CPHE

# THE EVALUTION OF THE DELIVERY OF PRIMARY HEALTH CARE BY MRTIN (JOHND)

# CPHE

COMMUNIT

OR3 20 BANGALOPE-3

MEDICA

# OMMUNITY HEALTH CEL

THE EVALUATION OF THE DELIVERY OF PRIMARY HEALTH CARE

The development of a methodology suitable for use in Primary Health Care Units in developing countries.

## JOHN D. MARTIN

Submitted in part fulfilment of the requirements for the degree of Master of Science in Social Medicine at the University of London.

1977

Received



Definition of Functions

Questionnaire of local population

English

Kannada

Quality of Care questionnaire

Assessment of efficiency record form List of Mallur equipment Maps

## SUMMARY

Evaluation of the delivery of health care has been recognised as a means of improving its effectiveness and efficiency by providing information which facilitates improved decision making for management and planning. The need for such improvement is particularly urgent in developing countries where the resources available for the health care of the population are severely limited.

The study set out to develop and test methods suitable for the evaluation of the delivery of health care in Primary Health Care Units (PHCUs) in developing countries, recognising that such evaluations should be carried out routinely in order to provide relevant up to date information. Since the day to day management is the responsibility of local PHCU staff it was envisaged that evaluation should also be the responsibility of local staff, especially the medical officer.

It was necessary to place three important constraints on the techniques of evaluation to be developed so that they would be appropriate to the circumstances described above.

These were as follows:-

- (a) The methods of evaluation must be simple
- (b) The time required must be short
- (c) The resources required in terms of money, manpower and equipment must be small.

The many varied processes involved in health care delivery were described by means of a conceptual model whose components formed the framework for subsequent analysis of information obtained in the evaluation study.

In order to obtain the information necessary for evaluation the following techniques of data collection were utilised:- (a) A questionnaire survey of the local population

(b) Examination of existing PHCU records and reports

- (c) An observational study of the activities of the PHCU staff in order to obtain a measure of the efficiency of health care delivery
- (d) A questionnaire study of a selected group of recent patients in order to obtain a measure of quality of health care activity.

The methods were tested in three rural PHCUs in the State of Karmataka, South India.

The results of the study demonstrated that the methods of evaluation, despite necessary resource constraints, were capable of generating information which could be used for the improvement of management and planning of health care delivery. However, the merits of the study of quality of care were not sufficiently proven and further testing of this method was considered necessary.

#### INTRODUCTION

In the modern world it is generally accepted as a basic human right that health care of some sort should be available to everyone. However, no country can hope to offer all her citizens a standard of care approaching that which modern medical knowledge has the potential to offer. The reason is simple; insufficient resources, particularly financial resources. It follows that in such circumstances potential for improvement in health care delivery lies in the ability to make use of resources in an effective and efficient way (16).

In developing countries the limitation of resources is particularly acute and thus there is a vital necessity for the best possible use to be made of the little that is available. Since the vast majority of people in these countries depends for health care on countless small and often isolated rural clinics then it is in these where improved health care delivery can produce the greatest benefit. Improvement requires good management which in turn requires comprehensive information about all aspects of health care delivery. The aim of this study has been to develop and test methods for obtaining information which can be used routinely in the circumstances common to the majority of rural clinics.

The problem of health care in developing countries is immense. The majority of the population, who also form the majority of the world's population, live in conditions of extreme poverty. (See Table 1).

#### TABLE 1

# DISTRIBUTION OF WORLD POPULATION BY GROSS NATIONAL PRODUCT

| GNP per capita | GNP          |       | Populat   | Number of<br>Countries |    |
|----------------|--------------|-------|-----------|------------------------|----|
| (\$)           | \$ millions' | %     | (000)     | %                      |    |
| 5.000 or more  | 2,400,050    | 45.25 | 384,450   | 9.86                   | 14 |
| 3,000 - 4,990  | 931,120      | 17.55 | 245,386   | 6.29                   | 11 |
| 2,000 - 2,990  | 875,920      | 16.51 | 368,361   | 9.45                   | 10 |
| 1,000 - 1,990  | 351,700      | 6.63  | 251,820   | 6.46                   | 20 |
| 500 - 990      | 231,527      | 4.36  | 302,909   | 7.77                   | 20 |
| 300 - 490      | 330,310      | 6.23  | 1,045,412 | 26.81                  | 24 |
| 200 - 290      | 34,940       | 0.66  | 140,450   | 3.60                   | 11 |
| 100 - 190      | 140,730      | 2.65  | 1,064,558 | 27.30                  | 24 |
| 50 - 90        | 8,260        | 0.16  | 95,599    | 2.45                   | 11 |
|                |              |       |           |                        | 1  |

### PER CAPITA 1974

SOURCE: Health Planning, Management and Training Needs in Developing Countries (1976) GRIFFITHS, A.

68% of people live in countries with a GNP under \$1,000 per capita and 60% in countries with a GNP less than \$500 per capita. These same people are those who face the greatest health problems resulting

# TABLE 2

# HEALTH STATUS INDICATORS BY GROSS NATIONAL PRODUCT

J

PER CAPITA 1972

| Country       | 25 selected countries of over 5 million population |                     |                     |                     |                    |  |  |  |  |
|---------------|--|---------------------|---------------------|---------------------|--------------------|--|--|--|--|
|               | GNP per<br>capita(\$)                              | Crude birth<br>rate | Crude death<br>rate | Infant<br>Mortality | Life<br>Expectancy |  |  |  |  |
| Upper Volta   | 70   | 48.5                | 24.9                | 180                 | 39.0               |  |  |  |  |
| Ethiopia      | 80   | . 49.5              | 23.8                | 162                 | 40.0               |  |  |  |  |
| Indonesia     | 90   | 44.8                | 18.9                | 125                 | 45.4               |  |  |  |  |
| India         | 110  | 41.1                | 16.3                | 139                 | 49.2               |  |  |  |  |
| Tanzania      | 120  | 50.1                | 23.4                | 122                 | 44.5               |  |  |  |  |
| Nigeria       | 130  | 49.3                | 22.7                | 150-175             | 41.0               |  |  |  |  |
| Uganda        | 150  | 46.9                | .15.7               | 160                 | 50.0               |  |  |  |  |
| Viet Nam Rep. | 170  | 41.8                | 23.6                | 100                 | 40.5               |  |  |  |  |
| Bolivia       | 200  | 43.7                | 18.0                | 60                  | 46.7               |  |  |  |  |
| Thailand      | 220  | 43.7                | . 10.4              | 23                  | 58.6               |  |  |  |  |
| Egypt         | 240  | 37.8                | 15.0                | 120                 | 50.7               |  |  |  |  |
| Ghana         | 300  | • 48.8              | 21.9                | 156                 | 43.5               |  |  |  |  |
| Syria         | 320  | 46.9                | 14.4                | 24                  | 53.8               |  |  |  |  |
| Ecuador       | 360  | 41.8                | 9.5                 | 37                  | 59.6               |  |  |  |  |
| Turkey        | 370  | 39.4                | 12.7                | ) 53                | 56.4               |  |  |  |  |
| Colombia      | 400  | 40.6                | 8.8                 | 81                  | 60.9               |  |  |  |  |
| Algeria       | 430  | 49.4                | 16.6                | 86                  | 51.5               |  |  |  |  |
| Iran          | 490  | 45.3                | 15.6                | 160                 | 51.0               |  |  |  |  |
| Peru          | 520  | 41.0                | 11.9                | 67                  | . 55.7             |  |  |  |  |
| Brazil        | 530  | 37.1                | 8.8                 | 110                 | 61.4               |  |  |  |  |
| Mexico        | 750  | 42.0                | 8.6                 | 63                  | 63.2               |  |  |  |  |
| Portugal      | 780  | 18.4                | 10.1                | 50                  | 68.0               |  |  |  |  |
| Chile         | 800  | 25.9                | 8.1                 | 71                  | 64.3               |  |  |  |  |
| Venezuela     | 1,240  | 36.1                | 7.0                 | 52                  | 64.7               |  |  |  |  |
| U.S.A.        | 5,590  | 16.2                | . 9.4               | 19                  | 71.3               |  |  |  |  |

-2-

SOURCE: As in Table 1

1.

The close correlation vetween GNP per capita and expectation of life is very clear. For example the Life Expectancy of 71.3 years in the richest nation, USA, is almost twice as high as that in Upper Volta, the poorest nation, with a Life Expectancy of only 39.0 years.

Further characteristics typical of developing countries are illustrated in Table 3 below.

## TABLE 3

# CHARACTERISTICS TYPICAL OF UNDERDEVELOPED COUNTRIES

| 1  | Low Gross National Product per head                   |    |
|----|---|----|
| 2  | High Birth Rate                                       |    |
| 3  | High death rate                                       |    |
| 4  | High population growth rate                           |    |
| 5  | Low expectation of life                               | •* |
| 6  | High infant mortality rate                            |    |
| 7  | High proportion of deaths from communicable and       |    |
|    | parasitic diseases                                    |    |
| 8  | High proportion of the population aged 0-14 years old |    |
| 9  | Low calorie and protein intake per head               |    |
| 10 | Low proportion of protein intake from animal sources  |    |
| 11 | High proportion of rural population                   |    |
|    |   | *  |

SOURCE: As in Table 1.

With such meagie resources available and so many important potential drains on them e.g. industry, agriculture, education etc., it is obvious that expenditure on health care facilities must, of necessity, be extremely small. (see Table 4) (11, 18).

#### TABLE 4

MINIMUM ESTIMATES\* OF HEALTH EXPENDITURE IN DEVELOPING

## COUNTRIES 1974

SOURCE: As in Table 1

| Income<br>Category | Number<br>of | Population<br>(000) | GNP<br>(\$ | Assumed<br>Health         | Estimated Health<br>Expenditure |                 |  |
|--------------------|--------------|---------------------|------------|---------------------------|---------------------------------|-----------------|--|
| (\$)               | Countries    | 8                   | millions)  | Expen-<br>diture<br>% GNP | Total<br>\$ million             | Per<br>Capita S |  |
| 1,000 - 1,990      | 20           | 251,820             | 351,700    | 2.0                       | 7,034                           | 27.9            |  |
| 500 - 990          | 20           | 302,909             | 231,527    | 1.0                       | 2,315                           | 7.6             |  |
| 300 - 490          | 25           | 1,045,412           | 330,310    | ·1.0                      | 3,303                           | 3.1             |  |
| 200 - 290          | 11           | 140,450             | 34,940     | 1.0                       | 349                             | 2.4             |  |
| 100 - 190          | 24           | 1,064,558           | 140,730    | 0.5                       | 703                             | 0.6             |  |
| 50 - 90            | 11           | 95,599              | 8,260      | 0.5                       | 41                              | 0:4             |  |
| TOTAL              | 111          | 2,900,748           | 1,097,467  | 1.25                      | 13,745                          | 4.7             |  |

The estimated expenditures in columns 6 and 7 are based on the assumed health expenditure % GNP in column 5 and the 1974 GNPs given in column 4. NB the estimates are intended as <u>minimum orders of magnitude</u>. SOURCE: As in Table 1

These gross figures, however, do not properly reflect the inequalities in the distribution of resources. For example, many countries committed to Western style training for their doctors have constructed large medical college hospitals in their big cities only to find that the costs required to run and maintain them have swallowed up a large portion of the annual national health budget (30, 31) In addition, the services offered by such hospitals are only accessible to a tiny proportion of the population, in particular the urban population, since in most developing countries only 20% approximately of the total population lives in urban areas and the remaining 80% in the rural areas. (10,21,24,39,40,45).

To divide resources in this way is both morally and economically wrong. In developing countries with highly labour intensive industries, the good health of the labour force is of great importance in raising the potential for increased productivity. For example, in Haiti a yaws eradication campaign was estimated to have returned 100,000 previously incapacitated workers to their jobs. ( 14 ). Similarly, an antimalaria programme in the Phillipines reduced daily absenteeism due to malaria from 35% to apprxomately 4%. ( 14 ).

From the above it is clear that two major problems face the organisation of health care in developing countries, i.e.

1. Severely limited resources,

2. Maldistribution of these resources.

The likelihood of (1) being solved in the foreseeable future is highly unlikely. (See Table 5)

| TA | BLE | 5 |
|----|-----|---|
|    |     |   |

|                | CNP ner        | capita   | Expenditure on healt         |  |  |  |  |
|----------------|----------------|----------|------------------------------|--|--|--|--|
| COUNTRY        | <u>(1965 )</u> | J.S. \$) | per capita<br>(1965 U.S. \$) |  |  |  |  |
|                | 1965           | 2000     | 1963-1964 2000               |  |  |  |  |
| Indonesia      | 99             | 123      | .0.20 0.25                   |  |  |  |  |
| Nigeria        | 83             | 125      | 0.50 0.75                    |  |  |  |  |
| Thailand       | 126            | 402      | 0.60 1.91                    |  |  |  |  |
| Colombia       | 277            | 359      | 3.50 4.54                    |  |  |  |  |
| United Kingdom | 1804           | 6530     | 56.00 202.26                 |  |  |  |  |

PROJECTIONS OF EXPENDITURE ON HEALTH PER CAPITA

COURCE. Health and the Developing World Bryant I

Problem (2) can be approached with more optimism. Bryant formulated it in a positive way by regarding as a challenge the problem of reaching "most of the people with health care using severely limited resources in ways that will yield the greatest possible benefit". In other words the problem is one of planning and management.

Successful planning and management, even at a local level. requires that the functioning of health services be periodically examined. (4, 25). For too long the assessment of health care delivery has been based on unscientific, subjective impressions gained from occasional visits to clinics or the perusal of routine clinic reports which frequently emphasised the attainment of certain set targets and excluded information on other aspects of clinic activities. (41 ).

With the aim of correcting this state of affairs recent research has tended to concentrate on two broad aspects of the study of health care delivery:-

- (1) the problem of quantifying the many components of health care delivery systems,
- (2) the development of methods which can be applied to produce reliable information which is adequate for scientific evaluations.

Thus far much of this research has involved some lengthy and complex procedures directed towards the analysis of different types of health care delivery systems. This has been of undoubted value in aiding the future planning of suitable health care facilities for a community but due to the relative complexity of the methods involved it has been unable to contribute to the improvement in the day to day working of individual PHCUs.\*

The scope for improvement in the delivery of health care in many countries, including the U.K. and U.S.A., is illustrated by the wide variation in both the quantity and quality of health care provided by individual practitioners, often where there is equality of available resources. (2). The need for improvement in the delivery of health care has already been illustrated (Table 2 and Table 3) by the continuing existence of high rates of mortality and morbidity, often due to diseases which are preventable, curable, and frequently both. It is

\*PHCU is an abbreviation for Primary Health Care Unit, a term used in this study to denote all types of primary health centres which have at least 'one medical officer.

-5-

accepted that improvement can be achieved by systematic reviews of the working of an individual PHCU. (27,32,41) The implication, therefore, is that such systematic reviews must become an integral part of the activities of each and every PHCU. However, in order to become a feasible objective in a situation of severely. limited resources three important constraints must be placed on any techniques of evaluation which are to be employed:-

(i) the methods of evaluation must be simple
(ii) the time required for evaluation must be short
(iii) the resources required, in terms of money, equipment, and manpower must be small.

