

COMPUTERIZED DATABASES IN THE AID OF BETTER HEALTH AND FAMILY WELFARE

AN INNOVATION IN MANAGEMENT PRACTICE BY
SHARE MEDICITI RURAL HEALTH CENTER

Shameerpeta Mandal Ranga Reddy District Andhra Pradesh, India



Ranganayakulu Bodavala,
Takemi Fellow in International Health, Harvard
School of Public Health
email: rbodaval@hsph.harvard.edu

TABLE OF CONTENTS

| No. | Item | Page No. |
|-----|--|----------|
| 1 | Primary health care in India: the present scenario | 1 |
| 2 | Number and profiles of rural institutions ⁱ | 2 |
| 3 | Issues and problems with the public health care system | 3 |
| 4 | Need for NGO intervention: share “reach” project | 4 |
| 5 | Computerized database in the aid of better reproductive health services. | 7 |
| 6 | Illustrations of the success of the project | 11 |
| 7 | Management decision making (with sample reports) | 12 |
| 8 | Primary health care in India – share mediciti RCH in comparison with a governmental PHC system | 19 |
| 9 | Further developments due | 20 |
| 10 | Conclusion and discussion | 21 |
| | Detailed data of individual and not aggregates | 21 |
| | End user involvement in the use of data cost of | 22 |
| | computerization | 23 |
| | | |

PRIMARY HEALTH CARE IN INDIA: THE PRESENT SCENARIO

INTRODUCTION: THE EVOLUTION OF PRIMARY CARE

India started building its primary health care infrastructure way back in 1952 as part of the Community Development program, much before it formally accepted the Alma Ata declaration of health for all through primary care approach. The main stress of the national health policy as adopted by the Indian parliament in 1983 is the provision of preventive, promotive and rehabilitative health services to the people, thus representing a shift from medical care to health care and from urban to rural population. Since 74% of the Indian population lives in the villages, the delivery of health services to the rural masses is key and forms the integral part of their socio-economic development. In essence the prime objective is the provision of universally acceptable and affordable health care to the communities.

| | |
|--|-------------------------|
| Total population (1991 census) | 846 million |
| Rural population | 629 million (74.3 %) |
| No of inhabited villages (1991 census) | 0.58 million |
| Birth rate urban | 21.4 |
| Birth rate rural | 29.3 |
| Death rate urban | 6.5 |
| Death rate rural | 9.7 |
| IMR urban | 46 |
| IMR rural | 78 |

SERVICES AND STAFFING

Initially the staff in the PHC consisted of one medical officer, one sanitary inspector four midwives (ANM) and 2 ancillary personal. But the structure and services have undergone changes through the reviews of the expert committees like Mudaliar committee (1962), Jungalwala Committee (1967), Srivastava committee (1975) finally to include the national norms of population coverage (table 2)

| Type of institution | Plain area | Hilly area |
|---------------------|------------|------------|
| Sub center | 5000 | 3000 |
| PHC | 30000 | 20000 |
| CHC | 120000 | 80000 |

NUMBER AND PROFILES OF RURAL INSTITUTIONSⁱⁱ

| Facility | Sub-center | PHC | CHC |
|--------------------------|--------------------------------|---|---|
| No. of Facilities (1997) | 136339 | 22010 | 2622 |
| Building | One room plus | With small operation theatre and male and female wards usually 6 beds | 30 bedded hospital and major operation theatres etc., |
| Not having own buildings | 72142 | 8323 | 224 |
| Equipment | Mostly kits for delivery etc., | Only minimal lab and OT equipment | Generally X- ray and other items |
| Doctors/specialist | No | One or two and 20% formally do not have the posts filled up and 50% generally do not turn up ever day | By norm 4 specialists but usually one or two doctors function |



| | | | |
|----------------|---------------------------------------|---|---|
| Para medical | One ANM generally reports in the PHC | As per the norms—14 No.s real pillar of the PHC system | As per the norms – 21 No.s |
| Vehicle | No | Around 20-30% have some Jeep cum pick up vans | 70-80% have Jeep cum pick up vans |
| Location | Big village | Major village called Panchayats or mandal head quarters | Town of 20,000 and above population |
| Others | Last link in the Primary Health chain | On an average 5 to 7 Sub-centers are attached | First referral hospital and usually have 3- 6 PHCs attached |
| Visual SAMPLES | | | |

Primary health centers are the vehicles of implementing the national health programs like disease control programs like, Malaria, TB, Leprosy, Filarial, but mainly they are the pillar stone of the maternity and child health program, now integrated into Reproductive and Child Health program.

ISSUES AND PROBLEMS WITH THE PUBLIC HEALTH CARE SYSTEM

The primary health system is plagued by many series problems and lack the vigor and the kind of strength needed to service the rural poor. The quality and quantity

of services are very much inadequate and the system functions on a weak footing. The rural location of the health centers could not offer the kind of incentive for the urban educated doctors and others to stay and render the services. This encourages the absenteeism of the doctors and severely affects the quality of services. There are other supply and logistics problems like inadequate medicines, lab and other supplies. Very meager supplies are received by the hospitals conforming to the budget procedures and not according to the seasonal and patients loads. The centralized control, monitoring of every financial activity, personal scheduling, equipment and building maintenance, vehicle allocation, severely hampers the initiative and management flexibility of the local PHC. This serves as a further disincentive to the willing and working doctors and gradually eroded the ability for creativity and innovation in improving the quality and accessibility of the services. In summary the Governmental primary health care system functions to report some numbers of population (control) (christened with different names from time to time). The range of services supposed to be performed for preventive and promotive roles are largely ignored and only a mechanical and most inadequate and inefficient system functions.

LEFT TO THE COSTLY PRIVATE CARE

This kind of public health services delivery has left the poor and middle class alike to seek the care, mostly curative from the private, which is mainly in the small clinics of the nearby cities, through heavy fees. The private care is by all means curative and the commercial proposition of it does not include the preventive and promotive aspects of health. Unfortunately the need and profitability of the private care thrives in the absence of the preventive and promotive functions. The absence of regulatory mechanism for the quantity, quality and price of the private care in India is another major issues in the health care system. With the result the public are mostly left to their own means of transport for the medical services (including emergency), good will of the private doctor and finally his own ability to pay for the services.

This kind of public health services delivery has left the poor and middle class alike to seek the care, mostly curative from the private, which is mainly in the small clinics of the nearby cities by paying heavy fees

NEED FOR NGO INTERVENTION: SHARE “REACH” PROJECT

The major contention and a clever escape to this scenario of the primary care is to attribute every issue to the lack of funds or insufficient finances. This issue has occupied the minds of academics and administrators alike, ways and means of improving the physical infrastructure and increase the staffing or drug supply as remedies are debated and attempted. Some states are going for heavy borrowing from World Bank and others to construct PHC buildings and equip themⁱⁱⁱ. It can

be logically admitted that there needs to be a minimum of infrastructure for the service delivery— but, it is not alone sufficient to improve the access and quality of services. The issue could well lie in the management of the system at macro level at head quarters and mostly at the unit level in the PHC where in industrial management practices, work improvement techniques, motivational schemes and informational technologies will come to help the service improvement and reduction of the cost of care.

