

Development of a Quality Assurance Procedure for Reproductive Health Services for District Public Health Systems: Implementation and Scale-up in the State of Gujarat

Frontiers in Reproductive Health Program, Population Council

M. E. Khan
Anurag Mishra
Vivek Sharma
Leila Caleb Varkey

April 2008

This study is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of Cooperative Agreement No. HRN-A-00-98-00012-00 and Subproject number 5800.53075. The contents are the responsibility of the FRONTIERS Program and do not necessarily reflect the views of USAID or the United States Government.



EXECUTIVE SUMMARY

This project, entitled was carried out in two districts each in Gujarat and Maharashtra states. It confirmed that Quality Assurance (QA) checklists and an implementation manual, developed by the USAID-funded Frontiers in Reproductive Health (FRONTIERS) Program of the Population Council in collaboration with UNFPA/India, are useful and effective tools that the Ministry of Health and Social Welfare (MOHFW) can use to monitor the quality of services provided by health facilities. It also demonstrated that this QA mechanism can be easily institutionalized at the district level management.

The QA procedure involves a series of visits to health facilities by a team of three district level health officials, called the Quality Assurance Group (QAG). This team uses the QA checklists to review the readiness of the facility to offer services and the measures the quality of services provided. Before the QAG team leaves the facility, any gaps in readiness or quality identified by the team members are communicated to the Medical Officer in-charge (MO I/C) and actions are suggested for improvement. Further visits are made to the facility every four months, during which progress in addressing the gaps identified previously is assessed. The QA checklists provide easy procedures to provide an aggregated score for each individual facility with respect to input (readiness), process (how the service is delivered) and outcome (performance).

Comparison of the data from the QA visits demonstrated that the data obtained through the QA visits have been used by the district officials and the MO I/Cs of the facilities to address the gaps identified in the services. Many of the facilities that had scored a C or B grade for their readiness had moved to a higher grade, indicating improvements in the facilities. Similarly the measures of service quality also showed some improvements, although the quality of services generally remained below a desirable level and seems to require more attention than simply improving readiness.

The findings of the pilot study were disseminated at several fora, and the QA Manual and Checklists were formally launched by the PHN Division Chief of USAID/India. After reviewing the study findings, the Commissioner for Health and Family Welfare of Gujarat State decided to scale up the model throughout the state, in a phased manner. At the request of the State Government and with support from USAID and UNFPA, FRONTIERS staff provided technical assistance and built the capacity of state, district and block level officials to implement the QA mechanism. During the first phase, 466 facilities (about 35 percent of the 1,345 primary health facilities in the state) in 24 districts have been covered, through training 1,922 doctors and program personnel. FRONTIERS staff also developed a dedicated MIS package, and technical assistance was provided in the training of data entry staff at the district/block level to use it.

The first visit to all 466 facilities has been completed; a second visit has been undertaken in 19 districts and is underway in the remaining five districts. In five districts, a third

QA visit has just started. The QA visits have now been fully institutionalized within the state health system and the QA activity has become an integral component of the RCH-II program, thereby ensuring that resources will be available to sustain to the QA visits and to address gaps identified. A State-level QA Coordinator has been appointed by the MOHFW, who functions as the link person between state and districts.

One key lesson has been the critical role that the commitment of state officials plays in the success of such interventions and their scale up and institutionalization. After the results of the pilot study had convinced the state officials that the QA mechanism is effective in identifying gaps in services and improving readiness and quality of care, they immediately agreed to scale up the approach throughout the entire state through adopting and printing the QA manual and checklists, allocating the required funding for the initial training and QA visits, and ensuring its sustainability by making the QA mechanism a part of the RCH-2 program. The State's commitment to improve the quality of services can be demonstrated by the fact that on at least two occasions, the Commissioner for Health and Family Welfare has written a formal letter to the district authorities instructing them to implement the QA visits in a timely manner and instructing them to ensure that action is taken to address any gaps identified. In the absence of such commitment at the state level, the pace of scaling up would undoubtedly be slower.

The proven effectiveness of the QA mechanism and its scaling up in Gujarat State has prompted the national MOHFW to introduce it into six other states, with a slightly enlarged scope for the QA visits. FRONTIERS, PATH and EngenderHealth are providing technical assistance to support this scale-up, with funding from USAID, UNFPA and GTZ.

Table of contents

Executive Summary.....	i
Abbreviations.....	v
Acknowledgements.....	vi
Background.....	1
Objectives.....	2
Study locations.....	3
Implementation process	3
Development of the QA framework and approach.....	4
Development of an operational manual for District Quality Assurance Groups	7
Training and Orientation at District Level.....	8
QA visits to the PHCs/CHCs	8
Support, monitoring and feedback	9
Results	9
Findings from the baseline survey	9
Findings from three QA visits.....	10
Changes in funding State health services and their effect on the QA process	12
Communication of results	14
Scaling up the QA Process in Gujarat State	15
Planning for scaling-up the QC process	15
Conclusions and recommendations.....	22
References	23

LIST OF TABLES

Table 1: Quality Assessment Framework	6
Table 2: Changes in overall grades	11
Table 3: Change in Selected MCH, Family Planning and STI/RTI Indicators	12
Table 4: Input and Process Gaps Identified	19
Table 5: Training Needs Identified and Training Accomplished	20
Table 6: CHC/PHC readiness to Provide Quality RH Services (inputs)	20
Table 7: CHCs/PHCs quality of services (processes)	21
Table 8: Changes in outputs	21

LIST OF FIGURES

Figure 1: Training and Orientation Plans for QA Scale-up, Gujarat.....	16
Figure 2: Input Scores of CHC/PHCs during the 1 st and 2 nd visits.....	18
Figure 3: Process Scores of CHC/PHCs during First and Second Round	18

ABBREVIATIONS

ADHO	Additional District Health Officer
ANC	Antenatal Care
ANM	Auxiliary Nurse Midwife
BAMS	Bachelor of Ayurvedic Medicine and Surgery
BHO	Block Health Officer
BHV	Block Health Visitor
BIECO	Block IEC Officer
CDHO	Chief District Health Officer
CHC	Community Health Centre
CMO	Chief Medical Officer
DDO	District Development Officer
DHO	District Health Officer
DPC	District program Coordinator
EmOC	Emergency Obstetric Care
FP	Family Planning
IDSP	Integrated Disease Surveillance Program
IEC	Information, Education and Communication
IPD	Integrated Population and Development
IUD	Intra-Uterine Device
LR	Labor Room
MCH	Mother and Child health
MO I/C	Medical Officer In-Charge
M&E	Monitoring and Evaluation
NGO	Non-Governmental Organization
NRHM	National Rural Health Mission
OCP	Oral Contraceptive Pills
OPD	Out-Patient Department
PHC	Primary Health Centre
PIP	Project Implementation Plan
QA	Quality Assurance
QAC	Quality Assurance Cell
QAG	Quality Assurance Group
RCH	Reproductive and Child Health
RDD	Regional Deputy Director
RH	Reproductive Health
RTI	Reproductive Tract Infection
STI	Sexually Transmitted Infections
TA	Technical Assistance
UN	United Nations
UNFPA	United Nations Fund for Population Activities
USAID	United States Agency for International Development

ACKNOWLEDGEMENTS

In carrying out the pilot study and its subsequent scale-up in Gujarat, many people have contributed in different ways. First of all, we extend our special thanks to Dr. Amarjit Singh, Commissioner and Secretary of Health, Government of Gujarat for his immense interest, commitment to quality, and continued support throughout pilot and scale up phase. We would also like to thank Dr. Vikas K. Desai, Additional Director Family Planning and Dr. D. Bhatt (the then Additional Director, Family Planning), DOHFW, for their active involvement and support. Our sincere gratitude to Dr. J. L. Meena, State QA Coordinator, for his active participation and coordinating the QA scale up activities in the entire state. We are also thankful to the DHOs of Dahod, Surendranagar, Chandrapur and Gadchiroli districts for implementing the QA visits in their districts during pilot phase. Dr. Robert Clay and his colleagues at USAID/India have been tremendously supportive throughout this project, and its subsequent scale-up. We are grateful to Dr. Dinesh Agarwal, Dhanashree Brahma and Arvind Pullikal (the then State Program Coordinator) of UNFPA for their unremitting guidance and support during pilot phase and in finalization of QA tools.

