

## Relating Health Services To Community Health Needs

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Received for publication June 27 1972

Planning and evaluation of health services would benefit from an increased ability to relate health needs to health measures effective to meet these needs. In 1968-69 studies were made in India and Turkey which attempted to develop a framework using well defined health functions to link needs and services. An important feature of these studies was the functional analysis of health services as a basis to describe the allocation of resources within the services. Consequences of changes within the services or accommodation of the services to fulfil unmet community health needs are illustrated in this paper using data from Punjab, India. Applications of the methods of the study for health services research, planning and evaluation are suggested.

### Introduction

Planning and evaluation are rapidly becoming recognized as essential activities in organized health services throughout the world. In spite of the proliferation of methods, health planning and evaluation still suffer from a lack of satisfactory techniques which can relate health needs† to specific services that could satisfy these needs. The identification of need is itself a difficult problem since felt needs of a community will generally be different from needs perceived by health professionals or expressed as economic demand. Moreover once needs have been defined, there remains the problem of setting priorities among these needs. In a field research study‡ concluded in 1969, new methods and approaches were explored in an attempt to resolve these problems. The basic objectives of the study were to :

- (1) quantify community health needs with particular attention to the setting of priorities among them,
- (2) identify the health resources currently available to satisfy these needs,

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†Need is used here to indicate any state or condition of individuals or communities requiring some form of health intervention whether preventive or curative

‡The Functional Analysis Project of the Department of International Health The Johns Hopkins University School of Hygiene and Public Health Baltimore Maryland USA (Project supported by USAID Contract No. CSD-832)

(3) determine how health services are being utilized and gaps in their ability to meet the needs of the community, and

(4) specify health service activities in a manner that would effectively permit their impact on health needs to be measured.

The analysis was designed to organize the data collected in such a manner that practical alternatives among health service activities, job requirements and training could be defined. In carrying out this study, however, the traditional description of programmes, staff, facilities or costs were minimized in favour of thinking in terms of the functions\* of a health service. The approach was based on the ability to relate both multiple health needs and diverse service activities to a relatively few functions. Once services and needs were segregated into functional groups their detailed analysis became more manageable. This paper will briefly summarize the methods used in the study and illustrate some of the findings particularly relevant to the problem of relating needs and services (Although the study involved several closely related projects in North and South India and Turkey, for ease of presentation the following discussion has been limited to the project carried out in the State of Punjab in India).

#### Material and Methods

Early in the development of the study it was necessary to precisely define the functions to be analysed. This then provided clear guidelines for linking each bit of information collected to a particular function. For the purpose of this study six major functions were selected. These were medical relief including all care of illnesses (MR), personal preventive services, maternity services, family planning (FP), communicable disease control at the community level (CDC) and environmental sanitation (ENV). The small amount of adult preventive services encountered in the study permitted the combining of personal preventive services and maternity services into a maternal and child health function (MCH) at the analysis stage.

Although the functional approach can be limited to specific aspects of health services, it was the intent of this study to apply it on a comprehensive basis to entire communities and their health services. Since a primary concern was the development of methods for data collection and analysis, well defined communities with simple, yet relatively comprehensive health services were sought. In India the Community Development Block (CDB) with its related Primary Health Centre (PHC) and Sub-centres offered a nearly ideal setting for the study. In Punjab two CDBs were selected with full recognition that they could not represent the entire State. The findings of the study must therefore be considered only illustrative of the uses of the method. Within the set geographical limits, multiple techniques were applied over one year to collect detailed data representative of all health services available and the communities they served.

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\*Function was defined in this study as a discrete area of responsibility

**Community data :** Three villages were selected in each CDB at distances of approximately one, two and three miles from the PHC. Detailed surveys as described below were carried out in these villages. Thirteen additional villages in which brief surveys were conducted were selected randomly to represent all the villages of each block. These community studies were performed by a team of eight field investigators and a social scientist supervisor. The studies included the following components :

- 1. Village level information :** Discussions with villagers and special village leader interviews provided a general profile of the village characteristics including estimates of local health needs and service patterns. This was carried out only in the three intensively studied villages in each CDB.
- 2. Detailed household surveys :** Interviews were conducted to gather demographic, social and economic information ; felt needs for health services ; episodes of illness ; and details about the utilization of various health services and practitioners, including expenditures for medical care. Two sets of households were selected for these interviews. One set included a panel of 25 households in each village interviewed every fortnight throughout an entire year in order to obtain information on the dynamics of continuing health problems. A second set included 120 households per village interviewed just once to provide broader representation of the community. These latter were spread throughout the study year, 10 being visited each month.
- 3. Brief household surveys :** In the 26 other villages, 25 households in each were selected randomly. Abbreviated versions of the detailed household interviews were administered only once, generating limited data, useful for comparison purposes.

