CHAPTER – VI

RESEARCH DESIGN AND METHODOLOGY

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6. Research Design and Methodology

As the purpose of the research is to study the public health delivery system, the focus of the study is field, at the level of health centres. District is the unit for implementation of NRHM under the District Health Mission. As district is the major administrative unit, the effectiveness of functioning of public health delivery system can be measured by evaluation of performance of health care outcomes at district level.

At the cutting edge level, it can be observed that the focal point for actual delivery are villages where services are provided from sub-centres and PHCs. CHCs are the first referral hospitals which provide specialised health care with specialists like physician, obstetrician & Gynaecologist and paediatricians. But the most crucial and paramount public health care services are provided by female and multi-purpose health workers at the sub-centres and PHC under the supervision of Medical Officer at PHCs. Thus the availability, quality, efficiency and effectiveness of management of health centres in terms of infrastructure, manpower and resources therein are critical for the performance of the public health delivery system.

While the above factors are important for supply of health care services, the demand for these services is derived from the people in the area, mainly women and children in case of RCH program. Beneficiaries who require preventive and curative health care are the potential consumers of the services. Health service is also available from other sources like qualified private practitioners, traditional/indigenous medical practitioners, nurses and others. A beneficiary for public health care would evaluate various factors like availability, access, quality, cost, experience, references and facilities in choosing the health care provider. The aim of the rural health mission is to improve these parameters in health centres to enhance the demand for services from the people in the area. Even in situations where health centre services do not have any competition in providing quality health care, deficiency and defect in these factors would restrict the demand. This latent demand which remains untapped is a key contributor to low level outcomes.

6.1 Two Stage Research Study

Considering these aspects, methodology for research requires two stage study of public health delivery. In the first stage, performance of all the districts is evaluated for various health care outcomes in key general health and RCH indicators. The aim is to

evaluate the performance of districts before and after the introduction of NRHM and compare the performances. Based on actual status of health indicators and improvement during the period, the districts are grouped to three categories. A district from each group is selected on random basis for second stage of research. The steps involved in the first stage are:

6.1.1 First Stage Research Study

1. Selection of key RCH indicators to evaluate maternal, child and family planning outcomes in these districts. The indicators chosen were institutional delivery, full ANC check-ups, full immunization of children, prevalence of contraceptive use, total fertility rate and sex-ratio
2. Compare the performance of indicators in these districts before and after the implementation of NRHM program. Since NRHM was simultaneously launched in all districts this comparison is free of any time bias.
3. The source of data is another key factor. For first stage study, main source of data are decadal census data and district level health and facilities survey. For the purpose of this study, data was obtained from DLHS-2 in 2002-04, DLHS-3 in 2007-08 and Census reports of 2001 and 2011. It may be noted that the DLHS-2 was conducted before the launch of NRHM and DLHS-3 was conducted 3 to 4 after the launch of NRHM. Hence, this data is useful in estimating and comparing the performance of the districts.
4. Actual performance for each district was estimated by measuring the relative performance with respect to the overall performance in Gujarat, taking State's performance as benchmark. Districts above zero have performed better than state average and those below zero have performed below state average.
5. With this data, percentage improvement (or otherwise) for each of the selected parameter is estimated. Any improvement in positive parameter and any decline in negative parameter are taken as positive and vice versa. An equal weighted average of the percentages is estimated to ascertain the overall improvement in the district performance.
6. In the next step, districts were ranked for performance before the launch, after the launch and improvement during the program. Based on these ranks, all the districts were classified into three groups: above average, average and sub-average performers.

7. One district from each category was selected for field survey on a random basis. Selected districts were Junagadh, Ahmedabad and Bharuch.

6.1.2 Second Stage Research Study

1. After the selection of three districts in the first stage, detailed field study was undertaken in these selected districts. The scope of the second stage is to study supply and demand of public health care at the level of PHC and villages.
2. Supply side management is studied through survey of health workers at the PHC and sub-centres. Detailed field survey was undertaken to ascertain factors which affect the supply of public health delivery: planning; organization; infrastructure and facilties; activities and targets; human resource issues; time management; finance and monitoring & review.
3. Demand side management was studied by way of survey of beneficiaries of health care services in health centres. Detailed survey was undertaken to ascertain factors like: awareness; health care seeking behaviour; acess to health care; infrastructure and facilities; availability of services; affordability; quality; referral services; documentation & record keeping; willingness to pay; and possibility of repeat services.