Finally, we would like to acknowledge support and help from our colleagues at the FRONTIERS office of the Population Council in India and USA. We would like to especially mention Dr. John Townsend, Dr. Ian Askew, Ms. Sohini Roychowdhury and Ms. Geetha Vaithyanathan.

BACKGROUND

Quality assessment (QA) and quality improvement (QI) activities have burgeoned in recent years, stimulated by a diversified rationale, experiences and perspectives. Most interventions are driven by the fact that provision of services should reflect the providers', management and clients' perspectives. There is also increasing recognition of the need to ensure that providers adhere to service delivery protocols so as to achieve desired health outcomes, and to be able to measure service quality on a continuing basis. Quality management models from industry, demands from providers' professional associations, increased focus on clients' perspectives and satisfaction, and emphasis on achieving efficiency in program settings have provided much needed momentum to introducing these interventions.

The Government of India (GOI), through its Reproductive and Child Health II (RCH-II) and National Rural Health Mission (NRHM) programs, is committed to improving the quality of reproductive and child health services provided through its vast network of rural health facilities, which includes primary health centers (PHCs), community health centers (CHCs), Sub-centers and RCH camps. It aims to improve RCH by identifying and filling gaps in the inputs and processes of RCH service delivery.

The Population Council has global experience in conducting operations research to improve quality of reproductive health care and a demonstrated ability to work closely with public health systems to build their capabilities. Population Council devised a framework for defining and assessing Quality of Care (QOC) for family planning services, which captured both the technical and interpersonal dimensions (Bruce 1990; Bruce and Jain 1991; Jain, Bruce and Kumar 1992). Through the USAID-funded Asia and Near East Operations Research/Technical Assistance (ANE OR/TA) project, Population Council staff in India worked closely with district health authorities and medical officers, district public health nurses and health assistants at rural health facilities in Uttar Pradesh to strengthen their supportive supervision to improve comprehensive Maternal and Child Health (MCH) and family planning (FP) services (ANE OR/TA Update No. 8, 1997; Khan et. al. 1997). At the same time, an attempt was made in those districts to mobilize the community and facilitate the functioning of field workers by creating a cadre of volunteer link workers within each village (ANE OR/TA Updates No. 5 and 10, 1997). Further, under a special arrangement with the Secretary of Health and Family Welfare, Government of Uttar Pradesh, efforts were made to enhance the work environment and to improve clients' as well as providers' perspectives of RH services, before implementing the interventions. For example, family planning targets from selected intervention districts were withdrawn and at the policy level, four senior staff from the Population Council were part of a World Bank team that conceptualized and formulated the Reproductive and Child Health program (World Bank Report No. 14644-IN, June 23, 1995). All of these efforts contributed to the withdrawal of family planning targets from the entire country.

Building upon these previous experiences, and to meet the growing demand from the Central and State Governments for a standardized method to address quality of care issues, the USAID-funded Frontiers in Reproductive Health Program (FRONTIERS) in collaboration with the UNFPA developed tools, checklists and a procedural manual to introduce a QA process at the district level of management. Pilot testing of these tools and manual was undertaken in four districts, two each in Gujarat and Maharashtra states. Besides providing technical assistance to the state health departments, the operations research component of the project tested, through a pre and post surveys, the institutionalization of this process and showcased the improvements in reproductive health services provided by the PHCs and CHCs. The QA project developed a set of checklists that could be used by the Quality Assurance Group (QAG), a group of 3-4 district level health officials, to assess the readiness and quality of services provided by each facility. The project also developed guidelines and a manual on how to use these checklists and an analysis plan for the data collected by the QAG to recommend actions for improvement.

The QA intervention was an attempt to improve the quality of services through a standardized process involving the use of practical and feasible indicators for quality assessment and to transform existing supervision practices into a more standardized and structured quality assessment process. Since the very beginning, the project was guided by the belief that any sustainable change in the institutionalization of a QA mechanism will need to come from within the system, not from outside, and followed the principle of institutional capacity building for its replication into a wider area.

OBJECTIVES

The overall objective of this study was to work with state governments to demonstrate the feasibility of institutionalizing QA checklists and to show that services can be improved to the desired level in a sustainable and acceptable manner by creating an enabling environment at the health facilities. More specifically the project aimed to:

1. Assist state governments to develop operational details for introducing a Quality Assurance Program at the district level management.
2. In consultation with the district/state authorities and other experts, develop simple indicators of quality of RCH services at the PHC and CHC levels using a quality framework that incorporates provider, client and community perspectives.
3. Help in developing tools and checklists that could be used for assessing enabling environment at the health facilities and measuring the inputs, processes and

outputs of RH services by the QAG. Develop a scoring system to grade the health facilities on their attempts to improve the quality of performance.

4. Train District Quality Assurance Groups (DQAG) for undertaking rapid appraisals of the quality of services at the PHCs/CHCs using the tools and checklists. Build the capacity of DQAG and district management to analyze data and use this information to improve the quality of RH services provided.
5. Evaluate and document the impact of QA interventions.

STUDY LOCATIONS

Two districts each from Gujarat and Maharashtra were selected. UNFPA/India, through its Country Programme 6 (2003-2007) of 'Integrated Population and Development Programme' (IPDP), supported the Government of India to translate the International Conference on Population Development (ICPD) mandate and strive towards meeting Millennium Development Goals (MDGs). This program was implemented in 32 districts in five states, including Gujarat and Maharashtra. The objectives of the IPDP were to increase access to quality RH information and services in project districts, support programmatic interventions for meeting sexual and RH needs of adolescents, and empower community for better organization of demand side with special reference to gender equity.

Dahod and Surendranagar districts were chosen in Gujarat and Gadchiroli and Chandrapur were selected in Maharashtra. Approximately 25 percent of the PHC/CHC facilities were selected through systematic random sampling for a pre and post intervention assessment. Five to 13 health facilities in each of the selected districts were covered in the study. Evaluating the impact of this approach and documenting the process was undertaken by an independent research and consultancy organization, the Centre for Operations Research and Training (CORT), following a bidding process.

IMPLEMENTATION PROCESS

The pilot phase consisted of three main activities. These included:

1. Development of a quality framework, standards, indicators, tools and QA checklists and conceptualization of the operational details for their use.
2. Development of a training manual for District Quality Assurance Groups.
3. Organization of orientation workshops and training sessions for different levels of providers to make them understand the concept, significance and process of the district level Quality Assurance program.