REACH project of the SHARE India (A research foundation promoted and set up by Non resident Indian) is ample example and testimony of the above observation i.e., good management, innovation and motivated staff and mainly the harnessing of the information technology for the improved service delivery.

REACH project of the SHARE India (A research foundation promoted and set up by Non resident Indian) is ample example and testimony of the above observation i.e., good management, innovation and motivated staff and mainly the harnessing of the information technology for the improved service delivery.

This paper mainly focuses on the REACH project concept of computerized demographic and health data bases as a better means of health care delivery. In the process we will detail now and then the other management innovations and tools employed by the REACH project.

BRIEF NOTES ABOUT THE REACH PROJECT

Population : 40,000
Villages : 35 Villages in Medchal Mandal except Medchal Town
Mandal : Medchal
District : Ranga Reddy
State : Andhra Pradesh



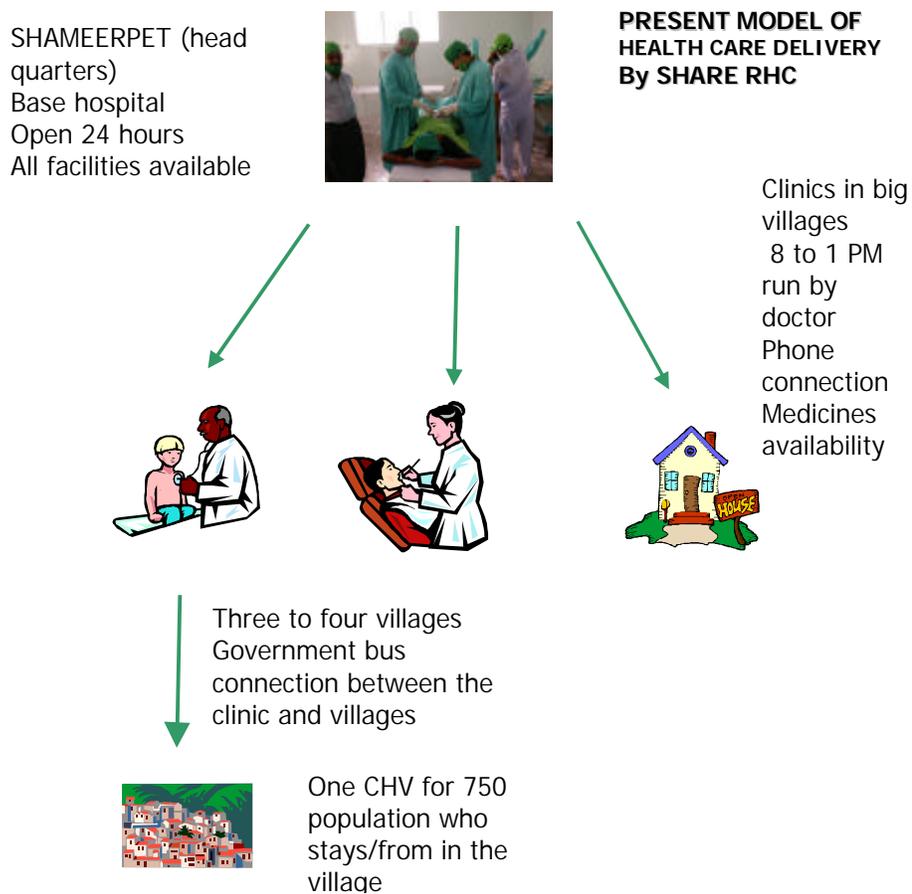
Rural Health Center : The Rural Health Center consists of 10-15 beds with labor room and operating theater. Besides X-ray and diagnostic lab facilities are made available. Out patient clinic is operated every day of the week. Emergency services are provided round the clock.

| ANNUL BUDGETS in \$ | |
|---------------------|--------|
| Salaries | 50,000 |
| Supplies | 20,000 |
| Transport | 10,000 |
| Other exp. | 20,000 |
| <hr/> | |
| Income –OP | 7,000 |
| Income – IP | 45,000 |
| Income – others | 4,000 |
| Deficit met from | 40,000 |
| Trust funds | |

| TEAM | |
|--------------------|----|
| Doctors | 4 |
| Pediatrician | 1 |
| ANMs | 5 |
| Health supervisors | 3 |
| CHVs | 40 |
| Health Manger | 1 |
| Computer Operators | 2 |

A

Schematic model is presented below to illustrate the process and structure of health care delivery by the REACH. It highlights the head quarters organization, clinics in the major villages and the CHVs for every 750 population.



COMPUTERIZED DATABASE IN THE AID OF BETTER REPRODUCTIVE HEALTH SERVICES.

The Reach project developed the computerized database of the entire population it is serving (nearly 40,000) in the Medchal Mandal of the Ranga Reddy district of Andhra Pradesh. The data collection/development process and the refinement of the software took nearly 5 years. It went through a good amount learning cycle. The underlying concept of the entire development process is bottoms up approach, which involved the village level health care workers in the generation and utilization of the health information. The process towards a H&MIS must be driven from within by local management and community structures, and it must be based on locally felt needs. The focus must be on the processes which occur at a local level: a bottom-up approach rather than "top-down development.^{iv} The following pages outline the process of learning, software and hardware employed and the utilization of the computerized data for reproductive and child health services. The process started with the conduction of survey in the entire population in the 1994 and again 1997 with a comprehensive format. The updated and latest information collected and computerized through the CHV mechanism.

LEARNING CURVE OF THE DATABASE DEVELOPMENT PROCESS

| Year | Activity | issues |
|-------------------------------|--|---|
| 1994 | Base line survey of the population | Data not collected systematically, flat database like spreadsheets are used to enter the data. Problems cropped up in the validation of the data, migration problems could not be accounted for. Final summaries are completely out of the bounds of national averages. Like male female ratios etc., |
| 1995-96 | Data validation and program development trails | This period is testing and learning for the programmers. Different type of problems were encountered in developing the software. 3 versions of development have seen the present version. |
| 1997 June 1997 December | Base line survey of the population (redone) and Data entry | Systematically prepared forms and preplanned relational database structure |
| 1999 end | Software development | Completed for all modules – 4 versions of development preceded the perfection ability to generate reports |

| Hardware | Software | Personnel |
|-----------------|---|---------------------------|
| 2 Pentium nodes | Windows NT, 95 | 1 Programmer ¹ |
| 1 NT server | MS Access Visual Basic MS SQL 6.5 | 2 Data entry ² |

1. Programmer requirement is almost over with the software being perfected.
2. One data entry operator will be relieved as only update information will flow now on wards. Two persons for data entry was necessitated to complete the base line survey data.