6.2 Survey Objectives

Field survey has two components: survey of health workers to ascertain supply and provision of public health care and survey of beneficiaries to ascertain the demand and satisfaction with the delivery of services.

6.2.1 Survey of Health Workers

Health workers who constitute the first level contact for health care provide basic public health care to various beneficiaries. Most of the initiatives under RCH II and NRHM converge at the level of health workers who have a decisive role in the success of the program. Purpose of survey of health workers was to assess and analyze various factors which make management and delivery of public health care effective. Survey aims to identify all the work areas of health workers and key work areas from their point of view. Further, the survey assesses the process of preparation of health plan and main stakeholders involved in the exercise. Since NRHM aims at participation of stakeholders in public health service, the extent and quality of involvement of local bodies like gram sabha and gram panchayat, anganwadi workers, ASHA etc., is also assessed.

Preventive health care being a key component of RCH, the efforts made to improve the awareness, visit to target groups and meeting with community groups is

assessed in the survey. Determination of targets, performance of day to day activities and mode of contact of beneficiaries is also assessed. Availability of infrastructure like connectivity and transport to health centre and villages in their service area, facilities like water, toilet and sitting arrangements were also evaluated.

Human resource management is the most critical factor in quality of health care at health centres. Interpersonal relationship, involvement in decision making, motivation, performance evaluation and opportunities for career growth were assessed in the survey. Time management is measured in terms of number of active days spent on different activities like field visit, health centre activity, training/workshops, meetings and emergency work. Monitoring and review by superiors, training, and delegation of financial powers were also assessed in the survey.

6.2.2 Survey of Beneficiaries/ Patients

Public health services are made available to persons from all sections of society by Government. Thus the market for these services is entire population in domain area of each health centre. However, the actual market depends on socio-economic and demographic profile of area which varies from one centre to the other. Various type of health service providers include practitioners of traditional system of medicine like Ayurvedic, Unani and Homeopathy, health healers, nurses and qualified private practitioners apart from health centre facilities. The health seeking behaviour of people depends on awareness, availability, accessibility and affordability of these services

Demographic and socio-economic factors like age, family size, literacy, income, poverty, occupation, community and gender of beneficiaries affect the awareness of health care programs and schemes. Availability is a key factor which limits the choice of services to beneficiary. It refers to the availability health service providers in the market and of health care personnel like doctors & health workers to provide health care. Accessibility means physical infrastructure and facilities like road connectivity to health centres, transport, timings and distance. Affordability is a measure of cost of health care, both direct and indirect. Though cost of health care itself may be absent, there are other elements of cost like transport and loss of wages. Cost is incurred also due to non-availability of drugs in health centre and absence of laboratory facilities. Thus, demand for health care is a function of many qualitative and quantitative parameters evaluated consciously and sub-consciously by beneficiaries.

Survey of beneficiaries was carried out among beneficiaries of health care services, both preventive and curative. The target group was persons who had availed

maternal and child health services in recent past, preferably in the last two years. The purpose was to ascertain from their experience, the impact of initiative under RCH II and NRHM.

Survey of Beneficiaries: Framework

The purpose of beneficiary survey was to assess the management of public health delivery at health centres from a demand side perspective. With this objective, survey was designed to capture the socio-economic parameters of respondents. Awareness and participation in awareness programs were also assessed. Survey also ascertained health care seeking behaviour of beneficiaries in recent past along with their evaluation of quality of services at the health centre. Availability of infrastructure like transport and road, and facilities in the health centre was also assessed from beneficiaries. Extent of availability of supplies like drugs and allied services like laboratory testing was also surveyed.

Survey also included the extent of ease or difficulty in availing Government financial assistance, spending on private health care, willingness to pay for better services, referral services, record keeping and repeat visits to health centres in future.

6.3 Questionnaire Design[69]

Separate questionnaires were prepared for Health Workers and Beneficiaries/patients for field survey and both were administered in Gujarati. Test surveys were undertaken using draft questionnaires among health workers and beneficiaries and based on the feedback, final questionnaires were prepared.