Development of the QA framework and approach

The implementation process started with development of the QA checklists, based on a review of accepted guidelines and standards of care prepared by the Ministry of Health and Family Welfare (MOHFW), Government of India. As the first step, in June 2004, visits to health facilities in the four pilot districts provided factual information for initial understanding of the issues of quality in reproductive health service delivery. These visits also collected information on supervisory issues that needed to be assessed and addressed through a quality assurance process. An expert advisory group meeting was held in August 2004 to highlight the priority RH services needing assessment and improvement (see Box 1). The expertise represented senior central government technical program managers, senior obstetricians, public health academics, and researchers of various UN agencies and NGOs.

Initially, a comprehensive list of indicators was prepared which covered a range of services and the indicators related to those services. The advisory group of experts reviewed the comprehensive list of possible indicators and narrowed the scope of the assessment to just those items that were considered of primary importance to assess functioning and a respect for clients' needs and rights. These items were further discussed with state level administrators in the two states. These informal meetings further helped narrow the list of possible RH quality indicators for services provided at PHCs and CHCs. The final QA checklists thus developed covered the following areas:

1. Comprehensive maternity services: focused antenatal care, emergency obstetric care, and postnatal care.
2. Basic RTI/STI prevention and treatment using an etiological approach where laboratory services should be made available.
3. Provision of family planning services including counseling and prevention of unwanted pregnancies.

Box 1: Experts Group for QA Checklist Development

Prof. John Cleland, London School of Hygiene and Tropical Medicine, U.K.

Prof. Jai Satia, Director, International Council on Management of Population Programme, Malaysia

Dr. Lalrintulangi, Deputy Commissioner (RSS) Ministry of Health and Family Welfare, New Delhi

Prof. Rajesh Kumar, Head of Department- Community Medicine, PGIMER, Chandigarh

Mr. S.K. Das, Chief Director- Data, Ministry of Health and Family Welfare, New Delhi

Dr. M.E. Khan, Regional Associate Director, FRONTIERS Program, Population Council, New Delhi

Dr. Leila Caleb Varkey, Senior Program Officer, FRONTIERS Program, Population Council, New Delhi

Key Considerations in checklist development: At the outset, the following parameters were set when developing the QA checklists:

- The measurement of all indicators should be completed within clinic working hours, taking approximately 2 ½ to 3 hours.
- The measurements should be simple enough so that a three-member team from the District Health Officer's office (off-site supervisors) can make the assessment without referencing advanced manuals.
- The results for each indicator should be tangible so that improvements or deterioration could be aggregated to give each facility a score or grade.
- The copy of checklists should be shared with Medical Officers (MOs) and information for the QA visit should be conveyed well in advance to make the whole QA process transparent and supportive, rather than be perceived as a 'policing' assessment.
- Each visit should provide a stand-alone assessment so that no further information on the numerator/denominator is needed to arrive at a score.

The draft checklist was based on the feasibility of the items to be objectively evaluated during the district QAG visit to a facility. The framework of Inputs, Processes and Outputs guided development of the checklist. In order to get a holistic picture of the issues involved in delivering quality services, it was decided that service quality would be assessed from both providers and clients' perspectives (see Table 1).

Consultations to finalize the checklists: Using this framework, a list of possible indicators for each cell of the grid was prepared. A two-day "National Consultative Meeting of Quality Assurance of Reproductive Health Services at PHC/CHC Level" was organized on 9 - 10 August 2004. Participants included senior National and State level officials in the Ministry of Health and Family Welfare besides researchers, program managers and implementers from various UN departments and NGOs. After an overview of the issues guiding the checklist and proposed measures of quality assurance, participants' contributions were elicited. The participants were divided into three groups covering FP, RTI/STI and MCH, respectively with a resource person guiding the discussion. Professor Jay Satia facilitated discussions in the Family Planning group, Prof. John Cleland, in the RTI/STI management group, and Dr. Rohit Bhatt the Maternal and Child Health group. Each group went critically through the checklist of possible Input, Process and Output measures to suggest a small number of best indicators for measurement at primary health care facilities.

Table 1: Quality Assessment Framework

RH Facility Based Services to be Assessed	INPUTS	PROCESS	OUTPUTS
Family Planning	<ul style="list-style-type: none"> ● Building ● Infrastructure ● Equipment ● Personnel training ● Supplies 	<ul style="list-style-type: none"> ● Clinic-wide procedures e.g.-schedules, hygiene, asepsis ● Technical competence ● Client-provider interaction 	<ul style="list-style-type: none"> ● FP method mix ● Complications ● Follow-up
Maternity Care			<ul style="list-style-type: none"> ● ANC/PNC attendance ● Normal deliveries ● Complications managed
RTI/STI			<ul style="list-style-type: none"> ● Lab tests ● Case treatment ● Follow-up

Immediately after the national consultation, the short listed indicators were then re-grouped into Quality Assessment Checklists with separate sections for each group of inputs – such as personnel, infrastructure, equipment and supplies etc. Process indicators requiring record review, recall or observation were placed together and all output indicators were grouped together into a separate form. This re-grouping was done to simplify the process of assessment by supervisors in the field, as there is enormous overlap of inputs and processes for various RH services at the point of actual service delivery i.e. the PHC/CHC.

The next level of consultations was held with the State level providers and program managers. The first draft of the QA Manual containing the QA checklists and descriptions of how to measure each indicator was discussed at State level QA workshops held at Vadodara, Gujarat in September and at Nagpur, Maharashtra in October 2004. In addition to senior program managers from the state health departments, Regional Directors, District Health Officers, District RCH Officers and the Chief Development Officer of the two study districts also participated in the meeting. The participants reviewed and discussed indicators to ensure accuracy and operational viability within state norms for PHC/CHC level RH services. The State QA workshops were also a forum where the strategy for district level implementation was discussed and the roles and responsibilities of State, Regional and District supervisory systems including the formation of the District Quality Assurance Group were identified.

Given that most districts have approximately 60 PHCs, and considering the personnel requirements to make QA visits to all the PHCs/CHCs, it was decided to pilot-test the QA process in one quarter of the facilities; if found feasible, the process could then be introduced into the remaining facilities. Additionally, all four pilot districts had many facilities without a Medical Officer (MO) due to a shortage in the district public health services. Presence of an MO was considered the most important determinant of quality

at the facility level and thus was set as the most basic criterion for inclusion of a facility in the sample.

District level consultations were then held with the District Health Management teams and key State officers in each of the four districts, at which identification of QAG members and a district level Coordinator for organizing and documenting all QA activities were discussed. In Gujarat, a full-time Medical Officer was appointed in each district as QA Coordinator, while in Maharashtra state, it was not feasible to appoint a full-time district level officer, and so the QA coordination responsibilities were delegated to the existing district IEC/IPD officer. These different approaches provided the opportunity to learn about and compare alternative models.

Pre-testing the QA Checklists: The QA checklists were pre-tested immediately after the State-level workshops at 13 PHCs/CHCs from across both states. The pre-testing revealed some practical problems. The use of the checklist in one day was feasible, but there the listing of items in the QA forms needed re-ordering to collect the information more systematically. Provision was made for the most senior QAG member to use the Medical Officer's room to be able to review the laboratory, antenatal, inpatient and outpatient records and record the quality processes and indicators of service utilization. Responsibilities of the three QAG members were clearly separated to make the assessment more systematic; for example, all components that required physical checking and observation were put together, those requiring a review of supplies and equipment and discussions about maternal and newborn care were put together, and a review of records to assess process and outputs were grouped together. After re-organization of the checklists, they were translated into Gujarati and Marathi languages, using translation expertise from the State Departments of Health and Family Welfare to ensure the translations made sense to those working in the department.