This study set out to formulate and test methods appropriate for the evaluation of the delivery of health care by PHCUs in developing countries. Thus the constraints listed above were of particular importance, especially due to extremely limited available resources.

Further importance was given to the following aims as being desirable in order to achieve maximum benefit from any evaluation of health care delivery:-

- (1) evaluation should be a regular event in any PHCU,e.g. annual.
- (2) the staff of the PHCU, especially the medical officer, should be involved as much as possible in carrying out the evaluation. (25,27,34)

Maximum staff involvement was considered desirable because it would encourage them to see their role in the local community in much broader terms and thus, potentially, encourage them to think about their approach to the health problems of their community in broader terms. However, it was recognised that the maximum involvement of staff would not be feasible in certain circumstances e.m. due to lack of staff motivation, shortage of suitably literate staff etc. In these circumstances the task of evaluation could conceivably be carried out by 'evaluation teams' from National, State or District Health Authorities.

In order to formulate appropriate methods three PHCUs were studied. These were the Mallur Health Co-operative and two adjacent government PHCUs in the State of Karnataka, South India. The Health Co-operative is a pilot project which is exploring a new method of financing health care in a rural community and is based in the village of Mallur near Bangalore. It receives its finance from the local Dairy

-6-

Co-operative and aims to provide total primary health care for the 4,500 people of the five member villages. The organisation and functioning of the Health Co-operative is supervised by the Department of Preventive and Social Medicine, St. John's Medical College, Bangalore, at whose invitation I carried out this study.

The 2 government PHCUs were chosen as they typified the health care facilities available to the rural population in this part of S.India.

All 3 PHCUs were in the same administration district and thus were accessible for the purpose of conducting the study. In addition the people were culturally comparable and yet there was no overlap of the PHCU catchment areas.

-7-

# REVIEW OF THE LITERATURE

The term 'evaluation' in the field of health care refers to the process of measuring the effectiveness of the processes by which the health programme attains its objectives.

The study of health care in general has been gaining momentum increasingly over the past decade as it gradually became obvious that the demand for care was limitless and the resources to cope with the demand increasingly limited. Thus an urgent need has arisen for rational planning to enable resources to be allocated according to need and for measurement of the effectiveness of such planning decisions. ( 26,35 ). Too often in the past the assessment of the delivery of health care has been based on unscientific, subjective impressions in the absence of sound information and frequently on an entirely intuitive basis. ( 26 ).

The need for routine assessment of the delivery of health care is now widely recognised as a means of aiding improvement of services. (12,32,41) Similarly, the scope for improvement is apparent in many countries including the U.K. and U.S.A. as illustrated by the wide variation both in quantity and quality of services provided by individual practitioners, even where there is equality of available resources. (2).

Approaches to the problem of evaluation methods

There is general agreement that the primary objectives of evaluation are to provide relevant information to those involved in operating the health services at local level so that rational decisions can be made concerning day to day management as well as for future planning purpose (3,12 26-23,41, 43, 44,46,47,48,50, 52-54, 56.

However, two major basic difficulties occur in developing a successful evaluation system:-

 <u>Operation difficulties</u> which are similar to those facing any developmental effort e.g. planning activities, distribution of responsibilities, allocation of tasks to personnel etc. (27)

2. <u>Theoretical difficulties</u>. These can be separated usefully into:-

(a) What to measure.

(b) How to measure.

There is unanimous agreement that the theoretical difficulties have provided the major obstacles.

A 1967 WHO paper provides an early example of attempts to combat these obstacles. (52) The main components of this approach are as follows:-

- (i) Define the objectives of the programme
- (ii) · Identify the component activities
- (iii) Define the measurements and standards used
- (iv) Define the baseline to be used or select controls
- (v) · Describe the methodology of data collection
- (vi) Analyse the data

Later studies have employed this objective orientated approach with additional refinements. ( 48 )

Considerable difficulties were encountered in implementing some of the above steps, especially indentifying component activities, defining suitable measurements and standards and developing a suitable methodology for data collection (27,42,50)

Recognising these difficulties Roemer, in a review of evaluation methods, formulated four major levels of evaluation in order of importance but also in order of measurement difficulty:-

- (i) Provision of resources
- (ii) Assessment of services provided and received
- (iii) Assessment of the quality of services
- (iv) Measurement of improvement in health resulting from the services.

(iv) is the best level of evaluation since it provides a measure of the ultimate objective of any health service i.e. an outcome measured in terms of change in the health status of the catchment population. (44).

Another major type of approach began with attempts to describe a health care system in the form of a conceptual model. (6,28,42)

INPUT ------> PROCESS -----> OUTPUT

At its most basic it was considered that any health care system has three components which can be classified as Inputs, Process and Outputs where the Inputs are the health problems of a community plus its resources; the Processes are the health care activities; and the Outputs are the services performed which in turn affect the health status of the community. (50)

In practice more complex models are required. An example is that developed by Logan et al (see Figure below).

-9-



In effect this model is a more precisely defined version of the model above and thus is more useful for purposes of scientific measurement. However, two of the components i.e. Need and Outcome, present major difficulties of measurement, the former because there is no commonly accepted definition (13) and the latter because of difficulties in clearly specifying outcome criteria other than in relatively few medical conditions. (7,33,38,46)<sup>5</sup>

Nevertheless, measurement of Outcome in still regarded as the best level of evaluation and much modern research remains directed towards defining adequate measures. Mortality is one unequivocal measure which will continue to play an important role in many studies but more specific measures are required, particularly of morbidity. (49) Although much refinement is still required some promising results have emerged from attempts to measure morbidity in terms of its effects on the lives of individuals e.g. functional or social disabilities. (49)

Related to the above is another important aspect of any health care delivery system i.e. the quality of care provided<sup>(19,33)</sup> A recent American study set out to explore methods of evaluating quality of primary health care and introduced the concept of 'indicator cases'. An 'indicator case' was defined as "an example of either health or illness care that is statistically frequent, which may be provided by a variety of different systems, about which there is general agreement concerning appropriate management, and in which maintenance or improvement can be objectively measured". (15)

Four indicator cases were chosen i.e. normal pregnancy, normal infancy, adult onset diabetes, and congestive cardiac failure. Numbers of patients within these categories were studied in order to try to measure the care as well as cure provided by physicians. Although major problems of measurement remain to be solved researchers are in general agreement on the best sources of information for the evaluation of primary health care delivery. These are:-

- 1. The catchment population
- 2. Clinic records and reports

3. Clinic staff

Similarly the following techniques of data collection are generally recommended:-

- Sample surveys of the population in order to obtain information about their health <u>needs</u>
   Examination of clinic records and reports in
  - order to obtain information about demand for medical care and available resources
  - 3. Examination of clinic records and reports plus observational studies in order to obtain information about health care activities (process)
  - Examination of clinic records and reports in order to obtain information about <u>outcome</u> and <u>cost</u>.

In circumstances of limited resources <u>Cost</u> is an important component of any evaluation system. Indeed, it has been advocated that the starting point for health care planning should be economic resources available and not data about disease.(1)

There have been two basic approaches to the costing of health care i.e. averaging and surveying. In the former the total expenditure is divided by the total number of units in receipt of the results of expenditure. Thus Cost may be expressed in terms of e.g. average expenditure per head of population, or per clinic attendance etc. This type of costing relies on the maintenance of good records in order to be successful (5,27,29)

Surveying is a more accurate method of costing but is also more expensive in terms of resources required. The need for a survey usually arises because of a lack of suitable data ( 8, 9, 36,37)

In practice most costing relies on a combination of the two methods because averaging does not provide enough detail and surveys do not have a wide enough applicability.

-11-

COMMUNITY HE

This review of the literature describes the progress thus far of research into the process of evaluation of the delivery of health care and it is clear that this field of research is still very much under-developed. Ideally since good health involves not only physical well being but mental and social well being also any evaluation should involve measurement of all three components. However, recognising the shortcomings of present methodology for evaluation it has been concluded that in order to gain further experience in the techniques of evaluation current research should remain concentrated on the physical component of health which contains more data measurable in scientific units, a more certain literature, and the outcome of which is more precisely measurable. ( 2 ).

## METHODOLOGY

The major basic difficulties facing the development of any evaluation system i.e. operational and theoretical, have already been discussed. The importance of these problems was highlighted by my own previous experience in developing countries and so the development of a methodology began with a statement of the following aims:-

- The evaluation system must be intimately associated with the decision making processes and, therefore, with the local decision makers. In particular the involvement of the PHCU medical officer was considered imperative.
- 2. The evaluation system must be capable of producing reliable information which is relevant to the needs of the local decision makers.
- 3. In view of the problem of severely limited resources facing all developing countries the evaluation system must have the following limitations in order to be a feasible, practical tool:
  - a) the methods must be simple and easily applicable.
  - b) implementation should require the minimum possible time.
  - c) the resources required in terms of money, manpower and equipment must be as small as possible.

# Development of a conceptual model

The delivery of health care is a complex process involving a large number of factors. It is essential for an evaluation system to provide an analytical framework which permits an understanding of the components which go to make up such a process.

One possibility is to condense the performance of a system into a few broad categories in a similar way that GNP is used to describe a nation's performance. Alternatively every single activity can be examined and evaluated ( 27 ).

Neither of these extremes is acceptable since the first is too crude and insensitive and the second would require extensive data processing facilities which would be totally prohibitive in circumstances of limited resources.

In order to conform to the aims outlined above this study



....

.......

....

sought to formulate a model which would :-

(a) adequately describe a health care delivery system

so as to facilitate analysis, (6,23).

and (b) would act as a teaching model to those local health personnel, especially the medical officer, approaching the subject of evaluation for the first time.

The model chosen is described in Figure 'B'. The backbone of this model is the well accepted concept of health care delivery consisting of three components, i.e.

INPUT ------> PROCESS -----> OUTCOME Input refers to the health problems of a community plu's the resources of a health care delivery system to deal with these problems. <u>Process</u> refers to the many activities involved in the delivery of health care. <u>Outcome</u> refers to the end product of the health.care activities i.e. a measure of the change in the health status of the population.

Building upon this basic framework the components of the model described in Figure 'A' were adopted as they appeared to meet the criteria of adequately describing a health care delivery system as well as being suited to teaching. The components were defined as follows:-

Health Needs. This refers to the felt needs of the local population for health care. There is obvious scope for a lot of value judgement in the assessment of need and thus objective measurement is extremely difficult.

<u>Demand</u> for health care. This is closely related to <u>need</u> and represents those people who not only have a felt need for health care but actually present themselves at a PHCU in order to receive care. Measurement is much easier and can be made by consulting attendance records.

<u>Resources</u> i.e. the money, manpower and equipment which is allocated to a PHCU.

<u>Process</u>. This refers to the many activities performed by PHCU staff in coping with <u>demand</u>. For purposes of evaluation it can be separated into three categories i.e. quantity, quality and efficiency. <u>Outcome</u>. The importance of this component has already been discussed in the Review of Literature as well as the difficulties of measurement. Ideally <u>outcome</u> is measured in terms of change in health status of the people using a PHCU i.e. in terms of change in mortality and morbidity. However, measurement in these terms is not possible without well established data collection procedures which are non existent in many real life PHCUs.

In order to deal with these shortcomings an intermediate component, termed <u>output</u>, has been introduced. Output will be measured in terms of proportions of the catchment population who have received services from the PHCU which have assumed automatic beneficial effects on health status. Thus, for example, the proportion of the population receiving vaccination coverage, proportion of deliveries conducted by trained staff, porportion of drinking wells routinely chlorinated, were all considered to have automatic beneficial effect on health status and thus were regarded as legitimate, if second best, measures of <u>outcome</u> of delivery of health care.

<u>Cost</u>. In general the most stable feature of a health care delivery system is that of available resources which can be measured in terms of cost both cheaply and easily. (27). This total cost can then be allocated e.g. according to each type of service provided or per patient contact, thus providing information of economic interest and in addition providing another crude measure of system performance.

The simple costing procedure outlined above was considered too crude principally because it makes no allowance for the major division of PHCU work into that carried out in a clinic building and that carried out in the community. For this reason the study adopted the system developed at the Rural Health Research Centre, Narangwal, Punjab. ( 5 ). In effect this system divides costs not only between the major sectors of clinic and community, but also within each sector costs are allocated to broad divisions of health care activities. (See next section for detailed description).

Having decided upon the major components of the model the conceptual problem remained of fitting into this model the many health care activities involved in the provision of services. Examples of such activities range from the examination, diagnosis and treatment of patients' ailments to the filling out of administrative forms etc. The problem was alleviated by grouping the health care activities into broad divisions or FUNCTIONS, similar to those mentioned under <u>cost</u> above.

-15-

Seven functions were used in the study as follows:-

Medical Relief

Maternal and Child Health Services

Family Planning

Communicable Disease Control

Environmental Sanitation

Liaison with other Health Care Services

Administration

The introduction of Health Functions had the following

advantages:-

| (i)  | They acted as a bridge between health care |
|------|--|
|      | activities and the components of the model |
| (ii) | They reduced the number of variables to be |
|      | considered                                 |

 (iii) They aided objective analysis since they lay outside traditional administrative divisions.
 (For definitions of health Functions see Appendix)

### Sources of Information

In order to obtain adequate information for the analysis of all the components of the model the following sources of information were utilised:-

- 1. The catchment population of the PHCU
- 2. PHCU records and reports
- 3. The PHCU staff

Methods of Data Collection

It was necessary to use multiple techniques of data collection. These may be summarised as follows:-

- 1. Information on health <u>Needs</u> was obtained from a questionnaire survey of a sample of the catchment population.
- 2. Information on <u>Demand</u> for health care was obtained from examination of the existing clinic records and reports.
- The component of <u>Process</u> was analysed in terms of quantity, quality and efficiency.

- . (a) Information for the analysis of quantity was obtained from existing clinic records and reports.
- (b) Information for the analysis of quality of health care was obtained from a questionnaire survey of selected recent patients.
  - (c) Information for the analysis of efficiency of delivery of health care was obtained from an observational study of PHCU staff activities.
- 4. Information on available <u>Resources</u> in terms of staff, equipment and finance was obtained from examination of existing clinic records and reports.
- 5. Information for the measurement of <u>Outcome</u> was obtained from existing clinic records and reports as well as from the questionnaire survey of the catchment population.
- Information for the analysis of <u>Cost</u> was obtained from existing clinic records as well as from the observational study of the activities of the staff.

# DETAILED METHODOLOGY

For the purposes of developing and testing the methodology the kind co-operation of three PHCUs was received. All three were situated in Kolar District, State of Karnataka, South India. Two were run by the State Government and the third, the Mallur Health Co-operative was an independent pilot project (See Introduction).

(A) Questionnaire Survey of Catchment Populations

There has been general agreement amongst reseachers on the usefulness of surveys of local populations to obtain information not otherwise available. (26,41,50) However, it would neither be practical nor scientifically acceptable to attempt to elicit all desirable information from a single survey. Thus the subject matter of questionnaires must be decided according to local priorities. In this study the questions were concerned mainly with Maternal and Child Health, a topic of major importance in all developing countries.

-17-

Target Population: samples of member villages of the Mallur Health Co-operative Society and those of the catchment areas of the two Government PHCUs.

Data Collected: the questionnaire contained 63 questions designed to gather information about the local population.

