The Cono Sur PRICOR II Project
Subagreement 87/11/3300 to
U.S.A.I.D. Coop. Agrmnt. DPE-5920-A-00-5056

PERU COUNTRY STUDY

Final Report

Volume 4

SYSTEMS ASSESSMENT

OF THE

1988 IMMUNIZATION CAMPAIGNS

IN THE CONO SUR

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INTERIM REPORT

PERFORMANCE EVALUATION OF DIRECT SERVICE DELIVERY THROUGH THE USE OF SIMULATION EXERCISES:

Comparison with direct structured observations of EPI Services delivery during the VAN88 immunization campaign of of the Peruvian Ministry of Health in Lima's Cono Sur during July 1988

The PRISM Group

30 April 1989

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INTRODUCTION

An important part of the systems analysis in the PRISM Cono Sur PRICOR Project is the measurement of quality of care given during direct service encounters with the users of the fourteen health centers under study. This aspect is the most critical of all aspects of the system under study and one of the most difficult. We have dedicated much thought to defining performance in terms of measures that are both reliable and valid.

There are a number of different ways in which performance can be measured. One of the most common used in the U.S. is record audits but the uncertain record-keeping in the Peruvian Ministry of Health (PMOH) system creates a serious limitation to a similar approach in Peru.

The most widely favored approach is direct structured observation, which is useful with clearly defined processes and frameworks of analysis. Direct structured observation in the field can be a powerful technique for assessing quality of care. Nevertheless, the limitations of this approach can be serious enough to undermine its utility. From the point of view of designers of an efficient systems analysis process model, we find that the practical logistical difficulties are, by themselves, a telling reason to seek alternative approaches. In the study of ORS delivery, for example, direct observation of each health worker involved in the systems analysis may take 2-3 days just waiting of the arrival of a case of diarrhea at the health center.

A theoretical limitation to direct observation, particularly acute if relatively infrequent events are being monitored, is that the range of cases observed at one health facility will rarely correspond in severity and patient characteristics to those at other facilities. While this limitation may not be unacceptable if an overall description of service delivery is all that is wanted, it seriously undermines the validity of making the comparisons between units that are necessary to establish a viable system of accountability and quality control.

In an attempt to get around the limitations imposed by observations of actual patient encounters, we have introduced a major innovation to the existing PRICOR methodology. Our approach has been to employ simulation exercises (SIMULEX) using analogue patients to test the performance of health service delivery personnel in basic care-giving and educational activities.

SIMULEX has been used extensively in the assessment of management potential in private enterprises throughout the world and a large body of management literature exists on this subject. The use of SIMULEX for evaluation in the area of health has been much less. Most of these studies have concentrated on the measurement of physician behavior through the use of analogue patients.

On the other hand, SIMULEX is extensively used as a training methodology in many, if not all, health organizations that do in-service training. The basic concepts of SIMULEX are not, therefore, unknown to the individuals who will be asked to use it as an assessment tool. What is lacking is the development of a

sound analytical model for its application in this role.

The current interim report covers a description of the SIMULEX approach and of its concrete application in the assessment of EPI service delivery during last year's vaccination campaign by the PMOH. Since there appears to be no previously published account of the use of SIMULEX as a methodology for assessing quality of care either in the U.S. domestic or international literature, a second focus of this report will be to present the design and results of a comparative study carried out to establish the reliability of SIMULEX and its validity with respect to direct structured observations carried out during the second of the three days of immunization that comprised VAN88 (the PMOH national immunization campaign).

METHODOLOGY

Observation Instrument

The Immunization Observation Checklist (IOC) originally designed for the assessment of service delivery during the first day of VAN88 has been reported in detail in the Peru PRICOR Report #1: Evaluation of EPI Service Delivery in the Cono Sur of Lima, Peru. This IOC contained 65 items covering the delivery of anti-polio vaccine (10 items), DPT (19 items), Measles (23 items), and counseling and education (13 items). These items were also groupable by the type of task they represented: maintenance of cold chain (3 items), sterile technique (24 items), checking vaccine expiration/condition (2 items), correct dosage and injection technique (20 items), positioning of child (3 items), informing the mother about immunizations (4 items), and informing the mother about possible side-effects and reactions (9 items).

After its application during the first day of VAN88 (22 May), this IOC was again reviewed by the PRISM PRICOR Team and the Focus/Informant (F/I) Groups created by the project (i.e., working groups of 6-9 doctors, nurses, health auxiliaries, nurse-midwives, and mothers) during a 1-month period to determine what modifications should be made in preparation for the second day of VAN88, held the first Sunday of July. The review process included a thorough debriefing of the 15 nurses and health auxiliaries who served as observers for the project during the first day of VAN88. These workers had been asked to note anything they felt was not being adequately covered by the current form.

This process resulted in a significant increase in the detail of the IOC in almost all task areas, but most specifically in those involving educational messages and socioemotional aspects of the care encounter. The latter had been left out of the first version of the IOC, and both the observers and the F/I Groups felt that this was an area in which health workers were particularly in need of improvement. The final instrument has been included as Appendix 1.

Table 1 lists the items related to quality of care in this IOC that have been included in the subsequent analysis. The numbering of these items has been re-done to facilitate the analysis so they do not reflect the original numbering of the IOC. During analysis, two items (12 and 38) dealing with multiple-use syringes, which had been included in the selection, were dropped because of two few observations.

The Task Areas referred to in Table 1 are as follows: 1 - Maintenance of Sterility; 2 - Cold Chain Maintenance; 3 - Proper Vaccination Technique; 4 - Expiry Date/Quality Check; 5 - General Educational Messages; 6 - Reactions to Vaccinations; 7 - Socioemotional effort; 8 - Record-keeping.

Table 1. Quality of care items included in comparative analysis

#	Item description	Task Area
1	POL-PICKUP VIAL/STERILITY	1
2	POL-CONFIRM EXPIRY DATE	4
3	POL-REMOVE PROTECTIVE RING/STERILITY	1
4	POL-OPEN THE WRAPPING/STERILITY	1
5	POL-PUT DROPPER IN VIAL/STERILITY	1
6	POL-DRAW VACCINE FROM VIAL/STERILITY	1
7	POL-POSITION CHILD CORRECTLY	3
8	POL-TAKE PROTECTOR FROM DROPPER/STERILITY	1
9	POL-SQUEEZE CHILD'S CHEEKS	3
10	POL-APPLY DROPS CORRECTLY	3
11	POL-PUT PROTECTOR BACK ON DROPPER	1
13	DPT-USE NEW STERILE SYRINGE	1
14	DPT-HANDLE SYRINGE TO MAINTAIN STERILITY	1
15	DPT-USE NEW STERILE NEEDLE	1
16	DPT-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	1
17	DPT-PICKUP VIAL/STERILITY	1
18	DPT-CONFIRM EXPIRY DATE	4
19	DPT-REMOVE PROTECTIVE COVERING/STERILITY	1
20	DPT-CLEAN RUBBER CAP	1
21	DPT-WAIT UNTIL RUBBER TOP DRIES	1
22	DPT-ROTATE VIAL SLOWLY IN CIRCULAR MOTION	3
23	DPT-LOOK FOR SEDIMENT	4
24	DPT-INJECT 0.5CC AIR INTO VIAL	3
25	DPT-REMOVE VACCINE CORRECTLY	3
26	DPT-REMOVE AIR FROM SYRINGE	3
27	DPT-PUT VIAL BACK IN COLD BOX	2
28	DPT-IF MULTDOSE SYRINGE MAINTAIN STERILITY	1
29	DPT-POSITION CHILD CORRECTLY	3
30	DPT-CLEAN INJECTION SITE	3
31	DPT-LOCATE PROPER SITE FOR INJECTION	3
32	DPT-GRAB AREA BETWEEN FINGERS	3
33	DPT-INTRODUCE NEEDLE AT 90 DEGREE ANGLE	3
34	DPT-ASPIRATE AND VERIFY BLOOD	3
35	DPT-INJECT VACCINE SLOWLY	3
36	DPT-WITHDRAW NEEDLE WITHOUT RUBBING SITE	3
37	DPT-SINGLE USE/DISCARD SYRINGE AND NEEDLE	1
39	MEA-PICKUP VIAL/STERILITY	1
40	MEA-CONFIRM EXPIRY DATE	4
41	MEA-REMOVE PROTECTIVE COVERING/STERILITY	1
42	MEA-CLEAN RUBBER CAP	1
43	MEA-WAIT UNTIL RUBBER TOP DRIES	1
44	MEA-OPEN VIAL OF DILUENT/STERILITY	1
45	MEA-USE NEW STERILE SYRINGE	1
46	MEA-USE NEW STERILE NEEDLE	1
47	MEA-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	1
48	MEA-DRAW UP ALL DILUENT	1
49	MEA-SLOWLY INJECTS DILUENT INTO VIAL OF VACCINE	1

Table 1. Quality of care items included in comparative analysis (continued)

#	Item description	Task Area
50	MEA-ROTATE VIAL SLOWLY IN CIRCULAR MOTION/BC.	1
51	MEA-VIAL INTO COLDBOX DURING PREP.	2
52	MEA-USE NEW STERILE SYRINGE	1
53	MEA-HANDLE SYRINGE TO MAINTAIN STERILITY	1
54	MEA-USE NEW STERILE NEEDLE	1
55	MEA-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	1
56	MEA-PICKUP VIAL/STERILITY	1
57	MEA-CLEAN RUBBER CAP	1
58	MEA-INJECT 0.5CC AIR INTO VIAL	3
59	MEA-REMOVE VACCINE CORRECTLY	3
60	MEA-REMOVE AIR FROM SYRINGE	3
61	MEA-VIAL IN COLD BOX AFTER VAC.	2
62	MEA-POSITION CHILD CORRECTLY	3
63	MEA-EXPOSE LEFT ARM	3
64	MEA-CLEAN SITE WITH SOAPY WATER	3
65	MEA-CLEAN SITE WITH STERILE WATER	3
66	MEA-GRAB LEFT ARM	3
67	MEA-INTRODUCE NEEDLE CORRECTLY	3
68	MEA-ASPIRATE AND VERIFY BLOOD	3
69	MEA-INJECT ALL VACCINE	3
70	MEA-INJECT VACCINE SLOWLY	3
71	MEA-REMOVE NEEDLE WITHOUT RUBBING	3
72	MEA-SINGLE USE/DISCARD SYRINGE AND NEEDLE	1
73	EXPLAIN WHICH VACCINES GIVEN	5
74	EXPLAIN WHY VACCINES GIVEN	5
75	EXPLAIN VACCINATION SCHEME	5
76	REACTIONS-NONE FOR POLIO ONLY	6
77	REACTIONS-GO TO H.C. IF OCCUR	6
78	REACTIONS-DPT,POL/PAIN	6
79	REACTIONS-DPT,POL/FEVER	6
80	REACTIONS-DPT,POL/DONT APPLY ANYTHING	6
81	REACTIONS-DPT,POL/DONT SCRATCH	6
82	REACTIONS-DPT,POL/FEVER DURATION	6
83	REACTIONS-DPT,POL/OTHER SYMPTOMS	6
84	REACTIONS-DPT,MEA,POL/PAIN	6
85	REACTIONS-DPT,MEA,POL/FEVER	6
86	REACTIONS-DPT,MEA,POL/ERUPTIONS	6
87	REACTIONS-DPT,MEA,POL/DONT SCRATCH	6
88	REACTIONS-DPT,MEA,POL/DONT APPLY ANYTHING	6
89	REACTIONS-DPT,MEA,POL/FEVER DURATION	6
90	REACTIONS-DPT,MEA,POL/OTHER SYMPTOMS	6
91	INDICATE RETURN DATE	5
92	VACCINATOR GREETED THE MOTHER	7
93	VACCINATOR PRESENTED HIM/HERSELF	7
94	VACCINATOR SMILED	7
95	VACCINATOR CARESSED THE CHILD	7
96	VACCINATOR LISTENED ATTENTIVELY	7
97	CARNET WAS FILLED OUT CORRECTLY	8
98	REGISTRY WAS FILLED OUT CORRECTLY	8

SIMULEX Protocol

Observation Checklist

The Observation Checklist must allow rapid recording of detailed observation. This necessitates a clean, logical layout which follows the sequence of events in a normal session of the kind being simulated.

Vignettes

Six Scenarios

Six distinct scenarios are recommended in the case of vaccination observation. These should be sufficient to provide the statistical variance required as well as to enable observation of all important "situations" that vaccinators may encounter in a normal vaccination situation.

Note: Scripts of the six scenarios employed by the VAN sociodramas are included as Appendix 2.

Observers

Efficiency requirements dictate running two or more sessions simultaneously. Health worker performance on each session will be recorded by a separate observer. Increasing the number of observers also allows more precise calculation of observation instrument reliability.

Two Standard Observers

Standard Observers will serve as a cross-check against interobserver reliability. Standard observers should split their observation time evenly across all observers. Standard Observers will also be asked to record the "General Quality" of each session. i.e., "Does the health worker being observed appear to be very nervous or upset?"

One "gold standard" Observer

A "gold standard" observer, relying on both direct visual observation as well as videotape footage of each session, should serve as a final check on the accuracy of all other observers.

Participants

Planning Team

The Planning Team, while consisting primarily of members of the project team members, should also include experienced personnel drawn from typical institutions of the kind being observed.

Observers

Observers should be recruited directly from the Ministry of Health. They should meet the following criteria:

1. They should be generally recognized by their peers and supervisors to be skilled "experts" in the activities they will be expected to observe; and

2. They should be veterans - namely, their tenure with the MOH should exceed to years.

Observers should be paid a nominal honorarium, and provided with an achievement certificate on completion of the SIMULEX exercise.

Standard Observers should meet all criteria suggested for observers, additionally, they should occupy a "supervisory" position within the MOH.

The **"Gold Standard" Observer** should be an experience member of the project team who is either a nurse or a physician.

Actors

Actors may be recruited either from among MOH staff, or from among the community being directly served by the MOH. A reasonable ability to portray a mother presenting her child for either treatment or prophylaxis is a necessary skill for each successful actor.

Actors should be provided with an attractive monetary incentive to both showup on time and to act consistently.

Health Workers/Vaccinators

Health Workers selected for observation should be chosen at random from among all qualified candidates, unless previous live observation is a selection criterion. In such instances, those previously observed performing live care delivery will be invited to attend the "training cum observation" sessions. Prompt Health Worker attendance is critical to the success of each session, it is therefore suggested that an appropriate local variation of a lottery or raffle should be implemented, with tickets accruing to all those attending sessions on time. Winning prizes should be sufficiently large to generate local excitement.

Planning

Careful planning of the SIMULEX exercise, down to precise choreography of the vignettes themselves, is essential.

Selection of Participants

Participants (and alternates) must be selected and contacted well in advance. A single no-show an result in the loss of an entire session.

Scheduling

Intelligent scheduling requires an intimate knowledge of MOH schedules, as well as the private schedules of key participants. Project personnel should solicit assistance from both standards observers and observers whenever possible.

Lottery Incentive to Attend

Participation incentives should be judiciously employed to maximize the probability of attendance. This should be reinforced through redundant participation by alternates (backup personnel).

Supplies

Supply lists should be developed and finalized at least 15 days prior to implementation. Where possible, supplies used in the exercise (i.e., vaccines) should closely approximate the real thing. Aged MOH stocks are a possible source of free supply, as are pharmaceutical companies and private donor groups.

Training

A training plan detailing curricula, rehearsal schedules, personnel, supply requirements, prop requirements, and written material requirements should be developed by a key member of the project planning team. The plan should then be presented to the collective project planning team for revision and amendment. This amended plan should then be reviewed by MOH technical personnel (i.e., observers and standard observers) chosen to participate in the project.

Actors

Actors should be carefully screened for both their acting abilities as well as their ability to quickly learn new material.

Observers

Observers and Standard Observers will be selected from a short list of Observer participants nominated by the project Systems Group. Training can be conducted in a day-long session, beginning with an orientation meeting, and culminating in repetitions of the six standard vignettes.

It is strongly recommended that training be conducted, where possible, in small groups not exceeding ten people.

Dress Rehearsal

A dress rehearsal with **at least** four complete repetitions should be conducted two days before the scheduled SIMULEX starting date. Preparations for the dress rehearsal should be identical to those planned for the actual SIMULEX exercise.

SIMULEX Implementation

Setup

Setup should be painstaking. Placement of lighting and sound equipment (for video and audio taping) should be carefully thought through and tested where possible. Setup should be complete prior to the scheduled arrival of the first participants.

Props should be subjected to reasonable pretesting (i.e., can cloth dolls accommodate repeated application of oral polio vaccine?) and standby items procured where necessary.

Careful projections of SIMULEX **supplies** requirements should be made at least two weeks prior to SIMULEX implementation. 30%-40% redundancy on critical items is recommended.

Review Meeting

Upon arrival of all participants to any given SIMULEX session, the first activity should always will be a review/orientation session: reviewing activities and performance of the preceding day, and orienting participants to the requirements of the coming session.

Conduct SIMULEX exercises

All SIMULEX exercises should be carefully choreographed. The impression should be one of everyone participating equally in a slice of life. Health Care workers being observed during the SIMULEX should not have the impression that the entire exercise is focussed on their performance. They should feel that they are simple one of a group of performers.

Timing is important. Actors will be expected to perform a given vignette for two or more sessions. Timing of vignettes should therefore be balanced to enable switching of actor teams between sessions without occurrence of delays on any given session. Breaks during switching should, therefore, be kept to a minimum - allowing only ten minutes for observers to review and complete their checklists.

Post SIMULEX activities

Observers should be given ten additional minutes **alone** at the end of the final simulex session to finish their checklists and to review their answers. They should be asked **to refrain** from making second guessing original responses. First impressions are preferred. Observers should, however, attempt to complete responses that were passed over or missed.

Standard Observers should complete "impression" notes on all sessions after they have completed all binary response items.

Actor health cards and other SIMULEX records should be collected, counted for completeness and filed appropriately.

Observers's completed questionnaires should be collected by the "gold standard" observer and quickly checked for "areas of obvious discrepancy". The causes for these discrepancies should then be examined and discussed in a group session attended by all observers. It is important that this be done while impressions are still fresh.

Actors and observers should be paid in cash as they leave to go home.

The site should then be restored to a condition appropriate for subsequently scheduled activities.

Statistical design of comparative analysis

The design for the comparison between SIMULEX and DSO was based on observing two health workers from each of the 14 health centers participating in the Peru PRICOR Project from the Cono Sur. Each pair would be observed by the same observer (nurse or auxiliary) as they performed as vaccinators during the second day of the VAN88 campaign in July, 1988. Each worker was observed for up to 10 vaccination encounters during the course of the day.

Subsequently, all 28 workers and 14 observers were involved in the SIMULEX exercise described above, beginning in late July and continuing throughout August to cover everybody. Each worker was observed for a set of 6 standard vaccination vignettes.

From this effort, we ultimately obtained 24 workers, each observed by the same person in both the VAN and SIMULEX. A total of 98 items associated with quality of care were extracted from the somewhat larger dataset and tabulated for analysis. The tabulation process is described in the section on Results and Discussion.

RESULTS AND DISCUSSION

Overall performance quality.

Of the original 28 health workers observed during the second day of VAN88, we were able to obtain acceptable SIMULEX sessions from 24. Thus, the following analysis is based on a sample size of 24 auxiliaries. The observations included in this analysis are those made by the primary observers. The same observer/health worker pair was maintained in each of the 24 sets of observations made.

The following pages (Figures 1-9) contain graphical presentations of the overall level of performance of each of the 96 items included in the quality-of-care assessment. These graphs are based on the SIMULEX data only. As we will show subsequently, there is little difference between SIMULEX results and those from DSO in terms of whether a given item was performed adequately or not by the whole group of health workers studied.

The X-axis in each graph is the proportion of observations in which the task was done correctly. The Y-axis gives the number of the item in list in Table 1 and each item is also identified by title. Graphs are grouped by Task Areas. In certain instances, there were too many items in a Task Area to include in a single graph. In those instances, we have divided them into two graphs based on whether or not performance of the given item met our current criteria for acceptability.

The criterion for acceptable performance of an item was that it was done correctly in 70% or more of the times it was observed. Since the number of observations of a given item for a given health worker varied from 2 to 6 depending on the item, the score for each worker was standardized before being used to calculate an overall average score.

Standardization was done by setting a criterion that a worker must have performed a task correctly at least 3 out of 4 times, or the equivalent, in order to be given credit for doing it correctly. Thus, for an item observed only twice or three times, a worker would need to perform it correctly always to get credit. This calculation produced a simple Pass/Fail score for each worker on each item. These scores were then used to calculate the overall performance index: the proportion of workers doing an item correctly out of the total (24) observed.

Each of the following nine pages contains a graph of items covering all or part of a Task Area, followed by notations where appropriate.

Sterility Maintenance

High Scoring Items

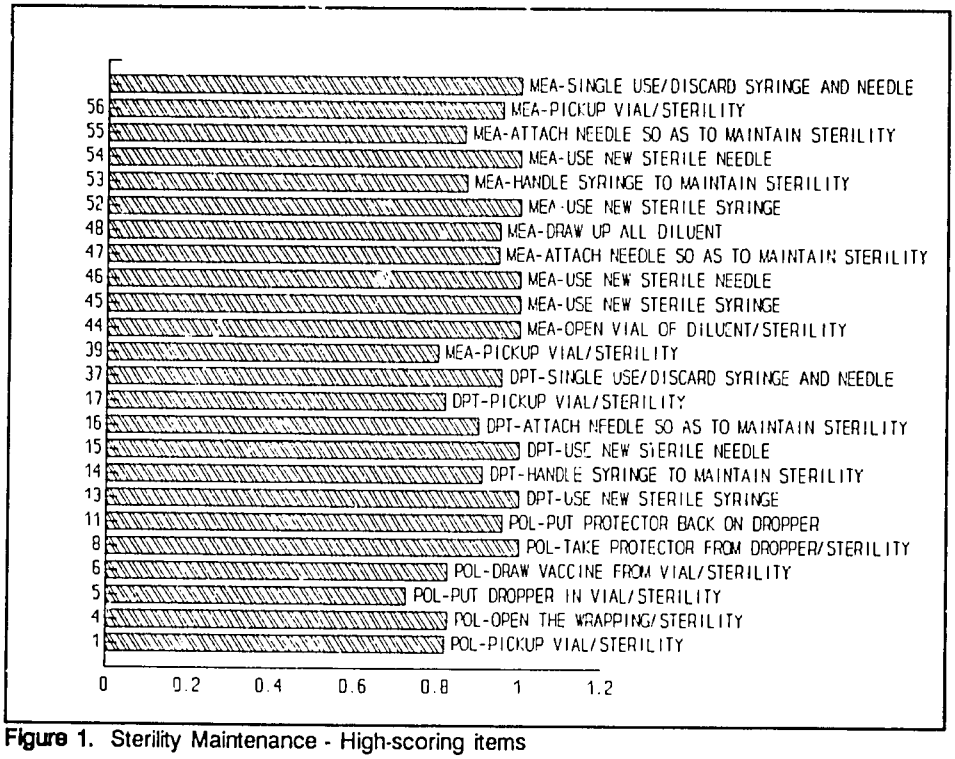

Figure 1. Sterility Maintenance - High-scoring items

Of the 34 items included in Sterility Maintenance, 24 were performed adequately by the current criteria. In general, the handling of polio vaccine and of the syringes/needles for the other two vaccines were done with a high degree of the smoothness and care needed to maintain sterile conditions.

Sterility Maintenance

Low Scoring Items

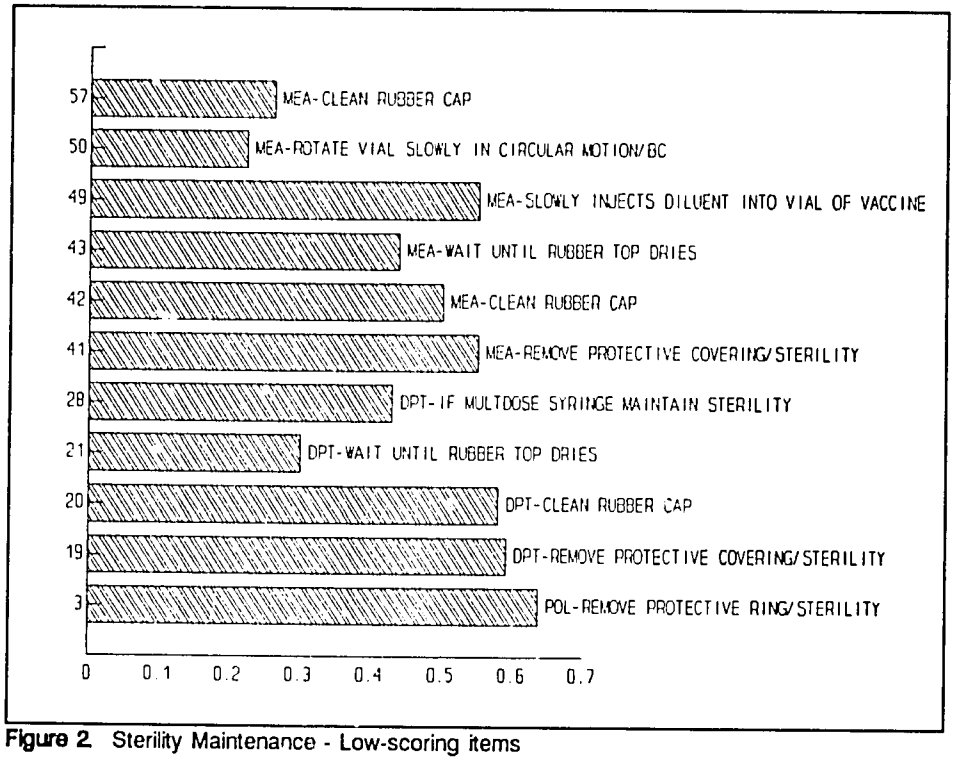

Figure 2. Sterility Maintenance - Low-scoring items

Tasks within the Sterility Maintenance group which were not performed particularly well included most of the steps in handling either the DPT or Measles vaccine vials (NOTE: Item 50 - MEA ROTATE VIAL SLOWLY - has erroneously been included here rather than in Figure 5, below). The opening and cleaning of the rubber top caused particular problems for well over half of the workers observed. Subsequent debriefing indicated that this was an aspect of the process which they did not get to watch or practice very much during EPI training sessions.