**Health services data :** Initially all health services including private practitioners in each CDB were identified. Information was collected about these services by the same field investigators and social scientist who conducted the community surveys. In addition, a statistician, public health nurse and physician were involved in the collection of health services data. The following specific methods were used :

- 1. Interviews and observations of private practitioners :** All full-time private practitioners in one CDB (53 non-western type and 3 western type) were interviewed. Other practitioners utilized by the households in the village studied, and a small sample of indigenous midwives (Dais), were also interviewed. Basic information about their background, training, practice, patient volume and charges were identified. These interviews were all conducted by the social scientist. In addition he observed and recorded the content of services rendered by certain of these practitioners to approximately 500 patients.
- 2. Data from records :** PHC and sub-centre records were examined and pertinent data abstracted. The same record abstracts were performed in all other organized health facilities in the CDB, including an average of one Red Cross MCH Centre and four Government supported dispensaries. Additional statistical and cost data were obtained from district and state health officials.

## Health Services

**3. Health centre work sampling :** Instantaneous intermittent observations were made at two-minute intervals throughout the entire clinic hours of days sampled to represent the days of the week and the major seasons of the year. Observations were made of the activities of workers within the confines of the PHC itself and included a classification by function of these activities.

**4. Field work sampling :** When PHC workers made visits into the community a modified version of work sampling was carried out that permitted an accompanying observer to sample their activities at five-minute intervals and keep a continuous record of all service contacts made. This again was designed to sample all days of the week and seasons of the year for each category of field worker.

**5. Patient flow analysis :** Patients were observed as they received outpatient services in the PHC. The technique was designed to generate information on the sequence of events that accompany patient care, the content of this care, the personnel delivering the care and the time and cost involved. The days that these data were collected were selected to represent all days of the week and seasons of the year.

**6. Interviews of PHC staff :** Each staff member was interviewed especially to learn about their background, training, attitudes and knowledge about PHC work. Using these multiple techniques a large volume of data was generated in the two CDBs studied. These data have been analysed and presented in another report\*. The following findings are therefore not intended to be comprehensive but include selected data of particular relevance to the objectives mentioned at the beginning of this paper.

### Discussion

There have been two major questions associated with this study since its inception. One is concerned with the potential usefulness of the data and the second involves the relevance and practicality of the methods that have been developed. This discussion will attempt to answer these queries first by presentation of illustrative data and then by discussing possible simplification of the methods that might lead to their adoption on a routine basis for planning and evaluation.

**Uses of the data:** As an aid to conceptualizing the functional analysis of the data generated in this study the schematic diagram in Text-fig 1 was constructed. In it a large reservoir of **Community health needs** has been represented by the selection of a few specifically stated needs. The major sources of health services in a CDB have then been linked to these needs using the five major functions previously listed. The solid lines indicate direct flow of services from the various practitioners or health facilities to the community. The dotted lines are an attempt to show the multiple impacts certain functional services may have on needs. For example, family planning services (FP) should most directly affect the birth rate. However it is generally accepted that better spacing of births would lead to more adequate development and decreased morbidity of the resulting