- (a) General information i.e. age, sex, education, occupation and income of the inhabitants of each househld.
- (b) Information about Environmental Sanitation, i.e. number of residents in each household, presence or absence of a sanitary latrine, source of drinking water.
- (c) Information about Maternal and Child Health. As a subject of major importance in all developing countries this category was the one most thoroughly examined by the questionnaire. The information sought was as follows:-
  - Number of live children, previous still births, previous miscarriages, previous child deaths.
     This information contributed towards an estimation of need for Maternal and Child Health services in each of the catchment populations studied.
  - (ii) Uptake of PHCU services as assessed from present and recent pregnancy practices regarding antenatal examinations, care at the time of child birth and attendances for post natal examinations.
  - (iii) Information about each individual child under 5 years old i.e. number and type of vaccinations received, number, type and duration of illnesses in the past month and whether or not a doctor was consulted. This provided information about Need for care for the under fives as well as an estimate of Outcome in the case of vaccinations and uptake in the example of recent illnesses.
  - (iv) Felt need of the population for health care was assessed by enquiring into knowledge and attitudes towards certain common diseases and conditions.
     These examples were otitis media, diarrhoea in under

fives, worm infestation, and care during pregnancy. An assessment of the need for Family Planning services was obtained from information about family size, birth interval and family planning knowledge and practice. The information about family planning practice facilitated an assessment of Outcome.

# Pilot Study to test Questionnaire

Thirty village mothers co-operated in the testing of the questionnaire. Assessment of the validity and repeatability presented problems but these were diminished by the fact that the questionnaire aimed to characterise groups of the population rather than individuals. The information about previous deaths, still births, and miscarriages could not be validated and the accuracy of information received from each respondent was obviously suspect due to the problem of recall. However, since the purpose of the questions was merely to help in assessing birth interval amongst village mothers this section of questions was retained.

The problem of good repeatability was approached by making maximum use of closed ended questions, many with a simple 'yes' or 'no' reply. In addition each pilot interview was timed and showed a mean time for completion of 21 minutes with SD<sup>+</sup>4.5 minutes, thus indicating a fairly uniform ability of respondents to answer the questions.

Unit of enquiry:-

Mothers with children aged under 5 years residing in villages served by the three PHCUs.

village household.

Lists of village households maintained by each PHCU.

The sample of households was selected using a two stage technique (55) In the case of the government PHCUs only villages within a three mile radius of the PHCU were chosen because previous Indian studies have shown that some 75% of consultations are from people living within a three mile radius. Since all the villages of the Health Co-operative were within a three mile radius of the PHCU no exclusions were necessary.

Sampling Unit:-Sampling Frame:-

Sample Design:-

In order to obtain a population roughly equivalent to that of the Health Co-operative villages the total number of villages in each of the two government catchment areas was weighted according to the average number of households per village in the area. Thus six villages were required in one government PHCU area and eight in the other, the villages then being selected at random. The total number of households thus selected in each first stage sample were as follows:-

# MALLUR 638 HOUSEHOLDS GOVERNMENT PHCU (B) 855 HOUSEHOLDS GOVERNMENT PHCU (J) 822 HOUSEHOLDS

150 second stage units (households) were then selected from the sampling frame in each PHCU, the number in each village being weighted according to the number of houses and the households then being selected using Random Number Tables.

Since the object was to interview a total of 100 mothers with children aged under 5 years in each area a total of 150 households were selected to allow for the fact that some households would contain no under fives. This was unavoidable since the sampling frames did not accurately document the ages of the members of each household.

# (B) Examination of Clinic Records and Reports

The clinic records and reports for the past complete year i.e. 1975, were examined in order to obtain information about Demand for medical care, available Resources, Process involved in coping with the Demand, Cost and Outcome of the delivery of health care. The information was categorised by Function.

# (C) Assessment of the quality of medical care

The assessment made use of the concept of Indicator Cases, an indicator case being defined as "an example of either health or illness care that is statistically frequent, which may be provided by a variety of different systems, about which there is general agreement concerning appropriate management, and in which maintenance for 'improvement of health status of the individual studied can be objectively measured". In this study the following indicator cases were used:-

- 1. Anaemia of pregnancy
- 2. Diarrhoea in under fives
- 3. Skin abscess

-20-

A register was maintained at each PHCU in order to record the names and addresses of patients whose diagnoses fell within these categories. A questionnaire was then put to these patients in order to assess the quality of care which they had received. The categories for the assessment of quality of delivery of health care were as follows:

> <u>Physician performance</u> i.e. type of history elicited, extent of examination carried out, method of diagnosis employed, details of treatment and management of the patient's disease. <u>Physician communication</u> i.e. communication by the doctor of the diagnosis and details of treatment etc. to be given to each patient.

> Patient compliance i.e. patient's actions in carrying out the instructions given by the medical officer. <u>Cost and convenience</u> to the patient i.e. in terms of wages lost and travelling cost plus travelling time and time spent waiting at the clinic for the doctor's attention. <u>Referral or re-appointment</u> i.e. for further diagnostic tests

Patient satisfaction i.e. patient's opinion of the result

of this treatment.

or treatment.

(For example of above questionnaire see Appendix) (D) Assessment of Efficiency of Health Care Delivery

Efficiency of the delivery of health care was assessed by measuring the amount of time spent by the members of both clinic and field staff on activities which were categorised by Function. The Functions were those already mentioned i.e. Medical Relief, Maternal and Child Health services, Family Planning, Communicable Disease Control, Environmental Sanitation, Liaison and Administration. In addition categories were included to allow for time spent travelling on clinic business, time spent on personal activities and a final miscellaneous category to allow for activities such as assisting Medical Relief e.g. helping another staff member perform a minor operation, put on a dressing etc., as well as cleaning the clinic premises.

The measurement of time spent on each category was carried out by means of an observational study. An observer was posted to each clinic for two weeks i.e. 10 working days. During that time each observer spent approximately the same number of working days with clinic and field staff, the division depending on the numbers and responsibilities of the field staff. The programme of attendance by the observer either at the clinic or with field staff was arranged using random number tables. In order to record the time spent by each member of staff the observer was provided with a form (See Appendix) on which the activities were listed by the functions mentioned above. The functions were then subdivided into more specific activities e.g. medical relief was subdivided into the eliciting of a history', examination of the patient, prescribing of drugs, dispensing of drugs, putting on a dressing, giving an injection.

Beginning at the clinic opening time in the morning the observer then recorded (by placing a tick in the appropriate category) every two minutes throughout the working day, the activities of each staff member. In the case of field staff the observer accompanied one staff member during his working day in the villages and maintained the observation form as above. Thus, for example, during a six hour working day 180 observations were made of the activities of one staff member, permitting the building up of a profile of the day to day working.

In order to check that the correct number of observations had been made the working hours of each PHCU were recorded each day of the ten day study and then the number of recordings on each form checked against these.

A previous study by Feldstein et al (20), measured the time spent by staff members on health care activities. However, this consisted of a time and motion study of each task performed by a staff members. Given the important constraints on methods used in this study such a time consuming exercise was rejected in favour of the above.

## (E) Analysis of Cost

A simple method of cost analysis was envisaged whereby the PHCU resources could be allocated by the functions already used in the other techniques. This involved the summing up of annual expenditure, both capital and recurrent, and then allocating these to Functions using the data from the assessment of efficiency study in section (D) above. This system was originally developed at the Rural Research Centre, Narangwal, Punjab.

Expenditures were derived according to the following procedures:-

<u>Capital expenditures</u>: Capital expenditures for buildings and equipment were obtained from various PHCU records and reports. The total capital expenditures were then depreciated using an arbitrary 1% annual rate of depreciation. The 1% figure was considered appropriate in the circumstances of this study since the PHCU buildings and equipment were very basi and required and received very little in the way of maintenance etc.

-22-

<u>Maintenance Expenditure</u>: The annual maintenance expenditure for buildings and equipment was assessed from existing clinic records and reports.

<u>Drug Expenditures:</u> The annual expenditures for the purchase of drugs and other expendable items were readily available from PHCU records and reports.

<u>Salaries</u>: Annual expenditures on salaries and allowances for PHCU workers were similarily obtained from existing records and reports.

# Allocation of Expenditures by Function

The procedure for costing PHCU activities on a functional basis involved allocating all the PHCU expenditures among the specified functions. The allocations were made as follows:

> <u>Capital expenditures:</u> The 1% annual capital depreciation figure was allocated in the first place either to PHCU or the Field and was based on an estimate of the principle location of the staff activities. Subsequent allocation of expenditures to the functional categories was based on the results of the Assessment of Efficiency study.(See section (D) above).

kecurring Expenditures:

(i) Maintenance Expenditures

Building maintenance expenditures were distributed in the same manner as the capital depreciation expenditures mentioned above. Equipment maintenance expenditures, where they existed, were distributed according to where the particular item of equipment was most utilised e.g. the Mallur medical officer's motor cycle was utilised entirely in the field for activities within the functions of Medical Relief and Maternal and Child Health.

#### (ii) Drugs

The total expenditures on drugs were allocated by examining the PHCU records and separating out drugs used in activities related to specific locations and functions.

Expenditures on Personnel Salaries and Allowances:

The salaries and staff allowances were allocated among the various functional categories using the data from the Assessment of Efficiency study (as in section (D).

-23-

#### ADAPTING TO CONSTRAINTS

Mention has already been made of the importance of the methodology conforming to the following constraints:-

(a) methods should be simple and easily applicable

- (b) implementation should require a minimum of man hours.
- (c) resources required in terms of money, manpower and equipment should be as small as possible.

The following techniques were affected by these constraints:-

- . i. Questionnaire survey of samples of the population
  - ii. The 'quality of care' questionnaire
- iii. The assessment of efficiency study.

#### (i) Questionnaire Survey

It was recognised from the outset that this technique would present the most difficult problems in terms of time, manpower and organisational requirements. The important factors for consideration were as follows:-

> Length of questionnaire i.e. the number of questions, number of respondents required,

number of interviewers required.

the quality of interviewers required i.e. trained or untrained,

access to respondents.

Initially an arbitrary limit of one month was imposed as the requirement for completion of the questionnaire survey in all three centres. One month was chosen as being a likely upper limit of time for which a PHCU could possibly spare a member of staff for participation without serious disruption of services.

The subject matter of the questionnaire which has already been outlined consisted of 63 questions. A pilot study using 30 respondents found that the average time required for completion of each was 21.3 minutes,  $SD^{+}$  4.5 minutes.

The choice of the number of respondents was chiefly dependent on the following factors i.e. the arbitrary limit of one month for completion of the survey and the number of questionnaires which could reasonably be expecte to be completed in one day. The latter in turn depended on the accessibility of the respondents and the number of interviewers employed.

## Number of Interviewers

It was considered desirable to employ a total of three interviewers but for practical reasons it was possible only to employ two, one of whom had previous experience and training in survey techniques and the other who had neither training nor experience.

# Accessibility

Having taken into account the terrain and public transport facilities available in the three study areas it was concluded that between 5 and 10 questionnaires could be completed daily without undue effort. Thus in one month i.e. approximately 20 working days, the range of completed questionnaires would, with two interviewers, be between 200 and 400 in all three centres. From these rather crude calculations it was decided to make 100 respondents the target for each study centre i.e. a final total of 300.

Although the information for each questionnaire was gathered from one respondent i.e. the mother of each household, it must be stressed that the information covered an entire family which had an average membership of 6 (from a previous report of the Mallur Health Co-operative). This meant, in effect, that 600 people were covered in each of the three study centres.

# (ii)'Quality of care" questionnaire

The concept of indicator cases and the six criteria employed for the assessment of 'quality of care' have been described previously.

It was considered that the best way of obtaining adequate information whilst ensuring simple methods and minimum resource requirements was to incorporate the criteria into a questionnaire (see Appendix) which would then be put to patients who had recently attended the PHCUs for treatment for each of the 3 indicator cases, i.e. anaemia in pregnancy, diarrhoea in under fives and skin abscess.

It was decided that the assessment of quality of care provided by a PHCU could most usefully be made by judging whether or not certain basic procedures, which could reasonably be expected to be carried out, were in fact carried out in the course of treating a patient. In addition, and less importantly, consideration was given to cost and convenience of treatment to the patient.

In effect quality of care was judged on the answers received to the following questions:-

- 95-

Was a history taken?

Was an examination carried out? Was a diagnosis made purely on clinical grounds or were aids to diagnosis employed e.g. Hb test? Was the patient informed of the diagnosis? What treatment was prescribed?

Were appropriate instructions or advice given to the patient concerning management of the condition? Was the treatment successful in the patient's opinion?

The remainder of the questions dealt with cost and convenience of treatment to the patient.

The three indicator diseases required different management so that three different questionnaires were necessary. However, due to the general nature of the questions and the narrow scope for variation in management the differences between the questionnaires were very minor.

For practical reasons it was possible only to carry out this part of the study in one PHCU i.e. the Mallur Health Co-operative. A register was maintained in the clinic and the names and addresses of 10 patients suffering from each of the three diseases were collected. - When the register was completed an interviewer visited their homes and completed the questionnaires.

This part of the methodology was unsatisfactory for the following reasons:-

 (a) no attempts were made to test the validity and repeatability of the questionnaires,

(b) the number involved were too small.

# (iii) Assessment of efficiency study

The methods described previously were considered both suitably simple and easily applicable so that only the constraints of time and minimum resources were of importance.

Two working weeks i.e. 10 days, were chosen as a suitable duration, with 5 days allocated to observation of the activities of the Clinic staff and 5 days to the Field staff. This ensured that any variations in the PHCU weekly programme would be included e.g. a day or part of a day when only antenatal examinations were performed. For a PHCU with an average working day of 8 hours, a total of 2,400 observations were recorded. Although this was considered sufficient for the construction of an accurate profile of PHCU activities it was recognised that the observations could be biased due to the study coinciding with a period when staff activities were diverted to special programmes, e.g. during an epidemic, and thus interpretation of the results could only be made after consultation with the Medical Officer to ensure that no such special circumstances existed.

The chief component of resources utilised was manpower, one observer being allocated to each PHCU. However, since the methods were simple the only essential attribute, apart from average intelligence, was

-26-

an ability to read and write and thus it was possible to employ three young men from local villages, thereby reducing to a minimum maintenance and travel expenses during the 10 days of the study. The equipment required was also obtained cheaply and consisted of the observation forms, pens and watches. Watches were owned by two of the observers and in the third case one was borrowed from a PHCU staff member. The results are presented as an illustration of the competence of the methodology in obtaining information and thus they have been combined into a single chapter together with the discussion.

ITTOTITO & DIDCOPPION

The data from the Mallur Health Co-op is presented as the main topic for discussion but data from the other PHCUs is referred to when comparisons are relevant.

The components of the conceptual model (See Fig.B) were used as the basic framework for the analysis of data and the results have been presented in sections corresponding to the 7 health Functions. Each Function has been analysed and presented in terms of Demand, Process, Outcome, Resources and Cost where appropriate. The results concerning Need for health care have been presented separately due to the controversy over its definition and the consequent difficulties of measurement.

However, as an important preliminary procedure the boundaries of responsibility of each PHCU have been determined by measurement of each catchment population (48).

#### Catchment Population

Measurement of the catchment population is a very important first step in the study of any health care delivery system. It sets the boundary of responsibility for health care and as such is a basis denominator which is essential for the calculation of many parameters of health care delivery.

