RESEARCH ARTICLE

Systematic way to incorporate Operational research in health care system.

Dr. U Venkatesh[1], Dr. Manish K Singh[1], Dr. D K Srivastava[1], Dr. Harish C Tiwari[1]
1.   Department of Community Medicine, B.R.D Medical College, Gorakhpur, UP.

Manuscript Info   *Abstract*

OR gives scientific evidences for programs concerning furtherance of health and controlling disease; which enhances the program quality, success and learning as program accentuates. Collaboration between, global fund to fight AIDS, TB, Malaria, special program for research and training in tropical disease (TDR) and interagency technical working groups gave rise to the framework for operations and implementation research in health and disease control programs. These programs were aimed at standardization of OR practices across international community and its integration with health programs. These agencies recommend appropriate use of framework for integration of OR in a systemic way, between programs and agencies, so that learning quality and success of health services may be enhanced as program accentuates. OR should be incorporated as necessary part of Monitoring and Evaluation (M&E) efforts, so that M'OR'E (Monitoring and Evaluation in OR) may prove to be a fresh prototype to method for including research, evaluation, monitoring as single component into program management systems. It strengthens program implementation as well as help in effective use of M and E resources.

Introduction:-

In their efforts during World War II, the military planners came up with operational research as formal discipline. For making decisions on necessary actions to improve the military operations, the military problems underwent analytical study in order to provide responsible commanders and staff agencies with a scientific basis. The techniques continued to be applied more widely to problems in business, industry and society in the post-World War II decades. Ever since, the operational field has emerged out as a field widely used in areas such as industries, finance, logistics, and government, wherein shifting focus on the development of mathematical models can be used to analyze and optimize complex systems, and has become an area of active academic and industrial research. More recently, Operations research (OR) has been used in the realms of Entertainment, Pricing, Sports, Health care.

OR gives scientific evidences for programs concerning furtherance of health and controlling disease; which enhances the program quality, success and learning as program accentuates.[2] Different bodies define OR and implementation research (IR) differently, as per WHO (2003)[3], **OR is ''use of systematic research methods for program decision-making to achieve a definite outcome''**. According to population council (2000)[4], **''OR helps policy-makers and program administrators to review, redirect, restructure programs that have been in place for many years''**. Scope of OR as stated by Andrew Fisher et al. (1991)[5], "OR is a process, a way of identifying and solving program problems. As currently applied in health, family planning and other development programs, OR can be defined as a continuous process with five basic steps:
1.   Problem identification and diagnosis,
2.   Strategy selection,
3.   Strategy experimentation and evaluation,
4.   Information dissemination, and
5.   Information utilization.

The process of OR is designed to increase the efficiency, effectiveness, and quality of services delivered by providers; and the availability, accessibility and acceptability of services desired by users". The international food research institute (2005)[6] states " OR aims at studying the processes by which programs are implemented and interventions are delivered to intended beneficiaries. The main purpose is to identify, as early as possible in the life of a program, any shortcomings in the process that may affect the effective delivery of the intervention, and as a result, its potential impact on the expected outcomes. Thus, the overall goal of OR is to generate the necessary information to program planners and implementers that will allow them to design and test potential solutions to improve program delivery and will lead to the timely implementation of corrective actions. OR methods have been used to evaluate the quality of implementation of a number of social programs. A major focus of OR as described is to assess the implementation and operational aspects of programs, with the overall goal of identifying areas that could be improved and to propose solutions for strengthening the program and maximizing its effectiveness."In the Working meeting on OR/IR organized at Geneva for developing its framework, partakers agreed on the following statement[7]

"Any research generating practically-usable information (proof, results, data, etc.) which can advance program implementation (e.g., quality, access, effectiveness, efficiency, , scale-up, sustainability) irrespective of the type of research (design, methodology, approach) falls within the boundaries of operations research."

Unlike clinical or epidemiological research, operational research examines a system (in this case the health care system) rather than focusing on an individual or a group of individuals (as in clinical or epidemiological research where patients are examined).Along with general health issues, it also handles the identified problems within selected programs. It also tackles problems controlled by managers, such as program systems, pricing, training and dissemination of data. Use of systemic data collection procedures help in gathering evidences which support decision making. Identification of research problem needs contributions of managers and researchers to recognize research problems, study design development, implementation of study along with analyzing and interpretation of outcome. Success of OR is achieved only when study results are utilized for making program decisions; publication solely do notinfer success of OR.