Cold Chain Maintenance

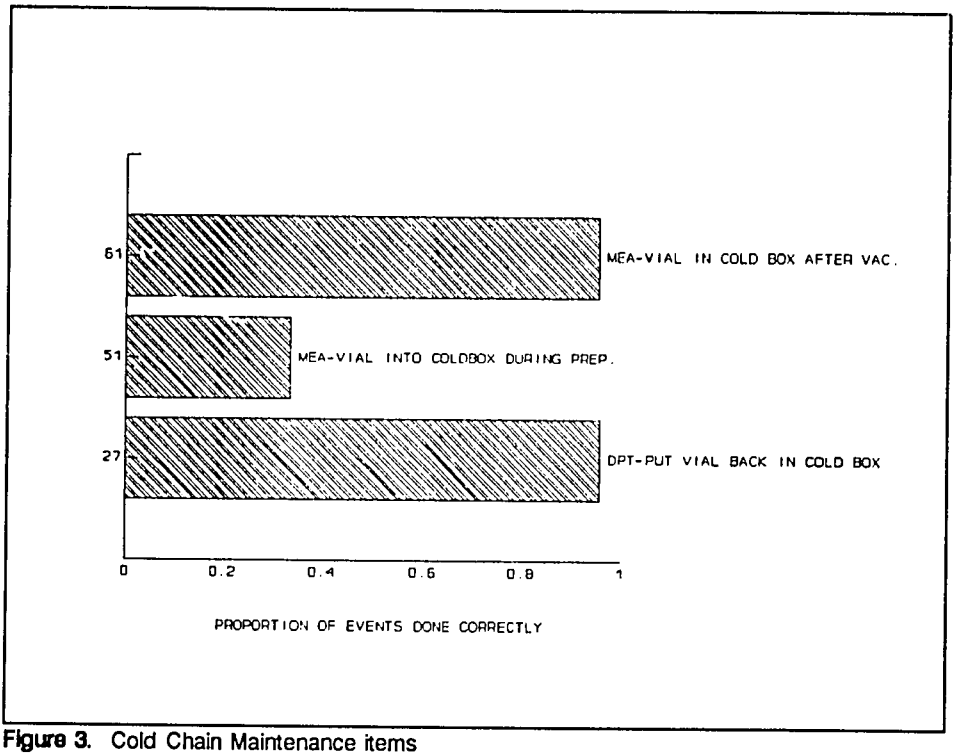

Figure 3. Cold Chain Maintenance items

Cold chain maintenance during the vaccine delivery stage was excellent for both DPT and Measles vaccine. Only one worker in three stored the Measles vaccine in the cold box after preparing it and while he/she was preparing the syringe for the first immunization. When this step is done rapidly, as was usually the case, the time out of the box for the vial was less than 1 minute.

Vaccine Technique

High Scoring Items

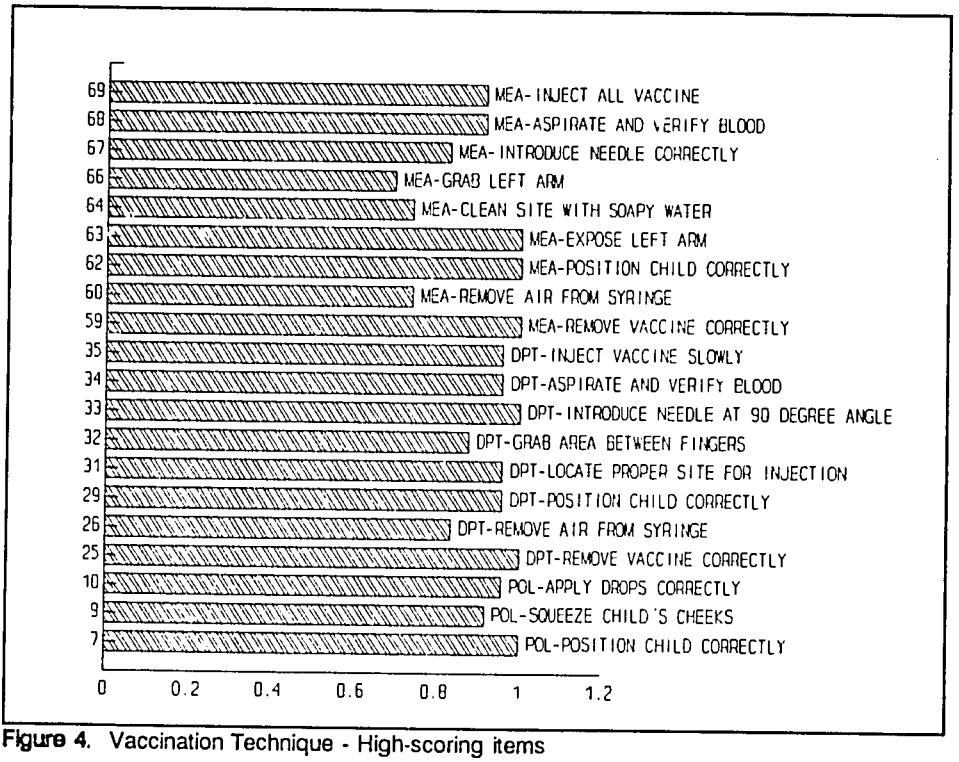

Figure 4. Vaccination Technique - High-scoring items

Good Vaccination Technique was seen in 20 of the 28 items observed. Most of the particular important items (such as introducing the needle at the correct angle in DPT injection, aspirating to verify that a vein has not been entered, etc.) associated with quality performance appear to be done adequately.

Vaccine Technique

Low Scoring Items

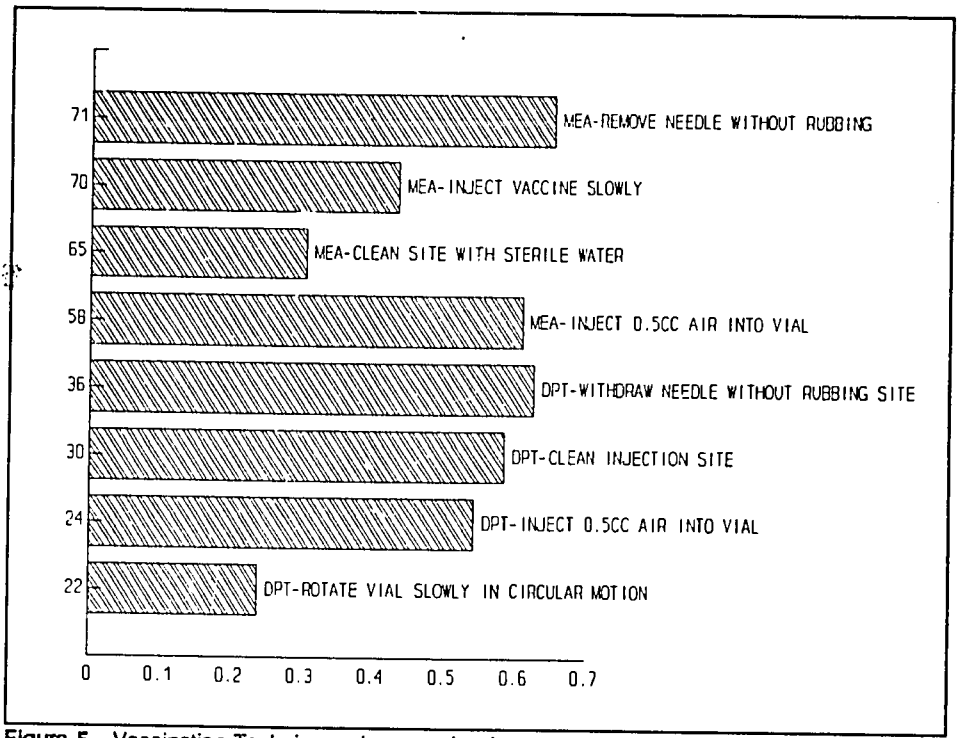

Figure 5. Vaccination Technique - Low-scoring items

The items in Vaccination Technique that did not meet the criterion for adequate performance exhibit a close parallelism between DPT and Measles vaccination. Thus, for both vaccines, problems were encountered with agitating the vials too rapidly and vigorously (NOTE: Item 50 included with Fig. 2 by error), with not injecting air into the vial in order to facilitate withdrawing vaccine, with properly cleaning the site of injection, and with rubbing the injection site after withdrawing the needle.

Check Vaccine Items

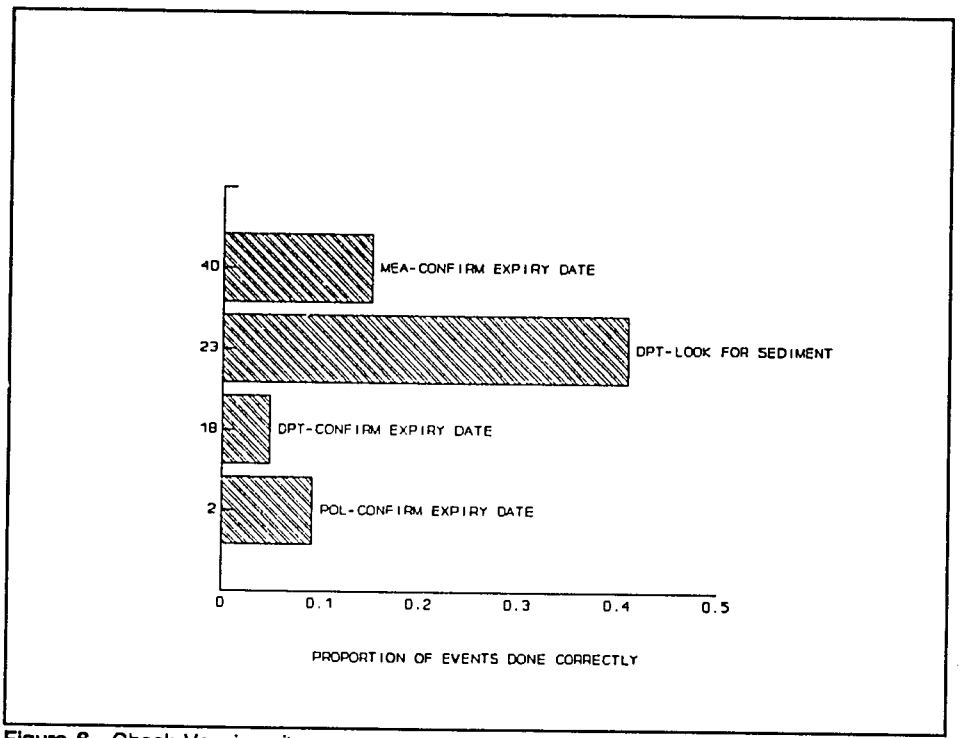

Figure 6. Check Vaccines items

Virtually no one of the health workers studied checked the expiry dates of any of the three vaccines. Only one in three checked the DPT vaccine for sediment prior to using it.

General Educational Message Items

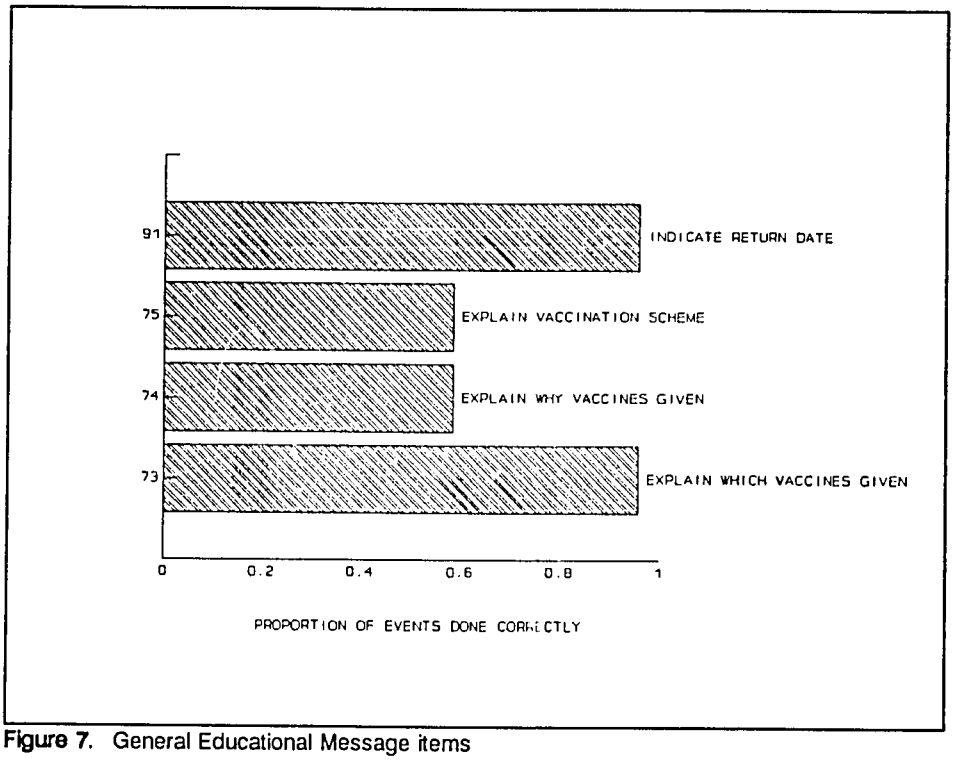

Figure 7. General Educational Message items

Health workers were very brief in their discussion of the immunization process to the "mother" in the SIMULEX (as they were to the real mothers during the day of VAN88). Almost all told the mother what vaccines were given and when to return for the next immunization but only half explained in any detail what immunization was or why the particular vaccines given were used.

Reaction Message Items

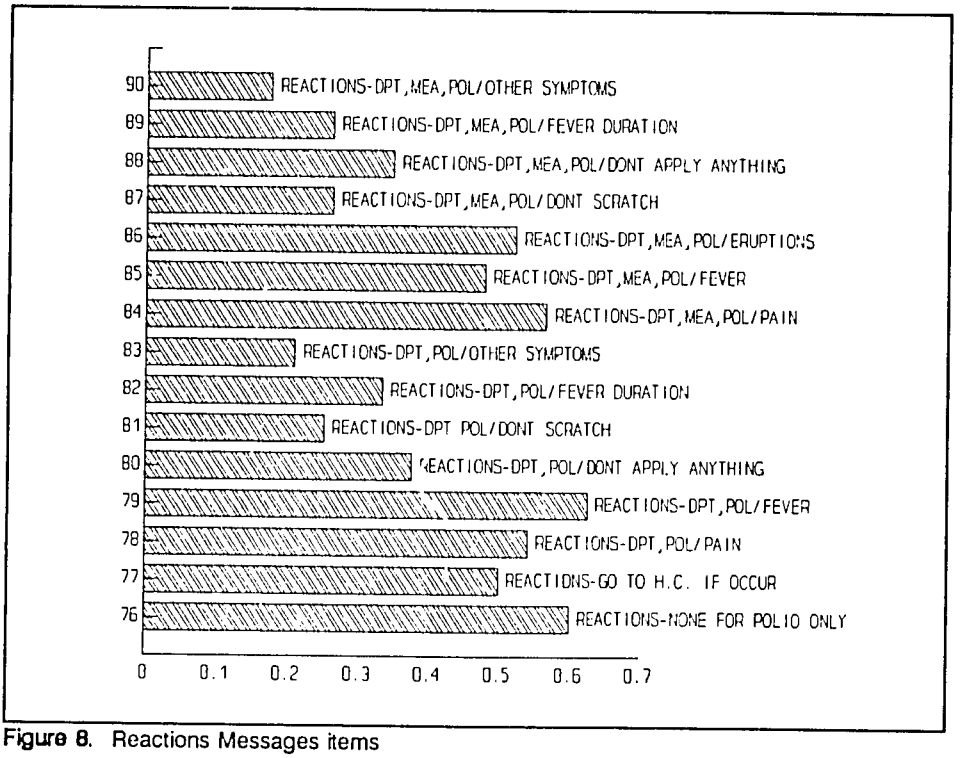

Figure 8. Reactions Messages items

Discussion of specific Reactions to watch for as a result of the particular combination of vaccines given to a child was a task area of completely unacceptable performance. Only 1 of the 15 items surpassed 60% of observed encounters done correctly. In talking to participating health workers afterwards, it became clear that this was an area in which two factors are interacting: a sense of it taking too much time to go over a detailed list of possible reactions with each mother, and a lack of clarity about the precise messages that are to be given in each instance.

Affect and Record-Keeping Items

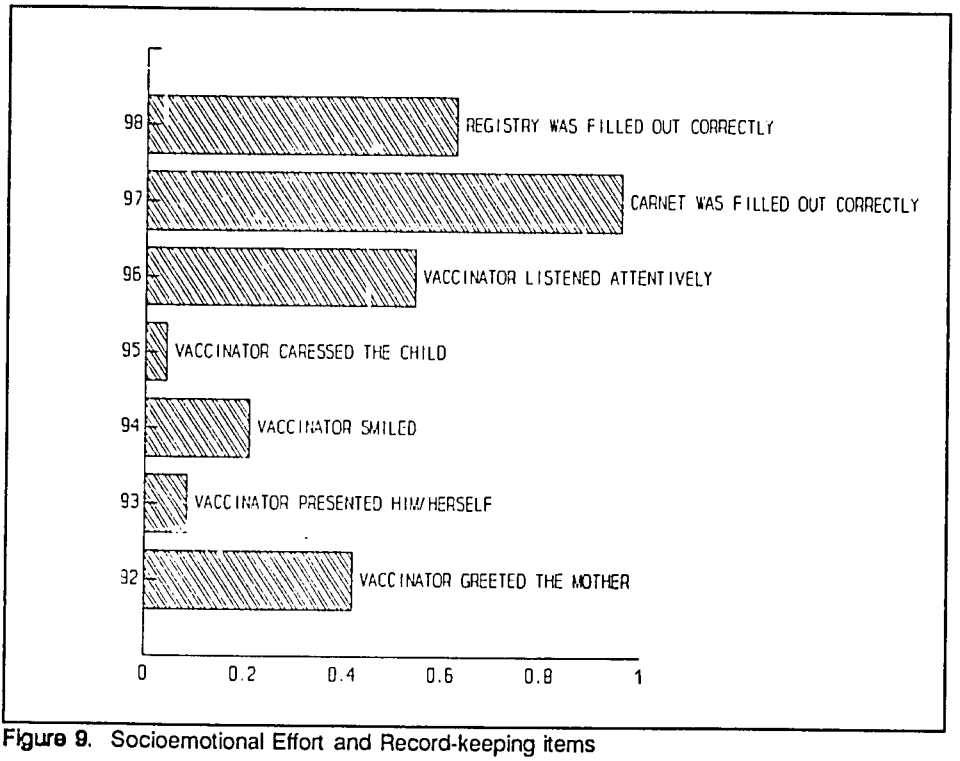

Figure 9. Socioemotional Effort and Record-keeping items

Routine record-keeping was good for the child's carnet but poor for the registry maintained by the health center. The latter was often ignored completely. Comments during debriefing suggested that many health workers may delay complete recording if there is a line of people waiting (as was established in the SIMULEX), trusting to their memories and cursory notes to fill in the blanks afterwards. The DSO data for the same item done during VAN (during which the pressure at most sites was significantly lower than we established for the SIMULEX) showed a correct performance rate of 84%, which supports the comments made during debriefing.

Comparative analysis of simulex with direct structured observation.

The main purpose of the current study was to produce a comparative analysis of SIMULEX versus DSO that would establish the former's reliability and validate it against the latter, if possible. The following pages, Figures 10-19, present the results of this analysis.

It is important to stress again at this point that the critical criterion in this analysis is item-specific convergence and not correlation between individual performance in the two assessments. The purpose of this methodology in the PRISM PRICOR Systems Assessment Model is to identify weaknesses in performance on a unit- or system-wide basis. Thus, we are not interested in scoring the performance of a given worker against his or her peers as we would in Mastery testing or traditional performance appraisal.

We are not, in other words, looking at SIMULEX as an alternative way of measuring how well a person is doing in his or her job at a given moment. We are using SIMULEX to identify those specific tasks within an activity that many workers are doing incorrectly so that everyone -- workers, supervisors, and managers alike -- can be sensitized to them and re-educated to perform them correctly. The implications of this distinction for the statistical design of the comparative analysis are profound and should be clear before we proceed.

SIMULEX: Individual Item Scores

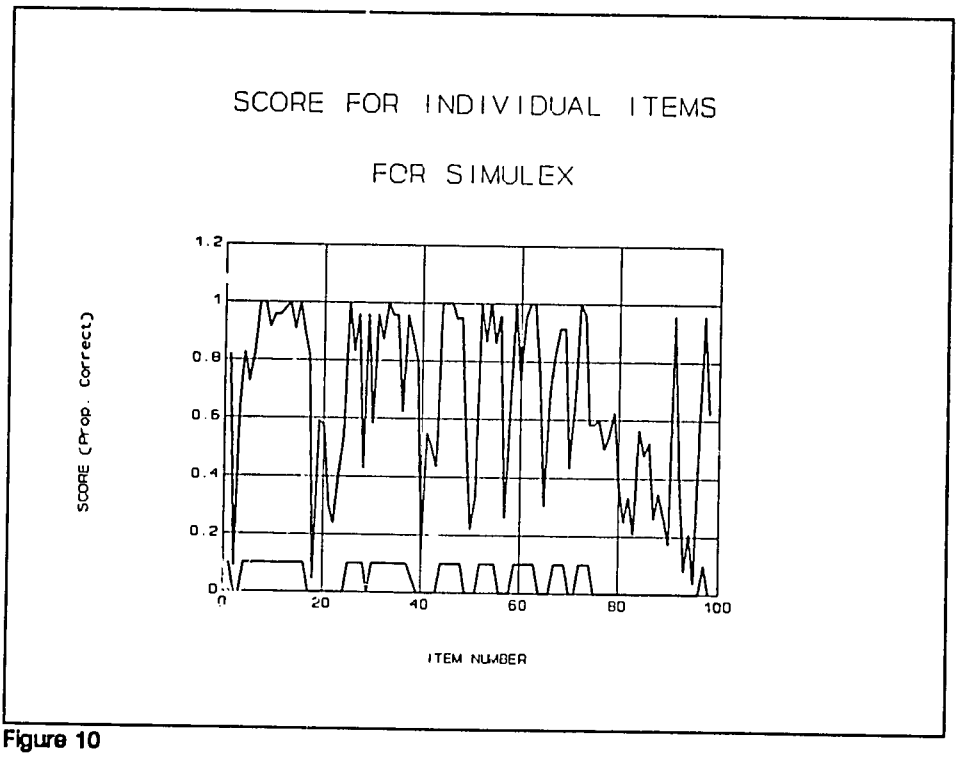

Figure 10

Figure 10 presents the signature obtained in the SIMULEX.

The first level of comparison presented is both simple and, perhaps, the most compelling validation of SIMULEX as a method for identifying the same weaknesses that have been identified in DSO. The top line in Figure 10 presents a continuous graph of the performance of each of the items in the list of Table 1. It is apparent from Table 1 that the items are covered in a natural sequence that closely reflects the routine immunization process used in the PMOH. The clustering of high performance and low performance tasks is obvious (providing another view of the data presented in Figures 1-9) and provides a unique "signature" for an individual worker or a group of workers. The lower line simply plots items as acceptable (= 0.1) or unacceptable (= 0.0) performance.

VAN: Individual Item Scores

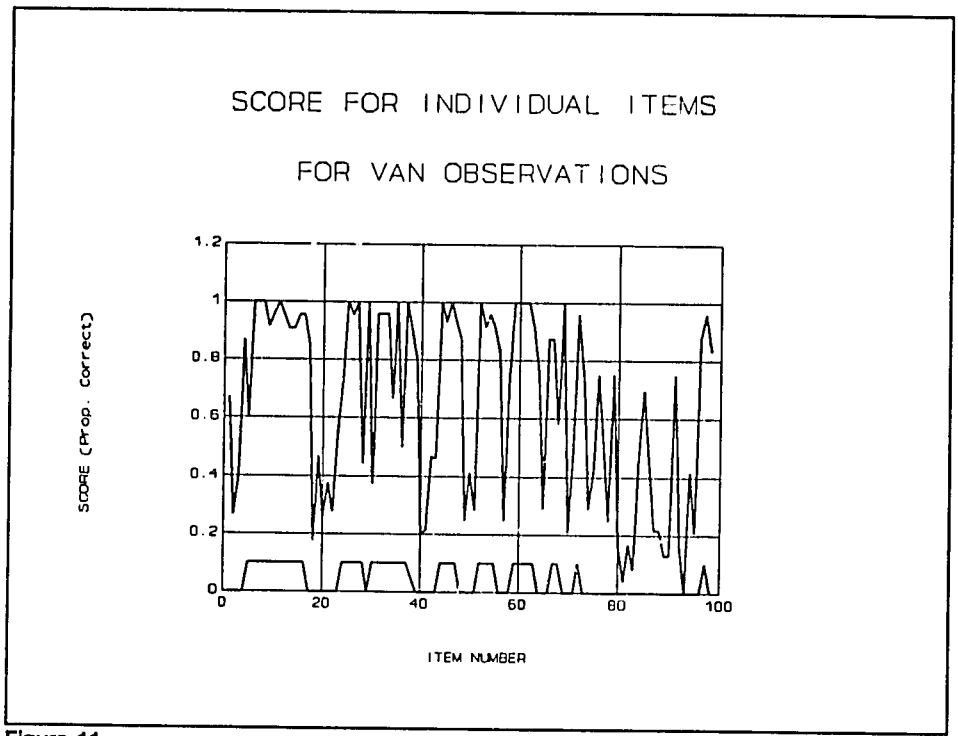

Figure 11

Figure 11 is the signature obtained in the DSO of VAN88. Flipping between Figures 10 and 11 quickly shows a very close relationship between the signatures.

SIMULEX - VAN Overlay

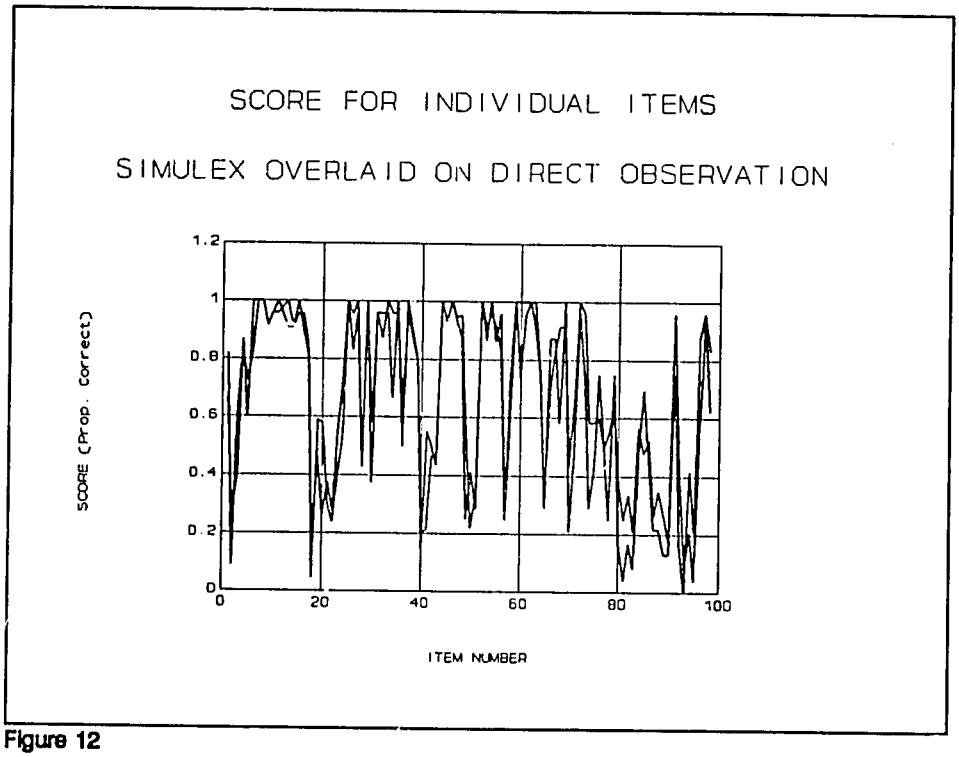

Figure 12

Overlaying Figure 10 on Figure 11 is a sensitive method for identifying items or clusters of items in which the two methods show significant discrepancy. The signatures are virtually identical, with only small differences in absolute scores of a small number of individual items to distinguish them in a few instances. The implication is clear: SIMULEX and DSO are identifying exactly the same areas of performance strength and weakness. SIMULEX appears, therefore, to be an excellent alternative to direct observation in the field for this purpose.