KEY ROLE PLAYED BY THE COMMUNITY HEALTH VOLUNTEER (CHV)

The project employed CHVs in every village to identify the individuals, their needs, and motivate them to seek the appropriate health care. CHV is key to success of project. She/he brings to focus on the individual all the services available from various sources and agencies.

CHVs are supervised by Health Supervisor (HS). There is one HS for every 10 CHVs. Each HS is associated with a Doctor. Health Supervisors are supervised by a Health Manager. Thus one Doctor, one HS and 10 CHVs constitute a team in charge of 1500 families (approximately 7500 members)

KEY FEATURES OF THE DF SYSTEM

It is organised in the relational data base format and supports the ODBC links to any database

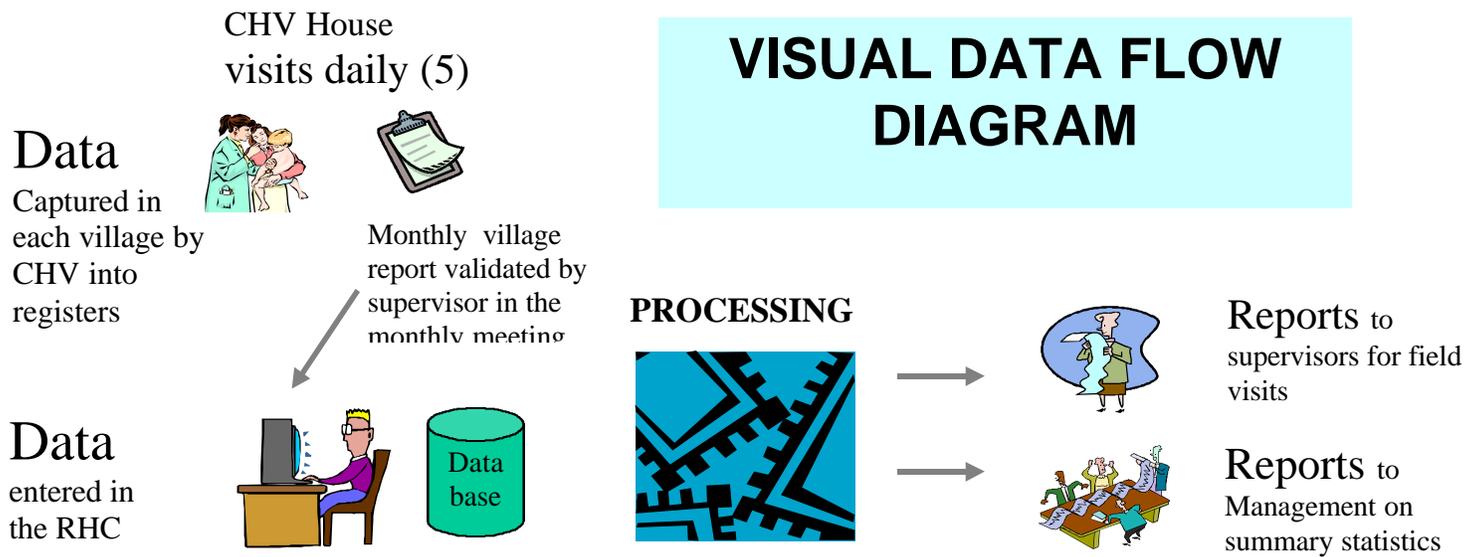
It is in the windows operating systems and very intuitive to the user to navigate the screens and to query the database on any parameter



Community Health Volunteer –the key link

- Selected from the same village
- Passed 7th class minimum
- Trained by RHC
- Each looks after 150 families
- Can render First-Aid and attend to minor ailments.
- Paid a nominal honorarium of Rs. 350 (approximately 8 \$) a month

A visual flow diagram is presented to simplify the data collection processing storage and reporting mechanism employed by the REACH project. The mechanism starts with the process of data collection by the CHV on daily basis from the house to house visits. She visits on an average 5 houses a day and that



way she covers 150 house holds a month. Besides these she may visit other houses to take note of special events. The data is entered into manual registers by the CHV. Data is transferred monthly to the RHC in the fixed form to enable data entry. The data is scrutinized first by the Health supervisor and clarified for authenticity. In a matter of day the data entry will be complete and reports are generated and passed on the health manager and supervisors. The report generation can be any time. Usually as soon as the data entry is complete for the former month, the report will have immediate planning and intervention requirement.

The software has the provision to store state level indicators of Andhra Pradesh, Kerala and India level indicators besides some major indicators of USA. The chart bellow explains the information storage point and the form of information storage.

Information storage points are illustrated through a separate diagram. The information captured in the original family survey is also presented.

Information storage points



VILLAGE

Registers of CHV
1 Household register
2 Eligible couples
3 Pregnant woman and infant



RHC

Computerized Data base



Reports with the mobile supervisors



Key information captured through the family survey

- Housing, income, general assets and domestic animals
- Family member information, education, occupation, marital status and FP status
- Health information of the individuals - events

ILLUSTRATIONS OF THE SUCCESS OF THE PROJECT

The indicators in the following table are ample testimony of the success of the project in terms of physical targets achievement. The national goals set for 2000 have been clearly achieved and some indicators Birth rate and death rate have improved beyond the targets to be on par with Kerala and some times better. The results are worth studying and emulating.

Table of indicators in comparison with the Government of Andhra Pradesh, Kerala state and USA.

| S no | Indicators | National Goals | REACH | A.P | INDIA | KERALA | USA |
|------|-------------------------|----------------|--------------|------|-------|--------|------|
| | Year | 2000 | 1998 | 1996 | 1996 | 1996 | 1996 |
| 1 | Couple Protection Rate | 60 | *48 | 48.8 | 45.4 | 51.5 | 83 |
| 2 | Birth Rate | 21 | 16.5 | 22.7 | 27.4 | 17.8 | 15 |
| 3 | Death Rate | 9 | 6.4 | 8.3 | 8.9 | 6.2 | 9 |
| 4 | Growth Rate (%) | 1.2 | 1 | 1.44 | 1.85 | 1.16 | 0.6 |
| 5 | Total Fertility Rate | 2.3 | - | 2.7 | 3.5 | 1.7 | - |
| 6 | Maternal Mortality | 2 | 0 | 3.8 | 4.2 | NA | - |
| 7 | Perinatal Mortality | 30-35 | 55 | - | 44.3 | - | - |
| 8 | Infant Mortality 0-1 yr | 60 | 62.7* | 66 | 72 | 13 | 8 |
| 9 | Child Mortality 1-4 yr | - | 2.1 | 22.4 | 33.4 | - | - |
| 10 | Low Birth Weight | - | 24 | - | 33 | - | 7 |

*62.7 is moving average of 2 years; *48 Includes permanent methods and not temporary methods.

