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AN ANALYSIS OF THE PRIMARY HEALTH CARE SYSTEM IN INDIA WITH FOCUS ON REPRODUCTIVE HEALTH CARE SERVICES

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Introduction

India has a rich, centuries-old heritage of medical and health sciences. However, over the centuries, with the intrusion of foreign influences and mingling of cultures, various systems of medicines evolved and have continued to be practised widely. The allopathic system of medicine gained popularity under the British rule and made a major impact on the entire approach to health care in the country after Independence.

The health care system in India, at present, has a three-tier structure to provide health care services to its people. The first tire, known as primary tire, has been developed to provide health care services to the vast majority of rural people. The primary tire comprises three types of health care institutions: Sub Centre (SC), Primary Health Centre (PHC) and Community Health Centre (CHC). The rural health care infrastructure has been developed to provide primary health care services through a network of integrated health and family welfare delivery system.

India is a signatory to the Alma Ata Declaration of 1978 and was committed to attaining the goal of “Health for All by the Year 2000 A.D" through the universal provision of primary health care services (Government of India, 1983). However, India could neither achieve reproductive health related goals (Srinivasan, 2000 and Sood, 2000) nor could develop a good health care infrastructure for rural people (Majumder, 1999). Productivity, efficiency and quality of care of public rural health service sector have always been questioned by

scholars from many different fields. The present study makes an attempt to reveal the true condition of the system by examining the relationship between efforts and accomplishments.

Rural Health Care Institutions

Rural health care institutions are established and maintained by the State Governments out of funds provided to them by the Central Government under the Minimum Needs Programmes / Basic Minimum services Programmes.

Sub Centres (SC): SC is the first contact point between health workers and village community. (National norms of population coverage: 5000 in plain area and 3000 in hilly / tribal area).

Primary Health Centre (PHC): PHC is the first contact point between village community and doctor. The activities of PHC involve curative, preventive, promotive and Family Welfare Services. It acts as a referral unit for 6 SCs. It has 4-6 beds for patients. (National norms of population coverage: 30, 000 in plain area and 20, 000 in hilly / tribal area).

Community Health Centre (CHC): It serves as a referral centre for 4 PHCs. It has 30 in-door beds with one OT, X-Ray, Labour Room and Laboratory facilities. (National norms of population coverage: 120, 000 in plain area and 80, 000 in hilly / tribal area).

Staffing pattern of Sub Centres, Primary Health Centres and Community Health Centres is shown in table 1(at the end).

Health Care System as an Economic Unit

The rural health care system could be considered as an economic unit -- as a health care industry. It utilizes different inputs and provides output. The inputs of health care industry could be categorised as follows (Fuchs, 1966):

Labour input (Manpower): Personnel engaged in medical occupations, such as doctors, dentists and nurses, plus other personnel working directly under their supervision, such as practical nurses, orderlies and receptionists.

Physical Capital (Plant and Equipment): The plant and equipment used by these personnel, e.g. hospitals, x-ray machines.

Intermediate Goods and Services: Drugs, bandages, laundry services, etc.

Output: The system provides different types of services to rural people, viz., medical services, hospitality or hotel services, and validation services (Fuchs, 1966). These services are output of the health care industry measured in terms utilization of health facilities, e.g., number of cases treated, hospital admission, etc. (Feldstein, 1967a & Feldstein, 1967b).

Review of Literature

Economists begun to turn their attention to the matters concerning the efficient allocation of resources devoted to curing and alleviating ill health around the end of the 1950s (Culyer, 1971). However, much of the literature developed in this field is normative in nature. Positive studies are less extensive and less known (Sodani, 1997). Moreover, much of the positive studies have been directed at the evaluation of health care technologies. These include Cost Benefit Analysis, Cost Effectiveness Analysis, Cost Utility Analysis (Hutton, 1994). All these need adequate knowledge and information about the available alternative health care technologies for addressing a particular problem (see Drumond, *et. al.,* 1997).