The convergence of SIMULEX and DSO will now be tested using a variety of other approaches.

SIMULEX - VAN Correlation

Item Scores

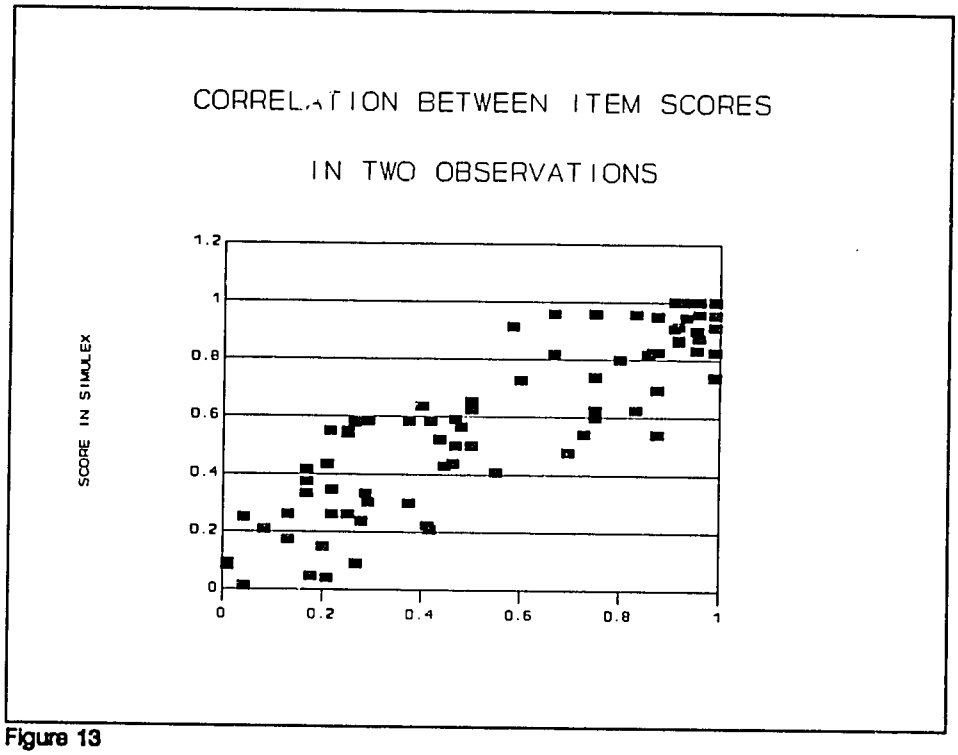

Figure 13

The first such test is simple correlation between item scores obtained with the two methods. Figure 13 is the scattergram of the 96 items. The correlation coefficient is 0.82, which for 94 degrees of freedom is highly significant ($p<0.001$).

SIMULEX - VAN Correlation

Worker Scores

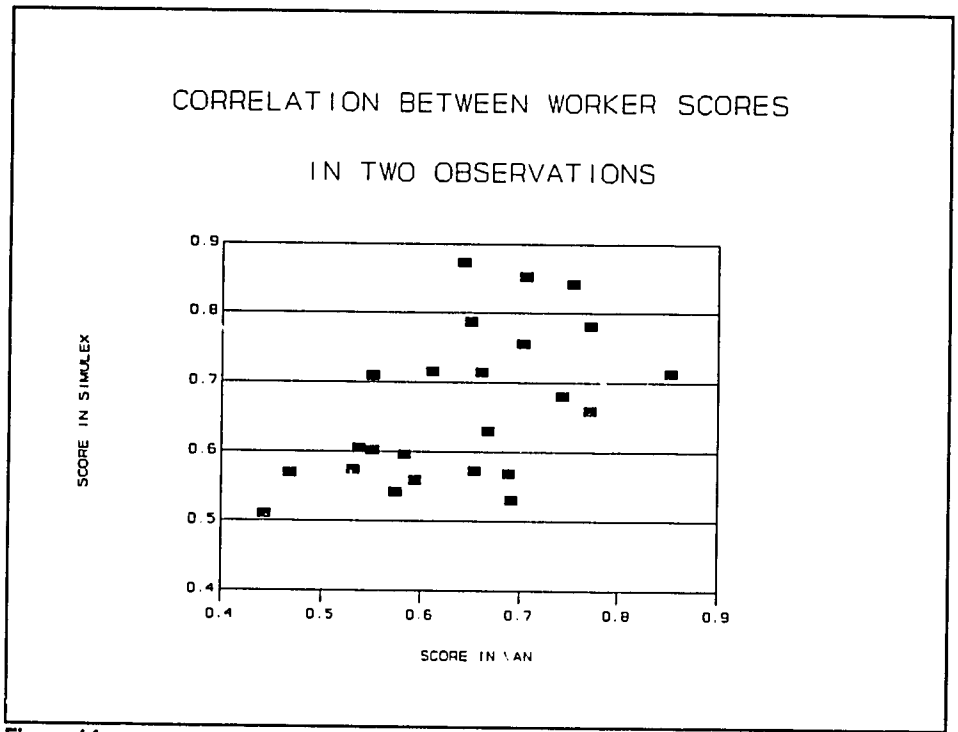

Figure 14

The correlation between individual worker's overall performance score from one method to the other is, as discussed, not a relevant issue to this analysis. Not surprisingly, the correlation coefficient (0.27) is not significant. There is no argument that the methods differ widely in a great number of factors that might affect an individual's performance in different ways. Further, the two tests were made up to two months apart. Under these conditions, little correlation should be expected.

Item Scores Frequency Distribution

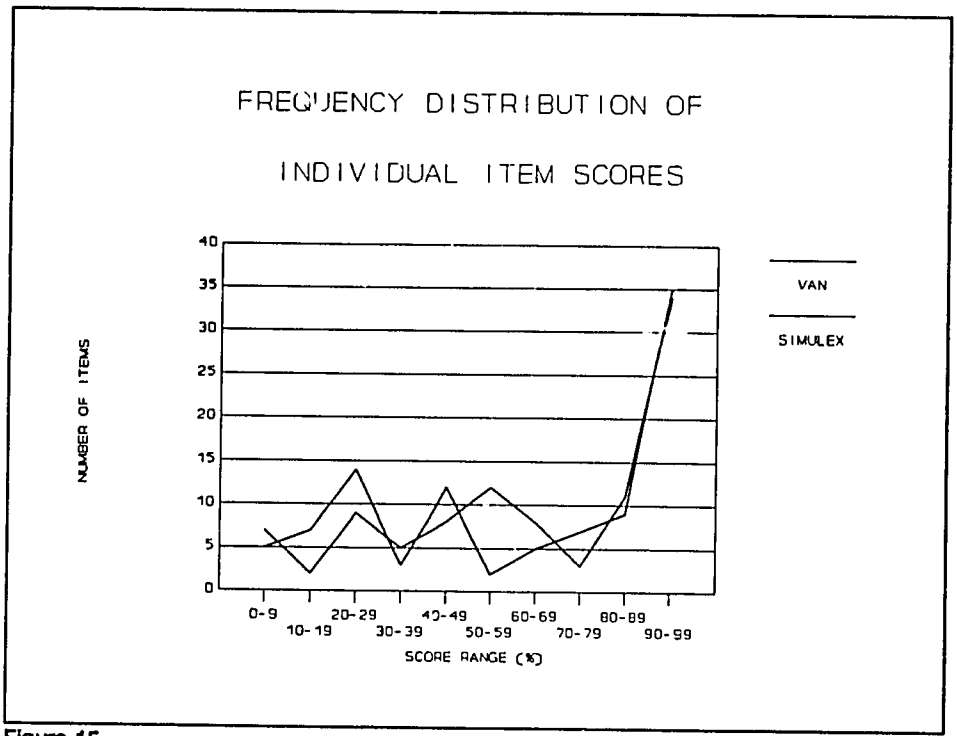

Figure 15

An important indicator of a test is the frequency distribution of scores on individual items. Ideally, a test should have a relatively even distribution of items in each scoring range. The items included in the current IOC are heavily skewed toward a cluster which almost everyone covered in either the SIMULEX or DSO assessment did correctly. On the other hand, we recognize that many of these items are important in their own right and must be retained in the final IOC. It seems likely, therefore, that this bias will never be truly dealt with completely, nor should it.

The parallelism in the frequency curves between the two methods is predictable from their identical signatures.

Worker Scores Frequency Distribution

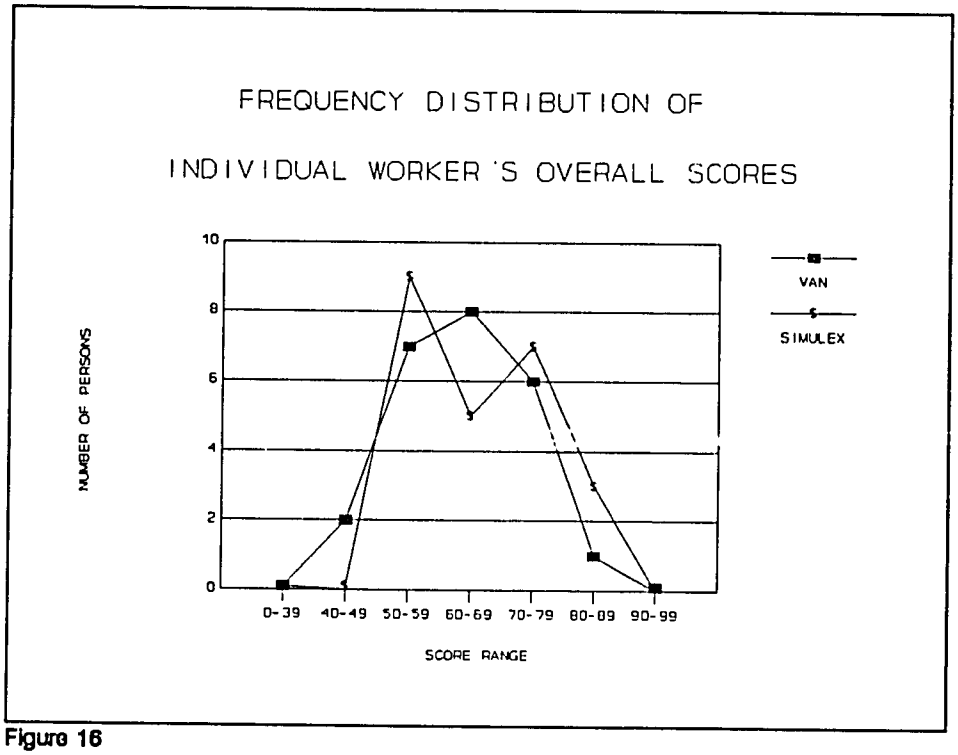

Figure 16

A different frequency distribution that is not predictable from the two methods' signatures is shown above: that of individual worker's overall scores. This is an important graph because it shows that, though the correlation between the two methods for individual performance is poor, there is an excellent relationship between the ranges of worker performance on a group basis. This suggests that SIMULEX can function as a valid surrogate for "field" performance and as a basis for comparing one unit's performance with that of another unit (if the number of workers per unit is adequately large).

Convergence between Individual Items

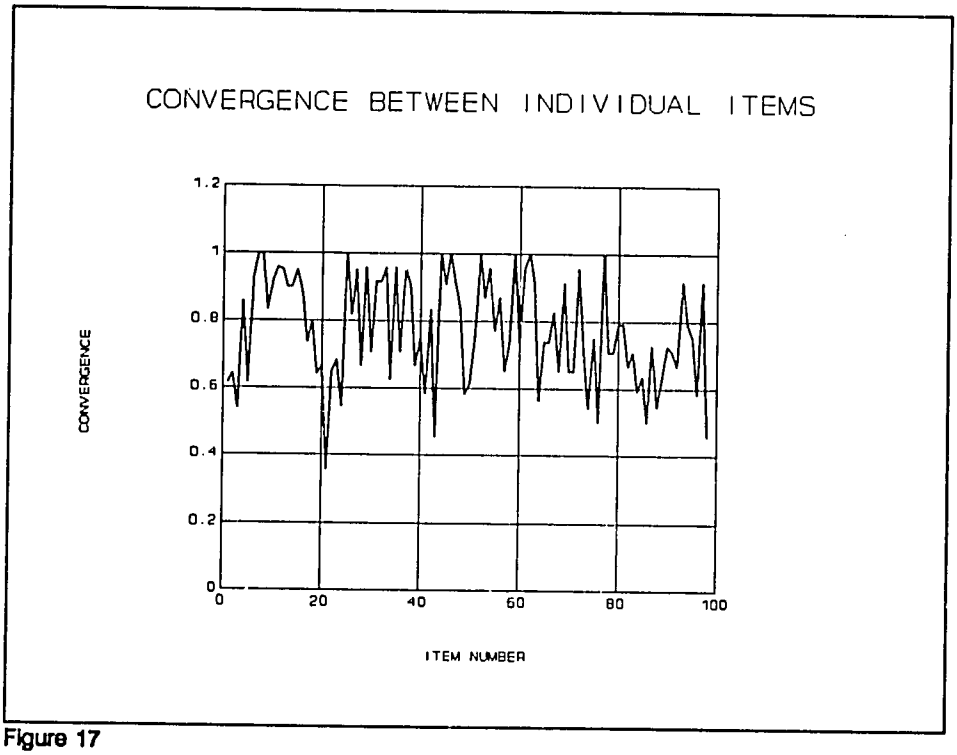

Figure 17

The final test of convergent validity is that of "item agreement". This is calculated from only positive observations, which is to say that a comparison is made between each person's performance of each item for all pairs in which at least one of the methods yielded a positive score (i.e., >0.70). Agreement, then, is defined as the [number pairs in which both are positive]/[number of pairs in which either is positive]. It is obvious, then, that Agreement equal to 1.0 is a perfect positive correlation and equal to 0 is a perfect negative correlation. Agreement equal to 0.5 shows no relationship at all. Generally, Agreement equal to 0.8 is taken as a strong convergence on an item between two methods or tests. Figure 17 shows the Agreement for each item on a graph that parallels Figures 10-12.

Item Agreement Distribution

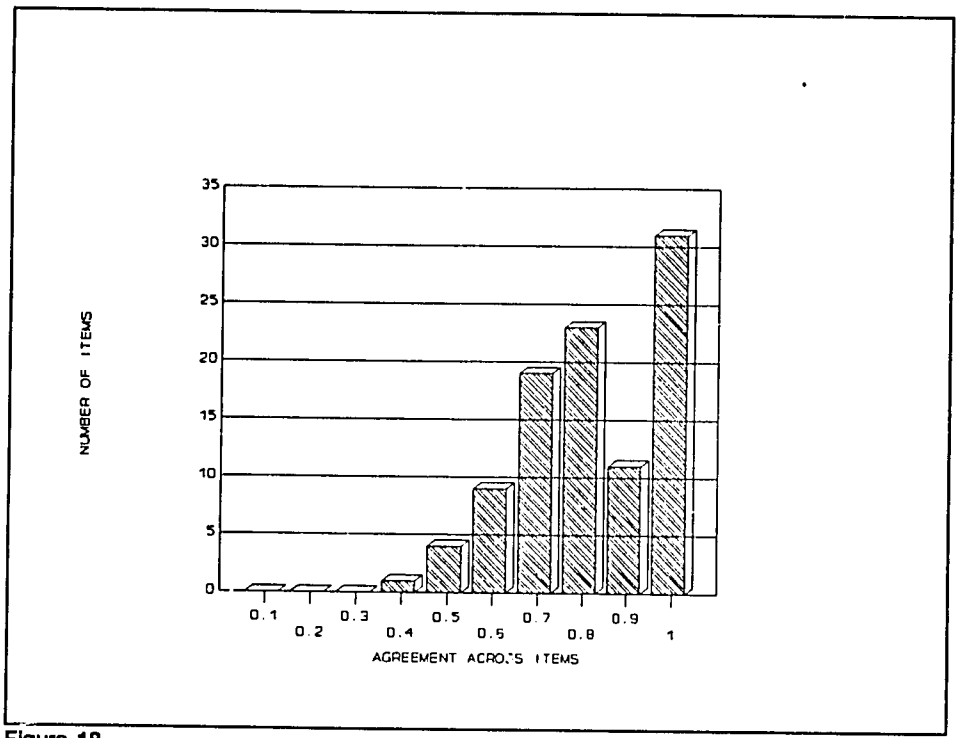

Figure 18

The distribution of item agreement from Figure 17 is shown in this graph. Over two-thirds of the items included show strong convergence between the two methods. Over half of those remaining show moderate convergence (>0.7). A review of Figure 17 in context of the list in Table 1 makes it clear that areas of significant non-convergence occur particularly in the tasks associated with education/promotion. While the overall predictive validity of SIMULEX (i.e., as predictor of overall performance in DSO) in these tasks is strong, it is obvious that individuals show less consistency in the way they differ in their response to the two methods in terms of their performance.

Overall Mean Agreement Across Items

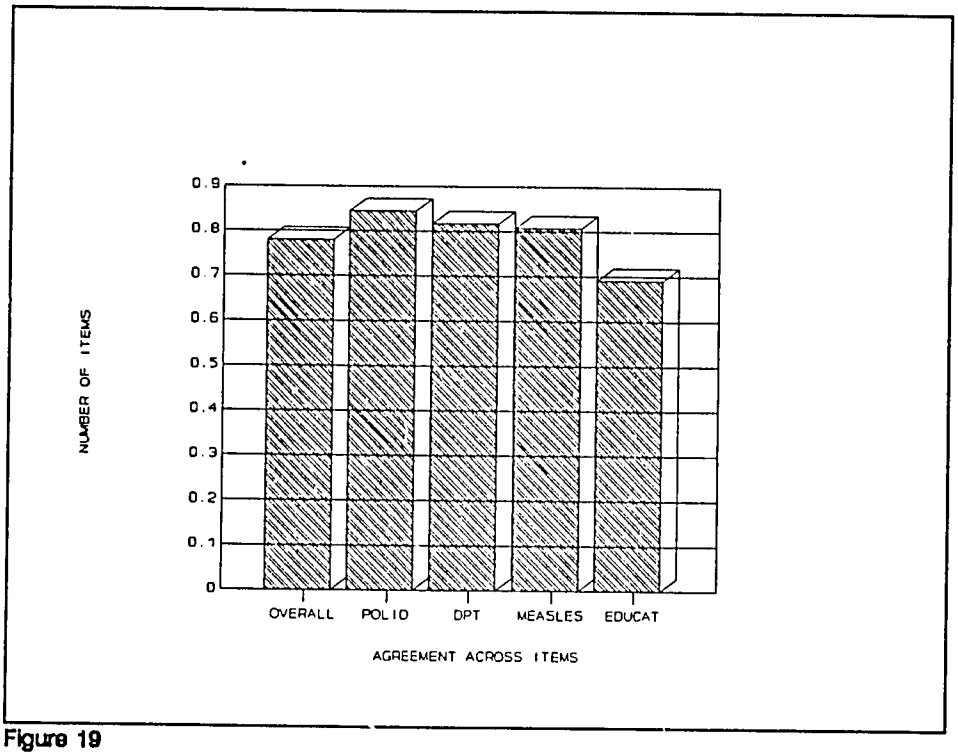

Figure 19

The last Figure shows the mean agreement across items overall and for each of the major vaccine groupings and education/promotion. Again it is clear that variation in response to the method was consistent when dealing with physical manipulations. That is to say, SIMULEX, even on an individual worker basis, is an accurate predictor of the performance of a specific physical task as measured by DSO. The convergence for the education/promotion items was, as just noted, only moderate.

FINAL COMMENTS

The major innovation we have introduced in methodology is an attempt to get around the limitations imposed by direct observation of actual patient encounters. Our approach has been to employ simulation exercises (SIMULEX) with standardized vignettes to test the performance of health service delivery personnel in basic care-giving and educational activities.

The evaluation is done within a non-threatening context in which the exercise is treated as the first stage of a personalized in-service training session. It is made clear to the subject that he or she is being asked to perform as well as possible so that the observer/trainer can see what the person's real strengths and/or weaknesses are in the topic activity. SIMULEX carried out in this way avoids most, if not all, of the theoretical and practical weaknesses of direct encounter observation.

The data obtained from SIMULEX clearly represent maximal as opposed to typical performance. Two points are important, however. The first is that inadequate maximal performance (a fairly common phenomenon in the assessments just described) can be taken as an excellent indicator of inadequate typical performance. This has been confirmed both by the comparative study SIMULEX with direct structured observations of real encounters as well as by interviews with the supervisors of the individual health workers who participated in this study. Workers who routinely fail to do something right in their day-to-day activity are unlikely to be able to change when challenged by the reasonably fast-paced SIMULEX we have designed.

The second point is that maximal performance data are not interpreted in isolation. The complete battery of instruments for unit performance assessment includes SIMULEX, verbal examinations of content knowledge, checklist-controlled site visits (including record review), interviews with recent users, and confidential questionnaires requesting unit members to rate deviations from the norms in important activities.

Our approach to performance assessment assumes that any significant failure in typical performance will show up in one or more of this battery of instruments. We believe that the battery approach will prove very sensitive for this purpose, and that the evidence to date suggests the SIMULEX merits a key role in that approach.

INTERIM REPORT

SYSTEMS ASSESSMENT OF EPI SERVICE DELIVERY IN THE *CONO SUR* OF LIMA, PERU DURING THE 1988 NATIONAL VACCINATION CAMPAIGN

The PRISM Group

31 May 1989

The work upon which this presentation is based was performed under a subagreement with the Center for Human Services under its Cooperative Agreement No. DPE-5920-00-A-5056-00 with the U.S. Agency for International Development.

Background

Introduction. The *Cono Sur*, or Southern Cone, of Lima, Peru comprises approximately 650,000 people living in peri-urban marginal communities along the southern rim of the Lima metropolitan area. Politically, this area is divided into three well-defined Districts: San Juan de Miraflores (SJM), Villa Maria del Triunfo (VMT) and Villa El Salvador (VES).

The Peruvian Ministry of Health (PMOH) provides health and medical services to the Cono Sur through a network of 14 Health Centers (HC), each with up to six ancillary Health Posts (HP) and a single support hospital, Hospital del Apoyo "Maria Auxiliadora" (HAMA).

The 14 health centers are administered from an office known as the "Entidad Ejecutivo Presupuestal" (EEP), which has responsibility for budget and finances, and serves as the coordinating entity for PMOH activities in the Cono Sur. HAMA is a separate budgetary entity and functions independently of the EEP.

The PRISM-PRICOR Project has been active in the Cono Sur since December, 1987, working in close collaboration with the PMOH to carry out a systems analysis and organizational assessment of health service delivery at the health center level. This effort is targeted on primary health care activities, especially those in the Child Survival Action Program (CSAP), at the 14 health centers.

The objective of the project is two-fold: 1) to develop a methodology for systems analysis that can be applied by local and intermediate managers for the routine monitoring of service delivery; and 2) to concentrate this methodology mainly on the process of service delivery rather than on inputs and outcomes.

This report covers the systems analysis of the PMOH's Expanded Program in Immunizations (EPI), specifically reflecting evaluations done as part of the PMOH 1988 national vaccination campaign (VAN88). It incorporates portions of two earlier reports produced by the PRICOR Peru Project: "Peru PRICOR Report #1 - Evaluation of EPI Service Delivery in the Cono Sur of Lima, Peru" and "Interim Report - Performance evaluation of direct service delivery through the use of simulation exercises".

The PMOH Program in EPI. The PMOH has, for over five years, placed heavy emphasis on annual vaccination campaigns (of 3 days, 1-to-2 months apart) to extend immunization coverage. These national campaigns have enlisted the assistance of thousands of volunteer workers from schools, charitable and social organizations, etc., but have consistently fallen short of coverage targets.

The current trend in the PMOH is to integrate immunizations into general service delivery as much as possible, while continuing to run annual campaigns, particularly in rural areas where a constant source of vaccine is difficult to maintain.

A PMOH decision to carry out a national vaccination campaign (VAN88) in May and July of 1988 offered a concrete opportunity for the PRICOR Peru Project to carry out a limited systems analysis and to test key instruments for EPI service evaluation that The PRISM Group has been developing as part of the project.

Project focus. The PMOH focus on campaign-based immunizations meant that routine vaccination services were severely disrupted (e.g., little vaccine and few syringes were available for routine immunizations in many health centers) during the period originally designated within the PRICOR Peru Project to study EPI services. As a result, the project's EPI evaluation has been limited to service delivery and support system performance observed during the campaign.

This was the first major field effort of the project. As such, it represented as much an opportunity for instrument development and testing, and for the validation of data-collection methodologies, as it did an opportunity for a systems analysis. Both aspects are reflected in the following discussion.

Goals of the Analysis

Coverage assessment. While the emphasis of the PRICOR systems analysis is on the process of service delivery, it is not intended that the outcomes arising from that process be ignored. It is clear that a complete description of the EPI system in the Cono Sur must include some information about the immunization coverage it is attaining in the catchment population.

As a practical matter, the PMOH directorship in the Cono Sur specifically requested that the project provide an answer as to whether or not the coverage from routine service delivery was already meeting the standards of the EPI program (i.e., 80% of children in appropriate age groups protected).

Available information, much of it anecdotal, suggested to many of them that a campaign was not needed in the Cono Sur. The Cono Sur directors were unanimous in their preference for investing available resources in better routine services than in such a campaign but lacked convincing evidence to justify an exemption from VAN88. To meet this need, the project carried out a pre-VAN survey to verify existing coverage.

Systems analysis. The primary objective in this study was to describe how service delivery personnel assigned to the VAN88 campaign actually provided the requisite services. Issues addressed included the quality of care and counselling as part of direct service delivery; and planning, supervision, training, logistics and record-keeping as part of support service delivery.

From preliminary experience with the Cono Sur health system, we had reason to

suspect that the delivery of EPI services would not be found to be grossly deficient and that support services, in general, would prove to be adequate to the need. We were able, therefore, to focus a significant amount of effort on the assessment of the quality of vaccination direct services executed by the PMOH staff participating in VAN88.

Performance analysis through the use of Simulation Exercises (SIMULEX). An important part of the PRICOR Peru Project is the development of efficient methods for the measurement of quality of care given during direct service encounters. Work on the second day of VAN88 was, therefore, focused exclusively on quality of care items as part of an effort to validate SIMULEX as a substitute or analogue for direct observation. This analysis has been reported previously and will not be included here. The data on performance, however, will be included since they identify specific aspects of care-giving and counselling that are either well- or poorly-done by the health workers in the Cono Sur.

Methodology

Constructing a model of the EPI system

The initial step in the systems analysis was the construction of a model that included the important activities that make up the VAN campaign. This information was obtained from a variety of sources, including: Focus/Informant groups made up of health workers from the Cono Sur (separate groups were formed for nurse auxiliaries, nurses, general physicians, and health center directors); interviews with individual VAN coordinators (for the Cono Sur, for each district, and for each health center); review of PMOH norms and manuals; review of appropriate international literature (including the PRICOR Thesaurus); and the project team members' own experience.