On the positive side, Government department of Health and Family Welfare often approaches for the right statistics and data of the population. They rely more on the RHC statistics for reporting to the higher ups.

The following pages detail the process of Management decision-making – how the database is put to use in Reproductive and Child Health Services.

MANAGEMENT DECISION MAKING (with sample reports)

An information system plays a critical role in a PHC system in achieving equity, effectiveness, and efficiency (affordability). It helps to :

- Identify who is to be served, what are their needs, and where they are
- Identify problems in implementation
- Monitor progress
- Show whether the programme is having any effect, including impact on health status and
- Show the cost of providing the services.^v

FAMILY PLANNING

Identification of eligible couples and Identification of eligible woman for terminal methods

The family planning effort at the PHC requires clear planning based on objective data and execution of the plan through identification, motivation of the eligible couples. The governmental efforts are crippled by lack of information about the populations in terms of number of children they already have, male/female

The screenshot shows a software interface with a menu on the left and two data tables. The top table is titled 'NON-OPERATED ELIGIBLE COUPLE' and the bottom table is 'OPERATED COUPLE'. Both tables have columns for age groups (15-19, 20-24, 25-29, 30-34, 35-39, 40-44) and a 'TOTAL' column. The 'NON-OPERATED' table has a red circle around the '2 Children' row, which shows 141 couples in the 25-29 age group and 83 in the 30-34 age group.

| AGE GROUP | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | TOTAL |
|-------------|-------|-------|-------|-------|-------|-------|-------|
| No Children | 282 | 410 | 165 | 03 | 02 | 04 | 1866 |
| 1 Children | 85 | 903 | 200 | 120 | 77 | 05 | 1288 |
| 2 Children | 10 | 200 | 328 | 148 | 72 | 83 | 938 |
| 3 Children | 0 | 0 | 141 | 132 | 02 | 02 | 440 |
| 4 Children | 0 | 0 | 27 | 74 | 55 | 43 | 217 |
| Total | 387 | 1313 | 872 | 672 | 213 | 256 | 3906 |

| AGE GROUP | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | TOTAL |
|-------------|-------|-------|-------|-------|-------|-------|-------|
| No Children | 8 | 0 | 0 | 0 | 0 | 8 | 8 |
| 1 Child | 8 | 1 | 0 | 4 | 0 | 8 | 28 |
| 2 Children | 4 | 110 | 275 | 270 | 155 | 178 | 392 |
| 3 Children | 8 | 88 | 298 | 536 | 324 | 301 | 1525 |
| 4 Children | 8 | 12 | 112 | 273 | 283 | 278 | 966 |

numbers, age of the woman and income of the family etc., Hence the governmental PHC activity is mostly based on the couples themselves coming forward to adopt either temporary or terminal methods.

The effort of planning and identification of eligible couple is simplified by the computerized records of the entire mandal population. The

following is the

the adjacent report is of the entire mandal. It shows there are 1555 eligible couple in the entire mandal who are already having 2 children and more. The unique depth of the database lies in going to the village level numbers and finally identifying the names and families histories of the woman. The report below shows the eligible couples for Arkalaguda village. There are 9 women who are having more than 2 children and can be motivated for terminal methods. The following report partially shows the list of those 9 woman. Mrs. R. Sangeeta can

be identified for terminal methods of family planning . she is already having two male children. She may be looking for female child. She can be convinced that she need to go for terminal method of family planning. From the same report couple of others like N. Manjula and K Indra can identified temporary method. They are

| Personal ID | NAME | SEX | AGE | Total Children | Male | Female | No method Used | Tubectomy |
|-------------|-------------|-----|-----|----------------|------|--------|----------------|-----------|
| 10460 | NIRHAGYANMA | F | 32 | 3 | 1 | 2 | | 03/04/99 |
| 10493 | NIRHAGYANMA | F | 44 | 3 | 1 | 2 | | 03/04/99 |
| 10470 | NIRHAGYANMA | F | 32 | 4 | 1 | 3 | | 03/04/99 |
| 10476 | NIRHAGYANMA | F | 43 | 3 | 1 | 2 | | 03/04/99 |
| 10490 | NILAKSHI | F | 36 | 3 | 1 | 2 | | 03/04/99 |
| 10502 | NISANDHYA | F | 34 | | | | 03/04/99 | |
| 10504 | K LATHA | F | 41 | 2 | 1 | 1 | | 03/04/99 |
| 10511 | K RAMALAMBA | F | 35 | 2 | 2 | | | 03/04/99 |
| 10515 | K SNOBHA | F | 32 | 3 | 2 | 1 | | 03/04/99 |
| 10520 | S NARAYANA | F | 35 | 2 | 1 | 1 | | 03/04/99 |
| 10523 | K SPANROOPA | F | 34 | 5 | 1 | 4 | | 03/04/99 |
| 10530 | K BEECHANNA | F | 39 | 4 | 2 | 1 | | 03/04/99 |
| 10541 | NIRHAGYANMA | F | 25 | 1 | 1 | | 03/04/99 | |
| 10543 | NIRHAGYANMA | F | 22 | 1 | 1 | | 03/04/99 | |
| 10547 | NIRHAGYANMA | F | 36 | 2 | 1 | 1 | | 03/04/99 |
| 10548 | NIRHAGYANMA | F | 32 | 1 | 1 | | 03/04/99 | |
| 10550 | NIRHAGYANMA | F | 33 | 2 | 2 | | | 03/04/99 |
| 10591 | P SAMANTHA | F | 32 | 2 | 2 | | | 03/04/99 |

very young like 22 years and they can wait for the second child some more time. Based on the id number even the house of these woman can be located from the excellent village maps prepared by the RHC. Sample village map of Yadaram village is presented in the following page.

The following is the report for the summary of eligible couples for the entire mandal who are yet to operated.

| NON-OPERATED ELIGIBLE COUPLE | | | | | | | |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Age Group | 05-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | TOTAL |
| No Children | 1 | 4 | 0 | 0 | 0 | 2 | 7 |
| 1 Child | 0 | 4 | 3 | 2 | 0 | 0 | 9 |
| 2 Children | 0 | 2 | 2 | 1 | 1 | 0 | 6 |
| 3 Children | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| >4 Children | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Total | 1 | 10 | 5 | 4 | 1 | 4 | 25 |

| OPERATED COUPLE | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| Age Group | 05-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | TOTAL |
| No Children | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| 1 Child | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| 2 Children | 0 | 2 | 4 | 1 | 4 | 1 | 12 |
| 3 Children | 0 | 0 | 4 | 5 | 3 | 5 | 17 |
| >4 Children | 0 | 0 | 0 | 1 | 4 | 5 | 10 |

This report helps to study the reasons plan the motivation scheme and identify and work out the details. The same report can be obtained for any village.