Studies on utilization of services by economists, demographers, medical sociologists and geographers have addressed the issues like availability, accessibility, affordability, family characteristics (age, sex, family size), social structure (employment status of family heads, occupation, education, ethnicity, and culture) and need (Faizi, 1996). Feldstein (1967b) was the first person to focus on the effect of availability of health care services on demand by estimating production function of hospitals for the British National Health Service. He explained a large inter-regional variation in demand by availability differences. Subsequent studies done by Chuttani (1976), Frost and Francis (1979), Annis (1981) and Parkin and Yule

(1985) also revealed similar results. The effect of **accessibility** of health care services on utilization has been explored by Pathak, *et. al*., (1981), Alun (1981), Freeman (1983), Stock (1983), Francis (1984), Stamper (1984), William (1987), Airey (1989), Ghosh and Mukherjee (1989), Bailey (1990). Above studies found that utilization varies inversely with the distance covered by people to reach health facilities. The importance of **Family Characteristics** and **Social Structure** come out in studies done by Coe R (1965), Aday Luann (1972), Pasriza (1983), Kapil (1989), Garg (1985), and Yesudian (1989). Studies on 'need' and 'affordability' have not been reviewed, as those are not relevant for our study.

Need for the Study

The above review reveals that utilization of services depends on a number of factors. Planning Commission (Government of India, 1999) evaluated functioning of the CHCs taking into account availability and accessibility factors (area coverage of a CHC, total number of Doctors in a CHC, per cent of specialists present in CHC, mean distance of PHC from the CHC). It has explained 71 per cent of variation in utilization of services by these variables. The study did not consider factors related family characteristics and social structure. Sodani (1997, 1999) has estimated demand functions for health care for TSP region of Rajasthan. Though he has taken into account 11 independent variables (age, education, time gap, duration of illness episode, number of visits, distance, income, number of rooms, family size, highest level of education among males and highest level of education among females), he has not included availability factors. After the International Conference on Population and Development in 1994 (ICPD) at Cairo, **quality of care** is coming to be acknowledged as equal in importance with access to reproductive health services. Delivering successful care involves respects for the individual needs and rights of the clients, and useful service from the staff in hygienic conditions (UNFPA, 1994, 1995). This review has not revealed any study

on Indian family planning incorporating primary health care system to address the issue of quality of care. This paper makes an attempt to include variables from all the 5 categories: availability, accessibility, family characteristics, social structure and quality of care.

Objective

The objective of the study is to check the productivity / efficiency aspects of the Primary Health Care System with focus on Reproductive Health Care Services. In other words, the objective is to examine how output is affected by inputs, socioeconomic, geographic and other factors reflecting background characteristics of the population. The specific objective of the study is to compute input and other factor-elasticities of output by estimating Cobb-Douglas type log-linear function.

Data and Method

Utilization of Services: Though a number of services are provided by the rural health care institutions we have taken into account 3 types of services related to mother's health and contraception:

i) **Antenatal Care**: Percentage of births whose mothers received '2 or more doses of tetanus toxoid injections' and 'received iron and folic acid tablets or syrup'.

ii) **Delivery**: Percentage of delivery took place in public institutions.

iii) **Sterilization**: Female sterilization done in public institutions.

Simple average of the above 3 has been taken to measure utilization of services.

For utilization of services (as above) source of data is *Preliminary Reports of National Family Health Survey, 1998-99 (NFHS-2)* published by the International Institute for Population Sciences (IIPS), Mumbai.

Availability of Services: In the manpower category we have taken number of Doctors and average number of Paramedical Staff available in rural area per 30 thousand population.

Paramedical Staff include Pharmacist, Auxiliary Nurse Midwife, Nurse, Health Assistant - Female, Health Assistant – Male, and Male Multipurpose Worker. In the plant and equipment category we have taken number of hospital beds (public) in rural area available per 30 thousand population. Source of data in this category is *Health Information 2000* (contained information mostly as on 31/12/1998) published by the Ministry of Health and Family Welfare, Government of India.

Accessibility of Services: Rural population density (per square kilometers) has been computed from 1991 Census data.

Family Characteristics: Rural Total Fertility Rates (TFR) have been taken from NFHS-2 reports.

Social Structure: Average (minimum) completed years of education by rural females in the reproductive period (15-49) computed from NFHS-2 reports.

Quality of Care: We have taken 2 factors:

i) Talk: Percentage who said staff at the health centre talked to them nicely.

ii) Cleanliness: Percentage who rated facility as very clean.

Simple average of the above 2 has been taken to measure quality of care.

The study is confined to 16 major States of India namely, Andhra Pradesh, Assam, Bihar, Gujrat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharshtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Feldstein (1967b) has developed a framework for evaluating British National Health Care System. He computed Productivity Index for assessing a hospital's performance. In his formulation a hospital's production function takes the shape of a Cobb-Douglas production function:

$$W_i = A \left(\prod_r X_{ir}^{\alpha_r} \right) \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad [i]$$

where W_i measures output, X_{ir} is the physical quantities of inputs used by hospital i , α_r's measures input elasticities and ε_i is a random term indicating that the output that each hospital would obtain from given inputs will not be the same. This production function has, however, been generalized replacing α_r's by α_{ir}'s to capture productivity differences among hospitals. He then took the ratio of production of ith hospital and a production function with average productivity to compute a productivity index. The production function can be estimated if W_i and X_{ir} are first transformed into logs.