The main purpose is to identify any shortcomings in the process that may affect the effective delivery of the intervention, and as a result, its potential impact on the expected outcomes as early as possible in the life of a program. Thus, the overall goal of OR is to facilitate the program planners and implementers with the necessary information that will allow them to design and test potential solutions to improve program delivery and hence lead them to the timely implementation of corrective actions.

OR can be helpful in:
1. Identifying and solving program problems in a timely manner.
2. Making evidence-based program decisions to help policy-makers and program managers.
3. Improving program quality and performance using scientifically valid methods.
4. Helping program managers and staff understand how their programs work.

Collaboration between, global fund to fight AIDS, TB, Malaria, special program for research and training in tropical disease (TDR) and interagency technical working groups gave rise to the framework for operations and implementation research in health and disease control programs. These programs were aimed at standardization of OR practices across international community and its integration with health programs. These agencies recommend appropriate use of framework for integration of OR in a systemic way, between programs and agencies, so that learning quality and success of health services may be enhanced as program accentuates.[10]
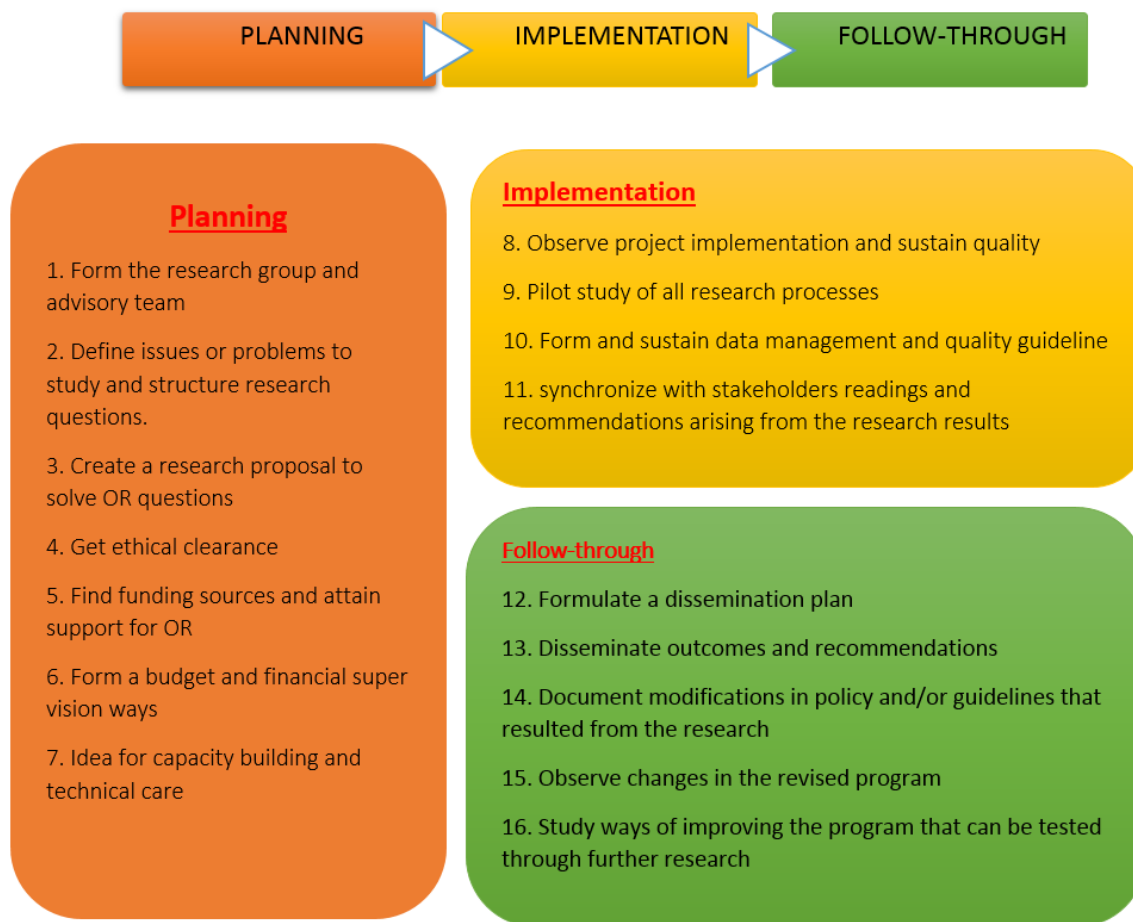
Figure 1. Flow chart of operational research