Development of an operational manual for District Quality Assurance Groups

A manual was prepared to assist the QA team members in conducting the QA visits. The manual describes how to initiate the QA process and to sustain QA visits on a quarterly basis. It also describes the roles and responsibilities of various district officials in the Quality Assurance Group and explains the steps involved in using the QA checklist at the



Quality Assurance Manual

facility. The last chapter describes how to summarize and compile QA reports for district level actions.

UNFPA was closely involved in development of the manual through the active participation of one of its senior professionals (Dr. Dinesh Agarwal), who critically reviewed the whole text before it was finalized. This QA manual has now been adapted by the State Health Department of Gujarat and is being used to expand QA activities throughout the state following its formal handover by the Chief of the Population Health and Nutrition, USAID/India (Robert Clay).

Training and Orientation at District Level

Training of District Quality Assurance Groups: When the manual was ready, the districts selected the supervisors who would be members of their District QAG, prepared a plan for QAG visits in the first quarter of the financial year 2005-06, and initiated the QA process, beginning with training of the QAG members. The Chief District Health Officer (CDHO), RCH Officer, District Public Health Nurse, Additional DHO of Family Welfare, Chief Medical Officer (CMO) of the district hospital among others constituted the district QAGs. The District Development Officer (DDO) also participated in the training. FRONTIERS staff collaborated with the State Health Departments to conduct three-day training sessions at the district level, which covered issues such as planning and making a field visit, the meaning and purpose of measuring each indicator, how to record data collected, how to score and grade a facility, and preparation of output summary reports. The QA Operational Manual was used to orient and train District QAG members in the QA process. Role plays were used to familiarize them with the QAG monthly reporting and meeting process.

Medical Officers' Orientation about the QA Process: Each district QAG (with support from FRONTIERS) organized a one-day orientation workshop for all the Medical Officers in-charge (MO I/C) of the selected PHCs and CHCs about the QA process. These orientation meetings maintained transparency in the assessment process and enabled the MOs to be aware in advance the assessment indicators and process.

QA visits to the PHCs/CHCs

In each pilot district, a quarterly QA schedule of visits was prepared, which included the name of PHC/CHC, proposed date of visit, and the QAG members making QA visit. The QA coordinator took the lead in preparing these schedules and shared them with QAG members and the MO I/Cs of facilities to be visited, well in advance of the visit dates. During each QA visit, one a QAG leader was identified; originally it had been recommended that the roles and responsibilities of the QAG members, including the group leader, should be rotated routinely so that each QAG member became familiar with all QA activities. But most frequently the most senior person in the QAG led the group, and sometimes delegated their responsibilities to other QAG members.

QAG members usually reached a facility and started the assessment after OPD hours, i.e. around midday, to minimize disturbances to clinical services; in some cases, however, the QAG had to visit the facility during peak clinic hours.

Support, monitoring and feedback

A FRONTIERS staff member was posted at Baroda, Gujarat, to provide support to the QA teams in each state. He regularly visited the four study districts and accompanied teams, observed the whole process and, as and when required, helped them to carry out the visit properly and filling out the information correctly. Considerable assistance was required, at least initially, in dividing responsibilities among QAG members, completing the checklists correctly, extracting data from the service register, summarizing the observations made during the visits, and debriefing the MO I/C and their staff on the gaps observed, including recommending improvements that could be made without waiting for extra support from the district.

On completion of the QA visit, the QAG leader, together with the other QAG members, discussed the findings and gaps in service quality with the MO I/C and PHC/CHC staff. Each indicator that scored lower than required was reviewed to arrive at a consensus on action needed to improve the quality. The QAG calculated the overall scores, graded the facility and filled the output summary sheets at the facility itself. They discussed the output summary sheets with the MO I/C, and both the QAG and MO I/C signed the sheets after mutually agreeing on the score.

The designated district QA coordinators prepared District QA summary tables giving highlights of the key issues and problems observed during QA visits. These QAG reports were reviewed at monthly district QAG meetings. After reaching a consensus on the actions needed, letters describing the actions required were issued to the concerned facilities. The monthly district-level meetings with the MO I/Cs were also used to communicate these decisions. Monthly reports on the QA activities were also sent to the Regional and State level supervisors to ensure that the actions taken were documented and reported. When making the next QA visit to a facility, the QAG carried with them the summary of the previous assessment and reviewed performance with particular attention being paid to the recommended actions.

RESULTS

Findings from the baseline survey

A baseline survey was conducted to assess the status of service quality at the PHCs/CHCs prior to initiating the QA activities. In all, 32 facilities were selected

through systematic random sampling for the baseline assessment. Facilities selected in Gujarat included 10 PHCs and 3 CHCs in Dahod district and 6 PHCs and 3 CHCs in Surendranagar district. In Maharashtra, 5 PHCs each were selected in Gadchiroli and Chandrapur districts. Data collected included an assessment of the quality of reproductive health services from the perspectives of clients, providers, supervisors and the community through interviews with the Medical Officers, female health workers, laboratory technicians/pharmacists/male health supervisors and class IV workers and exit interviews with clients. Key findings from the baseline survey include:

- Most clients received all the services they wanted from the service providers.
- Nearly half of the clients said that privacy was lacking during examinations.
- In the majority of facilities, women received the full range of ANC services. Fourteen of the 32 facilities (44%) were fully equipped to conduct normal deliveries for 24 hours; however, 25 facilities (78%) had no personnel trained to provide even basic Emergency Obstetric Care.
- Only three women delivered on the day of the QA visit. None were observed to breastfed their newborns within one hour of birth, and all had applied something on the cord. No facility had protocols or job aids for newborn care.
- Of the 32 facilities, 23 (72%) had a doctor and 24 facilities (75%) had a lab technician and/or nurse trained to support RTI/STI diagnosis. Twenty-nine clinics (91%) had a fully equipped laboratory for management of RTI/STI cases; in 13 facilities (41%), however, no lab tests were done and most RTI/STI cases were referred elsewhere.
- Using the QA tools, the facilities were graded according. Only three facilities scored a grade A (More than 75%), 28 facilities (88%) scored a grade C (26-50%), and one facility scored D grade (less than 26 percent of the total score). All three facilities with a grade A were CHCs in Gujarat.
- In terms of equipment and supplies for laboratory and MCH services, drugs and consumables, and record keeping, 55 percent of the facilities scored a grade B (51-75%), while for personnel, infrastructure, in-ward services, FP services in RCH camps, and essential protocols and job aids, most facilities scored a grade C or D.
- The building and operation theatres lacked maintenance or cleanliness, adequate and regular water supply and availability of basic functional equipments. Additionally, improper arrangements of waste disposal, non-observation of infection prevention practices and lack of IEC materials were widely observed.

Findings from three QA visits

It was agreed that at least three visits would be required to measure the effectiveness of the QA process. In Gadchiroli district, Maharashtra, QA visits were abandoned after the

first one when extensive changes in staffing rendered it impossible for the QAG to continue. The other three districts completed the three quarterly QA visits to all facilities.

Analysis of changes in key quality indicators was carried out after completion of the three quarterly visits. As can be seen in Table 2, significant improvements in the readiness of the facilities between the 1st and 3rd visits can be seen. Dahod District performed most encouragingly, where the total scores showed a remarkable improvement. In the first quarter, no facility scored a grade A, yet by the second visit over half (54%) of the facilities achieved a grade A; this increased further to three-quarters by the third quarterly visit. During the third visit, only 25 percent of the facilities scored a grade B, and no facility scored grades C or D. Similarly, in Surendranagar and Chandrapur districts, the proportion of facilities scoring a grade A increased from nil at the first visit to 13 percent and 11 percent respectively in the second visit, and to 33 percent and 46 percent respectively by the third quarterly visit.