Now if we take natural logarithm of the production function (replacing α_r's by α_{ir}'s) then we have:

$$ln\ W_i = ln\ A + \alpha_{i1}\ ln\ X_{i1} + \alpha_{i2}\ ln\ X_{i2} + \cdots + \alpha ir\ ln\ Xir + ln\ \zeta_i \ \ldots\ \ldots \quad \ldots \quad \text{[ii]}$$

$$\text{or, } w_i = \alpha_i + \alpha_{i1}x_{i1} + \alpha_{i2}x_{i2} + \cdots + \alpha_{ir}x_{ir} + \zeta_i \ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ \text{[iii]}$$

where, $w_i = \ln (W_I)$, $x_{ir} = \ln (X_{ir})$ and $\zeta_i = \ln (\varepsilon_i)$.

The above model is used to explain interregional variations in utilization of services by availability of services. However, as our objective is to explain variations in utilization of services by availability, accessibility, family characteristics, social structure, and quality of care, we have fitted similar log-linear model with independent variables from the above-mentioned 5 categories.

Variables in the Model (in natural log term):

Dependent variable:	y:	Utilization of services (ULTZN)
Independent variables:	x_1:	Doctors (DOC)
	x_2:	Paramedical Staff (PARA)
	x_3:	Hospital Beds (BED)
	x_4:	Population Density (POPDEN)

x_5: Total Fertility Rate (TFR)

x_6: Education (EDU)

x_7: Quality of Care (QLI).

So, our model will be:

$y = intercept + \alpha_1 * x_1 + \alpha_2 * x_2 + \alpha_3 * x_3 + \alpha_4 * x_4 + \alpha_5 * x_5 + \alpha_6 * x_6 + \alpha_7 * x_7 + random\ disturbance$ … … … … … … … … … … … … … … … … … ... … … … [iv]

where α's are elasticity coefficients meaning percentage change that will occur in the dependent variable for a hundred percent change in an independent variable.

Analysis of Results

The estimated log-linear equation is as follows (the detailed results are given in table2 at the end):

$y = -1.843 + 0.313 * x_1 + 0.475 * x_2 + 0.027\ x_3 + 1.355 * x_4 - 0.829 * x_5$

$- 0.468 * x_6 + 0.745 * x_7$ … [v]

A high R-square value indicates that nearly all variations in utilization of services have been explained by the independent variables. 'α' / standardized coefficients for few variables are positive meaning those variables are positively related with the dependent variable. For 2 variables namely, x_5 and x_6 (Total Fertility Rate and Education) coefficients are negative. These indicate negative relationship between the independent variables and the dependent variable. Now, if we look at the α - coefficients, then we can see that the coefficient for Doctors (x_1) is 0.313. It means that a hundred per cent change in the number of Doctors (per 30 thousand population) would increase utilization of services by slightly more than 30 per cent. The same coefficient for Paramedical Staff (x_2) is 0.475 which is higher than that of Doctors. This means that Paramedical Staff are playing greater role as compared to the

Doctors. As the rural health care system in India is experiencing an acute shortage of Doctors or Medical Staff, Paramedical personnel are performing the crucial task of providing services to rural people. The negative coefficient of Education of mothers (- 0.468) indicates that as the period of education increases utilization of services decreases in the public health facilities. They may go for services in the private sector because educated mothers may have better awareness of the low quality of services provided by the Paramedical personnel. Utilization also varies inversely with family size (TFR, X_5). This may be due to ignorance, poor concern for health, lower status of women, etc., or may be complicacies are higher at higher order births and mothers utilize secondary or private health facilities. It could be understood in other ways also (not from the fitted equation), e.g., as utilization of health and family welfare related services is low, TFR is high. Accessibility factor also plays an important role in the rural health care system. Utilization of services is higher where rural population density is higher. This means that where villages are compact people need to cover less distance to reach health facilities. Utilization of services is higher where people are likely to suffer less from inconveniences related to accessibility. Quality of care (X_7) appeared as an important determinant of utilization of services. However, in the plant and equipment category, bed (X_3) has become insignificant in this study.