For example, knowledge of population size, even as a single number, permits a crude estimate of potential demand for health care and this in turn gives a crude indication of staff and other resource requirements. If the age and sex structure of the population is also known then the potential for more refined planning is much enhanced. If, for example, the size of the under 5 population is known then it is possible to estimate the numbers of staff required to carry out an immunisation and developmental screening programme. Where the numbers of staff is fixed due to financial constraints then the information can be used to organise the most efficient programme which is possible under the circumstances. Knowledge of the geographical distribution of the population is of obvious importance in planning such a programme since the time required for staff to travel from the PHCU to the homes of their patients must be included within their working hours.

The time, effort and cost required for patients to reach the PHCU has important implications especially since studies in developing countries have shown that patients within the theoretical catchment area but living more than approximately 3 miles from the PHCU tend not to attend for treatment (14,41)

-28-

# MALLUR AGE AND SEX DISTRIBUTION AS IN

## OCTOBER 1975

| ·                    | AGE GROUP (IN YEARS) |      |       |       |                  |       |       |       |      |      |      |      |       |
|----------------------|----------------------|------|-------|-------|------------------|-------|-------|-------|------|------|------|------|-------|
| VILLAGE              | o -                  | 5    | 5 -   | 15    | 15 -             | 30    | 30 -  | 50    | 50 - | 60   | 60+  | -    | •     |
|                      | M                    | F    | М     | F     | М                | F     | M     | F     | М    | F    | М    | F    |       |
| MALLUR               | 169                  | 210  | 242   | 319   | 333 <sup>:</sup> | 310   | 228   | 210   | 43   | 60   | 57   | 89   | 2270  |
| KACHAHALLI           | 24                   | 25   | 37    | 44    | 44               | 44    | • 33  | 43    | 30   | 20   | 13   | 10   | 367   |
| MUTHUR               | 102                  | 90   | 156   | 158   | 128              | 102   | 142   | 151   | 37   | 46   | 16   | .17  | 1145  |
| BHATRENAHALLI        | 16                   | 25   | 38    | 30    | 24               | 15    | 36    | 33    | 3    | 6    | . 5  | 3    | 234   |
| A LLUR UNAGENAHA LLI | 13                   | 8    | 13    | 21    | 5                | 8     | 15 ·  | 16    | 2    | 3    | 1    | 3    | 108   |
| TOTAL                | 324                  | 358  | .486  | 572   | 534              | 479   | 454   | 453   | 115  | 135  | 92   | 122  | .4124 |
| % TOTAL              | 7.86                 | 8.68 | 11.78 | 13.87 | 12.95            | 11.61 | 11.00 | 10.98 | 2.79 | 3.27 | 2.23 | 2.96 |       |

SOURCE: CENSUS STUDY CARRIED OUT BY INTERNS OF ST.JOHN'S MEDICAL COLLEGE, BANGALORE.

# TABLE 6

TABLE 7

# POPULATION, (Age/Sex distribution (%)

|          |      |       |       | 3     |       | AGE GROUPS (YEARS) |       |       |      |            |      |      |
|----------|------|-------|-------|-------|-------|--------------------|-------|-------|------|------------|------|------|
|          | 0 ,- | 5     | 5 -   | 15    | 15 -  | 30                 | 30 -  | 50    | 50 - | 6 <b>O</b> | 60 + |      |
|          | M    | F     | М     | F     | М     | F                  | м     | F     | M    | F          | М    | F,   |
| MALLUR   | 7.86 | 8.63  | 11.78 | 13.87 | 12.95 | 11.61              | 11.00 | 10.98 | 2.79 | 3.27       | 2.23 | 2.96 |
| рнси (в) | 9.76 | 8.56  | 15,02 | 13.96 | 8.26  | 13.36              | 11.71 | 7.36  | 2.10 | 2.10       | 4.35 | 3.45 |
| PHCU (J) | 9.62 | 10.86 | 12.21 | 13.89 | 10.23 | 16.18              | 11.29 | 7.02  | 1.07 | 1.37       | 2.90 | 3.36 |

NOTE: Distributions of Age/Sex for PHCUs B and J obtained from sample survey.

•
Thus the potential demand estimated solely from knowledge of the numbers of the entire catchment population may be much more limited in practice.

The availability of data about the catchment population is variable, a fact which was confirmed in the study.

The Mallur Health Co-op consists of the population of 5 villages situated close to one another. Thus it had been possible for a house to house census to be carried out without difficulty (See Table 6). Such detailed information was not available for the catchment populations of the 2 other PHCUs because the catchment areas were much larger and the populations larger and widely distributed in small villages. However, maps were available showing the locations of villages and, in addition the following information was known to PHCU staff:-

BASETTIHALLI PHCU (B)

| Total  | popı |          | 11,875 |    |
|--------|------|----------|--------|----|
| Number | of   | villages | •      | 42 |

For each village the number of houses and the number of inhabitants per house were known.

## JANGAMKOTE PHCU (J)

| Total population   | 15,402 |
|--------------------|--------|
| Number of villages | 30 ·   |

Similarly the numbers of houses and inhabitants were known. Additional information from Questionnaire Survey

The prime purpose of the Questionnaire survey was to fill in important information gaps. Thus an estimate of the Age/Sex distributions of the catchment populations of PHCUs (B) and (J) was obtained and these are included in Table 7.

## Need

The fundamental problem for any health care delivery system is to cope with the health care needs of the catchment population. For this reason Need has been incorporated as a component of the conceptual model adopted in this study (See Figure B).

However, the difficulties of quantifying need are very considerable, mainly because there is no accepted definition of the term. Thus, for example, in a given situation the need for care as assessed by a health professional may differ markedly from the assessment of a lay person. The scope for value . judgement is enormous and this is of particular importance in developing countries where the concepts of modern Western health care may clash with traditional customs and beliefs. (51). For this reason it is essential that local attitudes should be investigated and an attempt made to assess the Felt Need (13) of the population for health care in common clinical situations. If this is not done then confidence in local health personnel may be undermined and the potential of a PHCU to improve the health status of the population seriously diminished.

In the study a section of the Questionnaire Survey was devoted to the assessment of Felt Need of village mothers for health care in certain given situations. These included common local illnesses of childhood as well as Felt Need for care during pregnancy and delivery, and for family planning services. Table 8 presents the results of investigation into the Felt Need of mothers concerning childhood diarrhoea, antenatal care and family planning. On each of these topics the responses of the Mallur mothers was significantly different statistically from the responses in the other PHCUs. The reasons for these differences in attitude could only be discovered by a much deeper sociological investigation but the fact that they occur, even within such a small geographical area, illustrates the importance of investigating local attitudes.

- 30-

## TABLE 2 Felt Need

|            | M (N=100)                        | B (N=100)  | · J (N=100)  |
|------------|----------------------------------|--|--|
| YES        | . 97                             | 61   | . 69   |
| NO         | 1                                | . 39   | 30   |
| DON'T KNOW | 2                                | 0  | · 1  |
| TOTAL      | 100                              | 100  | 100  |
|            | YES<br>NO<br>DON'T KNOW<br>TOTAL | M (N=100)   YES 97   NO 1   DON'T KNOW 2   TOTAL 100 | M (N=100) B (N=100)   YES 97 61   NO 1 39   DON'T KNOW 2 0   TOTAL 100 100 |

Q. Is watery diarrhoea serious in young children?

Differences between Mallur and PHCUs B + J are highly significant (P<0.001)

Q. Is antenatal care important?

|            | M (N=100) | B (N=100) | J (N=100) |
|------------|-----------|-----------|-----------|
| YES        | 44 .      | 85        | 23        |
| NO         | 39        | 14 .      | 67        |
| DON'T KNOW | 17        | 1 .       | 10 .      |
| TOTAL      | 100       | 100       | 100       |

Compared with Mallur the positive response at PHCU (B) was significantly greater ( P<0.001) and the positive response at PHCU (J) was significantly lower (P<0.005).

| 4)         | M (N=100) | B (N=100) | J (N=100) |  |
|------------|-----------|-----------|-----------|--|
| GOOD       | 98        | 58        | 90        |  |
| BAD        | 1;        | 3 '       | 4         |  |
| DON'T KNOW | 1         | 39        | 6         |  |
| TOTAL      | 100       | 100       | 100       |  |

Q. Do you think Family Planning is good?

Compared with Mallur the positive response was significantly greater than PHCU (B) (P < 0.001) and than PHCU (J) (P < 0.005)

#### Inditions manages

Medical Relief i.e. the health care activities involved in the management of the sick, is the most important of the 7 Health Functions in terms of consumption of PHCU resources. It takes up a large proportion of staff time and effort as well as consuming a major part of the financial resources expended on drugs and equipment. However, the effectiveness of Medical Relief activities in improving the health status of the population is very much in doubt, and for these reasons careful evaluation of all aspects of these activities is warranted.

DEMAND is measured in terms of Outpatient attendances at the PHCU. The amount of information recorded about each attendance may vary enormously in different PHCUs. However, even a record of the total numbers of weekly or monthly attendances is useful for planning purposes. These figures will yield information about the average volume of attendances as well as showing variations which may occur eg. throughout a year. This is important for estimating staff requirements and possibly the extent of PHCU hours of availability to the public.

As an example Table 9 shows the attendance figures for the year 1975 in each of the 3 PHCUs which were studied.

|           | М      | В        | J      |
|-----------|--------|----------|--------|
| JANUARY   | 2,089  | 2,739    | 1,298  |
| FEBRUARY  | 1,757  | 2,170    | 1,339  |
| MARCH     | 1,674  | 2,431    | 1,491  |
| APRIL     | 2,109  | 2,283    | 1,547  |
| MAY       | 1,880  | 2,465    | 1,840  |
| JUNE      | 1,847  | 2,897    | 1,485  |
| JULY      | 1,438  | 2,866    | 1,493  |
| AUGUST    | 1,801  | 3,114    | 1,532  |
| SEPTEMBER | 1,889  | 2,581    | 1,193  |
| OCTOBER   | 1,738  | 3,327    | 2,025  |
| NOVEMBER  | 1,631  | 2,656    | 1,607  |
| DECEMBER  | 1,751  | 2,567    | 1,616  |
| TOTAL     | 21,604 | 32,096 ' | 18,466 |

## TABLE 9

## DEMAND (Total) FOR MEDICAL RELIEF 1975

## CATCHMENT POPULATION

M = 4,124 B = 11,875 I = 15,402 Comm/UNI



The above figures were plotted on a graph (see Figure C) in order to demonstrate the variations in attendance more vividly. Examination of the attendances at PHCU (B) shows that the period of lowest demand occurred from February to May whilst from June to August there was a period of high demand. For planning purposes this is evidence that the early part of the year has the lowest staff requirements and thus, for example, may be the best time for staff leave. However, there may be important reasons for low demand e.g. there may be a period of very time consuming agricultural activity such as planting seeds or harvesting so that the local population cannot afford time to travel to a clinic. In such circumstances it might be better if PHCU staff visited the villages to investigate any current illness.

Another reason for low attendances may be that PHCU staff were on leave so that the reduced numbers reflected reduced availability of services and not low demand. It is important, therefore, that possible reasons for variations in demand should be considered.

Variations in the monthly attendances were further explored by constructing the 3 frequency distributions. All 3 conformed roughly to the theoretical Normal distribution although the inadequacy of 12 readings for each curve must be admitted.

However, on the assumption that monthly attendances were normally distributed the mean and standard deviation were calculated for each of the 3 PHCUs.

| М | = | 1800.3, | S.D. ±           | 185.6 |
|---|---|---------|------------------|-------|
| В | = | 2674.7  | S.D <sup>±</sup> | 334.8 |
| J | = | 1538.8  | s.d <sup>±</sup> | 226.2 |

Taking Mallur (M) as an example it could be assumed with confidence that it would be most unlikely for the monthly attendances to exceed + 2 S.D. i.e. 2171, or to fall below - 2 S.D. i.e. 1429. These figures can then be employed in calculating the numbers of staff and the clinic time required to provide services.

As already mentioned variation in demand may be due to many different reasons and it is important that the possibilities should be considered. This is especially important when a period of unusually high attendance is noted because this may indicate the occurrence of an epidemic. If any preventive action is to be initiated in such an event then demand must be monitored continuously in order that the staff may be alerted at the earliest possible time.

The routine recording of diagnosis is important not only in the early detection of an epidemic but also as an aid to constructing a profile of local morbidity. Tables 10 and 11 show the monthly attendances at Mallur in 1975

-32-

TABLE 10

O.P. ATTENDANCE BY DIAGNOSIS (MALLUR 1975)

|           | Coryza | Bronch-<br>itis | Pneumonia | Anaemia | Trauma | Ascari-<br>asis | H'Worm | Amoeba | Vit def. | 'Flu | Measles | Smallpox | Whoc |
|-----------|--------|-----------------|-----------|---------|--------|-----------------|--------|--------|----------|------|---------|----------|------|
| TANHARY   | 292    | 39              | 98        | 40      | 92     | 6               | 32     | 19     | -        | 360  | 0       | О        | 0    |
| FEBRUARY  | 94     | -               | 104       | 49      | 104    | 9               | 38     | 32     | _        | 290  | 0       | 0        | 0    |
| MARCH     | 116    | -               | 123       | 39      | 182    | 9.              | 32     | 21     | -        | 182  | 0       | 0        | 0    |
| ADRTI.    | 182    | _               | 106       | 38      | 102    | 10              | 33     | 31     | 18       | 218  | ō       | ο ΄      | . 0  |
| MAV       | 106    | 39              | 182       | 31      | 192    | 2               | 34     | 39     | 18       | 218  | 0       | 0        | 0    |
| TUNE      | 106    | _ ~             | 92        | 21      | 121    | 3               | . 11   | 18     | -        | 398  | 0       | 0        | 0    |
| THIT.Y .  | 368    | 329             | 103       | 38      | 163    | . 2             | 4      | 12     | -        | 463  | 0       | ο.       | 0    |
| AUCUST    | 309    | 189             | 48        | 38      | 404    | 7               | 13     | 19     | 39       | 502  | 0       | 0        | 1    |
| SEPTEMBER | 208    | 93              | 106       | 53      | 218    | 22              | 9      | . 33   | 102      | 416  | 0       | 0        | 3    |
| OCTOBER   | 69     | 83              | 29        | 22      | 103    | 3               | 28     | 16     | 108      | 366  | 0       | 0        | 1    |
| NOVEMBER  | 109    | 169             | 102       | 47      | 102    | 8               | 41     | 38 ·   | 102      | 362  | 28      | · 0      | 2    |
| DECEMBER  | 102    | 106             | 108       | 48      | 192    | 6               | 38     | 10     | 162 .    | 398  | 6       | 0        | 1    |
|           | 2060   | 1047            | 1201      | 464     | 1975   | 87              | 313    | 311    | 549      | 4173 | 34      | 0        | 9    |

O - NO CASES

- = NOT RECORDED

1.

....

