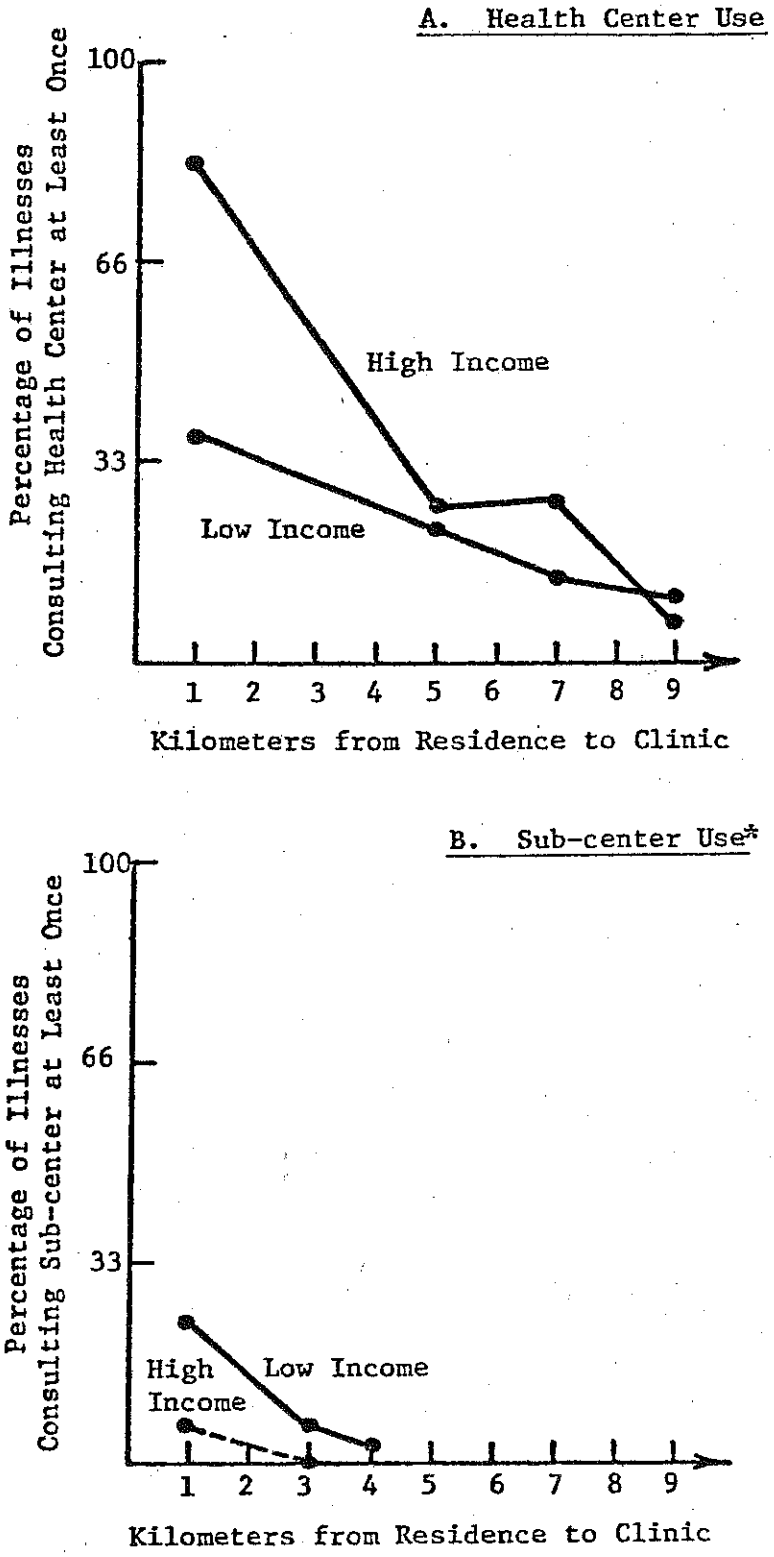
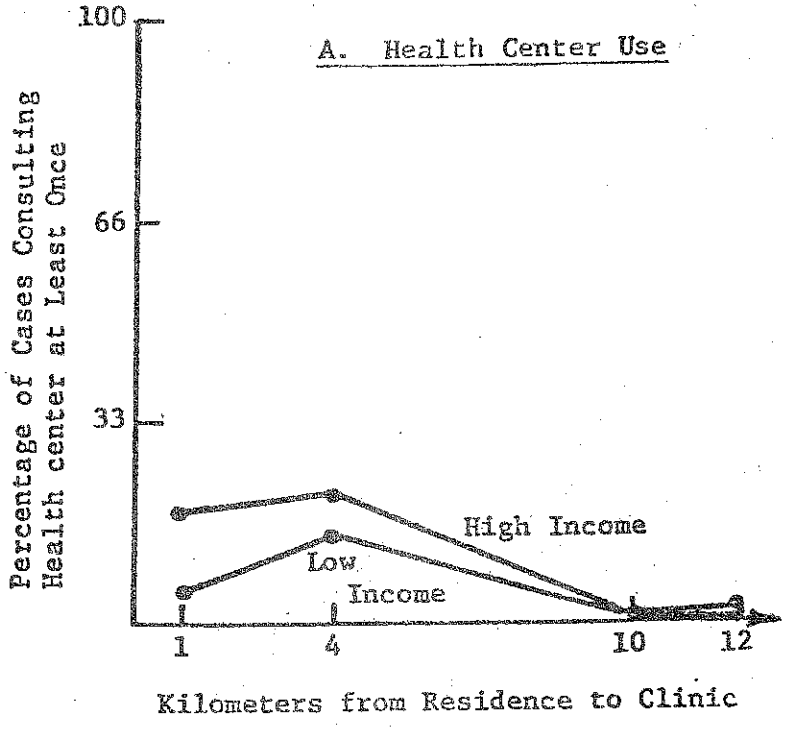


Figure 7-4. RATE OF HEALTH CENTER AND SUB-CENTER USE BY DISTANCE - GLACAH



*Missing observations had zero utilization.

Figure 7-5. RATE OF HEALTH CENTER AND SUB-CENTER USE BY DISTANCE - BERAN



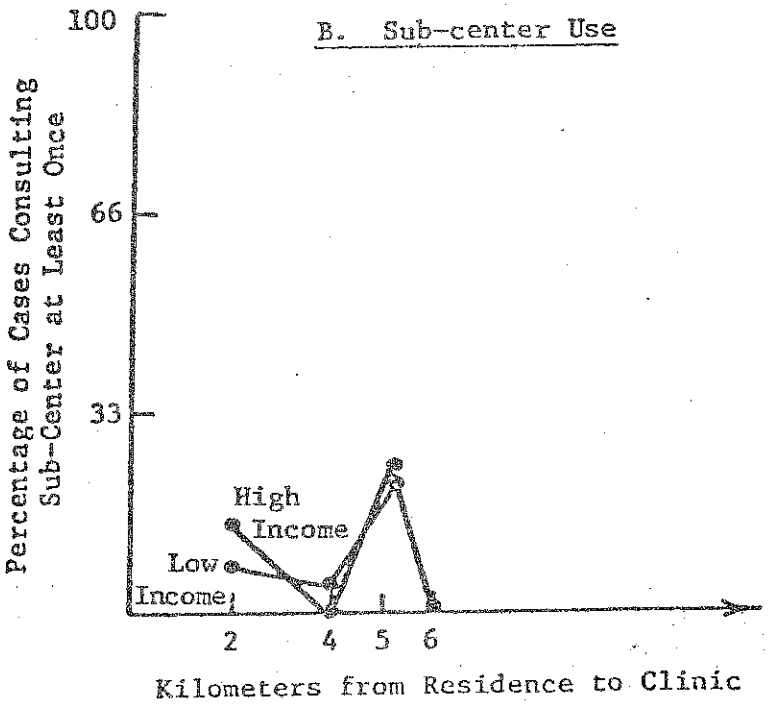


TABLE 7-11. REGRESSION RESULTS: SUB-CENTER USE, HEALTH CENTER USE, AND PRIVATE PRACTICE USE IN GLAGAH AND BERAN

Estimated Coefficients
(s.e.)

	Glagah			Beran		
Independent Variables	SC Use 1 = SC 0 = other	HC Use 1 = HC 0 = other	Private Use 1 = Private 0 = other	SC Use 1 = SC 0 = other	HC Use 1 = HC 0 = other	Private Use 1 = Private 0 = other
Distance	-.758***	-.213***	.124	-.092	-.218***	-.248***
	(.268)	(.06)	(.166)	(.167)	(.067)	(.11)
Income	-.079***	.0078**	.015***	-.015*	.0046***	.006***
	(.041)	(.004)	(.006)	(.010)	(.002)	(.002)
Patient Age	.0065	-.027	.011*	-.018**	-.001	.007
	(.012)	(.008)	(.010)	(.010)	(.008)	(.007)
Severity Rank	-.764**	-.740***	-.711***	-.703***	-.928***	-.288
	(.414)	(.225)	(.306)	(.325)	(.314)	(.237)
Constant	1.752*	1.92***	-1.805***	.307	.249	-1.011**
	(1.29)	(.625)	(.827)	(1.089)	(.766)	(.691)
n =	245	245	245	291	291	291
Users	17	60	26	23	28	45

*** - $p < .05$
** - $p < .10$
* - $p < .20$

The estimated coefficients for income are most interesting. In both sub-districts, the coefficient in the sub-center equation was negative, in the health center equation positive, and in the private practice equation positive also. All of these coefficients were significant at the $p < .20$ level or lower, with most of them at $p < .05$. The negative coefficient on income for sub-center use and the positive coefficient for health center and private practice use are strong evidence of an equity difference in use of modern health services, controlling for other factors affecting use. In economic terms, this suggests that sub-health center services are an "inferior good," i.e., the demand for that good is negatively correlated with income, while health center and private practice services are "normal goods," i.e., demand for them is positively correlated with income. These results strongly support the contention that sub-centers are more likely to serve low income patients.

The coefficients on the severity ranking are almost all significantly negative signifying the tendency to bring illnesses felt to be severe to modern services of all kinds. This is important in contrast to the non-significance of the severity ranking in the limited model. This suggests that patients perceive modern services as able to provide efficacious care, but may not perceive large differences in efficacy between health center and sub-centers.

One possible source of confounding in factors determining clinic use would be differences in the perceived severity of illness by patients in different income classes. Table 7-12 shows there is little significant difference in the probability of perceiving illness as serious by different income groups. Low income households were as likely (Glagah) or more likely (Beran) to perceive illness as serious than high income households. This suggests that the tendency of low income patients to use sub-centers and high income patients to use health centers occurs within a similar mix of perceived seriousness of illness.

As in the limited model, the estimated regressions can be used to predict a probability of utilization curve for representative individuals in low and high income groups. These are shown in Figures 7-6 and 7-7 for the health center and sub-center models in the two sub-districts. These figures reflect the predicted behavior estimated by the data in the four regression models.

The predicted probabilities of utilization from Glagah match the strong relationship hypothesized in Figure 7-3. Higher income individuals have a higher probability of using the health center over longer distance than lower income individuals. The relationship is reversed for sub-center use.

The predicted probabilities from Beran show the same relationship as those from Glagah. The sub-center use curves show a sizable difference in probability of use, with low income patients having a much higher probability of use at all distances. The difference in the predicted probability of health center use for low and high income individuals in

Table 7-12. PERCEIVED SEVERITY OF ILLNESS FOR DIFFERENT INCOME CLASSES (HHPOSS)

Income Group	n	Percent of Individual Illness Cases			
		Severe	Moderate	Mild	
		Glagah			
Low	162	21	40	40	100%
Middle	60	20	40	40	100%
High	35	20	43	37	100%
		Beran			
Low	67	24	54	22	100%
Middle	156	27	41	32	100%
High	72	14	47	39	100%

Figure 7-6. PROBABILITY OF HEALTH CENTER AND SUB-CENTER USE PREDICTED BY LOGISTIC REGRESSION FOR REPRESENTATIVE INDIVIDUALS, GLAGAH

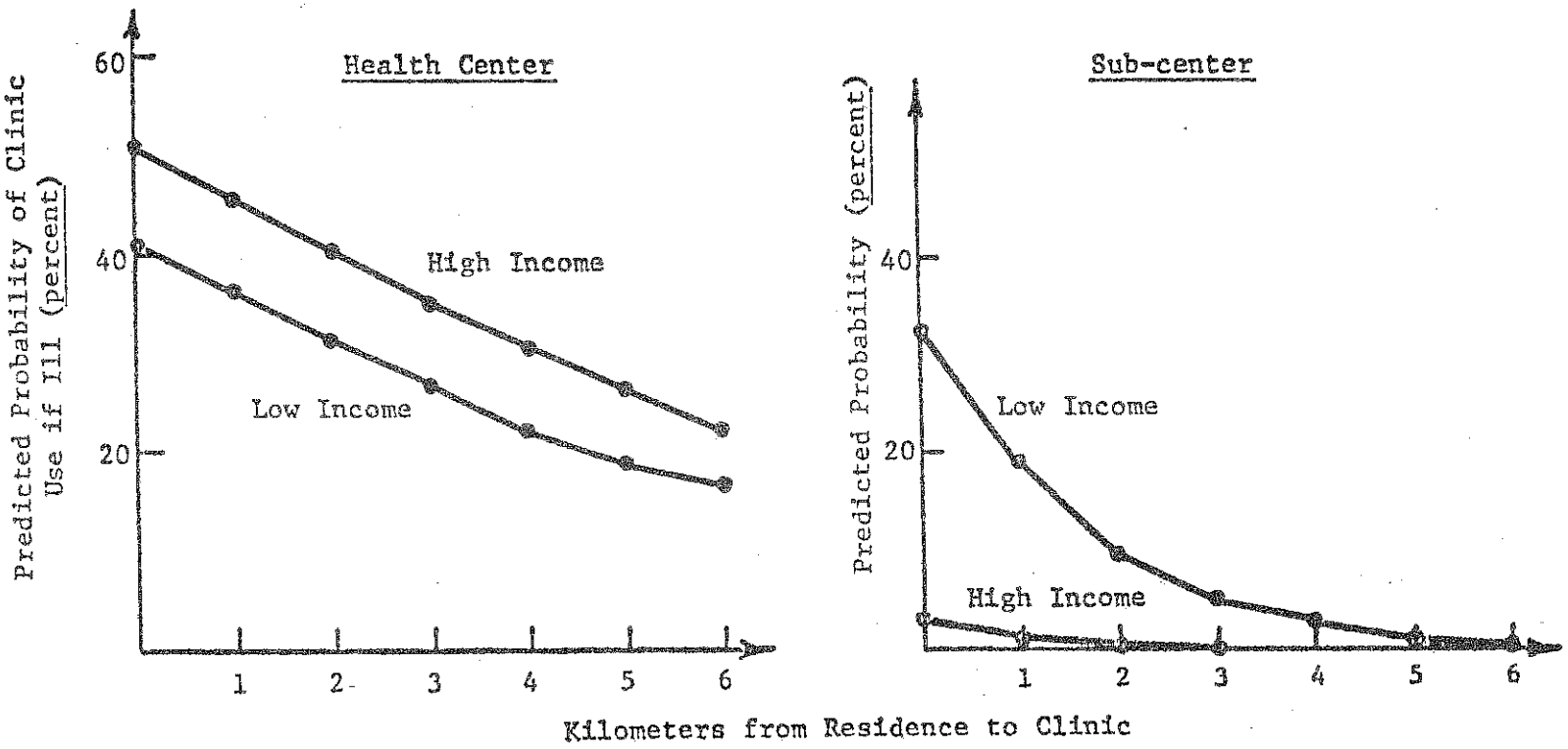
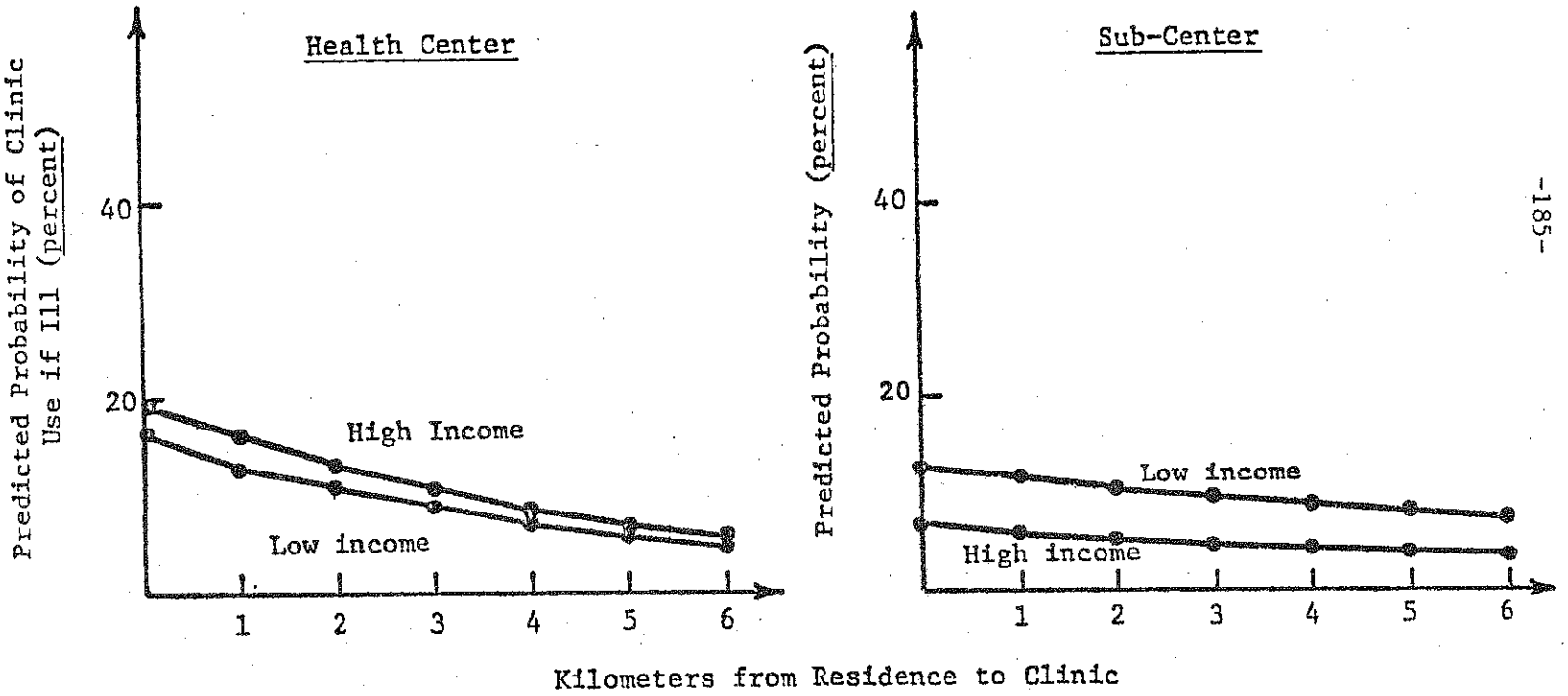


Figure 7-7. PROBABILITY OF HEALTH CENTER AND SUB-CENTER USE PREDICTED BY LOGISTIC REGRESSION FOR REPRESENTATIVE INDIVIDUALS, BERAN



Beran is much smaller, however, and may not be statistically meaningful. As in the limited model case, the difference in structure between the two delivery systems may explain the difference in strength of the estimated equity effect. Nonetheless, the behavioral predictions support the proposition that income significantly determines choice of clinic, as well as the observed tendency of poorer patients to use sub-centers over health centers.

