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**SERVICE QUALITY ASSESSMENT  
SERIES**

**EXPANDED PROGRAM ON  
IMMUNIZATION**

**A REVIEW OF EXPERIENCE  
IN NINE COUNTRIES**

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## TABLE OF CONTENTS

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<i>Preface</i> .....		<i>i</i>
<i>Acknowledgements</i> .....		<i>ii</i>
<i>Executive Summary</i> .....		<i>iii</i>
<b>1. INTRODUCTION</b> .....		<b>1</b>
1.1 The Expanded Program on Immunization (EPI) in Developing Countries .....		1
1.2 Assessing the Quality of Care in EPI Programs: The PRICOR Approach .....		2
1.3 The EPI System.....		2
1.4 Systems Analysis Methodology .....		4
1.4.1 Study Design.....		4
1.4.2 Sampling .....		4
1.4.3 Data Collection.....		6
1.4.4 Data Analysis and Interpretation.....		6
1.5 EPI Systems Analyses in Nine Countries.....		8
1.6 Overview of the EPI Comparative Review.....		12
<b>2. EPI SERVICE DELIVERY</b> .....		<b>13</b>
2.1 Introduction .....		13
2.2 Channeling .....		14
2.2.1 Community Volunteers .....		14
2.2.2 Clinic Record Systems.....		15
2.2.3 Home Visits .....		15
2.2.4 EPI Cards and Other Strategies.....		15
2.3 Observations of Vaccination Sessions.....		16
2.3.1 Sterilization of Reusable Needles and Syringes.....		16
2.3.2 Protection of Sealed Vaccines from Heat and Light .....		16
2.3.3 Checking Vaccine Expiration Date.....		17
2.3.4 Destruction of Disposable Needles and Syringes.....		17
2.3.5 Disposal of Used Vials of Vaccine.....		17
2.3.6 Group Health Education.....		17
2.4 Observations of Individual Vaccination Encounters.....		19
2.4.1 Checking the Child's Vaccination Card.....		20
2.4.2 Using a Sterile Needle and Syringe for each Injection.....		20
2.4.3 Providing Appropriate Information to Mothers and Caretakers.....		23
2.4.4 Examining Vaccine Vials for Expiration Date and Sediment.....		24
2.4.5 Using Correct Vaccination Technique .....		25
2.4.6 Recognizing Contraindications to Vaccination.....		25
2.5 Observations of Home Visits .....		26
2.6 Caretaker Knowledge .....		26
2.7 Summary of Service Delivery Observations .....		28
<b>3. EPI SUPPORT SERVICES</b> .....		<b>29</b>
3.1 Introduction.....		29
3.2 Planning Immunization Services .....		29
3.3 Logistic Support and Supplies .....		31
3.3.1 Policies and Procedures for the Logistics System.....		32
3.3.2 Adequacy of Vaccines and Supplies.....		32
3.3.3 Protection from Heat and Light.....		34
3.3.4 Other Logistics Issues .....		34
3.4 Training for EPI.....		34

3.5	Community Organizations.....	36
3.6	Supervision.....	36
3.6.1	Objectives for Supervision Planned and Defined.....	37
3.6.2	Frequency and Regularity of Supervision.....	37
3.6.3	What EPI Supervisors Actually Do.....	38
3.6.4	Evaluation and Documentation of Supervision.....	40
3.7	Financial Management of EPI.....	40
3.8	Evaluation and Monitoring.....	41
3.9	Summary of Support Services Observations.....	42
<b>4.</b>	<b>CONCLUSIONS AND FUTURE DIRECTIONS.....</b>	<b>43</b>
4.1	Strengths and Weaknesses.....	43
4.1.1	Strengths of EPI Programs Reviewed.....	43
4.1.2	Weaknesses of EPI Programs Reviewed.....	44
4.2	Changes and Activities Resulting from The PRICOR Analysis.....	44
4.3	Future Directions.....	48
4.3.1	The Utility of Systems Analysis Methodology for EPI Programs.....	48
4.3.2	Future Directions.....	48

**Appendix: EPI Sections from the PRICOR Primary Health Care Thesaurus**

## TABLES

	<b>Page</b>	
Table 1-1	<b>Components of the EPI System</b>	<b>5</b>
Table 1-2	<b>PRICOR Systems Analysis of EPI, Sample Sizes</b>	<b>7</b>
Table 2-1	<b>Disposal of Used Vaccine Vials</b>	<b>19</b>
Table 2-2	<b>Information Imparted to Mothers</b>	<b>24</b>
Table 2-3	<b>Health Worker Behavior and Affect</b>	<b>24</b>
Table 2-4	<b>Vaccinations Denied and Reasons Noted</b>	<b>25</b>
Table 2-5	<b>Mothers' Knowledge of EPI Target Diseases</b>	<b>27</b>
Table 2-6	<b>Mothers' Knowledge of Date of Next Vaccination</b>	<b>27</b>
Table 3-1	<b>EPI Training for Health Workers</b>	<b>35</b>
Table 3-2	<b>What Supervisors Actually Do</b>	<b>39</b>
Table 4-1	<b>Operations Research Relating to EPI</b>	<b>46</b>

## FIGURES

Figure 1-1	<b>EPI Systems Model</b>	<b>3</b>
Figure 2-1	<b>Vaccines Protected from Heat</b>	<b>18</b>
Figure 2-2	<b>Vaccines Protected from Light</b>	<b>18</b>
Figure 2-3	<b>Health Workers Examine Vaccination Cards</b>	<b>22</b>
Figure 2-4	<b>Health Workers Use Sterile Needles and Syringes</b>	<b>22</b>
Figure 3-1	<b>Vaccine Shortages</b>	<b>34</b>
Figure 3-2	<b>Cold Chain Equipment</b>	<b>34</b>
Figure 3-3	<b>Percentage of EPI Workers Supervised</b>	<b>38</b>

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## PREFACE

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Since 1985 PRICOR<sup>1</sup> has assisted Ministries of Health and other groups in 12 developing countries<sup>2</sup> to analyze systematically the delivery of child survival services. Depending upon local priorities, these systems analyses have examined one or more of six essential child survival interventions: oral rehydration therapy, growth monitoring, immunization, the treatment of acute respiratory infections, the prevention and treatment of malaria, and maternal care surrounding childbirth. For each intervention the studies have analyzed service delivery and critical support systems at the periphery: in homes, in the community, and at first-line health facilities. These systems analyses have employed direct observation and systematic quantification of task performance using measurement instruments derived from the PRICOR Primary Health Care Thesaurus, a detailed compendium of significant health worker tasks. By documenting specific areas of strength and weakness in service delivery and support activities, the analyses enable the health manager to identify operational problems and to target corrective actions more precisely. Accordingly, systems analyses have been followed, in most cases, by problem-solving operations, research studies, or administrative adjustment.

This report is one of a series of PRICOR service quality assessments based on systems analyses and operations studies. The series presents comparative reviews of results from these analyses and documents multi-country program experience, using standardized task definitions and more precise measurements than previously thought possible. The results add significantly to knowledge of program operations and their common problems. The objective of this report series is to identify operational problems commonly faced by primary health care and child survival programs as well as to describe solutions that PRICOR-supported midlevel and peripheral managers and supervisors have devised and tested for improved quality of care. While country programs are discussed alongside each other, the objective is not to compare countries or to evaluate relative performance, but rather to illustrate shared problems and international variations.

Reflecting the structure of the Thesaurus, the comparative framework employed in this report on immunization (EPI<sup>3</sup>) services assesses the delivery of those services as well as the quality of the support services necessary for effective service delivery. In addition to the vaccination session itself, service delivery activities include outreach education and the channeling of mothers and caretakers to vaccinations services. Support activities include planning, logistics and supplies, training, community organization, supervision, financial management, and evaluation and monitoring.

This series of reports summarizes findings from systems analyses within PRICOR's comparative framework. Comments on the series are invited and should be addressed to Dr. Jeanne Newman.

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<sup>1</sup> The PRICOR (Primary Health Care Operations Research) Project is operated by the Center for Human Services (Bethesda, MD, USA) for the United States Agency for International Development.

<sup>2</sup> Colombia, Costa Rica, Haiti, Indonesia, Niger, Pakistan, Peru, Philippines, Senegal, Togo, Thailand, and Zaire.

<sup>3</sup> Expanded Program on Immunization.

## ACKNOWLEDGEMENTS

Grateful acknowledgement is extended to the host country field staff who served as principal investigators for the country studies in Colombia, Costa Rica, Haiti, Pakistan, the Philippines, Senegal, Thailand, and Zaire. Thanks and recognition are also extended to Dr. Joseph Valadez, who led the systems analysis in Costa Rica, and to Drs. William Spira and Paul Skillicorn, who led the analyses in Peru. Finally, we express our gratitude to Dr. James Heiby, PRICOR Project Officer, USAID/S&T/Health, whose collaboration and intellectual contributions were crucial inputs to the research studies.

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## EXECUTIVE SUMMARY

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During the mid-1970s, the smallpox eradication campaign proved to be a major immunization achievement. During the same decade, however, fewer than five percent of children in developing countries were properly vaccinated against other diseases, despite the availability of effective, low-cost vaccines. In response to this situation, the World Health Organization (WHO) an Expanded Program on Immunization in 1974. The Expanded Program on Immunization (EPI) sought to achieve to significant reduction in diphtheria, pertussis, tetanus, measles, poliomyelitis, and tuberculosis through improved vaccination program management, the development of an effective cold chain, training of health service delivery personnel and improved supervision and monitoring.

Systems analysis assessments of vaccination programs were carried out by the PRICOR Project in nine developing countries. Focusing attention on the processes of service delivery and essential support services, and guided by the detailed dissection of EPI tasks provided by the project's *Primary Health Care Thesaurus*, the systems analyses enabled investigators and EPI program managers in the host countries to examine exactly what EPI health workers do to provide immunization services to their clients, and how they are doing it.

PRICOR conducted 11 systems analyses on EPI services in 9 countries: Colombia, Costa Rica, Pakistan, Zaire, Haiti, Peru, Philippines, Senegal and Thailand. Each of the systems analyses was designed independently with host country officials and tailored to the conditions and recognized problems in that country. The PRICOR Thesaurus and the WHO guidelines for EPI provided a unifying framework, but the studies were not designed to compare countries. This analysis attempts to avoid such comparison while employing data from the individual studies to highlight common strengths and weaknesses, and other aspects that did not permit generalization. Furthermore, PRICOR systems analyses pointed to the types of changes needed and areas meriting additional operations research.

PRICOR's systems analyses focused on systematic observation of health workers performance of the essential EPI activities: channeling children and women to services; administering vaccines; counseling mothers, and conducting group health education sessions. In addition, exit interviews were conducted in some countries to verify whether mothers understood what they had been told. Support activities, such as logistics, training and supervision were also reviewed through observation, record reviews and interviews with health workers and supervisors. In some studies household surveys were conducted with mothers to assess their EPI awareness and practice. In others, interviews were also held with community health workers and community key informants (i.e., health development committee members and village chiefs).

Even though there were some differences in the types of workers observed, sampling strategies and data collection methods among these 11 systems analyses, it was possible to identify some common areas of strength and weakness in EPI implementation, and to suggest ways in which some of the components could be improved.

The strengths found fairly consistently across all programs include:

- EPI programs had well established delivery systems.
- Health workers and mothers were familiar with vaccination services.
- Planning and training activities had effectively equipped health workers with adequate knowledge regarding the targeted age groups and schedules.

- Most health workers correctly examined the vaccination cards of children before administering vaccines.
- Very few children presented for vaccination were turned away.
- Given sufficient supply, most programs were found to employ disposable needles and syringes, ensuring sterile equipment for each vaccine injection. Most programs using reusable equipment correctly sterilized it beforehand.
- Vaccination technique was very good in almost all countries.
- In most of the studies where mothers were interviewed, the majority were found to know when to return for the next injection.
- Supervision was found to be built into most of the EPI programs. Most do see the personnel they are expected to supervise and most used checklists.
- Record review and the collection of data were routinely carried out by program managers and supervisors in all programs studied.

Despite the generally smooth operation of the EPI programs studied, deficiencies were identified in all countries, and certain problems were common enough to be highlighted as general EPI weaknesses:

- Policy guides and clear intermediate goals were not found at most health facilities visited, making it difficult for local EPI workers to plan and monitor their progress.
- Communication of EPI messages to mothers and the community was often ineffective, and health workers rarely verified that messages had been understood. As a result, mothers were often unaware of vaccination schedules and just what is recommended for their children.
- Shortages of vaccines and EPI supplies were common. Some of the dangerous practices observed (e.g. multiple use of needles and syringes without sterilization between children) would probably not occur if supplies were adequate.
- Deficiencies in the cold chain were discovered in most of the programs studied. Thermometers and temperature records were frequently missing. When present, they documented frequent temperatures above the acceptable range.
- The proper disposal of opened vials of vaccine at the end of the day was not enforced by several of the programs.
- Although they visit the health workers they are expected to supervise, supervisors were not seen to observe technical performance systematically, to provide feedback, to conduct on-the-job training, or to assist in problem-solving.
- The data collected were often not used locally, but were simply transmitted to higher authorities.

Shortage of vaccines and supplies occurred frequently and may have contributed to dangerous practices. In Senegal, sterile needles were used consistently in 15 out of 16 observed sessions and, in the case of inadequate supply in some of the sessions, needles and syringes were observed to be resterilized. There, 75% of the sessions placed used equipment in water, 6% placed them in the sterilizer box and 19% left them out on the table. In Thailand, only a minority of staff used a fresh syringe for each child and in Zaire, 35% of the children were vaccinated with previously used and not yet resterilized needles. Furthermore, some

Zairian health workers were observed to introduce used needles into the vaccine bottle, thus contaminating the entire vial. Costa Rican health workers reportedly discard needles and syringes in the households in which the vaccines were administered. Open vials were properly discarded in only 55% of the sessions in Zaire.

Results from many of the systems analyses showed that counseling of mothers was very weak. With the exception of Peru, almost every communication task was performed in no more than 70% of the cases. In Costa Rica, only 17% of the sessions were seen to make an attempt to communicate the diseases being prevented by the given vaccine and the side-effects. Only 44% of the mothers in Zaire were even informed which vaccination was given. The health worker verified that mothers in the Philippines retained the message in 22% of the cases and this was the most frequent of all the countries.

Although training and supervision are built into all the EPI programs studied, they were neither observed to cover all health workers nor to be optimally effective. In Haiti, only 42% of the local staff had been trained in EPI in the past three years; in Zaire, only 12% of the community health workers and 70% of the health center workers had been trained in the same period. In the Philippines, only 59% of the training conducted covered the key components of EPI. Use of participatory techniques and immediate post-training evaluation of those trained never exceeded 75% in any country where it was assessed.

In Haiti, one out of nine supervisors was observed to use a guide to direct him; 51 out of 101 in Senegal used a supervisory protocol. In Colombia, 75% of health workers reported being accompanied by a supervisor during the past year. In Haiti, only 52% of the health volunteers had met with a supervisor. Supervisors observed to observe worker performance ranged from about a third in Punjab to three-fourths in the Philippines.

This cross-country review brings together information on the performance of EPI services in a number of diverse settings. The results can help focus program improvement in the coming years. Two of the major problems prompting operations research were failure to reach immunization coverage targets and failure to complete vaccination series. The strategies tested to correct those problems generally involved ways of communicating with mothers. A number of studies were directed to ineffective supervision, inadequate management policies and procedures and logistics problems. The studies were reported to result in a short term improvement in most cases. The fact that program changes ensued supports their relevance: they provided information that program managers understood and considered convincing enough to alter their programs. The long term effects of any changes that were made and of any OR methodologies adopted may well be significant, but they have not been measured.

The PRICOR studies shed much light on the process of supervision, and it is clear that the supervisor is a crucial actor in the system in ensuring quality of health worker performance in accordance with the national health program. How to do that most effectively and in a cost-effective manner deserves further investigation, probably on a country-by-country basis. More effective methods are needed by supervisors to motivate their workers and involve them in solving problems facing local EPI programs.

Inputs, particularly financial and material resources needed by EPI programs, were not the focus of the PRICOR EPI studies. Nevertheless, a number of the problems identified (transport and adequate supplies of sterilized equipment, for example) may well be largely problems linked to the availability of resources. Thus, availability and appropriate use of resources should be afforded priority in future studies.

Finally, the data collected by EPI programs warrant further study. They are valued by supervisors and program managers, but too frequently used only to be sent up the line to superiors. Much of the data could be used at local and intermediate levels to assist mid-level program managers in making appropriate decisions. Ways to exploit data more appropriately need to be developed.

# SERVICE QUALITY ASSESSMENT OF THE EXPANDED PROGRAM ON IMMUNIZATION IN NINE COUNTRIES

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## 1. INTRODUCTION

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### 1.1 THE EXPANDED PROGRAM ON IMMUNIZATION (EPI) IN DEVELOPING COUNTRIES

During the mid-1970s, the smallpox eradication campaign proved to be a major immunization achievement. During the same decade, however, fewer than five percent of children in developing countries were properly vaccinated against other diseases, despite the availability of effective, low-cost vaccines. In response to this situation, the World Health Organization (WHO) initiated in 1974 an Expanded Program on Immunization. The Expanded Program on Immunization (EPI) aimed to significantly reduce diphtheria, pertussis, tetanus, measles, poliomyelitis, and tuberculosis through improved vaccination program management, the development of an effective cold chain, training of health services delivery personnel, and improved supervision and monitoring<sup>1</sup>.

With the assistance of organizations such as WHO, the United States Agency for International Development (USAID), the United Nations Children's Fund (UNICEF), and others, most countries have elaborated their own programs. Indeed, among the child survival interventions, EPI is generally considered to be one of the better-functioning programs. Among the notable accomplishments:

- Two thirds of the developing world's children receive a first dose of DPT vaccine and 50% complete the full course of three injections.
- Half the children in the developing world are immunized against measles.

Even in this successful program, however, problems persist. The six EPI diseases continue to be responsible for at least one third of infant and child disability and mortality<sup>2</sup>. In light of these problems, Dr. James Grant, Executive Director of UNICEF, declared, "In the 1980s alone, just three vaccine-preventable infections -- measles, whooping cough and tetanus -- have killed more than 25 million children -- more than the entire under-five population in the United States or Western Europe. We have the low-cost means to stop that unconscionable carnage, and to stop it within the next few years. If we do not use those means, then our pretensions towards civilization and our hopes of human progress will not stand up to any further examination."<sup>3</sup>

According to the EPI director of the World Health Organization, speaking at the Bellagio II conference in Cartagena in 1985, management problems pose the most severe constraint to national EPI programs. An important step toward addressing this problem is improving the capacity of program managers at the local level to detect and resolve problems in service delivery and in key support activities, both of which impede the delivery of quality services.

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<sup>1</sup> F. Marc Laforce, Ralph Y. Henderson and J. Keja, "The Expanded Program on Immunization", World Health Forum, V.8 (2), pp.216-315 (1987).

<sup>2</sup> John Snow, Inc., REACH Project, "EPI Essentials: A Guide for Program Managers", Second edition, August (1989).

<sup>3</sup> UNICEF, State of the World's Children (1988).

Improving vaccination program management requires knowledge about which aspects of the program are performed inadequately. National vaccination programs typically have information about outputs, such as numbers of vaccinations provided. While this is useful and important information, it does not enable the program manager to identify problem areas. The process of service delivery remains poorly documented, limiting the ability of managers to intervene where necessary.

## 1.2 ASSESSING QUALITY OF CARE IN EPI PROGRAMS: THE PRICOR APPROACH

The Primary Health Care Operations Research Project (PRICOR) has developed a systems analysis approach by which the performance of health workers can be assessed. This approach uses an operational systems framework to evaluate how service delivery and essential support activities are actually carried out. Since much information is already available on resources and outputs, the systems analysis has focused on process: how resources are transformed into services. Systems analyses examine what health workers are doing and how they are doing it. Such assessments provide information about program strengths and weaknesses, enabling program managers to identify problem areas as well as those meriting praise. Following the systems analysis, program managers may opt to take corrective action, or if appropriate, to use operations research as a tool to determine what actions are best suited to strengthening these services.

Since 1985, PRICOR has worked with 12 developing countries to document and analyze primary health care (PHC) and child survival service delivery in order to identify and resolve problems through direct action or operations research. Systems analyses of immunization programs were carried out in nine of those countries: Colombia, Costa Rica, Haiti, Pakistan, Peru, the Philippines, Senegal, Thailand, and Zaire. In addition, 17 operations research studies have been or are being conducted on aspects of EPI service delivery and support activities. This review presents some of the results of systems analyses in those nine countries.