Table 2: Changes in overall grades

Grades	Dahod			Surendranagar			Chandrapur		
	1st Qtr.	2nd Qtr.	3rd Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.
Grade A	0	54	75	0	13	33	0	11	46
Grade B	8	46	25	67	67	60	83	83	54
Grade C	84	0	0	33	20	7	17	6	0
Grade D	8	0	0	0	0	0	0	0	0
Total No. of Facilities	20	20	20	15	15	15	18	18	11

Table 3 illustrates the improvements in selected maternal and child health, family planning and RTI/STI indicators. The availability of a provider trained in Emergency Obstetric Care (EmOC) is crucial to minimize facility level delays in managing emergency cases and to save a mother's and newborn's life. The checklists identified the need to train doctors and nurses in EmOC, but the second and third visits show that only Dahod district took steps to train their providers – during the third visit, 50 percent of facilities had a doctor or nurse trained in EmOC, compared with only 20 percent during the first and second quarterly visits. The other two maternal health indicators – percentage of facilities having a labor room and percentage of facilities providing PNC within first 6 weeks – showed improvements in all the three districts. By the third quarter, all facilities in Dahod had at least three spacing methods, compared with 85 percent in the first quarter visit, and the proportion having at least three spacing methods also increased steadily in Surendranagar and Chandrapur districts. The RTI/STI indicators also showed considerable improvements in all the three districts.

Table 3: Change in Selected MCH, Family Planning and STI/RTI Indicators

Indicators	Dahod			Surendranagar			Chandrapur		
	1st Qtr.	2nd Qtr.	3rd Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.
Maternal Health									
▪ % of facilities where a doctor or nurse is trained in EmOC	20	20	50	13	DNA*	7	0	0	0
▪ % of facilities have labor room and conducted ≥ 10 deliveries in past 3 months	65	65	70	40	27	60	5	25	45
▪ % of facilities providing PNC for women and/or newborns within 6 weeks of delivery	23	50	70	7	27	DNA*	27	44	45
Family Planning									
▪ % of facilities where at least 3 temporary methods are available	85	100	100	40	73	80	61	81	91
RTI/STI Indicators									
▪ % of facilities where MO, Female Health Worker and Lab technician. ALL trained for RTI/STI	20	30	50	20	40	33	66	63	73
▪ % of facilities can diagnose bacterial vaginosis with KOH	55	65	90	47	53	60	89	75	73
Total No. of Facilities	20	20	20	15	15	15	18	16	11

*DNA – Data Not Available

Changes in funding State health services and their effect on the QA process

Withdrawal of IPD Funds: At the time this project entered the second round of visits, the Government of India decided that all funding for RH issues should be pooled together and administered through the Central Ministry of Health and Family Welfare under the RCH II Program instead of through funding the state-level programs individually. As a result of this change, UNFPA’s financial assistance to states through the IPD Program was withdrawn and all resources were pooled within the RCH II program at the central level. Withdrawal of IPD funds had an immediate impact on the activities of the districts funded through the IPD program – both Maharashtra and Gujarat’s Health and Family Welfare Departments issued D/O letters to district managers to stop all IPD-related activities, which included the QA visits.

With the withdrawal of IPD funding, the position of QA coordinator was also eliminated, which had a variable impact in the districts. The decision to continue or discontinue the QA activities was left to each district health management team. The district health authorities in Gadchiroli, Maharashtra, which was suffering from district

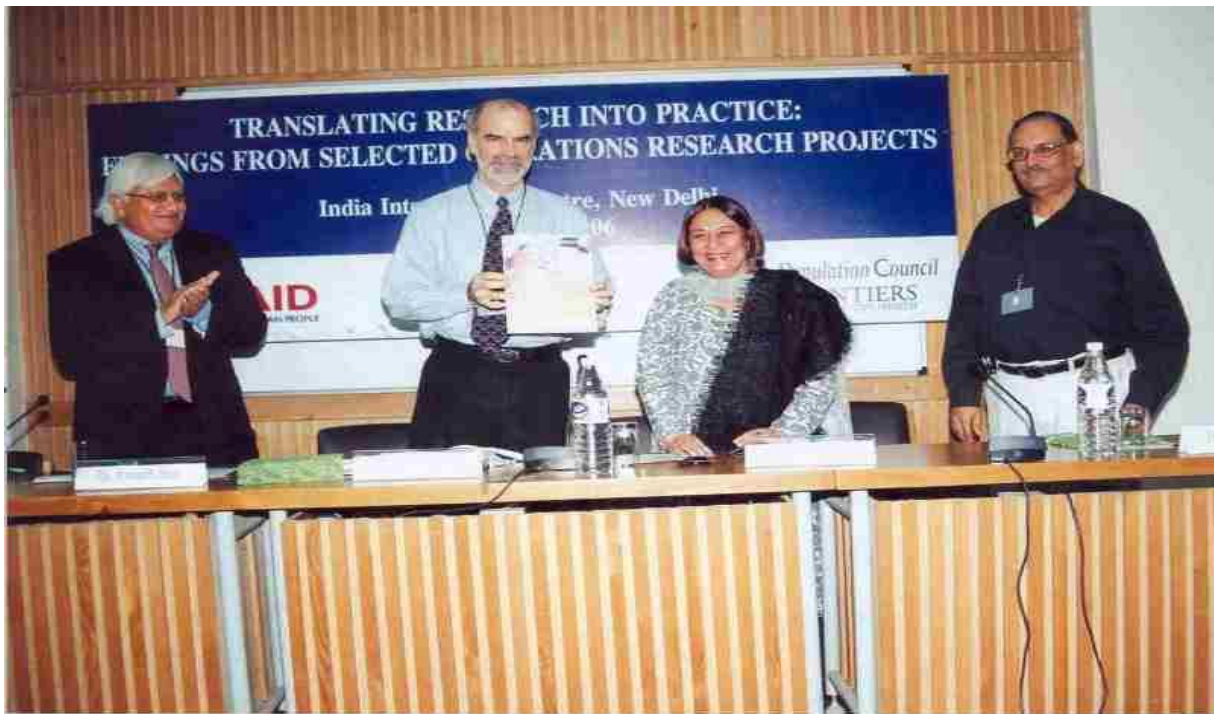
level staff shortages and frequent transfers of district level officials anyway, decided to completely abandon the QA process. The district administrations of Chandrapur in Maharashtra and of Dahod and Surendranagar in Gujarat decided to continue with the QA activities; they did this by linking the QA visits with the regular supervisory visits. The QAG members were asked to administer the checklists on a quarterly basis during their routine supervision visits to PHCs/CHCs, and these districts also decided to use resources from other health programs to address the issues identified through the checklists.

QA Activities in Gujarat after IPD withdrawal: The state officials in Gujarat appreciated the potential usefulness of the QA process and felt that the approach could be sustained if it was made an integral component of the RCH II program and the necessary resources were linked with the District Program Implementation Plan (DPIP). Accordingly, the QA process and resources for quality improvements were made part of the RCH II program budget. District officials felt the same way: commenting on the QA a district official stated '*If I go without the checklist I may forget many things to ask, but now with this checklist I will be able to check all things and my supervision will improve*'. Further, several facility staff including the MO, female and male health workers, confirmed that there were now regular supervisory visits by district officials to the facility to check their performance.