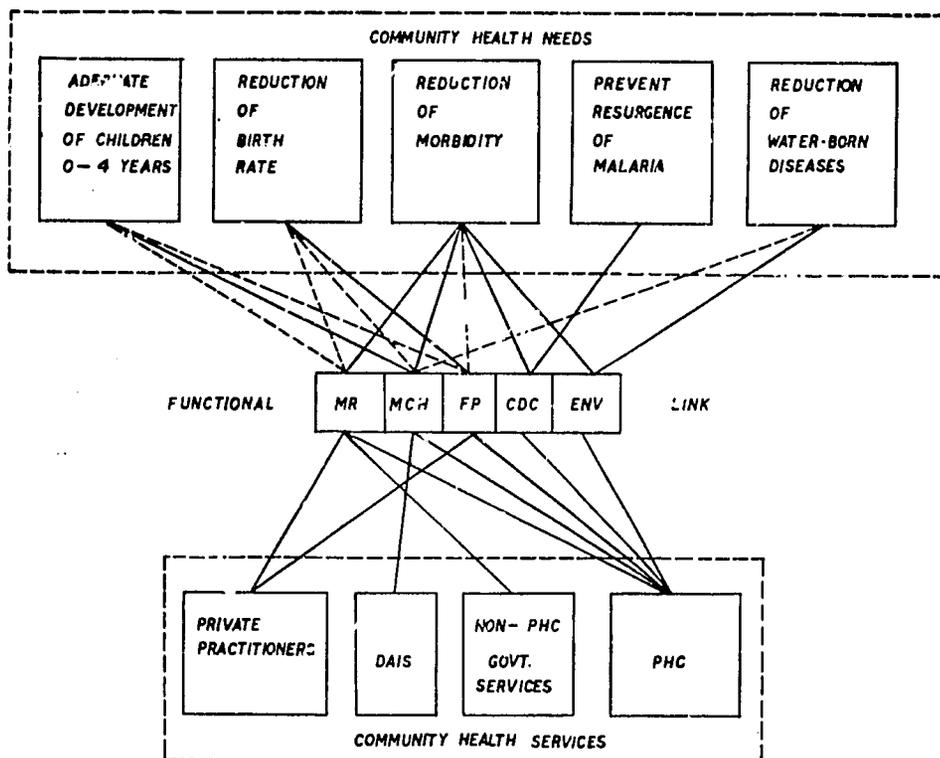
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\*Functional Analysis of Health Needs and Services : The Johns Hopkins University School of Hygiene & Public Health Department of International Health December 1970 (Mimeographed document)

children. It is a matter of judgement how directly certain functions are related to specific needs. To be more accurate the diagram should provide for multiple types of lines to reflect the varying degrees to which services relate to needs.

Text-fig 1

Diagram of functional interrelation of community health needs and health services in a Punjab community development block



One of the basic intentions of the analysis was to generate information that would adequately indicate health needs and how they were being met. In Table I, Text-fig 1 has been reorganized into tabular form to permit the introduction of certain numerical indicators. The most convenient indicator was the requirement for specific service visits. Except for the medical relief function the conversion of generally stated needs into needs for visits was a relatively simple task. Judgement was required and the assumptions underlying these judgements are simply stated in the Table as norms for required visits. For all except the medical relief function, basic demographic data were used, such as the number of children in specific age groups, the number of eligible couples (wife in child-bearing years) and the number of households in a CDB with its population standardized to 100,000. The norms were applied to these data to yield visits that might be effective to meet the related needs. For example the broadly stated

need to prevent the resurgence of malaria could be translated into the standard need for fortnightly fever surveillance visits to each household in the CDB. With 15,440 households per block this means a need for over 400,000 household visits per year. In 1968-69 it can be seen that the PHC provided less than half the needed visits.

The indicator of need for medical relief in Table I was derived from data collected from the panel households of the study villages. Health problems were identified at each fortnightly interview. These problems were categorized by type, duration, days lost from normal activities, and whether consultation was sought from a health practitioner. Depending on various combinations of these factors, problems identified each fortnight were divided into (a) generally preventable or non-preventable, and (b) needing medical relief visits or not needing medical relief (Text-fig 2). For example diarrhoea was considered generally preventable. When it was related to either more than 6 days duration, or loss of more than 2 days of normal activity, or consultation with a practitioner, it was considered a problem requiring care averaging 3.3 visits to some health service (The latter average number of visits per problem was obtained from the actual experience of individuals in this study seeking care). Using these rather conservative criteria it rapidly becomes evident that there is a large reservoir of unmet need for medical relief services. What also stands out starkly in Table I and Text-fig 2 is the inescapable fact that the PHC or even all government services combined provide for only a minor fraction of the currently satisfied need for service. It is unrealistic to think that the PHC as now organized could soon make much of an inroad on the unmet need for medical relief unless it were in the area of preventable problems. If programmes could be mounted to prevent most of the problems theoretically considered preventable, Text-fig 2 shows that unmet need for medical relief visits would be reduced from 61 per cent of total need for visits to 16 per cent. The question whether preventive programmes could effectively produce this reduction is left unanswered, but at least the data provided here should start the health administrator thinking along these lines.