## 1.3 THE EPI SYSTEM

The Expanded Program on Immunization aims to achieve universal childhood immunization in all nations. In this program, vaccinations against six targeted diseases are provided according to a schedule designed to reach children at risk. The WHO recommends the following vaccination schedule to assure the earliest feasible protection of each child:

Birth:	BCG, OPV <sub>0</sub> <sup>4</sup>
6 weeks:	DPT <sub>1</sub> , OPV <sub>1</sub>
10 weeks:	DPT <sub>2</sub> , OPV <sub>2</sub>
14 weeks:	DPT <sub>3</sub> , OPV <sub>3</sub>
9 months:	Measles

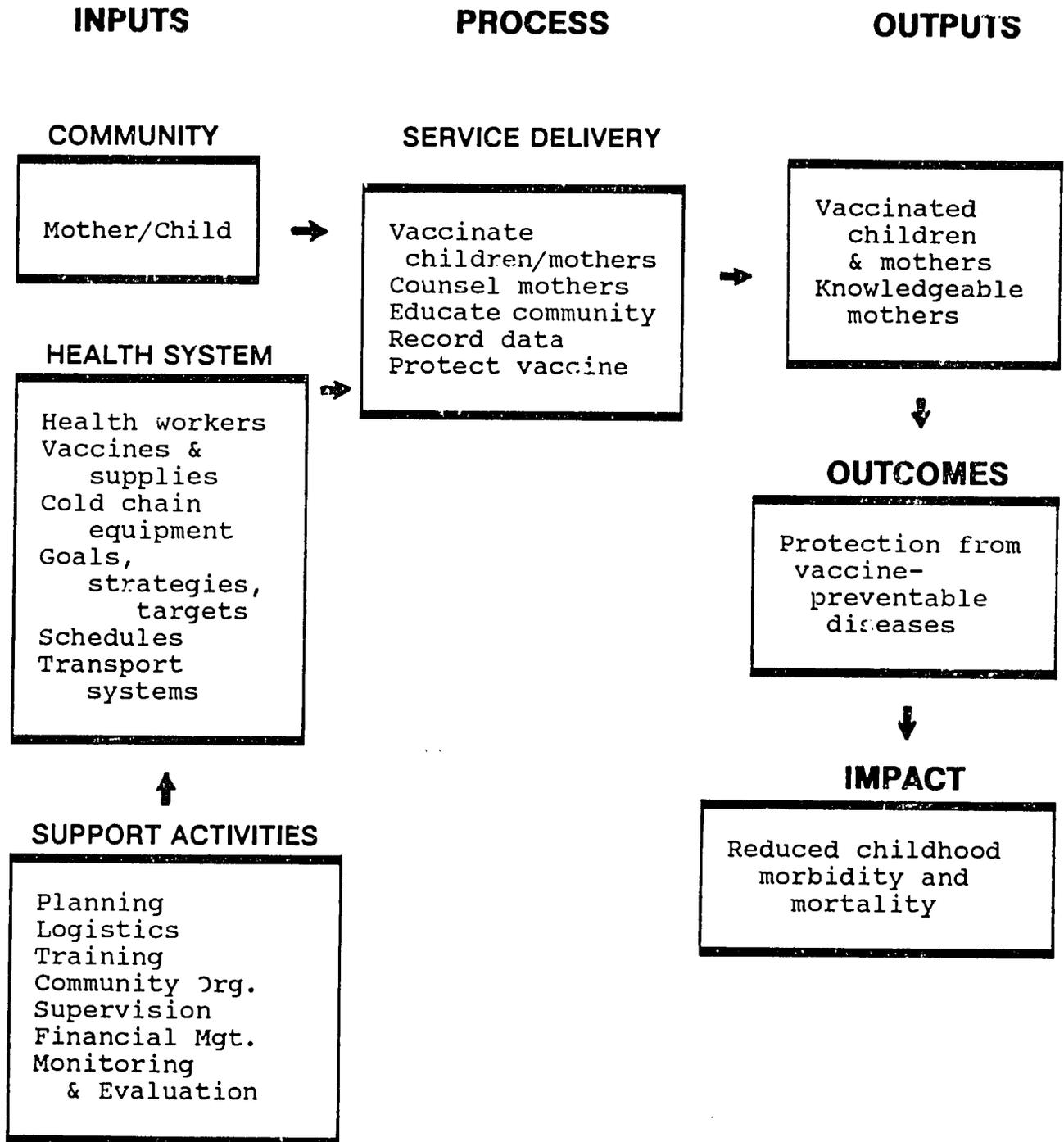
Alternative schedules have been devised for situations in which frequent contacts are not feasible. Many countries, however, including the nine in which PRICOR studies were conducted, adhere to this five-contact schedule.

The EPI system is comprised of a set of activities to be carried out in order to vaccinate a child correctly and completely. The EPI service delivery activities (subsystems) or tasks (components) interact to achieve an effect which no one component could produce by itself. An EPI systems model showing major subsystems and how they relate to one another is presented in Figure 1-1.

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<sup>4</sup> OPV<sub>0</sub>: The oral polio dose at birth is in addition to the standard schedule of three doses. The rationale for this is that protection against polio is enhanced the earlier OPV is received.

Figure 1-1. EPI Systems Model



Effective immunization requires satisfactory task performance in planning, community organization, training, logistics, service delivery, supervision, financial management, and monitoring/evaluation. Each of these can be viewed as a subsystem grouping a number of activities. Considering just the service delivery sub-system, for example: vaccines and vaccination supplies must be available and protected from heat, light, and contamination; children must be identified and channeled into the system; caretakers must be motivated to ensure their children's participation; health workers must register children, prepare and administer the vaccine(s), and dispose of needles and syringes correctly. In addition, health workers must inform caretakers of possible side-effects from the vaccines and how to manage them, tell the caretaker when to return for the next vaccination, verify the caretaker's understanding, and address any remaining questions or uncertainties. Finally, health workers need to record on the child's EPI card and in the clinic register the date of each vaccine given. Other subsystems involve similar sequences of activities.

## 1.4 SYSTEMS ANALYSIS METHODOLOGY

The systems analysis methodology breaks down the various subsystem activities into observable tasks and subtasks. Indicators of their performance are then identified, and data collection instruments designed to measure actual performance. Table 1-1 presents a list of activities comprising the EPI system, based on the Primary Health Care Thesaurus<sup>5</sup>. Calling upon WHO guidelines, expert opinion, and staff experience, the PRICOR project developed this compendium as a reference document for seven child survival interventions, including immunization. The *Thesaurus* contains lists of tasks and subtasks for each activity. It also includes indicators for the measurement of their performance and suggested information sources. Appendix 1 contains part of the *Thesaurus* section on EPI, showing the tasks and subtasks involved in the activities listed in Table 1-1.

### 1.4.1 Study Design

Generally speaking, the Thesaurus served as a guide for designing a systems analysis within each particular country. In the nine countries where EPI was studied, the actual application of the systems analysis methodology differed depending upon the organization of the local health system and the interests of local health officials. In every case, however, the application of systems methodology started with collaboration with the Ministry of Health, local private voluntary organizations, the USAID mission, and other responsible agencies of the host country to identify PHC interventions and geographic areas of particular interest. Together they developed criteria to select localities and facilities for study. PRICOR staff provided technical direction and assistance for the studies under its purview during short- and long-term visits to the host country. Counterparts from the countries involved played crucial roles in directing the day-to-day activities of the studies. The two projects managed by PRICOR subcontractors<sup>6</sup> followed a similar approach.

### 1.4.2 Sampling

The aim of these studies was to utilize systems analysis tools to generate information that would enable district-level program managers to identify problems impeding the delivery of effective child survival services. No attempt was made to achieve statistically representative samples of whole countries, as such an approach tends to be costly, time consuming, and beyond the resources of program managers

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<sup>5</sup> PRICOR, Primary Health Care Thesaurus, Volumes I and II, PRICOR, Center for Human Services, Bethesda, MD.

<sup>6</sup> Harvard Institute for International Development in Costa Rica and PRISM in Peru.

Table 1-1. Components of the EPI System

**SERVICE DELIVERY COMPONENTS:**

Channeling activities

- Identify children <1 year (or <2/<5 years) needing vaccination.
- Recruit mothers and other caretakers to participate.
- Refer them to appropriate sources for vaccination.

Vaccination encounter activities

- Determine vaccine(s) needed (review EPI card; ask mother).
- Administer appropriate vaccine(s).
- Record vaccine(s) given, including dose and date.
- Counsel mother/caretaker about possible side effects of vaccine(s).
- Inform mother/caretaker of need and dates for future vaccinations.

Outreach education activities

- Educate concerning diseases prevented by vaccination.
- Educate concerning multiple doses and appropriate ages for vaccinations.
- Advise of dates and times of vaccination sessions.

**SUPPORT SERVICE COMPONENTS:**

Planning activities

- Set immunization objectives and targets.
- Develop immunization strategies.
- Develop vaccination procedures, budgets, workplans.

Logistics and supply activities

- Plan logistic support for cold chain, distribution, and maintenance.
- Procure cold chain equipment, fuel, supplies, vaccines, cards.
- Protect and store vaccines and supplies.
- Distribute vaccines, syringes, needles, cold chain equipment and supplies.
- Maintain inventory records.
- Maintain cold chain equipment and vehicles.

Training activities

- Plan training of health workers.
- Transmit key EPI information and skills using appropriate training methods.
- Evaluate training, testing competence of health workers trained.

Community organization activities

- Determine appropriate role for community in vaccination activities.
- Motivate leaders and community to participate, developing their capacity to do so.
- Establish and coordinate schedules and workplans with community.
- Monitor community activities.

Supervision activities

- Plan supervision activities, strategies, schedules.
- Supervise service delivery and support, providing feedback, motivation, problem-solving.

Financial management activities

- Budget and obtain resources earmarked for EPI activities.
- Generate local resources as appropriate.
- Disburse and account for funds received and used.

Monitoring and evaluation activities

- Maintain records of size and location of target population.
- Maintain records of vaccination service delivery and support activities.
- Process data, report information, and use for planning, monitoring, problem-solving.
- Conduct KAP, coverage, and impact studies for EPI.

at this level. Often, a bracketed sample was used.<sup>7</sup> In Costa Rica, sampling decisions were based on principles of Lot Quality Assurance Sampling (LQAS).

### 1.4.3 Data Collection

The *Thesaurus* also guided the development of data collection instruments to document service delivery processes. PRICOR staff and their local country counterparts adapted *Thesaurus* indicators to local conditions to develop data collection instruments in seven of the nine countries reviewed in this report. The data collection instruments developed for the other two countries by the two sub-recipients also incorporated several of the *Thesaurus* indicators.

PRICOR considers direct observation of service delivery and support activities to be the best means of knowing how key tasks and subtasks are performed. Therefore, specific emphasis was placed on systematic observation of health workers in the performance of PHC activities and tasks. These observations were guided by the use of checklists. Exit interviews with caretakers were employed to determine whether they had understood what they had been told. Support activities, such as logistics, training, and supervision, were also assessed through observation, record review, and interviews with health workers and supervisors. In some studies, household surveys were conducted with community members to determine general levels of health knowledge and practice.

Specific data collection methods used in the EPI studies typically included:

- ▶ observations: of clinical facility supply levels and preparedness prior to, during, and after immunization sessions; of health worker performance during vaccination encounters; of supervisor performance during vaccination encounters; and of community-based health worker performance during home visits;
- ▶ record review: of vaccination registers, family health records, cold chain temperature logs, and logistics records;
- ▶ interviews: with mothers and other caretakers as they departed from health facilities; with caretakers in households; with health facility personnel; and with key community informants.

### 1.4.4 Data Analysis and Interpretation

Table 1-2 presents an overview of the types of data collection and sample sizes in the country studies.

PRICOR staff (and sub-recipients) and their national counterparts processed and analyzed data to identify program strengths and weaknesses. In many cases, most or all data analysis was completed in country using SPSS or dBase programs to generate graphs, charts, and frequency distributions. The findings were presented to health officials and program managers during specially organized workshops in which counterparts and PRICOR staff led discussions to review the study results, identify program strengths, and prioritize problems identified. In some cases, the problems suggested specific courses of corrective action; in others, operations research studies were developed.

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<sup>7</sup> Bracketing involved ranking health centers according to their perceived levels of performance. Approximately equal numbers of good, substandard, and in some countries average facilities were chosen randomly from the ranked list. This measure ensures that the full range of performance is represented in the sample studied.

**Table 1-2. PRICOR Systems Analyses of EPI  
Sample Sizes by Country**

	COMMUNITY BASED HEALTH WORKERS				CLINIC BASED HEALTH WORKERS							
	Colomb.	Costa R.	Pak/ Punj	Zaire	Haiti	Pak/ Punj	Pak/ Regi	Peru 1/11*	Phil.	Sen.	Thai.	Zaire
<b>OBSERVATIONS:</b>												
HW Service Delivery	118	108	652	-	87	76	193+	206/168	1013	330	60	405
Supervision	-	-	227++	-	-	-	-	-/-	52	15	-	3
Session/facility	-	18	50	-	8	17	23	15/-	88	15	9	19
<b>INTERVIEWS:</b>												
Household	304	108	1312	-	428	**	487	-/-	-	-	-	664
Exit	-	-	-	-	-	714	168	-/-	903	-	630	-
Health Worker	92	18	-	56	22	-	7	-/-	80	35	-	67
Supervisor	-	-	-	-	9	-	10	-/-	24	101	-	-
Key Informant	-	-	-	-	49	-	4	-/-	-	24	-	63

- Data not available
- \* Data collection included both direct observation and simulated role-plays.
- + Clinic-based observations (169) plus community-based observations (24).
- ++ 36 meetings between health worker and supervisor, 153 home visits with health worker, plus 38 unaccompanied home visits by supervisor.
- \*\* Note that the 1312 community-based HW interviews also produced information on clinic utilization.

## 1.5 EPI SYSTEMS ANALYSES IN NINE COUNTRIES

Two separate systems analyses were carried out in Pakistan, in two regions of the country. Similarly, two separate analyses were carried out in Peru during two days of the 1988 National Vaccination Campaign. Thus, this review includes a total of eleven studies. While the systems analyses followed the same general methodology, application of the methodology varied among countries. These differences resulted from differences in the structures of the health systems being analyzed and from modifications prompted by local interests. The following section provides brief descriptions of the EPI studies.

Colombia (1987): PRICOR worked with the Fundacion Santa Fe de Bogota (FSFB), a non-governmental organization, to conduct a systems analysis of community health services provided by volunteer health workers, literate members of their communities who work in the peri-urban areas of Bogota where the FSFB is active. The volunteers receive 12 days of training in health promotion, prevention, and first aid. Their training in immunization includes information about vaccine preventable diseases, general information about what a vaccine is and how it works, and the recommended vaccination schedule for children. The volunteer health workers' role in this program includes giving mothers information through home visits and group education programs. They also promote vaccination campaigns and refer children requiring vaccination to health centers or health posts. The volunteers do not provide vaccinations themselves.

The systems analysis team was composed of FSFB personnel with technical assistance from PRICOR staff. Information on health volunteer performance was collected using checklists to guide systematic observation of health worker performance during home visits (N=118). In addition, 97 active, semi-active, and retired health volunteers participated in interviews, and 7 FSFB supervisory staff completed self-administered supervision questionnaires. Finally, household surveys with 304 mothers provided information about their knowledge regarding vaccinations.

Costa Rica (1988): The Harvard Institute for International Development (HIID) carried out an assessment of the Costa Rican Ministry of Health measles vaccination program in 1987. The study, which applied Lot Quality Assurance Sampling (LQAS) techniques, revealed that coverage rates were falling short of national targets for 58 of 60 randomly selected health areas in the sample.<sup>8</sup>

In 1988, a team led by HIID undertook a more in-depth study, also using LQAS methodology, to identify the primary causes of low measles coverage and to obtain information on the quality of services provided by community health workers.

To measure performance of the EPI program on a national level, and to identify particular problems leading to low coverage rates, the required sample size was three health areas within each of Costa Rica's six regions (N=18). To assess the quality of health worker service delivery, the team observed each health worker during six independent vaccination encounters with children in a home setting, for a total of 108 observations.

The measles vaccination system was envisioned as consisting of 15 sub-systems, including such support system elements as maintenance of the cold chain (both at the health center and in the field), the EPI information system (updating and appropriate use), logistics (permanent materials at the health center and supplies), and documentation of MOH norms regarding vaccination. Sub-systems relating to actual service

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<sup>8</sup> Detailed information about the LQAS methodology and the results of this study are available through the PRICOR Project in a report entitled "Quality Control of Primary Health Care" (available in English and Spanish). Joseph J. Valdez, W. Vargas and Z. Rivera, "Diagnosis of Measles Vaccination Sub-System of the Costa Rican Primary Health Care System: Understanding Low Vaccination Coverage and Low Quality of Service Delivery", Harvard Institute for International Development and the Office of Primary Health Care Quality Control Program in the Ministry of Costa Rica (1988).

delivery included vaccination, quality of service delivery (preparation, vaccine administration, and disposal of syringe and needle) and education to mothers about EPI. Other important subsystems examined in this analysis were health worker knowledge and supervision. The team developed several checklists to guide observations of these service delivery and support activities.

As presented in this comparative review, the data from the Costa Rica study appear to be similar to that from other systems analyses. However, an important point must be made about interpretation of the results from this study. As an industrial sampling technique, LQAS involves the use of small samples to identify problems within a product "lot". This sampling methodology is used to identify product lots that fail to meet preexisting quality standards. In the context of this study, LQAS principles were used to assess (1) the extent to which health worker performance fell below standards established by the Ministry of Health, and (2) the extent to which the components of the EPI program failed to meet the MOH's national-level performance standards.

Health worker performance was judged to meet or fail performance standards in the following manner. Within each health area, one health worker was observed giving six independent vaccinations. The health worker's performance of each task was considered "acceptable" if he or she made no more than one mistake per six observations. If two or more errors were observed, the health worker was deemed to have "failed" in performing that task. By extension, performance for the entire health area was judged to be substandard as there is generally only one health worker providing vaccination services within each health area. Similar criteria were used for assessing program performance at the national level. A subsystem of the service delivery program was considered to have acceptable performance if fewer than six of 18 health areas failed. In the event of six or more health area failures, the subsystem was considered to be below acceptable standards.

Thus, in the narrative, efforts will be made to identify those facets of the Costa Rica immunization system that were found to meet or to fail the performance standards developed by the Ministry of Health.

Haiti (1987-1988): At the time of this study, Haiti was divided into 4 public health regions and 15 districts. Health care was provided through 20 hospitals, 94 health centers, and approximately 200 dispensaries. The facilities are managed, often jointly, by the Ministry of Public Health and Population (MSPP) and by several hundred private voluntary organizations. Outreach locations, known as rally posts ("postes de rassemblements"), provide education and growth monitoring services.

PRICOR staff and representatives from the MSPP examined service delivery for four child survival interventions (immunization, growth monitoring, malaria, and oral rehydration) in three districts of the Transverse and Southern regions of the country. In the Transverse region, the study team and regional staff used a consensus process to select the district with the "best" performance, plus one other. In the Southern region it was only possible to complete the analysis in the district of Cayes (the "best") before political unrest forced the early termination of the project. Four health facilities were examined within each district, including one health center and three dispensaries. Eight immunization sessions occurred in the regions being studied, enabling the study team to observe 87 immunization encounters. In addition, interviews were conducted with nine facility supervisors and 428 mothers.

Peru (1988): The PRISM Group carried out a systems analysis in the peri-urban areas of the Cono Sur portion of Lima. This systems analysis differed from the others in two significant ways. First, the study was undertaken during two national vaccination campaign days (May and July, 1988) conducted by the Peruvian Ministry of Health, rather than at health centers where routine vaccination services are provided. Second,

Data collection for the second phase of the systems analysis (July-August) employed a combination of direct observations of service delivery and a role-play simulation methodology developed by PRISM, called SIMULEX.<sup>9</sup>

During the first campaign day, data collection involved direct observations of 206 vaccination encounters by 74 health workers at 74 health posts. The observers also used a 12-item checklist to examine the maintenance of the cold chain at 15 principal health centers. Finally, vaccinators at each of the observed vaccination posts completed questionnaires which asked about (1) the amount and type of training they had received in preparation for the national vaccination program (VAN); (2) feedback they had received on performance; and (3) vaccinator satisfaction with various aspects of support for the VAN effort. Data collection during the second phase involved the first test of the SIMULEX methodology. Two vaccinators from each health center were observed while providing services during the second vaccination campaign day in July. These same vaccinators then participated in a simulation exercise involving six different vaccination scenarios. The health worker's performance of vaccination service delivery and counseling activities was examined by the same people who had observed his/her performance during the vaccination campaign day. In the end, complete data were obtained on 24 vaccinator/observer pairs.

Pakistan--Regi Model Basic Health Unit (1989): The first systems analysis in Pakistan was conducted at the model basic health unit (BHU) at Regi village in Northwest Frontier Province. The Regi BHU had been designed to experiment with ways of making BHUs more effective and responsive to the needs of the community. It is representative of other BHUs in physical facilities, equipment, supplies, and staffing patterns. Although no additional resources are authorized, care is taken to ensure that all the authorized resources are made available at the model BHU. Moreover, staff and activities at the BHU receive additional interest and attention from Provincial and other health authorities. Accordingly, although all data refer to the operations of one BHU only, and should not be taken as typical of other BHUs in the Province, it is reasonable to expect that health worker performance in other, non-model BHUs may be weaker than that at Regi.

The systems analysis research team observed BHU health workers providing vaccinations at the BHU (N=38) as well as in the community (N=4). In addition, 168 patients leaving the health center were interviewed concerning health worker performance, particularly regarding education and counseling, during the encounter, and 487 community members in the Regi catchment area responded to household interviews. The research team interviewed seven health workers regarding training and supervision they receive. The team also interviewed ten supervisors, questioned four health facility key informants concerning logistics, and made observations of BHU records.

Pakistan--Punjab Province (1959): The systems analysis in the Punjab Province in Pakistan grew out of the Provincial government's desire to assess utilization of rural health facilities and the effectiveness of community-based health workers (called multi-purpose health workers). Provincial health personnel, with assistance from local PRICOR staff and a PRICOR consultant, carried out the systems analysis in three districts. Data collection included clinic-based observations of 76 vaccination encounters at basic health units and rural health centers and 852 observations of multi-purpose health workers making home visits. Observers also noted supervisor performance as they accompanied health workers on home visits (N=153), on unaccompanied home visits by supervisors (N=38), and during 37 meetings between supervisors and health workers. Finally, household interviews (N=1312) were carried out in the multi-purpose health workers' communities, and exit interviews were conducted with patients leaving the BHU and RHC (N=714).

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<sup>9</sup> The PRISM Group, "Systems Analysis of EPI Service Delivery in the Cono Sur of Lima, Peru during the 1988 National Vaccination Campaign", Columbia, MD (1989). Further information concerning the SIMULEX methodology is available from Mr. Paul Skillicorn, 10480 Little Patuxent Parkway, Suite 500, Columbia, MD 21044, or from Dr. Jeanne Newman (PRICOR/Bethesda).