The main market in each sub-district was located close to the health center. Patients could amortize the travel costs to health center services by combining visits to the health center with use of the market. Table 7-13 shows the proportion of all illness care health center patients in the three HHPOSS classes (from the patients interviewed at the clinics) using the health center on a market day or a non-market day. Low income patients had the highest probability of visiting the clinic on a market day. Thus, they have a higher probability of using the trip to the sub-district town to attend both the market and the health center. In other words, the observed probability of their using the health center includes the combined probability of some patients using both the health center and market. Low income patients were more likely to combine these trips than high income patients. This suggests that the difference in probability for each income group using the health center and sub-center alone may be even greater than shown by the regressions. This observation strengthens the difference in utilization behavior by income group observed in the descriptive and multivariate analyses.

The graphs of predicted probabilities in Figures 7-6 and 7-7 show the probability of clinic use by low and high income cases declining approximately at the same rate. That is, the curves are parallel. However, the relationship hypothesized in Figure 7-3 shows the curves for low and high income cases differing both in slope, the rate of decline, and intercept, the probability of clinic use when distance is minimal. The curves already presented from the estimated regressions demonstrate that low and high income patients have different patterns of clinic use. Additional runs of the "full" health center and sub-center use models were done to determine whether differences in slope and/or intercept could be detected for the two income groups.

The two models were run again for each sub-district, first with a slope dummy variable for income groups, then with an intercept dummy. Unfortunately, the results were not consistent nor conclusive. Most of the dummy coefficients did not test as significantly different from zero, nor were their signs consistent. However, the total number of cases using services in the sample is small, and made smaller by the use of dummy variables representing income levels. Future research on this issue with larger samples should attempt to define more precisely the different service use patterns of patients in different income groups.

Table 7-13. INCOME GROUPS OF ILLNESS CARE USERS AT GLAGAH AND BERAN HEALTH CENTERS ON MARKET AND NON-MARKET DAYS

		Percent of Health Center Illness Care Patients					
		Glagah			Beran		
HHPOSS		n	Market Day	Non-market Day	n	Market Day	Non-market Day
Low	1	22	64%	36%	24	75%	25%
Mid	2	22	59%	41%	22	64%	36%
High	3	31	42%	58%	13	69%	31%

Services without Accessibility Constraints: Village Health Workers

The use of village health workers has developed as a way of reducing both accessibility and acceptability constraints to utilization. VHWs live and usually work in their home village, and thus effectively eliminate distance and related time and money costs as factors. In Java, they usually serve as volunteers, charging patients only the costs of medicines. Depending on how they are chosen, they may be more acceptable culturally. However, VHWs may not be perceived as able to provide services of adequate quality, because they have received only limited training. They cannot offer the prestige of clinic or private practice use, especially to higher income clients. These characteristics suggest that VHWs should achieve high coverage and reach proportionately more low income beneficiaries.

Most of the VHW services studied in Glagah were similar to maternal and child services provided by the clinics. In one village, simple illness care was also given. It was felt inappropriate to compare VHW and clinic directly because of the great difference in training, supplies, and facilities between them.

In Glagah, 67 percent of all households reported at least one VHW contact in the month preceding the survey. The range of variation amongst the income classes was 60 to 71 percent reporting a contact. The poorest households tended to be at the low end of the range. In comparison, only 8.7 percent of all households in Glagah and 6.2 percent in Beran reported any MCH/FP contact with clinic services during the same period. Also, Table 7-4 shows that the rate of MCH/FP contacts per capita for poorer households was less than half that reported by better-off households. These improvements in service coverage and equity can be attributed in large part to the better accessibility and acceptability of VHWs.

The main target group for VHW services in Glagah is children under five years of age. Table 7-14 shows the proportion of households with under-fives in each POSS/ADLT group who reported VHW contacts for education and weighing. Sixty percent of all households with under-fives reported at least one VHW contact for education, while 78 percent reported a weighing contact. The proportion of the poorest households reporting contacts was equal to the whole population rate for weighing and slightly above that rate for education. It is noteworthy that the percentage of the highest income households reporting weighing was well below the average. A weighing contact requires a household member to actively attend a village weighing session. In contrast, education contacts usually represent a home visit by the VHW.

In Table 7-15, the actual percentage of children under-five in each income class who were weighed the previous month is presented. The children from the poorest households participated at an above average rate while those from the highest income class had the lowest participation rate and were well below the average. These VHW services achieve very high rates of coverage and show no bias away from low income beneficiaries.

Table 7-14. GLAGAH HOUSEHOLDS WITH CHILDREN UNDER FIVE REPORTING EDUCATION AND WEIGHING CONTACTS WITH VHWS DURING PREVIOUS MONTH

POSS/ADLT	Number of HH's with Under-Fives	Percent Reporting Education	Percent Reporting Weighing
1	41	63	78
2	62	56	77
3	48	60	88
4	19	63	58
All	170	60	78

Table 7-15. GLAGAH CHILDREN UNDER FIVE WEIGHED IN PREVIOUS MONTH BY INCOME CLASS

POSS/ADLT	Number of Under-Fives	Percent Weighed
1	52	73
2	77	69
3	66	77
4	24	50

One village studied in Glagah and one in Beran had VHWs providing simple illness care. Table 7-16 shows the proportion of illness care cases in each social class group who contacted a VHW and the proportion who contacted a clinic. In Glagah, none of the cases from the poorest households used either VHW or clinic. For the other cases, approximately the same proportion contacted VHW as contacted the clinics.

In Beran, a different picture emerges. Sixty-four percent of the poorest cases used a VHW, the highest proportion of all classes. Only 14 percent of the highest income cases contacted a VHW. Contact rates for the clinics ranged from 23 to 31 percent of cases. While coverage rates for VHW illness care services are clearly higher than for clinic-based services, no consistent pattern of equity is apparent from this small sample.

Thus, the data on the nutrition and child care function of the VHWs show high rates of coverage, especially when compared with similar clinic services. Households from all socio-economic strata reported approximately the same rates of coverage for education contacts, which primarily involved VHWs visiting clients' homes. Weighing contacts, which required families to attend monthly village weighing sessions, were reported for 70 percent of all under-fives in the preceding month. Children from the poorest households participated at a rate almost 50 percent higher than children from the best-off households.

Data on VHW illness care activities showed contradictory results. In Glagah, there was no utilization by the lowest income group. Use of VHW illness care by the higher income groups ranged from 22 to 36 percent of illness cases. In Beran the poorest cases had the highest levels of use of VHWs for illness care. Overall, population coverage with illness care increased. However, the equity implications of this increase are unclear.

In general, these results support the supposition that eliminating constraints to service access and improving acceptability can raise the absolute levels of service utilization for all. VHW nutrition services were more likely to be used by low income beneficiaries. Compared to health center and sub-center services in terms of equity alone, services provided by VHWs maintain the trend of improved utilization by the poor at increasingly decentralized levels.

Summary

Does income significantly determine overall utilization of health services and, when utilization occurs, does it affect the choice of source of care? These two questions were posed at the beginning of this chapter. Both have been answered in the affirmative by the results from Glagah and Beran.

Table 7-16. ILLNESS CASES IN VILLAGES WITH VHW MEDICAL CARE. CASES WHO SOUGHT TREATMENT FROM VHW AND FROM CLINIC BY INCOME CLASS--GLAGAH AND BERAN

POSS/ADLT	Number Sick	Percent with VHW Contact	Percent to Clinic
	Glagah		
1	7	0	0
2	27	26	33
3	11	36	36
4	23	22	22
	Beran		
1	11	64	27
2	13	23	23
3	26	58	31
4	21	14	24

An "equity effect" was defined as differences by income level in service use relative to need. This implies different rates of service coverage for different income classes. Specific hypotheses were formulated on the causes of such an equity effect in Glagah and Beran, relating the distance-price of using services to income and the acceptability of health centers, sub-centers, and private services.

Tabulations of the data on illness cases and health service use in Glagah and Beran show clearly that poorer cases have a much lower probability of using modern public health services than do cases from better-off households. In addition, when they use services poorer cases have higher probability of using the sub-center/health post level, while higher income patients have a higher probability of using the larger health centers.

Utilization rates for MCH/FP services showed similar results--less use by poorer households. Data was not available to examine differences in the use of health centers or sub-centers for MCH/FP, since only one sub-center offered those services.

Demonstrating differences in utilization rates by social class does not shed light on how important such an equity effect might be relative to other factors affecting utilization. These include distance to a source of care, perceived severity of illness, age of the patient, and other service use by household members.

Logit regression analysis was used to estimate models of the probability of individual use of specific health service units. The dependent vaiables were binary (0/1) variables representing use or non-use of each type of unit. The independent variables were the relevant individual and household characteristics determining service use. The observations were individual illness cases reported in the household survey.

"Limited" regression models were estimated only the sub-sample of illness cases using either health center or sub-centers. "Full" models were estimated predicting sub-center, health center, and private practice use, based on the whole sample of illness cases.

The regression results show that income is a significant determinant of the choice of clinic, controlling for other factors like distance and perceived severity of illness. Higher levels of income increase the predicted probability of health center and private practice use while lower income increased the predicted probability of sub-center use.

The regressions also showed that distance to a source of care was a significant health service price. Perceived severity of illness was an important factor determining use of modern services, suggesting that patients perceive these services as efficacious. However, severity had little influence on the choice between health centers and sub-centers, suggesting that patients perceive little difference in service quality

between the two sources of modern public treatment. This implies greater weight for the argument that higher income patients use health centers in part for their prestige value.

The use of village health workers provides an example of service delivery which should in some ways be more acceptable to village users and which eliminates constraints on access. Data from the VHW programs in Glagah showed very high rates of coverage, especially when compared to the coverge of clinic-based MCH/FP services. There was little difference in rates of contact with VHWs by social class. However, children from the poorest households had above average rates of participation in the monthly weighings, whereas those from the highest income households had significantly lower rates of participation.

The general trend indicated by these results is that lower level, more localized modes of delivering primary health care services provide proportionally more service to low income beneficiaries. Sub-centers served proportionally more low income patients than health centers. VHW services provided much higher rates of coverage overall than clinic-based services. Nutrition program coverage for low income households and children under-five was well above the population average. Increased equity in the utilization of the more decentralized modes of service organization like sub-centers and VHWs resulted from their being more accessible and acceptable.

The tendency for more decentralized services to reach proportionally more poor patients lends itself to policy prescriptions when improved equity is an explicit objective of programs. Sub-district health centers are already well established in rural Java. Future investments in the rural health system will mainly be in the form of marginal additions to staff, facilities, and programs. If the objective is to improve coverage of the poor, these investments are best made at the lowest level possible in the delivery system.

The current policy in Java is to strengthen illness care and MCH/FP services in the health center by adding a second physician and inpatient facilities. This study suggests that more active extension of these services to the village population would be more likely to improve coverage of the poor. Strengthening and expansion of sub-center-based services can assure current levels of quality of care and improve equity. VHW systems promise much wider extension of services, although additional development of VHW training and supervision is needed to equip the workers with more efficacious technique and to assure adequate quality of care in their performance.

Strengthening services below the health centers is feasible. These modes of delivering services are already an important part of the current structure of rural delivery systems. Allocating a larger proportion of new resources to the lower levels of the health service system would probably improve the equity of modern public services. The next chapter will examine how the organization of primary health care influences the public sector cost of services.

CHAPTER 8

PRIMARY HEALTH CARE COSTS IN GLAGAH AND BERAN

In the 1980-81 fiscal year, the Government of Indonesia spent approximately $4.80 per capita on health services and family planning or about 1 percent of gross domestic product. In contrast, in the mid-1970's some European countries where the public sector also plays a major role in providing health services spent hundreds of dollars per capita or between 4 and 7 percent of a much larger gross domestic product on health (World Bank, 1982). Clearly, resources for public health services are limited in absolute terms in Indonesia. Even these limited funds only provide services to a minority of the population. Under such conditions, every effort must be made to provide adequate services at the lowest possible cost. Inefficient organization of services reduces the potential for distributing benefits more broadly.

How health services are organized determines what they cost. This chapter compares the cost of illness care and MCH/FP services at health centers and sub-centers, and calculates the cost of village-level health worker services.

Costs are analyzed in three parts. An estimate of the total costs of all public health services provided during 1981 in Glagah and Beran is calculated. The 1981 total costs of illness care and MCH/FP services provided at the health centers and sub-centers are computed based on appropriate allocation of the fixed and variable costs of clinics. The total cost of VHW nutrition activities in Glagah in 1981 is also presented. Second, based on these total costs, the costs per visit or contact (average cost) are calculated, using the reported utilization figures for health centers, sub-centers, and VHWs. These figures provide a "snapshot" of average costs in two health centers, three sub-centers, and a large VHW program during one year of operations. They reflect the particular characteristics of the units and areas studied.

To move beyond this limitation, the third part uses the data collected on fixed and variable costs, some results from the secondary data study of 26 sub-district delivery systems, and observation in the field to estimate total and average cost curves for health centers and sub-centers. These curves are used to determine whether there are any structural differences in average costs between health centers and sub-centers providing similar services at different levels of utilization.

Summary of Data and Methods

Calculation of total and average costs for specific health service functions requires complete estimates of both current expenditures and

previous investments, a method for allocating costs among different functions, and data on service utilization. Only the data on service utilization were readily available from routine reports and records.

The financing of rural health services in Indonesia is extremely complex. This is a major obstacle for researchers attempting to study the costs of specific programs. A recent World Bank study described the situation as follows:

> A multiplicity of budgets exists at all levels of central and local government and any particular item of expenditure may be financed from several sources. Indeed, it is seldom that a program or activity is financed entirely from one source or even from one level of Government. This situation is exemplified in the financing of health centers. The health centers are normally owned and managed by the regency and a budget specific for the unit exists in the regency health department. However, salaries of health center personnel may be paid from the national health budget, from provincial development or provincial routine budgets, or from regency routine or development budgets. Additional funds for remuneration may come from the civil servant's health insurance scheme or from the National Family Planning Board. Any individual may receive his salary from a variety of sources. The same complexities occur in the financing of drugs and equipment. Nowhere is there a consolidated statement of the cost of operating a health center or of its component activities ... (World Bank, 1982, p. 132).

The costs presented here are calculated from a patchwork of sources including official budgets at various levels, interviews with health workers and patients, and reports and records. These costs are estimates since, inevitably, some items are omitted or only measured incompletely. Every effort has been made to be consistent and explicit about assumptions and missing data.

A detailed description of the sources of data and accounting methods is given in Appendix 1. A brief discussion of data sources and methods is presented here. In the total cost calculations, the costs of services were divided into the following seven components:

1. Buildings and land
2. Equipment and vehicles
3. Personnel
4. Drugs and supplies
5. Expenditures on specific projects
6. Operations and maintenance
7. Supervision

In calculating the total costs of illness care and MCH/FP activities, appropriate proportions of these cost components were allocated to those functions as described below.

Buildings and land. Actual expenditures on land and building construction and renovation were recorded where possible. Land values were estimated to appreciate 10 percent of their initial value per year in real terms and this was counted as income. Since the land is owned outright by the regency government, no financing costs were assessed for carrying title to the land. Buildings were depreciated using a straight line method over 20 years. The opportunity cost of capital was calculated at 13.5 percent per year. Where data on actual expenditures for land and buildings were not available, local officials were asked to estimate the present value of existing facilities and this was used to calculate the annual cost or income as above.

Land and building costs directly associated with illness care and MCH/FP were calculated based on the utilization of space in the buildings. The total cost of land and buildings was divided by the proportion of total floor space used directly for illness care or MCH/FP. Space used for general support activities (offices, records, pharmacy, etc.) was allocated according to the proportion of total personnel expenditures attributable to illness care and MCH/FP (see Personnel below).

Equipment and vehicles. No data on the original expenditures for equipment or vehicles were available in either Glagah or Beran. Ministry of Health estimates of the current (1981) cost of equipping a health center and sub-center and purchasing motorcycles and bicycles were used instead. Vehicles were straight-line-depreciated over ten years while clinic equipment was depreciated over twenty years. A similar proportion of these costs was allocated to illness care and MCH/FP as was found in the distribution of personnel expenditures.

Personnel. Complete data on official salaries and benefits was available from the regency health office, including base salary, pension fund contributions, health insurance, and the rice allowance, which was paid in cash. Data on special project allowances was collected in interviews with all health personnel in the two sub-districts. These allowances include a "field allowance," and special monthly or yearly payments for work on family planning, immunization, the VHW nutrition and health projects, and the civil service health insurance scheme.

Allocation of personnel costs to illness care and MCH/FP services was based on a time allocation study of all workers. Special attention was given to this study, since several other cost components are allocated to illness care and MCH/FP based on the proportion of work time spent in these functions. Clinic personnel completed 12 daily work diaries during one month in which they identified their time according to location (clinic or field), activity (direct service or several types of non-service activity), and function (illness care, MCH/FP, VHW nutrition program, and others). Each worker's salary was allocated to illness care or MCH/FP

according to the proportion of their direct service time that was spent performing those functions.

Drugs and supplies. Several sources of data were available on the use of drugs and supplies. Each sub-district prepares a monthly report for the regency health office on drug and supply receipts, stocks, and use. Observation in the clinics indicated that these reports might not accurately reflect each month's drug use, as inventory and records were not always kept up to date. This inaccuracy is minimized by using reports from a full year of drug use in Glagah and Beran in the calculation of total costs.

It was not always possible to distinguish between drugs used at health center and sub-center and whether drugs were used for illness care or MCH/FP. In calculating drug use for these functions and in the average cost estimates, the average drug cost per patient visit was used. The clinic patient interviews recorded the drugs given to each patient as noted in the clinic register. These were multiplied by the relevant prices to compute the cost of drugs received by each clinic visitor.