To identify the birth and administering the immunization.

Indemnification of the new born is a real issue in the rural areas. Usually the expecting mother travels to their parents village, which might be located in other mandal or block and returns only with a 5 months old baby. The immunizations till then would have been performed in their parents village (if they are done). In this aspect the governmental system simply fails and supplements the whole issue through the percentage of estimated figures of in and out migration for delivery. In the governmental system the numbers are balanced. But immunization is such that there should be no miss. Each child missing one type of immunization would not

bring down the percentages in governmental calculations say Polio 95%. But the 5 % missing children need not be the same for every type of immunization. This means if every alternative may miss one or two types of immunization or doses. (still the governmental calculations may not show the total coverage of all immunizations by every child. This crucial aspect has been glaringly missed in the percentage concept.

| Age in months | Total | BCG0 | Polio-0 | DPT1 | DPT2 | DPT3 | Measles | Vit.A-1 | DPTB | Vit.A-2 |
|---------------------|----------|------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|
| <1 | 0 | 0 | 0 | NA | NA | NA | NA | NA | NA | NA |
| 2 | 0 | 0 | 0 | 0 | NA | NA | NA | NA | NA | NA |
| 3 | 0 | 0 | 0 | 0 | 0 | NA | NA | NA | NA | NA |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA | NA | NA |
| 5 | 2 | 1 | 1 | 0 | 0 | 0 | NA | NA | NA | NA |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA | NA | NA |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA | NA | NA |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA | NA | NA |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA |
| 10 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | NA | NA |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NA | NA |
| Total | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | NA | NA |
| Total Year % | | 67% | 67% | 33% | 33% | 33% | 0% | 0% | NA | NA |
| 13 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | NA | 0 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | NA | 0 |
| 15 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | NA | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

RHC adopts a different approach. It tracks every child for all immunizations. As soon as the mother returns to the husband's village, the CHV approaches and collects the data of previous immunizations and passes on the information for data entry. Based on the date of birth the system generates the required immunization and matches with the ones completed and alerts for the ones to be given.

| NAME | DOB | B C G | Polio 0 | DPT1/Polio1 | DPT2/Polio2 | DPT3/Polio3 | Misc |
|--------------|------------|---------------|---------------|---------------|---------------|---------------|---------------|
| D PARA | 08/01/1997 | 1/0/0/1/997 | 1/0/0/1/997 | 1/0/0/1/997 | 1/1/0/1/997 | 1/2/1/997 | 0/0/0/0/1/997 |
| B SANTOSHI | 08/11/1997 | 0/0/1/0/1/997 | 0/0/1/0/1/997 | 0/0/1/0/1/997 | 1/1/1/7/997 | 0/0/0/0/1/997 | 0/0/0/0/1/997 |
| B RAJITHA | 04/12/1998 | 0/0/1/0/1/998 | 0/0/1/0/1/998 | 0/0/2/1/998 | 0/0/0/1/998 | 0/0/0/1/998 | 0/0/1/0/1/998 |
| D LAVANYA | 07/06/1998 | 0/0/0/0/1/998 | 0/0/0/0/1/998 | 0/0/0/0/1/998 | 1/0/0/0/1/998 | 0/0/0/0/1/998 | 0/0/1/0/1/998 |
| D MAHESHWARI | 05/07/1999 | 0/0/1/0/1/999 | 0/0/1/0/1/999 | 1/0/0/1/999 | 0/0/0/1/999 | 0/0/0/1/999 | 0/0/0/0/1/999 |
| B PARA | 08/07/1998 | 1/0/1/1/1/998 | 1/0/1/1/1/998 | 1/0/1/1/1/998 | 1/1/0/1/998 | 0/0/0/1/998 | 0/0/1/0/1/998 |
| R MAHESHWARI | 11/01/1998 | 0/1/0/0/1/998 | 0/1/0/0/1/998 | 0/2/1/1/998 | 0/0/1/1/998 | 0/0/1/0/1/998 | 0/0/1/0/1/998 |
| B MOUNIKA | 07/11/1998 | 0/0/1/0/1/998 | 0/0/1/0/1/998 | 0/0/0/1/998 | 1/0/1/1/998 | 1/1/0/1/998 | 0/0/1/0/1/998 |
| B BHAGYAKR | 04/06/1999 | 0/0/0/1/1/999 | 0/0/0/1/1/999 | 0/0/0/1/1/999 | 0/0/1/1/999 | 1/0/1/1/999 | 0/0/1/0/1/999 |
| D TEJASWINI | 08/07/1999 | 0/0/1/0/1/999 | 0/0/1/0/1/999 | 0/0/1/0/1/999 | 0/0/1/0/1/999 | 0/0/1/0/1/999 | 0/0/1/0/1/999 |
| D BHASKER | 05/07/1999 | 0/0/0/1/1/999 | 0/0/0/1/1/999 | 0/0/1/1/999 | 0/0/1/1/999 | 0/0/1/1/999 | 0/0/1/0/1/999 |
| PARA | 11/11/1999 | | | | | | |
| Total | 12 | 11 | 11 | 11 | 11 | 9 | 9 |

The above report shows the immunization age wise in the Arkalaguda. The percentage deficiency will show the gaps in the service delivery or data entry/ collection issues. In this case the Children do belong to the village but have been born in the woman's portents place. Only the birth has been reported and the details of immunization will be reported as soon as they arrive at the husband village. Then the percentages should match and be near 100. the adjacent report is the name wise details of the children with the immunization status clearly marked date wise. The gaps are clearly identified and supervisor rushes to the village with the necessary supplies and completes the chain of service delivery.