TABLE 11

|           | Cholera | T.B.  | Leprosy | Allergy | Furun<br>culosis | Scabies | Conjunc<br>tivitis | G-Enteritis | Diarrhoea | Otitis |
|-----------|---------|-------|---------|---------|------------------|---------|--------------------|-------------|-----------|--------|
|           | 5       |       |         |         |                  |         |                    |             | 010       | 0      |
| TANUARY   | 0       | 1     | 0       | 16      | 0                | 3       | 18                 | 1           | 212       | 92     |
| FEBRUARY  | 0       | ı     | О       | 33.     | 0                | . 9     | 28                 | 30          |           | 10     |
| MADOU     | 0       | 1     | 0       | 34      | о                | 0       | 18                 | 6           | 306       | .10    |
| MARCH     | 0       | 1     | о       | 42      | 91               | 0       | 139                | 2           | - 292     | 162    |
| APRIL     | 0       | 1     | 0       | 6       | 92               | 0       | 31                 | 3           | 189       | 0      |
| MAY       | . 0     | - · · | 0       | 16      | 89               | 3       | 29                 |             |           | 32     |
| JUNE      | 0       | 1     | 0       | 61      | . 89             | 29      | 6                  | 6 .         | 189       | 68     |
| JULY      | . 0     | 0     | 0       |         | -                | -       | -                  | -           |           | 81     |
| AUGUST    | 0       | 1     | 0       |         |                  | · .,    | 36                 | -           | 208       | 93     |
| SEPTEMBER | · 0     | 1     | 0       | 106     | 15               | - 13    | 2                  | 2           | 198       | 71     |
| OCTOBER   | 0       | 1     | .0      | 18      | 62               | 10      | 11                 | _           | • 193     | 102    |
| NOVEMBER  | 0       | 0     | 0       | 68      | 162              | 31      | 16                 | -           | 396       | 122    |
| DECEMBER  | 0       | 0     | o .     | 106     | 128              | 39      | 10                 |             |           |        |
| a         | 0.      | *1    | 0       | 506     | 786              | 128     | 334                | 30          | 2,183     | 839    |

\*Same case each month

0 = NO CASES - = NOT RECORDED

recorded by diagnosis. The quality of the data is suspect since the monthly totals are absent from some of the diagnostic headings.  $I_n$  addition some of the diagnoses are suspect. For instance it is difficulty to accept that only 1 TB patient attended the clinic during 1975 (See Table 11). However, 78.9% of the attendances are recorded by diagnosis and a summary of the commonest diseases appears in Table 12.

The largest proportion of consultations was due to the common cold and influenza for which only inadequate palliative medicines were available. No information was available to exclude the possibility that antibiotics were prescribed in some of these cases at a high cost and little or no benefit.

For planning purposes the information in Table 12 is useful in 2 ways.

- (a) it enables an estimate to be made of which drugs and equipment should be available and the likely quantities required.
- (b) by identifying the commonly occurring diseases the medical officer may be able to train other PHCU staff to diagnose and treat them thereby releasing him for other work such as preventive medicine.

The high numbers of cases of diarrhoea means that all staff should be capable of coping with the rehydration of at least mildly dehydrated infants. They should also be able to deal with cases of minor trauma.

The high incidence of bowel infestation may indicate the need for routine deworming of all children. A recent study in U.P. (23) has demonstrated the effectiveness of such a programme in improving the nutritional status of under 5s.

## TABLE 12

## % DISTRIBUTION OF ATTENDANCES BY DIAGNOSIS (MALLUR)

### DIAGNOSIS

## % ATTENDANCE

| COLD + 'FLU                                      | 28.8 |
|--|------|
| DIARRHOEAS + BOWEL INFESTATIONS                  | 13.6 |
| RESPIRATORY DISEASES (BRONCHITIS ÷<br>PNEUMONIA) | 10.0 |
| TRA UMA  | 9,0  |
| SKIN DISEASE                                     | 6.6  |
| OTITIS MEDIA                                     | 3.9  |
| VITAMIN DEFICIENCY                               | 2.1  |
| TOTAL  | 74.0 |

-33-

PROCESS There are so many activities carried out in a PHCU under the heading of Medical Relief that it would be unreasonable and impractical to attempt to record them routinely. However, in the study some measures of process were possible from PHCU data.

For example from Table 8 the following rates were calculated for Mallur:-

| Total attendance for 1975            | 21,604      | 94-1 al                          |
|--------------------------------------|-------------|----------------------------------|
| Average weekly attendance            | 415         |                                  |
| Average daily attendance             | 75          | $(5\frac{1}{2} \text{ day wk.})$ |
| Average throughput per hour          | 14          | (5.4 hour day)                   |
| These are important indicators of cl | linic work] | .oad.                            |

In comparison PHCU (B) had a considerably greater total outpatient attendance in the same year of 32,096. However, because the PHCU was available for 9 hours per day on 6 days each week the average attendance per day was 103 patients but the average throughput per hour was only 11 patients. Thus, although the annual attendance was approximately 50% greater than at Mallur each patient had approximately 1 more minute of clinic time available to him. However, the significance of this fact depends on what was done for each patient during his time in the clinic.

Thus for example, there were laboratory facilities available in Mallur but not in the other PHCU.

During the year 1975 the following examinations were carried out:-

Stool examinations742 of which 31 were normal326 Hookworm positive

74 Ascarasis positive

311 A mooba positive

Haemoglobin estimations 489 of which 157 less than 50%

205 50% to 60%

79 60% to 70%

48 more than 70%

263 of which 244 were normal

11 were sugar positive

8 albumen positive

No details were available about drugs prescribed other than total annua cost. A comprehensive study of the appropriateness of drugs purchased and prescribed would be too time consuming and, therefore, not feasible in this type of evaluation.

The assessment of process is not just a matter of quantifying the many health care activities performed. The activities must be appropriate in the circumstances and in an attempt to assess what can be termed the <u>Quality</u> of Care 3 indicator cases were chosen for study.

## Urine examinations

## Analysis of Quality of Care

Mention has already been made of the unsatisfactory aspects of this part of the study, in particular the very small numbers of patients interviewed. In addition, attempts to achieve good repeatability and validity were inadequate, the former consisting of the maximum use of closed ended questions with yes or no answers and the latter of checks on the answers to questions (iii), (v) and (vi), by reference to records maintained in the PHCU.

Despite these shortcomings the findings have been included in this report in order to demonstrate the criteria used for the assessment of 'quality' and the fact that the necessary information was easily obtainable from patients who had recently received medical care.

Thus this part of the development of an evaluation methodology has been regarded as a Pilot study requiring further refinement and testing.

A summary of the data obtained from the questionnaire relating to anaemia in pregnancy is set out below.

| (i) | 7 out | of | 10 | patients | had | а | history | taken |  |
|-----|-------|----|----|----------|-----|---|---------|-------|--|
|-----|-------|----|----|----------|-----|---|---------|-------|--|

- (ii) All the patients were examined and the doctor used his stethoscope in all cases.
- (iii) In all cases a blood sample was taken for Hb estimation
- (iv) The doctor informed the patient of the diagnosis in only 1 case out of 10 (2 could not remember)
- (v) 9 out of 10 knew correctly the drug regimen prescribed
- (vi) 8 out of 10 received advice about looking after themselves 4 being given dietary advice only, and 4 advice about diet and taking rest
- (vii) 7 out of 10 reported definite improvement after treatment with 1 reporting a little improvement and 2 reporting no improvement at all.

(viii) The average time spent waiting to see the doctor was 25.5 mins. (Range 20 to 35 mins.)

A further assessment of process was carried out by studying the <u>Efficiency</u> of the PHCU staff in performing their duties but as this involved all 7 Health Functions the results and discussion are presented in a separate section, p. 52. Similarly Resources + Cost are presented separately (see p.49&51).

OUTCOME Since no follow up information about the patients was available no assessment of Outcome was possible at this stage. The Quality of Care study assessed outcome of care as perceived by each patient but this cannot be considered as a valid measure of Outcome if one adheres to the definition of

-35-

Outcome as an objective measure of the change in health status following treatment. In order to conform to the constraints necessary for an evaluation of this kind measurement of Outcome would have to take the form of ad hoc prospective studies of selected groups of patients.

## Maternal & Child Health

The services provided under this category were as follows:-Antenatal examinations Assistance at deliveries by trained midwives Postnatal visits Health care of children aged under 5 years

### Antenatal examinations

DEMAND If it is accepted that all pregnant women should be routinely examined at regular intervals then it is possible to estimate the potential demand for antenatal examinations if the birth rate and the population size are known.

For example, the Crude Birth Rate for the Mallur population was calculated to be 31.6 births per 1000 population (see section on Family Planning,p 42) Thus with a total population of 4124 one would expect approximately 125 births each year in all 5 villages. This information can be used in the planning of the numbers of staff and PHCU time required to carry out the antenatal examinations.

However, actual demand measured in terms of the numbers of women who attend for examination may be considerably less than potential demand. Table 13 shows that only 36% of the 94 women whose births were recorded at Mallur in 1975 ever attended for antenatal examinations.

In addition 70.6% of these 34 did not make their first visit until after 28 weeks gestation.

| T | a | b | 1 | е | 1 | 3 |
|---|---|---|---|---|---|---|
| _ |   |   |   |   | _ | - |

| GESTATION PERIOD AT<br>FIRST VISIT | NUMBER OF PATIENTS |
|------------------------------------|--------------------|
| less than 12 wks                   | 0                  |
| . 12 - 28 wks                      | 10                 |
| 28 - 32 wks                        | . 6                |
| 32 - 36 wks                        | 12                 |
| 36 - 40 wks                        | 6                  |
| TOTAL                              | . 34               |

- 26-

One reason for low demand may be that the local people do not appreciate any need for antenatal care (see Table 8) and so a Health Education programme may be required in an attempt to alter such attitudes.

Another reason may be a failure to identify pregnant women in the population so that they can be encouraged to attend for examination.

The information in Table 13 indicates that this was a likely factor in Mallur. If this problem is to be overcome then it is vital that the field workers, expecially the females such as the Auxiliary Nurse Midwives (ANM), should make enquiries about possible pregnancies as they visit each household.

Poor attendance at antenatal clinics by known pregnant women may indicate that regular attendance is not possible due to other committments e.g. in the home. Consideration should then be given to planning domiciliary examinations with visits to the clinic only for special reasons e.g. taking blood samples for Hb tests and blood group determination.

PROCESS The amount of information which can reasonably be recorded routinely under this heading will depend to a large extent on the demand and the number of available staff. In each of the PHCUs in the study the quality of available data was poor.

In an attempt to improve this the Mallur PHCU had recently introduced a record card for each woman which contained details of all antenatal examinations as well as information about her subsequent delivery and post natal progress. Future evaluation of process would then be possible by scrutiny of these cards for details of examinations performed, results of tests e.g. Hb estimations, and the outcome of any clinical intervention.

In circumstances where records could not feasibly be maintained evaluation would have to rely on special studies such as that described under Quality of Care.

OUTCOME In the study lack of information and poor maintenance of records made it impossible to make a valid measurement of Outcome. For example, although 34 women registered for antenatal care the standard of recording was such that the numbers of subsequent attendances of each patient was unknown. Had this information been available then assuming that regular attendance for antenatal examinations is likely to be beneficial both to the mother and the foetus, an appropriate measure of Outcome would have been the proportion of women attending regularly for antenatal examination from an early stage of pregnancy e.g. 16 weeks.

## Assistance at deliveries

DEMAND Once again potential demand can be calculated from population size and knowledge of the local birth rate. The most accurate estimate can be

-37-

made if the number of fertile couples is known i.e. where the wives are in the 15 to 44 years age groups, and where the number of births is recorded routinely and accurate.

Table 14 shows the numbers of deliveries recorded in each PHCU. This information helps in the planning of midwife requirements. However, much more accurate planning can be made if, as recommended in the previous section, the field staff make early indentifications of pregnant women. Planning can then utilise knowledge of the estimated delivery date for each woman. Furthermore, information from antenatal examinations will identify those women likely to need a hospital delivery e.g. abnormal foetal presentation, cephalo-pelvic disproportion.

## Table 14

|   |           | M      | В        |     | J   | •    |
|---|-----------|--------|----------|-----|-----|------|
|   | JANUARY   | 5.     | 18 .     | • . | 50  |      |
|   | FEBRUARY  | 9.     | 13.      | -   | 51  |      |
| а | MARCH     | 5      | 6 (2)    |     | 38  |      |
|   | APRIL     | · 2    | .18 (2)  |     | 33  |      |
|   | MAY       | 8      | . 15 (1) |     | 42  |      |
|   | JUNE      | • 10   | 17 (4)   |     | 46  |      |
|   | JULY      | 6      | 28 (6)   |     | 57  |      |
|   | AUGUST    | 6      | 28 (1)   |     | 60  |      |
|   | SEPTEMBER | 14     | 41 (1)   |     | 60  | (*)  |
|   | OCTOBER   | · 13 · | 27       |     | 54  |      |
|   | NOVEMBER  | 12     | 35       | 380 | 59  | e 83 |
|   | DECEMBER  | 4      | 24       |     | 56  |      |
|   | TOTAL     | 94     | 270 (17) |     | 606 |      |

## Recorded Deliveries (1975)

() = stillbirths which were recorded at PHCU (B) only Total population M = 4,124 B =11,875 J = 15,402

PROCESS Since the activities involved in a routine domiciliary delivery by trained personnel tend to have limited scope for variation it was considered that a suitable measurement of process would be the numbers of deliveries was not available from PHCU records and so an estimate was obtained from the Questionnaire Survey. (see Table 15).

## Table 15

## PERSONS CONDUCTING LAST DELIVERY

|   | 2  |   |
|---|--|---|
| М                                       | В  | J .   |
| N = 100                                 | N = 100                                    | N = 100 DR = 8                                      |
| TRAINED = $51$ ANM = 26<br>HOSPITAL = 1 | TRAINED $\approx$ 45 ANM $\approx$ 44      | TRAINED = $9$ ANM = 1                               |
| UNTRAINED = 48 i.e.<br>relative         | UNTRAINED = $55 - rel = 53$<br>no help = 2 | UNTRAINED = 90 rel 88<br>husband = 1<br>no help = 1 |
| UNKNOWN = 1                             |  | Dai = 1   |

DR = Doctor

ANM = Auxiliary Nurse Midwife rel = relative

OUTCOME The ideal outcome of a delivery is a live, healthy baby and a healthy mother. As a more practical objective for PHCUs in a developing country this can be expressed as the prevention of stillbirths and maternal deaths. Therefore, in order to calculate reliable rates it is important that all live and stillbirths and maternal deaths should be routinely recorded. In the study only PHCU (B) recorded stillbirths.

The measure of Outcome which was used in the study was the proportion of deliveries which were attended by trained staff since this was assumed to be beneficial to both mother and baby.

Table 15 shows that 51% of deliveries at Mallur were attended by trained staff. When tested statistically (by calculating the difference between Proportion there was no significant difference between Mallur and PHCU (B) but the difference between Mallur and PHCU (J) was highly significant (p < 0.001). To establish the reason for this would require deeper investigation.