Philippines (1988): The systems analysis in the Philippines examined service delivery of four child survival interventions, including EPI. The analysis was carried out in Bulacan Province, identified by the Department of Health (DOH) as representative of many other provinces throughout the country in terms of service delivery quality and human resource levels. Observations were made of a total of 1013 vaccination encounters in 18 rural health units and 54 associated barangay health stations. The assessment also included observations of supervision during vaccination encounters (N=52), and exit interviews with mothers leaving the health center in order to assess their knowledge about when to return for the next vaccination (N=903). Eighty health workers and 24 supervisors were also interviewed to assess supervision practices.

Thailand (1987): The systems analysis in Thailand was carried out in Srisaket Province. A decentralization policy of the Ministry of Public Health being implemented in the province offered an opportunity for Provincial staff to assess their own health services delivery. Assistance was provided by PRICOR through the MOPH Management Improvement Unit. Six of Srisaket's 16 districts were selected, based on performance in a number of service categories. Two provinces were selected from the stratum judged to have high performance, two from the stratum of medium performance, and two from the low performance stratum. Delivery of EPI services was observed at subdistrict (tambon) health centers during ten immunization sessions. A total of 60 encounters were observed. In addition, researchers conducted exit interviews with 630 mothers as they left the health centers and used observation checklists to assess logistics.

Senegal (1989): The systems analysis carried out in Senegal, under the auspices of PRICOR and the Ministry of Public Health, focused on supervision of primary health care (PHC) activities. Of Senegal's ten regions, the study included five: two in which USAID had been supporting PHC programs and three other regions for comparison.

The study team, led by a researcher from the MOPH, observed 330 vaccination encounters provided during 16 immunizations sessions conducted at health facilities and by mobile teams. During the immunization sessions three observation checklists were used: one to collect information on health worker performance, a second to examine supervisor performance, and a third to assess logistics and cold chain maintenance during the session. One observer was assigned responsibility for each instrument. Following the sessions, researchers interviewed the supervisors regarding their perceptions of health worker performance during the session and in general (N=55).

Zaire (1987): The systems analysis in Zaire was carried out as part of an operations research component of the USAID Rural Health Project operating in nearly half the health zones in Zaire. It represented one of the first efforts to test the systems analysis methodology developed by PRICOR and was one of the largest studies undertaken during the life of the project. In Zaire vaccinations are provided at rural health centers during regularly scheduled sessions. The EPI program, which is closely linked to growth monitoring and nutrition activities, relies heavily on community-based health workers to identify and recruit children needing vaccination.

Four health zones were selected for the study. In each zone the systems analysis team selected five health centers staffed by nurses and auxiliary nurses: four for their estimated high performance and one for its low performance. In addition to observations of immunization session activities at the health centers (N=405 encounters), data collection included interviews with 664 households, 67 clinic health workers, 56 community health workers, and 63 key informants from health facilities and the community. Observation checklists were also employed to collect data on cold chain maintenance and logistics. Finally, records at 19 health centers were reviewed to obtain information on the information system, and 3 supervisors completed interviews regarding their supervisory activities in EPI.

## **1.6 OVERVIEW OF THE EPI COMPARATIVE REVIEW**

This comparative review focuses mainly on service delivery activities associated with immunization programs and on those support activities that facilitate the delivery of vaccination services. Chapter 2 analyzes observations of health facility and health worker performance. Chapter 3 reviews support services as outlined in the Thesaurus. These support activities provide key inputs to service delivery and are important determinants of the quality of health worker performance. Chapter 4 summarizes the strengths and weaknesses of EPI service delivery and support systems, describes what managers did with this information in the countries studied and what additional operations research followed the PRICOR systems analyses, discusses the utility of the PRICOR methodology for EPI managers, and suggests future directions for additional study.

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## 2. EPI SERVICE DELIVERY

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### 2.1 INTRODUCTION

The delivery of vaccination services is the all-important step in achieving the goal of EPI -- the vaccination of children and mothers. In figure 1-1 the service delivery functions surrounding the vaccination event are represented in the central "process" box. These are primarily activities of the health worker, whose role is thus central to the process. If his or her activities are not carried out properly, a break in the system occurs, and all the program outputs, outcomes, and impacts may be jeopardized.

**EPI, as a leading public health program, is obliged to show an example of care and quality in its work. (REACH, 1989)**

The activities represented by the process box of the systems diagram include the multiple tasks that the health worker is expected to perform for the EPI:

- Tasks requiring interaction with mothers and other caretakers:
  - informing them of the benefits of vaccination;
  - recruiting children into the program who need to be vaccinated;
  - advising the caretakers of possible vaccine reactions and when to return with the child to continue the series.
  
- Tasks requiring interaction with the child:
  - determining vaccinations needed;
  - providing the right vaccines, using correct technique.
  
- Tasks required to protect the safety and potency of the vaccine:
  - protecting it from contamination;
  - protecting it from heat and light;
  - respecting expiration dates;
  - discarding opened vials appropriately.
  
- Tasks required to maintain the information system:
  - reviewing records regularly to identify children requiring vaccination;
  - recording information correctly on EPI cards and clinic records;
  - compiling information for reports, monitoring, and evaluation.

Breakdowns resulting from poor quality in service delivery pose a serious threat to an EPI program. For this reason PRICOR has placed principal emphasis on examining the quality with which health workers perform these essential service delivery tasks.

## 2.2 CHANNELING

Good immunization coverage requires regular and near-universal participation of target-age children. This, however, can rarely be achieved without facility-based health personnel and community workers working to identify children needing vaccination, and directing them to vaccination services. Strategies to enumerate and register children help to increase program effectiveness by identifying children, particularly those under one year of age, who are hard to reach.

The PRICOR Thesaurus lists the following activities associated with channeling:

- Maintaining rosters of all children of the target age group<sup>10</sup> in the catchment area.
- Identifying, at clinic sessions and during home visits, target-age children who are due for vaccinations.
- Recruiting target-age children who are due for vaccination. This includes motivating mothers and other community members through education on the importance of vaccination.
- Directing those children of the target age group who are due for vaccination to the appropriate location (health facility or upcoming vaccination session).

In the PRICOR immunization systems analyses, channeling activities were examined in eight studies.<sup>11</sup> The results provide examples of how different programs attempt to carry out channeling activities. From these findings it is possible to categorize channeling strategies into four types of activities.

### 2.2.1 Community Volunteers

In Colombia, Haiti, and Zaire the EPI program engages community volunteers to inform caretakers of the benefits of vaccination and to recruit children needing vaccination to participate in facility-based programs. The Fundacion Santa Fe de Bogota (FSFB) in Colombia has a cadre of community volunteers who make home visits to households in their areas of responsibility. They review the health cards of children under five, identify children with vaccinations due, inform the caretaker of the FSFB health center hours, and provide a referral slip. During these home visits and in health talks the volunteers educate mothers about vaccine-preventable diseases.

In Haiti community members serve as *collaborateurs-volontaires*, or *col-vols*. They provide assistance in a variety of ways. With respect to immunizations they cooperate with health facility staff to educate caretakers and to recruit children for vaccination sessions. Data collection for the Haiti study examined the role of the *col-vols* in a general way; it was not possible to tease out the effects of their efforts on the EPI program *per se*.

Community members in Zaire play a significant role in mobilizing caretakers to participate in well-child sessions for growth monitoring as well as immunization. Health facility informants credited them with the major role in recruiting children for these sessions.

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<sup>10</sup> Usually children under one year of age or as defined by the local EPI program.

<sup>11</sup> Channeling was not examined in the Peru, Senegal, or Thailand studies.

### 2.2.2 Clinic Record Systems

In Costa Rica, the Philippines, and Zaire the EPI information system includes rosters that serve as data sources to identify children needing vaccination. In the Costa Rica study, all health facilities studied were found to have EPI rosters of children in their catchment areas. These records are reviewed by community health workers to plan for measles immunization when conducting home visits.

In the Philippines 97% of the facilities studied maintain a list of children by immunization status, and 95% have a scheme to remind staff when children require vaccination. Respondents indicated that the most common method to identify children requiring vaccination is to review birth records and EPI cards.

In Zaire all but one of the 19 health facilities studied maintain well-child registers, and all but three keep family health registers. Such registers can facilitate planning as well as channeling.

### 2.2.3 Home Visits

The third strategy is for community-based health workers to make home visits to vaccinate children or to refer for vaccination. As noted, the Costa Rican health workers provide vaccines to children as they visit homes in their catchment areas. If not identified beforehand from the EPI rosters, children due for vaccination are vaccinated as they are identified.

In the Punjab province of Pakistan, multi-purpose health workers (MPHWs) review children's EPI cards as they make routine visits to the communities for which they are responsible. When a child requiring vaccination is identified, the MPHWP provides the needed vaccination. This is in addition to the routine vaccination activities of the rural health facilities.

Community health workers associated with the Regi model basic health unit in Pakistan make home visits to educate mothers about vaccination and to recruit them to use vaccination services. It was noted in the study that community health workers discussed vaccine-preventable diseases as part of 100% of the home visits observed. In 80% of visits the vaccination schedule was mentioned, and the need for mothers to be vaccinated against tetanus was raised in 72%.

### 2.2.4 EPI Cards and Other Strategies

In the Punjab and Regi programs the EPI vaccination cards themselves were found to play a role in advising mothers about return dates for vaccination. Seventy-four percent of the Regi BHU health workers were observed to record the date for the next visit on the child's vaccination card. The same number told the mother the date for the visit. Seventy percent did both.<sup>12</sup> In the Punjab, when caretakers were asked how they had been reminded to come for the current vaccination session, 10% said they had referred to the vaccination card.

Responses from the Punjab study indicate that other reminder mechanisms exist as well. Eighteen percent of caretakers questioned said they had heard an announcement about vaccinations from the mosque on the day the MPHWP team visited the village. Five percent said that either friends or family members had reminded them.

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<sup>12</sup> Unfortunately, this appears to have been ineffective: less than 10% of mothers interviewed when leaving the clinic knew when to return.

In Zaire monthly growth monitoring sessions are carried out in satellite villages as the principal means of identifying and channeling children due for vaccination that month. The Road-to-Health cards of such children are retained by the nurses, who use the cards for accurate planning and ordering vaccines, while the mothers are told to report to the health center on a certain day later in the month for the required immunizations. The cards are then returned to the mother after the child is vaccinated. If the mother fails to appear with the child, the card indicates the follow-up needed.

## **2.3 OBSERVATIONS OF VACCINATION SESSIONS**

Several of the PRICOR studies assessed health facility preparedness for vaccination, using the facility as the unit of analysis. Aspects of the process addressed in this fashion included the maintenance of needle and syringe sterility, the protection of sealed vaccines from heat and light, the checking of expiration dates, and the disposal of used needles and syringes and opened vaccine vials.<sup>13</sup>

### **2.3.1 Sterilization of Reusable Needles and Syringes**

Disposable needles and syringes were used in most of the EPI programs studied by PRICOR, but reusable equipment was employed routinely in Senegal, Thailand, Zaire, and occasionally in Pakistan.<sup>14</sup>

Observation of 16 sessions in Senegal disclosed sterile needles used consistently in 15, sterile syringes in 11. At several sessions where supplies were inadequate, needles and syringes were resterilized during the session. In Senegal used needles and syringes were placed in water after 75% of sessions and in the sterilizer box in 6% (totalling correct procedure after 81% of sessions); after 19% of sessions the supplies were improperly left out on the table.

In Thailand sterilization was performed correctly in all nine health facilities studied, but the PRICOR report observed that "only a minority of staff used a fresh syringe for each child receiving an inoculation." Similarly, in Zaire sterilization was done correctly in all 12 of the vaccination sessions where it was observed, but up to 35% of children were noted to be vaccinated with previously used (and not yet resterilized) needles, and at least 82% of vaccinations were done with a previously used syringe. Furthermore, some health workers were observed to introduce used needles into the vaccine bottle, contaminating the entire vial.

In the Philippines, where disposable equipment is the rule, health workers were observed to reuse needles and syringes at 5% of vaccination sessions when the supply of equipment was insufficient.<sup>15</sup>

### **2.3.2 Protection of Sealed Vaccines from Heat and Light**

Exposure to heat, and sometimes light, can denature the fragile protein structure of vaccines and reduce their potency. With respect to heat in particular, it is the cumulative effect that destroys vaccines: whether

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<sup>13</sup> These aspects were also considered in the observation of individual health workers in some studies (see section 2.4).

<sup>14</sup> In fairness to the EPI programs observed, it should be noted that WHO standards regarding sterile syringes were changing during the time of these systems analyses: sterile needles were always required, but sterile syringes were only required when the threat of AIDS was recognized. World Health Organization, Report of the EPI Global Advisory Meeting, Copenhagen, Denmark, 1985. WHO/EPI/GEN/86/2.

<sup>15</sup> The researchers reported that the health workers reasoned that there was less risk from a previously used needle or syringe (usually only the syringe) than from letting the child go unvaccinated.

intense heat at one time, or a little heat over many exposures, both can damage vaccines (REACH, 1989). Constant vigilance in protecting vaccines is essential. All the studies of service delivery therefore examined how well this important aspect of cold chain maintenance was performed. Figures 2-1 and 2-2 demonstrate the study findings graphically. As can be seen, performance was generally very good. Only in Senegal was vaccine noted to be protected from sunlight at less than 80% of sessions.

### **2.3.3 Checking Vaccine Expiration Date**

Expiration dates should be checked before administering vaccine to be sure the vaccine has **not** lost its potency simply because of time. Two studies addressed this question in different ways. Vaccine expiration dates were checked at 15 vaccination facilities for the second vaccination campaign day in Peru, and nearly 100% were found to be acceptable. In Thailand health workers were observed to check expiration dates at seven of the nine vaccination sessions studied.

### **2.3.4 Destruction of Disposable Needles and Syringes**

To avoid injury or the possible reuse of contaminated disposable needles and syringes, they should be destroyed properly after vaccination. The systems analyses in the Punjab, Costa Rica, and at Regi examined performance of this activity at the health facility level. In the Punjab needles and syringes were observed to be thrown away after 90% of vaccination sessions, and at Regi 96% of the time. In Costa Rica it was observed that there are no rules about what the health worker is expected to do with the used needle and syringe. Although supervisors agreed that needles and syringes should not be discarded in the household, health workers reportedly continue to do so. What happened to the equipment that was not thrown away? The remaining 10% in the Punjab was handled as follows: boiled (3%), autoclaved (1.5%), rinsed in water only (1.5%), or other (2%). The disposition of the remaining 4% in Regi was not explained.

### **2.3.5 Disposal of Used Vials of Vaccine**

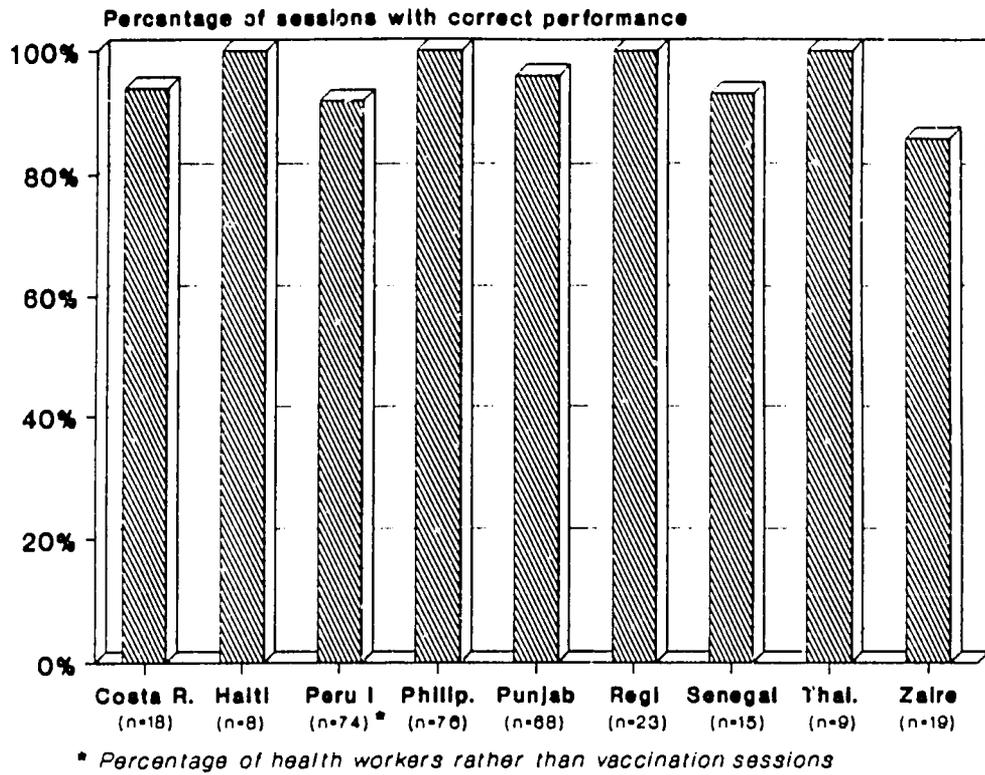
WHO guidelines for EPI service delivery dictate the destruction of opened vaccine vials at the end of a vaccination session. Six systems analyses examined this task. The findings, presented in Table 2-1, demonstrate significant variation in how the task is carried out, reflecting, to some extent, differences in the organization of vaccination sessions and in data collection. Appropriate disposal of opened vials of vaccine after a clinic-based session differs, for example, from a program that vaccinates during home visits where it may be appropriate for the health worker to keep the vaccine cold and carry it to another house.

### **2.3.6 Group Health Education**

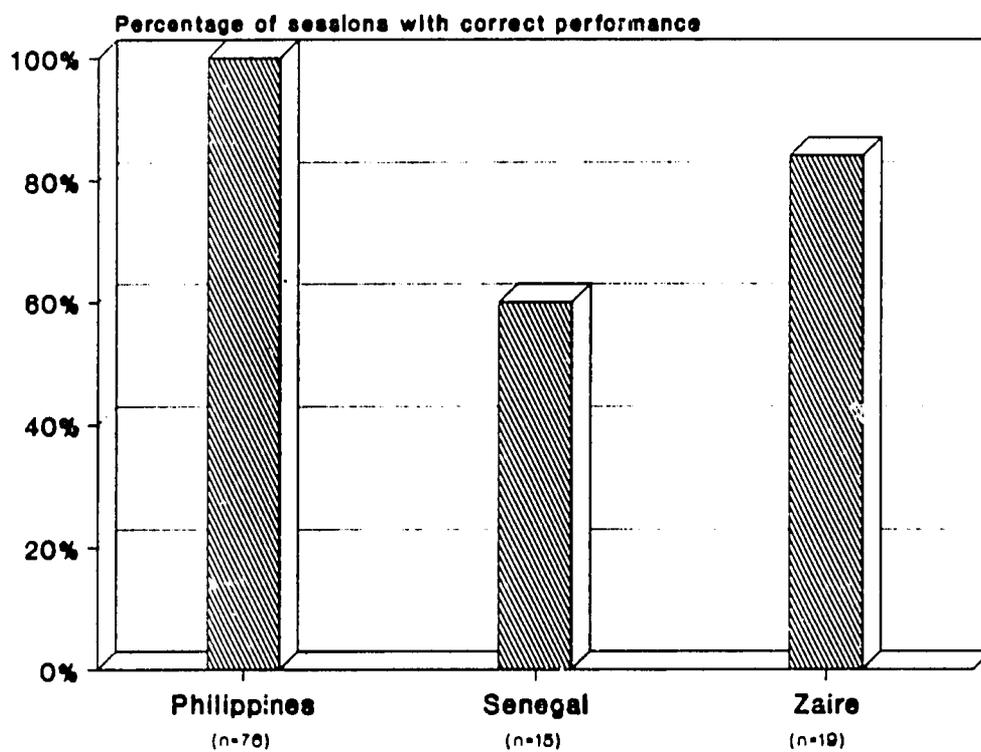
Group health education sessions permit health workers to communicate key health information to several mothers or other caretakers at a time. Three studies noted the types of information presented during such sessions.

Senegal (6 sessions observed): During the six group health education sessions observed, the diseases prevented by EPI vaccinations were mentioned at two sessions (33%). The childhood vaccination schedule was also mentioned at just two sessions.

**Figure 2-1 Vaccines Protected from Heat**



**Figure 2-2 Vaccines Protected from Light**



**Zaire** (25 sessions - 19 at health facilities, 6 at itinerant health posts): Group health education is carried out at well-child sessions that focus on growth monitoring and vaccination. Subjects covered included vaccination (68% of sessions), diarrhea, malaria, parasites, hygiene, and birth spacing. More than 80% of the sessions were held before the well-child activities began, and over 90% of the participants were mothers.

**Haiti** (9 sessions observed): The vaccination program was discussed during 4 of the 9 group health education sessions (44%).

**Table 2-1. Disposal of Used Vaccine Vials**

Study:	Number of sessions observed:	Number (and percentage) of sessions after which open vaccines were properly discarded:
Philippines	76	75 ( 99%) [70 discarded, 5 kept cold for same day use]
Punjab (Pakistan)	67	13 ( 19%) <sup>16</sup> [13 refrigerated, 15 taken to another location for same day use]
Regi (Pakistan)	23	2 ( 4%) <sup>16</sup> [22 refrigerated for same day use]
Senegal	15	13 ( 87%) [6 discarded, 7 transported to discard at clinic <sup>16</sup> ]
Thailand	9	9 (100%)
Zaire	11	6 ( 55%)

## 2.4 OBSERVATIONS OF INDIVIDUAL VACCINATION ENCOUNTERS

By means of direct observation systems analyses can examine how well health workers carry out the multiple activities associated with vaccinating a child. Each of the 11 studies made direct observations during service delivery encounters. Comparative data from the studies are available for the following activities:

- Checking the child's vaccination record to determine what vaccination is required;
- Using a sterile needle and syringe for each injection;
- Telling the mother or caretaker about possible reactions to the vaccine given, telling them when to return, and verifying their understanding of the information provided.

The findings are presented below. In addition, some studies collected information on such aspects of

<sup>16</sup> It is assumed, but not verified, that the vials that were kept cold for same day use or transported in the cold box back to the health facility were actually disposed of at the end of the day.