Step 1: Form the Research Team:-
a) Select Researchers:-
Owing to excessive work burden, the Program Managers and staff will not be able to conduct the OR on their own efficiently; that is why they usually deal with qualified organizations like medical college, university, research institute, NGO or autonomous bodies. Main criteria for selecting a suitable research group will be the availability of fellows with multidisciplinary qualifications.

b) Custom an Advisory Team:-
Even after appropriate researchers are picked, Program Managers and staff have a significant role to play in the Operational Research to achieve desired goals. A team comprising of 5-6 members including program managers, researchers and if possible, problem areas people actually facing, may regularly meet (e.g. Monthly) so that outcome is shared by all members and to confirm that there is ownership of the outcome. This will also improve the community participation approach.

Step 2: Define problem statement to address and frame research questions:-
The actual execution of a health program must be able to produce all the problems in front of the Operation Research team. These problems must come out as a result of sharing of experiences and healthy discussions between team members along with Program Managers and client of services. OR issues may be defined at three levels.

   A.   Identify the health program implementation issue or problem:-
From basic M &E reports,identifyingthe issues and problems encountered in health program implementation. For example, despite the presence of a program offering anti-retroviral (ARVs) to HIV-positive clients, reports

generated at a health clinic may reveal that the prevalence of opportunistic infections (OI) such as pneumonia and diarrhea among patients has increased significantly. At this juncture, an OR question may pop up "Why are HIV-positive clients experiencing poorer health outcomes?" An OR study investigating this problem might find out that HIV-positive patients are not complyingwith their treatment plans and hence more prone to developing other infections.

B.   Considering basicreasons for the problem that can be studied through OR:-
At this point of time an OR question may arise "Why are HIV-positive clients not adhering to their treatment regimens?".Investigation might uncover that patients are not complying with their treatment plans for various reasons, such as poor communication between patients and staff; patients with meager income do not have enough money for transportation to the clinic for consultation; Clinic times are too short and patients cannot afford to omit their work to visit the clinic during the day; patients are unwilling to visit the clinic because of the observed stigma associated with pursuing services there; or frequent drug shortage may also be a cause of discouragement of client to refill their prescriptions.

C.   Recommend possible answers that can be tested to address the problem:-
Regarding the hurdles encountered in drug adherence as stated above, find out the possible solutions that can be tested to address the problem; one possible answer to address the issue of drug stock-outs may be to conduct an in-service training for treatment center staff to advance drug forecasting. Another possible solution may be to grow clinic-based performance standards that inform the basis for problem solving among staff. Also, OR could be planned to study and examine the usefulness of both of these methods