Prices of most drugs were recorded from provincial purchasing records based on the Ministry of Health's competitive bidding procedure. Where a particular price was not available from these records, 60 percent of the 1981 retail price was used.

Expenditures on specific projects. Several projects implemented by the sub-district health services involved significant expenditures in addition to the items already mentioned. In Glagah, the VHW nutrition project was a major consumer of special project funds. In both sub-districts, expenditures on rural water supply systems, hand pumps, and village latrines were included in this category. Only project expenses not already part of another cost item were used. For example, salaries and allowances of health center staff working on the VHW project were already included in the total personnel figures, whereas those for regency staff were not and so were added to specific project expenses.

Operating and maintenance costs. No data were available directly on these costs. The regency budgets contain a line for such expenses, but it is not broken down by sub-district and includes costs of the regency hospital, making it difficult to separate the relevant expenditures for Glagah and Beran. Instead, operating and maintenance costs were calculated as 10 percent of the prorated annual cost of buildings and equipment plus 10 percent of the initial cost of vehicles.

Supervision. No data were available on the costs of supervision of sub-district activities by regency, provincial, and national staff. One exception was for the VHW nutrition project in Glagah, and those costs were included in the total cost of that project. For routine supervision expenses, 1 percent of total annual personnel costs was used.

Items omitted. Two important items were omitted from the cost calculations. Despite enquiries at both provincial and national levels, it was impossible to find estimates of the training and education costs of health personnel. These costs are borne entirely by the government or at least are heavily subsidized. In principle, these costs should be prorated over the career of each health worker.

The second item not shown in the total cost calculations is receipts from the fees paid by clinic users. At the time of the study, only a small part of this income was available to the rural health system. Illness care and MCH/FP patients were routinely charged fees. An illness care visit at the health center or sub-center cost 150 Rupiah ($.25), whereas an MCH/FP visit varied between 50 and 150 Rupiah ($.08-.25). This income was deposited in the regency treasury as general funds. Some of these funds were returned to the rural health system in the form of regency drug and supply purchases, operating and maintenance grants, or local hire personnel. These items are included in total costs. Technically, those costs paid for by income from clinic visits should not be counted. There was no way to identify this component of cost, although it is believed to be small. In the year following the study, 1982, a new regulation required that a fixed percentage of clinic income be available to each clinic for operating expenses and to supplement salaries. That order was not yet in effect during the period discussed below.

The VHW Nutrition Project - Glagah

The objective in calculating total costs of the VHW activities was to estimate the actual cost of running a sub-district-wide well-managed VHW system. This implies a full accounting of costs, while excluding extraordinary expenses that inflated costs beyond feasible levels for continued funding in Indonesia.

The VHW nutrition project in Glagah was in its fourth year at the time of the study. As a pilot project funded by a major international agency, significantly more money and personnel support was available compared to other VHW areas. However, this increased funding was reflected in extensive coverage--all villages and hamlets in Glagah had VHWs. The additional funds were also used for refresher training, meetings, supply of project materials, and supervision in preparation for a project evaluation study during 1981.

These additional resources available in Glagah posed a dilemma. While the expenditures on increased project activity and materials were unusual, an extensive VHW system requires such support. These extra expenses should have resulted in higher output levels and so it is legitimate to include them. Thus, the estimated total costs of the VHW project in 1981 include expenditures on village-level activities, special payments to sub-district, regency, and provincial personnel working on the project, related travel costs during 1981, and other miscellaneous expenses. In addition, expenditures on training VHWs in Glagah from 1977

to 1981 were totalled and prorated over five years, as were all materials and equipment given to the VHWs and their hamlets.

Major project development expenses were omitted so that the total cost estimates for the VHW project reflect a feasible level of funding for continuing VHW activities. These include all expenditures on the development of educational and training materials, all expenses associated with international consultants, and all major capital purchases such as vehicles, film projectors, etc. In a large national system, these costs would be amortized over many project sites.

A final note concerns the omission from all cost calculations of family planning services funded by the National Family Planning Coordinating Board (Badan Koordinasi Keluarga Berencana Nasional, BKKBN). These services are arguably part of the total package of government-sponsored health care in each sub-district. However, while formally coordinating with the local health services, BKKBN is a separate bureaucratic institution with a separate budget and program. It was not included in any part of this study.

Total Costs of Services - Glagah and Beran

Using the data and procedures described above, the total costs of health services provided by the Department of Health were calculated for Glagah and Beran. Table 8-1 presents the figures for 1981.

About 66 percent more was spent on services in Glagah than in Beran during the year. Almost all this difference is accounted for by the VHW nutrition project. Total costs for personnel, capital investment (buildings, land, vehicles, and equipment), and operating, maintenance, and supervision are similar, reflecting the similar staffing and structure in the two sub-districts. Expenditures on drugs and supplies are somewhat higher in Glagah, as a result of the higher rates of service use there. It is noteworthy that the two areas have similar levels of costs for capital goods and personnel despite the differences in utilization. This shows how resources have been allocated by area, not based on performance.

The estimated total costs of illness care services at the two health centers and three sub-centers are presented in Table 8-2. Land, buildings, and equipment costs have been joined under the heading "capital costs." Since these figures are only for outpatient services provided in a clinic building, vehicle costs have been omitted. Similarly, all special allowances to staff given as incentives for work outside the clinics have been omitted from the salary costs used to compute personnel expenses.

The total cost of health center illness care was about 20 percent higher for Glagah than for Beran. This difference is almost entirely due to the higher expenditures for drugs and supplies related to the larger number of service users at that health center. Capital and personnel costs were almost identical.

Table 8-1. ESTIMATED TOTAL COST OF GOVERNMENT HEALTH SERVICES, GLAGAH AND BERAN, 1981

	(In Rupiah, Rp. 625 = $1.00) Glagah	Beran
Land and buildings	56,850	549,675
Vehicles and equipment	1,089,500	974,750
Personnel	19,401,800	19,749,200
Drugs and supplies	4,503,200	3,572,720
Other projects	24,204,200	4,630,000
Operating and maintenance	308,300	205,275
Supervision	194,018	197,492
TOTAL	49,564,044	29,879,112
	$ 79,303	$ 47,806

Table 8-2. TOTAL COST OF ILLNESS CARE SERVICES AT TWO HEALTH CENTERS AND THREE SUB-CENTERS IN GLAGAH AND BERAN, 1981

	(Indonesian Rupiah)		
	Glagah	Beran	
Health Centers			
Capital	69,178	172,240	
Personnel	2,674,260	2,505,510	
Drugs and supplies	2,269,217	1,298,346	
O&M, Supervision	33,660	42,279	
TOTAL	5,046,315	4,018,375	
Sub-centers	SC	SC1	SC2
Capital	107,940	163,895	112,750
Personnel	675,600	1,905,660	683,280
Drugs	610,182	389,346	370,107
O&M, Supervision	17,550	35,446	18,108
TOTAL	1,411,272	2,494,347	1,184,245
All Outpatient Illness Care			
Capital	117,118	448,885	
Personnel	3,349,860	5,094,450	
Drugs	2,879,399	2,057,799	
O&M, Supervision	51,210	95,833	
TOTAL	6,457,587	7,696,967	

Illness care was provided at three sub-centers in the two areas. The total costs of the Glagah sub-center and one of the Beran sub-centers are similar. These two units were both staffed by a single paramedic whose main responsibility was illness care in the clinic. In both cases, the clinic consisted of a room in the paramedic's home. The other sub-center in Beran was a larger unit with its own building and staffed by three paramedics. Two of these worked primarily on illness care while the third was a midwife. Capital and personnel costs at that unit were significantly higher than the other two. Thus, the total expenditure on sub-center illness care in Beran was also higher than in Glagah.

Summing the total costs for illness care at both health centers and sub-centers in the two areas shows a slightly higher overall expenditure for Beran despite its lower level of utilization. This is because the cost of the additional sub-center personnel in Beran is larger than the added cost of drugs for the more heavily used services in Glagah. In general, personnel costs are significantly greater than any other cost item. As a percentage of total service costs clinic-based illness care was 14 percent in Glagah and 26 percent in Beran. If the 1981 expenditures on the VHW nutrition project are subtracted in Glagah, clinic-based illness care is about 22 percent. That is, in both areas illness care accounts for approximately one quarter of total costs, excluding the specially funded VHW activities.

Table 8-3 presents the total costs of clinic-based MCH/FP services. Here significant differences are apparent between the two sub-districts. Glagah has a particularly well-staffed and heavily used health center MCH/FP service, which is reflected in much higher personnel and drug costs and correspondingly higher total costs. Drug costs for MCH/FP are much lower at all levels than for illness care, since most patients are given only inexpensive diet supplements.

Sub-center based MCH/FP services were only available in Beran. Their cost includes the appropriate salary allocation of the one midwife stationed there as well as other cost components. When health center and sub-center costs are totalled, there is not much difference between the two sub-districts. MCH/FP services account for about 5 percent of total costs in the two sub-districts.

In 1981, expenditures on the Glagah VHW nutrition project were approximately Rp. 15 million. To calculate the true 1981 cost of the project, some of those current expenditures must be prorated into the future, and some earlier expenditures must be counted as current costs. This figure for the estimated total cost of VHW nutrition activities during 1981 in Glagah is shown in Table 8-4. It excludes the sizable project development costs associated with the VHW project, but includes both the appropriate prorated expenditures on training, equipment, and materials for the VHWs and their hamlets.

The Glagah VHW project accounts for about 38 percent of total sub-district health service costs for 1981, much more than expenditures on

Table 8-3. TOTAL COSTS OF OUTPATIENT MCH/FP SERVICES AT TWO HEALTH CENTERS AND ONE SUB-CENTER IN GLAGAH AND BERAN, 1981

	(Indonesian Rupiah)	
	Glagah	Beran
Health Centers		
Capital	49,418	73,591
Personnel	1,904,020	1,054,700
Drugs	294,292	108,731
O&M, Supervision	23,982	17,906
TOTAL	2,271,712	1,254,928
Sub-center		
Capital		35,964
Personnel		545,700
Drugs		87,584
O&M, Supervision		9,053
TOTAL		678,302
All Outpatient MCH/FP		
Capital	49,418	109,555
Personnel	1,904,020	1,600,400
Drugs	294,292	196,315
O&M, Supervision	23,982	26,959
TOTAL	2,271,712	1,933,229

Table 8-4. TOTAL COST OF VHW NUTRITION PROJECT, GLAGAH, 1981

Item	Cost in Rupiah
Annualized cost of training sub-district personnel and VHWs in Glagah, 1977-1981	1,237,800
Annualized cost of supplies and equipment for VHW activities, 1977-1981	7,929,400
Village-level activities, 1981	2,364,000
Special allowances and allocated salary of Glagah health personnel, 1981	2,973,700
Salary and allowances for supervisory staff at Regency and Province levels, 1981	2,308,000
Travel expenses, 1981	1,777,300
Miscellaneous supplies and other operating expenses, 1981	420,000
Total Cost	Rp. 19,010,200
Number of VHWs	approx. 800
Cost per VHW per year	Rp. 23,800
	$ 38.-

illness care and MCH/FP combined. Substantial expenditures were made for equipment and training materials (the largest item in the project's cost for 1981) as well as for travel and supervision both by staff from within and outside the sub-district. However, the approximately 800 VHWs in Glagah also require a large amount of supervision, training, and supplies to maintain their work. These high costs reflect both the availability of funds, and the needs of a large system of VHWs oeprating at the level of activity found in Glagah.

An example of this is the cost of Glagah personnel supporting the VHW program. This cost was calculated based on the reported time health workers spent training and supervising VHWs during the study period and the small supplemental allowance they received for working on the project. Of the total three million rupiah spent on sub-district personnel by the project, less than 8 percent (Rp. 217,000) consisted of the special allowance, while the balance is the proportion of routine salary allocated to the project. In-district personnel expenses associated with the project account for more than 15 percent of all Glagah health personnel expenses. This is about the same amount spent on illness care and much more than was spent on MCH/FP for personnel.

It is often assumed that VHWs are a low cost alternative to clinic-based services, since they receive little training or equipment. In Indonesia, almost all VHWs are volunteers, receiving no salary. When costs are calculated per worker, this impression is certainly true. The annual cost of a VHW in Glagah was approximately $38.00 including supervision and prorated expenses for training and supplies. This is a small fraction of just the salary costs of a health center worker, which ranged from $730 to $1,800 per year. However, when these low per worker costs are multiplied by the large number of workers required, they become the largest single item in total health service expenditures in the area. Although the costs in Glagah may be somewhat inflated, the real costs of a well-run VHW program would not be much lower. The total cost of training, retraining, supplying, and maintaining an extensive system of VHW volunteers is high relative to clinic-based services.

Average Costs of Services - Glagah and Beran

Total costs are mainly useful in determining the feasibility of a particular service delivery strategy, i.e., whether costs are within the range of available funds. In order to analyze efficiency in providing services, one needs an indicator which relates expenditures to outputs. Average cost--the cost per unit of output--is one such measure.

Average cost is computed by dividing total cost by total output. The primary interest in this study is to compare the average costs of similar outputs from different types of service delivery units. As was discussed in Chapter 6, health centers and sub-centers provide quite similar illness care and MCH/FP services. The personnel providing treatment have the same

level of training in both types of units. In most cases the same drugs and supplies are also available. Comparing the average costs of such similar outpatient contacts for illness care and MCH/FP at health center and sub-center is the main focus of this section.

VHW nutrition services in Glagah are most similar to some aspects of clinic-based MCH/FP care, especially the services offered to infants and young children. It was noted earlier that the facilities and staff for clinic-based MCH/FP are clearly more sophisticated than for the VHW services. With this difference in mind, the average costs of specific VHW project outputs in Glagah will be presented for comparison with clinic-based care.

The denominators in the average cost calculations presented below are the number of visits or contacts for each type of service and unit. Average cost varies with both the total costs of an activity and the level of utilization. In addition, service use is distributed differently between the various delivery units in Glagah and Beran. Thus, the average costs estimated for the two sub-districts reflect not only the characteristics of the different types of units, but also the differences (staff quality, geography, history, etc.) between the two sub-districts.

Average costs may be different in health centers and sub-centers for several reasons. Despite the higher total operating costs of health centers, their larger capacity might result in more efficient use of fixed inputs as utilization increases, giving lower average costs than sub-centers. Such "economies of scale" (see Chapter 3) could result from the fact that the additional cost of fixed inputs at health centers may be proportionally less than the additional utilization they can support, resulting in a lower cost per output. An example of this might be use of personnel. A sub-center can have no fewer than one paramedic who must keep records, examine and treat patients, clean the clinic, etc. A health center can have additional staff specializing in these different functions. The increased costs may be more than offset by increased capacity to treat patients as tasks are divided more efficiently.

In opposition to the economies of scale argument is the possibility that the higher total costs of health centers represent inefficient investment in buildings, redundant staff, or overly expensive equipment and drugs. If this were the case, the relative increase in total costs in health centers would not be offset by increased utilization. As a result, average costs would be lower at the sub-centers.

A third alternative is that the efficiency of outpatient services is neutral to scale. That is, a greater cost of fixed inputs in the larger units supports a proportionally equivalent increase in utilization. This would result in average costs being approximately the same in both units.

Finally, average costs vary greatly depending on the level of utilization at a particular type of unit. If some structural characteristic of health centers or sub-centers promotes or discourages

utilization, this would result in different levels of average cost. Similarly, utilization can vary with topography and availability of transportation (as shown in Chapter 5), so that even environmental characteristics can influence average costs.

Table 8-5 shows the average cost of an outpatient illness care contact at the two health centers and three sub-centers in Glagah and Beran. The results are somewhat contradictory. In Glagah, the estimated health center average cost is about 15 percent less than the sub-center cost. In Beran, the health center cost is about 80 percent greater than the small sub-center and 12 percent less than the larger one. Overall, the lowest average cost was measured at the Glagah health center and the highest average cost at the Beran health center.

Most of these differences appear to be due to differences in utilization levels. As shown in Table 8-2, total capital, personnel, operating, maintenance, and supervision costs at the two health centers were quite similar. While there was some difference in average drug costs between the two (Rp. 170 in Glagah versus Rp. 266 in Beran) this only accounts for a small part of the difference in average cost. Far more important is the fact that the Glagah health center registered 2.7 times more contacts in 1981 than did the Beran center.

Despite the low capital and personnel costs of the sub-center in Glagah, utilization was not sufficient to reduce average cost below that for the heavily-used Glagah health center. The smaller Beran sub-center did well in utilization relative to the health center, resulting in lower average costs. Both sub-centers in Beran had approximately the same number of contacts, giving the larger unit a significantly higher average cost which exceeded cost per patient at the health center. The smaller sub-center in Beran had essentially the same total and average cost pattern as the unit in Glagah, at a similar level of utilization. Although average drug costs varied somewhat, the ability to distribute personnel costs over a large number of visits is the principal factor influencing average costs.

Table 8-6 shows the average cost of an outpatient MCH/FP visit to the two health centers and the Beran sub-center that offered those services. The Glagah health center has the lowest overall average cost, due mainly to its much higher number of patient contacts. In Beran, the average cost of an MCH/FP contact at the sub-center is approximately 25 percent less than the cost of a health center visit. The sub-center MCH/FP service reported approximately one-half the total cost of the health center but had two-thirds the utilization, resulting in the lower average cost. Although average drug costs per contact were 30 percent higher at the sub-center, these had only a minor effect on the overall average cost, which mainly reflects the distribution of personnel costs over a larger number of contacts.

In general, average costs respond both to differences in utilization and in total costs. Based on these few observations, utilization appears to have the more dramatic effect. No conclusion emerges as to the relative

Table 8-5. AVERAGE COST OF ILLNESS CARE CONTACTS IN TWO HEALTH CENTERS AND THREE SUB-CENTERS, GLAGAH AND BERAN, 1981

	(Rupiah Cost per Patient Contact)		
	Glagah	Beran	
Health Center			
Capital	5	35	
Personnel	201	513	
Drugs	170	266	
O&M, Supervision	3	9	
TOTAL	Rp. 379 $.61	Rp. 823 $1.32	
Sub-centers			
Capital	38	60	50
Personnel	239	701	303
Drugs	216	143	164
O&M, Supervision	6	13	8
TOTAL	Rp. 500 $.80	Rp. 918 $1.47	Rp. 525 $.84

Table 8-6. AVERAGE COST OF MCH/FP SERVICES AT TWO HEALTH CENTERS AND ONE SUB-CENTER, GLAGAH AND BERAN, 1981

	(Rupiah Cost per Patient Contact) Glagah	Beran
Health Centers		
Capital	3	23
Personnel	134	333
Drugs	21	34
O&M, Supervision	2	6
TOTAL	160	396
Sub-center		
Capital		17
Personnel		256
Drugs		41
O&M, Supervision		4
TOTAL		318

efficiency of health centers or sub-centers because of the large variation in utilization amongst the units studied.