The findings are presented below. In addition, some studies collected information on such aspects of service delivery as checking vaccine expiration dates and turbidity,<sup>17</sup> correct vaccination technique, and instances in which vaccination was denied to children presenting at health facilities. Some studies investigated particular aspects of service delivery in great detail, e.g. the use of appropriate vaccination technique for each vaccine and maintenance of sterility throughout the encounter. These findings are also discussed in the following sections.

#### **2.4.1 Checking the Child's Vaccination Card**

During a vaccination encounter, one of the first tasks the health worker must perform is to determine which vaccine(s) the child should receive. This entails examining the child's health record, which may be a "Road to Health" card, an EPI card, or some other record. Nine of the studies observed health workers performing this task.<sup>18</sup> Figure 2-3 presents the percentages from 8 studies of workers who did so correctly.<sup>19</sup>

As the figure illustrates, most health workers examined vaccination records in all the studies. Performance varied, however, raising concerns about missed opportunities for vaccination, and perhaps even unneeded vaccinations, in some of the programs.

#### **2.4.2 Using a Sterile Needle and Syringe for Each Injection**

**One child, one sterile needle, one sterile syringe**

One of the clearest and most unequivocal recommendations for EPI service delivery, the above rule underscores the importance of sterility in vaccination programs. This is both to avoid transmitting blood-borne diseases such as AIDS and hepatitis B, but also to avoid bacterial contamination that could result in abscesses. While the risk of transmitting infection is greatest with multiple use of the same needle, there is also risk associated with multiple use of the same syringe. When the first systems analyses were begun, WHO standards permitted careful multiple use of syringes. When the risk of AIDS transmission was recognized, the standards were changed to require a sterile syringe for each immunization.

Figure 2-4 shows the percentages of vaccination encounters in which the health worker was observed to use a sterile needle, or a sterile syringe or both, in seven of the studies.<sup>20</sup> The most worrisome situations appear to be those where syringes -- and sometimes even needles -- are used for multiple vaccinations because of inadequate supplies. The supply situation is discussed below as part of logistics (section 3.3). The studies in Peru and Costa Rica examined the maintenance of sterility in some detail. The Costa Rica

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<sup>17</sup> DPT vaccine loses its potency if frozen, indicated by excessive sediment in the vaccine vial.

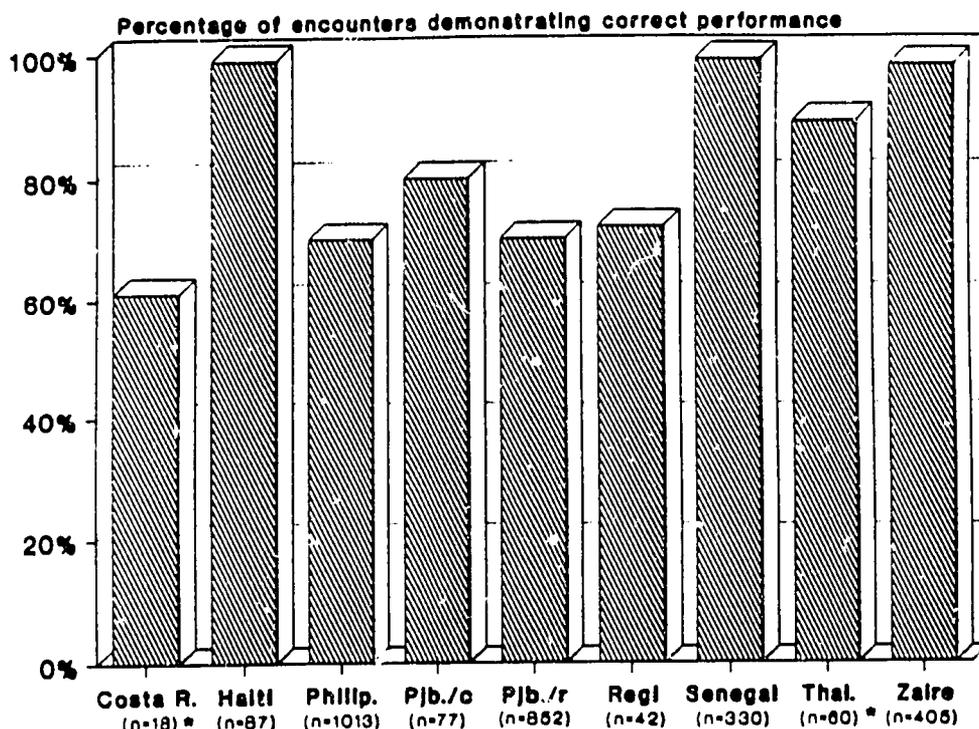
<sup>18</sup> The two Peru studies focused on the activities of the vaccination team members who prepared and gave the vaccinations; examining the cards was performed by other team members.

<sup>19</sup> Data for the Costa Rica study were collected by facility rather than by encounters and are therefore not strictly comparable. They showed acceptable performance of this task at 61% of facilities (11 of 18 health areas).

<sup>20</sup> Again, the data from Costa Rica represent health areas, not vaccination encounters, and are therefore not strictly comparable with that from the other studies.

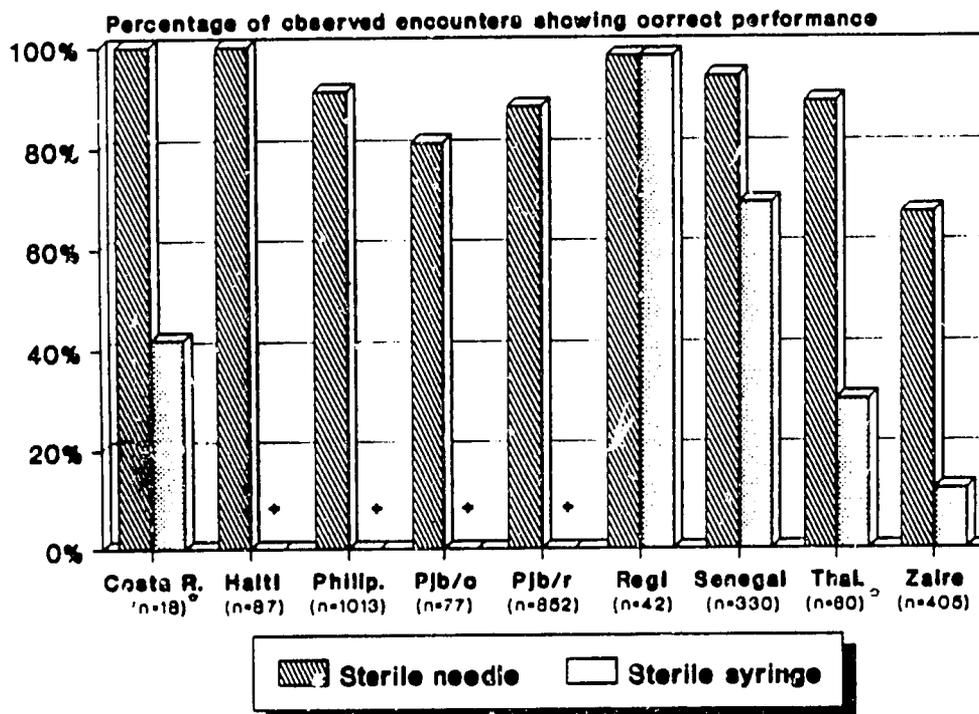
investigators watched for possible contamination in preparing injections. They observed the CHW contaminate the syringe while filling it with vaccine in 14 of 18 health areas. In the two Peru studies 20 and 34 indicators respectively were used to monitor maintenance of sterility. The investigators found that the majority of errors occurred when opening and cleaning the rubber tops of vaccine vials and probably did not contaminate the vaccine delivered to the child. They concluded that overall sterility was well maintained.

**Figure 2-3 Health Workers Examine Vaccination Cards**



\* Percentage is not of vaccination encounters, but of sessions observed

**Figure 2-4 Health Workers Use Sterile Needles & Syringes**



\* Percentage for sessions rather than encounters

\* No data reported

### 2.4.3 Providing Appropriate Information to Mothers and Caretakers

Since much of the success of an EPI program depends on the cooperation of mothers and other community members, providing health education and counseling is one of the most important EPI service delivery tasks health workers perform. Through direct encounters, health workers provide information that aims to educate and motivate caretakers to have their children immunized, to inform them which vaccines are given and about possible side effects, and to tell them when to return for future vaccinations. These encounters can also give health workers the opportunity to verify caretakers' understanding and to answer any questions they might have. The PRICOR studies examined performance of these tasks during individual vaccination encounters, group education sessions, and home visits.

Eight studies observed the interaction of health workers with caretakers during vaccination encounters and noted, using checklists, whether the health worker told caretakers:

- ▶ about vaccine-preventable diseases,
- ▶ the schedule for vaccinations,
- ▶ that the full series of vaccinations should be completed,
- ▶ what vaccines the child was being given,
- ▶ what possible side effects might occur, and
- ▶ when to return for the next vaccination.

Some also noted whether the health worker verified:

- ▶ whether the caretaker could repeat the message and
- ▶ whether the caretaker had any questions.

As illustrated in Table 2-2, performance in these different tasks varied considerably. Overall the results suggest a significant communications gap between many health workers and caretakers during vaccination sessions. While not unexpected during large vaccination campaigns, the same pattern of limited information exchange characterized regularly scheduled vaccination sessions and routine service delivery encounters. Aside from informing mothers when they should return for the next vaccination, almost every communications task was performed with less than 70% accuracy, especially if we ignore the Peru results and look only at routine vaccination services.

**Table 2-2. Information Imparted to Mothers during Vaccination Encounters  
Percentages of Mothers Given Particular EPI Information**

Study:	CR <sup>21</sup>	Peru <sub>1</sub>	Peru <sub>2</sub>	Philp.	Punj.	Regi	Sngl.	Zaire
<b>H. worker told mother:</b>								
diseases prevented	17	65	60	51	--	--	--	--
vaccination schedule	25	60	--	29	--	--	--	--
need to complete series	--	--	--	40	--	64	--	--
which vaccine(s) given	--	80	96	--	--	--	--	44
possible side effects	17	75	62	47	34	29	31	--
when to return	--	82	96	78	77	100	50	
<b>H. worker verified if:</b>								
message retained	0	--	--	22	11	0	1	--
any questions	--	--	--	--	3	2	--	--

The Zaire and Peru II studies tried to observe health worker affect during the vaccination encounter. The aspects they looked for and the results obtained are presented in Table 2-3.

**Table 2-3. Health Worker Behavior and Affect during Vaccination Encounters**

Vaccinator...	Study:	Zaire	Peru II
...greeted the mother		...	40 %
...introduced self		...	10 %
...smiled		42%	20%
...touched the child		77 %	5 %
...listened attentively		70 %	60 %

#### 2.4.4 Examining Vaccine Vials for Expiration Date and Sediment

When facilities were assessed to be sure the vaccines they were using were not expired (section 2.3.3), the two studies that examined this question found reassuring results. Interestingly, when the focus was shifted in the Peru studies from the facility to the individual health worker, the results were less favorable. Only

<sup>21</sup> Note that Costa Rica scores are for health facilities, not individual encounters.

about 5% of health workers in Peru were observed to check the expiration dates of DPT vaccine, and about 10% and 15% for polio and measles vaccines. This example demonstrates how different the data can look when obtained in different ways, even for the same study. It also reinforces the caveat that these studies not be used to compare countries, since a different mode of data collection was used for each.

DPT vaccine will lose its potency if it is frozen, after which excess sediment can be observed in the vial. This can happen if vaccine is improperly packed into a cold box or refrigerator, or if a refrigerator is set improperly or malfunctions. For this reason it is advisable to check vials of DPT vaccine for sediment before using them. Only the Peru studies reported assessing this task. It was correctly performed by 40% of the health workers observed.

#### 2.4.5 Using Correct Vaccination Technique

Each of the EPI vaccines should be administered in a specific way for maximum efficacy.

<b>Recommended vaccination technique:</b>
<b>BCG</b> - intradermal injection in the arm
<b>OPV</b> - oral vaccine placed in child's mouth with a dropper or <b>IPV</b> - intramuscular injection, upper outer aspect of thigh
<b>DPT</b> - intramuscular injection (90° angle) in the upper outer aspect of the thigh
<b>Measles</b> - subcutaneous injection (45° angle) in the arm

Vaccination technique was studied in detail in Thailand, Peru, and Costa Rica. Findings in Thailand and Peru both showed very good technical performance. In Thailand BCG, DPT, and measles injections were performed properly in 92, 100, and 91 percent of cases respectively. In Peru DPT, measles, and OPV were observed to be administered correctly in 90, 84, and 95 percent of cases.

The Costa Rica study focused exclusively on measles vaccination and found that health workers in 14 of 18 health areas failed to introduce the needle correctly. What constituted acceptable administration was not defined for these studies, and the Costa Rica study could well have used stricter criteria than the others.

#### 2.4.6 Recognizing Contraindications to Vaccination

Four of the PPICOR studies examined whether, and for what reasons, health workers refused to vaccinate children who presented during vaccination sessions. The findings, with the reasons noted, are presented in table 2-4.

According to current EPI guidelines, vaccinations should be given even to most sick children. The only exceptions are children with AIDS<sup>22</sup> and children who are gravely ill and appear near death. The latter

<sup>22</sup> Children with clinically apparent AIDS should not receive BCG because their immune systems may not be able to control the live attenuated virus.

**Table 2-4. Vaccinations Denied and Reasons Noted,  
Findings from 4 PRICOR Studies**

Country:	Punjab (Pakistan)	Zaire	Haiti	Philippines
Number of observations	76	405	83	1013
Number refused (%)	6 (8%)	24 (6%)	10 (12%)	37 (4%)
Reason for refusal:				
Child ill	2	1		20
Not due for vaccine	2			8
Child underage		1		1
Child > 9 months		3		1
Completely vaccinated		1		
Skin lesion			1	
Unknown	2	18	9	7

children should obviously be given emergency care. Despite these guidelines, however, some health workers remain reluctant to vaccinate sick children. Although few in number, most of the children denied vaccination in the sessions observed by the PRICOR studies probably should have been vaccinated.

## 2.5 OBSERVATION OF HOME VISITS

As part of the Colombia, Regi, and Punjab studies health workers were accompanied on home visits and observers noted activities relating to EPI. One hundred thirty-seven home visits were documented in Colombia, 24 in Regi, and 852 in Punjab. Vaccination was addressed during virtually all the visits: the Colombia health workers were observed to ask about the vaccination status of children in the household 98% of the time; 100% of the Regi health workers discussed vaccine preventable diseases with mothers; and the Punjabi Multipurpose Health Workers asked about vaccination status on 55% of home visits and inquired or examined the vaccination card on 70%. The Colombian volunteers reviewed the vaccination cards of children in 76 cases and told many of the mothers that their children were due for vaccinations. They discussed vaccines against polio, whooping cough, and measles during 27%, 26%, and 29% of visits respectively. They asked questions of the mother to verify her understanding of the subject during 52% of visits.

The Regi health workers explained the vaccination schedule on 78% of the visits, and discussed contraindications on 31%. Interestingly, tetanus toxoid vaccination of women was emphasized on 72% of the visits. In the Punjab health workers gave vaccinations on 47% of home visits, warned about possible side effects 25-30% of the time, and advised 56% of mothers when the next vaccination was due. In less than 5% of visits where vaccine was administered was any effort made to verify the mother's understanding of what she had been told.

## 2.6 CARETAKER KNOWLEDGE

Although the PRICOR studies emphasized observation of what actually happens in encounters between health workers and mothers and children, it was realized that what mothers know about the program will

affect their participation. Several studies therefore attempted to assess their knowledge. Two methods were used -- interviews to assess the mothers' knowledge of vaccine preventable diseases and who should be vaccinated, and exit interviews to ascertain the extent to which mothers knew when to return for another vaccination.

In Haiti and Zaire, where mothers were asked who should be vaccinated, infants were mentioned by 65% of respondents in Haiti and 86% in Zaire. Pregnant women or women of childbearing age were mentioned by 49% and 25% respectively. Table 2-5 shows the percentages of respondents who could

**Table 2-5. Mothers' Knowledge of EPI Target Diseases**  
Percent of Mothers Who Mentioned Each EPI Target Disease in 3 Countries

<b>Country:</b> <b>Mothers mentioned...</b>	Haiti (n=422)	Zaire (n=677)	Colombia (n=504)
tuberculosis	30	40	42
polio	10	41	61
diphtheria	7	7	52
pertussis	5	35	59
tetanus	25	17	52
measles	8	85	66

name the diseases prevented by the EPI vaccines. With the exception of knowledge of measles in Zaire, the figures are not impressive.

Four studies interviewed mothers as they were leaving the vaccination session to learn whether they knew when the next vaccination was due. As the following data illustrate, with the exception of Regi more than two-thirds of the mothers interviewed in each country knew the date to return.

**Table 2-6. Mothers' Knowledge of Date of Next Vaccination**

<b>Country Studied:</b>	<b>% of Mothers Knowing When Next Vaccine Is Due</b>
Philippines (n=1013)	79
Punjab, Pakistan (n=714)	69
Regi, Pakistan (n=168)	10
Thailand (n=60)	67

## 2.7 SUMMARY OF SERVICE DELIVERY OBSERVATIONS

The results presented in the preceding sections provide detailed information on EPI service delivery from the PRICOR systems analyses.

Major strengths identified through these studies include the following:

- In most programs, disposable needles and syringes were used, providing sterile equipment for each vaccination. In studies where reusable needles and syringes were used, the studies showed that the equipment had been sterilized beforehand.
- Health workers protected vaccines effectively against heat and light.
- Most health workers correctly examined children's vaccination records before giving vaccines.
- Very few children who presented for vaccinations were turned away.
- Vaccination technique was found to be uniformly high in all studies but one.<sup>23</sup>
- Most of the mothers interviewed understood when to return for the next vaccination.

Major weaknesses revealed by the studies include the following:

- Multiple use of needles and syringes is a continuing problem in some countries, especially where reusable equipment is employed or where inadequate supplies are available.
- The disposal of opened vials of vaccine at the end of the day remains uncertain in several programs.
- Communication of EPI messages to mothers and to the community is often ineffective, and health workers rarely verify whether messages have been understood.

The service delivery activities observed and analyzed in this chapter cannot be accomplished without a variety of inputs from the wider health system and the community. These can be considered support services for immunization programs and may help to explain the findings just presented. The EPI support systems are the subject of the following chapter.

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<sup>23</sup> The Costa Rica study did not report individual vaccination encounters and therefore may not be comparable with the other studies.

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## **3. EPI SUPPORT SERVICES**

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### **3.1 INTRODUCTION**

In addition to assessing the actual delivery of immunization services by front line health workers, the PRICOR studies attempted to assess the quality of the support services which are essential to health worker performance. This chapter will discuss those support systems in order to focus on issues that might explain what was seen in service delivery performance. The Thesaurus divides its assessment of EPI support services into seven aspects:

- ▶ Planning immunization services
- ▶ Logistic support and supplies
- ▶ Training of personnel
- ▶ Community organization
- ▶ Supervision
- ▶ Financial management
- ▶ Monitoring and evaluation.

This chapter will examine some of the findings and lessons learned from the PRICOR country studies in terms of these seven categories.

The systems analysis data relating to support services are more difficult to compare than those concerning service delivery. This is due to differences in data collection techniques, in program organization from country to country, and in local management priorities which affected the design of the studies. The organization of EPI services varied widely among the nine countries studied, presenting more diversity than the clinical settings and service delivery tasks of health workers. Thus this chapter will attempt to generalize only in terms of common problems and perceptions -- what questions were perceived to be important and what lessons can be drawn concerning EPI support services.

The findings relating to support services are presented with greater caution than those relating to service delivery, due primarily to the fact that many support activities were less accessible to direct observation. Many of the all-important planning activities, for example, had occurred long before the studies were conducted, rendering direct observation impossible, and usually only documents and indirect evidence of planning were available. The same is true for training, except as provided by supervisors in an on-the-job setting. Limited numbers of supervision encounters were accessible in some countries, and reports from supervisors and supervisees were used instead. The inability to make direct observations of many of the support activities means that the "immediacy" of the support systems data varies considerably, and the observations and conclusions from this part of the studies should be accepted more cautiously.

### **3.2 PLANNING IMMUNIZATION SERVICES**

The Thesaurus suggested viewing the planning of immunization services as a sequence of four activities:

- 1) assessing current coverage and impact,
- 2) setting immunization objectives and targets,
- 3) setting immunization strategies, and
- 4) communicating plans to those responsible for implementation.

Because most of the studies focused on actual service delivery, and much of the planning had been done in the past and was therefore not amenable to direct observation, few of the studies reported addressing these questions directly. Where service delivery is well done, it may be fair to conclude that its planning had been satisfactory. Where service delivery is not up to expectations, however, planning is only one of the aspects that may have been responsible.

Although it can be reasonably assumed that virtually all EPI programs conduct coverage surveys -- the coverage survey having become the quintessential measuring tool of EPI -- only half the PRICOR studies reported current coverage levels. Even then, coverage data were generally representative of larger areas of the country than the individual studies could address. The Peru study actually began with a coverage survey, requested by local EPI managers to support their contention that existing vaccination services are effective, and that support for routine services would be preferable to the campaign strategy adopted nationally. The survey found coverage to be very close to the targeted 80% level and supported the case of the local managers. Other studies<sup>24</sup> used coverage data to identify areas for study.

The performance of coverage surveys was not evaluated by any of the PRICOR studies. Nor was the impact of EPI programs addressed in any depth by any of the studies.

The age group targeted for vaccination was defined clearly for each of the programs studied. There was variation in the age groups chosen, but, at least for childhood vaccination, a targeted group is part of the plan in every country studied. Desired coverage was addressed in Costa Rica, Pakistan (Regi), Haiti, Peru, and Zaire, and quantitative and dated targets were mentioned for the latter three countries. Only in Zaire was an attempt made to determine how a service delivery facility contributes to setting its own targets. In the Philippines targets are set locally, and in Thailand targets are set at the provincial level. Elsewhere, targets were apparently set at some central level. In none of the studies were disease reduction targets discussed as part of planning.