Another major area of the analysis focuses sharply on the PHC itself. The bulk of the health services data that were collected provided considerable detail about the functioning of the PHCs. Table II summarizes some of these data under the broad categories of (1) the functional distribution of the overall effort or time of the PHC staff, (2) the numbers of service-contacts made during one year in each of the functional areas, (3) specification of certain quantifiable services rendered in each functional area, and (4) the total cost to the PHC of all services rendered in each function. The cost per contact or service in certain instances has also been calculated. These data provide a descriptive core of information which can be used over time to evaluate changes in performance, shifts in costs of programmes and the appropriateness of the distribution of staff effort. For example medical relief services consumed more total staff effort than MCH and environmental sanitation services combined. Total service-contacts for medical relief were four times greater and expenditures more than twice that of the other two functions. With the previously suggested possibility of reducing medical relief needs through preventive services, one wonders whether serious consideration should

**Table 1. Functional specification of certain annual health needs as service-visits required or provided in a Punjab community development block standardized to a population of 100,000, 1968-69**

Needs		Service-visits						
Type	Indicator	Functions	Required	Currently provided				Additional need
				PHC	Other Govt. facilities	Dais	Private practitioners	
Reduce Morbidity or its Consequence	398,000 problems requiring care averaging 3.3 practitioner visits per problem	MR	1,300,000	68,000*	68,000	..	373,000	791,000
Adequate Development of Children 0-4 years	3,120 children <1, 9,140 children 1-4, with bi-monthly visits the first year and semi-annual visits thereafter	MCH	37,000	7,500	..	5,200	..	24,300
Reduction of Birth Rate	10,150 eligible couples with at least one son who are not currently practising FP, requiring 4 visits per year. 860 annual acceptors requiring an average of 5.9 service or follow-up visits per year	FP	45,600	37,800	..	..	12,000	..
Prevent Resurgence of Malaria	15,440 households with fortnightly surveillance visits	CDC	401,000	195,000	..	..	..	206,000
Reduction of Water-Born Diseases	15,440 households with semi-annual visits for inspection and advice about water source, drainage & waste disposal	ENV	30,900	1,200	..	..	..	29,700

\*Approximately one-half in the PHC and one-half in the field

Text-fig 2

Distribution of 8,273 morbidity problems identified in the panel household interviews in Punjab by need for medical relief (MR), source of met needs and proportion of unmet needs, 1968-69

## TOTAL MORBIDITY PROBLEMS

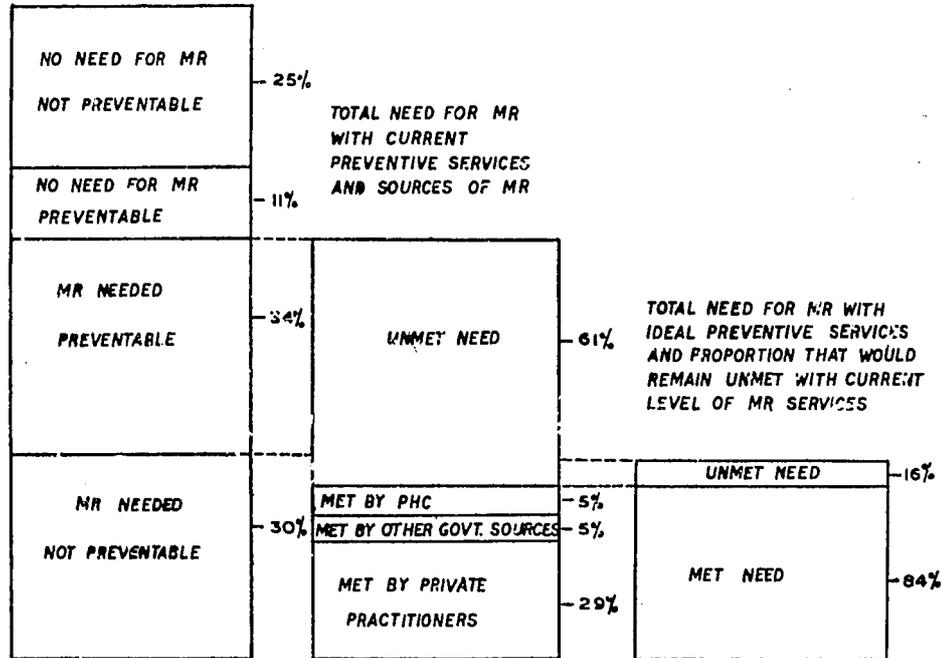


Table II. Distribution of total annual PHC staff effort, service contacts, and costs by functions with selected examples of specific services and unit costs. Average of two PHCs, Punjab, 1968-69 (Standardized to a population of 100,000)