As with clinic-based services, average costs can be estimated for the VHW nutrition project in Glagah: these are shown in Table 8-7. Since utilization of VHW services was measured for one month, the 1981 total costs of the project are divided by twelve to estimate the costs of one month's activity. The first average cost figure of Rp. 236 represent total monthly cost divided by the estimated number of households reporting at least one contact with a VHW during one month. This is the cost per household contacted at least once in a month. Many households reported more than one contact with the average number of VHW contacts during a month being 1.65. VHWs made an estimated total of 11,062 contacts at an average cost of Rp. 143 per contact (about U.S. $.23).

In order to estimate the average cost of a child under five attending a monthly weighing session it was necessary to allocate a portion of the total VHW project costs specifically to that activity. This was done on the basis of interviews with all the VHWs in each hamlet surveyed, in which they were asked to estimate the number of hours they spent each month working as a VHW. They also estimated the proportion of that time spent on specific tasks such as home visits, presentations to village groups, and the monthly weighing of children under five.

In the four study hamlets, fifty VHWs had received training and were interviewed. This is approximately 6 percent of all VHWs in Glagah. Of the 50, 39 were still active as VHWs, the others having withdrawn for various reasons. During one month, the 39 active VHWs reported working a total of 319 hours, an average of 8.2 hours per VHW. Of the 319 hours, 103 (32.3 percent) were spent directly involved in monthly weighing activities.

Based on these data, 32.3 percent of the monthly total cost of the project--Rp. 511,700--is the estimated monthly cost of the VHW weighing activities. Extrapolating the percentage of under-fives in the study hamlets weighed in the previous month to the estimated population of under-fives in Glagah, an estimated 4,308 under-fives are weighed each month, at an average cost of Rp. 119 approximately (U.S. $.19).

While VHW weighing services and baby/young child visits for MCH/FP care involve quite different levels of training and facilities, there are similarities between the services provided. The average cost of VHW weighing of an under-five is 30 percent less than the cost of an MCH/FP contact at the Glagah health center and 72 and 62 percent less respectively than a visit to the Beran health center and sub-center. Putting aside questions of quality of care for the moment, the VHW project is clearly a much less expensive means of reaching targetted individuals with specific well-baby services than the clinics. In addition, beneficiaries need expend no cash or time of their own for travel and waiting, resulting in an even lower economic cost. The very high rates of coverage and equity measured for VHW services (Chapters 6 and 7) make this expenditure seem preferable in terms of service distribution as well.

Table 8-7. ESTIMATED AVERAGE COSTS FOR OUPTUTS OF VHW NUTRITION PROJECT, GLAGAH, 1981

Total monthly costs of VHW project, 1981	Rp. 1,584,200	
Estimated number of households contacted in one month	6,704	
Estimated average cost per household contacted		Rp. 236
Estimated total contacts per month	11,062	
Estimated average cost per contact		Rp. 143
Monthly cost of VHW weighing	Rp. 511,700	
Estimated number of under-fives weighed each month	4,308	
Estimated average cost per under-five weighed		Rp. 119

To summarize, estimates of average costs for health centers and sub-centers provided no clear indication of a significant difference in efficiency between the two levels of care. Average cost figures proved quite sensitive to differences in utilization levels and less so to differences in total costs. The heavily used Glagah health center had the lowest average costs of all units, while the larger Beran sub-center had the highest. The Beran health center had an almost equally high average cost. Costs at the two small sub-centers fell between the two health centers. Since all these units were part of two contiguous delivery systems (see Chapter 6), the utilization of individual units is related to use of all units in both areas, which influences the estimated average costs. Average costs of VHW services were 30 percent lower than the lowest average costs of clinic-based MCH/FP services (in Glagah) and more than 70 percent lower than clinic costs in Beran where there was less service use. This suggests that VHW services can be a low cost alternative to certain clinic-based functions. They have the added advantage of high coverage and equity and require no expenditures by users. However, the possibly lower quality of these services may not justify the cost savings. This question of the quality of care of VHW services is discussed in more detail in Chapter 9.

Total and Average Cost Curves for Clinic-Based Services

The comparison of the average costs of health center and sub-center services presented above was inconclusive. Each service unit was observed at a specific level of utilization determined in part by its location and relation to other units in the sample. A small cross-sectional comparison of this type may not easily illuminate any systematic differences in average costs between types of units. Ideally, what is needed is a much larger sample of health centers and sub-centers to control for variability in the total costs and utilization of individual units.

Another way to examine differences in average costs is to develop an average cost curve for illness care and MCH/FP services at "typical" health centers and sub-centers. An average cost curve depicts the cost per patient contact at different levels of utilization from the appropriate estimated total costs of the service at those units (see Figure 3-2 and the accompanying discussion on total and average cost curves). Average cost curves can be estimated with the data from Glagah and Beran.

Buildings, land, and equipment are obviously fixed costs for the health centers and sub-centers studied. Similarly, drugs are provided on a per patient basis and are clearly variable costs. However, are personnel expenditures fixed or variable costs? That is, is a relatively fixed amount of staff time assigned to clinic-based illness care and MCH/FP services whether utilization is high or low? Or, alternatively, is staff time allocated to clinic-based services according to the expected number of patients?

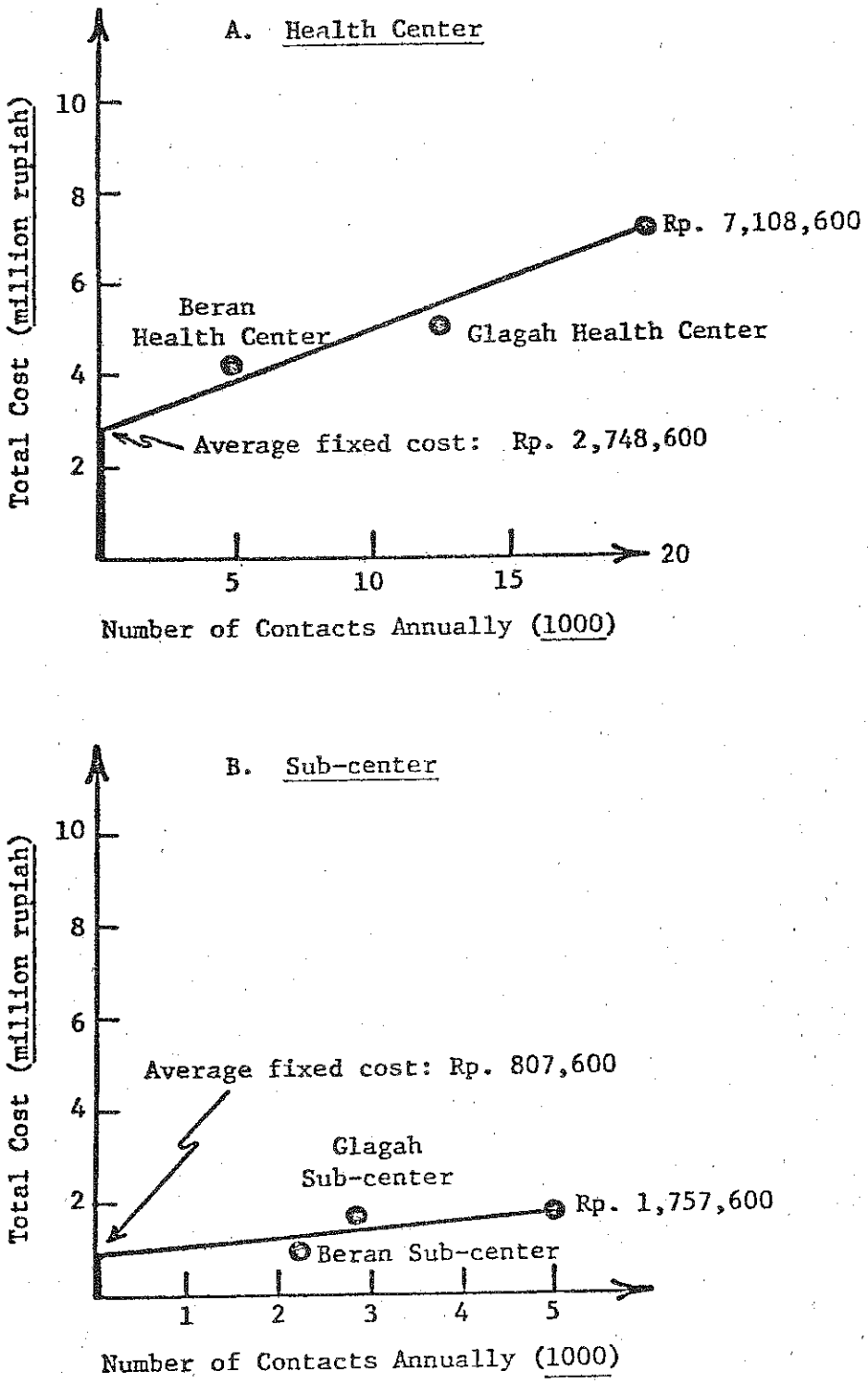
Several factors observed in Glagah and Beran suggest that personnel are more appropriately considered a fixed cost. First, clinics keep fixed hours and days during which illness care and MCH/FP services are offered. This requires that at least a base staff be present during those times, which are most of every official working day. Second, some of the total cost data collected support this impression of fixed personnel costs. Table 8-2 shows that most of the difference in total costs of illness care between the two health centers is from expenditures on drugs and supplies reflecting the different use levels. Personnel costs are almost identical. Similarly, the two small sub-centers have the same personnel costs for illness care. For MCH/FP, there is a significant difference in personnel costs at the two health centers. In large part, however, this reflects the more senior (and therefore better paid) staff in the Glagah health center, rather than a large difference in time allocated to MCH/FP services. And finally, observation in the clinics suggests that, while there is some tendency for staff to work on other services or in the field on slow days, this results in only minor variation in the overall staff time allocated to a particular function.

Thus, referring to Tables 8-2 and 8-3, fixed costs are defined as capital, personnel, and operating and maintenance and supervision costs. Variable costs are the costs of drugs and supplies. In order to estimate total and average cost curves for a model health center, the fixed and variable costs of the two units studied are averaged.

Figure 8-1a shows a total cost curve for health center illness care services based on the centers in Glagah and Beran. Total cost is plotted on the y-axis. The average annual fixed cost for illness care at the two centers was Rp. 2,748,600. The average cost of drugs and supplies per patient, based on a random sample of patients, was Rp. 218. This gives the slope of the total cost curve. Total cost estimates at various levels of utilization between zero and 20,000 patients annually are shown. The measured costs of services in Glagah and Beran are also marked. As expected, they bracket the estimated cost line, since it is an average of the two areas.

Estimating a total cost curve for sub-center illness care services was more complicated. Three sub-centers were studied: one in Glagah and two in Beran. The health post in Glagah is not included since it functions only part-time and it proved impossible to estimate personnel costs accurately. The Glagah sub-center and the smaller Beran sub-center were run by single paramedics working from a room in their homes and providing only illness care. The larger Beran sub-center had its own building, two paramedics providing illness care and one providing MCH/FP services. While the average costs from that larger unit are presented in Tables 8-5 and 8-6, it was felt that averaging its costs along with the two smaller units would result in cost estimates that represented neither the smaller (more typical) sub-centers nor a larger one. Thus, Figure 8-1b presents a total cost estimated from the two smaller sub-centers. Average annual fixed costs were Rp. 807,600. Average variable cost per patient was Rp. 190, about 15 percent less than at the health center. Total costs are

Figure 8-1. ESTIMATED TOTAL COST CURVES FOR CLINIC-BASED ILLNESS CARE SERVICES



estimated at utilization levels between zero and 5,000, lower than those for a health center. The measured costs at the two units bracket the estimated curve.

Average cost curves for health center and sub-center illness care can be drawn based on these estimated total cost curves. These are shown for health centers in Figure 8-2a and for sub-centers in Figure 8-2b at the same levels of utilization used in the previous figures. The measured average costs for the units in Glagah and Beran are also plotted.

These graphs are quite useful in depicting the very high average costs of services at low levels of utilization and their rapid drop as utilization increases. At higher levels of utilization, average cost begins to level off. Eventually, it will approach the level of variable cost, but it is clear from these graphs that observed utilization levels keep average costs well above that point.

Cost curves can also be estimated for clinic-based MCH/FP services in Glagah and Beran. Figure 8-3a shows a total cost curve for health center MCH/FP contacts estimated from the average fixed and variable costs of the two health centers. Average fixed costs were Rp. 1,561,800. The average variable cost was only Rp. 27.5, reflecting the preventive care emphasis of most MCH/FP visits. Thus, the total cost curve is only slightly sloped from the horizontal.

One sub-center, in Beran, provided MCH and not family planning services. A total cost curve based on that one unit is shown in Figure 8-3b for comparison. Total fixed costs were 678,300 and the variable cost was Rp. 41 per visit.

Average cost curves for MCH/FP are presented in Figures 8-4a for health centers and 8-4b representing the single sub-center. Because the variable cost per visit is quite small, these curves descend more steeply than the curves for illness care. Reductions in the per visit cost from increased utilization are more dramatic. The measured costs from the clinics in Glagah and Beran are also indicated on these figures. The average cost of an MCH/FP visit at the Glagah health center is less than half the cost of a visit to the Beran health center. This difference indicates the rapid drop in average costs with large differences in utilization.

These estimated average cost curves enable us to extrapolate beyond observed costs to examine the effects on costs of different levels of service use. In addition, because we have a curve showing the change in average costs as utilization changes, we can also assess the rate of change in costs.

What levels of utilization are of interest? First, we would like to look at the range and mean of serice use in functioning health units to get an idea of what the actual average costs are like in the field. Second, we would like to know the capacity of a service unit, to estimate the maximum