Immunization strategy was addressed by all the studies, primarily to ensure that the chosen strategy was being followed. Planning the strategy was rarely considered by PRICOR investigators. Policy issues such as recommended vaccination schedules and contraindications were defined for each country. Procedures for channeling children into the EPI were investigated in all ten studies, but procedures for site selection and frequency of vaccination sessions were addressed in only three. Adequate staffing and transport were considered in almost half the studies. Adequate budgeting was not formally addressed in any.

In all but three studies, an attempt was made to determine whether documents defining policies and procedures could be found at the site of service delivery. Such documents should at least reveal the results to be expected from the planning process. Unfortunately, they were rarely found.

The Costa Rica study found that many health workers, and even their supervisors, do not have access to written norms and procedures about vaccinating children and maintaining the cold chain. In Haiti only one of 11 health facilities visited had the expected documents. In Punjab (Pakistan) less than 20% of supervisors were observed to discuss program targets with the health workers. In Peru planning and strategy documents arrived in many rural areas too late to contribute to effective local planning; only the presence of experienced local coordinators prevented serious service delivery problems. The Zaire study found health centers that lacked data for planning and management as basic as target populations.

If we consider the assessment of EPI planning in terms of 1) the presence of both current and desired coverage rates, 2) the establishment of standard policies and procedures for targeted age groups, schedules of vaccines, contraindications, and methods to attract children effectively, and 3) evidence that policies and

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<sup>24</sup> Thailand, Philippines, Costa Rica

procedures have been communicated to front line health workers, then the following conclusions regarding EPI planning can be drawn from the PRICOR studies:

- ▶ Uncertainty about current coverage rates was paralleled by vague intermediate quantitative targets for most of the EPI programs studied.
- ▶ Planning for target ages has been effective, as demonstrated by the fact that target ages are generally understood and respected by health workers.
- ▶ Planning for schedules has resulted in generally correct health worker understanding, but suboptimal community compliance remains a problem.
- ▶ Recognition of contraindications to vaccination was inconsistent among countries.
- ▶ The fact that channeling procedures exist for all the systems studied indicates that program managers recognize their importance. However, inadequate community compliance suggests that this aspect of the EPI needs improvement.
- ▶ The absence of policy documents and procedures manuals at almost all service delivery sites is a common weakness in the EPI programs studied. It is difficult to see how managers can plan and gauge their progress in the absence of clear policies and targets.

### 3.3 LOGISTIC SUPPORT AND SUPPLIES

The EPI logistics system includes the procurement, transport, and storage of vaccines and related supplies. It can also be considered to include the system to transport personnel, both for service delivery and supervision. In addition to the usual requirements for a logistics system -- having the right things in the right place at the right time -- the fragility of vaccines and the possibility of contamination demand a respect for expiration dates and scrupulous attention to the maintenance of the cold chain and to sterility. The existence of a reliable logistics and cold chain supply system is absolutely essential to an effective EPI program.

The Thesaurus suggests that the EPI logistics system can be assessed from five perspectives, and the field experience of the country studies suggests a sixth:

- 1) the establishment of policies and procedures governing ordering, packing, transporting, monitoring, protecting from heat and light, and safe disposal (if compromised) of vaccines and supplies;
- 2) the availability of adequate vaccines and supplies for service delivery;
- 3) the maintenance of vaccines and diluents at proper temperature and light conditions, with the extent of any deviation monitored;
- 4) the distribution of vaccines and supplies to the site of vaccine administration;
- 5) the maintenance of inventory and equipment records; and
- 6) the availability of transportation as required for service delivery, supervision, and coordination.

Not all of the PRICOR studies looked at the logistics system in detail. In Colombia the health volunteers studied do not actually give vaccinations. They simply advise families of the importance of immunization and inform them where and how to get their children vaccinated. In Peru the EPI activities observed were part of a campaign strategy that differs greatly from the other programs (and from their own routine strategy). Moreover, logistics were not expected to be a particular concern in Peru because the activities examined took place near the central EPI warehouse. The analysis of logistics is therefore based on the remaining studies.

### 3.3.1 Policies and Procedures for the Logistics System

Perceived inadequacies in the supply system were a common complaint of EPI managers, and most of the studies looked at procedures for ordering or otherwise obtaining vaccines and supplies. The following specific problems were noted:

In Costa Rica it was concluded that the information system for vaccines and supplies should be redesigned to avoid stock shortages.

The Zaire report noted that "there is a need to insist on sufficient ordering and stocking to have the maximum amount of vaccine on hand at the time of a vaccination session."

It was not clear in Zaire when vaccine should be discarded if the temperature exceeds 8°C.

In Haiti it was found that not all vaccinating facilities had access to additional supplies as needed.

Similarly, in Regi, Pakistan vaccines and supplies were found to be issued on a fixed schedule. There is no routine method to obtain more when the existing supply is exhausted.

These findings, together with the fact that all the studies found instances of shortages of vaccines or supplies or both, suggest that a review of the logistics system would be useful for most of these EPI programs.

### 3.3.2 Adequacy of Vaccines and Supplies

Concern about possible supply deficiencies was expressed by the Thesaurus in terms of vaccination sessions having inadequate vaccines, supplies, or transport. It was considered by all the logistics studies.

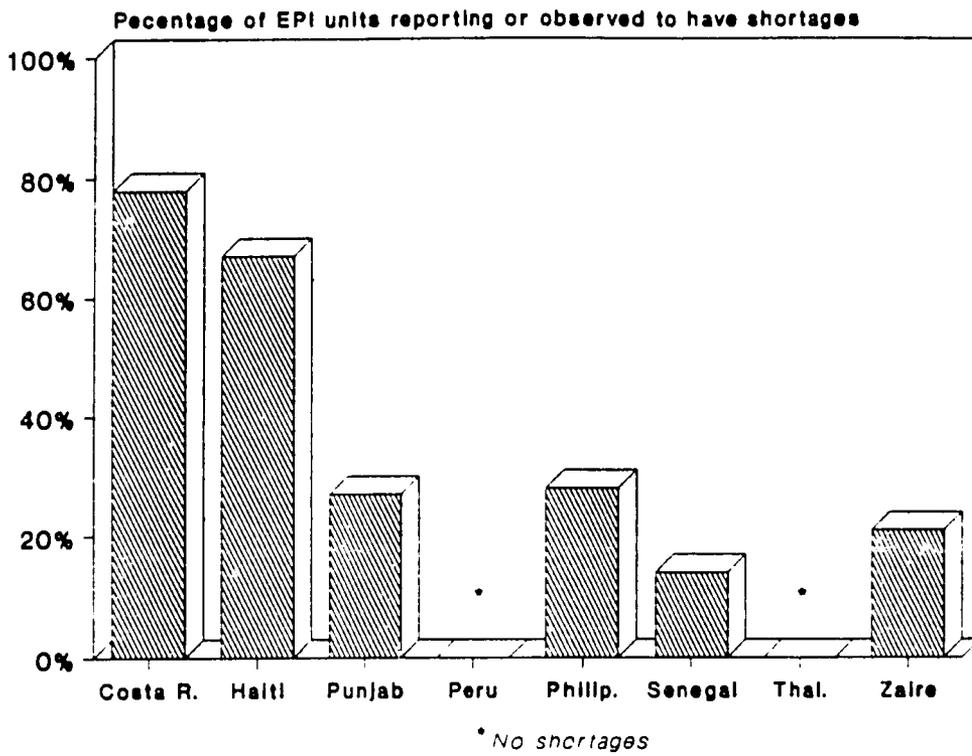
If we ask whether vaccine shortages were experienced in the past year, the following results were obtained:

Zaire -	21% of units were observed to run out of vaccine. 15% of units reported canceling sessions for lack of vaccine.
Thailand -	No vaccine shortages were reported.
Senegal -	14% of respondents reported vaccine shortages.
Philippines -	28% of units were observed to be out of at least one vaccine.
Peru -	No problems with stocks occurred in the "vast majority" of units.
Pakistan -	Shortages of vaccines were reported at Regi. Inadequate vaccines were observed at 27% of sessions in the Punjab study.
Haiti -	67% of units reported having had to cancel sessions due to lack of vaccines.
Costa Rica -	"Insufficient supply of measles vaccine and syringes" was noted as one of 3 major problems with the system. 14 of 18 clinic staff interviewed reported inadequate vaccine supplies.

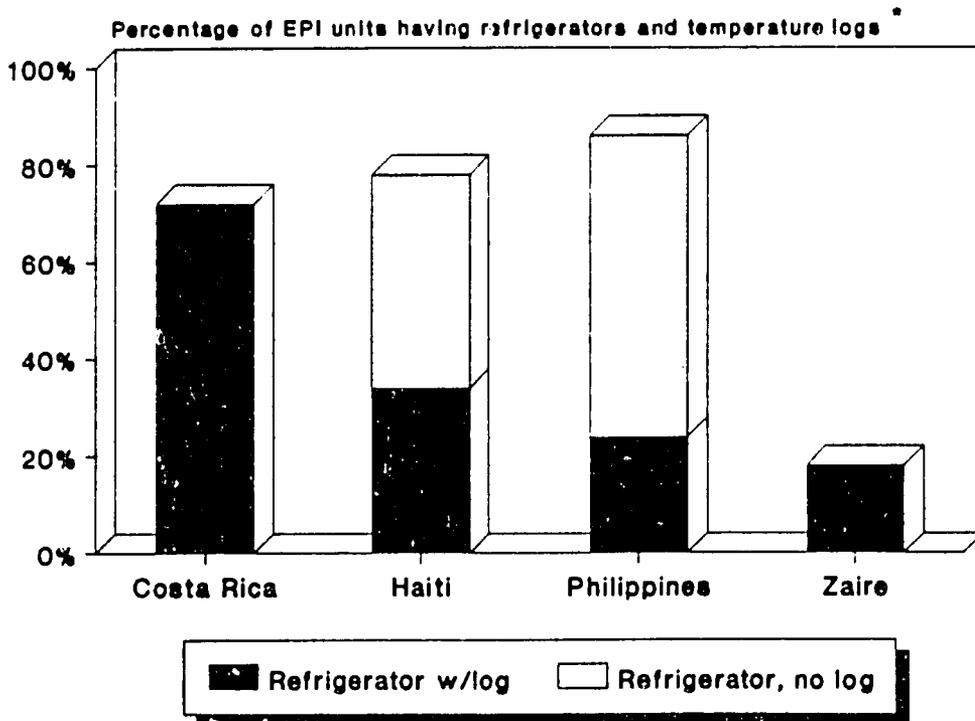
Figure 3-1 summarizes the above findings.

Most studies documented other shortages as well. Five mentioned shortages of needles and syringes. Three noted shortages of vaccination cards. The Thailand study noted a "significant shortage" of educational materials relating to EPI. Only the Peru study noted no significant shortages.

**Figure 3-1 Vaccine Shortages**



**Figure 3-2 Cold Chain Equipment**



\* Note that peripheral units in some programs are not expected to have refrigerators.

### 3.3.3 Protection from Heat and Light

The maintenance of vaccines in a defined temperature range and protected from light was addressed by most studies. Protection from light was generally not found to be a problem. Keeping the vaccines and diluent cold was more difficult. In most studies, the presence of a thermometer with an up-to-date temperature log was considered the key indicator of a system that can monitor cold chain performance. Findings from four of the PRICOR studies are illustrated in Figure 3-2.

Performance of temperature monitoring varied considerably. In Zaire all three refrigerators were observed to have temperature logs, and two of the three were filled in correctly. Unfortunately, they reported temperatures exceeding 8°C for 13-25 days per month. In Peru proper monitoring of the temperature was greater than 70%. In Haiti only three of nine refrigerators were operating and had temperature logs. The logs showed an average of 20 days in the safe range during the past month. In the Philippines only one of the 13 functioning refrigerators seen was found to have a log in use.

The Regi (Pakistan) study noted frequent power failures that constitute a hazard to the cold chain. The Costa Rica study found that some supervisors are not clear on the norms related to maintenance of the cold chain.

### 3.3.4 Other Logistics Issues

Transportation for personnel, although not a logistics concern identified by the Thesaurus, was highlighted as a problem in at least four of the studies. In Regi the lack of transportation was seen as a limiting factor for outreach workers. In Peru it was a major constraint on coordination. In Costa Rica it was the major factor limiting supervision.

Little attention was paid to systems of vaccine distribution and the maintenance of records of inventory and equipment. In Zaire fully 50% of health units visited reported the transportation of vaccines to be inadequate. Where they were looked at, no uniform system was apparent. In view of the frequency with which shortages were noted, it would appear that more attention should be directed to this aspect of the EPI system.

## 3.4 TRAINING FOR EPI

The PRICOR studies, focusing as they did on ongoing EPI programs, were unable to observe the formal training of health workers. Nevertheless, several of the studies attempted to assess through interviews the scope of EPI training for supervision as well as the delivery of services. To the extent that good supervision provides on-the-job training whenever deficiencies are noted, that aspect of training is reflected in the supervision studies (Section 3.6). This section will review the efforts of the studies to assess training methods and effectiveness.

The Thesaurus divides the EPI training function into four stages:

- 1) the planning of training,
- 2) the provision of training, both formal and informal, in specific skills,
- 3) the evaluation of the training effectiveness, and
- 4) the maintenance of training records.

The PRICOR studies were particularly interested in the second and third stages. Training for at least fifteen different health worker skills were addressed in the different studies. Some of the studies sought to

determine how such skills were taught, whether largely theoretically or with demonstration and supervised practice. Most of the studies asked how competence and performance are routinely assessed. A few of the studies, particularly that carried out in Senegal, looked at the training of supervisors as well. Lacking evidence from direct observation of training or from records, however, no attempt at comparative analysis of the training function will be made here.

Several studies attempted to determine what proportion of the health workers had been trained or retrained in the past three years:

**Table 3-1. EPI Training for Health Workers in Past 3 Years**

	Local Staff	Supervisors
Zaire	12 % (CHWs) 70 % (clinic workers)	
Peru	100 %	100 %
Haiti	42 %	
Regi, Pakistan	50 %	
Philippines	45 %	45 %

When the training received was reviewed to determine whether the key notions of vaccination schedule, sterile technique, and cold chain maintenance were included, three studies produced data on this question. In Zaire those key components were included in the training of 54% of clinic health workers interviewed. In the Philippines the figure was 59%. In Peru, where the training was for a specific campaign and not for routine immunization services, the figure was 90%.

Those studies which investigated training techniques found that participatory techniques were reported for 75% of the health workers in Peru, 50% in Regi, and 27% in the Philippines.

Immediate post-training evaluation was done both by written test and orally by the different programs. Respondents reporting having been evaluated by a written test varied from 9% in Zaire to 68% in the Philippines and 75% in Regi. Oral testing varied from 7% in the Philippines to 64% in Zaire. In Haiti about two thirds of the health workers questioned had been tested either on paper or orally.

Several of the PRICOR country reports suggested specific types of additional training. Supervisory training was needed in Costa Rica. Better training of the Community Health Workers was needed in Zaire because so much of the responsibility for reaching the population falls to them. The Thailand study focusing on information systems found that midlevel staff need additional training in the use of available health information.

A very interesting bit of information was obtained in Regi when the amount of training recalled by four health workers was compared with the amount their supervisors recalled having given them on immunization. Although all four were reported by the supervisors to have been trained in EPI, only one health worker

mentioned immunization as a subject in which training had been received. This suggests that many of these rates should be viewed with a healthy skepticism.

The PRICOR studies suggest the following conclusions relating to training for the EPI component:

- All the PRICOR studies found that health workers had received formal training in the policies and procedures of EPI. How it was decided what to include in that training was not evident, and no formal training was observed.
- A significant number of health workers have not had training or refresher training in the past three years.

### 3.5 COMMUNITY ORGANIZATION

Although the WHO recommendations for EPI emphasize the involvement of the community in program management, few of the programs examined by the PRICOR studies appear to have attempted to involve the community beyond bringing children for immunization at the right times and places, and paying for services in those programs where payment is required. Therefore, few of the studies discussed a larger role for the community. It would appear that in many countries EPI is organized by the health establishment *for*, but not necessarily *with*, the community.

The Thesaurus suggested looking at three aspects of community organization relating to EPI:

- 1) planning the appropriate role for the community,
- 2) management of the community role, including resource generation, and
- 3) the monitoring of community-managed activities.

In Zaire the PRICOR study found that "the Community Health Agents and the members of the Health Development Committees play an important role in the training and mobilization of the population for [EPI] activities." In as many as half the communities visited, they share the responsibility for transporting vaccine, for bringing children for vaccination, and for informing the mothers of vaccination sessions. In the nineteen communities studied in Zaire, the local community health worker was reported to have been chosen by the village health committee in fifteen and the accounts supervised by the committee in thirteen.

Community volunteers were observed to participate in channeling children to the EPI campaign in Peru, but this was for a special national EPI day and not representative of the normal role of the community. In Haiti this function has been institutionalized in the role of the *collaborateur-volontaire*, but it is unclear how important such volunteers are to the EPI program since almost half the health workers questioned were unaware of the presence of *col-vols* and 76% of mothers do not know what they do. Forty-six percent of these volunteers reported that community members help with immunizations and indicated that the communities help to select the "rally points" where EPI activities take place.

Because of differences in EPI organization in the countries studied, and differences in the study protocols, the PRICOR studies do not permit comparative lessons to be drawn concerning community organization.

### 3.6 SUPERVISION

The support function addressed most thoroughly by the PRICOR studies was supervision. The PRICOR Thesaurus divided the supervision function into the following four areas:

- 1) the planning of supervision activities,
- 2) the supervision of service delivery and support activities,
- 3) the evaluation of supervision activities, and
- 4) the maintenance of supervision records and reporting.

The second component received most emphasis, since the focus of the studies was on service delivery, but at least half the studies addressed the other components as well.

### 3.6.1 Objectives for Supervision Planned and Defined

Two major indicators were studied that relate to supervision planning -- a statement of objectives and the development of work plans. Some studies looked for presence of supervisor checklists as an indicator of supervision objectives. The reports had the following comments concerning supervisor objectives:

Costa Rica: "Is the process of supervision unclear to supervisors?" It appeared unclear to the investigators who suggested something like a checklist. "Supervision instruments would be used to guide supervisors in the regular performance of their work."

Haiti: One of nine supervisors was observed to have guide for supervision.

Pakistan (Regi and Punjab): There is a checklist for EPI which is used to collect information needed for reports to be sent to higher authorities.

Peru: "Supervision was done by a physician from the same health center who traveled around the catchment area visiting each vaccination post in turn and ensuring that its stock of supplies and ice were replenished as necessary. The health center coordinator was not responsible for direct supervision."

Philippines: Sixty-seven percent of supervisors were observed to use a supervisory checklist. Another 12% claim to use it as well, but were not using one when observed.

Senegal: Fifty-one of 101 supervisors were observed to use a supervisor protocol.

Thailand: "inadequate training and supervision of health volunteers" was reported.

Zaire: Although all three supervisors who were carefully observed were seen to use checklists, the report states, "The supervision visits are oriented to the checking of records. It would be more effective to organize them around vaccination sessions and to establish cards which would orient the supervision toward the tasks to be performed."

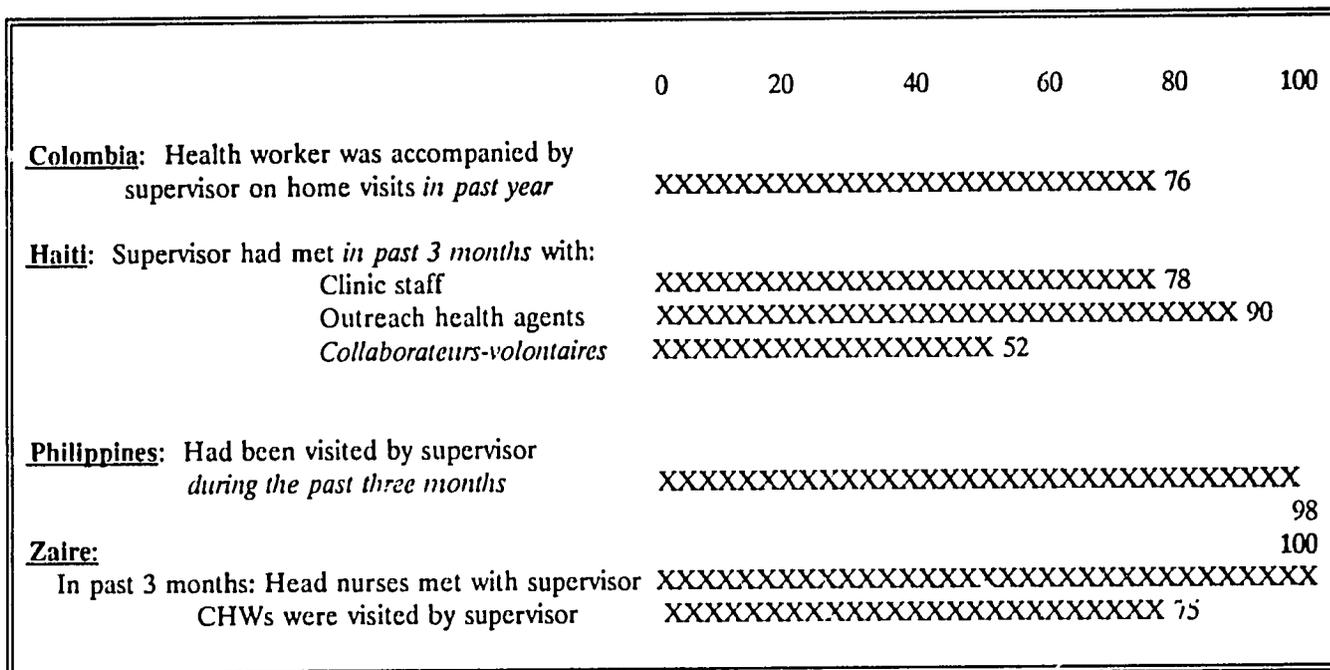
### 3.6.2 Frequency and Regularity of Supervision

Every study tried to assess regularity of supervision, and most tried to determine frequency. In general it was found that supervision by higher ranking supervisors tended to be irregular and unplanned, but immediate supervisors generally encountered their EPI workers at least once a month.