Table 16 below shows the percentage of deliveries attended by qualified persons in the state (Karnataka) as a whole and in 2 neighbouring states.

| Table | 15 |
|-------|----|
| Tabic |    |

| STATE         | DELIVERIES ATTENDED<br>BY QUALIFIED PERSON (%) |
|---------------|--|
| KARNATAKA     | 15.83  |
| <b>KERALA</b> | 25.72  |
| TAMIL NADU    | 21.92  |

-39-

TABLE 17

UNDER FIVES FYAMINATIONS 1975 (MALLUR)

|           | MALLUR | MUTHER | KACHAHALLI     | ALLUNAGANAHALLI | BHATRENHALLI | TOTAL     |
|-----------|--------|--------|----------------|-----------------|--------------|-----------|
| JANUARY   | 156    | 0      | 42             | 0               | 0            | 198       |
| FEBRUARY  | 110    | 0      | 32             | 0               | 0            | 142       |
| MARCH .   | 108    | 0      | о <sup>.</sup> | 0               | 0 ·          | 108       |
| APRIL     | -      | -      |                | -               |              | · · · · · |
| MAY       | _      | ·      | -              |                 | -            | - *       |
| JUNE      |        | -      | - · · · ·      |                 | -            | -         |
| JULY      | -      |        | -              | =               | -            |           |
| AUGUST    | -      |        | · - ,          |                 |              | -         |
| SEPTEMBER | 342    | 0      | ο.             | . 0             | 0            | 342       |
| OCTOBER   | 398    | 0      | 0              | 0               | 0            | 398       |
| NOVEMBER  | 406    | 0      | 0              | 0               | Ο.           | 406       |
| DECEMBER  | 470    | ο.     | 49             | -21             | 41           | 581       |
| TOTAL     | 1990   | 0      | 123            | 21              | 41           | 2175      |

NOTE: From April to September no ANM was available

Total No. of under 5s = 682 (From October 1975 census)



showed a significant difference. (p < 0.001)

<u>Postnatal visits</u> The purpose of the visits in each of the PHCUs was to check on the progress of mother and baby in the first 2 weeks after birth. The quality of available data was very poor so that no assessment could be performed and no results tabulated.

### Health Care of under fives

The programme consists of 2 main parts i.e.:-

(a) Immunisation

(b) Developmental screening with an emphasis on detection of nutritional problems.

DEMAND This is arguably an inappropriate term since the services are instigated by PHCU personnel who make domiciliary visits throughout each village on a rota basis. The term is retained for the sake of uniformity.

The potential demand for services is composed of the entire under 5's population within the catchment area. It can be measured by a census or estimated from a sample survey as described at the beginning of this Chapter. It is important that this initial estimate should be updated by the addition of all new births.

This information can be used together with details of the geographical distribution of the population to calculate the number of field workers required to make regular domiciliary visits. Where the number of staff is restricted through lack of resources the information can be used to devise the most rational programme of visits which is possible with the few staff available.

<u>PROCESS</u> In the study this was measured in terms of the number of examinations and the number of vaccinations performed during 1 year.

Table 17 shows the number of examinations performed in Mallur during 1975. Apart from the absence of the field worker (ANM) for 5 months the bias towards the headquarters village is striking. During the 7 months when examinations were performed the 379 under 5s in Mallur (from Table 6) were each examined approximately every 5 weeks on average. This compares with an examination approximately every 4 months on average for the remaining villages except Muthur where no examinations were carried out.

The most likely reason for the above discrepancy is a poorly organised visiting programme but poor record keeping may have been another possible factor.

Table 18 shows the numbers of vaccinations done in Mallur in 1975.

-40-

## VACCINATIONS DONE IN 1975

| Information | gathered | from | Road | to | Health | Charts |
|-------------|----------|------|------|----|--------|--------|
|-------------|----------|------|------|----|--------|--------|

|            |                     | MALLUR    | æ | MUTHER |   | KA CHAHA L | LI        | BHATRENHAL | LI ALLUN | IGANAHA | LLI | TOTAL     |
|------------|---------------------|-----------|---|--------|---|------------|-----------|------------|----------|---------|-----|-----------|
| SMALLPOX   | ı <sup>0</sup>      | 40        |   | 0      | × | 0          |           | . 0        | •        | 0       |     | 40        |
| Revacc.    |                     | 0         |   | 0      |   | 0          |           | 0          |          | 0       | • 1 | 0         |
| Total.     |                     | 40        |   | 0      |   | 0          |           | 0          |          | 0       |     | 40        |
| DPT        | 1 <sup>0</sup>      | 148       |   | 0      | • | 3          | •.        | .1         |          | 4       |     | 156       |
| 141 V<br>V | 2<br>3 <sup>0</sup> | 129<br>30 |   | 0      |   | 8<br>0     | ine<br>En | 1<br>1 ·   |          | 0       |     | 138<br>30 |
| - Total    |                     | 307       |   | 0      |   | 11         | *         | 2          |          | 4       |     | 324       |
| 'POLIO     | · 1 <sup>0</sup>    | 232       |   | 0      | * | 30         |           | ].         |          | 3       |     | 266       |
| •          | 2 <sup>0</sup>      | 169       |   | 0      |   | . 22       |           | 1          |          | 0       |     | 192       |
|            | 30                  | 1         |   | 0      |   | 0          |           | 0          |          | 0       |     | 1         |
| Total      |                     | 402       |   | 0      |   | 52         |           | 2          |          | 3       |     | 469       |

The same problem of bias towards Mallur is highlighted. OUTCOME On the assumption that vaccination is of automatic benefit the measure of Outcome employed in the study was the porportion of under 5s who were protected by immunisation.

The information was obtained from the Questionnaire Survey and is presented in Table 19.

## TABLE 19 % VACCINATION COVERAGE (UNDER 5s)

| М              |   |       |     | В                |   |       |     |    | J     |
|----------------|---|-------|-----|------------------|---|-------|-----|----|-------|
| N = 132        |   |       | a - | N = 122          |   |       | N = | 13 | 2     |
| No vaccination | = | 3.8%  |     |                  | = | 4.9%  |     | =  | 6.1%  |
| Smallpox only  | Ξ | 29.0% |     |                  | = | 73.7% |     | Ξ  | 90.0% |
| Smallpox + DPT | = | 67.4% | 8   |                  | Ξ | 1.2%  | 2   | Ξ  | 3.8%  |
| BCG            | = | 0%    |     | BCG+Smallpox     | = | 19.9% | BCG | =  | 0%    |
| a              |   |       |     | Smallpox+BCG+DPT | = | 0.4%  |     |    |       |

The results were tested statistically. The proportions of under 5s who had received smallpox vaccinations showed no significant differences between the 3 PHCUs. The higher DPT coverage at Mallur was significantly different from the coverage at the other PHCUs. (p < 0.001).

The fact that none of the children in the Mallur sample had received BCG vaccination was a serious omission in view of India's known high incidence of TB infection.

Since one could not assume that clinical examination was automatically beneficial per se it was not possible to use the proportion of under 5s regularly examined as a valid measure of Outcome.

## Family Planning

In developing countries where rapidly increasing populations are consuming limited resources there is an obvious need for an effective Family Planning programme. Since the production of children is such a fundamental part of human behaviour any attempt to bring about a change must be directed on a personal level at individual couples.

In order to obtain the goodwill and co-operation of the population a Family Planning programme, planned and executed at a local level e.g. by PHCU staff, should include an assessment of the attitudes and beliefs of the local people concerning the production of children. In the study the Questionnaire Survey included a number of questions which attempted to obtain such information and none was available at any of the PHCUs (see Section on Need, p 29). This information would be useful in planning a motivation campaign e.g. by identifying those couples sympathetic to Family Planning who could be further encouraged to adopt a contraceptive method.

DEMAND, as measured by the numbers of people coming forward for contraceptive supplies, sterilisation or even advice, is useful for the planning of resource requirements i.e. staff and equipment, as described in the section on Medical Relief, p 31.

Table 20 shows the demand for Tubectomy during 1975 at the Mallur PHCU. No information was available about demand for contraceptive advice or supplies.

Since a Family Planning programme is heavily dependent on promotion at a personal level by PHCU staff, the planning of a home visiting programme will be aided by knowledge of the <u>potential demand</u> for services. This can be defined crudely in terms of the number of women in the fertile age group together with their respective spouses. An estimation of these numbers can be obtained from knowledge of the numbers of the catchment population.

-42-

| <br>11110.   |
|--|
| <br>And a state of the |

## MALLUR FAMILY PLANNING 1975

| TUBECTOMY | ONLY i.e. Refere | ence to PHC Sidla | aghatta    |                  |               |
|-----------|------------------|-------------------|------------|------------------|---------------|
|           | MALLUR           | MUT'IUR           | KACHAHALLI | A LUNA GANAHALLI | BHATBENAHALLI |
| JANUARY   | 1                | 0                 | 0          | 0                | 0             |
| FEBRUARY  | 3                | 0                 | Ο          | 0                | 0             |
| MARCH     | 1                | Ο.                | Ο.         | 0                | Ο             |
| APRIL     | 2                | 0                 | 0          | 0                | 0             |
| MAY       | 2                | О                 | 0          | 0                | 0             |
| JUNE      | 2                | 0                 | 0          | О                | 0             |
| JULY      | 2                | 0                 | 0          | О                | Ο.            |
| AUGUST    | 3                | О                 | 0          | О                | 0             |
| SEPTEMBER | 5                | . 0               | 0          | . О              | 0             |
| OCTOBER   | 4                | 0                 | 0          | O                | 0             |
| NOVEMBER  | 3                | 0                 | 1          | . 1              | 1             |
| DECEMBER  | 4                | 0                 | 0          | 0                | 0             |
| TOTAI     | 32               | 0                 | 1          | 1.               | · 1           |

For example, from Table 6 it was known that there were 988 males and 932 females in the age group from 15 to 50 years in the Mallur population. The numbers of this group living in each village were also known. In the other PHCUs estimation of the numbers could only be made from knowledge of the total population and the proportions of males and females in each age group calculated from the results of the Questionnaire Survey. Thus in PHCU (B) there were an estimated 2371 males and 2460 females in the 15 to 50 year age group and in PHCU (J) 3314 males and 3573 females. It was not possible to estimate the numbers in each village.

These highly theoretical estimates can be refined by taking account of those factors likely to influence acceptance of contraceptive methods by the population. Local attitudes and beliefs have been discussed in the section on Need.

Another important factor is the local Infant Mortality Rate since, if the rate is high, people may wish to produce more children in order that some will survive to adulthood. This is related to another relevant factor i.e. the number of live children currently within a family. It may be potentially damaging for a Family Planning programme if parents with relatively few children are approached by PHCU staff and encouraged to adopt a contraception method or undergo sterilisation since unnecessary resentment may be aroused. For this reason it may be advisable to set an arbitrary limit, of the number of live children in a family, below which no routine approach should be made by PHCU staff

-43

## TABLE 21

# Family Planning Practice

|  |   | 1  |
|--|---|--|
| M<br>N = 100<br>TOTAL FRACTISING = 20<br>i.e. 18 Tubectomy<br>2 Pill<br>DON'T KNOW = 6 | B<br>N = 100<br>TOTAL PRACTISING = 21<br>i.e. 7 Vasectomy<br>11 Tubectomy<br>2 I.U.D.<br>1 Condom | N = 100<br>TOTAL PRACTISING = 13<br>i.e. 1 Vasectomy<br>11 Tubectomy<br>1 Rhythm<br>DON'T KNOW = 1 |
| $\overline{X} = 27.0 \text{ years, } \text{S.D.} \pm 6.1$                              | Age of all mothers<br>$\overline{X} = 28.7$ years, SD I 6.5                                       | $\overline{X} = 27.7$ years, SD $\overline{X}$ 5.9   |
|  | Age of mothers practising F.P.  |  |
| $\overline{X} = 25.4 \text{ years, SD} \pm 5.8$<br>N = 20                              | X = 25.1 years, SD <u>+</u> 5.9<br>N = 21.1 years   | $\overline{X} = 31.6$ years, SD $\pm 6.1$<br>N = 13  |
|  | · Number of live children (all mothers  |  |
| $\overline{X} = 3.1, SD + 1.8$   | $\overline{X} = 3.2$ , SD <u>+</u> 1.7  | $\overline{X} = 3.0, SD \pm 1.8$   |
|  | Number of live children (acceptors  |  |
| $\overline{X} = 3.0, \text{ SD} \pm 1.7$   | $\overline{X} = 3.1, SD \pm 1.9$  | X = 2.9, SD + 1.6  |

From Table 21 an arbitvary limit of 2 live children would appear to be appropriate since there were couples in each catchment area who were using contraceptive methods and yet had only 2 children.

PROCESS The only information available in the study was that presented in Table 20 i.e. the monthly referrals of tubectomy patients. For planning purposes it would have been useful to have details of contraceptives issued as well as procedures carried out, such as vasectomies and tubectomies, since they have implications for the purchase of supplies and deployment of staff. The Assessment of Efficiency study produced some data about staff deployment and is discussed on p. 52.

OUTCOME Given the many variables involved in carrying out a Family Planning programme such as traditional attitudes, personal beliefs and efforts by PHCU staff, a single measure of Outcome is extremely difficult to define. This is especially true where information is either unavoidable or unreliable.

However, as a crude estimate of Outcome the study used the percentage of couples practising family planning. This was calculated from the results of the Questionnaire Survey (See Table 21). Statistical test showed that the Outcome at Mallur was not significantly different from that at either PHCU (B) or PHCU (J).

Another useful indicator of Outcome is the birth rate. From the data at Mallur it was possible to calculate the Crude Birth Rate since the catchment population was known and from Table 14 it was known that there were 94 recorded births in 1975.

An important point was illustrated by the fact that when calculated using the total population of 4124,

Crude birth rate = 22.8 per 1000 pop<sup>11</sup> However since it was noted that the village of Muthur was excluded from the services then the more accurate figure is '

-44-

Crude birth rate = 31.6 per 1000 pop<sup>n</sup>

When compared statistically with the rural rates in Table 22 below there are no significant differences except with the All India Rural Birth Rate which is significantly higher (p < 0.01)

#### 14010 . 44 -

CRUDE BIRTH RATE - 1971

| •                      | • Rural      | Urban        |
|------------------------|--------------|--------------|
| State                  | Birth Rate   | Birth Rate   |
| Kerala<br>Tamil Nadu   | 31.3         | 29.6<br>27.8 |
| Karnataka<br>All India | 34.6<br>38.9 | 25.3<br>30.1 |
|                        |              |              |

### Communicable Disease Control

This Function refers to mass programmes aimed at the population at a whole. In the study area these programmes such as TB and smallpox eradication were carried out by teams from the State Government and this lay outside the limits of the study.

BANGALORE-34

## Environmental Sanitation

Sanitary measures are an important tool in the control of the communicable diseases which are water-borne and food-borne (17) ME These may be the dramatic diarrhoeal diseases such as cholera and shigellosis or the more insidious diseases such as typhoid, amoebiasis and infectious hepatitis.

Unfortunately, in developing countries, with their high rates of mortality and morbidity, the public demand is for curative rather than preventive measures. An added problem in promoting sanitation is the likely clash with traditional methods of water and food storage, cooking techniques, waste and sewage disposal.

However, examination of local morbidity rates is likely to demonstrate the need for improved sanitation. Thus, for example, Table 12 shows that in Mallur diarrhoea and bowel infestations were responsible for 13.6% of all clinic consultations in 1975, the second highest after cold and 'flu.

For reasons explained above the component of Demand is inapplicable and any Sanitation programme must be actively promoted by PHCU staff. In the Mallur PHCU this programme consisted of routine chlorination of drinking wells and the construction of sanitary latrines for each household. No information was available concerning sanitary measures promoted at the other PHCUs. The total number of drinking wells is shown in Table

23 below.

| ATT     |    |
|---------|----|
| Table 4 | .5 |

| Village         | No. of drinking.wells |  |  |  |  |  |
|-----------------|-----------------------|--|--|--|--|--|
| Mallur          | 8                     |  |  |  |  |  |
| Muthur          | 3                     |  |  |  |  |  |
| Kachahalli      | 5                     |  |  |  |  |  |
| Bhatrenhalli    | 3                     |  |  |  |  |  |
| Allunaganahalli | 2                     |  |  |  |  |  |
| TOTAL           | 21                    |  |  |  |  |  |

The aim was to chlorinate each well once every 2 months.