Figure 8-2. ESTIMATED AVERAGE COST CURVES FOR CLINIC-BASED ILLNESS CARE SERVICES

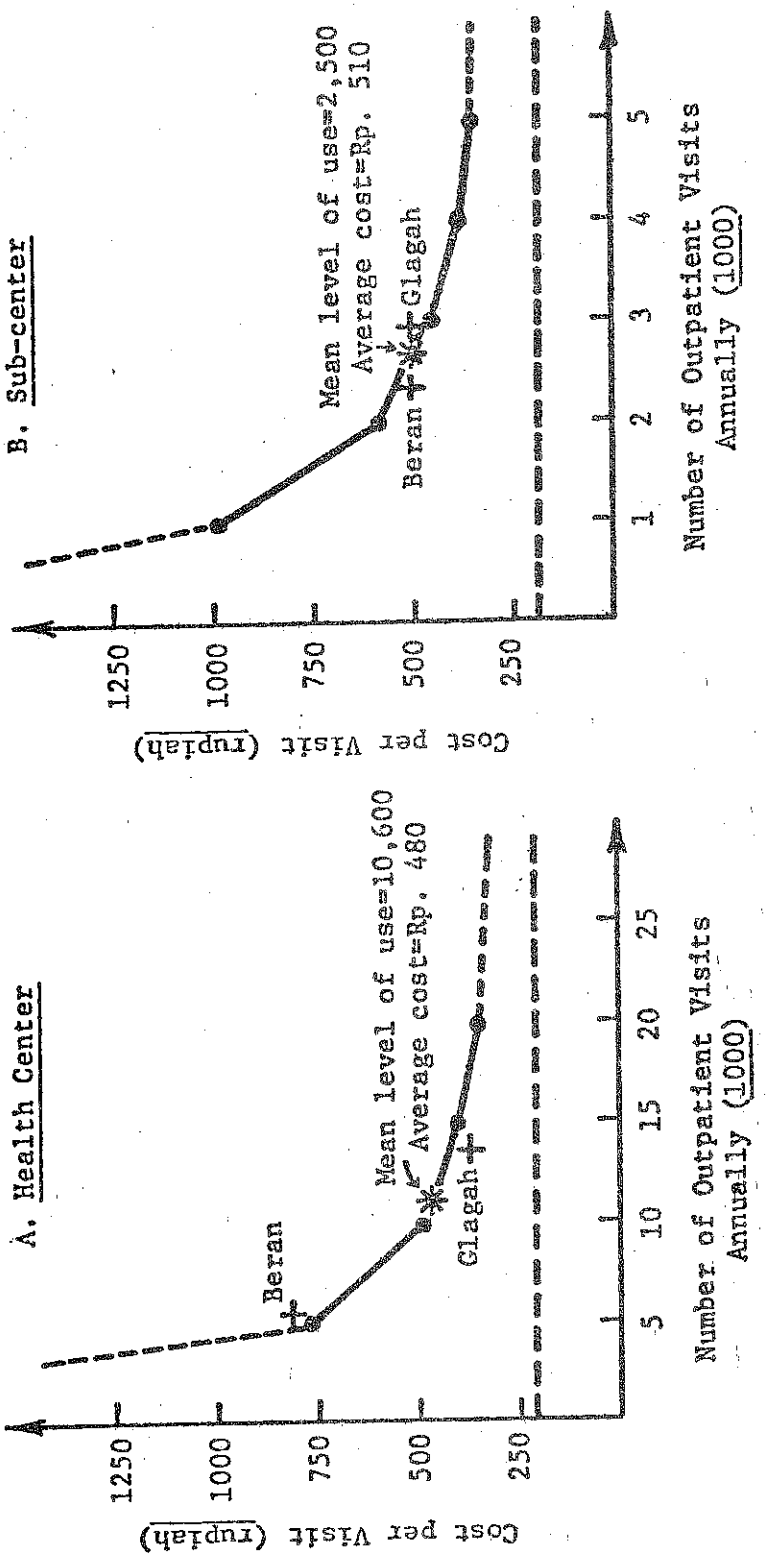


Figure 8-3. ESTIMATED TOTAL COST CURVES FOR CLINIC-BASED MCH/FP SERVICES

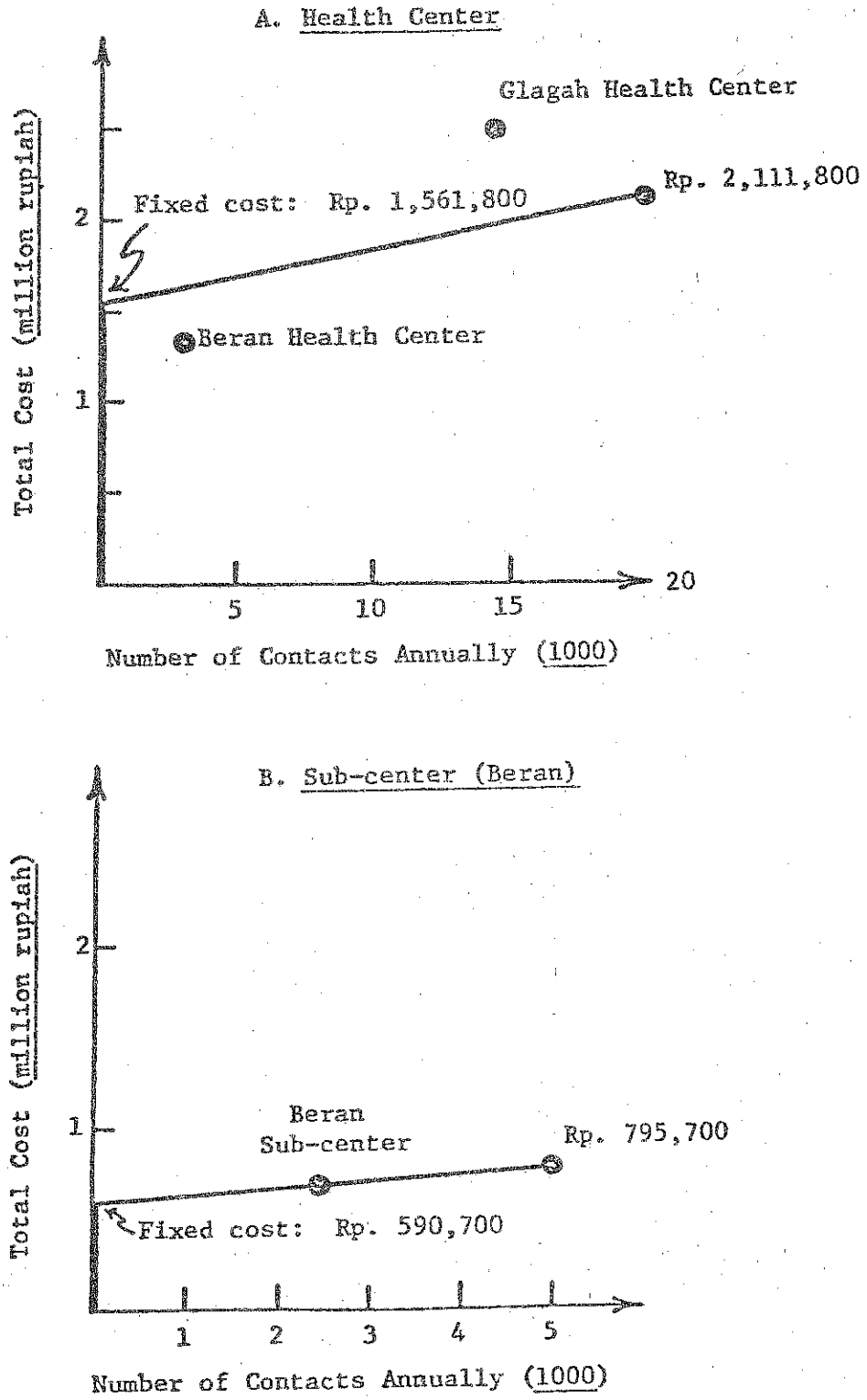
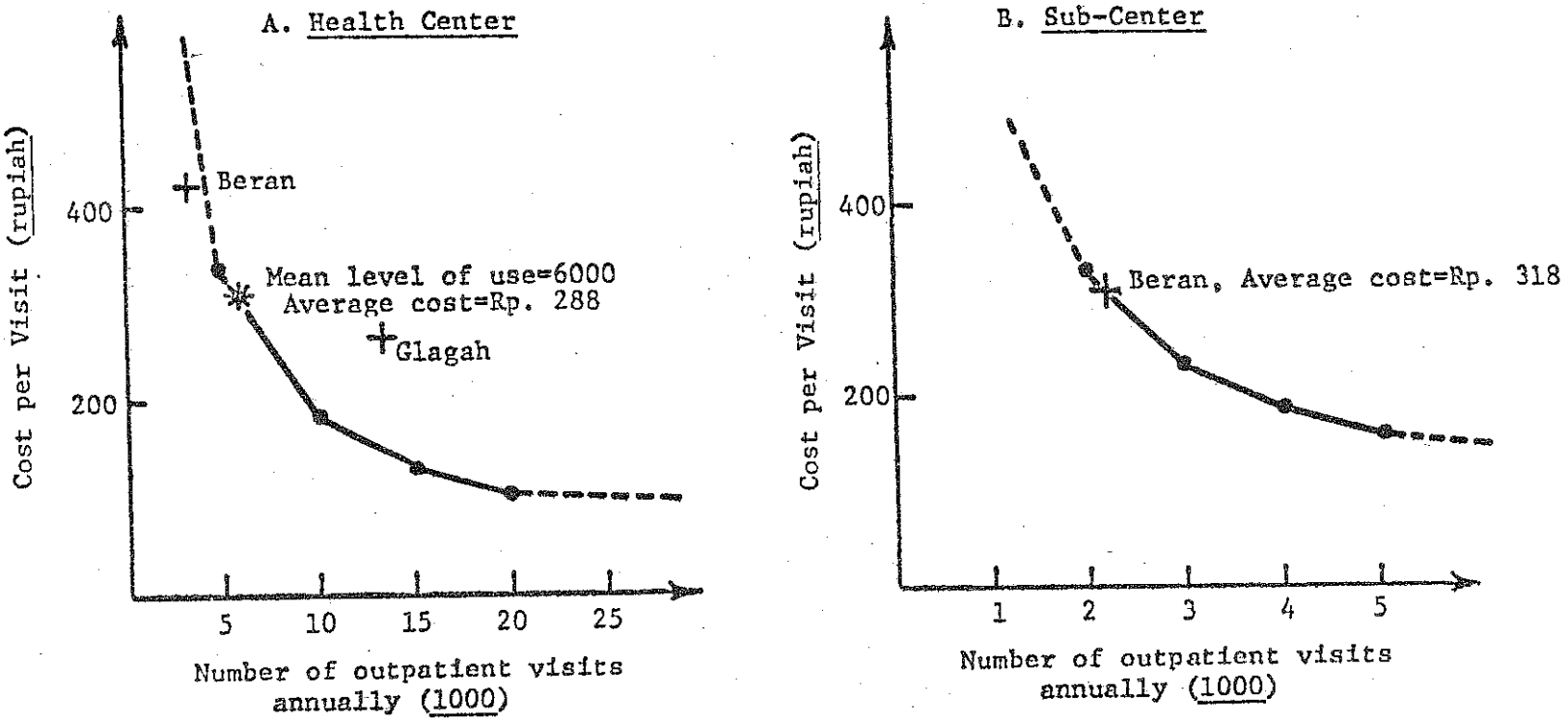


Figure 8-4. ESTIMATED AVERAGE COST CURVES FOR CLINIC-BASED MCH/FP SERVICES



reduction in unit costs possible before additional fixed cost investments would be required.

Some data are available on the first point from the secondary data study. Table 8-8 shows the range and mean in utilization of health centers and sub-centers/health posts for illness care and MCH/FP reported from the 26 sub-district study. The health center data are the most useful, since they represent individual health centers--one in each sub-district. On average, health centers reported about 10,600 illness care contacts and 6,000 MCH/FP contacts annually. For both illness care and MCH/FP, the average utilization level at health centers was below the Glagah level and above that for Beran.

Data on sub-center and health post utilization from the secondary data study cannot be disaggregated for individual sub-centers and posts. Only the total utilization figures for those units were reported for each sub-district. The average utilization of 2,800 patients each for illness care and MCH/FP includes both single and multiple units in a sub-district and combines the sub-centers and part-time health posts. These data indicate an upper limit to utilization of individual units in the field.

At the mean of 10,600 outpatient illness care contacts annually, the estimated cost per health center visit is approximately Rp. 480 per contact. For sub-centers, the average utilization level of an individual unit is not known. Average utilization for the two units studied was about 2,500, which gives an estimated average cost of approximately Rp. 510. These costs are indicated in Figures 8-2a and 8-2b as the estimated cost per visit at average levels of use. While the sub-center average costs are slightly higher than those for the health center, the estimates are very similar for the two different types of service units given other sources of uncertainty in the data. Within a range of normal levels of service use, there is little difference in average costs between health center and sub-center illness care services.

For MCH/FP services, Table 8-8 shows an average of approximately 6,000 visits per year for health centers. Compared to this figure, the Glagah health center is quite heavily used, while the Beran center is somewhat below average. At 6,000 visits annually, the estimated cost per visit is Rp. 288 at a health center. This can be compared with Rp. 318 at the Beran sub-center. These costs are marked on Figures 8-3a and 8-3b. Again, given the great variation in utilization levels found in the field, these average cost estimates are remarkably close, although the health center cost was slightly lower.

No reliable estimates of the capacity of health service units are available. Rather, services are usually underutilized in rural Java. Visits to rural clinics usually show the staff busy with patients in the early hours of the working day and the clinic virtually empty after 10:30 or 11:00 A.M. This was true in both Glagah and Beran, despite Glagah's much higher level of utilization. Official clinic hours run until 2 P.M., with staff who remain in the clinics having litle to do. These

Table 8-8. RANGE AND MEAN OF UTILIZATION OF CLINIC SERVICES IN 26 SUB-DISTRICTS IN CENTRAL JAVA AND YOGYAKARTA

	Number of Sub-districts	Number of Patient Contacts, 1982		
		Minimum	Maximum	Mean
		Illness Care		
Health Centers	24	2,790	23,910	10,567
Sub-centers and Health Posts	21	570	7,420	2,771
		MCH/FP		
Health Centers	22	770	17,030	5,962
Sub-centers and Health Posts	17	370	8,140	2,818

observations suggest that the services studied, both in Glagah, Beran, and the secondary data study, were probably far from reaching capacity. The average cost of outpatient services can still be significantly reduced by increasing utilization without additional capital investment.

To approximate estimates of capacity, levels of utilization approximately double the averages used above would be 20,000 patients annually for health centers and 5,000 for sub-centers. The corresponding average costs fall to Rp. 355 for health centers and Rp. 352 for sub-centers, or approximately 30 percent less than costs at current levels of use. There is still little difference in the estimates for health centers and sub-centers, suggesting that even at much higher levels of use the relative level of average costs between the two types of units remains stable.

Doubling the mean levels of use for MCH/FP services to 12,000 visits for the health center and 4,000 visits for the sub-center gives average costs of Rp. 158 and Rp. 189 respectively, a reduction of approximately 40-45 percent. The greater reduction in average costs for MCH/FP than for illness care reflects the larger potential savings from increased MCH/FP use due to the generally steeper slope of the average cost curve. Again, there is little difference between health center and sub-center costs at the projected higher level of utilization.

The estimates of average costs for "typical" health centers and sub-centers are summarized in Table 8-9 and compared with the average costs of weighing a child in the VHW program. At mean levels of use and double these levels, there is little difference in cost per visit between health center and sub-center for both illness care and MCH/FP. It is worth noting again, however, that there is a great deal of variation in utilization levels in the field resulting in similar variation in actual cost per visit in individual units. Another way to summarize these results would be that within the range of utilization actually reported, the range of average costs predicted is quite similar for both types of units and types of service.

Another interesting characteristic of the cost structure of service organization can be shown by calculating the slope of the average cost curves. The formula for average cost is:

$$\text{Average Cost} = \frac{(FC) + (VC)(Q)}{(Q)}$$

where FC equals fixed cost, VC equals variable cost, and Q is the quantity of outputs or service utilization. By taking the first derivative of this equation with respect to utilization, we can estimate the slope of the average cost curves at different levels of use. That is,

$$\frac{d(\text{Average Cost})}{d(Q)} = \frac{-(FC)}{(Q)^2}$$

Table 8-9. AVERAGE COST FOR HEALTH CENTER AND SUB-CENTER ILLNESS CARE AND MCH SERVICES AND COST PER CHILD WEIGHED BY VILLAGE HEALTH WORKER

Type of Contact	(Cost per Client Contact in Indonesian Rupiah*) Current Average Rate of Use		Double Average Rate of Use	
	Health Center	Sub-center	Health Center	Sub-center
Clinic Outpatient Contacts				
Illness Care	480	510	355	352
Mother and Child Health Care	288	318	158	189
Village Health Worker weighing activities-- Cost per child weighed		118		

*U.S. $1.00 = Rp. 625

From this it can be seen that the slope of the average cost curve depends on two factors, the level of fixed cost and the square of the number of patients. A high ratio of fixed cost relative to the square of utilization results in a steeply sloped average cost curve. In contrast, a low ratio of fixed cost relative to utilization results in a less steeply sloped curve. A more steeply sloped curve can be given two interpretations. First, the steeper the slope of the average cost curve, the larger the reduction in average cost for each additional patient. If two types of health service units have the same average cost level, average costs will be reduced more sharply by augmenting utilization at the one with the more steeply sloped curve. However, a more steeply sloped curve also indicates that the unit is operating farther away from its point of maximum efficiency, which occurs as the slope of the curve approaches zero.

It is important to note that the rate of change in average costs is affected by the square of utilization and not simply the number of patients. Health centers have higher fixed costs than sub-centers and also have the capacity to serve more patients. However, if in comparing the two types of units the increase in patients served is proportional to the difference in fixed costs the slope of the average cost curve for sub-centers will be steeper than for health centers at normal and capacity levels of use.

Table 8-10 shows the slope of the estimated average cost curves for health center and sub-center illness care and MCH/FP. The slopes are calculated for two points on each curve--the mean utilization level discussed above, and double that level. The figures shown can be interpreted as the change (point elasticity) in the cost per visit (in Rupiah) from one additional patient. The slopes for the sub-center average cost curves are higher at both levels of use and for both types of service than those for the health center. This suggests that, at current levels of use, greater reductions in cost per visit can be achieved by augmenting sub-center use than by augmenting the use of health centers. Although the difference in slope is not very large in absolute terms, it explains why the average cost for illness care at sub-centers was slightly higher than the health center figure at average levels of use, and slightly lower at double the average levels of use. This finding also indicates that, at observed levels of use, sub-centers may be farther from their point of most efficient utilization than health centers. However, without empirical estimates of the capacity of these units in treating patients, it is difficult to assess this conclusion.

This last set of findings should be treated with caution, as they are based on very limited data. For instance, we assumed that total cost curves for the different units were linear, and estimated these curves based on only two units of each type. Study of a larger sample of clinics is needed to assess the appropriateness of these inferences and to draw more substantive conclusions about the relative efficiency of health center and sub-center outpatient services.

Table 8-10. SLOPES OF HEALTH CENTER AND SUB-CENTER AVERAGE COST CURVES AT MEAN LEVELS OF USE AND TWICE MEAN LEVELS OF USE

	Illness Care		MCH/FP	
	At Mean Use	At Twice Mean Use	At Mean Use	At Twice Mean Use
Health Center	-.0245	-.0069	-.0434	-.0108
Sub-center	-.1292	-.0323	-.1477	-.0369

Summary

In this chapter, three aspects of rural health service costs in Glagah and Beran sub-districts were examined. The first objective was to describe the total costs of health services in the two areas. During 1981, about $73,000 was spent on services in Glagah and $48,000 on services in Beran. Most of the difference resulted from the VHW nutrition project in Glagah. Outpatient illness care services were about 14 percent of total costs in Glagah and about 26 percent in Beran. MCH/FP services cost approximately 5 percent of the total in Glagah and 6 percent in Beran.

The VHW nutrition project accounted for over 40 percent of total service costs in Glagah. This was calculated from an analysis of the total costs of that project based on government budgets from 1977, when the project began, through 1981. The 1981 costs of that project were approximately $30,400. In order to estimate a replicable level of funding for VHW activities, expenditures for long-term development of project materials, international consultants, and large capital investments were not included in the cost totals.

The second objective was to calculate average costs (cost per patient contact or clinic visit) for illness care and MCH/FP services at the health centers and sub-centers and for specific outputs of the VHW nutrition project. Total costs of specific services and service units were divided by appropriate measures of utilization.

The two health centers and two similar sub-centers providing illness care had almost identical total costs for those services, with the exception of the cost of drugs distributed, which is directly related to the number of patients. This suggests that costs of buildings, equipment, and personnel are relatively fixed, with the main variable cost being expenditures on medicines.

Measured average costs were extremely variable. In Glagah, a health center illness care visit was less expensive than a sub-center visit. In comparison, in Beran both health center and sub-center were more expensive than in Glagah. One sub-center had a higher average cost than the health center, while the other was lower. Health center MCH/FP visits were least expensive in Glagah and most expensive at the Beran health center, with that sub-district's sub-center in between. The most significant factor determining this variability was the different levels of utilization. No clear picture emerged concerning differences in service efficiency at the different levels.

VHW contacts, which are comparable in a limited way with MCH services, were somewhat less expensive than clinic care in Glagah, and substantially less so than clinic care in Beran. Attendance at an under-five weighing session was estimated to cost Rp. 120, whereas a clinic visit for MCH varied between Rp. 160 and Rp. 395, with most clinics probably closer to the latter figure.

The third objective was to estimate total and average cost curves for clinic-based outpatient services at the various levels in order to compare average costs at different rates of utilization. Personnel costs were treated as a fixed cost along with buildings, land, equipment, operating and maintenance, and supervision costs. The only variable cost was drugs. Fixed and variable costs were averaged across the two health centers studied and the two similar sub-centers.

Estimates were available from the secondary data study of the range and mean number of visits at health centers and sub-centers in 26 rural sub-districts. At estimated mean levels of use, health centers were slightly less expensive per patient contact than sub-centers for both illness care and MCH/FP. This small difference was judged to be insignificant compared to the other sources of variation in the estimates. Because of the low variable costs of MCH services, there may be greater potential to achieve lower average costs at health centers for those services than at sub-centers. However, in general the analysis of average cost curves indicated no significant difference in average cost per contact between health center and sub-center at current average levels of service use.

While no estimates of the utilization capacity of the services units are available, the averge cost curves allow some estimates of the potential for reducing average costs through much higher levels of use. At utilization levels double the average found in Central Java, average costs were reduced approximately 30 percent for illness care and 40-45 percent for MCH/FP. About the same level of reduction was estimated for both health centers and sub-centers. That is, a proportional change in utilization of both types of unit resulted in an approximately equal change in average cost. More careful examination of the slopes of the average cost curves showed that augmenting utilization at sub-centers would give a somewhat larger reduction in average costs than augmenting utilization at health centers, since the sub-centers studied may be more under-utilized relative to their fixed costs than the larger units.