The model was constructed according to the principles presented in a document previously submitted as part of the PRICOR Mid-term Evaluation: "The PRISM Systems Assessment Model - A summary with emphasis on the framework of analysis".

As a result of our discussions with PMOH staff and our experience with previous VAN campaigns, we knew that certain categories of activities were not likely to be very fruitful areas for detailed assessment (e.g., basic supply logistics have almost never been a problem in the Cono Sur due to its urban nature and closeness to the PMOH central warehouses).

We, therefore, made the decision to operationalize only certain parts of the model in order to test components of both the analytical and process models which this project was introducing to the PRICOR approach. As mentioned, a very heavy

emphasis was placed on performance of direct services (quality of care and counselling).

Ultimately, the EPI systems analyis was divided into the following categories:

PRE-VAN:

Coverage — Existing levels of vaccine coverage prior to the first day of VAN88

Planning/coordination — On-going, prospective, open-ended interviews /with designated coordinators at Cono Sur, district and health center levels

FOR VAN DAY 1:

Macro-description — Organization of health center and its vaccination posts; staffing; transport; etc.

INDIVIDUAL PERFORMANCE INDICATORS:
Sterility maintenance
Cold chain-Individual
Vaccine quality checking
Vaccination technique
General education
Reactions education

UNIT (VACCINATION POST) INDICATORS:
Cold chain-Unit
Vaccine quality assurance
Information/supervision
Supplies-Unit

Health center refrigerator (cold chain)

WORKER PERCEPTIONS:
Experience with VAN
Training
Information/feedback
Worker satisfaction

FOR VAN DAY 2 AND SIMULATION EXERCISES (ALL INDIVIDUAL PERFORMANCE INDICATORS):
Sterility maintenance
Cold chain
Vaccination technique
Expiry/Quality check

General education
Reactions education
Socioemotional effort
Record-keeping

Existing coverage

Coverage was determined in the week before the first day of VAN88 using the standard W.H.O. cluster sample methodology employing 30 clusters of 7 children selected at random in the Cono Sur. Two samples were selected: one for children less than 1 year old and a second for children 1-4 years old. Clusters were randomly selected using a set of maps of the area obtained from the municipal governments in each District and updated by the PRISM-PRICOR team.

The survey was carried out during 18-20 May with the collaboration of nurses and health auxiliaries under the coordination of the HAMA Epidemiology Unit. The questionnaire was a one page document that asked for basic identifying information and data from the child's immunization record (UNICEF Carnet), if available, or a vaccination history from the mother or other guardian if a Carnet were not available.

Observations on VAN Day 1 (May 22)

Performance was determined by direct observation at immunization posts during the first day of VAN88, Sunday, May 22nd. Fifteen collaborating nurses and health auxiliaries from HAMA, provided via the HAMA Epidemiology Unit, acted as observers for the PRISM-PRICOR Project. Each received approximately 8 hours of training in carrying out the observation protocol. Each observer was assigned to cover VAN activities at one HC and at ancillary vaccination posts being supervised by the HC. One observer was assigned to cover the VAN effort at HAMA.

Data was collected using an Immunization Observation Checklist (IOC), which is included in Appendix 1. Quality of care aspects of service delivery (i.e., individual performance indicators) were ultimately calculated based on 65 items from the IOC scored Yes/No/Not Applicable and covering the delivery of anti-polio vaccine (10 items), DPT (19 items), Measles (23 items) and counseling and education (13 items).

The 65 items could also be grouped according to the type of task they represented: 1 - sterile technique (20 items), 2 - maintenance of cold chain (3 items), 3 - correct dosage and injection technique (28 items), 4 - checking vaccine expiration/condition (1 item), 5 - informing mother about general information about immunizations (4 items), and 6 - informing mother about possible side-effects and reactions (9 items). The following table lists these 65 items:

#	Item description	Task Area
1	POL-PICKUP VIAL BY NECK KEEPING IT VERTICAL	1
2	POL-REMOVE PROTECTIVE RING & STOPPER MAINTAINING STERILITY	1
3	POL-OPEN THE WRAPPING MAINTAINING STERILITY	1
4	POL-PUT DROPPER IN VIAL & REMOVE PROTECTIVE CASE	1
5	POL-PUT PREPARED VIAL IN COLD BOX	2
6	POL-POSITION CHILD IN SUPINE POSITION IN MOTHER'S LAP	3
7	POL-TAKE PROTECTOR FROM DROPPER	1
8	POL-PLACE HAND ON CHEEKS, OPENING MOUTH	3
9	POL-APPLY 2 DROPS IN MOUTH AVOIDING CONTACT	3
10	POL-PUT PROTECTOR BACK ON DROPPER & PUT IN COLD BOX	1
11	DPT-PICKUP VIAL BY NECK	1
12	DPT-REMOVE PROTECTIVE SEAL OF VIAL WITHOUT TOUCHING	1
13	DPT-CLEAN RUBBER CAP & WAIT UNTIL DRIES	1
14	DPT-ROTATE VIAL SLOWLY IN CIRCULAR MOTION UNTIL WELL-MIXED	3
15	DPT-LOOK FOR SEDIMENT & DISCARD IF PRESENT	4
16	DPT-TAKE NEW SYRINGE FROM ITS CASE	1
17	DPT-ATTACH NEW NEEDLE ON SYRINGE	1
18	DPT-INJECT 0.5CC AIR INTO VIAL	3
19	DPT-REMOVE 0.5CC OF VACCINE FROM VIAL	3
20	DPT-REMOVE AIR FROM SYRINGE	3
21	DPT-PUT VIAL IN COLD BOX	2
22	DPT-POSITION CHILD IN LYING FACE DOWN ON MOTHER'S LAP	3
23	DPT-CLEAN INJECTION SITE W/ SOAPY WATER & STERILE WATER THEN DRY WITH COTTON - OR- CLEAN WITH ALCOHOL AND LET EVAPORATE	3
24	DPT-LOCATE INJECTION IN UPPER OUTSIDE QUADRANT OF BUTTOCKS	3
25	DPT-PLACE FINGERS AROUND INJECTION SITE	3
26	DPT-INTRODUCE NEEDLE AT 90 DEGREE ANGLE	3
27	DPT-ASPIRATE AND VERIFY NO BLOOD COMES OUT	3
28	DPT-INJECT 0.5CC OF VACCINE	3
29	DPT-WITHDRAW NEEDLE WHILE PRESSING ON INJECTION SITE WITH DRY COTTON,WITHOUT RUBBING SITE	3
30	MEA-PICKUP VIAL BY NECK KEEPING IT VERTICAL	1
31	MEA-REMOVE PROTECTIVE COVERING	1
32	MEA CLEAN STOPPER WITH ALCOHOL & WAIT FOR IT TO DRY	1
33	MEA-BREAK OPEN AMPULE OF DILUENT	1
34	MEA-REMOVE A 3 CC SYRINGE FROM ITS CASING	1
35	MEA-DRAW UP ALL DILUENT	1
36	MEA-SLOWLY INJECTS DILUENT INTO SIDE OF VIAL OF VACCINE	1
37	MEA-ROTATE VIAL SLOWLY IN CIRCULAR MOTION UNTIL VACCINE IS COMPLETELY DISSOLVED (CHANGES COLOR TO PINK)	3
38	MEA-PLACE VIAL OF VACCINE INTO COLDBOX	2
39	MEA-POSITION CHILD SITTING IN MOTHER'S LAP	3
40	MEA-UNCOVER LEFT ARM	3
41	MEA-CLEAN MIDDLE THIRD OF LEFT ARM SITE WITH SOAPY WATER	3
42	MEA-CLEAN SITE WITH STERILE WATER & DRY WITH STERILE COTTON	3
43	MEA-CLEAN STOPPER OF VIAL WITH STERILE WATER	1
44	MEA-REMOVE 1CC SYRINGE (WITH NEEDLE ATTACHED) FROM PROTECTIVE CASE	1
45	MEA-INJECT 0.5CC AIR HOLDING VIAL BY NECK	3
46	MEA-ASPIRATE 0.5CC OF VACCINE	3
47	MEA-TAKE MIDDLE THIRD OF LEFT ARM FORMING A FOLD	3
48	MEA-INTRODUCE NEEDLE AT 45 DEGREE ANGLE WITH BEVEL UP (SUBCANTEOUS INJECTION)	3
49	MEA-VERIFY THAT NO BLOOD COMES OUT	3

50	MEA-INJECT 0.5CC OF VACCINE	3
51	MEA-INJECT THE VACCINE SLOWLY	3
52	MEA-WHEN REMOVING SYRINGE, PRESS DOWN ON SITE WITH DRY COTTON WITHOUT RUBBING	3
53	EXPLAIN WHICH VACCINES GIVEN & WHICH NOT	8
54	EXPLAIN REASONS FOR GIVING OR WITHHOLDING EACH VACCINE	8
55	EXPLAIN VACCINATION SCHEME	8
56	EXPLAIN THE POSSIBLE REACTIONS AND PRECAUTIONS	6
57	THAT IF ONLY POLIO RECEIVED (NO DPT OR MEASLES) THERE SHOULD BE NO REACIONS	6
58	REACTIONS-THAT DPT IS SOMETIMES ACCOMPANIED BY SOME LOCAL PAIN AT INJECTION SITE	6
59	REACTIONS-THAT DPT MAY CAUSE SOME FEVER IN 4-12 HOURS	6
60	REACTIONS-THAT MEASLES MAY CAUSE SOME FEVER IN 7-10 DAYS	6
61	REACTIONS-THAT MEASLES MAY CAUSE A RASH IN 7-10 DAYS	6
62	REACTIONS-THAT IT IS BEST NOT TO APPLY ANYTHING FOR LOCAL PAIN AT INJECTION SITE	6
63	REACTIONS-THAT THE CHILD SHOULD BE BROUGHT TO THE HC IF A FEVER PRESENTS	6
64	REACTIONS-THAT THE INJECTION SITE SHOULD NOT BE SCRATCHED	6
65	INDICATE RETURN DATE	6

The IOC also contained items to measure selected indicators of unit (i.e., vaccination post) performance: cold chain (4 items), vaccine quality assurance (2 items), information/supervision (4 items), and supply(i.e., adequate stocks of ...; 10 items). These provide observational measures of certain critical aspects of the support system functioning on the day of VAN.

A separate checklist was incorporated in the IOC to assess the maintenance of the refrigerator at each of the 14 health centers and HAMA. This checklist contained 12 items and was also an observational measure of an important sub-system involved in cold chain maintenance.

Finally, a questionnaire was given to each person responsible for vaccinating at observed vaccination posts to be filled out and returned at the end of the day. This form contained questions dealing with the amount and type of training the worker had received in preparation for the VAN, the amount of information/ feedback on performance he or she received during the day, and his or her satisfaction with various aspects of the support given to the VAN effort.

The checklists and questionnaire were drafted initially by the PRISM-PRICOR team from the PMOH norms governing EPI and from the PRICOR Thesaurus developed by the Center for Human Services. The draft was then turned over to working groups of nurses and health auxiliaries from the Cono Sur for their criticism and suggestions. The development of the checklist involved two iterations between the PRISM-PRICOR team and the working groups prior to its pilot testing.

During VAN DAY 1, a total of 206 vaccination encounters were observed for 74 health workers. Only those health workers actually engaged in vaccinating were

observed. The number of vaccination posts (including the health center as one vaccination post) observed was equal to the number of health workers.

The operating procedure for the day of VAN1 was the same in each health center, and was basically divided into an equal number of observations in the morning and the afternoon. The observations were of the health-care service delivery and of the health center or post.

The vaccinator had to complete the questionnaire when he/she was able, but much of it was generally completed in the morning before the vaccinations began. The majority of the centers did not start vaccinating on time, and this allowed some time. The questionnaire was completed with the observer present to answer necessary questions.

The observer completed the checklist items dealing with the unit once in the morning and a second time in the afternoon. Observations were made at the health center and in at least 3 health posts.

To monitor direct service delivery, 10 observations were to be done in the health center and 6 were to be done in each of three health posts. An equal number were to be done in the morning and the afternoon. In some health posts, there were children to be vaccinated only in the morning. In several, the observer arrived in the afternoon after the post had stopped service or the staff had left to join a mobile unit going house to house. Due to wide variations in the utilization of vaccination posts and the distances between them, it ultimately proved impossible to control the number of encounters observed per health worker, which varied from 1 to 7.

IOC Revision for VAN2 and SIMULEX

After its application during the first day of VAN88, the IOC was again reviewed by the PRISM PRICOR Team and the Focus/Informant (F/I) Groups created by the project (i.e., working groups of 6-9 doctors, nurses, health auxiliaries, nurse-midwives, and mothers) during a 1-month period to determine what modifications should be made in preparation for the second day of VAN88 (July 10). The review process included a thorough debriefing of the 15 nurses and health auxiliaries who served as observers for the project during the first day of VAN88. These workers had been asked to note anything they felt was not being adequately covered by the current form.

This process resulted in a significant increase in the detail of the IOC in almost all task areas, but most specifically in those involving educational messages and socioemotional aspects of the care encounter. The latter had been left out of the first version of the IOC, and both the observers and the F/I Groups felt that this was an area in which health workers were particularly in need of improvement. The final instrument has been included in Appendix 1.

The following table lists the items related to quality of care in this IOC that have been included in the subsequent analysis. The numbering of these items has

been re-done to facilitate the analysis so they do not reflect the original numbering of the IOC. During analysis, two items (12 and 38) dealing with multiple-use syringes, which had been included in the selection, were dropped because of two few observations.

The Task Areas referred to in Table 1 are as follows: 1 - Maintenance of Sterility; 2 - Cold Chain Maintenance; 3 - Proper Vaccination Technique; 4 - Expiry Date/Quality Check; 5 - General Educational Messages; 6 - Reactions to Vaccinations; 7 - Socioemotional effort; 8 - Record-keeping.

#	Item description	Task Area
1	POL-PICKUP VIAL/STERILITY	1
2	POL-CONFIRM EXPIRY DATE	4
3	POL-REMOVE PROTECTIVE RING/STERILITY	1
4	POL-OPEN THE WRAPPING/STERILITY	1
5	POL-PUT DROPPER IN VIAL/STERILITY	1
6	POL-DRAW VACCINE FROM VIAL/STERILITY	1
7	POL-POSITION CHILD CORRECTLY	3
8	POL-TAKE PROTECTOR FROM DROPPER/STERILITY	1
9	POL-SQUEEZE CHILD'S CHEEKS	3
10	POL-APPLY DROPS CORRECTLY	3
11	POL-PUT PROTECTOR BACK ON DROPPER	1
13	DPT-USE NEW STERILE SYRINGE	1
14	DPT-HANDLE SYRINGE TO MAINTAIN STERILITY	1
15	DPT-USE NEW STERILE NEEDLE	1
16	DPT-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	1
17	DPT-PICKUP VIAL/STERILITY	1
18	DPT-CONFIRM EXPIRY DATE	4
19	DPT-REMOVE PROTECTIVE COVERING/STERILITY	1
20	DPT-CLEAN RUBBER CAP	1
21	DPT-WAIT UNTIL RUBBER TOP DRIES	1
22	DPT-ROTATE VIAL SLOWLY IN CIRCULAR MOTION	3
23	DPT-LOOK FOR SEDIMENT	4
24	DPT-INJECT 0.5CC AIR INTO VIAL	3
25	DPT-REMOVE VACCINE CORRECTLY	3
26	DPT-REMOVE AIR FROM SYRINGE	3
27	DPT-PUT VIAL BACK IN COLD BOX	2
28	DPT-IF MULTDOSE SYRINGE MAINTAIN STERILITY	1
29	DPT-POSITION CHILD CORRECTLY	3
30	DPT-CLEAN INJECTION SITE	3
31	DPT-LOCATE PROPER SITE FOR INJECTION	3
32	DPT-GRAB AREA BETWEEN FINGERS	3
33	DPT-INTRODUCE NEEDLE AT 90 DEGREE ANGLE	3
34	DPT-ASPIRATE AND VERIFY BLOOD	3
35	DPT-INJECT VACCINE SLOWLY	3
36	DPT-WITHDRAW NEEDLE WITHOUT RUBBING SITE	3
37	DPT-SINGLE USE/DISCARD SYRINGE AND NEEDLE	1
39	MEA-PICKUP VIAL/STERILITY	1
40	MEA-CONFIRM EXPIRY DATE	4
41	MEA-REMOVE PROTECTIVE COVERING/STERILITY	1
42	MEA-CLEAN RUBBER CAP	1
43	MEA-WAIT UNTIL RUBBER TOP DRIES	1
44	MEA-OPEN VIAL OF DILUENT/STERILITY	1
45	MEA-USE NEW STERILE SYRINGE	1
46	MEA-USE NEW STERILE NEEDLE	1
47	MEA-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	1
48	MEA-DRAW UP ALL DILUENT	1
49	MEA-SLOWLY INJECTS DILUENT INTO VIAL OF VACCINE	1
50	MEA-ROTATE VIAL SLOWLY IN CIRCULAR MOTION/BC.	1
51	MEA-VIAL INTO COLDBOX DURING PREP.	2
52	MEA-USE NEW STERILE SYRINGE	1
53	MEA-HANDLE SYRINGE TO MAINTAIN STERILITY	1
54	MEA-USE NEW STERILE NEEDLE	1

55	MEA-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	1
56	MEA-PICKUP VIAL/STERILITY	1
57	MEA-CLEAN RUBBER CAP	1
58	MEA-INJECT 0.5CC AIR INTO VIAL	3
59	MEA-REMOVE VACCINE CORRECTLY	3
60	MEA-REMOVE AIR FROM SYRINGE	3
61	MEA-VIAL IN COLD BOX AFTER VAC.	2
62	MEA-POSITION CHILD CORRECTLY	3
63	MEA-EXPOSE LEFT ARM	3
64	MEA-CLEAN SITE WITH SOAPY WATER	3
65	MEA-CLEAN SITE WITH STERILE WATER	3
66	MEA-GRAB LEFT ARM	3
67	MEA-INTRODUCE NEEDLE CORRECTLY	3
68	MEA-ASPIRATE AND VERIFY BLOOD	3
69	MEA-INJECT ALL VACCINE	3
70	MEA-INJECT VACCINE SLOWLY	3
71	MEA-REMOVE NEEDLE WITHOUT RUBBING	3
72	MEA-SINGLE USE/DISCARD SYRINGE AND NEEDLE	1
73	EXPLAIN WHICH VACCINES GIVEN	5
74	EXPLAIN WHY VACCINES GIVEN	5
75	EXPLAIN VACCINATION SCHEME	5
76	REACTIONS-NONE FOR POLIO ONLY	6
77	REACTIONS-GO TO H.C. IF OCCUR	6
78	REACTIONS-DPT,POL/PAIN	6
79	REACTIONS-DPT,POL/FEVER	6
80	REACTIONS-DPT,POL/DONT APPLY ANYTHING	6
81	REACTIONS-DPT,POL/DONT SCRATCH	6
82	REACTIONS-DPT,POL/FEVER DURATION	6
83	REACTIONS-DPT,POL/OTHER SYMPTOMS	6
84	REACTIONS-DPT,MEA,POL/PAIN	6
85	REACTIONS-DPT,MEA,POL/FEVER	6
86	REACTIONS-DPT,MEA,POL/ERUPTIONS	6
87	REACTIONS-DPT,MEA,POL/DONT SCRATCH	6
88	REACTIONS-DPT,MEA,POL/DONT APPLY ANYTHING	6
89	REACTIONS-DPT,MEA,POL/FEVER DURATION	6
90	REACTIONS-DPT,MEA,POL/OTHER SYMPTOMS	6
91	INDICATE RETURN DATE	5
92	VACCINATOR GREETED THE MOTHER	7
93	VACCINATOR PRESENTED HIM/HERSELF	7
94	VACCINATOR SMILED	7
95	VACCINATOR CARESSED THE CHILD	7
96	VACCINATOR LISTENED ATTENTIVELY	7
97	CARNET WAS FILLED OUT CORRECTLY	8
98	REGISTRY WAS FILLED OUT CORRECTLY	8

VAN DAY 2 Observations

The design for the comparison between SIMULEX and direct service observation (DSO) was based on observing two health workers from each of the 14 health centers participating in the Peru PRICOR Project from the Cono Sur. Each pair was observed by the same observer (nurse or auxiliary) as they performed as vaccinators during the second day of the VAN88 campaign in July, 1988. Each worker was observed for up to 10 vaccination encounters during the course of the day. The procedure followed paralled that used during the first day of VAN.

Subsequently, all 28 workers and 14 observers were involved in the SIMULEX exercise (described in a previous report), beginning in late July and continuing throughout August to cover everybody. Each worker was observed for a set of 6 standard vaccination vignettes.

From this effort, we ultimately obtained 24 workers, each observed by the same

person in both the VAN and SIMULEX. A total of 98 items associated with quality of care were extracted from the somewhat larger dataset and tabulated for analysis. The tabulation process is described in the section on Results and Discussion.

The comparative analysis of SIMULEX with DSO has been reported previously. Some of the data has been used here for the value it has in pointing out areas of strong or weak performance in the delivery of vaccination services.

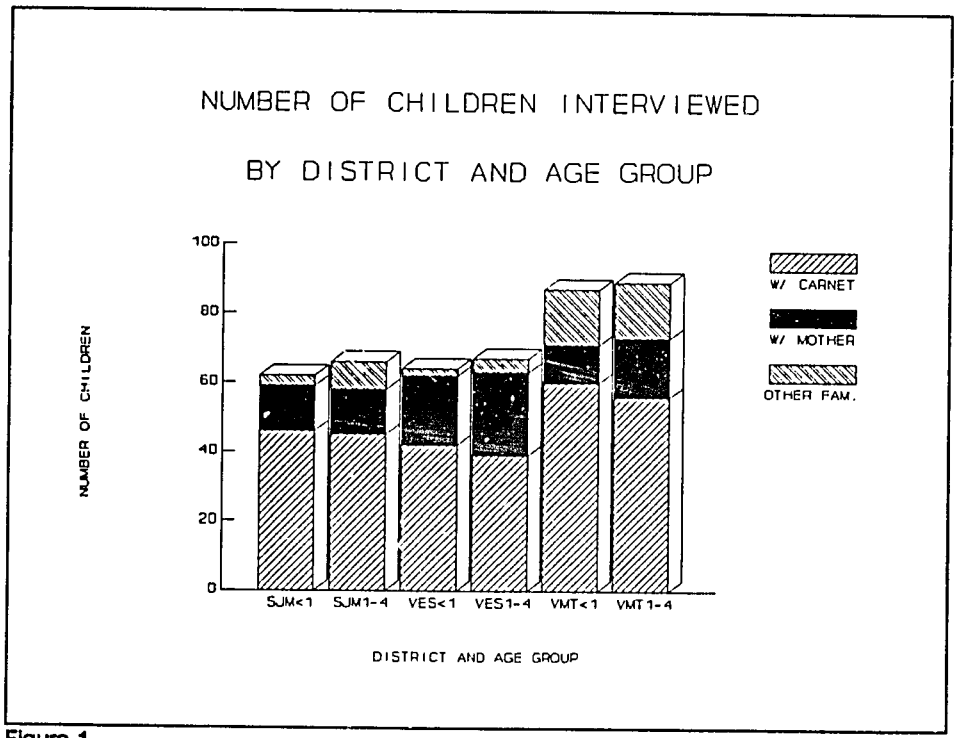

Figure 1

Results and Discussion

Existing coverage. The cluster samples included approximately the same number of children in each of the two age groups and in each of the three districts (Fig. 1). The clusters were stratified by district according to estimated populations, so VMT, the largest, was assigned 12 while SJM and VES each got 9. Fig. 1 also shows the sources of information available on vaccination history: overall 66% of children had a current UNICEF-style Carnet. For two-thirds of the children without Carnet, we were able to interview the mother about vaccination history while the remaining one-third had answers provided by other family members.

Histories elicited from mothers contained enough specific recollection (e.g., whether a vaccination was oral or by injection, location of injection, number ofdrops, etc.) to suggest their trustworthiness. Those from other family members were significantly less detailed and certain. Therefore, the final tabulations were made using a combined set of data from Carnets and Mothers' Histories, representing 89% of all interviews.

Table I

PROYECTO PRICOR - Carnet/No Carnet

	WITH CARNET: Num	Polio	DPT	Measl	BCG	All	Percent - Polio	DPT	Measl	BCG	All
SJM<1	46	20	15	5	41	3	43%	33%	11%	89%	7%
SJM1-4	45	37	37	35	35	27	82%	82%	78%	78%	60%
VES<1	42	23	23	8	37	7	55%	55%	19%	88%	17%
VES1-4	39	30	29	28	28	21	77%	74%	72%	72%	54%
VMT<1	60	24	25	14	55	11	40%	42%	23%	92%	18%
VMT1-4	56	46	41	49	49	28	82%	73%	88%	88%	50%
Total	288	180	170	139	245	97	63%	59%	48%	85%	34%

	WITHOUT CARNET - REPORTED BY MOTHER Num	Polio	DPT	Measl	BCG	All	Percent - Polio	DPT	Measl	BCG	All
SJM<1	13	2	3	3	8	1	15%	23%	23%	62%	8%
SJM1-4	13	10	11	10	13	8	77%	85%	77%	100%	62%
VES<1	20	2	2	3	12	2	10%	10%	15%	60%	10%
VES1-4	24	12	11	18	20	9	50%	46%	75%	83%	38%
VMT<1	11	0	0	1	7	0	0%	0%	9%	64%	0%
VMT1-4	17	9	9	11	13	6	53%	53%	65%	76%	35%
Total	98	35	36	46	73	26	36%	37%	47%	74%	27%

	WITHOUT CARNET - REPORTED BY OTHERS Num	Polio	DPT	Measl	BCG	All	Percent - Polio	DPT	Measl	BCG	All
<1	21	6	7	3	16	2	29%	33%	14%	76%	10%
1-4	28	19	18	17	25	16	68%	64%	61%	89%	57%
Total	49	25	25	20	41	18	51%	51%	41%	84%	37%

	WITH CARNET + WITHOUT CARNET/REPORTED BY MOTHER Num	Polio	DPT	Measl	BCG	All	Polio	DPT	Measl	BCG	All
SJM<1	59	22	18	8	49	4	37%	31%	14%	83%	7%
SJM1-4	58	47	48	45	48	35	81%	83%	78%	83%	60%
VES<1	62	25	25	11	49	9	40%	40%	18%	79%	15%
VES1-4	63	42	40	46	48	30	67%	63%	73%	76%	48%
VMT<1	71	24	25	15	62	11	34%	35%	21%	87%	15%
VMT1-4	73	55	50	60	62	34	75%	68%	82%	85%	47%
Total	386	215	206	185	318	123	56%	53%	48%	82%	32%

Table I presents the actual data for each of the two age groups in each of the three districts included in the sample. Rates (expressed as percentages) are calculated for each of three groups: children with carnet, children without carnet whose mothers responded to the interview, and children without carnets for whom a person other than the mother responded.