The key factor that facilitated continuation of the QA process in Gujarat was the initiative taken at the beginning of the project by State Department of Health and Family Welfare to include the QA visits under the RCH II program; because of this, the State could allow districts to use RCH-II resources for making QA visits, and so steps to institutionalize the QA process within the state health system was already well in advance, even before withdrawal of IPD funds. Surendranagar district, however, could not resume the QA visits for about a year after IPD withdrawal because staff were heavily involved in controlling an epidemic caused by flooding in the district. To ensure continuation of QA activities in Dahod district, the MO I/C was asked to take on the additional responsibility of coordinate the QA visits.

COMMUNICATION OF RESULTS

Throughout the project, a series of meetings were organized at district, state and national levels. After each quarter, district and state level meetings were organized to discuss the findings from that round of visits. In addition, a meeting with officials of the national MOHFW was organized after completing the first visits. Towards the end of the study, the final results from the analysis of the three QA visits were presented at a national dissemination workshop held in February, 2006; included in the audience were the Commissioner and the Secretary of Health, Gujarat, and the USAID/India Mission Director. The findings were well received and it was agreed that efforts would be taken to integrate this QA process within the ongoing RCH-II program. The final version of the checklists and the QA Operation Manual were officially released by Mr. Robert Clay, Chief of Population Health and Nutrition Division, USAID/India at a national conference on *'Translating Research into Practice'*, organized by FRONTIERS.



Mr. Robert Clay, Chief, PHN Division, USAID/India, releasing the QA Manual

SCALING UP THE QA PROCESS IN GUJARAT STATE

Planning for scaling-up the QC process

Based on the encouraging results from the assessment three visits, the Principal Secretary and Secretary and Commissioner of Health, Government of Gujarat, decided to scale-up the QA process in all 25 districts of the state in a phased manner. It was also decided that about half of the facilities would be covered in the first phase and the remainder in a second phase. It was further decided that visits to sub-centers to assess quality of services would be initiated after one year.

Accordingly, the QA process was introduced in 401 PHCs (37% of all PHCs in the state) and in 65 CHCs (24% of all CHCs), Selection of facilities within a district varied, from 17 percent in Mehsana district to 100 percent in Porbandar and Dand districts, primarily because during the first phase of expansion only those facilities that had a doctor and the clinic was functional were included. FRONTIERS staff provided technical assistance throughout the planning and implementation of the scale-up activities and helped develop the capacity of the State health officials to carry out the QA activities independently.

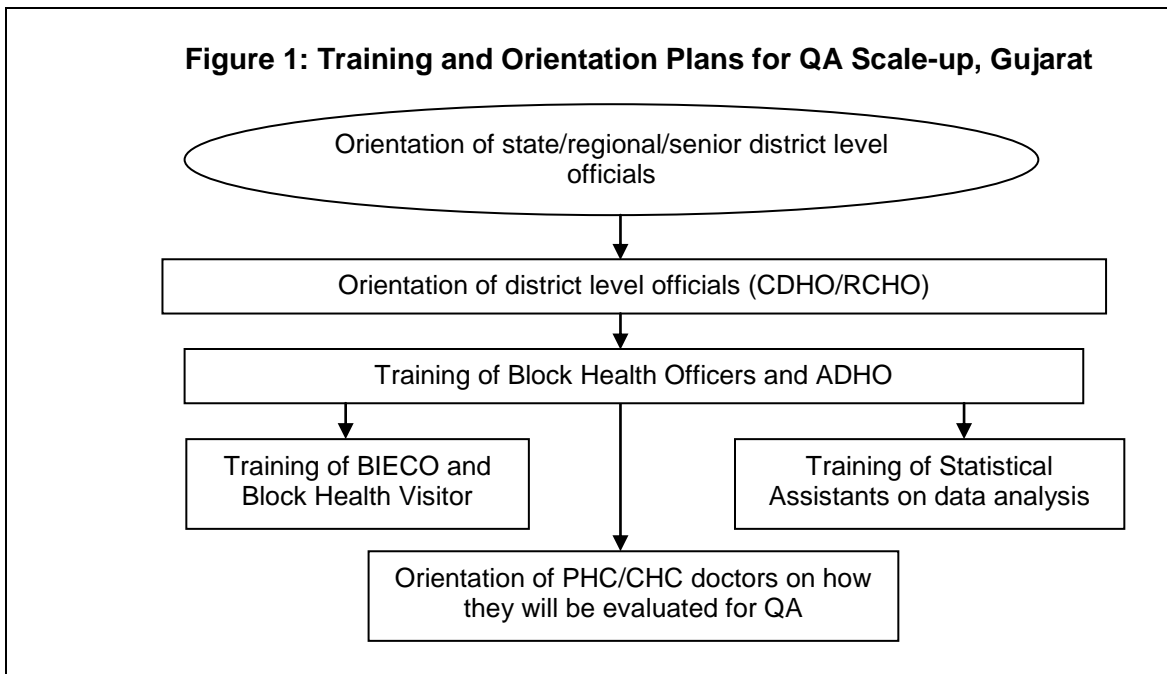
The scale-up process began in May 2006 with a state level orientation workshop. The Commissioner of Health and Secretary Family Welfare, along with the Additional Secretary, Department of Health and Family Welfare, Government of Gujarat, took the lead in organizing this workshop as well as orienting their staff. The 120 participants included senior state level officials and Regional Deputy Directors (RDD), Chief District Health Officers (CDHO), RCH officers and faculty members of the Social and Preventive Medicine Department of various medical colleges of Gujarat. A framework for capacity building of the state, district and block level officials/doctors by conducting different level of trainings was drawn up and guided implementation (Figure 1 below).

Following this framework, a total of 1,922 providers have been oriented and trained, including 197 ADHOs and BHOs, 29 District Program Coordinators (DPC) and Statistical Assistants, 396 Block Health Visitors and Block IEC Officers and 1,180 CHC/PHC Medical Officers. The details of training batches organized are briefed below:

- Seven batches of two-day regional/state level trainings were organized during June to August 2006 to train all the Additional DHOs and Block Health Officers (BHO) of the state as Master Trainers. A total of 197 BHOs/ADHOs attended the training. The number of participants in each batch ranged from 23 to 32 officials.
- Two batches of one-day orientation workshops, one for the District Program Coordinators (DPC) and second for District M&E Assistants, were organized

during July 2006 to orient them and explain their role and responsibilities about the QA program. A total of 24 DPCs and 5 M&E Assistants attended the workshops.

- Twenty batches of two-day district level training of Block Health Visitors (BHV) and Block IEC Officers (BIECO) were organized during July to October 2006. A total of 396 BHVs and BIECOs have been trained.
- Twenty district level orientation workshops for Medical Officer In-charges of PHCs/CHCs were organized in July -October 2006. A total of 1180 MO I/Cs have been oriented about the QA checklists and how their clinics (PHCs/CHCs) will be evaluated.



The state DOHFW planned and organized all of these trainings in batches and provided all required logistical support for the trainees and resource persons. At the state level, the department appointed and funded a Joint Director-level official as QA In-charge and a QA Coordinator to manage all QA activities. The state's strong commitment was demonstrated through action it took early on in the scale-up exercise. During some of the initial training workshops, state level officials were not present to facilitate the training, and consequentially it was observed that some district level officials were not taking the training seriously. On hearing about this, the Commissioner of Health and Secretary Family Welfare instructed that, in addition to the State QA Coordinator, a state Director or a Regional Deputy Director must always be present during district level trainings to enhance the trainees' attentiveness and participation.