Several conclusions can be drawn from these findings. First, the cost analysis showed no significant difference in average costs between health centers and sub-centers. Their average costs were surprisingly similar at typical levels of utilization and at estimates double the usual level. This implies that there is little difference in cost terms in using either form of service organization to achieve coverage. At normal rates of use, 10,000 patients annually can be served with equal efficiency by one health center or four to five sub-centers. There is some evidence that greater cost reductions from increased utilization can be achieved at the sub-centers. In addition, as shown in Chapters 6 and 7, patients bear greater costs in travel and time in the use of health centers than in sub-centers, raising the total social costs of using the more central units. The sub-centers were also shown to be more acceptable and accessible to low income clients.

Second, even with volunteers VHW services are expensive. A large and actively managed system of VHWs accounted for almost 40 percent of total health service costs in Glagah. A significant portion of that cost was related to management and supervision, which is probably essential to maintain the high levels of coverage reported in Chapter 6. VHWs require paid health center staff to spend a significant portion of their time in supporting village-level activities. However, despite the high total costs, average costs of VHW services are still low when compared with clinic-based services. This reflects the high rates of coverage achieved with VHW services in Glagah. If adequate quality of care can be assured, VHWs provide a viable alternative for service delivery with improved coverage and equity and potentially lower average cost.

The low average and high total costs of the Glagah VHW activities highlight an important constraint on drawing policy conclusions from analysis of average costs. Average cost levels will decline as utilization increases, but this will also raise total cost levels. The total resources available for rural health services are limited, and eventually this limit will be reached. The objective, then, is to provide adequate services organized as efficiently as possible (with the lowest average cost) within the budgetary constraint. There are clearly trade-offs between cost-efficiency, better utilization and equity, and quality of care within the total amount of resources available. The next chapter will explore these trade-offs.

CHAPTER 9

SUMMARY AND CONCLUSIONS: TOWARDS A MULTIPLE OBJECTIVE FRAMEWORK FOR PRIMARY HEALTH CARE

Study Findings

Progress towards "health for all" requires that health services be more effective, equitable, and efficient. The organization of health services is a significant determinant of equity and efficiency. This study compared how three types of primary health care organization--health centers, sub-centers and health posts, and village-level health workers--performed in terms of reaching low income beneficiaries and in terms of the costs of providing services. The study focused on curative care and maternal-and-child health and family planning services. Data were collected in Central Java, Indonesia.

Two separate studies were done. A "secondary data study" of 26 rural sub-districts gathered data on services organization, resources, utilization, and geographic, economic, and social factors that might affect health service performance. These data were collected in each sub-district from records, reports, and interviews with staff in the area.

The detailed analysis of equity and cost in service delivery was carried out in an "intensive study" in two sub-districts in rural Central Java--Glagah and Beran. The two areas had quite similar health service configurations. In addition to clinic-based services, however, Glagah also had a sub-district-wide system of village health and nutrition workers providing simple prenatal, infant and child care in all villages and curative care in one quarter of the villages.

Research in Glagah and Beran was conducted at both the clinic level and the household and village level. Surveys of clinic users and rural households were used to assess equity in utilization of modern public services and to disaggregate service use by income group, type of service, and mode of service organization. In addition data were collected from the service units themselves to assess their overall performance and role in each sub-district's health service system.

A cost analysis of health center, sub-center, and village nutrition worker services was based on data from all levels of government (for expenditures) and interviews and time-motion studies of health workers and village nutrition workers (for allocating costs to curative care and maternal and child health and family planning (MCH/FP) functions). Observations from the individual health units studied were combined to estimate representative total and average cost curves for analyzing the effect of variations in utilization on the average costs of services.

Sub-district Health Service Delivery Systems in Rural Java

Health service delivery systems in Java are complex and variable. The 26 rural sub-districts studied contained ten different combinations of the health service units that make up the rural system: health centers, sub-centers, health posts, VHWs (village health workers), and mobile units. Although health centers are formally the largest units in each district, the data showed that service units below the health center level are significant both in terms of resources used as well as their contribution to total utilization.

All the sub-districts had one health center, one-third had at least one sub-center, three quarters had health posts, and over half received some mobile unit services or had VHWs in a majority of villages. Fourteen percent of all staff time was allocated to sub-centers where they were available, and 7 percent to health posts, which operate part-time. The proprotion of paramedic time devoted to these units is much higher, since they use only paramedics to provide services. Sub-centers accounted for an average of 21 percent of all illness care outpatient contacts and 28 percent of all MCH/FP contacts, with the proportion running much higher in some districts. Thus, outpatient services provided by units below the health center are already a significant component of the rural delivery system. There is also substantial variation in the importance of these units in different locations.

Clinic utilization data from Glagah and Beran confirmed this picture. Both sub-districts had health centers and each area had two fixed units below the health center: two sub-centers in Beran and a sub-center and health post in Glagah. In Beran the sub-centers accounted for more than 50 percent of total illness care outpatient contacts, whereas in Glagah they accounted for only 20 percent of a much higher level of utilization. Despite their similar configurations of service organization, these two areas are at opposite ends of the distribution of the importance of health center and below-health-center units in providing services, as shown in the secondary data study.

Equity in Service Delivery in Glagah and Beran

Data from the household and clinic patient surveys showed that factors traditionally associated with health service utilization were associated with service use in these areas. Patients at health centers and sub-centers mostly came from less than three kilometers away, with the health centers having a significantly larger catchment area. Similarly, most patients travelled less than half an hour to reach services. Patients tended to use modern services for illnesses they perceived as more severe, and used self-treatment or no treatment for those they perceived as less serious. Little use of indigenous medicine was reported in the surveys. However, respondents in Java are reluctant to mention indigenous medicine in survey interviews. There were probably many indigenous health care alternatives. Generally, more severe illness was also taken to indigenous practitioners.

Low income individuals reporting illness were much less likely to use clinic services than those of higher income. That is, overall the public clinic system was biased towards higher income patients. In Glagah, 16 percent of the lowest income cases visited a clinic, whereas 38 percent of the highest income cases had at least one outpatient visit. In Beran, where total utilization was much lower, 12 percent of the lowest income and 22 percent of the highest income cases reported outpatient service use. For MCH/FP services, overall utilization rates were much lower in both districts, and also showed significant bias towards higher income beneficiaries. Six percent of low income households in Glagah reported at least one MCH/FP contact, in contrast with 12 percent of high income households. In Beran, the figures were 3 percent and 8 percent respectively.

To explore income biases within the public system, these utilization data were disaggregated for health centers and sub-centers/health posts. High income patients in both districts tended to use the health centers, while low income patients used the lower level units. The probability of illness cases from the lowest income group in Glagah using the health centers was less than one-third that of the other three income groups. In contrast, the lowest income group had the highest probability of using the sub-center/health post services, while no cases from the highest group consulted at that level. In Beran, none of the lowest income cases used the health center, and again that group had the highest probability of using the sub-center. The situation was similarly reversed for the highest income group, who had the highest probability of using the health center and the lowest of using the sub-center.

Logit regression models predicting the probability of health center and sub-center use were estimated to confirm that the utilization differences shown by the descriptive measures were, in fact, associated with income and not confounded with other variables related to service use. "Limited" models of the choice between health center and sub-center for only those illness cases using either type of clinic showed that higher levels of income significantly increased the probability of choosing health center services, even when controlling for the effects of the relative distance to the two types of units and the perceived severity of the illness.

Separate regressions using the whole population of illness cases to predict health center, sub-center, and private practice use confirmed that low income cases are more likely to use sub-centers, while those with higher income will use health centers or private services. With distance, severity, and patient age as controls, the income variable in the sub-center models had negative coefficients in both areas, while those in the health center and private practice models had positive coefficients.

The estimated regression equations were used to predict utilization probabilities for representative low and high income individuals as distance to health center and sub-center increases. The predictions show that low income cases will use sub-center services at a higher rate and

over a longer distance than high income cases, while the reverse is predicted for health center services although overall the catchment area for health centers is larger. These findings strongly support the contention that the lower level, sub-center services are positively biased towards low income beneficiaries, while the higher level health center services are biased towards higher income beneficiaries. These differences occur within a modern public system that is, overall, significantly biased towards higher income individuals.

In Glagah, no MCH/FP services were provided at the sub-center level. However, many of the activities of the village nutrition worker program, which was implemented in every hamlet in the sub-district, were similar to MCH services. Health center MCH services were biased to high income recipients and had low levels of coverage. In contrast, VHW nutrition services reached over two-thirds of all households in Glagah and over 70 percent of children under five attended village growth monitoring and nutrition education sessions each month. This compared with less than 9 percent who attended a well-baby or child care clinic at the health center. In addition, the children from the lowest income households had the highest probability of being weighed in the village, while those from the highest income households had the lowest probability, the opposite of what was reported for clinic-based services.

These findings suggest that more decentralized types of service organization will benefit the poor proportionally more than the more centralized types. Health centers performed worse than sub-centers or VHWs in reaching low income beneficiaries in comparisons for both illness care and MCH/FP. This is partially related to the more significant effect of income and price (both cash price and indirect prices like travel time and cost and waiting time) on the poor. However, the results also suggest that more decentralized types of service organization may be more acceptable to low income recipients for other reasons, such as familiarity with the staff and lack of formality.

Efficiency in Service Delivery in Glagah and Beran

In 1981, total government expenditures for public health services were estimated to be about $79,000 in Glagah and $48,000 in Beran or between $1.60 and $.90 per capita. The large difference in total expenditures was mainly attributable to the costs of the village health and nutrition worker programs in Glagah. Expenditures on clinic-based illness care services were 13 percent of total expenditures in Glagah and 26 percent in Beran. The difference reflects the addition of the VHW program to total expenditures in Glagah. The actual amount spent on clinic-based illness care in the two sub-districts was similar. Clinic-based MCH/FP services accounted for about 5 percent of total expenditures in both sub-districts. The largest cost components for all clinic-based services were the salaries and allowances of personnel, followed by the costs of drugs and supplies. These two items accounted for well over 90 percent of total costs.

The village nutrition worker program in Glagah increased total health services expenditures in that sub-district by about 40 percent or about $.60 per capita in 1981. Each volunteer VHW cost the public sector about $38 annually, including pro-rated costs of all training and supplies for the workers and their supervisors, and the current costs of supervision and travel. Over 25 percent of these expenditures were for the supervisory activities of sub-district and higher-level personnel. These costs are probably significantly higher than would normally be the case, since the project had ample funding from a major international development agency.

Estimates of the average costs of outpatient contacts for illness care and MCH/FP showed no consistent difference between health centers and sub-centers for clinic-based services. Illness care contacts ranged from $.61 to $1.32 at health centers and $.80 to $1.47 at sub-centers. MCH/FP contacts were $.26 and $.63 at the two health centers and $.51 at the one sub-center offering those services. The large differences in average cost reflect the different levels of utilization of the individual units, since total fixed costs (including facilities and staff) were similar for similar types of units. It is worth noting that user fees were about $.24 for illness care and as little as $.08 for family planning services. The government subsidy for these services is substantial.

The cost analysis in Glagah and Beran was used to estimate average cost curves for health centers and sub-centers. Average levels of utilization for each type of unit were computed from the secondary data study. At current average levels of utilization and double those levels, there was virtually no difference between health centers and sub-centers in the estimated average cost for outpatient illness care and MCH/FP contacts. Thus, even at increased levels of use there are no economies of scale from centralizing outpatient services in health centers. Field observations of the different types of service organization confirm this finding. There is no difference in technology between the two types of units. Where there is some specialization of the health center staff in specific patient care functions (record-keeping, pharmacy, treatment), this does not result in greater productivity than is found in sub-center services, given current and projected rates of output.

The average cost of weighing a child under five years of age in the village nutrition program was calculated for comparison with clinic-based MCH care. The village-level weighing is somewhat comparable to a well-baby visit at an MCH center. The cost of weighing one child each month was estimated to be $.18, compared with an average of $.48 at a health center or sub-center at current levels of use and $.28 at clinics at double current levels of use.

Conclusions

Improving Equity and Efficiency through Decentralization

This study had demonstrated the feasibility of analyzing the equity and efficiency of alternative modes of organizing primary health care. The

results have clear implications for health policy and planning. Decentralization of basic illness care and MCH/FP services can improve equity--that is, focus resources more on the needs of the rural poor. Both sub-centers and VHWs served proportionally more low income clients than health centers.

Providing clinic-based services in sub-centers rather than more centralized health centers does not result in increased cost to the public sector. Similarly, the average cost of MCH-like services provided by VHWs is significantly lower than that for clinic-based services, even at double current levels of clinic utilization. These results demonstrate that the organization of care can significantly affect equity in service use and that improved equity need not conflict with the objective of improving efficiency.

When considering only the goals of improving equity and efficiency in health service delivery, this study suggests that additional investments in the rural helath system should be made as far down in the delivery system as possible. The current plans of the Ministry of Health in Indonesia call for strengthening of sub-district health centers through addition of a second physician and inpatient facilities. A greater return in equity and efficiency might result from strengthening outpatient services in the sub-centers, health posts, and as appropriate, VHWs. The health center could then act more as a resource center for the sub-district, coordinating the different levels of activities and emphasizing preventive and promotional outreach activities such as mass immunization campaigns, development of clean water supplies, and health and nutrition education activities in the villages. The health center could also act as a small outpatient facility for the population in its immediate vicinity, i.e., as a sub-center for the sub-district town and nearby villages.

Effectiveness of Services

The potential health benefits produced by different modes of service organization have not yet been discussed. Equity and efficiency are given high priority in the objectives of PHC (primary health care) and merit separate attention. Possible differences in health outcomes were controlled for by comparing different modes of service organization in terms of outputs which appeared to be of similar efficacy. This finding notwithstanding, the effectiveness of services remains one of the most important objectives of PHC and merits further discussion.

Evidence of the comparability of health center, sub-center, and VHW outputs was provided in Chapter 7. However comparable these outputs are in terms of quality of care, one must also ask whether they are effective. Are the clinics and VHWs reaching a significant proportion of patients with serious need and are they able to provide efficacious service to them? The following are some impressions related to these questions.

As might be expected, most clinic cases require only routine preventive services or symptomatic treatment of self-limiting illness. To gauge the seriousness of cases, we classified the diagnoses reported in the clinics as potentially life-threatening or non-life-threatening. These are very imprecise categories. The diagnostic abilities of clinic workers are also imprecise. Nonetheless, we judged that about one quarter of all illness care cases had diagnoses that implied some potential threat to life.

For MCH/FP, services are intended for both healthy and at-risk mothers and children, with most of the users falling in the healthy category. We had no data on the proportion of mothers and children identified as high risk and on their rates of return visits or follow-up.

Clinic users for both illness care and MCH/FP visits had a low probability of repeat consultations. This was reflected in prescribing practices. Generally, patients were given a large number of different drugs but inadequate dosages for each type of drug. The health workers commented that patients were unable to follow instructions and were unlikely to continue taking medicines after they started to feel better, even if that would prevent recurrence of the illness.

Some diagnoses of illnesses known to be prevalent in Indonesia are conspicuously absent from most health center records. Malnutrition and tetanus are rarely reported, even though these are known to be important causes of death in children.

Immunizations against diphtheria, pertussis, and tetanus have only just become available and none are yet available for measles. In general, immunization is performed by only one person in each health center and is not always well integrated with illness care or MCH/FP activities.

These observations, combined with the overall low coverage of modern health care, suggest that the effectiveness of clinic-based services is low. Improved coverage and greater emphasis on preventive and curative services with potentially high impact--such as immunization, oral rehydration, prenatal care, proper hygiene at birth, and early identification and treatment of other infectious diseases of childhood like measles and respiratory infections--could probably increase this effectiveness significantly.

The impact of VHW illness care and nutrition activities is probably also quite limited. This impression is disturbing given the very high rates of coverage and equity demonstrated for VHW services in Glagah and Beran.

Studies of pilot projects using VHWs in other countries have shown that even illiterate villagers can provide efficacious primary care and significantly reduce mortality (Habicht, 1973, and Gwatkin et al., 1980). These projects have combined high coverage with a limited set of efficacious VHW tasks targetted on high prevalence life-threatening health diseases such as diarrhea and pneumonia (McCord and Kielmann, no date).

VHW projects in Indonesia have generally not followed this model of intensive training in a few efficacious tasks based on population needs. The village nutrition workers in Glagah (who are fairly typical of such programs in Java) received very limited training--often only one week, of which a significant part was not health-related. Their main task is providing information and referral, not treatment or direct action to prevent serious illness. Their strength is that they involve village mothers in the monitoring of their childrens' health. But when a serious problem arises, VHWs in Java are ill-equipped to handle it. While it is difficult to estimate the long-term impact of such educative activities, it is likely that the short-term effectiveness is limited.

Similarly, village health workers receive the same short amount of training and are expected to provide information on a much broader range of health issues. They also treat simple illnesses. The treatments they provide are all widely available at village and town shops and are often well-known to other villagers. They are also not well-equipped to handle more serious cases. Essentially, they provide an easily accessible distribution point for subsidized non-prescription drugs in the village.

The development of VHW programs of limited efficacy was probably intentional. It allows large numbers of VHWs to be trained rapidly by trainers without much qualification. It minimizes the importance of supervision and the risks of mistakes. It does not threaten the monopoly on treatment of the clinic-based services. However, one has to ask whether the high coverage and efficacy of VHW activities and their low average cost compared with clinic-based services are significant if the services they provide have little impact. Equitable and efficient VHWs may not compare well with other modes of services which perform less well on those aspects if they do not have a significant potential for improving health status.

Poor quality of care and limited impact are important problems at all levels in most LDC (less-developed country) health service systems. These issues are getting increasing attention. The problem is particularly poignant, however, when it exists in components of the delivery system that are achieving high coverage, equity, and efficiency. This is a striking example of how particular modes of health service organization can satisfy some of the objectives of PHC and still be deficient in others.

Cost-efficiency and Total Costs

A disturbing finding of this study is the high total cost of extensive service coverage and equity, even with the most efficient mode of service delivery. Despite the low average cost of the Glagah VHW program, activities reaching more than 70 percent of all young children increased total health service costs by about 60 percent. The costs of such high rates of coverage with clinic-based services might be even higher. "Health for All" may not be affordable at current levels of expenditures and with existing program designs.

There are several potentially fruitful approaches to solving this problem. The first is to increase the resources available for rural services. The 60 percent increase in total costs of services in Glagah only raised expenditures to $1.60 per capita from under $1.00, still well below total government health expenditure per capita. In other words, while significantly more resources are needed, rural services may still be relatively inexpensive compared with urban or hospital-based facilities.