Proportion of Children Protected

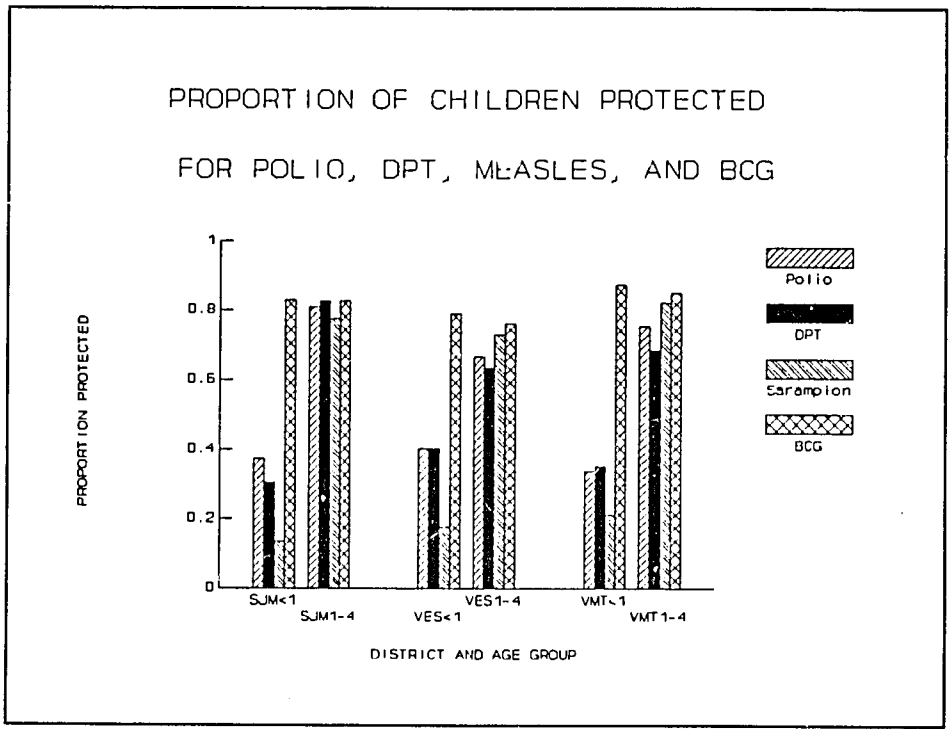

Figure 2

Existing levels of protection in the community just prior to VAN were found to be at or almost at the prescribed norm of 80% for all vaccines in the 1-4 year-old group (Fig. 2). Coverage of BCG, which is given at birth at all obstetrical facilities in the Cono Sur, was above 80% in the <1 year-olds, as well. The summary figures for DPT, Polio, and Measles in the <1 year-olds are below 80%, but not particularly meaningful since this group includes many children too young to have been vaccinated as yet.

DPT Vaccinations: < 1-Year Olds

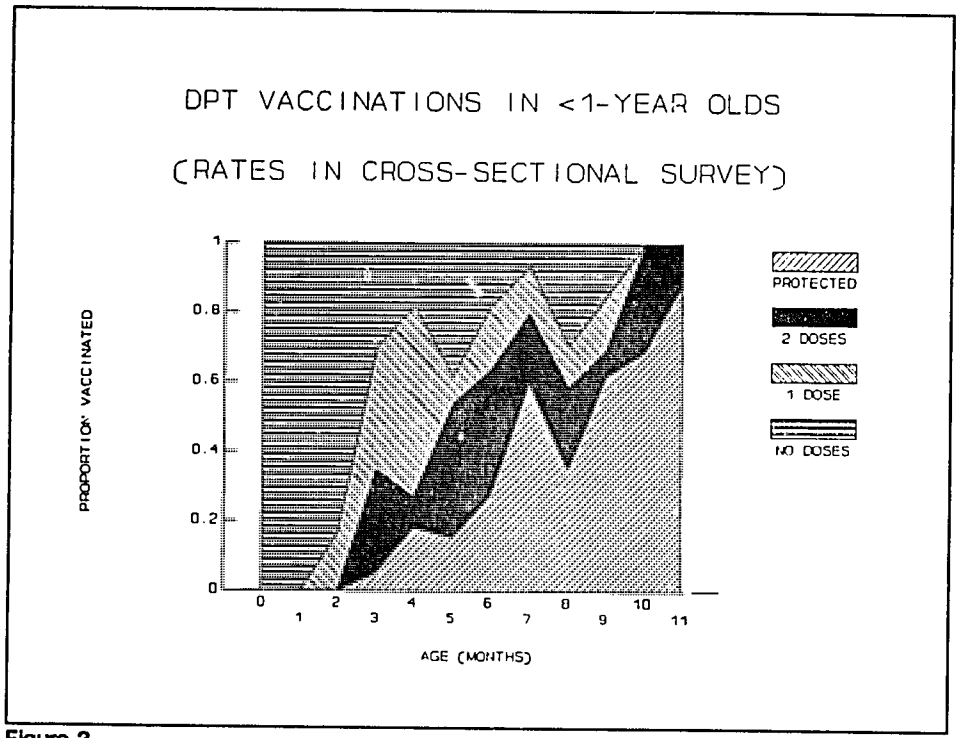

Figure 3

A closer examination of the dynamics of DPT vaccination (Fig. 3) shows that 80% coverage for Doses 1, 2 and 3 is achieved at the approximate ages of 4-6 months, 7-9 months, and 11 months, respectively. The pattern is virtually identical for anti-Polio immunization. For Measles vaccination, 50% coverage was observed at about 12 months and 80% coverage by 18 months.

The existing coverage in the Cono Sur supports the contention of the PMOH area directors that investing their resources in routine EPI rather than campaigns is warranted since only modest improvements are still needed to meet all coverage targets mandated by the program.

Role of VANS in Vaccination

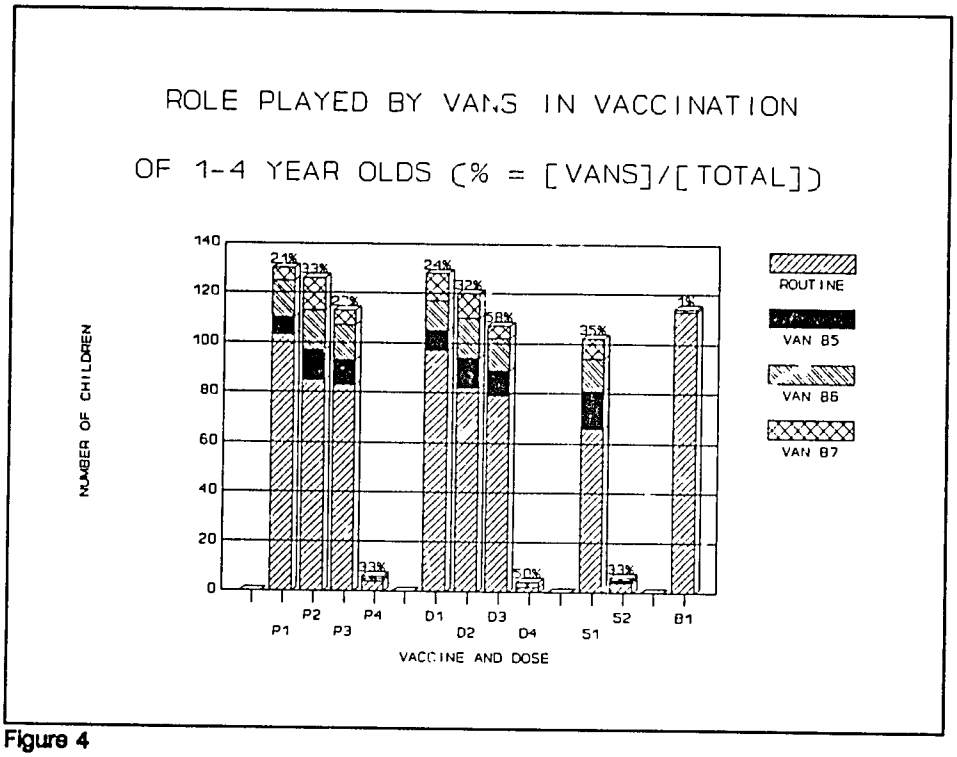

Figure 4

This argument is strengthened by Fig. 4, which shows the relative contribution of previous VANs (in 1985, 1986 and 1987) to the immunization coverage of children in the 1-4 year-old group. Overall, previous VANs accounted for only approximately one-third of the immunizations (excepting BCG) given.

A cost-effectiveness analysis of VAN88 versus routine immunizations is currently underway, but the preliminary data presented here already suggest strongly that a management decision to forego campaigns in the Cono Sur in favor of enhancing routine EPI services is a sound one.

Planning/coordination for VAN DAY1. The planning and organization of the VAN in the Cono Sur was the responsibility of an EEP-level coordinator (working out of HAMA), three district coordinators, and a coordinator for each of the 14 health centers.

The overall coordinator was named approximately 10 weeks before the first day of VAN was to take place, the district coordinators were named 8 weeks before, and all 14 health center coordinators were not named until 4 weeks before the first date.

The central PMOH published a set of manuals and guides specifically for VAN88: to guide and support both its organization and the training required. Unfortunately, sufficient copies of these manuals were not made available to the coordinators until mid-May (14 days before). It was learned that thousands of copies of these manuals were stocked in the central warehouse but theyr were not being released because the complex sequence of official requests and authorizations had not been completed until that time. The Cono Sur and other Lima metropolitan areas received copies still in time to be of use in training; some rural UDES, we were told, did not.

The coordinators at all three levels were nurses or senior nursing auxiliaries with substantial experience in running previous immunization campaigns. They showed great efficiency in the preparation of planning forms and the calculation of supply needs based on official estimates of catchment population and routine vaccinations completed to date during the current year.

Each health center was documented as having at least one afternoon training session in the two weeks before VAN DAY 1 and 4/14 were monitored by project staff and assessed as adequate (3/4 used role-playing in which health workers participated). No checklist had been developed for this assessment at this time.

The major constraint on coordination was the lack of transportation or funds for transport available to the four higher-level coordinators. This made it difficult to arrange meetings which everyone could attend and, thus, coordination of mass communication efforts to promote the VAN and of logistics support (delivery of supplies, transportation on day of VAN, provision of lunches to workers, etc.) was poor.

This lack of physical inter-communication was exacerbated by the fact that only half of the health centers have telephones. Because the VAN process is so familiar to the coordinators, the overall planning went on nevertheless with little error. The problems that arose tended to be ad hoc rather than structural: e.g., last minute re-assignments of personnel from one health center to cover additional vaccination posts created at another.

The irritation of such problems could have been reduced significantly by good communications. As it was, these problems rarely constrained the ultimate delivery of vaccine services, but this was prevented only by a constant and engergetic application of crisis management on the part of the coordinators.

Macro-description of VAN. The 14 health centers and their staffs established 185 vaccination posts throughout the Cono Sur on the first day of VAN. These vaccination posts were located in existing health posts, classrooms, churches, homes, or other buildings scattered around the catchment area of each health center. With very rare exceptions, these posts were no more than 20-30 minutes walking time from the parent health center.

Each vaccination post was to be assigned a vaccinator, a record-keeper, and a motivator. The vaccinator positions were assigned to health auxialiaries with the most experience in immunizations whenever possible.

Each vaccination post was to be opened at 0830 with a standard kit of supplies picked up at 0730 at the health center. Each health center was assigned a single car or other vehicle to transport workers and supplies throughout the day. Transport was available to almost all workers at the start of the day (the project had to provide transport to 8 workers to reach their posts).

Supplies for the health centers had started to arrive no earlier than three days before the VAN and many health centers received bulk supplies as late as Saturday afternoon. Again, availability of transportation was a problem. This meant that much of the division and checking of supplies had to be done at the last minute and that there was little recourse for dealing with discrepancies or unavailable items.

The vaccination teams were to handle the actual immunizations while community volunteers were expected to provide support for house-to-house visits to identify children needing vaccinations and motivate parents to bring them. Some community support was available at each health center and at some, but less than half, of the vaccination posts observed.

Posts were expected to remain open until 2:00-4:00 pm (depending on health center) unless the vaccination team chose to close in order to go house-to-house with a mobile unit. There were six mobile units overall. While a few permanent vaccination teams did spend the late afternoon going into the community, over 90% did not. Of these, well over 30% closed earlier than planned due to lack of work.

Supervision was done by a physician from the same health center who travelled 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.

Individual Task Error Rates

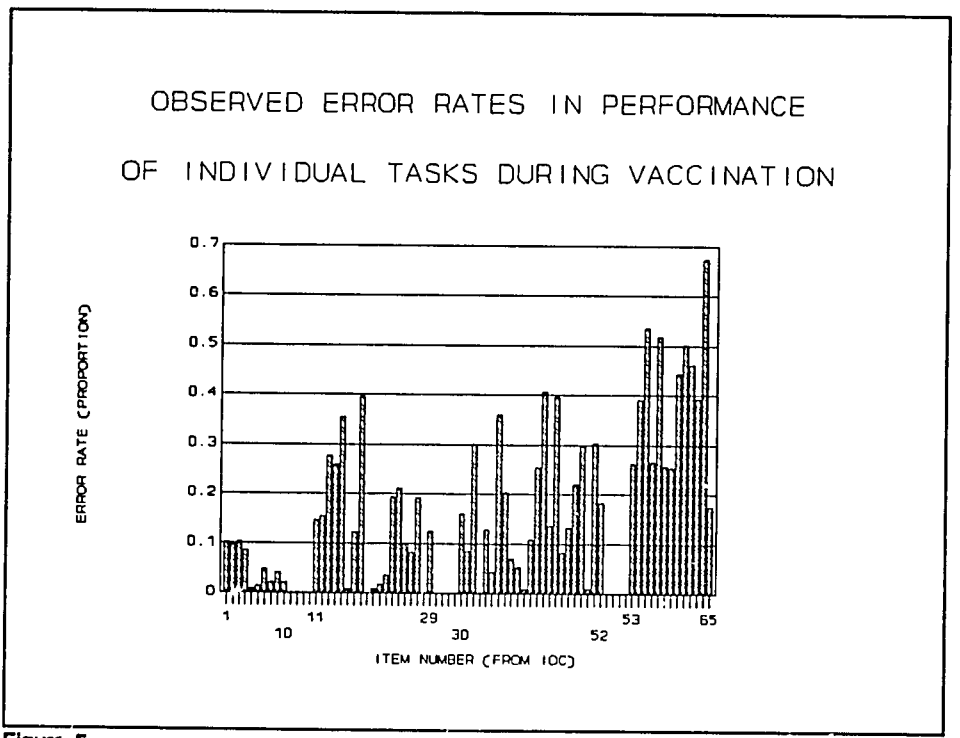

Figure 5

Quality of immunization service delivery by individuals. The items in the IOC for VAN1 have been given above. In the table (pp. 5-7), they are numbered and these numbers are used in Fig. 5, which shows the proportion of individual observations scored "incorrect" for each item (a summation of the data from all health workers observed). Since vaccinators were observed for different numbers of encounters, these individual marks were normalized by scoring each item as correct or incorrect based on the simple majority of scores received for all observatgions of that item for a given individual. Ties were settled as "correct".

The following six graphs show the overall error rates observed for each of the items in each of the six task areas delineated in the systems analysis model described earlier.

Sterility Maintenance Error Rates

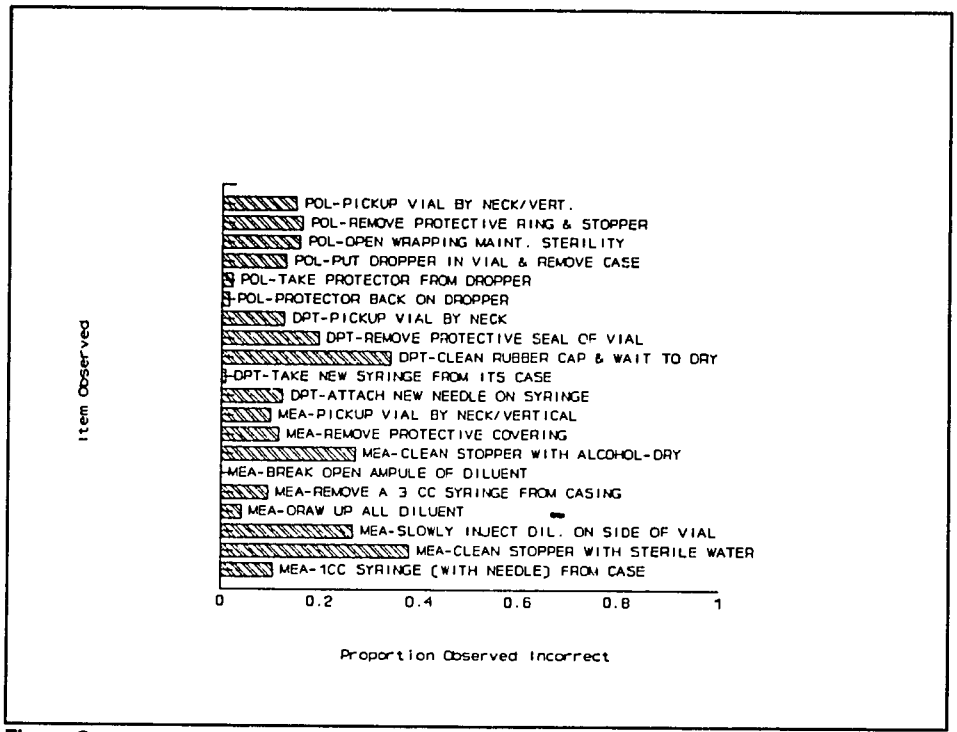

Figure 6

Error rates in items related to maintenance of sterility.

Cold Chain Maintenance Error Rates

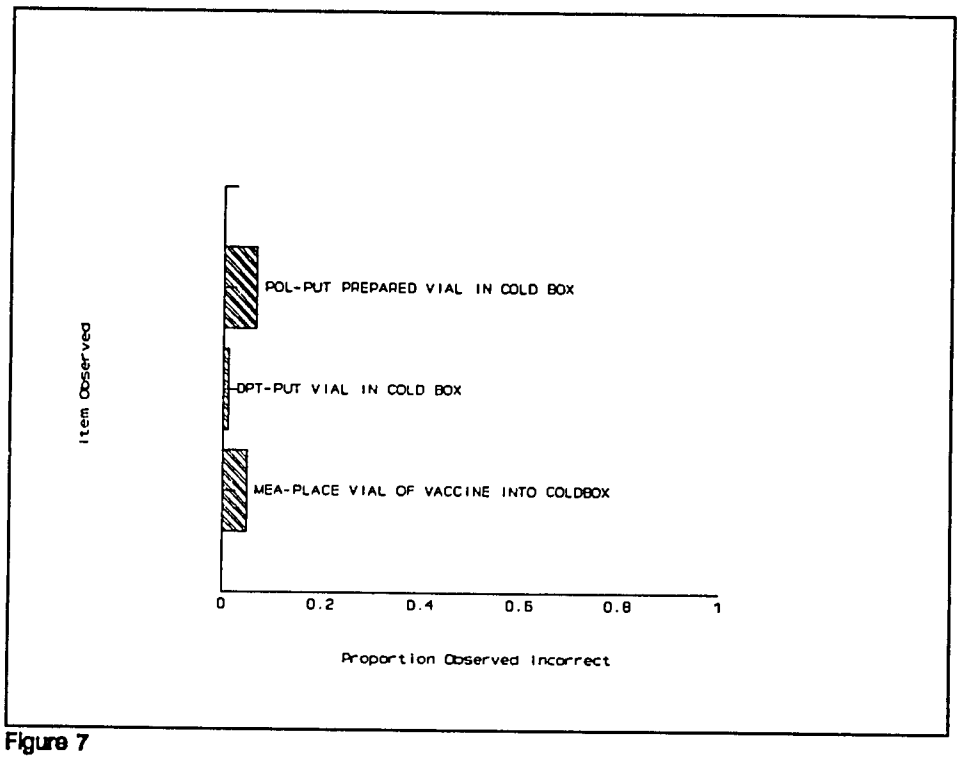

Figure 7

Error rates in items related to cold chain maintenance.

Vaccination Technique Error Rates

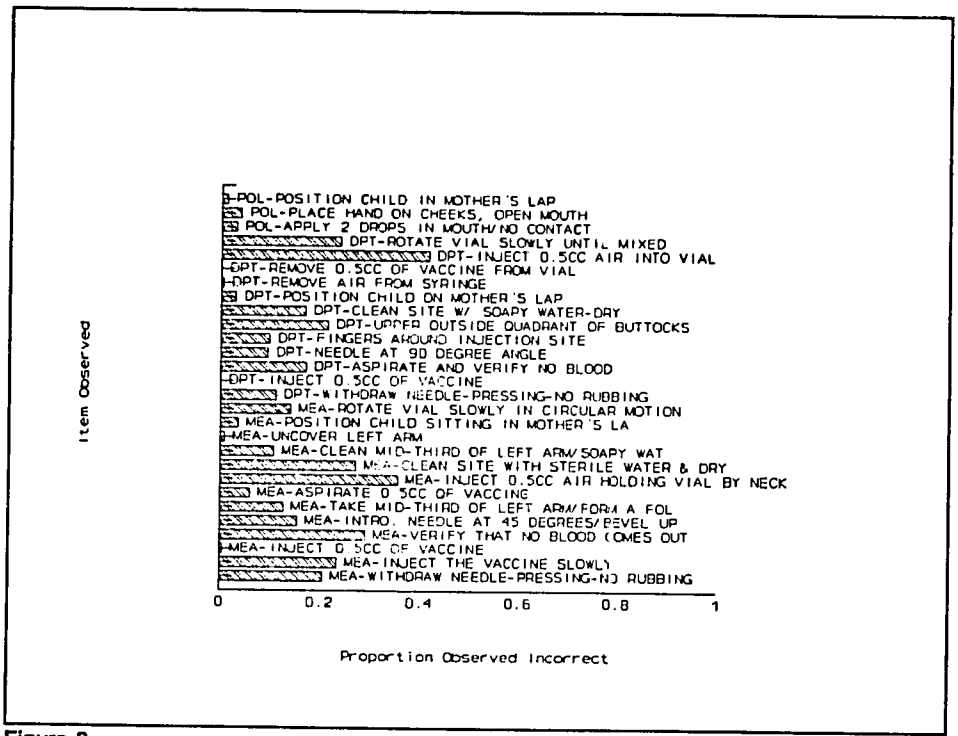

Figure 8

Error rates in items related to vaccination technique.

Vaccine Quality Control Error Rate

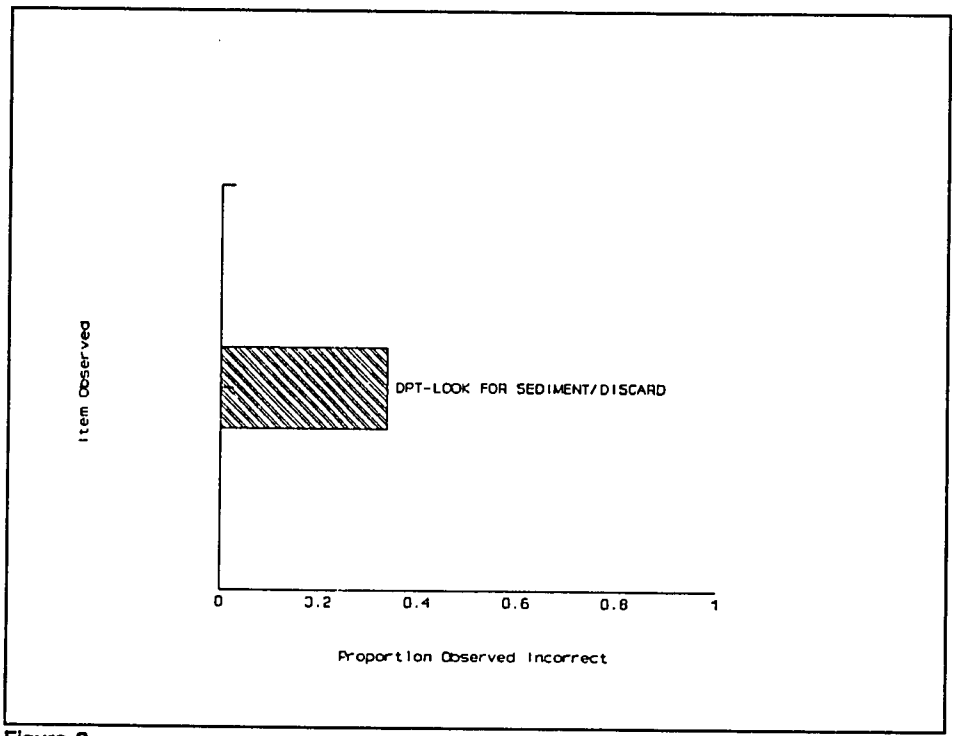

Figure 9

Error rate for the single item measuring control of vaccine quality.

Educational Messages Error Rates:

General Counselling to Mothers

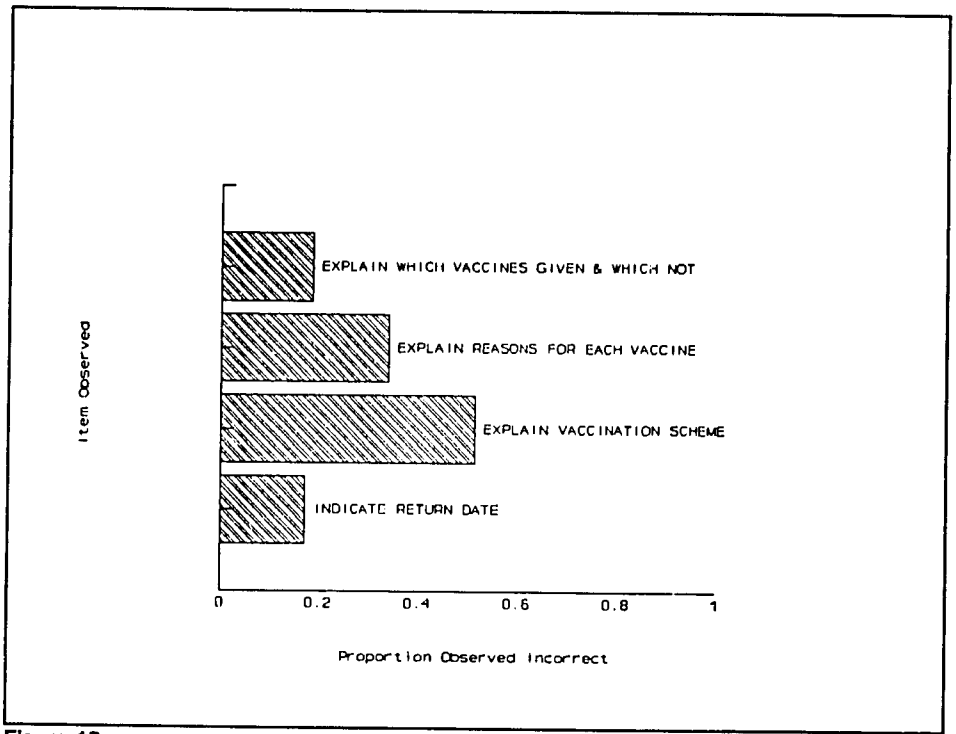

Figure 10

Error rates in items related to general educational messages given during counselling of the mother.