Frequency of supervision varied from daily, when the health worker's supervisor works in the same facility, to once in several months. As a rule, however, most EPI programs seem to consider three months as the maximum interval that can be allowed between supervision visits, and some of the studies attempted to determine what percentage of health workers had been supervised at least that frequently. The graph below

illustrates the findings from four of those studies.<sup>25</sup> It is apparent that supervisors do actually see the health workers they supervise. In every country studied more than half the EPI workers encountered had been subject to some sort of supervision within the previous three months.

**Figure 3-3. Percentage of EPI Workers Having Been Supervised within 3-12 months**  
Results from 4 PRICOR studies.



### 3.6.3 What EPI Supervisors Actually Do

The next question was what the supervisor does when he or she comes to visit the health facility. Some studies did not focus on the site of supervision, but looked instead at contacts between the supervisor and the supervisee, whether at the health facility, at the supervisor's office, or elsewhere. The advantage of such an approach is that more opportunities for supervision are available. The disadvantage is that the supervisor may not observe the performance of the health worker under actual working conditions.

Most of the studies did try to determine whether the supervisor actually observes the health worker in action and whether feedback and problem-solving assistance were provided. These questions were posed differently in the various studies, so that comparison is difficult. In Haiti, for example, it was determined that 33% of supervisors had actually observed vaccination sessions; in the Philippines, *when a supervisor was present*, it was observed that the supervisor watched the health worker function in 77% of sessions. In Regi such observation was reported as "rare."

<sup>25</sup> The Colombia study could not be analyzed for just the past three months, but it is included because it demonstrates an impressive effort to supervise the least accessible parts of the system.

Just what constitutes feedback was not precisely defined, but the PRICOR studies provided the following data on feedback of one sort or another:

<u>Punjab</u> - individual performance discussed:	16%
<u>Senegal</u> - feedback given:	29%
<u>Philippines</u> - comments given on performance:	24%
<u>Regi</u> - feedback described as:	"limited"
<u>Peru</u> - reported satisfaction with feedback:	"low"
<u>Colombia</u> - "advice" given:	77%

A few of the studies tried to determine if the supervision encounters were used for problem-solving. In the Philippines 10% of supervisors were observed to ask the health workers they supervised if there were any problems -- leading presumably to an attempt to solve them. In Senegal 28% of supervisory encounters were observed specifically to include problem solving, as were two of three supervisor visits in Zaire. The Regi report described problem solving there as *ad hoc*. Analyses of data from Senegal and the Punjab attempted to determine whether supervisors were differentially addressing those tasks in which health worker performance was observed to be deficient; the findings of those analyses were ambiguous.

Four studies observed EPI supervisors fairly closely to observe what they actually do when they encounter the persons they supervise. Their findings are shown in Table 3-2.

**Table 3-2. What Supervisors Actually Do**  
Observations from supervision encounters in 4 PRICOR countries

Supervisor...	Punjab (supervisory meeting) n=36	Punjab (home visits with H. worker) n=153	Philippines n=52	Zaire n=3	Regi n=10
reviews paperwork	50 %	42 %	40 %	routinely	routinely
checks stocks	33 %	--	20 %	1/3	usually
provides training	47 %	58 %	70 %	1/3	ad hoc
checks skills	8 %	--	0 %	1/3	--
checks cold box/ refrig.	36 %	--	--	2/3	usually
checks transport system	11 %	--	--	--	--
observes performance	--	100 %	77 %	1/3	rare
asks about problems	--	--	10 %	2/3	--
observes health ed.	--	--	--	1/3	very weak

### 3.6.4 Evaluation and Documentation of Supervision

Six of the studies examined the documentation of supervision encounters and the use of the data collected. They attempted to look at the information documented by supervisors and asked what happens to such data: how is it used?

Many supervisors indicated that they use the information immediately, either for evaluating the situation and providing feedback, and perhaps on-the-job training, or for processing prior to transmittal to higher authorities. In the Philippines 48% of supervisors reported using the data immediately, and in Senegal 65% were observed to be preparing tables and graphs.

Information not used immediately seems simply to be sent to higher levels in most cases. The Regi study found, for example, that little of the information on supplies and cold chain, or from the supervisor's checklist, is used by the supervisor himself. Instead, it goes to higher authorities who use it for monitoring, evaluating, providing feedback, and senior level planning. In the Philippines study, 35% report collected data to someone else, and 17% do not use the data at all.

In a few studies supervisor records were found at the clinic itself, presumably to document feedback to local staff and/or to provide background information for future supervisory visits. Fifteen of 18 Costa Rican Community Health Workers had records of recent visits from their supervisors. Curiously, only 2 of the 18 supervisors had such records for the CHWs they supervise. The Punjab study looked for information at the clinic level and reported "little evidence of clinic supervision...in the clinic records." In Haiti a supervisor's notebook was found in 8 of 12 clinics, notebooks in which supervisors can record their findings and recommendations at each visit. Whether the information is ever used cannot be determined from the study data, but at least it is available at an appropriate level.

### 3.7 FINANCIAL MANAGEMENT OF EPI

The PRICOR Thesaurus listed two aspects of financial management to be examined in conjunction with EPI programs:

- 1) securing or generating necessary financial resources, and
- 2) monitoring and accounting for such resources.

The PRICOR studies found little uniformity in the financial management of the various EPI programs studied.

In Haiti, the Philippines, Senegal, Thailand, and Zaire some payment is required (even though vaccination is officially free of charge in the Philippines and Haiti). In the other countries the question was generally not posed, and immunizations may be free of charge.

The financial costs of vaccination services were important to the local EPI managers in Peru, and their first request for the study there was to help complete a coverage survey to help demonstrate that routine EPI services are in fact cost effective. Their argument was that the added costs of a campaign strategy are unnecessary, and that the money could be spent more appropriately in supporting routine services. The coverage survey that resulted supported their position, but in no other study was the financial aspect prominent.

Since every EPI program, even those requiring no direct payment, has costs and resources to be managed, the management of those resources constitutes an important aspect of the management of immunization activities, especially in an environment of limited resources where EPI activities are frequently competing with

other primary health care activities for the same scarce resources. Some of the logistics, supervision, and training deficiencies identified in the PRICOR studies may reflect inadequate financial resources, but the subject was not addressed in most cases.

### 3.8 EVALUATION AND MONITORING

Managing an EPI program requires a regular flow of information to monitor the activities and to make appropriate management decisions. The Thesaurus breaks the process into four components:

- 1) the collection of data,
- 2) the processing of the data collected,
- 3) the reporting of the data to management levels, and
- 4) the utilization of the data.

The PRICOR studies frequently noted that the managers of the EPI programs they were observing took a particular interest in the administrative and recording activities of the process. "Supervision" often consisted of little more than a review of the records. It was apparent that the importance of the documentation and information system is widely appreciated. Unfortunately, the PRICOR studies do not provide comparable data to permit following that information through to the processing, reporting, and utilization phases.

EPI coverage rates were used in all countries, but a number of problems were observed. Different rates and age groups make comparison between countries difficult, but that is not a problem if whatever rates are chosen within a country are used consistently. A greater problem is denominators for the rates. Many of the rates are calculated not from coverage surveys but from catchment population figures. That these may be questionable is illustrated by the finding in Zaire that coverage figures showed 63% BCG coverage, while BCG scars were observed on 70% of children on home surveys. That coverage surveys are also suspect as suggested by the finding in the Punjab study that in one fifth of cases a vaccination had been given but not recorded on the vaccination card.

Vaccination cards were noted to be absent or insufficient in a number of visits to vaccinating sessions. The studies did not indicate how information from such sessions is handled. In such cases the information system problem may actually be a problem in supplies, logistics, or financial resources.

Two studies (Peru and Thailand) were able to document a remarkable consistency of findings within individual EPI facilities. Greater variation was seen between facilities than within them. This suggests that small samples may suffice for monitoring purposes if the objective is to identify units where problems are occurring. The LQAS methodology employed in Costa Rica used such small samples, although the criteria for acceptable performance may have been set so high that the results fail to highlight the areas with the most serious deficiencies.

Tabulation and reporting processes were not evaluated in any detail in the PRICOR studies, but the utilization of data was examined in a few. The Regi, Pakistan study compared health workers and their supervisors in their use of EPI information. It found that the health workers rarely used the information themselves to help to plan or evaluate their activities. Even for midlevel supervisors, most used the information simply to pass it on to higher levels. Only at the most senior levels were the data used for evaluating, planning, providing feedback, and instituting changes.

### 3.9 SUMMARY OF SUPPORT SERVICES OBSERVATIONS

The preceding sections provided information in some detail from the PRICOR systems analyses on the support services which facilitate the delivery of EPI services in the countries investigated.

Major strengths identified by these studies include the following:

- Planning and training activities have communicated targeted age groups and recommended vaccination schedules effectively to almost all health workers.
- Supervision is built into all the EPI programs studied, and supervisors do see the personnel they are expected to supervise, even if such encounters may be less than optimally effective.
- Supervisory checklists are used in many EPI systems.
- Reviewing records and collecting information for purposes of supervision and monitoring were observed to be performed routinely by program managers and supervisors in all EPI programs studied. Both record systems maintained at the health facility and records retained by the patient (or caretaker) are in general use.

Major weakness in support services revealed by the studies include the following:

- Policy guides and clear intermediate goals were not found at most health facilities visited, making it difficult for local EPI workers to plan and monitor their progress.
- Recurrent shortages of vaccines and supplies characterized the EPI programs. Some of the most dangerous practices observed (e.g. use of non-sterile vaccination equipment) result from attempts to compensate for such shortages.
- The cold chain was found to be deficient in most of the programs examined. Thermometer and temperature logs were often missing. When present, they documented recurrent problems.
- There was little evidence that supervisors were systematically observing health worker technical performance, providing feedback, conducting on-the-job training, or otherwise attempting to solve problems in performance as a routine supervisory function.
- Much of the information routinely collected was not utilized locally but simply transmitted to higher authorities.

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## 4. CONCLUSIONS AND FUTURE DIRECTIONS

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The PRICOR Project used systems analysis methodology to assess the performance of health workers providing primary health care and child survival services in twelve developing countries. This document reviewed the findings relating to the Expanded Program on Immunizations (EPI) in the nine countries where EPI was specifically addressed. The systems analyses focused on the actual processes of service delivery and essential support activities. In order to identify program strengths and weaknesses, PRICOR investigators and their host country colleagues carefully observed and documented what health workers actually do. When problem areas were identified, the detailed systems analysis information enabled program managers to know what corrective action to take, or suggested additional operations research studies to determine what action might be appropriate.

The systems analyses were designed in collaboration with host country health officials, and the *Primary Health Care Thesaurus* that was developed by PRICOR provided guidance in study design. As a common element that contributed to the design of all the studies, it provided the unifying framework for this comparative review.

This chapter is divided into three sections. The first will recapitulate the common strengths and weaknesses of the programs studied. The second section reviews some of the results of the analyses -- changes made by program managers on the basis of PRICOR findings and additional research studies that followed the systems analyses. The final section looks to the future, considering how the PRICOR methodology can be useful to EPI program managers in the future and identifying areas which warrant additional study.

### 4.1 STRENGTHS AND WEAKNESSES

#### 4.1.1 Strengths of EPI Programs Reviewed

Systems for the delivery of vaccination services to infants and young children were well established in all the countries studied. Health workers and mothers were familiar with vaccination services, and activities are occurring regularly. Among the strengths identified by the various PRICOR studies, the following stand out:

- Planning and training activities had communicated targeted age groups and recommended vaccination strategies effectively to almost all health workers.
- As a rule, health workers were careful to protect vaccines from heat and light.
- Most health workers correctly examined the vaccination cards or records of children before administering vaccines.
- Very few children who presented for vaccination were turned away.
- Most programs were found to employ disposable needles and syringes, ensuring sterile equipment for each vaccine injection. In those programs in which reusable needles and syringes were used, the equipment had been sterilized properly beforehand. (When supplies were insufficient, however, they were sometimes reused without sterilization -- see below.)
- Vaccination technique was very good in almost all studies.

- In the studies in which mothers were interviewed, most were found to know when to return for the next vaccination.
- Supervision was found to be built into all EPI programs studied, and supervisors did see the personnel they are expected to supervise.
- Supervisory checklists were observed to be used in many EPI programs.
- Record review and the collection of data for supervision and monitoring were routinely carried out by program managers and supervisors in all programs studied.

Overall, it was found that once a child presented at an organized vaccination session, the routine EPI activities were carried out reasonably well. Health workers knew what they were expected to do, and, for the most part, did it.

#### **4.1.2 Weaknesses of EPI Programs Reviewed**

Despite the generally smooth operation of the EPI programs studied, deficiencies were identified in all analyses, and certain problems were common enough to be highlighted as general weaknesses:

- Policy guides and clear intermediate goals were not found at most health facilities visited, making it difficult for local EPI workers to plan and monitor their progress.
- Communication of EPI messages to mothers and the community was often ineffective, and health workers rarely verified that messages had been understood, with the result that mothers were often unaware of vaccination schedules and just what is recommended for their children.
- Shortages of vaccines and EPI supplies were common. Some of the dangerous practices observed (e.g. multiple use of needles and syringes without sterilization between children) would probably not occur if supplies were adequate.
- Deficiencies in the cold chain were discovered in most of the programs studied. Thermometers and temperature records were frequently missing. When present, they documented frequent temperatures above the acceptable range.
- The proper disposal of opened vials of vaccine at the end of the day was not enforced by several of the programs.
- Although they visit the health workers they are expected to supervise, supervisors were not seen to observe technical performance systematically, to provide feedback, to conduct on-the-job training, or to assist in problem-solving.
- The data collected were not observed to be used locally: they were simply transmitted to higher authorities.

#### **4.2 CHANGES AND ACTIVITIES RESULTING FROM THE PRICOR ANALYSES**

The country studies were planned and carried out in collaboration with local health system officials. In focusing on EPI activities in new, systematic ways, many of the host country program managers and health workers acquired new perspectives and insights into their activities. Enough of these were documented in

the PRICOR reports to suggest that this was a generalized phenomenon even if the full impact cannot be measured.

In Thailand the findings from the systems analysis were presented to provincial and district officials who decided that the management corrections indicated were clear: no additional studies were needed. They decided to incorporate changes directly into the operational plans for the coming year. For EPI this meant improving the counseling and health education aspects in particular. Within the limitations of the budget, health educational materials would be obtained. Refresher training for EPI would focus on supervision and the implementation of improved education and counseling. The supervision model would be revised, centered on the supervision checklist which had been found to be extremely helpful in indicating to supervisors what aspects of the EPI were in greatest need of improvement.

In Regi (Pakistan) a solutions development workshop followed the systems analysis. Proposals for improving services were discussed and prioritized. Four recommendations relating to EPI services were placed in the "high" rankings. For counseling it was suggested that health workers 1) warn mothers of the possibility of fever following vaccination, 2) educate mothers on the purposes of immunizations, and 3) educate mothers on the importance of completing the vaccination series. For supervision the highly rated recommendation was to add "warns mothers about fever" to the supervision checklist.

In the Punjab (Pakistan) two workshops followed the systems analysis. Although it was agreed that EPI was not a weak area, a number of relevant comments and suggestions were raised:

- ▶ Clients should not leave the clinic with vaccinations overdue.
- ▶ Mothers should be warned of the possibility of fever.
- ▶ Better counseling is needed on the care for BCG scabs.
- ▶ Clients should be asked to repeat instructions, especially the date of the next vaccination.
- ▶ Supervision checklist should be produced for every level.
- ▶ Checklists should be available for both clinical and community workers.
- ▶ Completed checklists should accompany travel allowance submissions.
- ▶ Job descriptions are needed for all staff.
- ▶ Supervision visits should be regular.
- ▶ Midwives should be involved in vaccination activities.

Although unclear how many of these proposals were implemented, they illustrate the types of changes that operations research can address.

In Zaire the findings regarding the weaknesses of the cold chain were impressive enough to produce clear recommendations for 1) training in maintenance of cold chain equipment, 2) development of instructions for regular maintenance of that equipment, and 3) distribution of those guidelines in two study zones and to the national EPI program.

In Haiti, political events, which led to the US withdrawing all direct aid from the country, prevented the convening of a national primary health care seminar that was planned to follow the systems analysis. Nevertheless, major recommendations emerged relating to the cold chain and increased supplies of BCG.

The investigators in Costa Rica were very careful not to discuss their preliminary findings with health workers because they did not want that information to diffuse to other health workers who might then alter the behavior being studied. Nevertheless, even there recommendations were produced for better supervision instruments and training, for the development of an effective information system for the logistics of syringes and vaccines, for local financing experiments to cover vehicle maintenance and fuel, and for the replacement of ten-dose measles vaccine vials with single dose vials.

Where solutions to problems observed were not obvious, host country health officials and EPI managers were encouraged to carry the analysis of their programs further with operations research studies. The PRICOR Project funded a number of such studies. At least twenty-five OR studies related to immunization, including seven in Indonesia where the PRICOR systems analysis did not focus directly on EPI. Table 4-1 presents a list of such studies, noting the problem that triggered the study, the type of study carried out, and the results reported.

**Table 4-1. Operations Research Relating to Immunization Programs**

**A. Problems Addressed: Low Coverage/Completion Rates**

Country	Problem	OR Study	Results	Duration	Cost
Indonesia	Discontinuity of care; low completion rates	Study efficacy of infant calendar action poster	Action poster contributed to improving immunization compliance: up to 78%	2/89-5/90	\$7,599
Indonesia	Immunization coverage falling short of target	Use of non-health personnel as community motivators.	Immunization coverage increased by 40% (TT1) and 6% (TT2)	2/89-5/90	\$8,371
Indonesia	Children fail to complete vaccination series	Compare group versus individual education	Group education increased coverage rate from 30% to 70%; no change in drop-out rate	2/89-5/90	\$6,400
Indonesia	Low coverage of TT vaccination among pregnant women	Test screening intervention to reduce missed opportunities for TT immunization	Proportion of missed opportunities reduced from 63% to 40% (S. Jakarta) and from 18% to 6% (W. Java)	2/89-5/90	10,759
Indonesia	Low coverage of TT vaccination among pregnant women	Test model for TT screening program	Missed opportunities for vaccination reduced	2/89-5/90	11,106
Indonesia	Low coverage of TT vaccination among pregnant women	Reeducate private midwives to promote and provide TT vaccine	Slight reduction in proportion of missed opportunities (51% to 39%)	2/89-5/90	10,669
Zaire	Low vaccination coverage	Vaccinate at each opportunity, nurses training; intensify supervision	Increase in coverage rates: 66% to 84%; alternative solutions found	12/88-1/90	\$3,191
Zaire	Utilization rates for Child Survival services below target	Improve and intensify CHW home visits	Mothers' use and knowledge of EPI increased; mothers with cards: 28% to 54%; mothers at sessions: 39% to 61%	8/15-11/89	\$2,877
Zaire	Poor participation in EPI services	Test impact of dispersing services (3 studies)	1. Increased EPI participation 2. 9/88-1/91 2..3. Results not available	1. 1/88-2/90 2. 9/88-1/91 3. 11/88-1/90	1. \$3,284 2. \$3,392 3. \$2,527
Zaire	Low Measles Coverage	Intensify Health Education; questionnaire and observation	Increase: 38% to 49%	2/89-	\$2,323
Zaire	Low DPT and Polio completion rates	Test vaccination in community; home visits; improved health messages	(Report not yet available)	10/88-2/90	\$2,518

### B. Problems Addressed: Ineffective Supervision

Country	Problem	OR Study	Results	Duration	Cost
Costa Rica	Supervision system not functioning properly.	Self-reported Survey on Time Use; field test observation checklist for immunization.	Vaccination services improved after new supervision strategy implemented	8/88-7/90	
Senegal	Supervision instruments rarely used	Develop and test guide for departmental supervisors	Improvements in supervisors' skills noted	11/88-3/90	\$5,518
Zaire	Lack of clear Definition of Roles; poor allocation of tasks	Training in management policies and procedures	Demonstrated feasibility of role clarification through training	7/89-1/90	\$3,544
Zaire	Ineffective Supervision of Nurses	Improved supervision through direct observation; checklist developed (2 studies)	Better performance of supervisor and health workers; EPI technique improved from 50% to 85%	5/89-1/90	\$2,340 \$1,507
Zaire	Few active methods used in health education sessions	Develop and pretest evaluation tools for supervision	Final tool widely disseminated; consensus on its quality and utility	10/88-1/89	\$3,555

### C. Problems Addressed: Other

Country	Problem	OR Study	Results	Duration	Cost
Indonesia	Side-effects of DPT immunization (fever, crankiness, anorexia, vomiting, swelling, redness)	Study appropriateness of applying paracetamol (antipyretic)	Paracetamol administered immediately following vaccination significantly reduced side-effects	2/89-5/90	\$5,551
Zaire	Low vaccine coverage (Dungu) due to poor transportation and cold-chain; logistical problems relating to vaccine, supplies	Focus and nominal groups to conduct problem-solving; test efficacy of optimal solution	[Report not yet available]	10/89-1/90	\$2,729
Zaire	Refrigerators temperatures exceed acceptable limits	Train in maintenance followed by improved supervision	Refrigerator maintenance guidelines developed, distributed and submitted to national EPI	12/88-4/89	\$3,722
Zaire	Poor immunization reporting system; discrepancy between coverage and incidence	Intensive training; develop standardized recording documents; improve supervision	Standard documents and supervision help reduce reporting errors: error-free documents 3 months later	6/89-2/90	\$2,728
Zaire	Poor reporting system; insufficient personnel	Identify and Analyze problems; training	Intervention to correct priority problems was selected	5/89-1/90	\$2,728

Zaire	Poor monitoring and maintenance of health center refrigerators	Test solutions regarding training in maintenance; enhance supervision	(report not yet available)	12/89-	\$2,746
Zaire	CHW drop-out rate high	Systematize selection; enhance their recognition in community; intensify training and supervision; free medical care	Frequency of health education sessions was increased in villages; more latrines and waste pits found		

As Table 4-1 illustrates, two of the major problems prompting operations research were failure to meet immunizations coverage targets and failure to complete vaccination series. The strategies tested to correct those problems generally involved ways of communicating with mothers. A number of studies were directed to ineffective supervision, logistics problems, and the lack of management policies and procedures. The studies were reported to result in short term improvement in most cases. The long term effects of any changes that were made and of any OR methodologies adopted may well be significant, but they have not been measured.