One direct approach to increase resources for rural health care would be to reallocate funds from urban-based services to rural areas. Also, there has been little effort to generate financing for rural health services from the users of those services. There is evidence that rural people are willing to pay for primary care (Akin et al., 1982). The cash price of services may be a small component of their total cost to users. This cost may not be a major discouraging factor in utilization.

Another approach is to modify the design of rural services to emphasize cost-effectiveness. This would limit the content of primary care services to high impact interventions and provide those interventions in only the most efficient way--probably some kind of vertical mass campaign. Such a redesign could both reduce costs and improve impact. This is the approach suggested by Walsh and Warren (1979) in their "selective primary health care" proposal. At this time there is no evidence that such a system could be implemented in most countries or that it would be effective. If the "selective" approach were simply added on to existing systems, that would not solve the cost problem although it might improve effectiveness.

Lack of adequate resources for social sevices is endemic to LDCs and the solutions just mentioned all have their problems. Planners should note, however, that improving equity and efficiency of services may reduce the total projected costs of a health service system capable of achieving health for all, but these costs will still be substantially higher than the costs of the current system.

Suggestions for Further Research

The findings reported in Chapters 6, 7, and 8 are based on a small area in a single region of Indonesia. One must be cautious about generalizing from them too broadly. Rather, they can be used as a basis for further work in larger and more diverse areas to test the specific conclusions as well as the general approach used. In fact, it is shocking how little research has been done on both service utilization and service efficiency in LDCs, given the attention now being devoted to the primary health care approach.

Drawing on the material presented in Chapter 2 and the analysis in Chapter 7, it is clear that the theoretical model of determinants of equity in health service use in LDCs is still inadequate. Differences in

utilization of services by income level have been associated with economic demand factors, with social and demographic factors, and with cultural and acceptability factors. This lack of clarity in terms of causal hypotheses reflects the wholesale application of theory derived in the developed countries by various academic disciplines. This study did not attempt to solve this problem. No effort was made to discriminate finely between the causes of inequity. Rather, it explored the link between equity in service utilization and delivery system structure. Multivariate models of individual behavior were used mainly to control for factors possibly confounded with income, not to test a behavioral model about the actual determinants of inequity.

It would now be beneficial to develop more appropriate explanations of how low income populations in LDCs make decisions to use services. To date, only a handful of studies have explored these issues, and most of those have sought to apply rather rigid theoretical models to large sample survey data. Given the uncertainty in clearly defining the mechanism of health service utilization decisions, I would recommend that this work be done in multidisciplinary teams combining anthropologists, other social scientists, and clinicians. It would be more fruitful to do a series of smaller studies in different regions than to attempt large, national-scale surveys. Special attention should be given to exploring the impact of direct and indirect prices on service use (since these are the most readily manipulated policy variables) and the interaction between cultural characteristics, perceptions of need, and appropriateness of treatment. The behavioral model presented in Figure 2-2 could provide a basis for this research.

Further studies of the costs and efficiency of public sector health services are also needed. Research has been hindered by the difficulty in collecting accurate cost data and by the analytical complexity resulting from the multiple products of health services. This study showed the large variability in health service structure and utilization between different districts. Although representative cost curves for different types of units were estimated, the results would be much more reliable if they were based on a larger number of observations. Only Heller's 1975 study in Malaysia has attempted to do this in an LDC, and he was not concerned with comparing the efficiency of different components of the modern public system.

Additional research is also needed on factors determining the effectiveness of PHC, specifically the selection of interventions to be included in the PHC package and quality of care in service delivery. The issue of selection of technology for PHC (determining the "mix of services") was avoided by the design of this study. By comparing different types of organization in terms of the same or similar services, it was not necessary to ask whether, in addition to equity or cost differences, there were also important differences in impact resulting from the types of services provided. This question of effectiveness refers to determining "essential health care" (WHO, 1978, p. 4), one of the main goals of PHC. The choice of the "mix of services" is a subject currently receiving much

attention, as it should. Too much money has been spent providing services which are not likely to result in major health improvements, even if they do reach most of the people. Explicit consideration of this determinant of effectiveness should be included in future studies of alternative PHC activities.

In addition, much useful work can now be done to assess how well quality of care has been assured in routine, large-scale VHW programs, as well as in health centers and sub-centers. It would be useful to determine whether there are significant differences in quality between similar services provided at these different levels. Also, more information is needed on the extent and cost of measures needed to assure quality of care in decentralized services, including the logistics of maintaining extensive supply networks and the costs of supervision and in-service training.

Applying Equity and Efficiency Analysis to Planning Primary Health Care: The Multiple Objective Approach

The primary health care approach implies new directions in the provision of health care. These new directions can be summarized in terms of four objectives: effectiveness, or strengthening the impact of health services; equity, or extending distribution of services to those not currently served; efficiency, or reducing the average cost of service delivery; and fostering local participation and self-reliance in improving health. These goals are to be achieved by changes in health policy, planning, and programming: ultimately by modifying the mix of services provided and the delivery system through which these services are made available. Thus, policy and planning to attain the goals of primary health care is a "multiple objective" problem.

Whenever programs are intended to achieve several objectives simultaneously, it is likely that different alternatives for action will not all provide identical improvements in terms of each objective. Planners often make the error of calling for programs that will maximize more than one objective at a time--for example, a health intervention that will reach the most people at the lowest cost. Usually, such goals are impossible. In most cases, reaching the most people will not give the lowest cost because reaching more people and reducing costs are conflicting objectives. One must define how many people one wants to reach and choose the least cost alternative for doing so (minimize cost for a specific goal in output). Or, conversely, one must define how much money one has to spend and choose the alternative which gives the highest output at that cost (maximize output for a specific level of cost). When more than two objectives are involved, the possible conflicts and trade-offs between the objectives satisfied by real program alternatives become more complex.

There are basically two parts to choosing amongst alternative actions when there are multiple objectives. First, one must identify the expected results of different actions in terms of the different objectives. For PHC, one must evaluate the effectiveness, equity, cost, and participatory performance of alternatives. And second, one must have some way of evaluating the desirability of the alternative results. For PHC this means one must have a means for ordering and choosing amongst possible actions that emphasize one or two of the objectives, say effectiveness and cost-efficiency, over equity.

There are many techniques for ordering alternative actions with multiple objectives 1/. One method is for the results related to different objectives to be given weights reflecting their relative importance. The action with the largest sum of weighted results is the most desirable. This works well when the different objectives can be reduced to comparable units, such as of financial valuation of benefits in benefit-cost analysis. When the results of different goals are not comparable, as they are not in primary health care, weighting is difficult. How, for example, to choose between a program that reduces mortality 50 percent for a population of 10,000 at a cost of $1 million and a program that reduces mortality 25 percent for a population of 25,000 but also decreases the suffering associated with illness at a cost of $2 million? How does one choose between different types of benefits, reaching more people, and spending more money?

An alternative to subjective weighting of different types of outcomes is to present the results of actions explicitly in terms of their multiple objectives. Rather than seeking a single index of program results that synthesizes all the different outcomes, analysts display the results related to each objective for discussion. The process of expressing preferences for specific program alternatives is then used to clarify the implicit valuations being made vis-a-vis each objective. When an action is finally chosen, planners and decision-makers have understood more clearly the implications of the choice in terms of goals met and sacrificed.

This study was conceived as a first step towards the development of a multiple objective planning framework for primary health care. It was only possible to do a partial analysis of the objectives of PHC--equity and efficiency in producing outputs were studied, but not effectiveness in producing health benefits (outcomes) or whether different types of health service organization promoted participation and self-reliance.

This study found that the equity and efficiency objectives of choosing appropriate health care organization for PHC were not in conflict: the more equitable types of service organization were not less efficient. If one could analyze this graphically, it might appear as in Figure 9-1. The relative positions of the three types of primary health

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1/ See, for example, Stokey and Zeckhauser (1978), Chapter 8, or Keeney and Raiffa (1976).

care organization--health center, sub-center, and VHW--are shown in terms of indices of equity and efficiency. Health center and sub-center achieved about the same level of efficiency, but the sub-center was more equitable. VHWs, on the other hand, were both more equitable and more efficient. In the graph they are located to the northeast of the two other alternatives. In this case, VHWs can be said to dominate the other two alternatives--their use is superior in terms of both of the indices used in the graph. Graphically, the lines perpendicular to the axes through the dominant alternative will not intersect lines from any of the other alternatives.

The superior performance of VHWs in Figure 9-1 is only in terms of two of the four PHC objectives. While effectiveness of services was not studied, let us assume that VHWs perform worse on some index of effectiveness than the clinic-based services. That is, given their lower level of training, limited supplies, and primarily monitoring functions, their activities produce few significant health improvements compared with the clinics, despite their high coverage. Figure 9-2 shows how effectiveness and equity comparisons between the different types of service units might appear graphically. In this case, none of the alternatives are dominant. Health center and sub-center are superior to VHW in terms of effectiveness, while VHW is superior in terms of equity. Figure 9-3 shows a similar presentation for performance in terms of effectiveness and efficiency. Again none of the alternatives are dominant. When there is no dominant alternative, choice becomes a matter of how one values one type of objective relative to the others. Of course, if VHWs were shown to be superior in effectiveness to clinic-based services, they would dominate on all three graphs. There would be no conflict between objectives and VHWs would clearly be the superior choice for investment.

Graphical analysis limits comparison to only two objectives. Table 9-1 shows how multiple objective comparison might be presented in tabular form. Health center, sub-center, and VHW are compared in terms of the four objectives of PHC. Efficiency is represented by the estimated average costs of outpatient contacts computed from Glagah and Beran. For the other objectives, the performance of service units is ranked subjectively as low, medium, and high. The rankings for effectiveness and participation are subjective. For equity, the performance of the different types of units in Glagah and Beran are ranked. In a larger study, it would be possible to estimate an indicator of equity for each type of health service organization.

Ideally, each cell in the table would be filled with an actual observation of a project's performance (or estimated performance) on that specific indicator. Decision makers could then see what they were getting and giving up by investing in one alternative over another.

Ultimately, all choices amongst alternative actions reflect the values of those making the choices. Some methods for selecting amongst investments cloak those values in pseudo-scientific jargon or hide them