	Functions					Total
	MR	MCH	FP	CDC	ENV	
Distribution of Total Staff Effort (Per cent)	15	10	33	41	1	100
Distribution of Total Service-Contacts Provided by Staff	68,000*	16,000	37,800	453,000	1,200	577,150
Examples of Specific Services Provided	4,000 Injections	630 Deliveries	810 Acceptors	18,000 Smallpox Vaccinations	200 Wells Chlorinated	..
Distribution of Total PHC Costs in Rupees (and in \$)	54,500 (\$7300)	21,600 (\$2900)	63,300 (\$8400)	47,500 (\$6300)	1,000 (\$130)	187,900 (\$25,000)
Cost per Service-Contact (Rs.)	0.80	1.35	1.60	0.10	0.85	0.35
Cost per Service (Rs.)	0.70 Per Injection	..	78.00 Per Acceptor	0.77 Per Vaccination	..	..

\* Approximately one-half of these service contacts were patient visits to the PHC, when on the average the patient was seen by two staff members. If each such contact with a separate staff member were counted, the total MR service contacts would be nearly 100,000.

be given to shifting some of the PHC effort and expenditures from medical relief to MCH and environmental sanitation.

In Table II the total staff effort involved in each function was given. In order to better understand the staff work patterns of PHCs studied, additional details are presented in the bar graphs in Text-figs 3, 4 and 5. In Text-fig 3 the total efforts of PHC staff and various groupings of specific staff categories have been split up into the proportion of time spent in four major activity areas. These areas include (1) direct services—the actual technical work performed by staff involved in delivery of services ; (2) supportive services—those services that primarily relate to administration, record keeping, maintenance, and supervision ; (3) travel—time spent travelling in the field or going from one section of the PHC to another; and (4) personal—non-productive time involved in activities unrelated to work responsibilities. These figures would appear to be particularly useful for the administrator interested in improving the efficiency of existing services. It is quite obvious that a reduction in administrative and supervisory work load on the doctor might permit him to provide more direct services. Likewise more adequate supervision of the female field staff should reduce time spent in personal activities and increase their productive time. The latter may however require the doctor to spend more time than at present on supervision. This simple example illustrates quite well that decisions about specific staff categories cannot be taken in isolation from total staff considerations.