The actual chlorination programme as carried out in 1975 is shown in Table 24 below.

## Table 24

E.V. SANITATION MALLUR 1975

No.of Wells Chlorinated 1975

|           | MULLUR | MUTHUR         | KA CHAHA LLI | ALLUNGANAHALLI | BHATRENAHALLI | TOTAL |
|-----------|--------|----------------|--------------|----------------|---------------|-------|
| ANUARY    | 3      | 0              | .1           | 0              | 0             | 4     |
| EBRUARY   | 3      | 0              | 1            | о              | 0             | 4     |
| ARCH      | 3      | 0              | 1            | 0              | 0             | 4     |
| PRIL      | 3      | 0              | 1            | o              | 0             | 4     |
| 4.Y       | 3      | 0              | 1            | Ο.             | 0             | 4     |
| UNE       | 3      | о              | 1 .          | 0              | o             | 4     |
| -ULY      | 3      | 0 <sup>·</sup> | 0            | 0              | 0             | 3     |
| UGUST     | o      | 0              | i o          | 0              | 0             | 0     |
| SEPTEMBER | 8      | 0              | 0            | 0              | 0             | 0     |
| CTOBER    | 8      | 0              | 0            | 0              | 0             | C C   |
| .OVEMBER  | 0      | • 0            | , o          | 0              | 0             | 0     |
| DECEMBER  | 8      | 0              | 0            | 0              | 0             | 8     |

It is clear that Mallur village once again received the bulk of the services as has already been demonstrated with the MCH and Family Planning Services.

OUTCOME was measured in terms of percentage of wells chlorinated per month. Thus in Mallur village the percentage coverage was an average of 93.75%. The other villages had no coverage except Kachahalli which had 40% coverage for the first 6 months only.

(ii) Sanitary Latrines

No information was available on the number of latrines constructed during 1975. However, information on the percentage of hcuseholds having sanitary latrines was gathered from the Questionnaire Survey (See Table 25 below).

| Ta | b1 | e | <b>25</b> |
|----|----|---|-----------|
|    |    |   |           |

HOUSEHOLDS HAVING A SANITARY LATRINE

| М  | . в  | J  |
|--|--|--|
| N = 100<br>11% have sanitary<br>latrines | N = 100<br>1% households have sanitary<br>latrines | N = 100<br>7% households have<br>sanitary latrines<br>(2% nct known) |
|  |  |  |

When tested statistically the difference between Mallur and PHCU (J) was not significant whilst the difference between Mallur and PHCU (B) was significant (P < 0.001). An adequate explanation of these results would not be possible without deeper study but a probable important factor is that the majority of sanitary latrines in Mallur and PHCU (J) were in the main villages which had good access to the modern city of Bangalore whilst access to all the villages in the PHCU (B) catchment area was very poor.

#### Liaison

Liaison between PHCUs or with other health organisations is unlikely to be a very important component and in some isolated PHCUs there may be no liaison at all. However, where liaison exists an assessment should be made of its implications for administration and future planning of health care delivery

The Mallur Health Co-op had 3 important links with other health institutions. These were:-

(a) St. John's Medical College, Bangalore

Members of the college staff sat on the Co-operative Committee and

-47-

contributed expertise to the management and planning of health care delivery. In addition newly graduated interns spent 6 week attachments at the PHCU and contributed to the health care delivery. Knowledge of the precise dates of attachments were useful in planning special projects such as immunisation programme or data collection programmes. Table 6 shows the results of a census conducted by the interns. The medical officer was also able to plan occasional short periods of leave whilst ensuring some continuity of care during his absence.

## (b) St. Martha's Hospital, Bangalore

Patients from member villages were afforded direct referral to the hospital for more specialist treatment, where necessary. In addition specialists from the hospital attended periodic treatment 'camps' at the PHCU and the medical officer was able to draw up lists of suitable cases for treatment.

(c) Primary Health Centre, Sidlaghatta

This government health centre was the referral unit for tubectomy in the locality so that good liaison was necessary for the planning of referrals from the Mallur PHCU. Table 20 shows that 35 women were referred for tubectomy during 1975.

The centre also stored certain special vaccines which the PHCU was able to utilise in special circumstances. In 1975 Mallur received 500 doses of cholera vaccine for use in a suspected outbreak of disease.

#### Administration

In many, if not most, PHCUs administration forms part of the duties of those staff members who are providing health care directly to the public. Thus evaluation of all the preceding components will automatically include, to a large extent, an evaluation of the administration of the PHCU in terms of the quantity and quality of data routinely collected as well as decisions made on the basis of this data.

In view of the above a separate, detailed evaluation of Administration may be inappropriate. The decision on whether or not to carry out a detailed study will be influenced by the proportion of total cost and staff effort expended on administration.

Table 27 shows that in Mallur in 1975 Administration accounted for 6.1% of total expenditure. This was considerably more than expenditure on Environmental Sanitation and only marginally less than on Maternal and Child Health at 6.9%. Table 30 shows that Administration accounted for approximately 21% of total staff effort, second only to Medical Relief. This was some 7 times greater than staff effort at PHCU (B) and some 3 times higher than at PHCU (J).

On the basis of the above evidence further investigation of Administration, would be warranted in order to discover the reason for such high cost and effort.

An important factor was that non members of the co-operative who attended for care were charged for drugs and so in addition to such records as patient registers, drug registers etc. a comprehensive record of accounts was maintained. A full time clerk was employed to maintain the records.

## RESOURCES

(i) <u>Manpower</u> In most, if not all, PHCUs in developing countries limited resources will result in limited members of staff with varying levels of training and capability. Knowledge of the number of available staff and their capabilities can be used to plan the best possible work programme. This is particularly important for field workers who have to carry out regular house to house visits in the villages.

In order to plan effectively it is necessary to have good information about the catchment area and its population. Knowledge of village locations and travelling distances from headquarters are necessary for calculating travelling times. Details of transport facilities, if any, are also important. Information about the numbers of houses in each village and the composition of each household i.e. sex and age of inhabitants, is required so that a rough estimate can be made of the time required to carry out visits in individual villages.

Table 26 shows the manpower resources in each of the 3 PHCUs in the study.

|       | MALLUR                  | BASETTIHALLI |                         |     | JANGAMKOTE               |
|-------|-------------------------|--------------|-------------------------|-----|--------------------------|
| <br>1 | Medical Officer         | 1            | Medical Officer         | 1   | Medical Officer          |
| 1     | Auxiliary Nurse Midwife | 3            | Auxiliary Nurse Midwive | s 3 | Auxiliary Nurse Midwives |
| 1     | Compounder              | 1            | Compounder              | 1   | Compounder               |
| 1     | Clerk                   |              | -                       |     | -                        |
| 1     | Ayah                    |              | 4<br>                   |     | -                        |
|       |                         | 1            | Senior Health Inspector | 1   | Senior Health Inspector  |
|       |                         | 1            | Junior Health Inspector | 2   | Basic Health Workers .   |
|       |                         | 3            | Helpers                 | 3   | Helpers                  |

Table 26

-49-

In comparison with Mallur the other PHCUs each had twice as many staff members but they also had larger catchment populations which were widely dispersed in small, often remote villages. (see maps in Appendix). A greater proportion of their workers was involved in field duties. For example, they each had 3 ANMS compared with one in Mallur.

No information was available to judge the success of the domiciliary visiting programme or whether, as in Mallur (See Tables 17 and 18) the services were concentrated in the main villages to the virtual exclusion of those in peripheral positions.

(ii) <u>Equipment and drugs</u> Little information was available at any of the PHCUs so that no proper evaluation was possible.

A list of the equipment used by the Mallur PHCU is included in the Appendix. The major items were as follows:-

1 Motorcycle (for house visits by the Medical Officer)

1 Refrigerator (for storage of vaccines and heat labile drugs)

1 Microscope

1 UNICEF Midwifery Kit.

In view of the services offered by the PHCU these items were appropriate.

The only useful available information concerning drugs was the total expenditure in the year 1975. This is discussed in the following section on COST.

Information about types and quantities of drugs used was not readily available and it was not possible to assess the planning of drug purchases.

A rough estimate of drug requirements could be made from knowledge of attendances by diagnosis for Medical Relief services. (see Tables 10 & 11). This information would indicate the types of drugs required as well as giving a rough estimate of quantities.

An investigation of drug prescribing and dispensing should also be considered as a check on whether appropriate drugs were given in the proper quantities. For example, if a medical officer gave antibiotics routinely for colds and 'flu a great waste of resources would ensue with little or no health benefit. If, as in Mallur, cold and 'flu formed the largest diagnostic group (see Table 12) then the waste could be very serious.

-50-

The resources expended in the delivery of health care, i.e. staff effort, use of equipment and drugs, all cost money. In developing countries, where the amount of money available for health care is severely limited it is therefore important for an overall examination to be made of total expenditure on health care delivery.

The costing method used in this study enabled a break down of total expenditure to be made by Function. By showing the order of magnitude of services provided by Function the results acted as a rough measure of performance by the system.

Table 27 presents an analysis of the total expenditure in the Mallur Health Co-operative in 1975.

The original method called for the inclusion of the calculated annual capital depreciation of 1%. However, the PHCU building was rented from a private landlord and the original capital expenditure was not known. In order to overcome this problem the capital expenditure was estimated arbitrarily at Rs 20,000, and thus the capital depreciation was Rs 200.

The table shows that by far the largest proportion of expenditure (91.8%) was on clinic based services with the remaining 8.2% on field services. The most costly item was the drugs bill which accounted for 64% of total expenditure and 98.4% of the total drugs bill was spent on Medical Relief.

However, Table 12 has shown that some 30% of C.P. attendances are for the common cold and influenza whilst diarrhoea, bowel infestations accounted for a further 16%. Thus almost 50% of attendances were either due to ailments where only mild symptomatic relief could be offered or where the illness itself was preventable. This evidence would warrant a special study into the appropriateness of prescribing and dispensing.

Administrative costs (6.1% of total expenditure) followed closely after MCH services as the third most expensive Function. In terms of money it cost Rs 3395 which was almost as much as the Rs 4000 annual drug allowance at PHCUs (B) and (J).

The per capita expenditure on health care for the population of the Co-operative member villages was Rs 13.50. Table 28 shows that this was some 4 to 5 times greater than expenditure in the state as a whole as well as two neighbouring states.

#### COST

-51-

## Table 27

# Annual Clinic and Field Expenditures by Functions (Mallur 1975)

|  |        |         | CLIŅI | С   |             |       |     | 2    | FIELD | 2   |              |       |
|--|--------|---------|-------|-----|-------------|-------|-----|------|-------|-----|--------------|-------|
|  | MR     | мСн     | FP    | CDC | Env.<br>San | Admin | MR  | MCH  | FP    | CDC | Env.<br>San. | Admin |
|  |        | . 12    |       | 0   | 0           | 75 .  | 0   | 129  | 0     | 0   | 1            | ο     |
| Capital Costs<br>Maintenance Costs                               | 112    | 21      | 0 *   | 0   | 0           | 120   | о   | 673  | 0     | 0   | 7            | 0     |
| Drugs  | 34,815 | · 0     | ο     | 0   | 0           | 0     | 160 | 25   | 0     | 0   | 550          | 0     |
| Salaries   | 12,780 | 2231    | 0     | 0   | 20          | 3228  | 0   | 3069 | 0     | . 0 | 0            | 0     |
| Total Expenditure  | 47,887 | 265     | 0     | 0   | 20          | 3423  | 160 | 3896 | ́О    | 0   | 558          | 0     |
| PERCENTAGE<br>Distribution of<br>Clinic Expenditure              | 92.8   | 0.5     | 0     | O   | 0.04        | 6.6   |     |      |       |     |              | -     |
| PERCENTAGE<br>Distribution of<br>Field Expenditure<br>PERCENTAGE |        | · · · · |       |     |             |       | 3.5 | 84.4 | 0     | 0   | 12.1         | 0     |
| Distribution of<br>clinic & Field<br>Expenditure                 | 85.2   | 0.5     | ō     | 0   | 0.04        | 6.1   | 0.3 | 6.9  | 0     | 0   | 1.0          | · 0   |

Total Expenditure - Rs.55,659

Catchment population - 4,124

....

### Table 28

## HEALTH EXPENDITURE PER CAPITA IN 3 S.INDIAN STATES

| STATE      | EXPENDITURE PER CAPITA<br>(RUPEES) |
|------------|------------------------------------|
| KARNATAKA  | 2.58                               |
| KERALA     | 3.70                               |
| TAMIL NADU | 3.03                               |

Further discussion on COST follows later in this Chapter.

In the absence of suitable measures of Outcome an intuitive reaction to the high cost of health care demonstrated above is that it is probably not justified.

## ASSESSMENT OF EFFICIENCY

Although this forms part of the evaluation of Process it has been presented at the end because it gives an overall picture of staff performance in the delivery of health care. It provides a more detailed analysis of performance by individual staff members than was possible in the analysis of Cost.

The results are presented in Table 29. The 10 days during which this part of the study was carried out did not coincide with any unusual occurrence such as an epidemic and thus the results can be regarded as representative of staff effort.

Examination of the table shows that the efforts of the medical officer and ANM in Mallur were restricted to very limited fields of activity compared with their counterparts in PHCUs (B) and (J). For example the ANM at Mallur only participated in the MCH services while her counterpart in PHCU (B) was involved in MCH services, Family Planning, Communicable Disease Control and Environmental Sanitation. The ANM at PHCU (J) was involved in all of these with the exception of Communicable Disease Control.