### 4.3 FUTURE DIRECTIONS

#### 4.3.1 The Utility of Systems Analysis Methodology for EPI Programs

The systems analysis methodologies developed for the various PRICOR country studies were consistently able to demonstrate which aspects of the EPI system were functioning reasonably well, and which were problematic. They demonstrated the utility of looking carefully at the details of the activities of health workers. The fact that program changes ensued supports their relevance: they provided information that program managers understood and considered convincing enough to alter their programs. The operations research studies that followed were demonstrations that OR methodologies were understood well enough for many host country colleagues to use the techniques themselves. Although not all the studies produced reported results, the majority could be completed and documented and they were not costly to implement.

#### 4.3.2 Future Directions

The PRICOR EPI systems analyses produced many specific suggestions for the individual programs studied, and a few general suggestions emerged as well. A great deal of effort was devoted to promotional and educational activities in the programs studied, but it is not clear which types of activity are most effective for particular audiences. Whether group sessions can be effective is not yet clear. If so, what is it that is most effective? Home visits require considerable time and effort. Is this well spent? When are messages to mothers and other caretakers most effective? How can they be assisted to remember essential messages such as when to bring a child back for another vaccination? The entire subject of informing parents and securing their cooperation deserves further exploration.

The PRICOR studies shed much light on the process of supervision, and it is clear that the supervisor is a crucial actor in the system ensuring the quality of health worker performance in accordance with the national health program. How to do that most effectively and in a cost-effective manner deserves further

investigation, probably on a country-by-country basis. More effective methods are needed by supervisors to motivate their workers and involve them in solving problems facing local EPI programs.

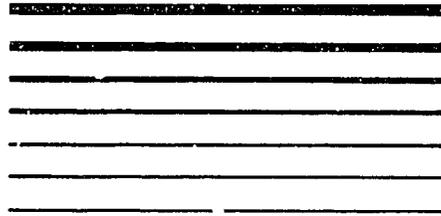
Inputs, particularly financial and material resources needed by EPI programs, were not the focus of the PRICOR EPI studies. Nevertheless, a number of the problems identified (transport and adequate supplies of sterilized equipment, for example) may well be largely problems linked to availability of resources. Thus, availability and appropriate use of resources should be afforded priority in future studies.

Finally, the data collected by EPI programs warrant further study. They are valued by supervisors and program managers, but too frequently used only to be sent up the line to superiors. Much of the data could be used at local and intermediate levels to assist mid-level program managers in making appropriate decisions. Ways to exploit data more appropriately need to be developed.

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PRICOR

**PRIMARY  
HEALTH CARE  
THESAURUS**



*VOLUME I*

Immunization  
Service  
**ACTIVITIES**

*Version 1.2  
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**CENTER FOR HUMAN SERVICES**

**Primary Health Care Operations Research Project  
Supported by the U.S. Agency for International Development**

## IMMUNIZATION SERVICE DELIVERY ACTIVITIES, TASKS AND SUBTASKS

1. **CHANNEL CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) NEEDING IMMUNIZATIONS TO IMMUNIZATION SERVICES**
  - 1.1 **IDENTIFY CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) NEEDING IMMUNIZATIONS**
    - 1.1.1 MAINTAIN RECORDS WHICH IDENTIFY ALL CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY)
    - 1.1.2 SEEK TO IDENTIFY CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) NEEDING IMMUNIZATIONS AT CLINIC SESSIONS
    - 1.1.3 SEEK TO IDENTIFY CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) NEEDING IMMUNIZATIONS DURING HOME VISITS
  - 1.2 **RECRUIT CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) NEEDING IMMUNIZATIONS (SEE IMMUNIZATION: SERVICE DELIVERY -- 3. MOTIVATE/EDUCATE MOTHERS AND OTHER COMMUNITY MEMBERS REGARDING IMMUNIZATION)**
  - 1.3 **DIRECT CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) NEEDING IMMUNIZATIONS TO SOURCES OF IMMUNIZATION SERVICES**
    - 1.3.1 DIRECT CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) IDENTIFIED AT CLINIC SESSIONS AS NEEDING IMMUNIZATIONS TO SOURCES OF IMMUNIZATION SERVICES
    - 1.3.2 DIRECT CHILDREN UNDER 1 (AND/OR OTHER AGE PER LOCAL POLICY) IDENTIFIED DURING HOME VISITS AS NEEDING IMMUNIZATIONS TO SOURCES OF IMMUNIZATION SERVICES
    - 1.3.3 EXPLAIN WHEN AND WHERE IMMUNIZATIONS ARE PROVIDED DURING GROUP IMMUNIZATION EDUCATION SESSIONS (SEE IMMUNIZATION: SERVICE DELIVERY -- 3.2.1.4 EXPLAIN WHEN AND WHERE IMMUNIZATIONS ARE PROVIDED)
2. **PROVIDE IMMUNIZATIONS**
  - 2.1 **PREPARE VACCINES AND IMMUNIZATION EQUIPMENT AND SUPPLIES**
    - 2.1.1 PREPARE VACCINES (SEE IMMUNIZATION: LOGISTIC SUPPORT)
    - 2.1.2 STERILIZE NEEDLES AND SYRINGES
  - 2.2 **IMMUNIZE CHILDREN**
    - 2.2.1 **DETERMINE IMMUNIZATIONS REQUIRED**
      - 2.2.1.1 Examine child's vaccination card or question mother to determine immunizations required
    - 2.2.2 **ADMINISTER VACCINES**
      - 2.2.2.1 Administer recommended doses for all vaccines
      - 2.2.2.2 Use correct administration technique for all vaccines

- 2.2.2.3 Administer all vaccines with sterile needles
- 2.2.2.4 Administer all vaccines with sterile syringes
- 2.2.2.5 Protect BCG, polio and measles vaccines from heat and light during use
- 2.2.3 COUNSEL MOTHER (SEE IMMUNIZATION: SERVICE DELIVERY -- 3.1 PROVIDE INDIVIDUAL COUNSELLING TO MOTHERS OF CHILDREN ATTENDING IMMUNIZATION SESSIONS)
- 2.3 RECORD IMMUNIZATION INFORMATION ON VACCINATION CARD
  - 2.3.1 RECORD CHILD'S BIRTHDATE
  - 2.3.2 RECORD INFORMATION ON VACCINES ADMINISTERED
    - 2.3.2.1 Record date
    - 2.3.2.2 Record dose (vaccine series #)
- 3. MOTIVATE/EDUCATE MOTHERS AND OTHER COMMUNITY MEMBERS REGARDING IMMUNIZATION
  - 3.1 PROVIDE INDIVIDUAL COUNSELLING TO MOTHERS OF CHILDREN ATTENDING IMMUNIZATION SESSIONS
    - 3.1.1 TRANSMIT KEY IMMUNIZATION MESSAGES
      - 3.1.1.1 Tell mother which vaccines were administered to her child
      - 3.1.1.2 Tell mother when and where to take her child for next required immunizations
      - 3.1.1.3 Tell mother of the child who received DPT3 and/or Polio3 immunization that she must take her child at 9 months of age (or other age per local policy) for measles immunization
    - 3.1.2 USE APPROPRIATE COUNSELLING TECHNIQUES
      - 3.1.2.1 Ask mother to repeat when and where to bring her child for next required immunizations
      - 3.1.2.2 Ask mother if she has any questions
  - 3.2 PROVIDE OUTREACH IMMUNIZATION EDUCATION
    - 3.2.1 TRANSMIT KEY IMMUNIZATION MESSAGES
      - 3.2.1.1 Explain the purpose of immunization
      - 3.2.1.2 Explain what diseases can be prevented by immunization
      - 3.2.1.3 Explain recommended age of first immunization after birth
      - 3.2.1.4 Explain when and where immunizations are provided
    - 3.2.2 USE APPROPRIATE HEALTH EDUCATION TECHNIQUES AND MATERIALS

**3.2.2.1 Ask questions of and respond to questions from attendees**

**3.2.2.2 Use visual aids in transmitting key messages**

## **IMMUNIZATION PLANNING ACTIVITIES, TASKS AND SUBTASKS**

- 1. ASSESS OUTPUTS, EFFECTS (COVERAGE) AND IMPACT OF CURRENT IMMUNIZATION ACTIVITIES UTILIZING INFORMATION SYSTEM, MONITORING AND EVALUATION INFORMATION**
- 2. SET IMMUNIZATION OBJECTIVES AND TARGETS**
  - 2.1 SPECIFY TARGET AGE GROUP(S)**
  - 2.2 DETERMINE DESIRED IMMUNIZATION PROGRAM IMPACT**
  - 2.3 DETERMINE DESIRED IMMUNIZATION COVERAGE**
  - 2.4 SET QUANTITATIVE AND DATED IMMUNIZATION TARGETS**
- 3. DEVELOP IMMUNIZATION STRATEGY**
  - 3.1 DEVELOP IMMUNIZATION POLICIES**
    - 3.1.1 DEVELOP RECOMMENDED IMMUNIZATION SCHEDULE**
    - 3.1.2 DEVELOP POLICY ON CONTRAINDICATIONS TO IMMUNIZATION**
    - 3.1.3 DEVELOP POLICY ON INCENTIVES FOR IMMUNIZATION**
  - 3.2 DEVELOP IMMUNIZATION PROCEDURES**
    - 3.2.1 DEVELOP PROCEDURES FOR CHANNELLING CHILDREN TO IMMUNIZATION SERVICES, INCLUDING OUTREACH IMMUNIZATION EDUCATION**
    - 3.2.2 DETERMINE SITES FOR IMMUNIZATION SESSIONS**
    - 3.2.3 DETERMINE FREQUENCY OF IMMUNIZATION SESSIONS**
  - 3.3 DEVELOP BUDGET FOR IMMUNIZATION ACTIVITIES**
  - 3.4 DEVELOP IMMUNIZATION WORKPLANS AND SCHEDULES**
    - 3.4.1 IDENTIFY SPECIFIC STAFF TO CONDUCT IMMUNIZATION ACTIVITIES**
    - 3.4.2 PROVIDE LOGISTIC SUPPORT FOR IMMUNIZATION ACTIVITIES**
- 4. COMMUNICATE IMMUNIZATION PLAN**

## **IMMUNIZATION TRAINING ACTIVITIES, TASKS AND SUBTASKS**

- 1. PLAN IMMUNIZATION TRAINING**
  - 1.1 ASSESS IMMUNIZATION TRAINING NEEDS**
  - 1.2 SET OBJECTIVES AND TARGETS FOR IMMUNIZATION TRAINING**
  - 1.3 SELECT IMMUNIZATION TRAINING MATERIALS AND METHODS**
- 2. TRAIN HEALTH WORKERS IN IMMUNIZATION TASKS**
  - 2.1 TRANSMIT KEY IMMUNIZATION INFORMATION AND REQUIRED SKILLS PER TRAINEES' IMMUNIZATION TASKS**
    - 2.1.1 TEACH WHAT DISEASES CAN BE PREVENTED BY IMMUNIZATION**
    - 2.1.2 TEACH RECOMMENDED IMMUNIZATION SCHEDULE (LOCALLY DETERMINED)**
    - 2.1.3 TEACH CONTRAINDICATIONS TO IMMUNIZATION (PER LOCAL POLICY)**
    - 2.1.4 TEACH POSSIBLE SIDE EFFECTS OF IMMUNIZATION**
    - 2.1.5 TEACH RECOMMENDED DOSES FOR VACCINES**
    - 2.1.6 TEACH VACCINE ADMINISTRATION TECHNIQUES**
    - 2.1.7 TEACH HOW TO STERILIZE NEEDLES AND SYRINGES**
    - 2.1.8 TEACH IMPORTANCE OF USING A STERILE NEEDLE AND A STERILE SYRINGE FOR EACH VACCINE INJECTION**
    - 2.1.9 TEACH PROCEDURES FOR RECORDING IMMUNIZATION INFORMATION ON VACCINATION CARDS**
    - 2.1.10 TEACH IMPORTANCE OF TELLING ALL MOTHERS OF CHILDREN ATTENDING IMMUNIZATION SESSIONS WHEN AND WHERE TO TAKE CHILDREN FOR NEXT REQUIRED IMMUNIZATIONS**
    - 2.1.11 TEACH USE OF COUNSELLING AND HEALTH EDUCATION TECHNIQUES AND MATERIALS**
    - 2.1.12 TEACH PROCEDURES FOR CHANNELLING CHILDREN TO IMMUNIZATION SERVICES**
    - 2.1.13 TEACH METHODS FOR DETERMINING QUANTITIES OF VACCINES AND NEEDLES AND SYRINGES TO ORDER**
    - 2.1.14 TEACH COLD CHAIN MAINTENANCE PROCEDURES**
      - 2.1.14.1 Teach procedures for packing vaccines for transport**
      - 2.1.14.2 Teach procedures for reading and recording refrigerator temperature**
      - 2.1.14.3 Teach procedures for protecting vaccines from heat and light during use**
      - 2.1.14.4 Teach procedures for discarding vaccines that are no longer potent or that have been opened**

55

2.1.15 TEACH PROCEDURES FOR MAINTAINING IMMUNIZATION RECORDS AND REPORTING IMMUNIZATION INFORMATION

**2.2 USE APPROPRIATE TRAINING METHODS**

2.2.1 DEMONSTRATE REQUIRED IMMUNIZATION SKILLS

2.2.1.1 Demonstrate how to sterilize needles and syringes

2.2.1.2 Demonstrate how to administer vaccines

2.2.1.3 Demonstrate counselling and health education

2.2.1.4 Demonstrate cold chain maintenance procedures

2.2.1.4.1 Demonstrate procedures for packing vaccines for transport

2.2.1.4.2 Demonstrate procedures for reading and recording refrigerator temperature

2.2.1.4.3 Demonstrate procedures for protecting vaccines from heat and light during use

2.2.2 ASK QUESTIONS OF AND RESPOND TO QUESTIONS FROM TRAINEES

2.2.3 USE VISUAL AIDS IN TRANSMITTING KEY INFORMATION

2.2.4 PROVIDE OPPORTUNITIES FOR TRAINEES TO PRACTICE IMMUNIZING CHILDREN DURING TRAINING

2.2.5 GIVE TRAINEES WRITTEN, INCLUDING PICTORIAL, REFERENCE MATERIALS ON IMMUNIZATION

**2.3 TEST COMPETENCE OF TRAINEES IN IMMUNIZATION TASKS**

2.3.1 TEST TRAINEE KNOWLEDGE OF RECOMMENDED IMMUNIZATION SCHEDULE BY: (1) OBSERVING WHETHER THEY FOLLOW THE RECOMMENDED SCHEDULE WHEN IMMUNIZING CHILDREN (IN IMMUNIZATION SESSIONS OR IN ROLE-PLAY EXERCISES); OR (2) ADMINISTERING WRITTEN OR ORAL TESTS OF THE RECOMMENDED SCHEDULE

2.3.2 TEST TRAINEE KNOWLEDGE OF RECOMMENDED PROCEDURES FOR STERILIZING NEEDLES AND SYRINGES BY: (1) OBSERVING WHETHER THEY FOLLOW RECOMMENDED PROCEDURES (IN IMMUNIZATION SESSIONS OR IN ROLE-PLAY EXERCISES); OR (2) ADMINISTERING WRITTEN OR ORAL TESTS OF RECOMMENDED PROCEDURES

2.3.3 TEST TRAINEE STERILE TECHNIQUE (USE OF A STERILE NEEDLE AND A STERILE SYRINGE FOR EACH VACCINE INJECTION) BY OBSERVING WHETHER THEY USE STERILE TECHNIQUE WHEN ADMINISTERING VACCINES (IN IMMUNIZATION SESSIONS OR IN ROLE-PLAY EXERCISES)

2.3.4 TEST TRAINEE KNOWLEDGE OF RECOMMENDED COLD CHAIN MAINTENANCE PROCEDURES

2.3.4.1 Test trainee knowledge of procedures for packing vaccines for transport by: (1) observing whether they follow recommended procedures (in role-play exercises); or (2) by administering written or oral tests of recommended procedures

- 23.4.2 Test trainee knowledge of procedures for reading and recording refrigerator temperature by: (1) observing whether they follow recommended procedures (in role-play exercises); or (2) administering written or oral tests of recommended procedures
- 23.4.3 Test trainee knowledge of recommended procedures for protecting vaccines from heat and light during use by: (1) observing whether they follow recommended procedures (in immunization sessions or in role-play exercises); or (2) administering written or oral tests of recommended procedures
- 23.4.4 Test trainee knowledge of recommended procedures for discarding vaccines that are no longer potent or that have been opened by: (1) observing whether they follow recommended procedures (in immunization sessions or in role-play exercises); or (2) administering written or oral tests of recommended procedures

### **3. EVALUATE IMMUNIZATION TRAINING**

- 3.1 **TEST COMPETENCE OF TRAINEES IN IMMUNIZATION TASKS (SEE IMMUNIZATION: TRAINING - 2.3 TEST COMPETENCE OF TRAINEES IN IMMUNIZATION TASKS)**
- 3.2 **ASSESS HEALTH WORKER IMMUNIZATION TASK PERFORMANCE (SEE IMMUNIZATION: SUPERVISION; INFORMATION SYSTEM, MONITORING AND EVALUATION)**

### **4. MAINTAIN IMMUNIZATION TRAINING RECORDS AND REPORT IMMUNIZATION TRAINING INFORMATION (SEE IMMUNIZATION: INFORMATION SYSTEM, MONITORING AND EVALUATION)**

## **IMMUNIZATION SUPERVISION ACTIVITIES, TASKS AND SUBTASKS**

- 1. PLAN SUPERVISION ACTIVITIES**
  - 1.1 ASSESS SUPERVISION NEEDS**
  - 1.2 SET SUPERVISION OBJECTIVES AND TARGETS**
  - 1.3 IDENTIFY AND TRAIN SUPERVISORS**
  - 1.4 DEVELOP SUPERVISION SCHEDULES AND WORKPLANS**
  - 1.5 PROVIDE LOGISTIC SUPPORT FOR SUPERVISION ACTIVITIES**
  - 1.6 COMMUNICATE SUPERVISION SCHEDULES AND RESPONSIBILITIES**
  
- 2. SUPERVISE IMMUNIZATION SERVICE DELIVERY AND SUPPORT ACTIVITIES**
  - 2.1 ASSIST HEALTH WORKERS IN ORGANIZING AND PLANNING IMMUNIZATION TASKS**
    - 2.1.1 SET OR COMMUNICATE IMMUNIZATION TARGETS**
    - 2.1.2 DEVELOP IMMUNIZATION WORKPLAN**
    - 2.1.3 DEVELOP OR CLARIFY STANDARDS FOR IMMUNIZATION TASK PERFORMANCE**
  
  - 2.2 IDENTIFY IMMUNIZATION SERVICE DELIVERY AND SUPPORT PROBLEMS AND STRONG POINTS**
    - 2.2.1 ASSESS ATTAINMENT OF IMMUNIZATION TARGETS, IF PRESENT, AND/OR FREQUENCY OF IMMUNIZATION SERVICE DELIVERY ACTIVITIES**
      - 2.2.1.1 Assess attainment of immunization targets by: (1) reviewing service delivery facility records to obtain data on the proportion of children immunized; or (2) conducting sample household immunization coverage surveys**
      - 2.2.1.2 Assess frequency of immunization sessions by: (1) reviewing service delivery facility records to obtain data on the number of immunization sessions held; (2) interviewing community leaders and members about the frequency of immunization sessions; or (3) asking health workers about the frequency of immunization sessions**
      - 2.2.1.3 Assess occurrence and frequency of channelling activities by: (1) observing whether records identifying specific children needing immunization are maintained; (2) observing whether health workers identify children needing immunizations during clinic sessions and/or home visits and whether they direct these children to sources of immunization services; (3) reviewing service delivery facility records to obtain data on the number of home visits made and/or group immunization education sessions held; (4) interviewing community leaders and members about the frequency of group immunization education sessions; or (5) asking health workers about the occurrence and frequency of channelling activities.**
  