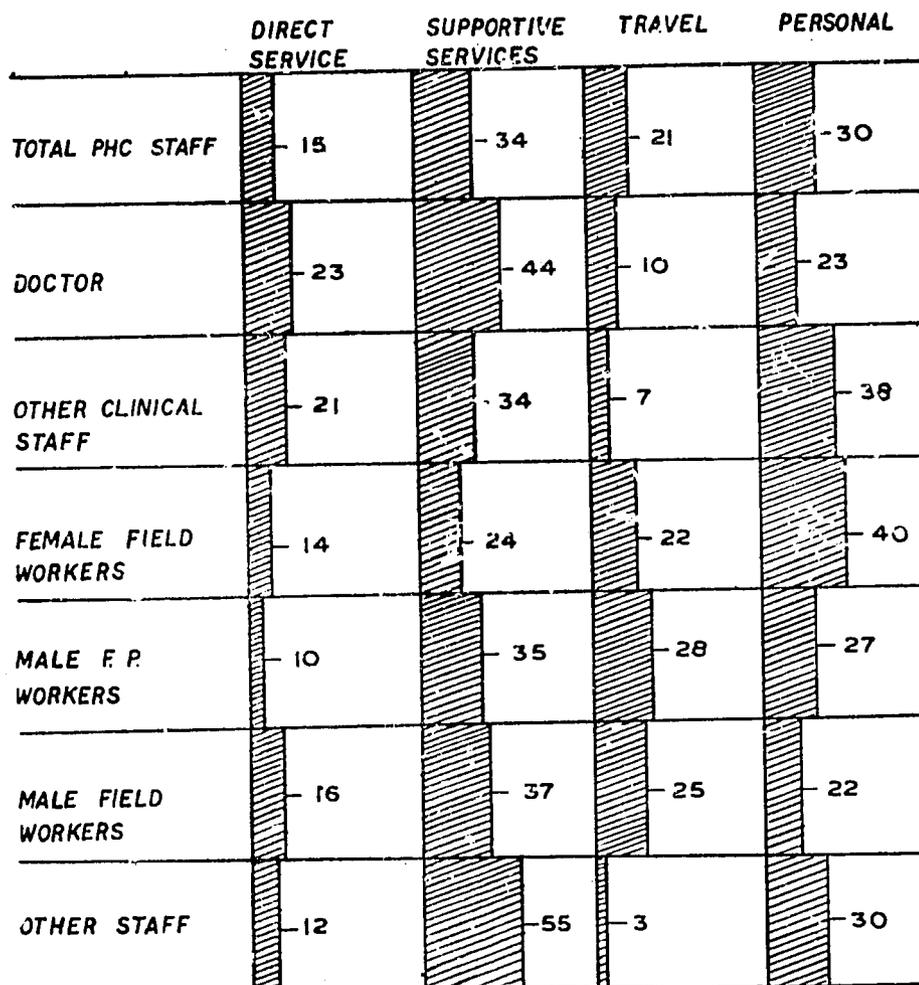
If we confine our interest only to the time spent by staff for direct service, this effort can again be described as it relates to specific functions (Text-fig 4). This more appropriately approximates the time currently provided by the PHC and its various staff for actual delivery of specific services to patients and the community. As expected the doctor and other clinical staff devote most of their direct service time to medical relief. A major finding apparent in this figure is that in Punjab the female field workers are the only real multi-function workers. This information should have considerable influence on the training programmes for PHC nursing staff as well as other PHC staff. Another significant use of these particular data is in the area of distributing costs by function. Salaries make up approximately three-fourths of total PHC expenditures. These salary costs can be conveniently allocated to specific functions by using the proportion of time each individual spends performing activities related to each function.

Each function in the PHC is supported by the activities of a number of different staff. Text-fig 5 illustrates the proportion of overall direct service effort in each function provided by specific categories of staff. Interestingly the doctors provide only 16 per cent of the total effort in medical relief. The effort of others in this area might be interpreted as only supportive of the doctor, but additional information shows that even within the PHC outpatient clinic, other staff handle 35 per cent of all primary care of patients including history, physical examination and prescribing of medicine or treatments. It is not the purpose of this paper to judge the appropriateness of this pattern of work. However, this type of delegation of responsibility which is a major policy in many developed as well as less developed nations, demands careful training, supervision

and organization. In examining other functions, MCH appears, as would be expected, almost the exclusive domain of female workers, while communicable disease control and environmental sanitation is handled by male staff. Family planning work is fairly evenly divided between male and female staff.