The medical officer at Mallur devoted 99.9% of his time to activities within the clinic building. 87.3% of his time was spent in Medical Relief activities and 7.1% on administration. Previous evidence (see Table 12) has shown that some 30% of attendances for Medical Relief were diagnosed as common cold or influenza. The next largest group (16%) was composed of

-52-

| Гa | b | 1 | e | 2 | 9 |  |
|----|---|---|---|---|---|--|
|    |   |   |   |   |   |  |

ASSESSMENT OF EFFICIENCY: STAFF EFFORT (% TIME) BY FUNCTION

| STAFF CATEGOR | RY  | MR    | МСН   | FP     | CDC  | ENV.SAN | ADMIN  | PERSONAL | TRAVEL | OTHER |
|---------------|-----|-------|-------|--------|------|---------|--------|----------|--------|-------|
|               |     |       |       |        |      |         |        |          |        |       |
| MED OFFICER   | М   | 87.3  | 0     | 0      | 0    | 0.1     | 7.1    | 4.4      | 0      | 1.1   |
| r. –          | в   | 60.5  | 16.5  | 1.7    | 0    | 0       | 10.3   | 2.6      | 1.2    | 7.2   |
|               | J   | 46.5  | · 0   | 2.7    | 0    | 0       | 8.1    | 30.6     | 12.3   | ° 0,  |
| COMPOUNDER    | M   | 65.5  | 0     | 0      | 0    | · 0     | 10.8   | 3.6      | 0      | 20.1  |
|               | B - | -     | -     | ·· -:- |      | -       |        | -        | -      |       |
|               | J   | 34.6  | 0.5   | • O    | 0    | о       | 11.9   | 33.3     | 19.2   | 0.5   |
| AMM           | M   | 0     | 74.3  | · 0    | 0.   | · 0     | 0      | 0        | 25.7   | ٥.    |
|               | в   | 0     | 42.3  | 23.7   | 2.0  | 2.1     | 0      | 3.9      | 25.7   | 0     |
|               | J   | о     | 26.9  | 19.0   | 0    | 19.7    | 10.0   | 14.6     | 18.3 . | . 0   |
| TOTAL EFFORT  | M   | 31.32 | 14.32 | 0      | 0    | 0.04    | 21.172 | 3.38     | 13.46  | 16.32 |
| е<br>1. к.    | В   | 17.86 | 16.98 | 16.52  | 9.60 | 12.62   | 3.05   | 3.90     | 17.34  | 2.13  |
|               | J   | 19.93 | 6.60  | 11.85  | 0    | 11.25   | 7.57   | 23.42    | 19.11  | 0.25  |

M B J Average total hours

worked per day

| CLINIC | FIELD |
|--------|-------|
| 5.4    | 5.1   |
| 9.0    | 7.2   |
| 8.1    | 8.4   |
|        |       |

preventable disease, i.e. diarrhoea, bowel infestations and vitamin deficiency. This would tend to suggest that both as a doctor and as manager of the local health services more effort should be devoted to preventive medicine in the community and less to Medical Relief Services.

On examining Total Staff Effort Table 29 highlights the high proportion of effort in Mallur expended on Administration (21.2%) compared with PHCU (B) (3.05%) and PHCU (J) (7.6%). This confirms the findings of the analysis of Cost and provides further evidence of the need for a study aimed at finding ways of reducing Administrative Cost and effort at Mallur.

Although not directly related to Mallur it is worth noting the high proportion of Personal time (23.4%) available to the staff at PHCU (J). Personal time refers to time available to staff members when not engaged in activities related to health care delivery. The probable reason was low demand for services by the local population. This is supported by data in Table 9 which shows that PHCU (J) had the lowest O.P. attendances for Medical Relief despite having the largest catchment population.

## Resources required to carry out evaluation

The importance has been stressed of keeping to a minimum the resources used to carry out an evaluation of health care delivery. In order to obtain the information, part of which is presented and discussed in this chapter, the following resources of time and manpower were required:-

### (a) Time

- (i) The Questionnaire Survey required 10 man days for each PHCU.
- (ii) The Quality of Care study required 2 man days for completion of each of the 3 questionnaires.
- (iii) The Assessment of Efficiency study required 10 man days for each PHCU.
- (iv) Examination of clinic records required 4 man days for each PHCU.

## (b) Manpower

The study required 2 interviewers to carry out the Questionnaire Survey and Quality of Care Study. Three Observers were employed to carry out the Assessment of Efficiency study and 1 person carried out the examination of all PHCU records.

An important role of a 'first time' evaluation is to identify defects in the previous system of routine data collection. Correction of these defects will enable any subsequent evaluation to be more effective.

.... ..... .....

RECOMMENDATIONS.

Although the choice of data to be collected should lie with the local PHCU staff, as a result of this study the following are recommended:-

#### Population data

Information about the catchment population is extremely important for the purposes of evaluation, management and planning. It is recommended, therefore that any PHCU about to infroduce routine evaluation should carry out a comprehensive population survey, perhaps as part of an initial evaluation. Although it is likely to be time consuming the survey should include details of the geographical location of all villages, the number of households in each village and the names, ages and sex of all inhabitants.

Thereafter the following are recommended for routine

recording: -

- All births and stillbirths including parents' names (i) and address.
- All deaths including name and address of deceased and (ji) suspected cause of death.
- All outpatient attendances should be Medical Relief (iii) recorded by age, sex and diagnosis. If possible, the patient's home village should be recorded as an aid to the initiation of control measures in the event of an epidemic.
- Maternal and Child Health (iv)
  - All pregnant women should be registered by name (a) and address. It is recommended that each pregnancy should additionally be registered on an individual Antenatal card which should contain name, address, age and estimated delivery date. Details of all subsequent examinations, tests and treatment should be recorded on these cards. All deliveries should be recorded as in (i) and

any maternal deaths.

(b)

(c) All children under 5 years old should be registered by name, address and date of birth. This can be updated from (b) above. It is recommended that each child should have an individual record card containing details of immunisation, routine examinations and any medical treatment.

(v) Family Planning All consultations about family planning should be registered by name and address for follow-up purposes. Details of contraceptive methods or sterilisation procedures should be included.

(vi) Environmental Sanitation In sanitation programmes which include chlorination of drinking wells, a register should be maintained stating the location of each well and the dates of chlorination. However, this is only one example since sanitation programmes will vary in content according to local conditions and priorities.

55

#### CONCLUSIONS

The results and discussion have demonstrated that the proposed methods of evaluation, despite necessary resource constraints, are capable of generating information which can be used for the improvement of management and planning of health care delivery.

However, the merits of the Quality of Care study remain unproven and further testing of this particular method is required to properly validate the questionnaire and test repeatability.

Interpretation of the results of an evaluation must be made with caution because of the necessary reliance on data collected by PHCU staff which may contain errors and omissions.

In an attempt to improve the quality of routinely collected data recommendations have been made concerning categories of information which should be recorded.

However, it must be stressed that the final decision on the nature of data to be collected should lie with those responsible for the day to day management of a PHCU, i.e., the staff and in particular, the medical officer. The role of an evaluation system is to provide information which may simplify decision making (27) and by implication must be relevant to local circumstances. The danger of making a standard list of data recommended for routine collection is that evaluation may degenerate into a system of processing inf-rmation whether or not it is relevant to local needs. This is a rapid means of condemning evaluation to a state of uselessness.

For these reasons this study has proceeded on the assumption that the process of evaluation is best carried out on a routine basis by the local PHCU staff. This does not mean that the introduction of 'self evaluation' is likely to be a simple process. On the contrary, there is the major problem of lack of local expertise in carrying out an evaluation study as well as probably the most difficult problem of lack of understanding of the basic concept of evaluation.

In order to overcome these problems, the next step should be the development of evaluation systems in selected PHCUs under the guidance of experienced evaluators who can both instruct the local staff and monitor the progress of systems so that specific organisational problems can be identified. When such problems and their implications have been carefully examined, then a strategy can be drawn up for a widespread introduction of routine evaluation as an integral part of primary health care delivery systems.

-56-
## REFERENCES

| 1. ABEL-SMITH. B (1976)                                 | Value for Money in Health Services; a comparative study. Heinemann, London.  |
|---|--|
| 2. ACHESON, H.W.K. (1975)                               | Medical Audit and General Practice.<br>Lancet, March 1, pp 511-513   |
| 3. ALDERSON, M.R. (1974)                                | Evaluation of Health Information Systems<br>Br. Med. Bull., Vol.30, No.3   |
| 4. ALDERSON, M.R. (1973)                                | Objectives and Concept of Health Informati<br>Systems<br>Proceedings of WHO Conference on Health<br>Information Systems, Copenhagen, 18-22 Jun<br>WHO Geneva.  |
| 5. ALEXANDER, C.A. et al                                | Cost Accounting of Health Centre Expenditu<br>Ind.J. Med.Res., vol 60, No.12.  |
| 6. ASHFORD, J.R. (1975)                                 | How Can quantitative Methods help the<br>Health Services Manager?<br>In McLachlan, G. (Ed)<br>Measuring for Management. Quantitative<br>Methods in Health Services Management.<br>Nuffield Provincial Hospitals Trust. |
| 7. ASHFORD, J.R. and RILEY, V.C.<br>1975.               | An Approach to Monitoring the Quality of<br>Health Care.<br>In McLachlan, G. (Ed.)<br>Measuring for Management. Quantitative<br>Methods in Health Services Management.<br>Nuffield Provincial Hospitals Trust.         |
| 8. BABSON, J.H. (1973)<br>9. BABSON, J.H. (1971)        | Disease Costing Manchester Univ. Press.<br>Hospital Costing in Great Britain<br>The Hospital 67 4 pp 106-111.  |
| 10. BARKER, K. (1970) et al<br>(Eds).                   | Health in the Developing World<br>Cornell Univ.Press, Ithaca, New York.  |
| 11. BIOLOGICAL SCIENCES<br>COMMUNICATION PROJECT (1973) | Delivery of Health Care in less developed<br>countries with exphasis on integration<br>of family planning with mother and child<br>health. George Washington Univ.<br>Washington D.C.                                  |
| 12. BLUM, H.L. (1974)                                   | Planning for Health. Development and<br>Application of Social Change Theory.<br>Human Sciences Press. New York.  |
| 13. BRADSHAW, J. (1972)                                 | A Taxonomy of Social Need. In Problems<br>and Progress in Medical Care, No. 7<br>Nuffield Provincial Hospitals Trust.  |
| 14.BRYANT, J. (1975)                                    | Health and the Developing World<br>Cornell Univ. Press.  |
| 15. BURDETTE, J.A. et al (1974)                         | Primary Care Evaluation. The AAFP - UNC<br>Collaborative Study.<br>JAMA, vol. 230, No.12.  |

•

16. COCHRANE, A.L. (1972)

Effectiveness and Efficiency Nuffield Provincial Hospitals Trust, London.

- 17. CVJETANOVIC, B and GRAB, B.
  (1976)
- 18 DJUKANOVIC V and MACH, E.P. (Eds) (1975)

19. DONABEDIAN, A (1969)

20. FELDSTEIN, M.S., PIOT, M.A. and SUNDARESAN, T.K. (1973)

21. FORD FOUNDATION (1976)

22. GRIFFITHS, A. (1976)

23. GUPTA, M.C. et al (1977)

24. HARRISON, P. (1977)

25. IDRISS, A.A. et al (1976)

26. LAST, J.M. (1965)

27. LITSIOS, S. (1976)

28. LOGAN, R.F.L. et al (1972)

29. MASON, A.M.S. et al (1973)

30. MORLEY, D. (1974)

31. MORLEY, D (1975)

32. MeDOWELL, I. and MARTINI, C.J.M.(L976) Rough Determination of the Cost Benefit Balance Point of Sanitation Programmes. Bulletin of W.H.O., Vol. 54, Part 2, pp 207-215.

Alternative approaches to meeting basic health needs in developing countries Joint UNICEF/WHO Study. WHO, Geneva.

Evaluating the Quality of Health Care in Programme Evaluation in the Health Field, SCHULBERG, H.C. et al (Eds.) Behavioural Publications, New York

Resource Allocation Model for Public Health Planning. A Case Study of Tuberculosis Control Supplement to Bulletin of W.H.O. Vol.48. WHO. Geneva.

The development of health services in Bangladesh Ford Foundation, New York

Health Planning, Management and Training Needs in Underdeveloped Countries Unpublished.

Effect of Periodic Deworming on Nutritional Status of Ascaris-Infested Preschool Children Receiving Supplementary The Lancet, July 16, pp. 108-110.

Basic Health Delivery in the Third World New Scientist, Feb.17. pp. 41-43

Sudan; National health programme and primary health care, 1977/78 - 83/84. Bull. World Health Organ, vol.53, part 4, pp 461-471.

Evaluation of Medical Care. Med. J. of Australia, November, pp 781-785

Developing a Cost and Outcome Evaluation System.

Int.J. of Health Services, Vol 6, No.2

Dynamics of Medical Care. Memoir No. 14. LSHTM.

Discase Costing in Hospitals. A review of completed work. Unpublished.

National Nutritional Planning BMJ, October 12, pp 85-88.

Paediatric Priorities in the Developing World. Butterworths. London.

Problems and New Directions in the Evaluation of Primary Care 'Int. J. Of Epidem., Vol.5, No.3 pp.247-256

| 33. M       | cLACHIAN, G. (Ed.)(1976)  | A             |
|-------------|---|---------------|
| • : /*      |   | · <u>A</u>    |
| 8           |   | · P           |
| 34.         | NEWELL, K.W. (Ed) (1975)  | H             |
| 35, P.      | ARKER, R.L. et al (1972)  | R             |
|             |   | He            |
| 36. 1       | PIACHAUD, D & WEDDELL, J.M.<br>(1972)                               | <u>C</u><br>I |
| 37. I       | PIACHAUD, D & WEDDELL, J.M.<br>(1972)                               | L<br>L<br>L   |
| -00 T       | OTF TD (1973)   | т             |
| 38. P       |   | S             |
| 20          | POPOV C A (1971)  | ן<br>ק        |
| .39.        |   |               |
| 5 5 N<br>10 | ×.  | I             |
| 40.         | RAMALINGASWAMI, P and<br>RAMALINGASWAMI, V. (1973)                  |               |
|             |   |               |
|             |   | 1             |
| 41.         | RAO, P.S.S. et al (1972)  |               |
| 42.         | REINKE, W.A. et al (1974)   |               |
|             | •   |               |
|             |   |               |
| 43.         | REINKE, W.A. (1972)(Ed.)  |               |
|             | · · · ·   |               |
| 44.         | ROEMER, MJ (1972)   | 81            |
| ۰.          | ÷   | 1             |
| 45.         | ROEMER, M.I. (1976)   |               |
| 46.         | SANAZARO, P.J. (1974)   |               |
| • 47.       | SANJIVI, K.S. (1971)  | (*)           |
| 48.         | SCOTTISH HOME AND HEALTH<br>DEPARTMENT AND WHO JOINT TEAM<br>(1974) |               |
| 49.         | SHAPIRO, S. (1967)  |               |
|             |   |               |

A Question of Quality. Roads to Quality Assurance in Medical Care. Oxford Univ. Press for Nuffield Provincial Hospitals Trust. Health by the People WHO, Geneva.

Relating Health Services to Community Health Needs. Ind. J. of Med. Res., Vol.60, No.12.

Cost of Treating Varicose Veins Lancet 2, pp 1191-1193, Dec.2.

The Economics of Treating Varicose Veins. Int.J. Of Epidem., <u>1</u>,3, pp 287-294.

The Use of Outcome Measures in Health Service Planning. Int. J. of Epidem., Vol. 2, No.1 Principles of health planning in the U.S.S.R. Pub.Health Paper No.43. WHO, Geneva.

In Health Service Prospects; an <u>International Survey.</u> Ed. by DOUGLAS-WILSON, I. and McIACHLAN,G. The Lancet and Nuffield Provincial Hospitals Trust.

Methods of Evaluating Health Centres. Brit: J. Prev.Soc.Med., No. 26, pp 46-52.

Functional Analysis of Health Needs and Services. Johns. Hopkins Univ., Baltimore. Unpublished.

Health Planning: Qualitative aspects and quantitative techniques. Johns Hepkins Univ., Baltimore.

Evaluation of Community Health Centres Public Health Paper, No. 48. WHO, Geneva.

Rural Health Care. The C.V. Mosby Company St.Louis.

Medical Audit. BMJ, February 16, pp 271-274.

Planning India's Health Orient Longman, Bombay.

The Child Health Services. A Systematic Planning Approach. WHO, Geneva.

End Result Measurement of Quality of Medical Care. Millbank Memorial Fund Quarterly, Vol. XLV, No.2.