Village level information

The village level information like water, sanitation facilities and many others can be obtained through the database and correlated with the available health indicators

The following village summary report shows the water and sanitation situation of

The software enables to see the family details like the family tree, type of house hold, members, type of cooking waste disposal etc.,

| Geographical Details | | Covered By | | Health Care | |
|--------------------------|-----------------|----------------------|-----------------|---|-----------------|
| Area in SQ KM | 3 | Post Office | PUDUR | PHC Clinic Centre | |
| Population Density | 111 | Sub Centre | MEDCHAL | Doctor's Name | |
| No of Families | 20 | Police Station | | Visit Day | |
| No of Houses | 20 | Sub Centre | SRI PALLABH | Road <input type="checkbox"/> Tractor <input type="checkbox"/> Motor <input type="checkbox"/> Metro | |
| Distance from Mandal | 12 | M.P. | SRI T. DEVENDER | | |
| Distance from RHC | 10 | M.L.A. | | | |
| Private Clinics | 0 | Major Centre | | | |
| Village Heads | | | | | |
| Sarpanch | PAPASIMBA | Uo/Sarpanch | CHARNAREDDY | VAO | INDRASENA REDDI |
| Health Personnel | | | | | |
| Health Officer | B NARENDRA NATH | 11 | | 11 | N BALAJI |
| Supervisor | | | | | |
| Assistant | | 21 | | 21 | |
| Local Del | | | | | |
| Volunteers | | 31 | | 31 | |
| Private Doctors | | | | | |
| Community Leaders | | | | | |
| Water Source | | Liquid Dmp. | | Solid Waste | |
| Well | 0% | Soak Pit | 0% | Kitchen | 0% |
| Tap | 0% | Open Pit | 0% | Composting | 100% |
| Bore | 100% | Drainage | 40% | Recycling | 0% |
| Crops | | Fruit Gardens | | Communication | |
| Rice | 50% | Pulses | 0% | Grapes | 0% |
| Mango | 20% | Cassia | 0% | Mangoes | 0% |
| Javva | 0% | Groundnut | 0% | Dustard | 0% |
| | | | | Guava | 0% |
| | | | | Apple | 0% |
| | | | | Newspaper | 0% |
| | | | | Monthly | 15% |
| | | | | Radio | 0% |
| | | | | Weekly | 0% |
| | | | | TV | 0% |
| | | | | Phone | 2% |
| | | | | Radio | 0% |
| | | | | Telex | 0% |



RHC developed wonderful village maps with the clear location of roads facilities like school, well and the type of houses with color coding. The maps show the geographic spread of the village and accessibility of the houses to the CHV in the management of the village Health and Family Welfare records.

| Demographic and Socio-economic Details of APRRMEDAG001 | | | |
|--|---------------|---------------------------------------|---------------------------------|
| State | AP | Religion | Hindu |
| District | PR | Cast | GOODS |
| Mandal | RED | Dia | |
| Village | AG | N Paper | |
| House No. | 3-121 | Wireless | |
| Other's | | Family Status | |
| Religion | Dustin | Room | 3 |
| Excrete | Open | Pets | None |
| Sewerage | Open Drainage | Farm | None |
| | | <input type="checkbox"/> Nuclear | <input type="checkbox"/> Active |
| | | <input type="checkbox"/> Joint Family | <input type="checkbox"/> Vacant |
| | | Adults | 1 |
| | | Toddler | 1 |
| | | Children | 1 |
| | | Income per month | 0 |

Family and individual details

The unique strength of the database lies in relating the individual to the family tree. It is the crucial process of stretching the database capabilities to the social tangles. The adjacent report shows the family details of Nakka Sathaiah. The individual details of one Mr. Sampth kumar are presented below. The database is maintained in the TREE like structure and one can go visually into the details like village from mandal, families in the village, individuals

| Family Type | JOBT | House_ Tild | Cooking | Kerosene | Fair |
|-------------|------|-------------|----------|---------------|-----------|
| Members | 11 | Boots | 5 | WaterSource | Bore well |
| Adults | 8 | Religion | Hindu | Events_Drugs | Open |
| Children | 1 | Costs | 00003204 | ReligionOrder | Open |
| Infants | 1 | Income | 5800 | Religion | Dustbin |

| EmpID | Name | Relation with Head | Birth Date | Sex | PHENIX | Education | Occupation |
|-------|----------------|--------------------|--------------|-----|--------|----------------|----------------|
| TE027 | NAKKA SATHAIAH | HEAD OF THE | 4. 4. 1926 | M | M | Uneducated | Self Employee |
| TE030 | MEHAGYAMMA | WIFE | 30. 3. 1946 | F | M | Uneducated | Housewife |
| TE030 | MUSAFIDEE | SON | 28. 3. 1977 | M | M | High School | Private |
| TE040 | MKRISHNA | SON | 28. 3. 1979 | M | LI | High School | Private |
| TE041 | MKRISHNA | SON | 28. 3. 1975 | M | M | High School | Private |
| TE042 | MEHAGYAMMA | DAUGHTER-IN-LAW | 27. 3. 1975 | F | M | Uneducated | Housewife |
| TE043 | MUSAFIDEE | GRAND-SON(S) | 30. 7. 1993 | M | LI | Not Applicable | Not Applicable |
| TE044 | M SRIRAVU | SON | 27. 3. 1974 | M | LI | High School | Private |
| TE045 | MUSAFIDEE | DAUGHTER-IN-LAW | 28. 3. 1970 | F | M | High School | Housewife |
| TE051 | MANJUNA | GRAND-DAUGHTER | 17. 3. 1999 | F | LI | Not Applicable | Not Applicable |
| TE128 | MUSAFIDEE | DAUGHTER-IN-LAW | 11. 01. 1988 | F | M | Waste School | Housewife |

and events. At any level the statistically details in the form of summaries can be generated online.

Personal Details of an Individual N SAMPATH KUMAR

Family Code: [] Name: N SAMPATH KUMAR [] Active [] Live []
 [] Vaccant []
 Father: N SAMPATH [] Mother: MEHAGYAMMA [] Main [] Birth []
 [] Female [] Adopted []
 Birth: [] Date: [] Age: [] Death: [] Date: [] Age: []
 [] Married [] Handicapped []
 [] Mental Disorder []
 Relation with Head: GRAND-SON(S) [] Education: Not Applicable [] Occupation: Not Applicable [] Income: 0 [] Sex: Male [] Spouse: []
 Spouse Details:
 [] Married [] Family Code: [] No Relation [] Married Out []
 [] Existing [] Divorced [] Un-Known [] First Cousin [] Immigrants []
 [] Not Applicable [] Distast [] Not Applicable []

Antenatal details

The database generates antenatal summaries for the mandal and village. The adjacent is the antenatal

summary for Arkalaguda. The details for the deliveries and Current ANC can be queried simply. The report below show the present ANC woman and the TT doses given along with the dates on which they are given. The LMP is also available from the report. The depth of this information enables the planning of the activities related to

| | Count | % |
|-----------------|-------|----|
| TOTAL CASES | 7 | 58 |
| CURRENT ANC | 4 | 57 |
| ABORTIONS | 0 | 0 |
| PRE-MATURE | 0 | 0 |
| STILL BIRTHS | 0 | 0 |
| NORMAL DELIVERY | 3 | 43 |
| CAESAREANS | 0 | 0 |

RURAL HEALTH CARE SYSTEM - [ANC Medication of Anakapudi]