    - 2.2.2 ASSESS QUALITY OF IMMUNIZATION SERVICE DELIVERY ACTIVITIES**

58

- 2.2.2.1 Assess whether health workers sterilize needles and syringes per standard procedures by observing health workers sterilize needles and syringes (in immunization sessions or in role-play exercises)
  - 2.2.2.2 Assess whether health workers examine children's vaccination cards or question mothers to determine immunizations required by observing health workers screen children (in immunization sessions or in role-play exercises)
  - 2.2.2.3 Assess whether health workers administer recommended doses of vaccines by observing health workers administer vaccines (in immunization sessions)
  - 2.2.2.4 Assess whether health workers use correct administration technique when administering vaccines by observing health workers administer vaccines (in immunization sessions)
  - 2.2.2.5 Assess whether health workers use sterile needles and syringes for all children immunized by observing health workers administer vaccines (in immunization sessions)
  - 2.2.2.6 Assess whether health workers protect BCG, polio and measles vaccines from heat and light during use per standard procedures by observing health workers handle vaccines (in immunization sessions)
  - 2.2.2.7 Assess whether health workers correctly record immunization information on vaccination cards by: (1) observing health workers record immunization information on vaccination cards (in immunization sessions); or (2) reviewing previously-recorded vaccination cards for completeness and correctness of information
  - 2.2.2.8 Assess whether health workers tell all mothers of children attending immunization sessions when and where to take children for next required immunizations by: (1) observing health workers counsel mothers (in immunization sessions or in role-play exercises); or (2) interviewing mothers leaving immunization sessions to determine whether they know when and where to take children for next required immunizations
  - 2.2.2.9 Assess whether health workers effectively provide outreach immunization education by: (1) observing health workers provide outreach immunization education (in group immunization education sessions, in home visits, or in role-play exercises); or (2) interviewing mothers leaving group immunization education sessions and/or after home visits to determine whether they know key immunization messages
- 2.2.3 ASSESS QUALITY OF IMMUNIZATION SUPPORT ACTIVITIES**
- 2.2.3.1 Assess whether the service delivery facility has adequate quantities of vaccines, needles and syringes by: (1) observing quantities of vaccines, needles and syringes available at the service delivery facility; or (2) asking health workers about shortages of vaccines, needles and syringes
  - 2.2.3.2 Assess whether the service delivery facility maintains refrigerator temperature in the safe range by: (1) reviewing refrigerator temperature log; or (2) checking current refrigerator temperature
  - 2.2.3.3 Assess whether health workers transport vaccines per standard procedures by: (1) observing health workers pack vaccines for transport; or (2) checking vaccines for coldness (in immunization sessions)
  - 2.2.3.4 Assess whether health workers adequately maintain immunization registers by reviewing immunization registers for completeness and correctness of information

- 2.3 ASSIST IN RESOLVING IMMUNIZATION SERVICE DELIVERY AND SUPPORT PROBLEMS IDENTIFIED**
    - 2.3.1 PROVIDE IMMEDIATE FEEDBACK ON IMMUNIZATION PERFORMANCE**
      - 2.3.1.1 Praise or otherwise reward good immunization performance**
      - 2.3.1.2 Advise or instruct health workers how to improve poor immunization performance**
      - 2.3.1.3 Provide direct assistance in performing immunization tasks**
    - 2.3.2 TAKE FOLLOW-UP ACTION ON IMMUNIZATION PERFORMANCE**
      - 2.3.2.1 Provide or arrange for formal immunization in-service training**
      - 2.3.2.2 Provide immunization logistic support, if applicable**
        - 2.3.2.2.1 Provide vaccines and/or immunization and/or cold chain equipment and supplies**
        - 2.3.2.2.2 Provide reference materials on immunization**
      - 2.3.2.3 Refer persistent immunization performance problems to higher-level supervisors**
      - 2.3.2.4 Apply sanctions for poor immunization performance, if applicable**
  - 2.4 MOTIVATE HEALTH WORKERS (SEE IMMUNIZATION: SUPERVISION – 2.3 ASSIST IN RESOLVING IMMUNIZATION SERVICE DELIVERY AND SUPPORT PROBLEMS IDENTIFIED)**
- 3. EVALUATE SUPERVISION OF IMMUNIZATION SERVICE DELIVERY AND SUPPORT ACTIVITIES**
    - 3.1 ASSESS FIRST-LEVEL SUPERVISOR SUPERVISION TASK PERFORMANCE**
    - 3.2 ASSESS HEALTH WORKER IMMUNIZATION TASK PERFORMANCE (SEE IMMUNIZATION: SUPERVISION, INFORMATION SYSTEM, MONITORING AND EVALUATION)**
- 4. MAINTAIN SUPERVISION RECORDS AND REPORT SUPERVISION INFORMATION (SEE IMMUNIZATION: INFORMATION SYSTEM, MONITORING AND EVALUATION)**

- 2.3 **ASSIST IN RESOLVING IMMUNIZATION SERVICE DELIVERY AND SUPPORT PROBLEMS IDENTIFIED**
  - 2.3.1 **PROVIDE IMMEDIATE FEEDBACK ON IMMUNIZATION PERFORMANCE**
    - 2.3.1.1 Praise or otherwise reward good immunization performance
    - 2.3.1.2 Advise or instruct health workers how to improve poor immunization performance
    - 2.3.1.3 Provide direct assistance in performing immunization tasks
  - 2.3.2 **TAKE FOLLOW-UP ACTION ON IMMUNIZATION PERFORMANCE**
    - 2.3.2.1 Provide or arrange for formal immunization in-service training
    - 2.3.2.2 Provide immunization logistic support, if applicable
      - 2.3.2.2.1 Provide vaccines and/or immunization and/or cold chain equipment and supplies
      - 2.3.2.2.2 Provide reference materials on immunization
    - 2.3.2.3 Refer persistent immunization performance problems to higher-level supervisors
    - 2.3.2.4 Apply sanctions for poor immunization performance, if applicable
- 2.4 **MOTIVATE HEALTH WORKERS (SEE IMMUNIZATION: SUPERVISION -- 2.3 ASSIST IN RESOLVING IMMUNIZATION SERVICE DELIVERY AND SUPPORT PROBLEMS IDENTIFIED)**
- 3. **EVALUATE SUPERVISION OF IMMUNIZATION SERVICE DELIVERY AND SUPPORT ACTIVITIES**
  - 3.1 **ASSESS FIRST-LEVEL SUPERVISOR SUPERVISION TASK PERFORMANCE**
  - 3.2 **ASSESS HEALTH WORKER IMMUNIZATION TASK PERFORMANCE (SEE IMMUNIZATION: SUPERVISION, INFORMATION SYSTEM, MONITORING AND EVALUATION)**
- 4. **MAINTAIN SUPERVISION RECORDS AND REPORT SUPERVISION INFORMATION (SEE IMMUNIZATION: INFORMATION SYSTEM, MONITORING AND EVALUATION)**

## IMMUNIZATION COMMUNITY ORGANIZATION ACTIVITIES, TASKS AND SUBTASKS

1. **PLAN COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES\***
  - 1.1 **DETERMINE DESIRED COMMUNITY ROLE IN CONDUCTING IMMUNIZATION ACTIVITIES**
    - 1.1.1 DECIDE ON DESIRED ROLE FOR UNSALARIED COMMUNITY MEMBERS AND/OR HEALTH WORKERS
    - 1.1.2 DECIDE ON DESIRED ROLE FOR COMMUNITY ORGANIZATIONS
    - 1.1.3 DECIDE WHETHER OR NOT TO SEEK COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES (SEE IMMUNIZATION: FINANCIAL MANAGEMENT)
  - 1.2 **ESTABLISH SCHEDULES AND WORKPLANS FOR ORGANIZING COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES**
    - 1.2.1 IDENTIFY SPECIFIC STAFF TO ORGANIZE COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES
    - 1.2.2 PROVIDE LOGISTIC SUPPORT FOR ORGANIZING COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES
2. **ORGANIZE COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES**
  - 2.1 **DEVELOP COMMUNITY MOTIVATION AND CAPACITY TO PARTICIPATE IN OR UNDERTAKE IMMUNIZATION ACTIVITIES**
    - 2.1.1 ASSESS LOCAL INTEREST IN IMMUNIZATION ACTIVITIES
    - 2.1.2 EXPLAIN IMMUNIZATION OBJECTIVES AND STRATEGIES
    - 2.1.3 IDENTIFY EXISTING OR ESTABLISH NEW COMMUNITY ORGANIZATIONS THAT CAN PARTICIPATE IN OR UNDERTAKE IMMUNIZATION ACTIVITIES
  - 2.2 **DEVELOP JOINT PLAN OF ACTION FOR COMMUNITY/HEALTH SYSTEM COOPERATION IN PLANNING, CONDUCTING AND MONITORING/EVALUATING IMMUNIZATION ACTIVITIES**
    - 2.2.1 **PLAN IMMUNIZATION SERVICE DELIVERY ACTIVITIES**
      - 2.2.1.1 Obtain community suggestions and/or decisions regarding health system immunization service delivery activities
      - 2.2.1.2 Plan community-managed channelling activities, including outreach immunization education
      - 2.2.1.3 Select community members for training as unsalaried health workers

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\*The term "community-managed immunization activities" refers to immunization service delivery and support activities carried out by unsalaried community members and/or health workers. It does not refer to the utilization of immunization services by community members, e.g. to having children immunized or to attending health education sessions. The specific immunization activities to be undertaken by the community will depend on local policy, although some common community-managed activities have been listed here.

- 2.2.2 PLAN COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES (SEE IMMUNIZATION: FINANCIAL MANAGEMENT)
- 2.3 TRAIN UNSALARIED COMMUNITY MEMBERS AND/OR HEALTH WORKERS IN IMMUNIZATION SERVICE DELIVERY TASKS
  - 2.3.1 TRAIN UNSALARIED COMMUNITY MEMBERS AND/OR HEALTH WORKERS IN IMMUNIZATION CHANNELLING TASKS, INCLUDING OUTREACH IMMUNIZATION EDUCATION
- 2.4 ORGANIZE COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES
- 3. MONITOR COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES
  - 3.1 MEET REGULARLY WITH COMMUNITY LEADERS AND MEMBERS TO ASSESS DEGREE AND EFFECTIVENESS OF COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES AND TO ASSIST IN RESOLVING PROBLEMS
    - 3.1.1 MONITOR COMMUNITY-MANAGED IMMUNIZATION SERVICE DELIVERY ACTIVITIES
    - 3.1.2 MONITOR COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES

## IMMUNIZATION LOGISTIC SUPPORT ACTIVITIES, TASKS AND SUBTASKS\*

### Vaccines

(BCG, DPT, Polio, Measles, Tetanus Toxoid)

### Immunization Equipment and Supplies

(Needles, Syringes, Vaccination Cards, Sterilizers)

### Cold Chain Equipment and Supplies

(Cold Boxes, Icepacks, Refrigerators, Fuel)

1. **PLAN IMMUNIZATION LOGISTIC SUPPORT ACTIVITIES**
  - 1.1 **DEVELOP POLICY ON QUANTITIES OF VACCINES, NEEDLES AND SYRINGES TO BE ORDERED OR ISSUED FOR IMMUNIZATION SESSIONS**
  - 1.2 **DEVELOP PROCEDURES FOR PROCURING VACCINES**
  - 1.3 **DEVELOP PROCEDURES FOR COLD CHAIN MAINTENANCE**
    - 1.3.1 **DEVELOP PROCEDURES FOR TRANSPORTING VACCINES**
    - 1.3.2 **DEVELOP PROCEDURES FOR READING AND RECORDING REFRIGERATOR TEMPERATURE**
    - 1.3.3 **DEVELOP PROCEDURES FOR PROTECTING VACCINES FROM HEAT AND LIGHT DURING USE**
    - 1.3.4 **DEVELOP PROCEDURES FOR DISCARDING VACCINES THAT ARE NO LONGER POTENT OR THAT HAVE BEEN OPENED**
  
2. **PROCURE VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**
  - 2.1 **ESTIMATE REQUIREMENTS FOR VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**
  - 2.2 **SECURE AND DISBURSE FUNDS FOR VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES, IF APPLICABLE**
  - 2.3 **ORDER OR BE ISSUED VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**

\*We recognize that there exist many different organizational arrangements for procuring, storing and distributing vaccines. In some instances, these activities are principally conducted by large central, regional or district facilities; in others, peripheral service delivery facilities play an important role in procuring and storing vaccines, and may distribute these to outreach locations. In organizing the immunization logistic support indicators as we have, we have assumed the peripheral model. In programs in which peripheral facilities play a minimal role in procuring and storing vaccines, the indicators in section 2, which measure peripheral facility performance in procuring vaccines and supplies, would more appropriately belong in section 4, as measures of the distribution performance of central, regional or district facilities. In this case, it may be of interest to add measures of the availability of vaccines and supplies at the central, regional or district level to section 2 as well as measures of vaccine storage conditions at this level to section 3.

- 2.4 **COLLECT OR RECEIVE VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**
  - 2.4.1 **TRANSPORT VACCINES PER STANDARD PROCEDURES**
  
- 3. **STORE VACCINES AND STORE AND MAINTAIN IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**
  - 3.1 **ORGANIZE AND ROTATE VACCINE STOCKS IN REFRIGERATORS**
  - 3.2 **MAINTAIN REFRIGERATOR TEMPERATURE IN SAFE RANGE (0-8°C)**
    - 3.2.1 **READ AND RECORD REFRIGERATOR TEMPERATURE DAILY**
  - 3.3 **DISCARD VACCINES THAT ARE NO LONGER POTENT OR THAT HAVE BEEN OPENED AT IMMUNIZATION SESSIONS**
  - 3.4 **CLEAN AND CHECK REFRIGERATORS WEEKLY**
  - 3.5 **REPAIR REFRIGERATORS, IF NECESSARY**
  
- 4. **DISTRIBUTE VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**
  - 4.1 **RECEIVE ORDERS FOR OR ISSUE VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**
  - 4.2 **DELIVER VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES**
    - 4.2.1 **TRANSPORT VACCINES PER STANDARD PROCEDURES**
  
- 5. **MAINTAIN INVENTORY AND EQUIPMENT RECORDS FOR VACCINES AND IMMUNIZATION AND COLD CHAIN EQUIPMENT AND SUPPLIES (SEE IMMUNIZATION: INFORMATION SYSTEM, MONITORING AND EVALUATION)**

65

## IMMUNIZATION COMMUNITY ORGANIZATION ACTIVITIES, TASKS AND SUBTASKS

1. **PLAN COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES\***
  - 1.1 **DETERMINE DESIRED COMMUNITY ROLE IN CONDUCTING IMMUNIZATION ACTIVITIES**
    - 1.1.1 DECIDE ON DESIRED ROLE FOR UNSALARIED COMMUNITY MEMBERS AND/OR HEALTH WORKERS
    - 1.1.2 DECIDE ON DESIRED ROLE FOR COMMUNITY ORGANIZATIONS
    - 1.1.3 DECIDE WHETHER OR NOT TO SEEK COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES (SEE IMMUNIZATION: FINANCIAL MANAGEMENT)
  - 1.2 **ESTABLISH SCHEDULES AND WORKPLANS FOR ORGANIZING COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES**
    - 1.2.1 IDENTIFY SPECIFIC STAFF TO ORGANIZE COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES
    - 1.2.2 PROVIDE LOGISTIC SUPPORT FOR ORGANIZING COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES
  
2. **ORGANIZE COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES**
  - 2.1 **DEVELOP COMMUNITY MOTIVATION AND CAPACITY TO PARTICIPATE IN OR UNDERTAKE IMMUNIZATION ACTIVITIES**
    - 2.1.1 ASSESS LOCAL INTEREST IN IMMUNIZATION ACTIVITIES
    - 2.1.2 EXPLAIN IMMUNIZATION OBJECTIVES AND STRATEGIES
    - 2.1.3 IDENTIFY EXISTING OR ESTABLISH NEW COMMUNITY ORGANIZATIONS THAT CAN PARTICIPATE IN OR UNDERTAKE IMMUNIZATION ACTIVITIES
  - 2.2 **DEVELOP JOINT PLAN OF ACTION FOR COMMUNITY/HEALTH SYSTEM COOPERATION IN PLANNING, CONDUCTING AND MONITORING/EVALUATING IMMUNIZATION ACTIVITIES**
    - 2.2.1 **PLAN IMMUNIZATION SERVICE DELIVERY ACTIVITIES**
      - 2.2.1.1 Obtain community suggestions and/or decisions regarding health system immunization service delivery activities
      - 2.2.1.2 Plan community-managed channelling activities, including outreach immunization education
      - 2.2.1.3 Select community members for training as unsalaried health workers

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\*The term "community-managed immunization activities" refers to immunization service delivery and support activities carried out by unsalaried community members and/or health workers. It does not refer to the utilization of immunization services by community members, e.g. to having children immunized or to attending health education sessions. The specific immunization activities to be undertaken by the community will depend on local policy, although some common community-managed activities have been listed here.

- 2.2.2 PLAN COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES (SEE IMMUNIZATION: FINANCIAL MANAGEMENT)
  - 2.3 TRAIN UNSALARIED COMMUNITY MEMBERS AND/OR HEALTH WORKERS IN IMMUNIZATION SERVICE DELIVERY TASKS
    - 2.3.1 TRAIN UNSALARIED COMMUNITY MEMBERS AND/OR HEALTH WORKERS IN IMMUNIZATION CHANNELLING TASKS, INCLUDING OUTREACH IMMUNIZATION EDUCATION
  - 2.4 ORGANIZE COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES
- 3. MONITOR COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES
  - 3.1 MEET REGULARLY WITH COMMUNITY LEADERS AND MEMBERS TO ASSESS DEGREE AND EFFECTIVENESS OF COMMUNITY-MANAGED IMMUNIZATION ACTIVITIES AND TO ASSIST IN RESOLVING PROBLEMS
    - 3.1.1 MONITOR COMMUNITY-MANAGED IMMUNIZATION SERVICE DELIVERY ACTIVITIES
    - 3.1.2 MONITOR COMMUNITY-MANAGED RESOURCE GENERATION FOR IMMUNIZATION ACTIVITIES

# IMMUNIZATION INFORMATION SYSTEM, MONITORING AND EVALUATION ACTIVITIES, TASKS AND SUBTASKS

## 1. COLLECT IMMUNIZATION DATA

### 1.1 COLLECT DATA ON SIZE OF IMMUNIZATION TARGET POPULATION

### 1.2 COLLECT IMMUNIZATION SERVICE DELIVERY DATA

1.2.1 MAINTAIN CLIENT RECORDS (SEE IMMUNIZATION: SERVICE DELIVERY -- 1.1.1  
MAINTAIN RECORDS WHICH IDENTIFY ALL CHILDREN UNDER 1 (AND/OR OTHER AGE  
PER LOCAL POLICY)

#### 1.2.2 MAINTAIN IMMUNIZATION RECORDS

1.2.2.1 Record children's ages

1.2.2.2 Record vaccines administered by dose (series #)

#### 1.2.3 MAINTAIN ACTIVITIES RECORDS

1.2.3.1 Record number of immunization sessions held

1.2.3.2 Record number of group immunization education sessions held

1.2.3.3 Record number of home visits made

### 1.3 COLLECT DATA ON IMMUNIZATION SUPPORT ACTIVITIES

#### 1.3.1 MAINTAIN PERSONNEL RECORDS

#### 1.3.2 MAINTAIN TRAINING RECORDS

#### 1.3.3 MAINTAIN SUPERVISION RECORDS

#### 1.3.4 MAINTAIN INVENTORY AND EQUIPMENT RECORDS

##### 1.3.4.1 Record information on vaccines

1.3.4.1.1 Record quantities received (by type of vaccine)

1.3.4.1.2 Record quantities distributed (by type of vaccine)

1.3.4.1.3 Record current stock levels (by type of vaccine)

##### 1.3.4.2 Record information on immunization and cold chain equipment and supplies

1.3.4.2.1 Record quantities received (by item)

1.3.4.2.2 Record quantities distributed (by item)

1.3.4.2.3 Record dates of cold chain equipment maintenance

#### 1.3.5 MAINTAIN ACCOUNTS LEDGER

1.3.5.1 Record immunization receipts

163

- 1.3.5.1.1 Record funds received from higher levels
- 1.3.5.1.2 Record monies collected for immunization services and supplies
- 1.3.5.2 Record funds disbursed for immunization activities
- 1.3.5.3 Record current balances
- 1.4 COLLECT IMMUNIZATION IMPACT DATA
  - 1.4.1 MAINTAIN RECORDS ON CASES OF VACCINE-PREVENTABLE DISEASES
  - 1.4.2 MAINTAIN RECORDS ON DEATHS FROM VACCINE-PREVENTABLE DISEASES
- 1.5 CONDUCT SPECIAL IMMUNIZATION KAP, COVERAGE AND IMPACT STUDIES
- 2. PROCESS IMMUNIZATION DATA
  - 2.1 VERIFY/VALIDATE IMMUNIZATION DATA COLLECTED
  - 2.2 CODE IMMUNIZATION DATA
  - 2.3 FILE IMMUNIZATION DATA
  - 2.4 TABULATE IMMUNIZATION DATA
    - 2.4.1 TABULATE NUMBER OF IMMUNIZATIONS PROVIDED MONTHLY BY TYPE OF VACCINE, VACCINE DOSE (SERIES #), AND AGE OF RECIPIENT
  - 2.5 ANALYZE IMMUNIZATION DATA
    - 2.5.1 CALCULATE INCIDENCE RATES OF VACCINE-PREVENTABLE DISEASES
    - 2.5.2 CALCULATE MORTALITY RATES FROM VACCINE-PREVENTABLE DISEASES
    - 2.5.3 CALCULATE IMMUNIZATION COVERAGE RATES
- 3. REPORT IMMUNIZATION INFORMATION
  - 3.1 PREPARE REQUIRED IMMUNIZATION REPORTS
  - 3.2 TRANSMIT REQUIRED IMMUNIZATION REPORTS
  - 3.3 RECEIVE FEEDBACK ON IMMUNIZATION INFORMATION REPORTED (SEE IMMUNIZATION: SUPERVISION)
- 4. UTILIZE IMMUNIZATION INFORMATION
  - 4.1 UTILIZE INFORMATION FOR IDENTIFYING IMMUNIZATION SERVICE DELIVERY AND SUPPORT PROBLEMS AND STRONG POINTS (SEE ALSO IMMUNIZATION: SUPERVISION)

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We, the World Health Organization and other experts in this field do not advocate charging fees for immunization services. We do recognize, however, that in some programs fees are charged, and the task of recording monies collected for these services, if applicable, has therefore, been included in this chapter of the Thesaurus.

**4.2 UTILIZE INFORMATION FOR PLANNING IMMUNIZATION ACTIVITIES (SEE IMMUNIZATION: PLANNING)**