In case of health workers, nominal data was obtained for ascertaining the category of health worker, availability of health plan, targeted functions, point of contact of beneficiaries, mode of travel and awareness generation methods. Cardinal data was obtained to ascertain time spent of various activities in a year. Ordinal responses were obtained to ascertain the level of satisfaction, involvement, quality and difficulty in their work. This included ascertaining involvement level of stakeholders in preparation of health plan, difficulty in achieving targets, quality of facilities at health centres, level of motivation, interpersonal relationship, satisfaction with pay and allowances, opportunity for career growth, effective use of time, ability to exercise financial powers, adequacy and quality of training, extent of monitoring and review. Continuous response scales were used for ascertaining duration of travel time. Likert scale type questions were indirectly

[69] Siniscalco, Maria Teresa and Nadia Auriat: Questionnaire Design, UNESCO International Institute for Educational Planning, September, 2005.

used to assess strength of opinion in some areas. Ranking scale was used to ascertain key health functions.

In beneficiary survey, cardinal data was obtained for family size and age. Other demographic and socio-economic parameters like gender, poverty, caste and occupation were obtained through nominal questions where as monthly income and literacy were obtained through continuous response scale. Responses to issues like type of awareness programs attended, type of private medical practitioners visited, identifying influencers and decision makers for health care, availability of doctors and health workers in health centres, availing financial assistance from Government, availing referral services and willingness to pay for better service were obtained using nominal questions. For ascertaining satisfaction, quality, connectivity, utility of services and facilities cardinal questions were administered. These include ascertaining quality of services in health centre, usefulness of awareness program, connectivity to health centre, difficulty in availing financial assistance from Government, level of facilities in health centre and quality of services. Continuous scale assessment was made to ascertain annual expenditure on health care and waiting time in health centre.

6.4 Sampling Strategy & Data Collection

1. Sampling Method

Survey of health workers was undertaken in three districts of Ahmedabad, Bharuch and Junagadh. The sample was selected randomly among all the health workers of the district.

Survey of beneficiaries was also carried out in same districts of Ahmedabad, Bharuch and Junagadh. Respondents were selected from those who had availed health care service in the health centres in the last 2 years on a random basis. Thus, a stratified random sampling method was adopted in case of beneficiaries/patients.

2. Sample Size

Sample size was estimated based on the population size of the health workers in these districts for 5% confidence level of estimating statistical variates. In case of health workers, the sample size was 50, 67 and 55 in Ahmedabad, Bharuch and Junagadh districts, of whom 35, 47 and 39 were FHW constituting 70% of the respondents and the rest 30% were MPHW.

Sample size in case of beneficiaries/patients was estimated at 95, 91 and 94 respectively with a total of 280 for all districts. Beneficiaries were selected on a random

basis in which female were 70, 63 and 59, constituting 69% of total for all districts, 74% in Ahmedabad, 69% in Bharuch and 63% in Junagadh.

3. Data Collection

Data was obtained from both the surveys by administering questionnaires in Gujarati. Female and multipurpose health workers were contacted for survey on a random basis in these districts by visiting the health centres and headquarters. Beneficiaries were also contacted based on the list of beneficiaries in PHC and sub-centres on a random basis. In cases where there was incomplete information, the persons next in the list were selected for survey.

6.5 Data Analysis

The questionnaires were designed to gather the response of health workers and beneficiaries to obtain their experience, feedback and assessment on different issues of management of health delivery.

6.5.1 Verification; Classification and Tabulation

The collected data was verified for completeness and consistency. In case of any defect, next person in the list was surveyed to complete the sample size. Then the data was entered in MS-Excel spreadsheets with proper codification. For example, FHW were given a code as "1" and MPHW as "2". Similarly ordinal data like satisfaction, involvement, difficulty and quality which were given in scales of 1 to 5 were also given numerical index during data entry. Similar exercise was done for continuous scale data. For cardinal data like age and days, actual numbers were used for analysis.