Limitation

The study utilized State-level data (average figures) for 16 major States of India. It could not include all the States and Union Territories, as data for the rests are not available according to the place of residence of the respondents. Use of household-level data instead was not possible because of unavailability of data on availability of government health facilities at micro level. Past studies based on small sample survey also could not include the 'availability

factors' as i) one government health facility, say, one PHC with one Doctor covers more than 30,000 population and / or a wide geographical area, ii) one eligible women may utilize health facility at her husband's place and delivery may take place at her distant mother's place. The study does not include 'need' and 'affordability' factors. The justification behind this is that reproductive health related services are very basic (independent of the need of the acceptors) and are made available according to the goal of the Government(s). Regarding 'affordability', utilization of services depends on both direct and indirect costs. We have ignored both the components as there is no direct cost (services are available at free of cost), and it is difficult to estimate indirect costs.

Conclusion

It is well known that Doctors are technically more resourceful than any other supporting Paramedical personnel. However, in rural India the people are more dependent on the latter which play a dominant role. If we consider the elasticity coefficients as a measure of productivity then in the rural health care system Paramedical Staff are more productive then the Doctors. If these coefficients are used to determine the programme's efficiency (see Roemer, 1972), then within the labour input category Paramedical staff are performing efficiently. So, productivity or efficiency in such a rural public sector service economy does not necessarily increase with the technical qualification or education of service providers. Geographical factors, social structure, family characteristics, and quality of care also work as the main determinants of the utilization of health care services. Education of the acceptors is also an important factor though its impact is negative. Our study reveals that as education increases people are likely to avoid public health facilities for reproductive health related services. This may be due to poor quality of services provided at the health centers. We should consider other qualitative factors also privacy maintained while doing medical

examination, average waiting time at the health centers, time spent by a staff with a client, etc. (please see NFHS – 2 reports). All these problems must be addressed by adopting appropriate measures. Otherwise primary health care system in India will lose its credibility even among poor rural people who are not in a position to attend private health care facilities.

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Table 1. Staffing Pattern for Sub Centre (SC), Primary Health Centre (PHC) and Community Health Centre (CHC)

	Name of the Post	Number of Posts
Sub Centre (SC)		
1	Health Worker (Female)/ANM♠	1
2	Health Worker (Male)	1
3	Voluntary Worker	1
	Total:	3
Primary Health Centre (PHC)		
1	Medical Officer	1
2	Pharmacist	1
3	Nurse Mid-wife (Staff Nurse)	1
4	Health Worker (Female)/ANM	1
5	Health Educator	1
6	Health Assistant (Male)	1
7	Health Assistant (Female)/LHV♣	1
8	Upper Division Clerk	1
9	Lower Division Clerk	1
10	Laboratory Technician	1
11	Driver (Subject to availability of Vehicle)	1
12	Class IV	4
	Total:	15
Community Health Centre (CHC)		
1	Medical Officer*	4
2	Nurse Mid-Wives	7
3	Dresser	1
4	Pharmacist/Compounder	1
5	Laboratory Technician	1
6	Radiographer	1
7	Word Boys	2
8	Dhobi	1
9	Sweepers	3
10	Mali	1
11	Chowkidar	1
12	Aya	1
13	Peon	1
	Total:	25

Source: *Bulletin On Rural Health Statistics December, 1997 (MOHFW, Govt. of India)*

♠ ANM: Auxiliary Nurse Midwife, ♣ LHV: Lady Health Visitor

* Either qualified or specially trained to work as Surgeon, Obstetrician, Physician and Paediatrician. One of the existing Medical Officers similarly should be either qualified or specially trained in Public Health

Table 2. Results of the Regression Analysis (Log-Linear Function)

Independent Variables / Intercept	Coefficients		t – Statistic	Sig. Levels
	α	Stand. α		
Intercept	-1.843	-	-2.065	.073
x_1: DOC	0.313	0.392	4.555	.002
x_2: PARA	0.475	0.461	3.548	.008
x_3: BED	0.027	0.083	0.699	.504
x_4: POPDEN	1.355	0.439	3.915	.004
x_5: TFR	-0.829	-0.513	-4.058	.004
x_6: EDU	-0.468	-0.660	-4.033	.004
x_7: EMP	0.745	0.564	3.902	.005
Model Summary				
R – Square		0.963		-
Adjusted R – Square		0.930		-
F – Value		29.415		0.000
SEE		0.090		-

Dependent variable, y: UTLZN