Figure 9-1. THE EQUITY AND EFFICIENCY OF ALTERNATIVE MODES OF ORGANIZATION FOR PRIMARY HEALTH CARE

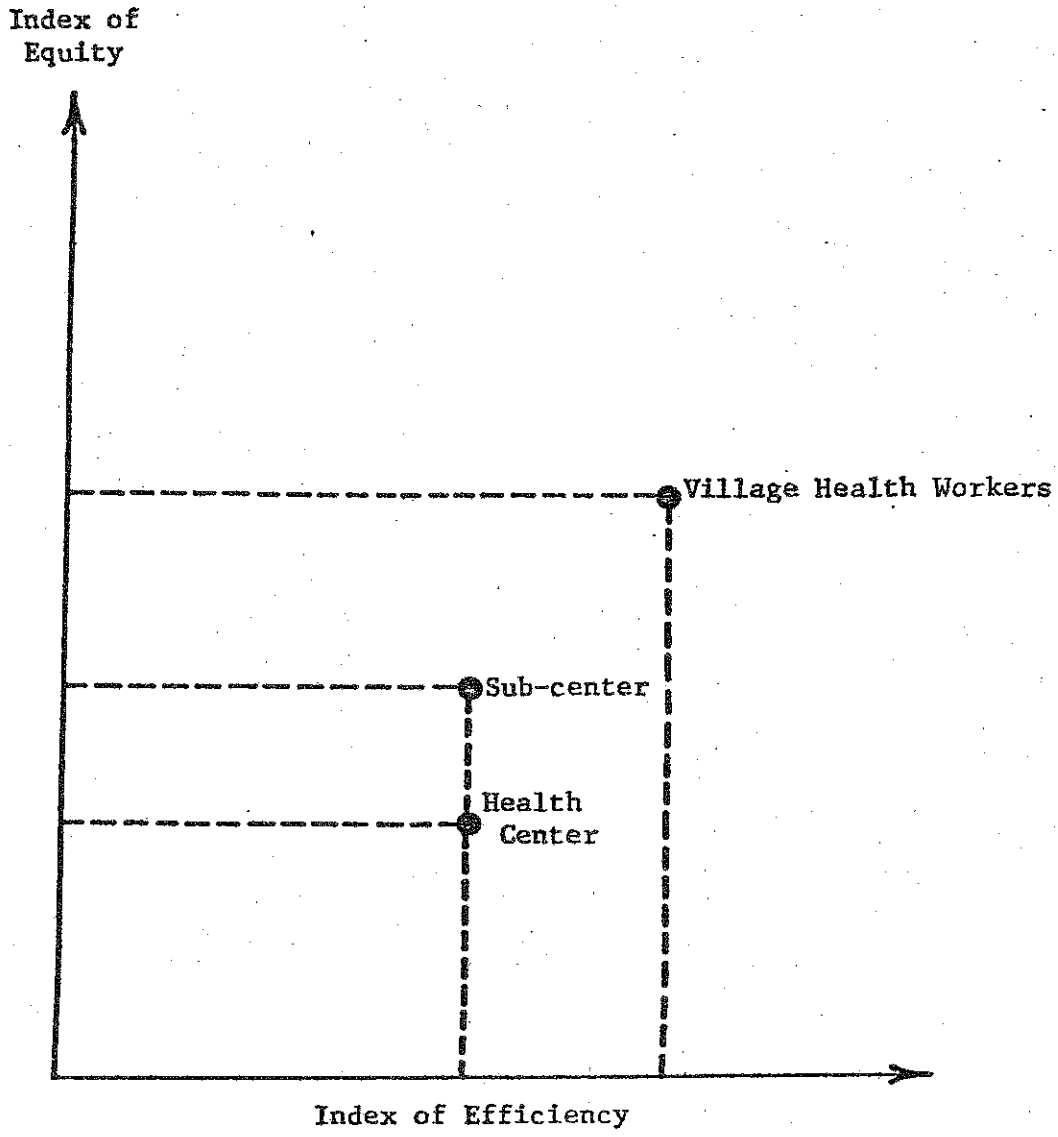

Figure 9-2. THE EFFECTIVENESS AND EQUITY OF ALTERNATIVE MODES OF ORGANIZATION FOR PRIMARY HEALTH CARE

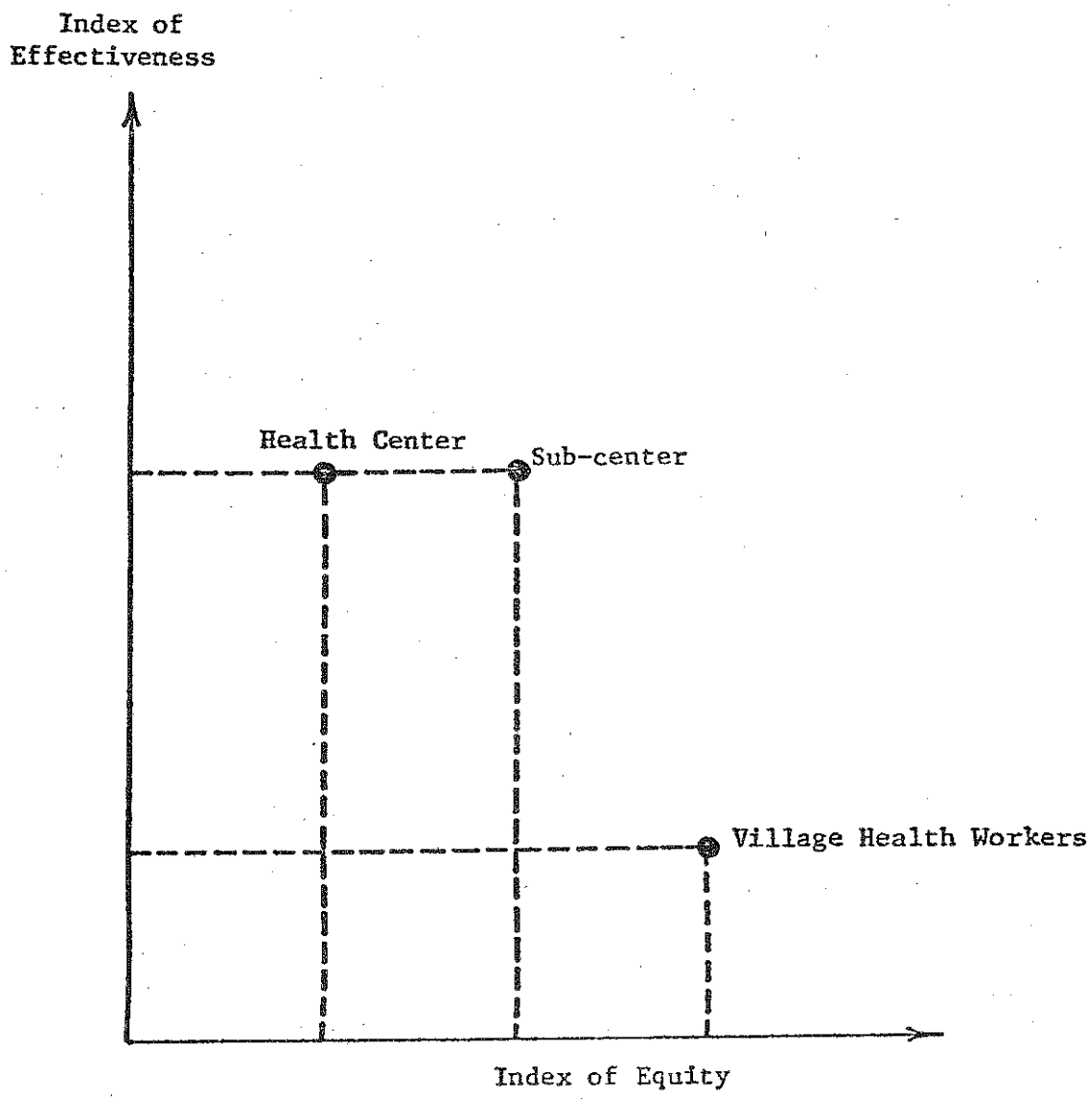

Figure 9-3. THE EFFECTIVENESS AND EFFICIENCY OF ALTERNATIVE MODES OF ORGANIZATION FOR PRIMARY HEALTH CARE

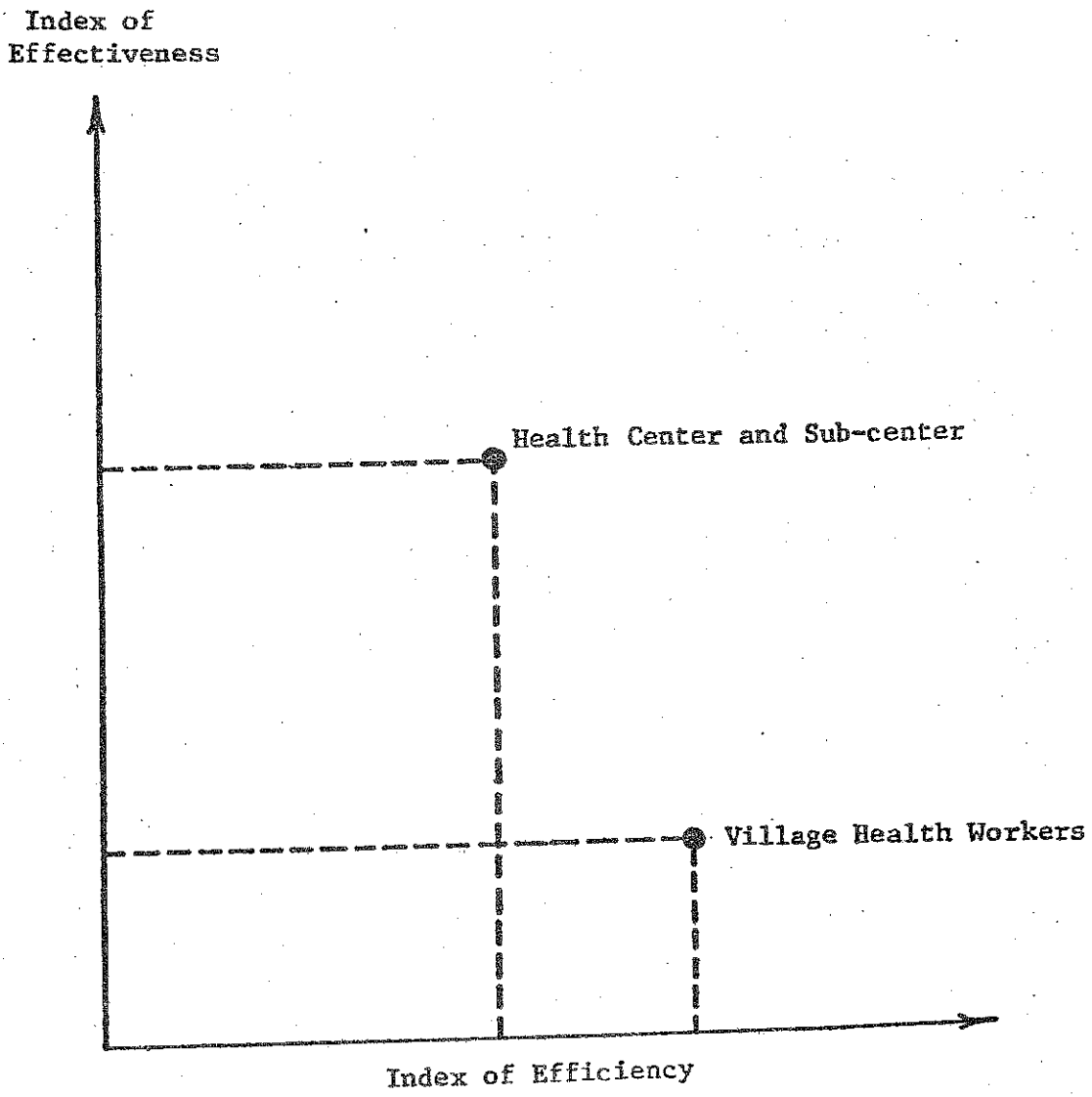

Table 9-1. MULTIPLE OBJECTIVES IN PRIMARY HEALTH CARE: A MODEL DISPLAY OF EFFECTIVENESS, EQUITY, EFFICIENCY, AND PARTICIPATION ASSESSMENTS OF SERVICE ORGANIZATIONS IN JAVA

	Effec-tiveness	Equity*	Average Cost**	Partici-pation
		Curative Care		
Health center	Medium	Low	Rp. 480	Low
Sub-center	Medium	Medium	Rp. 510	Medium
VHW	Low	High	-	High
		MCH/FP		
Health center	Medium	Low	Rp. 288	Low
Sub-center	Medium	Medium	Rp. 318	Medium
VHW	Low	High	Rp. 118	High

*An appropriate equity index might include both the income distribution of users and some measure of total coverage.

**If budgets are severely limited, it might also prove necessary to consider total cost as well as average cost.

away in "accepted" theory. Often, the values underpinning such theory are not even known to the analyst. However, the proper task of the policy analyst should not be to disguise the implications of choices in seemingly objective decision criteria. Rather, both the values underlying choices and the implications of those choices for the people affected should be made explicit and public. Then decision makers will be able to confront the true nature of their task.

Table 9-1 clarifies the issues facing planners in choosing to strengthen particular modes of PHC delivery. For illness care, health centers provide the highest probability of impact on individual cases, but poor equity and participation. Sub-centers provide similar impact and improve on equity and participation. There is little difference in average cost between the two. On balance, sub-centers may be the superior choice for providing primary illness care. VHWs, in contrast, probably have even lower impact but the best equity and participation. Their averge cost is unknown for illness care, but is probably below the clinics. Comparing their illness care activities to clinic-based services is essentially a trade-off between equity and participation on the one hand, and greater health benefits on the other. Making this trade-off explicit may spur action to improve the potential impact from VHW illness care services or to promote further extension of clinic-based care through additional sub-centers.

For routine MCH services, health centers and sub-centers perform approximately as they do for illness care. They may not be dramatically more effective then VHWs since much of MCH/FP service is preventive and educational--routine tasks often done well by VHWs. If the effectiveness difference is not significant, the better equity/participation performance of VHWs makes them more attractive. VHWs also are significantly less expensive than clinic-based services on a per patient basis. Again, an appropriate response may be to upgrade the quality of VHW services or to improve the equity of clinic-based services through strengthening the sub-center level. These observations illustrate how the multiple objective approach can highlight practical strategies for health service planning.

This study has provided meaningful and relevant analysis to guide planners in improving the health of low income people in poor countries. Assessment of the equity and efficiency of existing services brings useful insights for the improvement of primary health care. It is also a substantive step towards a more comprehensive planning method that explicitly considers the diverse and possibly conflicting objectives of efforts to improve public health in LDCs. Motivating this research was the belief that better information, appropriate techniques for its use, and good intentions can combine to improve peoples' lives.

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APPENDIX 1

METHODS USED IN ESTIMATING THE COSTS OF HEALTH SERVICES IN GLAGAH AND BERAN

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METHODS USED IN ESTIMATING THE COSTS OF HEALTH SERVICES IN GLAGAH AND BERAN

Estimating the cost of public sector health services in Indonesia is difficult and time-consuming. Services are financed from many different budgets and levels of government. There are no summary accounts listing the various sources of funds. In fact, local officials responded with enthusiastic support and interest to my proposal to estimate the costs of rural health services--regency and sub-district managers have little idea how much is being spent each year on services in their areas.

The objective of the cost analysis in this study was to estimate the total and average costs of illness care and mother and child health/family planning services provided by health centers, sub-centers, and health posts. We also sought to estimate the costs of primary nutrition services provided by village nutrition workers in Glagah. The first step was to estimate the total costs of services. We then needed to identify only those costs attributable to each type of service and type of unit. This latter step required a method for allocating the fixed costs of health service units amongst the various activities, since public health services in Java often perform up to 14 different functions (see Table 4-2 for a list of these functions). This is a typical problem in estimating the costs of individual products in multi-product enterprises.

Fixed costs were allocated to illness care and MCH/FP services using a method adapted from the "functional analysis" approach developed at Johns Hopkins University (Department of International Health, 1976, and Alexander et al., 1972). Basically, this method bases the breakdown of costs on the use of floor space in clinic buildings and the work time of helath service personnel.

Sources of Data for Total Cost Estimates

In order to estimate the total costs of rural health services in Java, researchers must consult a variety of sources at all the different levels of government. The fiscal structure of the Department of Health makes determining actual expenditures in a particular sub-district quite difficult.

One problem is the multiplicity of budgets. Health services are financed both from routine, development, and "presidential instruction" (Inpres) budgets, and there are separate sources of funds at the central, provincial, and regency levels. Routine budgets primarily cover personnel

expenses (including salary, pension and insurance contributions, and the rice allowance) and some expenses for supplies and operating costs of services. Development budgets fund most of the activities and programs of the rural health system. This includes most of the material needed for such programs as nutrition, health education, and rural water supply as well as salary supplements to encourage the health service staff to work in these programs. Inpres budgets have been established in the last few years to finance the construction, equipment, and vehicles for new health facilities, most of the drug supply for the rural health system, and specific health programs such as rural water supply and hygiene and sanitation.

Most of the routine and development budgets are determined at the central level and passed through the provincial and regency levels. Additional routine and development expenditures are financed directly by the provinces and regencies. Inpres budgets are determined centrally and allocated directly to the regencies for disbursement, skipping the province level.

The various vertical programs within the Department of Health are financed separately primarily within the development and Inpres budgets. It is usually possible to obtain figures for the total amont of these budgets at each level of government from the planning office at that level. However, it is not always possible to determine the distribution of these funds to the next level of government without directly consulting the officers of each particualr vertical program. For example, the Department of Health's planning officer in the regency would know the total amount allocated to immunization in the regency, but would not know how it was distributed amongst the sub-districts. That information would be available from the officers of the immunization program. To estimate the total project expenses for a sub-district, each vertical program might have to be consulted separately. The figures would not be available in the sub-district either.

For some vertical programs, such as the Glagah village nutrition workers, funds are disbursed in the sub-districts directly by the province-level staff, bypassing the regency. Regency staff in the area had no figures for expenditures on the village nutrition worker program in Glagah, although that information was available in the province and national offices of the program.

In short, collecting data on the costs of rural health services in a particular area requires tenacity, ample time, and the willingness to seek out alternative sources for particular pieces of information. The following lists the sources consulted for this study and the data obtained at each level.

Central Level

* Current (1981) cost estimates for clinic construction, equipment, and vehicles from the Inpres program. Sub-district and regency health staff sometimes did not know the cost of these items in their areas.

* Annual budgets for the Glagah village nutrition worker program from 1977 to 1982. These provided estimates for the costs of that program prior to the year of the study.

Province Level

* Costs of drugs and other supplies used in the rural clinics. Most drugs and supplies are purchased with Inpres budgets at the province level. Each province manages its own bidding procedure with suppliers. Prices paid for drugs and supplies in 1981 were taken from the purchase order of the provincial health office.

* Glagah nutrition project expenses. Some additional expenditures for the village nutrition worker program were determined at the office of the provincial project manager.

Regency Level

* Salaries of health personnel. Salaries are paid by the regency health office, which keeps computerized roles of all salaried personnel and the amount they receive.

* Glagah nutrition project expenses. Additional information on this program was available from the regency project manager.

* Vertical project expenditures. Actual expenditures on rural water supply, immunization, health education, and other vertical projects in Glagah and Beran were obtained from the offices of each division in the regency health department.

* Building construction and renovation costs. Some of the clinic buildings in Glagah and Beran were built or renovated with funds disbursed by the regency. These expenses were obtained directly from the regency records.

Sub-district Level

* Building, land, and vehicle costs. Some information on the costs of land, buildings, and vehicles used in Glagah and Beran was obtained directly from the local health staff.

* Utilization of drugs and supplies. Clinic records included a monthly inventory of drugs and supplies received, expended, and in stock. The total cost of these supplies was obtained by combining these records with the drug prices obtained at the province level. For the drug costs of illness care and MCH/FP services, the clinic patient survey noted the actual drugs received by the sample of patients. The costs of those prescriptions were averaged.

* Salary supplements. Special allowances were paid to clinic staff by many different programs. The amounts were determined from interviews with all clinic personnel. Their responses were verified with regency project managers.

As mentioned in Chapter 8, two cost items were omitted from the total cost calculations: estimates of the pro-rated education and training costs of health personnel and estimates of the income of the rural health services from user fees. The income from user fees was not difficult to estimate. However, only a small proportion of that income was returned to the rural health system during 1981, and it was not possible to determine that amount for Glagah and Beran.

Accounting Practices for the Estimates of Total Cost

Some components of the annual total costs of services represent a portion of previous investments made in the fixed inputs of the health care system, such as land, buildings, equipment, and vehicles. These pro-rated annual costs were estimated based on assumptions about the useful life of such investments and the opportunity cost of the funds used to purchase them.

The current cost of land purchased for the clinic buildings and staff houses was estimated from interviews with sub-district officials. The original purchase price was usually not known or the land had always been owned by the government. Land values have appreciated rapidly in recent years in Java. In the total cost calculations, land was estimated to appreciate 10 percent in value annually. Thus, 10 percent of the current value of clinic land was treated as income to the health services and deducted from the other costs. Since the land is owned by the government outright, there were no financing costs associated with this asset.

The actual construction costs of most clinic buildings in Glagah and Beran were known. Buildings were assumed to have a 20 year life. The initial cost of the buildings as well as the cost of renovations and improvements was pro-rated equally over 20 years with the annual amount charged as a cost to the health services. In addition, 13.5 percent of the original investment was charged annually to cover the opportunity cost of capital. That rate reflects the average interst rate as reported by the Bank of Indonesia between 1975 and 1981.

No information was available on the actual expenditures for equipment and vehicles in Glagah and Beran. Instead, estimates supplied by the Department of Health in Jakarta for the 1981 cost of equipping health centers and sub-centers and purchasing motorcyles and bicycles were used. These estimates of current costs were pro-rated over 10 years for vehicles and 20 years for equipment, with the annual amount charged as a cost.

The purchase price of government-supplied drugs was available from provincial records. The quantity of drugs used during 1981 was recorded in the clinics, so that the total costs of drugs used could be estimated. Whenever a drug price was not known, 60 percent of the 1981 retail price was used as the government pruchase price. The retail price was obtained from Purwanto, S.L. (ed.) (1981) Data Obat di Indonesia.

No information was available on actual expenditures for operating and maintenance of clinic facilities or for the supervision of sub-district health service activities. Operating and maintenance costs were estimated at 10 percent of the pro-rated annual cost of buildings and equipment plus ten percent of the purchase price of vehicles. For supervision, 1 percent of the total annual cost of personnel (salaries and allowances) was used.

Other recurrent costs such as salaries, allowances, direct project expenses, drugs and supplies, etc. were charged as costs in the full amount for 1981.

The costs of the village nutrition worker program in Glagah were given special attention. As a pilot project, much of the expenditures for this effort were for one-time development costs. Some of these costs were particularly high because of the involvement of international consultants. Even the local development costs could only be divided amongst the six sites of the project (Glagah was one), far fewer than would be the case for an ongoing national program.

To compensate for these special characteristics of the Glagah program, the costs of the village nutrition worker effort were divided into three components. Major project development expenses including the work of international consultants; the development of project materials such as manuals, curricula, posters, etc.; and the purchase of vehicles and other expensive equipment were omitted from the costs of the Glagah activities. The costs of training sub-districts and village workers and the production cost of all materials for them were pro-rated over 5 years, with the annual amount charged to the 1981 project costs. All other current expenses such as subventions for village-level activities, travel costs, salary supplements, etc. were charged in full to 1981 costs.

Methods for Determining the Costs of Illness Care and MCH/FP Activities in the Health Center and Sub-Center/Health Post

Illness care and MCH/FP are only two of the many different functions of the rural health system. A method was needed to separate the total costs of these services from the other health care programs in Glagah and Beran. The main problem was in allocating fixed costs such as buildings, equipment, and personnel.

Based on the "functional analysis" methods developed at Johns Hopkins University, two approaches were used for allocating these fixed costs. Some proportion of land, buildings, and equipment costs were directly assignable to illness care and MCH/FP services based on their full-time use for those functions. These proportions were determined by observing service activities and measuring space. For example, of the total area of building space in a health center, certain rooms were assigned for illness care consultations and others for MCH/FP. The

proportion of total floor space in the clinic was multiplied by the annual cost of the clinic building to give one part of the annual cost of building space for each function.

However, a part of these physical resources were not assignable to any specific function--for example, rooms used for record-keeping or storage. A portion of the fixed costs attributable to these "general support" facilities was determined based on the allocation of work time of health service personnel. The distribution of work time by function was also used to determine the appropriate proportion of personnel costs assignable to illness care and MCH/FP.

The time allocation study of health service workers was the basis for this cost allocation. All personnel were asked to complete a daily work diary each day for one week, and then repeated the process one week later, that is for two not-continuous weeks during the same month. The work diary consisted of a sheet of paper for each day divided horizontally into rows for each half-hour between 7 A.M. and 5 P.M. The sheet was divided vertically into three sections. One listed the place of work during each half-hour: in the health center, sub-center/health post, mobile unit, or other work outside the clinics. The second section listed types of activity such as travel, administrative work, preparation or assisting other staff, "empty time" or direct service to patients or communities. The third section classified the half-hour by health service function, including: illness care, MCH/FP, immunization and communicable disease control, nutrition, school health, village health worker program (illness care), hygiene and sanitation, laboratory, and dental.

Health personnel filled in a row for each half-hour worked during each day. They first identified that half-hour by place of work and then selected a type of activity that best described what they were doing during that period. Finally, for those half-hours identified as primarily "direct service to patients or community," each worker selected a function that best described what they were doing.

Based on these work diaries, the distribution of direct service time by health care function was used to allocate the costs of health personnel and the costs of "general support" facilities. For personnel costs, the total salary and allowances of each staff member were multiplied by the proportion of that person's direct service time spent on the illness care or MCH/FP function to determine the personnel costs attributable to each function. The data on place of work also permitted these costs to be broken down for health center and sub-center/health post. For support facilities, the proportion of total personnel costs (all staff) attributable to the illness care and MCH/FP functions (based again on direct service time) was multiplied by the proportion of the costs of fixed facilities that could not be assigned to any particular function. In other words, support facility costs were allocated to functions according to the overall distribution of work time by function.

Allocating Salary Costs for Supervision and Support of the Glagah Village Nutrition Worker Program

A proportion of personnel expenses was also allocated to the village nutrition worker program in Glagah. This was determined from the time allocation study as well. Health service personnel recorded a percentage of their direct service time as working with communities as part of the nutrition program. This was almost entirely time spent supervising the village nutrition workers and attending the monthly weighing sessions in the villages. The appropriate percentage of these workers' salaries was allocated to the village nutrition program and included in the total costs of that program reported in Table 8-4.

In addition to a portion of staff salaries, many health service personnel in Glagah received monthly or annual salary supplements for working on the village nutrition worker program. These were reported in the health service staff interviews and included in total costs of the Glagah program.

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