Step 3: Create a research proposal to solve OR questions:-
A research proposal is a manuscript that summarizes, as comprehensive as possible, what the study is all about, what weightage it holds, how the investigators have planned to carry it out and how the outcomes can be used to their advantage. Sometimes demands are made for proposals that deliver a specific preferred framework that one must follow. Often groups develop their own proposal and seek funding agencies. Some organizations ask for "letter of intent" before submitting a fully-developed proposal.
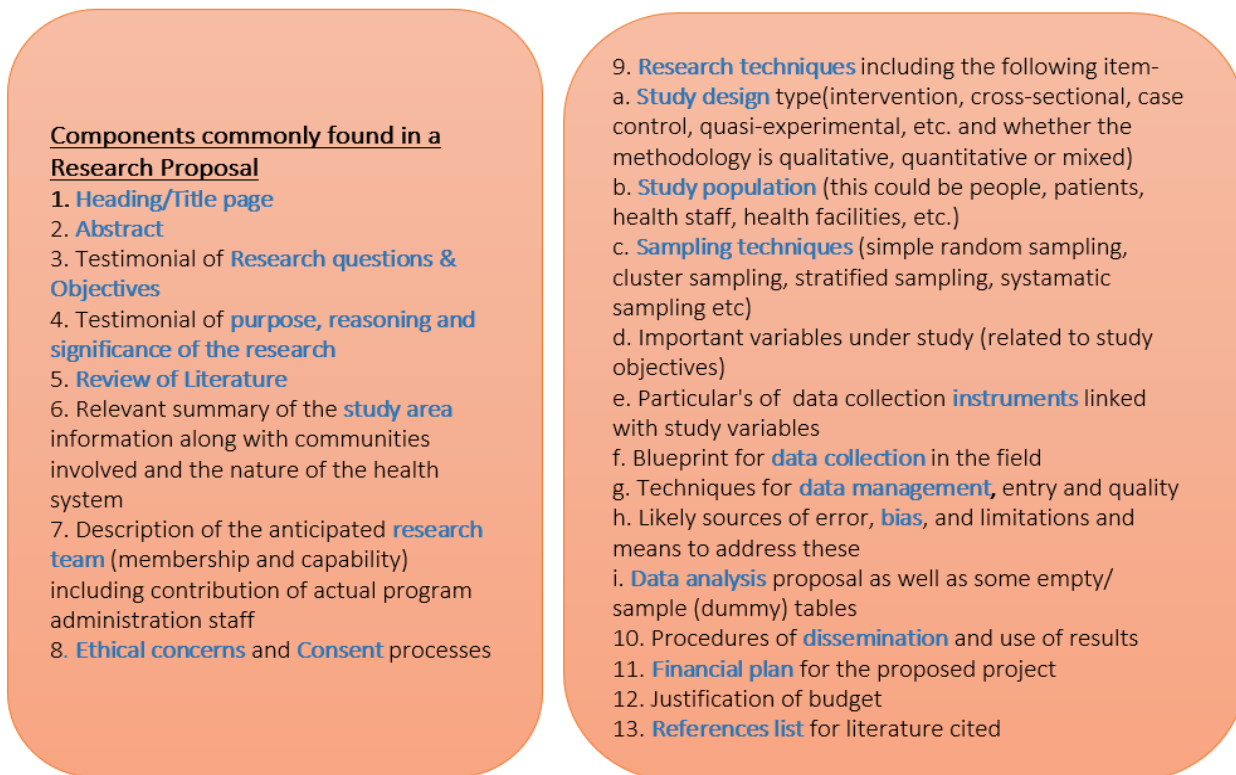
Components commonly found in a Research Proposal
1. Heading/Title page
2. Abstract
3. Testimonial of Research questions & Objectives
4. Testimonial of purpose, reasoning and significance of the research
5. Review of Literature
6. Relevant summary of the study area information along with communities involved and the nature of the health system
7. Description of the anticipated research team (membership and capability) including contribution of actual program administration staff
8. Ethical concerns and Consent processes

9. Research techniques including the following item-
a. Study design type(intervention, cross-sectional, case control, quasi-experimental, etc. and whether the methodology is qualitative, quantitative or mixed)
b. Study population (this could be people, patients, health staff, health facilities, etc.)
c. Sampling techniques (simple random sampling, cluster sampling, stratified sampling, systamatic sampling etc)
d. Important variables under study (related to study objectives)
e. Particular's of data collection instruments linked with study variables
f. Blueprint for data collection in the field
g. Techniques for data management, entry and quality
h. Likely sources of error, bias, and limitations and means to address these
i. Data analysis proposal as well as some empty/ sample (dummy) tables
10. Procedures of dissemination and use of results
11. Financial plan for the proposed project
12. Justification of budget
13. References list for literature cited

Figure 2. Research proposal components

"Letter of Intent"

Interested groups are invited to submit a letter of intent of no more than four pages (size A4, font 12pt) outlining the following:
1. Title of the project
2. Background and statement of the research question
3. Specific objectives
4. Methodology
5. Budget estimation
6. Association with any ongoing program, research project, system, any previous research experience.
7. Suggested principal investigator, study team and research institution

Figure 3. Format of "Letter of Intent"

Step 4: Obtain Ethical Clearance:-
All researcher dealing with humans; either they may be health workers or population poses risk to them. Even simple interview are at the cost of time of person interviewed and there is risk at sharing intimate information with strange person.

Being a part of the proposal, researchers need to speak out the details of how they will elaborate research procedures and risks to potential participants and obtain evidence (a signature, a mark) that participants confirm their participation in the research. Note that consent forms **must be written in such a language that research participants can comprehend with easily**. Most of the research institutions in particular have an **"institutional review board"** (IRB) or a **"committee on human subjects"** which is responsible for reviewing and approving the ethical and safety issues encompassing a research proposal before it can be realized.