Educational Messages Error Rates:

Advice Concerning Possible Reactions to Vaccines

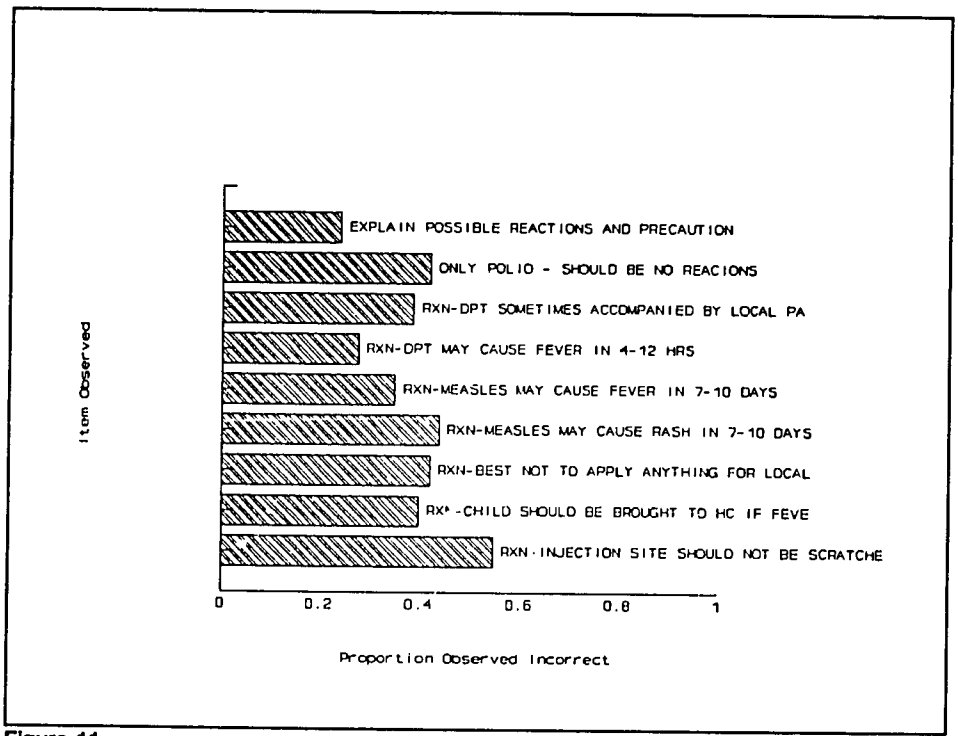

Figure 11

Error rates in items related to messages regarding possible reactions to vaccines to be mentioned during counselling of the mother.

Overall Average Error Rates

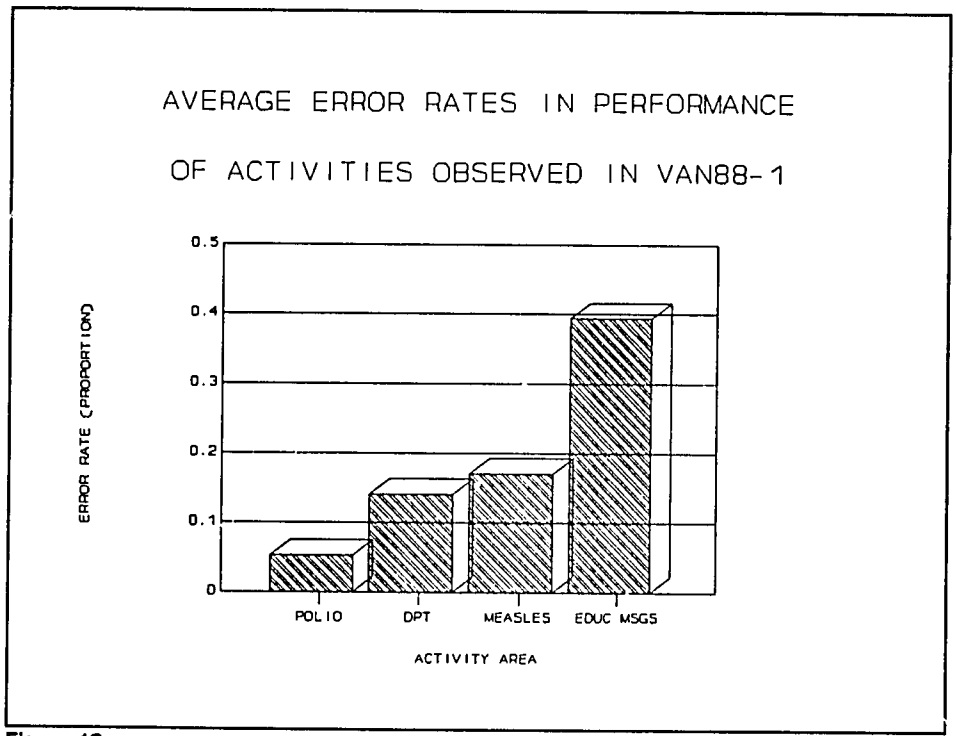

Figure 12

Fig. 12 presents an overall average performance score (i.e., the average of the proportions scored "incorrect" for each item) for each of the four basic functional activities involved in VAN: immunizing with polio vaccine, DPT or measles; and counselling.

As just shown, performance rating varied greatly between individual items in the checklist, ranging from virtually no errors in the act of taking DPT vaccine from the vial into the syringe (#19) to almost 60% errors noted in informing the mother not to permit the child to scratch the site of the Measles vaccination (#64). These individual observations are important in identifying serious "breaks" in important links in the performance chain.

The overall average performance scores for activity areas suggest a more generalized failure to perform. Though the technical aspects of vaccination appear to be handled well by the health workers observed (error rates below 20% for all three vaccines), there is a clear failure with respect to delivering the associated educational messages and counseling. This is a characteristic problem with campaigns, since long lines often form and time allocated to effort other than the physical act of vaccinating is minimized.

Individual Session Service Delivery Quality

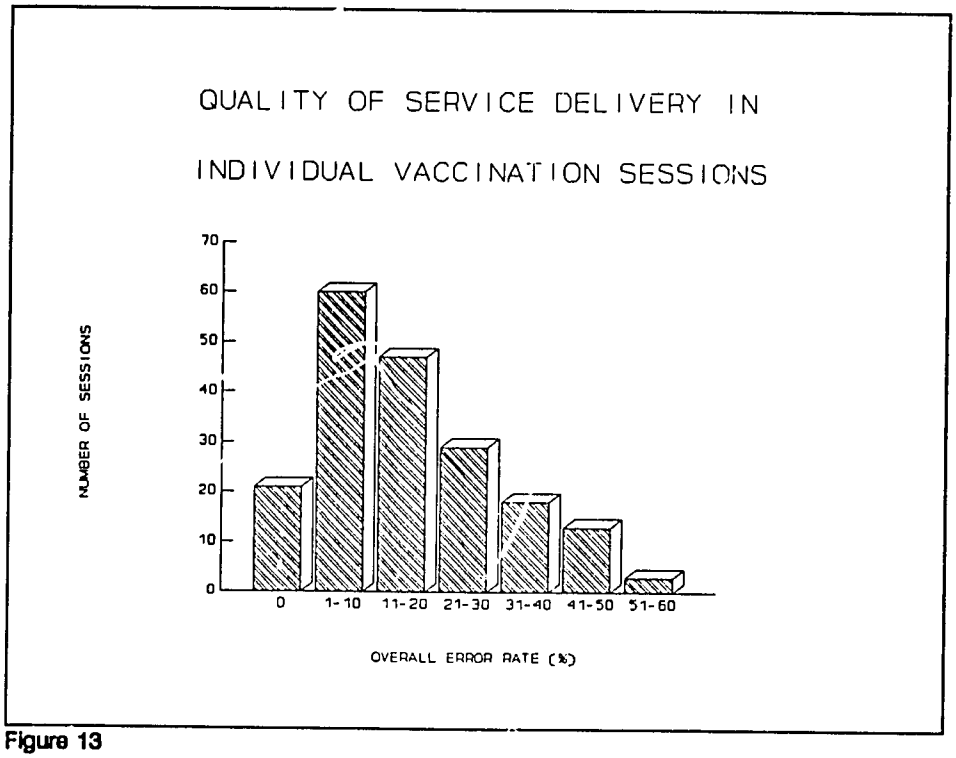

Figure 13

The profile shown if Fig. 13 was obtained by calculating an overall error rate for the individual health workers observed in VAN88. These data are limited to encounters with at least two vaccines given. Fig. 13 demonstrates that the pilot IOC is sufficiently sensitive to identify a range of performances within this group and, in particular, identify individuals who are significantly better or worse than the norm. Once identified, such individuals can receive more attention to determine the reasons behind their performance and to seek ways of bettering the effort of those who are not meeting the standard.

The issue of inter-observer variation must be dealt with at this juncture, since the study design, of necessity, assigned a different observer to each HC. It is worth mentioning, therefore, that limited pre- and post-VAN testing of the observer team showed relatively little inter-observer variation when they all had the opportunity to rate the same performances in role-playing. Further, detailed evaluation of inter-observer variation has been done as part of the second phase of IOC development during the second day of VAN88. These data are currently being analyzed and will be the subject of a later report. Preliminary results, however, suggest that inter-observer variation played only a small part in the differences reported here.

The data of Fig. 5 can be tabulated in a variety of ways to produce comparisons between health workers, HC's or other operational units. The approach taken for producing Fig. 14 was to place items in the IOC into task groupings that reflect some of the main concerns in EPI evaluation. These groupings are somewhat arbitrary and have not been subjected to any validation procedures (such as factor analysis) as yet. Nevertheless, they have intuitive appeal and, in retrospect, a certain amount of empirical value (i.e., they "work").

As discussed above, items were placed in six task groupings: cold chain, sterile technique, checking vaccine quality, correct dosage and injection technique, informing about immunizations, and informing about possible side-effects and reactions. The number of items placed in each task group ranged from 1 to 25. We recognize the need to achieve a better balance in the number of items assigned to each task grouping for statistical purposes; the IOC for the second VAN88 was modified accordingly.

Even with an imperfect design, it appears possible to calculate indices that have substantial power to differentiate the performance of different HCs. We first calculated, for each HC, an error rate for each task grouping based on the total observations made for the health workers belonging to that HC. When similar ratings were calculated for individual workers, we found that variation among workers within an HC was significantly less than that overall between HC's (data not shown). From a management perspective, therefore, the first important performance context to be considered would seem to be the HC rather than the individual.

Performance Ratings by Task Group

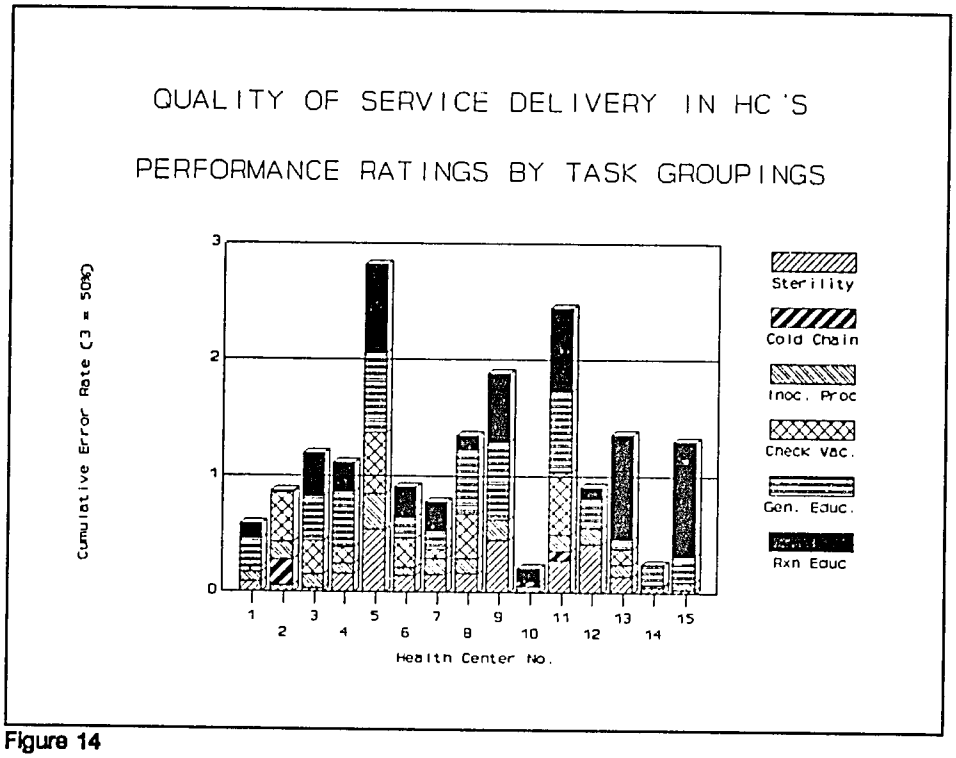

Figure 14

Fig. 14 presents a cumulative performance rating for each of the 14 HC's and HAMA. This overall rating represents the sum of the individual error rates (expressed as a proportion from 0 to 1) for the six task groupings. Since there are six task groupings included, a score of 6 would represent 100% errors in all groupings. A score of 3 denotes a cumulative error rate of 50%.

HC #1 - 4 belong to Villa El Salvador (VES) while HC# 5 - 9 are in Villa Maria del Triunfo (VMT) and HC #10 - 14 are in San Juan de Miraflores (SJM). Site #15 is HAMA, where a vaccination center was set up especially for the VAN (with no ancillary posts).

A number of important points are immediately obvious in Fig. 14: 1) there is a wide range of performance between health centers (over 30-fold difference between #5 and #10); 2) the four task groupings associated with physical delivery of vaccine show uniformly better performance ratings than do the two groupings covering education and counseling; and 3) there is a significant correlation between task group performance ratings within HC's (i.e., the "good" HC's are uniformly good and the "poor" HC's tend to be uniformly poor).

Some anecdotal information that enriches the quantitative data of Fig. 14 is that HC #5, the worst performer, has not had a nurse in its nurse supervisor position for over a year while all the other HC's have had a functioning nurse supervisor. HC #11, the second worst performer, has a directing team (HC head and nurse supervisor) that is routinely ranked as the least motivated and dynamic by their peers in confidential discussions. Site #15, the hospital, gets excellent marks for technical effort but fails badly with respect to informing mothers about possible reactions to vaccines. This site was literally overrun with parents bringing children to be vaccinated, with long lines evident most of the day. Our observer reported that children were being processed "like cattle", leaving little time to talk to and educate the parents.

On the other hand, the two standouts for uniformly excellent performance, HC #10 and #14, routinely get high peer ratings with respect to their management. HC #10 has arguably the best nurse supervisor in the Cono Sur and HC #14 one of the most concerned and active HC heads. HC #14, a "mini-hospital" with an obstetrical wing in addition to its outpatient clinics is the model unit to which visitors to the Cono Sur are generally taken.

These anecdotal observations suggest that the ranking of HC performance shown in Fig. 14 is in line with predictions that might have been made from existing perceptions of the quality of management in each of the HC's, at least at the extremes. A great deal remains to be done to validate these performance ratings as indicators, but as a preliminary result, they are certainly encouraging.

In summary, the overall performance of direct services appears to be very good to excellent in almost all important aspects. While the assessment of performance quality using the IOC and analytical framework just described is sensitive enough to identify activities and units that show some performance weaknesses, it is clear that, overall, direct services delivery in the Cono Sur VAN is a generally strong area of the system.

Unit Performance Measures

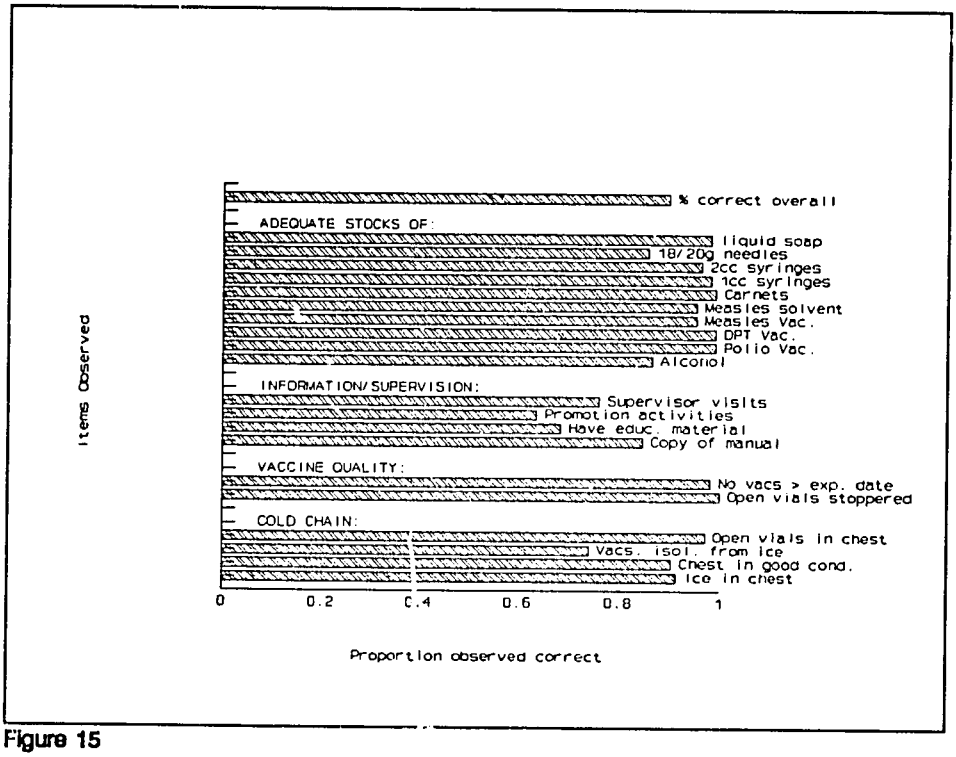

Figure 15

Measurement of unit performance. Fig. 15 contains items relating to a number of logistics and support activities that are more appropriately observed on a unit rather than individual basis. These include whether or not adequate stocks of critical supplies are on hand each time the observor visited the unit, whether vaccine quality and the cold chain were being maintained, and whether the unit could count on the information, communication, and supervisory support it was supposed to receive. Rates were calculated from a sample (i.e., observation at time of visit) that ranged from 80 - 150 depending on the item.

With respect to vaccine quality and cold chain, it is clear that handling and maintenance are excellent with the sole exception that too many units were storing vaccines in direct contact with the ice or cold packs. These data are in line with the observations made earlier on individual handling of vaccines and cold chain.

No problems were encountered with the stocks of critical materials at the vast majority of units. An occasional stockout occurred in the afternoon as the organization began to shut-down. A more pronounced lack of large needles and alcohol was seen in the vaccination posts associated with certain health centers. This was due to a mal-distribution of the materials which appeared to be based in

the late arrival of materials mentioned earlier. Most posts managed to obtain adequate amounts of both materials by direct contact with another posts rather than waiting for the supervisor to bring them.

The worst ratings relate to the information/communications/supervision that was supposed to be done in support of each vaccination post. Though the proportion of posts at which these failures occurred were still a minority, the rates are poor enough to suggest that this is an area needing emphasis in the planning of future campaigns.

Nevertheless, it is clear from this limited set of observational measures that support was adequate to maintain a fully functioning unit throughout the day. The measure for supervisory interaction masks the fact that those units that received supervisory visits during the day usually received 2 or more such visits.

It also should be pointed out that vaccination posts were not more than 20-30 minutes walking time from the health center so that one member of the vaccination team could be dispatched to seek assistance in cases of unresolved difficulties. The project observors noted this in a few instances during the day and this probably helped keep service delivery continuing unimpeded in those situations.

Unit Performance: Cold Chain

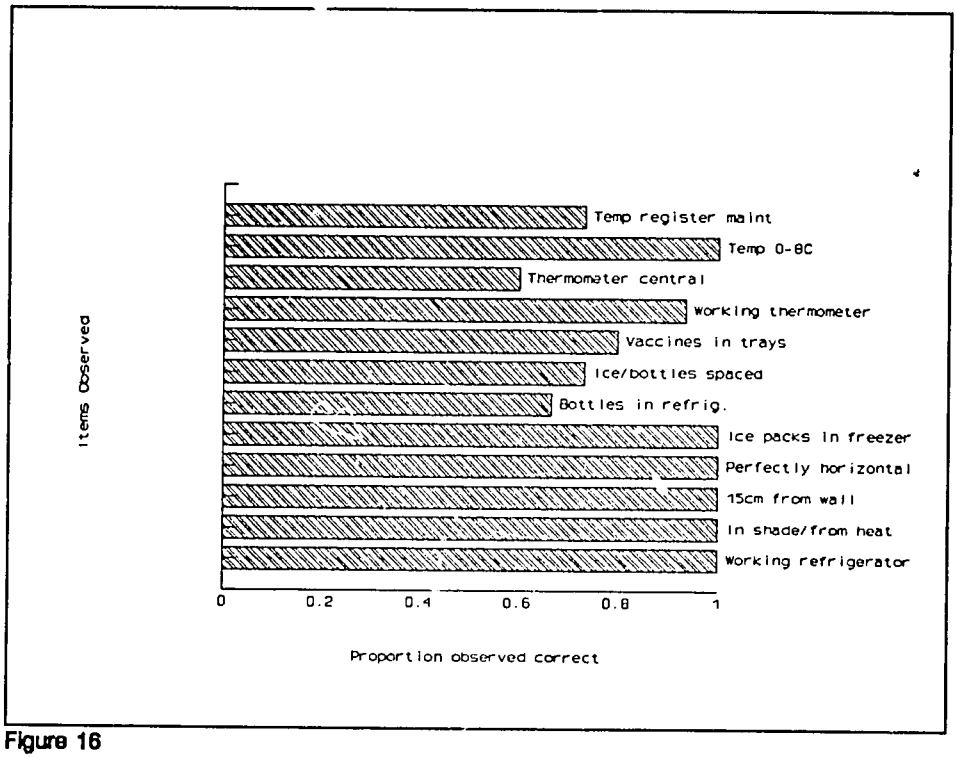

Figure 16

One category of unit performance that relates only to the health center itself is maintenance of the refrigerator used for the cold chain at this level. Fig. 16 presents the 12 items used to measure this indicator.

In general, the ratings given are very good. Several items appear to require a different interpretation when dealing with a campaign situation (i.e., large quantities of vaccines being temporarily stored) rather than the routine. For example, the three items dealing with bottles in the refrigerator, ice/bottles spaced properly, and vaccines in trays were clearly affected by the fact that unusually large amounts of vaccines were present at the health center and stored in the refrigerator.

Maintenance of this type of equipment, which is used frequently and has a high profile, is not difficult in the Cono Sur and it would be a serious indictment of the health center management if one of these refrigerators was found to be non-functioning with no corrective effort having been made.

Vaccinator Experience

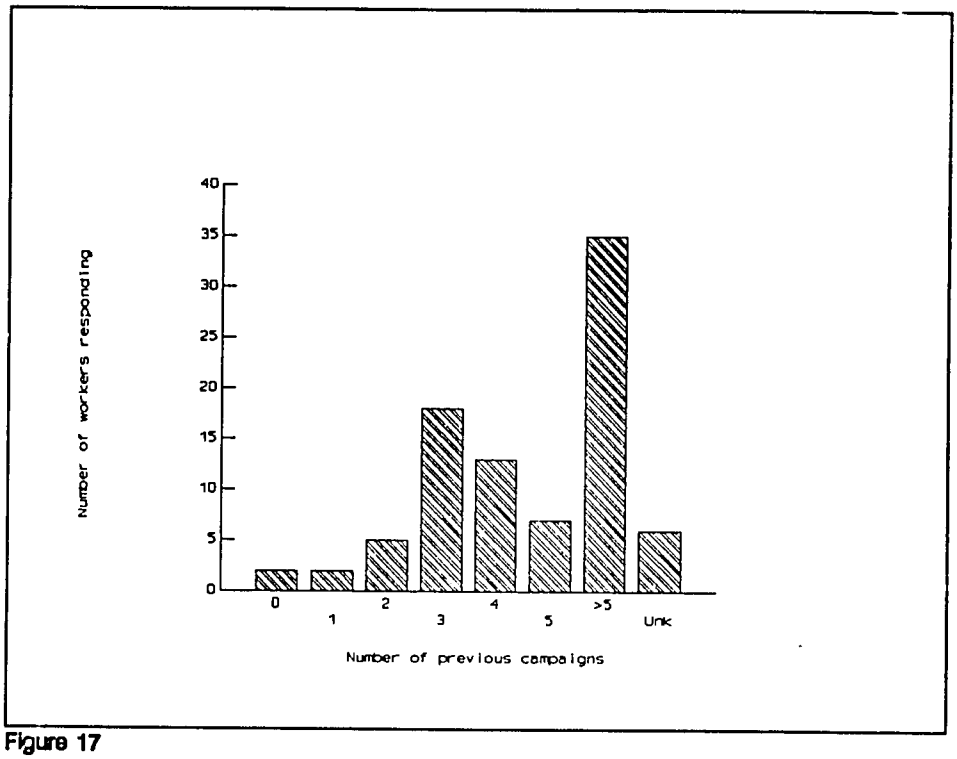

Figure 17

Vaccinator characteristics and perceptions. In addition to observational data, we gathered selected information by questionnaires given to the vaccinators at vaccination posts visited. One question asked was the experience each had in previous campaigns.

As mentioned earlier and shown clearly in Fig. 17, there were few vaccinators without experience of at least one previous campaign and almost half had participated in 5 or more similar campaigns in the past.

The group designated as Unknown represents those respondents who left this field blank.

Vaccinator Training

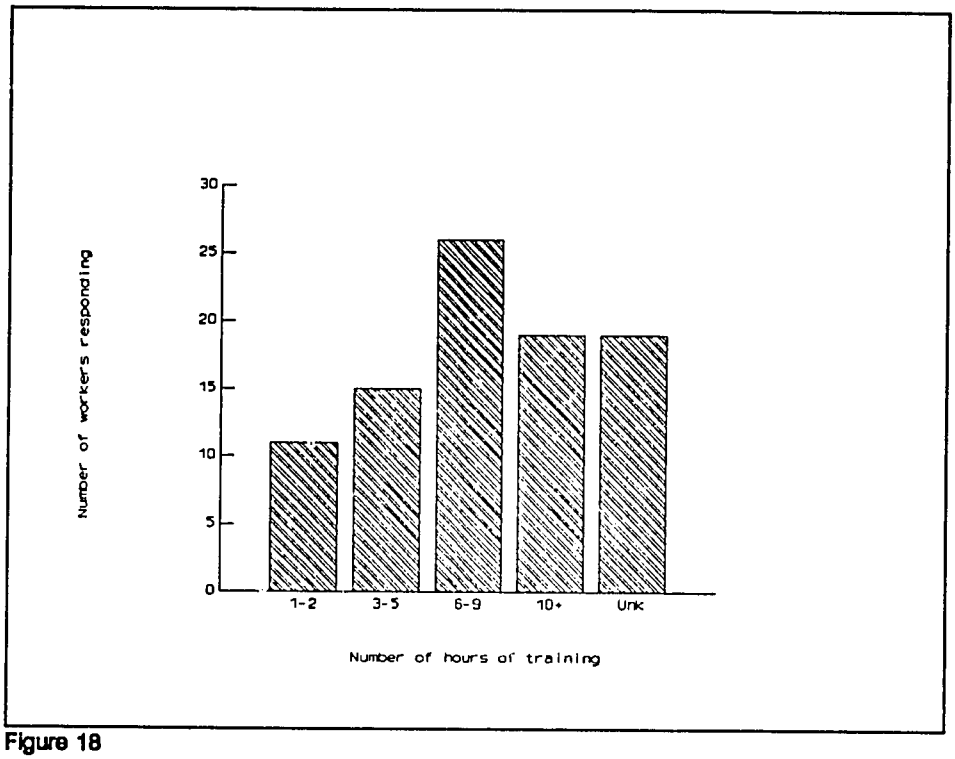

Figure 18

Another question we asked concerned the number of hours of training each vaccinator received specifically for the current VAN. As noted above, all 14 health centers carried out at least one course on EPI during the two weeks preceeding the VAN DAY 1.