Demograph Population Family Planning ANC/Deviates Immunization Injars Date

India
 Andhra Pradesh
 Hyderabad
 Medchal
 Anakapudi
 Abberpet
 Athvally
 Bameji Gudem
 Banda madwar
 Berojagali
 Dabba
 Gondovella
 Ghorpa Thanda
 Ghorpa
 Gundu Pochampoly
 Gokapur
 Gosaguda
 Gubbali Thanda
 Gyapur
 Kistapur
 Kanda Koya
 Konalipaly
 Karamba Thanda
 Lingapur
 Lethanandi Thanda
 Meisamma Gudem
 Muralipaly
 Meisreddypally
 Munnabadi

Zoom: 100%

| RIN | NAME | Age | LMP | Period | T_T DOSE - I | T_T DOSE - II | FA DOSE - I | FA DOSE - II |
|-------|-------------|-----|------------|--------|--------------|---------------|-------------|--------------|
| 10642 | N BHAIYANMA | 25 | 03/04/1999 | 10 | | | | |
| 10732 | D PADMA | 34 | 03/10/1969 | 10 | 08/16/1999 | | | |
| 24508 | K ANUSHA | 20 | 06/10/1999 | 6 | | | | |
| 85126 | N RAMADEVI | 18 | 03/04/1999 | 10 | | | | |
| 4 | | | | | 1 | 0 | 0 | 0 |

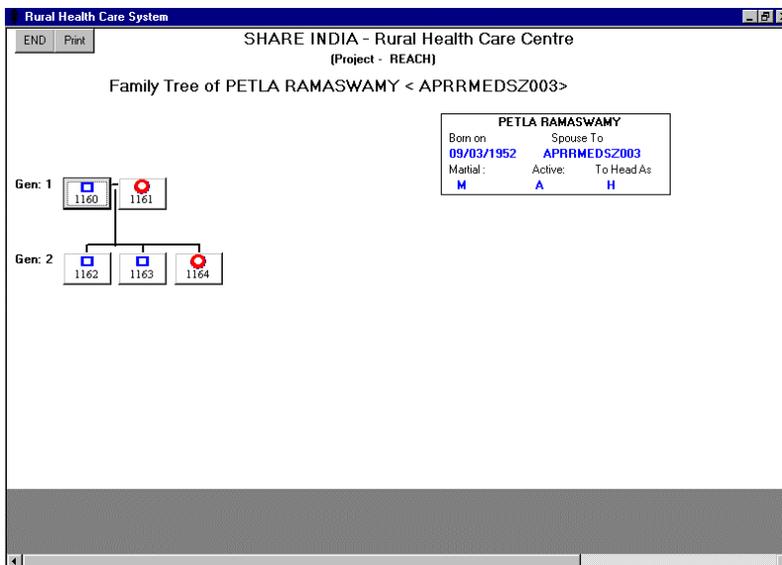
Page: 1

Data entry and validation process

The software has extensive provision to facilitate the entry of data and online validation of the correctness of the data. The complex issue in the entire database is the relation of each individual to the family tree. Considering the joint family structure in the villages and of course nuclear families which are emerging (needs updating on regular basis), the data entry module has provided for visual verification of the family tree in to a diagram. Any conflicts that

The screenshot shows the 'Rural Health Care System' software interface. At the top, it displays 'Health Supervisor : USER' and 'Survey Date : 10Jan-00'. The date 'Today : 10/01/2000' is also shown. The interface has tabs for 'Household', 'Persons', 'Health', and 'Bulk Edit'. The 'Persons' tab is active, showing a form for entering individual details. The form includes fields for 'Family Code', 'Name', 'Father', 'Mother', 'Birth' (Date and Age), 'Death' (Date and Age), 'Relation with Head', 'Education', 'Occupation', 'Income', 'Gen./Spouse /SI No', and 'Spouse Details'. There are also several radio button options for 'Active', 'Live', 'Died', 'Vaccant', 'Male', 'Female', 'Bath', 'Adopted', 'Normal', 'Handicapped', 'Mental Disorder', 'UnMarried', 'Married', 'Widow(er)', 'Divorcee', 'Entry', 'Exit', 'Applica', 'No Relation', 'Un-Known', 'First Cousin', 'Distant', 'Married-In', 'Married-Out', 'Immigrants', and 'Not Applicable'.

may be observed are cleared in this process. The following screen shows the family tree of Petla Rama Swamy. In the family tree Males are represented by Blue squares and females are represented by red circles. Each person in a family has unique registration number. Using this registration number we can get



individuals information of a family. At every stage the validation rules fire to ensure that the data is authentic. The data that does not pass the validation process is fed back to the CHVs for clarification and correction.

PRIMARY HEALTH CARE IN INDIA – SHARE MEDICITI RHC IN COMPARISON WITH A GOVERNMENTAL PHC SYSTEM

| ITEM | GOVERNMENT SYSTEM – PHC & Sub-center | SHARE MEDICITI RHC |
|--|--|---|
| Staff | | |
| Doctors | 2 doctors as the norm but generally one is posted (one doctor for nearly 50,000 to 75000 population) | 4 Doctors and one pediatrician (One Doctor along with a supervisor and 10 CHVs looks after 7,500 population) |
| ANM | One for 5000 population according to norm (But in practice covers 10,000 population) | Community Health volunteer One for every 750 population |
| Health supervisors | One for five Sub-centers 20,000 population | One for 10 CHVs 7500 Population |
| Arrangement of staffing | Fixed and does not respond to the increase in populations | Dynamic and the network of CHVs increase to take care of increasing numbers |
| Operation | | |
| PHC | Mostly doctor does not stay- formal OP hours between 8 to 1 PM | 24 hours and 4 doctors stay in the campus |
| Sub-center | Part time manned by ANM and hardly any facilities | OP and village rounds by doctor from morning 8 to 1 PM |
| Ambulance | No ambulance calling | 24 hours ambulance calling facility |
| CHV | Usually stays in the nearby city and visits the sub-center in her convenient timings | From the village and stays in the village |
| Delivery of services like immunization etc., | Periodically- Mostly in the PHCs and Sub-centers | Continuous on daily basis-on identifying the patient, supervisor visits the villages on along with ANM and supplies |
| Data management | | |
| Records | All manual – records are supposed to be maintained but the 10,000 numbers load on the ANM and limited time available makes this effort a non-reality | Manual registers in the village and complete family/individual record in the RHC. On line vital statistics |
| Identification of eligible woman and children for family planning and immunization | Based on “you have to come to me” concept | Identified through computerized data and House visits to motivate on a continuous basis |

Further developments due

Some of the validation rules are old and are being updated with the latest processes.