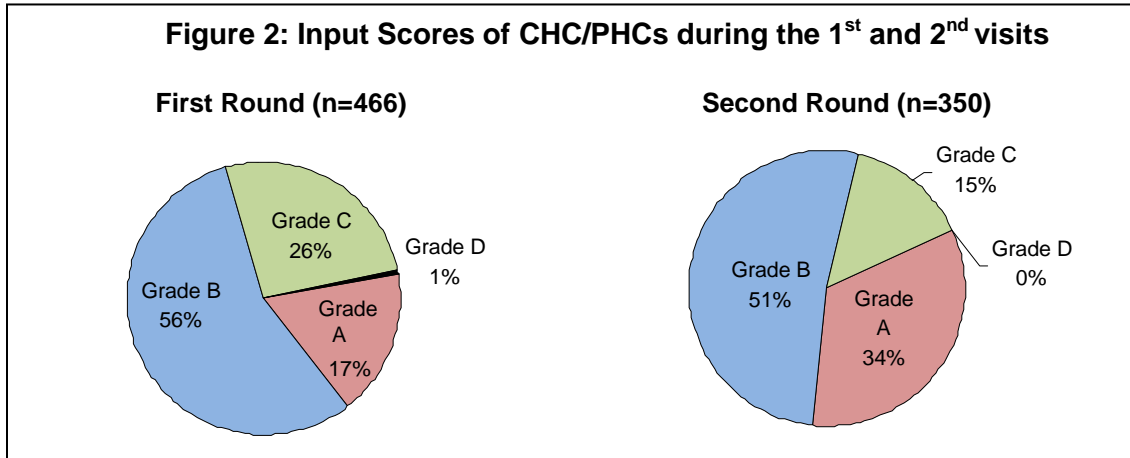
At the request of the state DOHFW, FRONTIERS developed a data entry software package to standardize entry of data for monitoring quality, which was provided to all districts and to their Statistical Assistants. FRONTIERS staff trained the Statistical Assistants in five districts, and subsequently, training of the other district Statistical Assistants was managed by the state's trainers. The QA manual and checklists were formally adopted and printed by the Government of Gujarat as an official document and used for training of providers and making QA visits.

The following points highlight the scale-up accomplishments to date, the key gaps found using the QA checklists, actions recommended by district authorities, and the problems experienced in conducting QA visits:

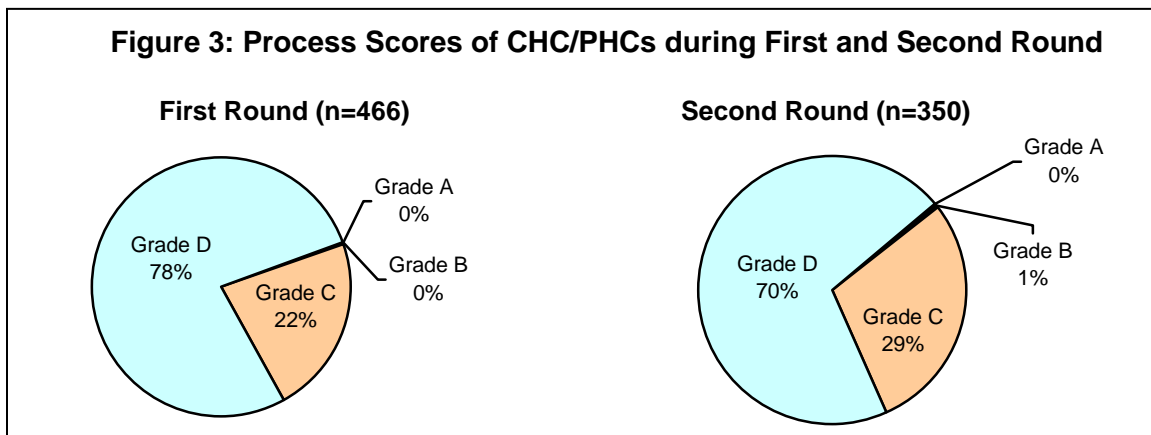
- Only one of the 25 districts did not complete the trainings of QAGs (Surat). The MOs of selected PHC/CHCs were oriented in the checklists and all of them were informed about how they would be evaluated. Activities in Surat were deferred because at the time the whole district was suffering from a serious flood and the all administrative and health staff were engaged in relief work.
- After completion of the training, implementation of the QA visits was initially slow with many districts not taking any action. After intervention from the Health Commissioner through a D/O letter asking for the status of the QA visits and their results, the visits in were regularized and all districts started QA visits, though at their own individual pace.
- By December 2007, the first round of QA visits had been completed in 24 districts, the second round of visits in 19 districts, and a third round visits in 5 districts.
- Results from the first round of visits were quite discouraging and revealed a substantial lack of readiness of health facilities to provide quality services. In addition to the necessary infrastructure and logistical support, many facilities lacked trained staff. These findings were taken seriously by the state administration and letters were issued to authorize addressing the gaps immediately. Throughout the state, trainings were organized so that each PHC should have at least one trained doctor/ nurse in managing EmOC.
- Comparison of findings from the first and second round of visits showed that the readiness of the facilities improved significantly. Several doctors and nurses were trained in EmOC, and doctors and paramedics were trained in managing RTIs/STIs. A number of laparoscopes were purchased to facilitate sterilization and adherence to infection prevention practices.

Improvements in inputs: Inputs were measured in terms of availability of human resources, infrastructure, equipment, medicines and contraceptives, and service delivery protocols. As can be seen on Figure 2, during the first round of QA visits, most facilities scored a grade B. Scores increased remarkably during the second

round of visits, with more than one-third of facilities scoring a grade A, and only 15 percent of facilities scoring grade C.



Improvements in processes: Quality process indicators measured items such as facility cleanliness, maintenance of records, infection prevention practices (such as hygiene and asepsis), adherence to service delivery standards, and trend in service utilization (outcomes). The analysis revealed that the process of offering quality, in general, was poor. The analysis revealed that more than three-quarters of the facilities scored a grade C and one fifth scored a grade D during the first visits; no CHC/PHC could score a grade A or B during the first round. However, during the second round of visits, slight improvements were, with seven percent of facilities moving from grade D to C, and one percent moving from grade D to B (Figure 3). The continued low scores for process indicators clearly reflect that poor quality services continue to be provided by CHC/PHCs and that improvement in readiness to do easily translate into improvements in quality or outcomes.



Gaps Identified: The key gaps for which the district QAGs recommended actions include: infrastructure and cleanliness of facility, availability of protocols and job aids and maintenance of service records and reports (see Table 4).