Step 5: Find funding sources and attain support for OR:-
Several large international donor partners have been sponsoring OR in the context of their support for national health and disease control programs, Tropical Disease Research Program, USAID, Global Fund to Fight AIDS , Tuberculosis and Malaria, International Bank for Reconstruction and Development (IBRD, the World Bank), Rockefeller Foundation, Council for the Development of Social Science Research in Africa (CODESRIA), Bill and Melinda Gates Foundation, International Development Research Center, Wellcome Trust, Pharmaceutical companies and others who produce disease control products often offer small grants for OR in the countries where they work.

Step 6: Form a budget and financial supervision ways:-
Funding organizations usually recommends the investigators to develop an **all-inclusive** budget and to **explain the necessity for each item included.** Investigators are responsible for designing OR, therefore it's quite possible that they might have budget items that are related to the research itself as well as to any programming activity that is being tested. Research project should contain administrative officer or a financial controller.

Step 7: Idea for capacity building and technical care:-
In OR, capacity building refers to assurance of qualities of all members (such as skill, knowledge, experience) needed for their specific roles. It is better to get "best from present working personnel" rather than planning their 5year doctorate course from abroad. While implementing, as in planning, it is required to continuously involve staff, program managers and group in the process (e.g. by advisory board) to assure that the OR is fulfilling the requirements of health and disease control program.

Step 8: Regulation of project implementation and sustain quality:-
An important part of quality control is maintenance of loyalty to implement the research according to its proposal/plan. The small advisory committee may probe whether the protocol procedures are following correctly and are in time. The research team needs to device an action plan. Team members who are meeting on regular basis

are required to gauge progress and implementation of plan. It is important to emphasize that research monitoring must be performed regularly.

Step 9: Pilot study of all research processes:-
Irrespective of the type of study, it is important to ensure the reliability and validity of the instruments being used. In case of quantitative study, instruments may be observation checklist, questionnaires etc. And in qualitative study it may be in-depth interviews, FGDs etc. should be tested. Practical testing of instruments in particular conditions at field, in a diversified community with similar characteristics to the study community other than the study area, should be done.

Step 10: Form and sustain data management and quality guideline:-
Formulating a research instrument is the first step of quality data management. It is necessary to ascertain that the variables to be studied are operationalized to reflect the aim of study. The instruments need to be user friendly for data collectors. Contraindication for both data collectors and respondent should be removed. Research supervisors should be trained to observe data collectors during field work. Monitoring of data collectors in field must be done by senior researchers. Data entries (survey result and interview transcripts) should be made by data collectors simultaneously. Data entry clerks are required to be well trained and availability of complete instrument should be maintained. Erroneous values should be caught at each step through daily review, data entry and simple frequency analysis. One should ensure that no data is missing.

Step 11: Synchronize with Stakeholders' readings and recommendations arising from the research results:-
The next phase, the "follow-through", involves the actual dissemination and use. Prior to dissemination it is important for the research team and the stakeholders (e.g., community leaders, program managers/staff, and donors) who were members of the project advisory committee or working group to review the results and have a clear and common understanding of the implications of these findings. The first follow-up meeting about the findings should take place within a week after data entry is finished and a set of preliminary frequency tables or qualitative interview summaries can be produced. By the second meeting, the group should start listing the key findings and the related implications for improving the program. They can ponder upon the appropriate segment of audiences with whom to share this information within the deadline. Feedback to communities is essential. One should also take into consideration the review of key stakeholders who are capable of acting on the information and the recommendations. The financers as well as technical support of OR, along with the national stakeholders are the ones who are concerned about the long term effects of that research. To ensure the sustainability of program changes resulting from OR, the collaboration with policy makers, provisions for sustainability, and responsiveness to local needs must also be accounted for.

Step 12: Formulate a dissemination plan:-
Synchronization of dissemination activities with key audiences including policy makers, program managers, service benefactors, program beneficiaries and donors should be conserved. Dissemination plan should be in harmony with annual presentation of research finding at national and international peer-reviewed journals, meeting with local people and national stakeholders to discuss research findings and press releases. The team should focus on advocacy process regardless of audience.

Step 13: Disseminate outcomes and recommendations:-
Issues such as timing, setting and occasion need to be considered, There are many components to timing, including presenting the outcomes after the research has been fully concluded, **Dissemination must consider the audience convenience**, hold an event in the organization auditorium.