None of the vaccinators responded by saying he/she had not received any training. The mode centered at 6-9 hours of training, which would correspond to two training sessions. This was the most common pattern reported by the health center coordinators.

Vaccinator Training:

Training Methods and Basic Knowledge Areas

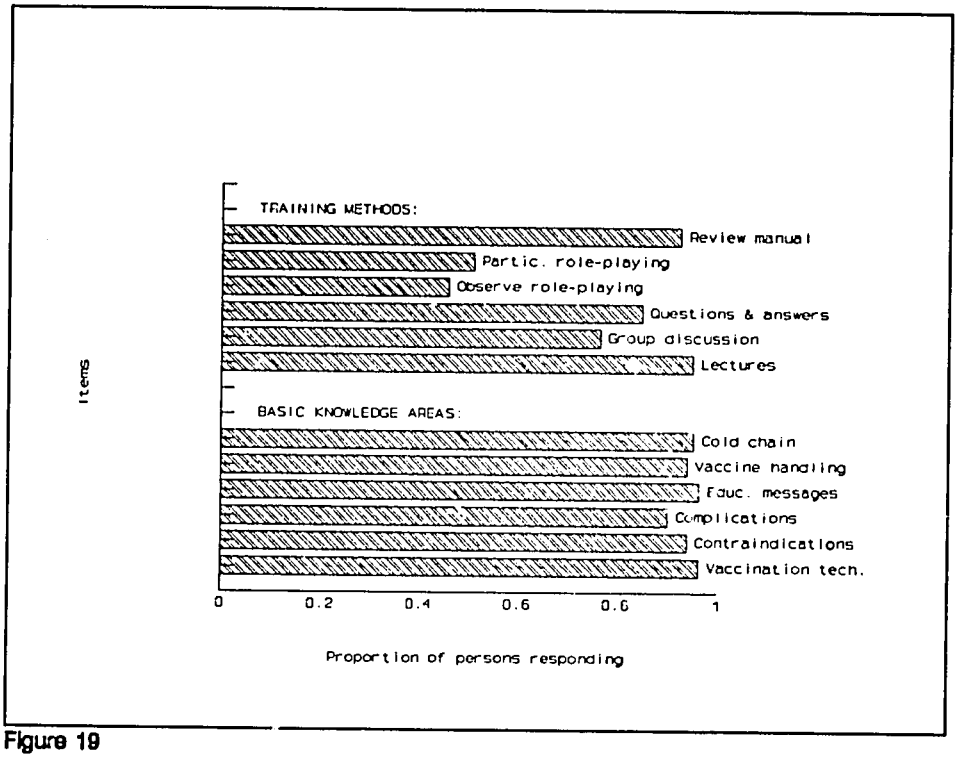

Figure 19

We were interested not only in the amount of training but its nature, as well. Fig. 19 presents items relating to two aspects of this: knowlege areas covered and the training methods employed.

Almost 100% of the vaccinators said they had received training in each of the six key aspects of EPI service delivery measured by our observors. This is consonant with the high ratings these vaccinators received for their performance, though the relationship is, of course, unproven.

With regard to training methods, there appears to be substantial margin for utilizing more concrete, active methods such as role-playing instead of relying on straight lectures or discussions without examples and actual practice. Role-playing is a commonly used training device in Peru and we are advocating its even more widespread application in targetted training linked to monitoring such as that done in this study.

Respondent Bias Measures

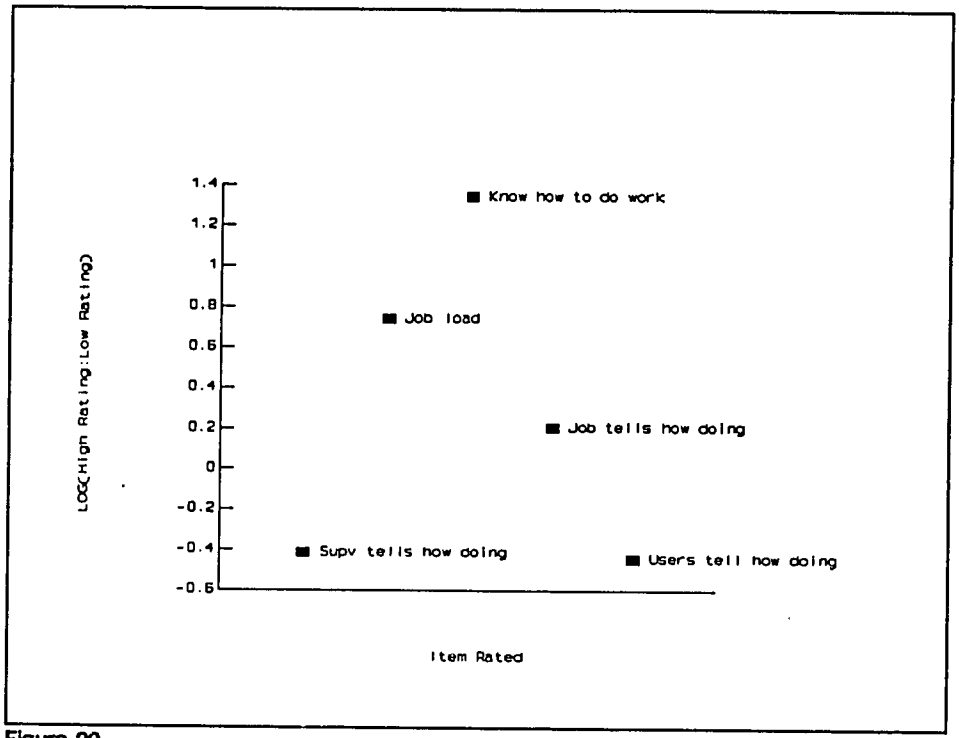

Figure 20

This and the following figure show logarithmic plots of the ratio of positive to negative answers given in response to certain questions about the individual's perceptions and satisfaction. These questions were provided with 5-point Likert scales anchored to responses such as "Strongly disagree ... Mildly disagree ... Neutral ... Mildly agree ... Strongly agree". The actual questions and answers are in the questionnaire included in Appendix 1.

This plot is useful in quickly showing those items for which individuals have shown a strong bias toward answering positively (i.e., "agree" choices) over negatively (i.e., "disagree" choices). The log of the ratio moves ever more positive as the replies favor positive over negative responses. Conversely, a value that is negative indicates that more of the respondents chose negative replies.

In the above figure, the respondents are stating overwhelmingly that they easily know how to do their job and that the job of vaccinator during the VAN tends to be too much rather than too little work. They are almost evenly split as to whether the job itself gives them significant information about how well they are performing. And they perceive that neither the people they are serving nor their supervisors provide them with specific, concrete information about the job they are performing.

Respondent Bias Measures

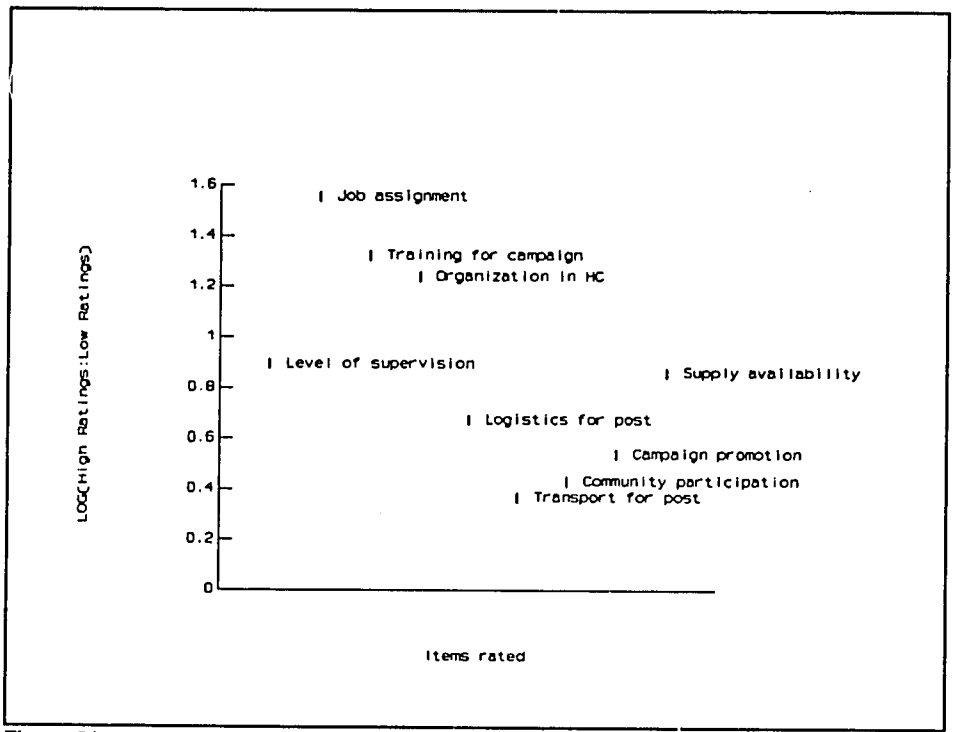

Figure 21

Overall, the group of vaccinators appears satisfied with the job they are doing and the support it receives from the rest of the system. All items measured ended up being positive, which indicates that more group members feel positively about the sub-system under consideration than otherwise.

Nevertheless, the range of values obtained does indicate that a priority ranking exists among these ratings. Vaccinators appear to be quite satisfied with their job assignments, training for the campaign, and the organization of their own health centers. They are significantly less satisfied with campaign promotion, community participation, and the transportation provided, even those these latter still show more positive than negative responses.

Quality of care performance in VAN2/SIMULEX

Of the original 28 health workers observed during the second day of VAN88, we were able to obtain acceptable SIMULEX sessions from 24. Thus, the following analysis is based on a sample size of 24 auxiliaries. The observations included in this analysis are those made by the primary observers. The same observer/health worker pair was maintained in each of the 24 sets of observations made.

The following pages (Figures 22-30) contain graphical presentations of the overall level of performance of each of the 96 items included in the quality-of-care assessment. These graphs are based on the SIMULEX data only. As we will show subsequently, there is little difference between SIMULEX results and those from DSO in terms of whether a given item was performed adequately or not by the whole group of health workers studied. They are presented solely to augment the observational data previously presented concerning performance of direct services during VAN DAY 1.

The X-axis in each graph is the proportion of observations in which the task was done correctly. The Y-axis gives the number of the item in list in Table 1 and each item is also identified by title. Graphs are grouped by Task Areas. In certain instances, there were too many items in a Task Area to include in a single graph. In those instances, we have divided them into two graphs based on whether or not performance of the given item met our current criteria for acceptability.

The criterion for acceptable performance of an item was that it was done correctly in 70% or more of the times it was observed. Since the number of observations of a given item for a given health worker varied from 2 to 6 depending on the item, the score for each worker was standardized before being used to calculate an overall average score.

Standardization was done by setting a criterion that a worker must have performed a task correctly at least 3 out of 4 times, or the equivalent, in order to be given credit for doing it correctly. Thus, for an item observed only twice or three times, a worker would need to perform it correctly always to get credit. This calculation produced a simple Pass/Fail score for each worker on each item. These scores were then used to calculate the overall performance index: the proportion of workers doing an item correctly out of the total (24) observed.

Each of the following nine pages contains a graph of items covering all or part of a Task Area, followed by notations where appropriate.

Sterility Maintenance: High Scoring Items

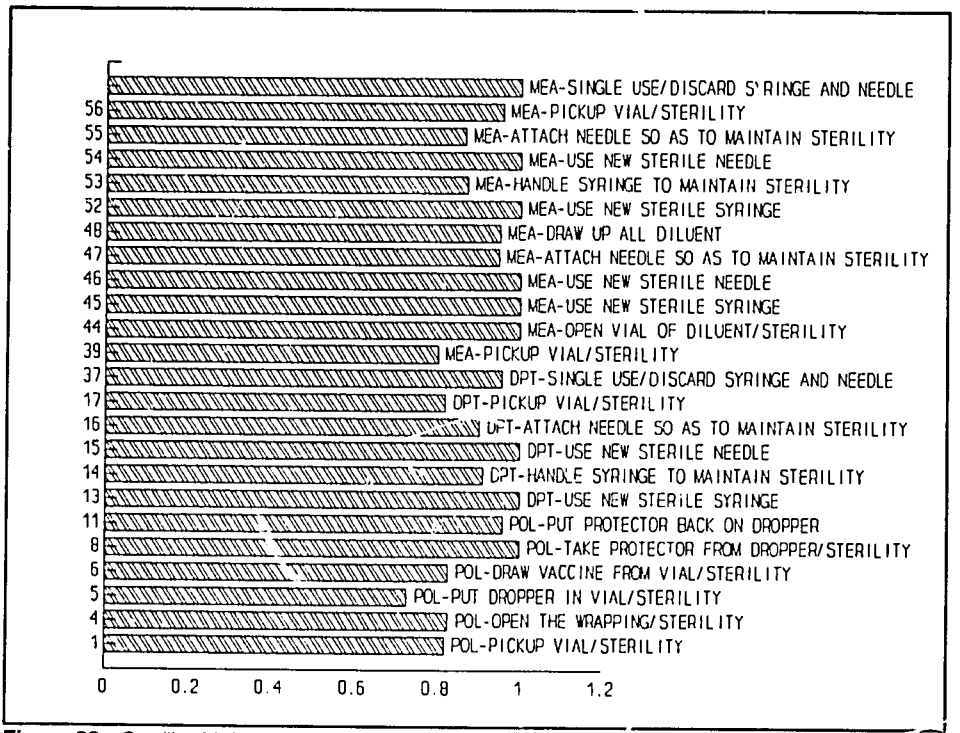

Figure 22. Sterility Maintenance - High-scoring items

Of the 34 items included in Sterility Maintenance, 24 were performed adequately by the current criteria. In general, the handling of polio vaccine and of the syringes/needles for the other two vaccines were done with a high degree of the smoothness and care needed to maintain sterile conditions.

Sterility Maintenance: Low Scoring Items

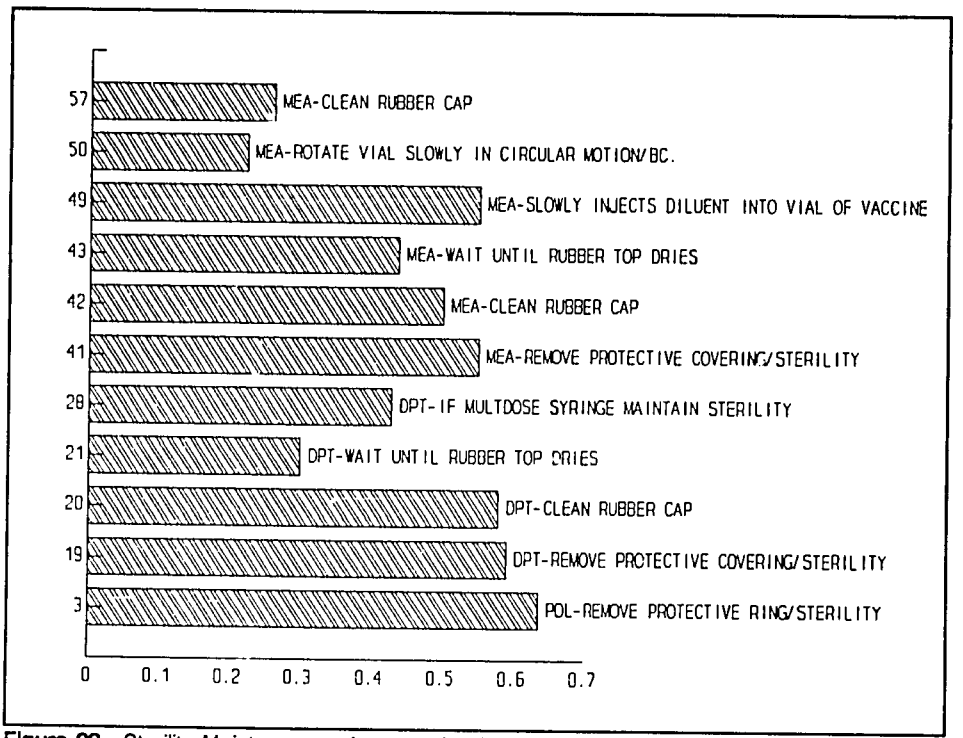

Figure 23. Sterility Maintenance - Low-scoring items

Tasks within the Sterility Maintenance group which were not performed particularly well included most of the steps in handling either the DPT or Measles vaccine vials (NOTE: Item 50 - MEA ROTATE VIAL SLOWLY - has erroneously been included here rather than in Figure 5, below). The opening and cleaning of the rubber top caused particular problems for well over half of the workers observed. Subsequent debriefing indicated that this was an aspect of the process which they did not get to watch or practice very much during EPI training sessions.

Cold Chain Maintenance

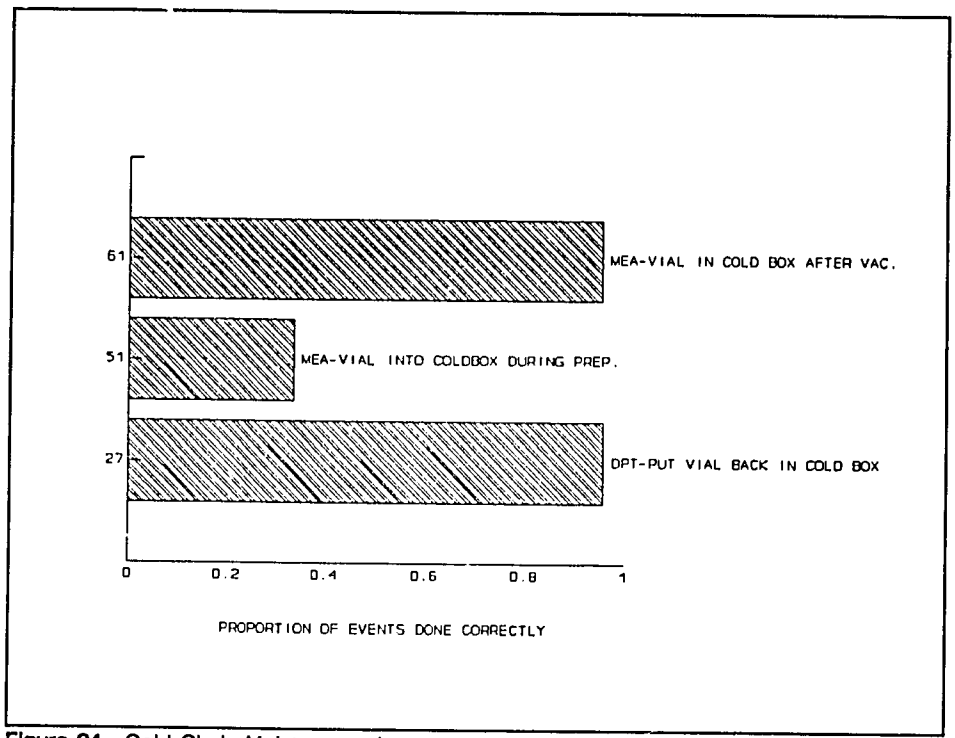

Figure 24. Cold Chain Maintenance items

Cold chain maintenance during the vaccine delivery stage was excellent for both DPT and Measles vaccine. Only one worker in three stored the Measles vaccine in the cold box after preparing it and while he/she was preparing the syringe for the first immunization. When this step is done rapidly, as was usually the case, the time out of the box for the vial was less than 1 minute.

Vaccination Technique: High Scoring Items

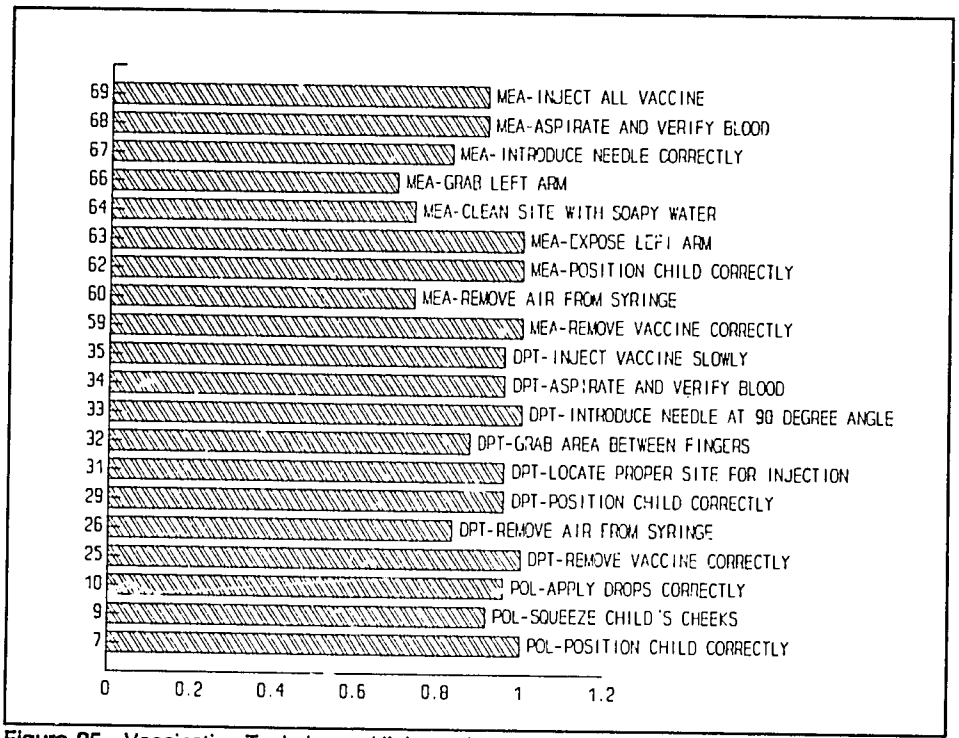

Figure 25. Vaccination Technique - High-scoring items

Good Vaccination Technique was seen in 20 of the 28 items observed. Most of the particular important items (such as introducing the needle at the correct angle in DPT injection, aspirating to verify that a vein has not been entered, etc.) associated with quality performance appear to be done adequately.

Vaccination Technique: Low Scoring Items

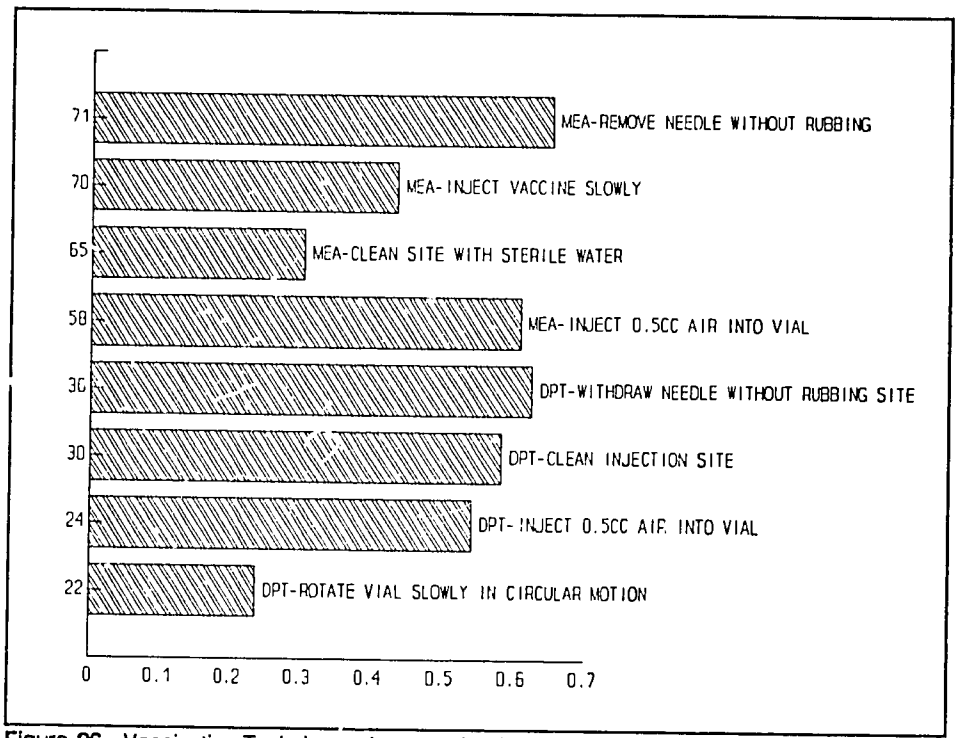

Figure 26. Vaccination Technique - Low-scoring items

The items in Vaccination Technique that did not meet the criterion for adequate performance exhibit a close parallelism between DPT and Measles vaccination. Thus, for both vaccines, problems were encountered with agitating the vials too rapidly and vigorously (NOTE: Item 50 included with Fig. 2 by error), with not injecting air into the vial in order to facilitate withdrawing vaccine, with properly cleaning the site of injection, and with rubbing the injection site after withdrawing the needle.

Vaccine Checking Scores

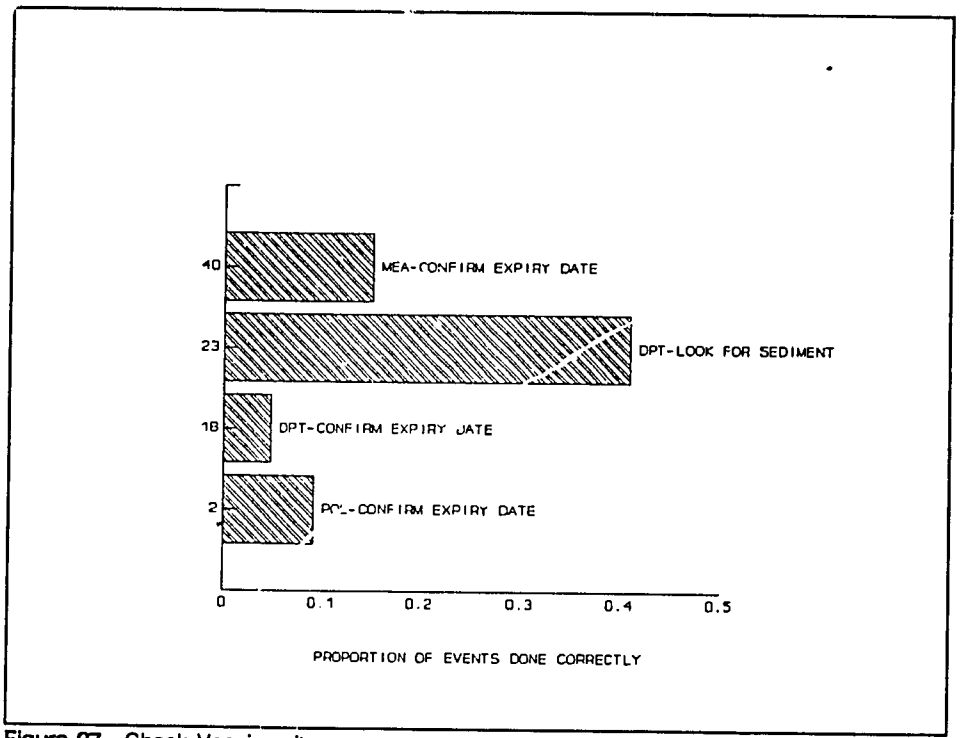

Figure 27. Check Vaccines items

Virtually no one of the health workers studied checked the expiry dates of any of the three vaccines. Only one in three checked the DPT vaccine for sediment prior to using it.