Text-fig 3

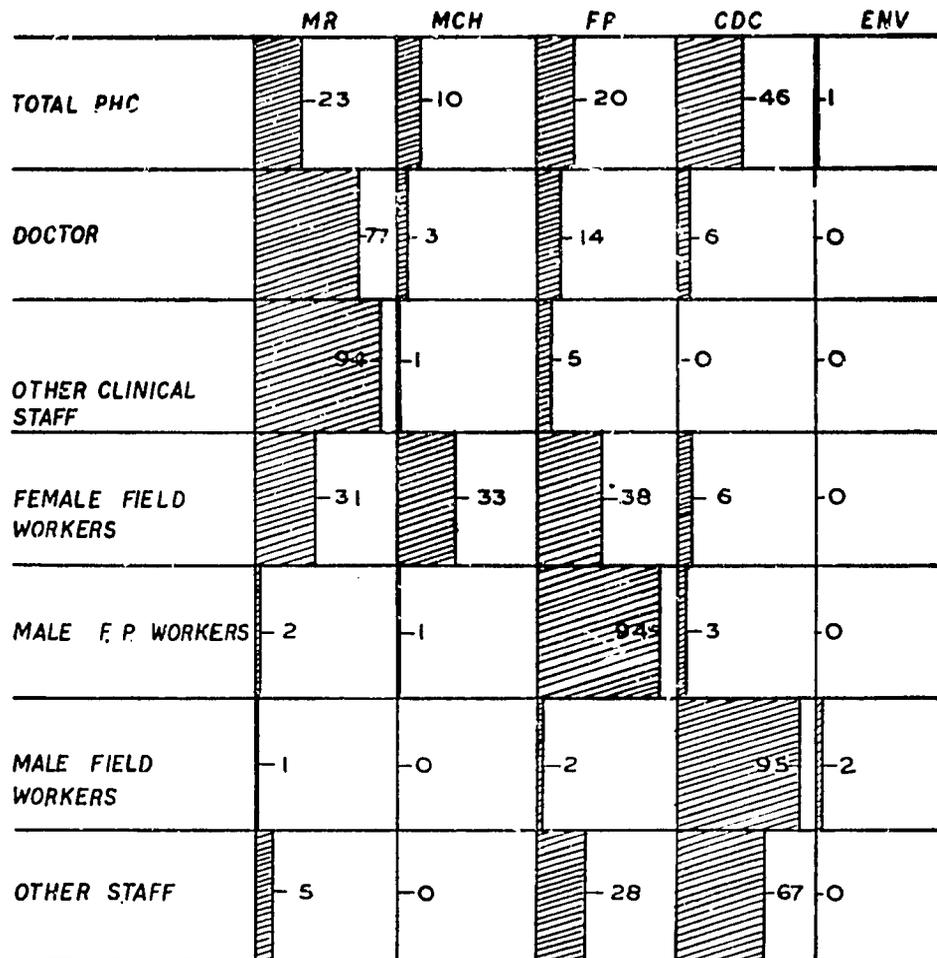
Percentage distribution of total PHC effort by type of activity and major categories of staff. From 2 PHCs in Punjab, 1968-69



Specification of Staff Categories : Other Clinical Staff—Staff Nurse, Pharmacist, Dresser; Female Field Workers — Lady Health Visitors, Auxiliary Nurses — Midwives, Trained Dais; Male FP Workers — Block FP Extension Educator, FP Field Workers; Male Field Workers — Health Inspector, Basic Health Workers and Vaccinators; Other Staff — Laboratory Technician and Clerical Staff

Text-fig 4

Percentage distribution of PHC direct service effort by functions and major categories of staff  
From 2 PHCs in Punjab, 1968-69



See Text-fig 3 for specification of staff categories

Utilizing data on costs of specific services and the proportion of staff effort related to these services, estimates have been produced that describe the manpower and costs that would be involved in meeting the total needs listed in Table I. Table III presents these estimates in the form of required PHC effort and cost, presuming that all needs would be met by simple expansion of the current PHC organization. One must keep in mind that these are only a few of the services offered by PHCs. If a similar procedure were carried out for all PHC services, health planners and administrators would have at their disposal "price tags" in the form of manpower or costs required

for any particular expansion of PHC programmes. This approach can certainly be criticized as being overly simplistic since it completely ignores possible changes in efficiency and productivity, significant interactions between different functions, or the effects that reorganization of health services along different patterns might have. Be that as it may, until experimental or comparative studies are undertaken permitting analysis of various alternatives, the type of data presented here certainly can be useful in making health planning a more quantifiable discipline.

**Table III. Estimates of manpower\* and cost of current PHC effort and "required" PHC effort to meet specific annual service needs. Average values for two Punjab PHCs standardized to a population of 100,000, 1968-69**

Functions and specific services	Service visits		Current PHC effort		"Required" PHC effort	
	Required	Provided by PHC	Manpower	Cost	Manpower	Cost
MR Practitioner visits	1,300,000	68,000	0.9 Dr. 2.6 O.C.S. 3.2 F.F.W.	Rs. 54,000 (\$7,200)	17 Dr. 49 O.C.S. 60 F.F.W.	Rs. 1,015,000 (\$135,000)
MCH Visits to children 0-4	37,000	7,500	0.1 Dr. 1.3 F.F.W.	Rs. 6,000 (\$800)	0.5 Dr. 6.5 F.F.W.	Rs. 30,000 (\$1,000)
FP Visits to eligible couples and acceptors	45,600	37,800	0.7 Dr. 6.3 F.F.W. 7.7 M.F.W. 1.6 Others	Rs. 63,000 (\$8,400)	0.8 Dr. 7.6 F.F.W. 9.2 M.F.W. 1.9 Others	Rs. 76,000 (\$10,000)
CDC Malaria surveillance visits	401,600	195,000	9.5 M.F.W. 0.8 L.T. 0.6 Others	Rs. 20,000 (\$2,700)	19.6 M.F.W. 1.6 L.T. 1.2 Others	Rs. 41,000 (\$5,500)
ENV Household visits	30,900	1,200	0.2 M.F.W.	Rs. 1,000 (\$130)	5.2 M.F.W.	Rs. 26,600 (\$3,500)