Step 14: Document modifications in policy and/or guidelines that resulted from the research:-
Team doing OR should enquire "whether the implementing or organization group "act on the outcome", "acting on the outcome" comprises implementation of the actual services of intervention or other activities supporting these services (e.g. Developing Training program, guidelines of service delivery, changes in distribution of personnel, producing and testing IEC materials, supervising and monitoring)

Step 15: Regulate changes in the revised program:-
In case, a field test in OR shows that supply of ITN(insecticide treated nets) with the help of community picked volunteers made wider coverage and use than campaigns by district health facilities, for instance national malaria

control program adopts and implements this new realistic approach, it is needed to be monitored, if after the scale up, the coverage increased across country. The original OR group may continue the coverage process and use surveys around nation, even though this activity remains the part of routine M&E activity.

Step 16: Study ways for improving the program that can be tested through further research:-
The example mentioned above, of program monitoring survey may find that in most areas of country, ITN coverage and its uses have increasedandsucceeded in achieving program targets. Investigations have showed that in group of primarily migrant people or coastal/riverine areas, new strategy is not very promising as compared to previously used campaign approach. This leads to blooming of new OR questions and can initiate the OR procedure over again with a new focus.

The IFORS (International Federation Of Operational Research Societies) monitors around 50 nations about their OR research societies including Australia, New Zealand, UK, US, France, Canada, Germany, India, Philippines, Japan and South Africa under UMBRELLA ORGANISATION. A website named "the science of better" has been started as an initiative by institute for operation research and management sciences (INFORMS), a US based organization in 2004 for marketing OR profession better and successful application of OR into industries. OR societyin UK has followed this initiative too and has made a website " learn about OR".

Integration of OR as an indispensable part of monitoring and evaluation (M&E) effort is need of hour. For enhancing practice of integrating the monitoring research and evaluation dimension as one common component into program management system, concept of M'OR'E should be implemented and followed.

References:-

1. Rau EP. Combat science: the emergence of Operational Research in World War II. Endeavour. 2005;29(4):156-61.
2. Rajesh Khanna PH, ChandrakantLahariya. Health Research Strengthening and Operational Research Needs for Improving Child Survival in India. Indian Journal of Pediatrics. 2010;Volume 77(March, 2010):291-9.
3. Expanding Capacity for Operations Research in Reproductive Health: Summary Report of a Consultative Meeting, WHO, Geneva, Switzerland, December 10–12, 2001, © World Health Organization 2003.
4. Strengthening Reproductive Health Services in Africa through Operations Research. Africa Operations Research and Technical Assistance Project II. The Population Council, 2000. Funded by the U.S. Agency for International Development (A.I.D), Office of Population Contract No. CCC-3030-C-00-3008-00.
5. Andrew A. Fisher, John E. Laing, John E. Stoeckel, John W. Townsend, Handbook for Family Planning Operations Research Design, Second Edition, Population Council, New York, 1991.
6. Cornelia Loechl, Marie T. Ruel, Gretel Pelto, and Purnima Menon. The Use of Operations Research as a Tool for Monitoring and Managing Food-Assisted Maternal/Chil Health and Nutrition (MCHN) Programs: An Example from Haiti. FOOD CONSUMPTION AND NUTRITION DIVISION February 2005, FCND Discussion Paper 187, Washington, IFPRI's Discussion Papers. Copyright 2005, International Food Policy Research Institute.
7. Framework for Operations and Implementation Research in Health and Disease Control Programs. Geneva: the Global Fund, TDR, the World Health Organization (WHO), the Joint United Nations Program on HIV/AIDS (UNAIDS), United States Agency for International Development (USAID), the World Bank; 2008.
8. Pren Naidoo BS, MareliClaassens, I.D. Rusen, Donald A Enarson, NuldaBeyers. Operational Research to Improve Health Services. South Africa: Stellenbosch University; 2013. Report No.: 978-0-620-57795-3.
9. Marin, M. C. and J. T. Bertrand (2003). Evaluation Manual: Evaluating Operations Research Utilization: Guidelines for Assessing Process and Impact. Washington, DC, Population Council, FRONTIERS Program.
10. Framework for Operations and Implementation Research in Health and Disease Control Programs. Geneva: the Global Fund, TDR, the World Health Organization (WHO), the Joint United Nations Program on HIV/AIDS (UNAIDS), United States Agency for International Development (USAID), the World Bank; 2008.