In case of health workers, tables were generated with district and category of health workers (FHW & MPHW). The broad categories were health functions, planning, infrastructure, facilities, human resources management, monitoring and time management. In case of beneficiaries, tables were generated demographic and socio-economic profile, awareness programs, infrastructure & facilities, decision making behaviour, purpose of visit to health centre, quality of service, financial burden, documentation and repeat visit to health centre based on districts and gender. Tables were also generated for each demographic and socio-economic factor: age, family size, occupation, income, poverty, caste and education of beneficiaries/patients against key behavioural variables, attributes and opinions. These were attendance in awareness programs, health care seeking behaviour like decision makers and influencers, purpose of

visit to health centre, visit to private health practitioners, out-of-pocket expenditure on health and willingness to pay for better services.

Tables were generated with numeric as well as percentage distribution for different categories. Thus, the tables could be used for further statistical analysis and ascertaining key relationships to make meaningful interpretations.

6.5.2 χ^2 - Test of Hypothesis

The strength of association between various factors and attributes, behaviour and opinions were ascertained by χ^2 - test of hypothesis. This was carried out for various factors and parameters across the districts[70].

Pearson's chi-squared was used for comparison based on tests of goodness of fit and tests of independence. Test of goodness of fit establishes whether or not an observed frequency distribution differs from a theoretical distribution. A test of independence assesses whether paired observations on two variables are independent of each other. For estimating the chi-squared test statistic- χ^2, degrees of freedom- d and probability- p, version 4.0 of PEPI software was employed. Null hypothesis was defined as absence of significant difference between the districts in the chosen parameters. This was evaluated at 95% confidence level based on which the null hypothesis was accepted or rejected (rejected for $p<=0.05$).

In case of beneficiaries similar tables were generated from the data collected from the survey. Here again, test of hypothesis was carried out by applying chi-square test[71]. In addition, statistical tables were generated for different socio-economic parameters and key factors concerning health care for beneficiaries. Subsequently, test of hypothesis was applied in these cases too.

χ^2 - test statistic were estimated to reject or accept the null hypothesis. Based on this, the tabulated data was further analyzed to make interpretations and derive conclusions[72] for different districts, category of health workers and category of beneficiaries on basis of which recommendations are proposed.

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[70] Stockburger, David W- Introductory Statistics - Concepts, Models and Applications, Missouri State University, Revised Version, 1998

[71] DiMaria, Rose Ann- Understanding and Interpreting the Chi-square Statistic (χ^2): WVU School of Nursing, Charleston Division

[72] McCreery, Charles: The Chi-Square Test- A test of association between categorical variables, Oxford Forum, Psychological Paper No. 2007-1.

6.5.3 Multiple Linear Regression (MLR)

Key factors which affect the demand and supply of health care in health centres are influenced by demographic and socio-economic parameters and health delivery factors. During the field survey many of these factors were ascertained from the health workers and beneficiaries. Since there are many independent variables affecting the dependent variable(s), MLR is a very useful statistical model which can explain the strength relationship between dependent and independent variables and significance of each independent variable. The regression equation generated from MLR[73] has predictive value to the extent these factors affect the dependent variable and also gives the directional impact based on the sign of the coefficient.

The key dependent variables identified in case of health workers were Target Achievement and Motivation Level. In case of beneficiaries it was Quality of Service availed in the health centre and Repeat visit to the health centre were identified as dependent variables. MLR was performed with the Statistical Package for Social Sciences[74] (SPSS) version 19.

For each of the dependent variable, SPSS was run for all the possible independent factors obtained from the survey in the first iteration. In subsequent iterations, independent variables which have no significant impact or correlation were eliminated. Eventually, the process identifies key factors significantly affecting the dependent variable. Thus, this process tends to reduce the multi-collinearity by reducing the number of variables at each stage.

Null hypothesis was that each independent variable has no significant impact at 95% confidence level. The key test statistics applied for analysing and interpreting the output are: sigma (if $p <= 0.05$, then the hypothesis is rejected); R^2, the coefficient of determination explains the percentage of variation in dependent variables due to the selected independent variables and; Beta β, the coefficient of the independent variable. The magnitude and direction of β indicates the nature of influence on dependent variable.

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[73] Trammer, Mark and Mark Eliot: Multiple Linear Regression, Cathie Marsh Centre of Census ans Survey Research.

[74] Field, A: Discovering Statistics Using SPSS (Introducing Statistical Methods Second Edition), Sage Publications, 2005.