Table 4: Input and Process Gaps Identified

Gaps Identified	
Inputs	Processes
<ul style="list-style-type: none"> ▪ Repair and maintenance of building ▪ Oxygen cylinder available in working order, ▪ Emergency medicines, lab reagents ▪ Training of providers on EmOC, RTI/STI, MTP ▪ Availability of essential protocols and job aids ▪ Telephone for incoming and outgoing calls ▪ Signboard and suggestion box ▪ Instruments and Equipments ▪ One staff available at facility round the clock ▪ Emergency medicines and delivery kits ▪ Solid waste containers in each room ▪ Proper arrangement for segregation of waste 	<ul style="list-style-type: none"> ▪ Maintenance and updating of records/registers ▪ 100 percent registration of ANC cases ▪ Facility conducting deliveries in night ▪ New born babies breastfed and given polio '0' ▪ Partner identification and treatment of RTI/STI ▪ RTI/STI screening before IUD insertion

Actions Initiated: Districts and the state administration started taking actions to address these gaps identified, including:

- ✓ Repair of CHC/PHCs, which is either complete or continuing
- ✓ Land acquirement for construction of new PHCs and sub-center building is ongoing
- ✓ Whitewash, water supply, electricity supply, and drinking water for clients, toilet for women, have been arranged
- ✓ Privacy is being maintained at the facilities
- ✓ Oxygen cylinders have been made available
- ✓ Emergency medicines have been purchased and supplied by the districts
- ✓ Orders have been placed to print essential protocols and job aids
- ✓ Telephones for clients to call in emergencies have been arranged
- ✓ Instructions have been given to MOs, LHVs, and ANMs to maintain their records
- ✓ Instructions have been given that all women should be registered for ANC, deliveries at the facilities should be conducted during the night, breastfeeding the newborn must be initiated within half an hour, and polio '0' drops must be given
- ✓ Suggestion and condom boxes have been made available at all facilities.

Actions which required initiation at the state level were mainly related to the availability of human resources and meeting their training needs. The analysis in Table 5 shows that training of providers on various issues has been initiated by the state and the regional training centers.

Table 5: Training Needs Identified and Training Accomplished

Type of Provider	Need training On	No. of Providers to be Trained	Number Trained*	% Trained
MO (CHCs)	CEmOC + Gynaec + MTP	54	34	63
MO (CHCs)	Anesthesia	57	57	100
MO (PHCs/CHCs)	RTI/STI	318	70	22
LHV/FHW	RTI/STI	283	148	52
Lab Technician	RTI/STI	352	95	27
MO (PHCs/CHCs)	BEmOC	299	299	100
No. of facilities selected for QA visit: CHC = 65, PHC = 401,				Total = 466

* Training program continues

Comparisons between first and second visits between some selected input and process indicators are presented in Tables 6 to 8 below.

Table 6: CHC/PHC readiness to Provide Quality RH Services (inputs)

Availability of Inputs Elements	Percent of Facilities	
	1 st visit (n=466)	2 nd visit (n=350)
Human Resources/Training		
A doctor trained in EmOC & RTI/STI	20	22
A HS or HW trained in RTI/STI screening	39	45
Lab technician is trained in RTI/STI lab test	25	23
Gynecologist available	22	27
Infrastructure		
Functional emergency lighting available	53	68**
Proper arrangement for segregation of wastes available	65	78**
A functional vehicle with driver available 24 hrs at PHC	58	72**
Separate labor room available	70	82**
Functioning phone available for incoming/outgoing calls	25	35**
Equipments and supplies		
All three temporary FP methods available	83	88*
Pediatric resuscitation kit	25	35**
Newborn mucus extractor or bulb syringe	53	63**
Full Oxygen cylinder with tubing and disposable masks/nasal prongs	33	39

* p < 0.05, ** p < 0.01

Table 7: CHCs/PHCs quality of services (processes)

Process Elements	Percent of Facilities	
	1 st visit (n=466)	2 nd visit (n=350)
Lab register maintained for RTI/STI test	14	14
FW records show OCP usage and new acceptor	71	78*
IUD cards available and filled for follow-up	54	66**
ANC cards available and filled	74	82**
Labor room register record normal deliveries and complications	63	67

* p < 0.05, ** p < 0.01

Table 8: Changes in outputs

Output Indicators	Percent of Facilities	
	1 st visit (n=466)	2 nd visit (n=350)
ANC women's BP more than 130/90 recorded	25	38**
Delivery performed between 8 pm to 8 am	32	43**
Low birth baby kept for 24 hrs. observation	21	25
>25 deliveries at facility within 3 months	10	13
>25 IUD inserted	36	41
>10 RTI/STI cases treated	20	26*
Baby in ward was breastfed within 1 hour, nothing on cord, and given OPV	70 (106)	80 (97)

* p < 0.05, ** p < 0.01

CONCLUSIONS AND RECOMMENDATIONS

The original pilot study of the QA process, and its subsequent scaling up in Gujarat State, has demonstrated that this QA model can be easily integrated within district level program management, with the full support of the state government. However, at the initial stage of implementation, intense and sustained technical assistance from FRONTIERS staff was critical to carry out QA visits, correct use of checklists and procedure of data collection, analysis of the information collected, identification of the gaps in the services and actions required. District supervisory staff could use the checklists in their routine monitoring visits to PHCs and CHCs. Findings from the initial three visits in Dahod district clearly demonstrated the feasibility and usefulness of the approach when systematically implemented.

The scoring system of the Quality Assurance model provides a comprehensive picture of the readiness and quality of services provided at the facilities. This is a simple tool that checks inputs, processes and outputs within public health facilities, which can be easily, accurately and quickly completed by senior supervisors to assess the quality in general and the family planning, maternal and newborn health, and RTI/STI services, in particular.

The state officials, in Gujarat especially, appreciated the QA program. They found the checklists useful, not only in monitoring service quality at facilities but also in systematizing the process of identifying gaps in service quality and addressing them. Realizing that the quality of services is going to be a key component of Government of India's RCH II program and that these checklists meet their requirements to assess the quality, the state officials in Gujarat decided to adopt the QA manual and scale up QA approach in all 25 districts of the state. During the first phase of scale up, 466 CHC/PHCs (approximately 35% of all CHC/PHC in the state) have already been incorporated into the model. As part of the process of institutionalizing the QA program, and to coordinate QA activities and their scale up, a State Coordinator for the QA program has been appointed and supported. His prime responsibility is to monitor the QA program and its outcome and to report to the state-level authorities and follow-up with the district officials on action taken. Results of the first two visits reconfirm the observation of the pilot study that the QA checklists are useful tools that can be used for improving the quality of services.

REFERENCES

- Asia and Near East Operations Research and Technical Assistance. 1997. "Bringing Services Closer to the Community Through Link Persons". *Update*. No. 5. Population Council. New Delhi.
- Asia and Near East Operations Research and Technical Assistance. 1997. "Supportive Supervision: Strengthening Supervision within the District Health System". *Update*. No. 8. Population Council. New Delhi.
- Asia and Near East Operations Research and Technical Assistance. 1998. "Link Person: An Approach to Improve Accessibility". *Update*. No. 10. Population Council. New Delhi.
- Bruce Judith. 1990. "Fundamental elements of the quality of care: A simple framework," *Studies in Family Planning* 21(2): 61-91.
- Bruce Judith and Anrudh K. Jain. 1991. "Improving the quality of care through operations research," in *Operations Research: Helping Family Planning Programmes Work Better*, ed. Myrna Seidman and Marjorie Horn. New York: John Wiley-Liss, pp. 259-282.
- Jain Anrudh K., Judith Bruce, and Sushil Kumar. 1992. "Quality of services, programme efforts and fertility reduction," in *Family Planning Programmes and Fertility*, eds. James F. Philips and John A. Ross. Oxford: Clarendon Press, pp. 202-221.
- Khan, M.E., Saumya Rama Rao, R.B. Gupta, Bella Patel, Leila Caleb Varkey, Jayanti Tuladhar, Sanjeev Kumar, and John W. Townsend. 1997. "Integrating RTI services in primary health care system: Observations from operations research in Uttar Pradesh," *Asia and the Near East OR/TA Special Report*. New Delhi: Population Council.