Since the software is developed in incremental fashion, it resulted in some small anomalies like; the data entry database is different from the reporting database. Every time a macro is run to create and update the reporting database. This is not a sound computing principle. The present practice may ensure greater amount of security to the database from data corruption problems with backups of two databases.

Good documentation is yet to be developed. This is very crucial as the time is ripe for the discontinuation of the programmers and transfer the database maintenance activity to the general supervisors. Since the software was developed by many programmers uniformity suffered a bit. To this extent documentation is all the more essential.

The reach project started the nutrition of the antenatal mothers in a big way, the software is being updated with the nutrition module.

CONCLUSION AND DISCUSSION

One of the serious criticisms on the uses of computers in the government and more on in the health care delivery is that it costs a lot. The other observation is that we should supply drugs first.

Probably the criticisms are based on a notion that computers are very expensive and they are used mainly for word processing and high-end calculations. But, today computers are available for less than 1000\$ in India. It is true that computers do word processing, but they are designed and will work better, give optimum results when they are used to build, process huge amounts of data. Population data is huge and the variables of any health and population related programs are many. It is not possible to track the population of a even a small unit like 100 thousand with out the use of some aids like computerized databases.

Detailed data of individual and not aggregates

The 50 years of experience has proved that India has done the planning based on aggregates of state level. The HMIS system in general processes the information in such a way that only summaries reach the higher levels. The details miss the attention of the policy makers and managers. This series limitation could be attributed to the lack of databases. Databases help collect and store the details of every transaction or the detailed record. They give the ability to process the data in a way that is required for a specific task, project or purpose. They help relate and integrate huge sets of data on identical fields. But for the database technology, banking, transport and every service and manufacturing sector would not have been as they are today.

Aggregates may not mean much in many instances. For example, Immunization coverage of 90% will sound very impressive. But the individual coverage of a particular vaccine may vary and some may be as low as 10 – 30%. Coverage in a particular region could be as low as the above. There may be misses in different dosages. Still the aggregates will not come down steeply to reflect these issues. Because conditions vary widely in India, detailed information is necessary on small geographical units and the different segments of the population. This kind of planning eliminated the end user peculiar requirements and generalized the entire approach and developed programs with rigidity. At present the country's health information system mostly generates data at the state level on socio-demographic matters. There are no useful data on the incidence of many diseases and disabilities. Long delays occur in the processing of data.^{vi} Most of the health and other indicators available are of state level. This means for 50 to 100 million populations is considered as a single unit for planning purpose. This kind of planning failed to take into account the district wise and block wise developmental

differentials and health seeking behavior. We need at least block level indicators, if not village level for focused attention and efficient targeting of the needy populations.

REACH project has attended to this problem. The data available is individual, family level, village level and mandal level. This gives the ability to focus on the weak spot. An individual or a category of Indians can be targeted for family planning, ante-natal or post natal services immunization or any of the range of health services.

End user involvement in the use of data

The principle user and supplier of the information is ANM, supervisor and finally the Medical Officer at the PHC level. But usually medical officers (in-charge of the PHC) do not show any interest in verifying the data, reflect on the data and finally using the data to take corrective action on any of the anomalies. They are observed to passively sign whatever is prepared by the data assistant called by various names like, computer, clerk etc., To achieve maximum participating from health workers collecting the data, three issues are of extreme importance; they should feel that they own the system, the system should not involve them in extra work, and it should be perceived as useful.^{vii} Information for the managerial process HMIS evolution in developing countries is usually reactive at best and information systems often serve the interests of bureaucrats and institutions rather than the front line health workers and clients.^{viii}

Unfortunately majority of the Medical Officers in the government sector do not understand the registers and various kinds of information. The second levels of information users are the supervisors who are supposed to guide and supervise the activity of the ANMs. They too share a sense of indifference to the data. At all levels of Health and Family Welfare administration, there is excessive concentration on Family planning targets. (Through formally we are operating under target free approach.)

REACH project has set right these anomalies. The CHV knows the information and prepares plans based on the records. The supervisor monitors the indicators as they are reflected in the reports and gives continuous feed back to the CHV. He visits them often to attend to any special requirement. Project manager too closely follows the data. It is the experience of the author to observe the Project manager getting excited at the time of the monthly reports processing.

Cost of computerization

It is not the number of employees that decides the quality of service but the efficiency of the employees. In public health the resources are few, time is extremely limited (with AIDS kind of epidemics, out breaks of plague (it is an emerging epidemic in India now) and results have to be achieved in a limited time frame, there is need for more and more tools, implements and what ever that makes these tasks easy and efficient. India spends 85% of the budget on the personnel and personnel alone. Employment of some personnel or creation of one department or a post will not automatically ensure achievement of the set objectives. Public health is a proactive and developmental function. The personnel need some implements, tools, training and others to effectively discharge their duties. Often the series criticism on computers is that 'we need drugs first'. Drugs are certainly needed and also the capability to know how much are needed, where are they needed, in what quantities they are needed how are they going to be spend.

The REACH project has proved that the computers cost less than one ANM salary to buy and operate. One time task like software development needed special expertise. The software now is made as generic application and it is easy for any other organization in India or else where to use it. Maintenance and updations of data by the general supervisors and needs little training.

Finally the REACH project is a innovation of its kind in managerial, technological and human resources areas. If not the government, at least the 100s of NGOs operating the country can be benefited by the software developed and the lessons learnt.

End notes

ⁱ Bulletin on rural health statistics in India June 1997, issued by rural health division, directorate general of health services Ministry of health and family welfare Government of India, New Delhi.

ⁱⁱ Bulletin on rural health statistics in India June 1997, issued by rural health division, directorate general of health services Ministry of health and family welfare Government of India, New Delhi.

ⁱⁱⁱ Andhra Pradesh secondary Health project, Orissa, Maharashtra, Punjab secondary health projects.

^{iv} J. Braa, A. Heywood, M. Shung King, District Level Information Systems: Two cases from South Africa, *Methods of Information in Medicine*, 1997, 36: 115 - 121.

^v Khatidja Husein, Oluson Adevi, John Bryant and Noorddin B Cara, Developing a primary health care management information system that supports the pursuit of equity, effectiveness and affordability, *Social Science and Medicine*, Vol. 36, No. 5, pp. 585-596, 1993

^{vi} A. Indrayan, Informatics: the key to efficiency, *World Health Forum*, Vol.16, 1995

^{vii} P.De. L.G.M. Ferrinho, E. Buch, D. Robb, G. Phakathi, Developing a health information system for primary health care centre in Alexandra, Johannesburg, *South African Medical Journal*, Vol. 80, No.7, 1991.

^{viii} A.B. Heywood, B.C. Campbell, Development of Primary Health Care Information System in Ghana : Lessons Learned, *Methods of Information in Medicine*, 1997 : 36 : 63 - 68