Abbreviations used : Dr.—Doctors ; O.C.S.—Other Clinical Staff ;  
F.F.W.—Female Field Workers ; M.F.W.—Male Field Workers and Male F.P. Workers ;  
L.T.—Laboratory Technician

\*Note : Manpower estimates are based on full time equivalents of various staff at current levels of productivity

**Applicability of the methods :** A functional approach to the study of health needs and services as demonstrated here can provide a wealth of useful data. The methods of data collection and analysis would seem to be applicable both for health planning and health services research. Specifically in the area of health planning a functional analysis can provide (1) a baseline quantitative description of health needs and resources in a defined population that permits more adequate priority setting and allocation of services, (2) a continuing evaluation of health service as part of a dynamic planning process which would measure changes in health status as new programmes are introduced, and (3) a basis for cost-effectiveness assessments when comparative analyses are carried out on alternate patterns for delivery of services.

Text-fig 5

Percentage distribution of PHC direct service effort within functions by major categories of staff.  
From 2 PHCs in Punjab, 1968-1969

	MR	MCH	FP	CDC	ENV
DOCTOR	16	2	3	1	0
OTHER CLINICAL STAFF	43	1	3	0	0
FEMALE FIELD WORKERS	37	96	42	3	0
MALE F.P. WORKERS	1	1	40	0	6
MALE FIELD WORKERS	1	0	4	85	94
OTHER STAFF	2	0	8	11	0

See Text-fig 3 for specification of staff categories

In the area of research a functional analysis would provide additional quantitative measures of service inputs into experimental or demonstration field programmes. Standard epidemiological and survey data which have traditionally been used to measure the impact of these programmes can now be more adequately related to input variables such as various mixes of manpower, activities and costs.

Although the methods demonstrated in this study could be directly utilized for research there is little doubt that simplification would make them more readily acceptable for routine application within most health service systems. Preliminary efforts have yielded a proposed streamlined study which could be carried out rapidly and effectively by a team of investigators selectively sampling health services in a defined administrative region. This modified approach is currently being applied in Punjab by the Directorate of Health Services. Basically the simplified version concentrates on household surveys, health services work sampling and record audits. Household

surveys to measure health levels and gather health services utilization data would be limited to one-visit interviews in households sampled throughout the defined service area. Work sampling studies have been adjusted to provide the maximum useful number of observations possible under new time constraints. Flexibility in their application would permit work sampling of only the more important staff in a health service if necessary. Although records proved disappointing as a source of a data in the original study, their potential usefulness should not be under-estimated in a streamlined functional analysis. Specification of useful recorded data desirable for ongoing functional assessment should act as a stimulus for making changes in current record and reporting systems.

Parallel to simplification of the data collection devices is the need to re-structure the data handling and analysis, especially to accommodate the capabilities of small health services. Selected data should be defined which when hand or machine tabulated can be fitted into specially prepared tables and formulas. The latter would provide quickly available feed back of meaningful data to health administrators and planners.

Like any evaluation tool, functional analysis will only be useful if the findings can be implemented. In this context it should be placed in perspective as a component within the entire planning-implementation process beset by all the constraints of a real world. It certainly is not a panacea, but it can be a worthwhile addition to the planner's tool box that should make some of his tasks more effective.

#### Acknowledgment

Although the findings of this paper were limited to one of several related field projects, the design and implementation of the study was closely co-ordinated with the other projects. This interdependence must be recognized. The investigators who collected the data in Punjab under rigorous field conditions deserve most of the credit for the findings that made this paper possible. We especially recognize the co-operation and assistance of the people of our study villages, the members of the Primary Health Centres and the Directorate of Health Services in Punjab.