General Educational Message Items

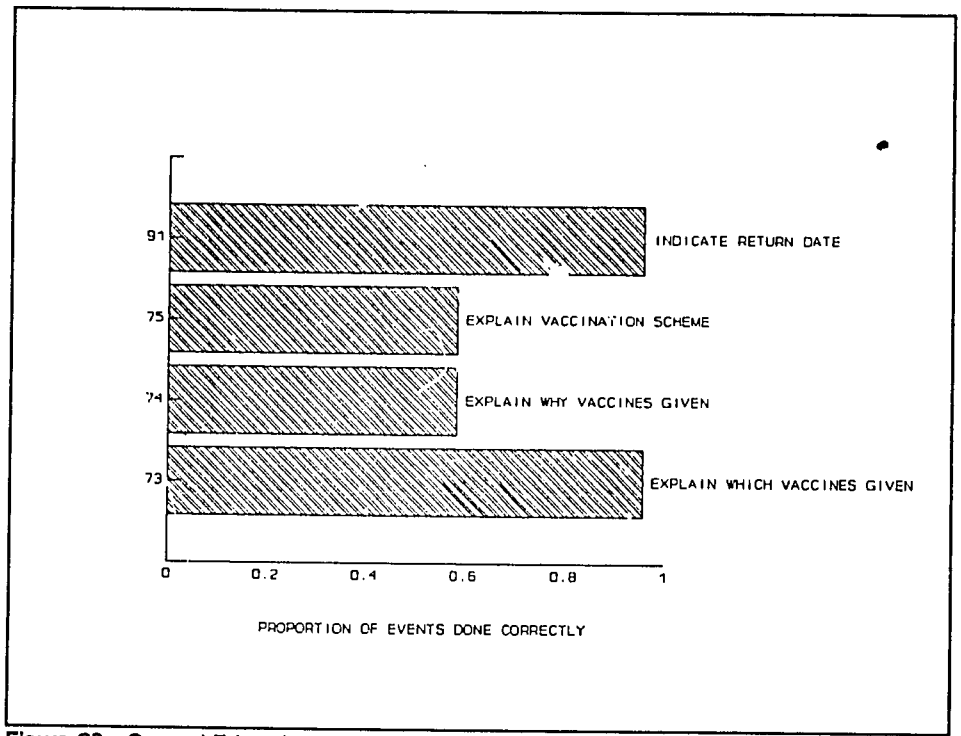

Figure 28. General Educational Message items

Health workers were very brief in their discussion of the immunization process to the "mother" in the SIMULEX (as they were to the real mothers during the day of VAN88). Almost all told the mother what vaccines were given and when to return for the next immunization but only half explained in any detail what immunization was or why the particular vaccines given were used.

Reactions Messages Items

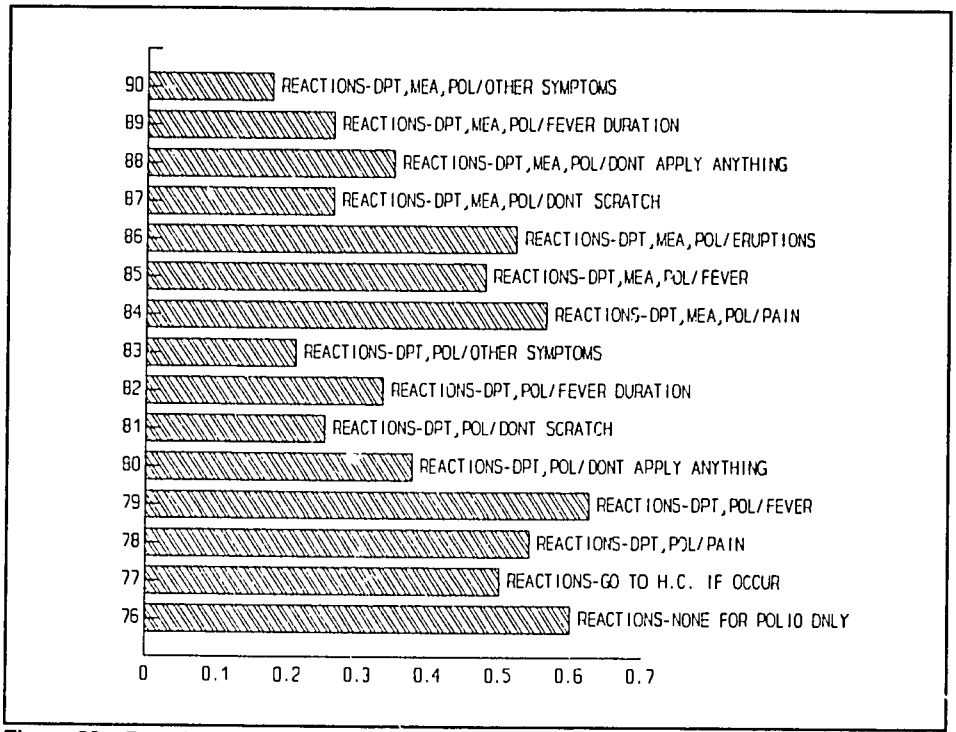

Figure 29. Reactions Messages items

Discussion of specific Reactions to watch for as a result of the particular combination of vaccines given to a child was a task area of completely unacceptable performance. Only 1 of the 15 items surpassed 60% of observed encounters done correctly. In talking to participating health workers afterwards, it became clear that this was an area in which two factors are interacting: a sense of it taking too much time to go over a detailed list of possible reactions with each mother, and a lack of clarity about the precise messages that are to be given in each instance.

Affect and Record-Keeping Items

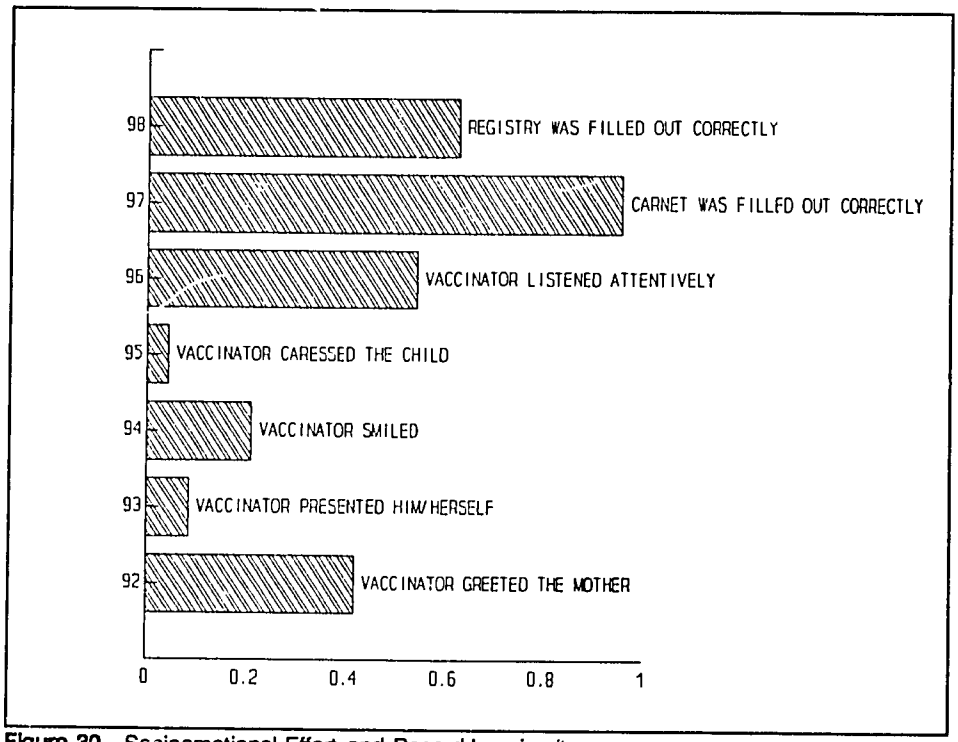

Figure 30. Socioemotional Effort and Record-keeping items

Routine record-keeping was good for the child's carnet but poor for the registry maintained by the health center. The latter was often ignored completely. Comments during debriefing suggested that many health workers may delay complete recording if there is a line of people waiting (as was established in the SIMULEX), trusting to their memories and cursory notes to fill in the blanks afterwards. The DSO data for the same item done during VAN (during which the pressure at most sites was significantly lower than we established for the SIMULEX) showed a correct performance rate of 84%, which supports the comments made during debriefing.

Conclusions

The approach reflected in this report has a number of important advantages for operations-level managers. First, it provides managers with a simple, replicable model for identifying weak areas in service delivery on an individual item basis and, subsequently, on a program (EPI), activity (DPT vaccination), or task grouping (sterile technique) level. Secondly, it provides a basis for comparative evaluations of performance at the level of individual health workers, teams, health centers, or other operational units.

A third advantage of this approach is that, once identified, weaknesses in service delivery in the poorest operational units can be addressed in a positive fashion by enlisting the units with demonstrated best performance as role models or "in-house" consultants to pair with a weaker unit for support. Such a process, depending only on locally available human and material resources promises to be far more efficient and applicable than attempts to bring in outside experts on a temporary basis to offer solutions.

A fourth advantage is that this approach is significantly more sensitive than traditional outcome measurements alone as a method of detect differences in performance. In the current instance, for example, the vaccination coverage data presented in Figs. 1 - 4 suggest a generally adequate level of EPI effort, yet Figs. 5 - 30 clearly show task areas and units whose performance is sufficiently different from the norm (both better and worse) to be noteworthy to the system's managers.

These results were discussed with the PMOH Cono Sur directors in group meetings to determine how best to make use of them in moving to improve system performance. The data were accepted as a potentially valuable tool for targeting training and management support to the HC's and service activities that most seriously need it rather than planning a generalized effort as has been typical of past attempts to improve service delivery.

The general conclusion from this limited systems analysis is that service delivery, of both direct and support services, during VANs is adequate. A simple intervention for future campaigns that would improve the coordination and planning and, thus, reduce the need for crisis management activities to keep the system functioning, would be to provide explicit transportation and communication support to the area and district coordinators during the preparation phase.

Beyond this, the conclusion was to utilize these results to better target the training that is already going on in EPI. As a result, individualized feedback specific to the observations at each health center were prepared and sent to the VAN coordinators prior to the third day of VAN (in October). These feedback reports were utilized by at least 5 of the 14 coordinators in targetting refresher training to their personnel prior to this last day of VAN.

A major innovation we have introduced in methodology is an attempt to get around the limitations imposed by direct observation of actual patient encounters.

Our approach has been to employ simulation exercises (SIMULEX) with standardized vignettes to test the performance of health service delivery personnel in basic care-giving and educational activities. The data obtained from SIMULEX in EPI exercises paralleled closely that obtained from direct observation in the field.

As just shown, Figs. 22-30 (SIMULEX) reveal much the same weaknesses in direct service activities as do Figs. 6-11 (direct observation). Since SIMULEX assessment is done within a non-threatening context in which the exercise is treated as the first stage of a personalized in-service training session, it avoids most, if not all, of the theoretical and practical weaknesses of direct encounter observation.

In any case, these results clearly show that IOC developed for EPI (as is true of those developed for other programs, as well) are applicable to either SIMULEX or direct observation. In both cases, we assume that the subject under observation is aware of that fact and is presenting the observor with behavior that is more appropriately treated as maximal, as opposed to typical, performance.

Nevertheless, these maximal performance data are not interpreted in isolation. The complete battery of instruments now developed (and currently in use for the diarrhea control/ORT program assessment) includes SIMULEX, verbal examinations of content knowledge, checklist-controlled site visits (including record review), interviews with recent users, and confidential questionnaires requesting unit members to rate deviations from the norms in important activities.

Our approach to performance assessment assumes that any significant failure in typical performance will show up in one or more of this battery of instruments. We believe that the battery approach will prove very sensitive for this purpose, and that the evidence to date suggests the SIMULEX merits a key role in that approach.

APPENDIX 1

ENCUESTA: PRE-VAN88

1. Conglomerado No. ____ 2. Grupo: <1 1-4 Niño No.: _____

3. Fecha: __/__/____ 4. Encuestador(a): _____

5. Dirección: _____

6. Nombre del niño: _____ _____ _____
Apellido Pat. Apellido Mat. Nombre

7. Quien contesta las preguntas: Nombre:_____

Relacion:_____

****

8. Fecha de nacamiento del niño: ___ / ___ / __ 9. SEXO: Masc Fem

10. Tiene el niño su Carnet de Inmunización? NO SI
Continue á 11 Pase á 13

.....

(Muestre ejemplares de varios tipos de Carnet)

11. Ha tenido el niño un Carnet anteriormente? NO SI NO SE

12. Ha recibido cualquier vacunación en el pasado? NO SI NO SE

Cuantos veces ha recibido inmunizaciones: 1 2 3 mas no se

Indicador de tipo de vacunación:

Gotitas en la boca (Polio)
Inyección en la nalga (DPT)
Inyección en brazo derecho (Sarampión)
Inyección en brazo izquierdo (BCG)

LA ENCUESTA ESTA TERMINADA

.....

13. Revise el Carnet y marca al siguiente para el niño:

VACUNA	1a	2a	3a	4a	Mas
POLIO	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__
D.P.T.	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__
SARAMP.	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__
B.C.G.	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__

14. De cuales servicios de salud ha recibido el niño inmunizaciónes:

__ VAN 84 __ VAN 85 __ VAN 86 __ VAN 87

__ P.S. de MINSA __ C.S. de MINSA __ Hospital de MINSA

__ Policlinico de IPSS/FF.AA. __ Hospital de IPSS/FF.AA.

__ Consultorio Privado __ Hospital/Clinica Privada

HOJA DE OBSERVACION DEL DIA NACIONAL DE LA VACUNACION 1988

Fecha: __/__/__ C.S.: _____

Observador(a): _____

Dirección: _____

Teléfono o Contacto: _____

Formularios en el juego de hojas:

	Paginas c/u	Numero c/u	Numero de paginas
1. Relación de los Puestos de Vacunación	1	1	1
2. Observaciones en el C.S. - mañana	4	1	4
3. Observaciones en los Puestos de Vacunac.			
a. Puesto	5	5 + 5	50
b. Centro de Salud	7	1 + 1	14
4. Encuesta al Usuario	2	24	48
5. Observaciones en el C.S. - tarde			
a. Hoja de sumario	1	1	1
b. Registro de no Vacunados	1	26	26
6. Encuesta al Vacunadores	6	26	156

1. Relación de los Puestos de Vacunación

No.	Nombre	Dirección
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		

2. Observaciones en la mañana en el Centro de Salud

2.1. Recursos materiales claves

Puesto	Polio Frx20	DPT Frx20	Frx1	Frx10	Sarampion Gotero	Jer2cc	Agu22G	Jer1cc	Carnés	FormA	Total
01											
02											
03											
04											
05											
06											
07											
08											
09											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											

2.2. Llegado a los C.S. y salida para instalación de Puestos

A que hora deben: a. llegar _____ b. salir _____

c. Coordinador del Centro llega:

No.	Que hora Llega	Que hora Sale	No. de Personas	
01				___ a Pie ___ por Carro
02				___ a Pie ___ por Carro
03				___ a Pie ___ por Carro
04				___ a Pie ___ por Carro
05				___ a Pie ___ por Carro
06				___ a Pie ___ por Carro
07				___ a Pie ___ por Carro
08				___ a Pie ___ por Carro
09				___ a Pie ___ por Carro
10				___ a Pie ___ por Carro
11				___ a Pie ___ por Carro
12				___ a Pie ___ por Carro
13				___ a Pie ___ por Carro
14				___ a Pie ___ por Carro
15				___ a Pie ___ por Carro
16				___ a Pie ___ por Carro
17				___ a Pie ___ por Carro
18				___ a Pie ___ por Carro
19				___ a Pie ___ por Carro
20				___ a Pie ___ por Carro
21				___ a Pie ___ por Carro

2.3. Observaciones en el Centro de Salud

a. Cadena de Frio en el Centro de Salud

1) Hay una Refrigeradora en funciónamiento para vacunas?	SI	NO
... si la respuesta es NO pase á Item No. 3 ... ... si la respuesta es SI continue ...		
2) Esta localizada a la sombra y alejada de toda fuente de calor?	SI	NO
3) Esta a 15 cm de la pared?	SI	NO
4) Esta perfectamente horizontal (probar con un vaso lleno de agua)?	SI	NO
5) Existen paquetes de hielo en el congelador?	SI	NO
6) Existen botellas de agua en los espacios libres del refrigeradora?	SI	NO
7) Los paquetes de hielo y botellas de agua estan colocados con 2.5-5 cm entre ellos y a igual distancia de los p edes del ref.?	SI	NO
8) Mantiene las frascos de las vacunas en bandejas, sobre las estantes centrales de la ref.?	SI	NO
9) Hay un termómetro dentro de la refrigeradora?	SI	NO
10) El termómetro está en la zona central de la ref.?	SI	NO
11) Está la temperatura entre el rango de 0-8C?	SI	NO
12) Hay un registro de la temperatura correctamente mantenido con datos precisos?	SI	NO

2.3.b. Incidentes que debe ser mencionado (porque son buenos o malos)

C.S.: _____

Hora	Persona Involucrada	Bueno o Malo?	Descripción

3. Observaciones en el Puesto de Vacunación

3.1. C.S.: _____ 3.2. No. de Puesto: _____ 3.3. Hora: a. ___:___ b. ___:___
Comenza Termina

Está ofreciendo vacunas de BCG y anit-Tétano? SI NO

(... si la respuesta es SI, incluye página 5 de esta hoja ...)

3.4. En el momento de llegada del observador:

No. de: a. _____ b. _____ c. _____ d. _____
ORIENTADORES VACUNADORES ANOTADORES OTROS

e. Voluntarios de la comunidad: _____

f. No. de niños en el Puesto: _____

3.5. Trabajadores:

Nombre	Cargo presup.	Functio.

3.6. Observaciones

3.6.a. Cadena de Frio

1)	Hay hielo/bolsas suficiente en la caja termica?	SI	NO
2)	La caja está en buenas condiciones para mantener su contenido frio?	SI	NO
3)	Las vacunas estan aislados (no en contacto directo con el hielo/bolsas)?	SI	NO
4)	Desde hace cuantas horas estan las bolsas (o hielo) sin rememplazarlas?	<4	4+

3.6.b. Materiales ... hay sufficiente para los usuarios actuales (en el Puesto) y 3 más?

Jeringas:	1) 1cc c/a	SI	NO	Solvente:	10) para Saramp	SI	NO
	2) 2 cc	SI	NO		11) para BCG	SI	NO
	3) 5/10 cc	SI	NO				
				Otros:	12) Carnets	SI	NO
					13) Formula "A"	SI	NO
Agujas:	4) 22/23G	SI	NO		14) Algodon	SI	NO
	5) 18/20 G	SI	NO		15) Alcohol	SI	NO
					16) Jabon liquido	SI	NO

Vacunas: 6) Polio SI NO
7) DPT SI NO
8) Sarampion SI NO
9) BCG SI NO

3.6.c. Otros Indicadores de Performance

1) Estan los frascos abiertos de vacunas tapados para mantener su condición esteril? SI NO
2) Estan los frascos abiertos de vacunas guardados para conservar la cadena de frio? SI NO
3) La fecha de expiración de toda las vacunas es posterior a la actual? SI NO

El némero de jeringas usadas: 4) 1cc 5) 2cc

_____

El número de dosis registrados: 6) DPT 7) BCG 8) Saramp. 9) Polio

_____ _____ _____ _____

10) El número de carnés distribuidos: _____

---

11) Hay un Manual del Personal de Vacunación? SI NO
12) Hay materiales educativos (esquema de vacunación, reacciones secundarias, fecha de regresar, etc.)? SI NO
13) Hay actividades de promoción entre los vecinos? SI NO
14) Visitó el supervisor el puesto? SI NO

15) Cuantas veces hasta el momento: _____

Que hizo? 16)____ Chequea recursos 17)__ Observa desempeño
18)____ Revisa registro 19)__ Habla con usuarios
20)____ Participa en prestar servicios

Que tipo de interación? 21)__Alabanza 22)__Critica 23)__Enseñanza 24)__Demostracion

3.7. Observaciones de la prestación del servicio

	Niño 1	Niño 2
a. Hora cuando empieza:	__:__	__:__
b. Edad del niño:	_____	_____

c. Ya tiene carné?			SI	NO		SI
NO						

El orient/vacunador dice que:

d. ...hay contraindicacciones?	SI	NO			SI	NO
e. Lo dicho fue correcto?	si	no			si	no
f. ...algunas vacunas no son necesarias	SI	NO			SI	NO
g. Lo dicho fue correcto?	si	no			si	no

h. POLIO- Recibe?			SI	NO		SI
NO						

Preparación:

1) Coge el frasco verticalmente por el cuello?	si	no			si	no
2) Quita el anillo metálico y el tapón de jebe sin tocar el borde del frasco?	si	no			si	no
3) Abre la envoltura del gotero cogiéndolo por el protector?	si	no		si	no	
4) Coloca el gotero en la boca del frasco cogido por el cuello y retire la envoltura?	si	no			si	no
5) Coloca la vacuna preparada en la caja térmica auxiliar?	si	no			si	no

Aplicación:

6) Coloca al: -Lactante en decúbito dorsal sobre la falda de su madre? - Al niño mayor sentado sobre la falda de su madre?	si	no			si	no
7) Saca el protector de gotero?	si	no			si	no
8) Coge al niño de los carillos, abriéndole la boca?	si	no			si	no
9) Aplica 2 gotas en la boca evitando contacto con el gotero?	si	no			si	no
10) Coloca el protector al gotero y lo deja en la caja térmica?	si	no			si	no
L DPT- Recibe?	SI	NO			SI	NO

Preparación:

1) Coge el frasco por el cuello?	si	no			si	no
2) Retira el sello de protección del frasco sin tocar el jebe?	si	no			si	no
3) Limpia con alcohol y/o agua estéril y espera que evapore?	si	no			si	no

4) Agita lentamente en forma circular hasta que la solución sea homogénea?	si	no	si	no	
5) Desecha el frasco que sedimente?	si	no	si	no	
6) Saca la jeringa de su envoltura?	si	no	si	no	
7) Asegura la aguja a la jeringa?	si	no	si	no	
8) Inyecta 0.5cc de aire al frasco?	si	no	si	no	
9) Extrae 0.5cc de vacuna del frasco?	si	no	si	no	
10) Saca el aire del jeringa?	si	no	si	no	
11) Coloca el frasco en la caja térmica?	si	no	si	no	

Aplicación:

12) Coloca al niño en decúbito ventral sobre la falda de su madre?	si	no	si	no	13)
Limpia con agua jabonosa y luego agua estéril la zona de aplicación y seca con algodón? o Limpia con alcohol y deja evaporar?	si	no	si	no	
14) Ubica la inyectión en el cuadrante superior exterior de la nalga?	si	no	si	no	
15) Coge la zona de aplicación?	si	no	si	no	
16) Introduce en angulo recto la jeringa?	si	no		si	no
16) Aspira y verifica si no sale sangre?	si	no	si	no	
17) Inyecta 0.5cc de vacuna	si	no	si	no	
18) Cuando retira la jeringa, presiona sin sobar la zona de aplicación con algodón seco?	si	no	si	no	

j. SARAMPION - Recibe?	SI	NO	SI	NO

Preparación:

1) Coge el frasco verticalmente por el cuello?	si	no	si	no
2) Retira el sello protector?	si	no	si	no
3) Limpia el jebe con alcohol y espera hasta que evapora?	si	no	si	no
4) Rompe la ampolla de diluyente?	si	no	si	no
5) Saca jeringa de 3cc de envoltura?	si	no	si	no
6) Carga el diluyente en la jeringa?	si	no	si	no
7) Inyecta el diluyente lentamente por la pared del frasco?	si	no	si	no
8) Agita lentamente el frasco en forma circular hasta que se diluya completamente (cambia de color a rosado)?	si	no	si	no
9) Coloca el frasco de la vacuna en caja térmica auxiliar?	si	no	si	no

Aplicación:

10) Coloca al niño sentado sobre la falda de su madre?	si	no	si	no
11) Le descubre su brazo izquierdo?	si	no	si	no
12) Limpia con agua jabonosa el tercer medio del brazo izquierdo?	si	no	si	no
13) Limpia con agua estéril y seca con torunda de algodón estéril?	si	no	si	no

14)	Limpia el jebe del frasco con agua estéril?	si	no	si	no
15)	Coge la jeringa de 1cc de su envoltura?	si	no	si	no
16)	Inyecta 0.5cc de aire cogido por el cuello?	si	no	si	no
17)	Aspira 0.5cc de vacuna?	si	no	si	no
18)	Coge el tercer medio del brazo izquierdo formando pliegue?	si	no	si	no
19)	Introduce la aguja en ángulo del 45 grado con el bisel hacia arriba (subcutánea)?	si	no	si	no
20)	Verifica que no sale sangre?	si	no	si	no
21)	Inyecta 0.5cc de vacuna?	si	no	si	no
22)	Inyecta la vacuna lentamente?	si		si	no
23)	Cuando retira la jeringa, presiona la zona con algodón seco sin frotar?	si	no	si	no

Alguien del equipo explica:

k.	... cuales vacunas se aplican?	SI	NO	SI	NO
l.	... las razones?	SI	NO	SI	NO
m.	... la esquema de vacunaciones?	SI	NO	SI	NO
n.	... reacciones o cuidados?	SI	NO	SI	NO
	1) Antipolio-ninguna?	si no x		si no x	
	2) DPT-dolor local?	si no x		si no x	
	3) DPT-fiebre en 4-12 horas?	si no x		si no x	
	4) Saramp-fiebre en 7-10 dias?	si no x		si no x	
	5) Saramp-erupción 7-10 dias?	si no x		si no x	
	6) Dolor local - no aplicar nada?	si no x		si no x	
	7) Fiebre dura - llevar al C.S.?	si no x		si no x	
	8) No rascado en zona de inyection?	si no x		si no x	
n.	... indica la fecha de regresar?	SI NO X		SI NO X	
o.	Hora cuando termina:	__:__		__:__	

6. Encuesta para Vacunadores

6.01. Puesto de Vacunación: _____ 6.02. Centro de Salud: _____

HISTORIA PERSONAL

6.03. Edad: ___ años 6.04. Sexo: M F

6.05. Cargo Presup.: _____

6.06. Tiempo de servicio en el MINSA: _____ años

6.07. Ha participado en otros campañas de vacunación? SI NO

6.07a. Si la respuesta es SI, cuantos veces: 1 2 3 4 5 >5

6.08. Recibio el último entrenamiento sobre vacunaciones antes de esta campaña hasta el __/__/__ (fecha).

POR FAVOR, CONTESTE LAS PREGUNTAS SIGUENTES PARA ESTA CAMPANA:

6.09. He recibido entrenamiento sobre:

__ Applicación de vacunas
__ Contraindicaciones para su aplicación
__ Complicaciones de su uso
__ Indicaciones al familiar despues de la vacuna
__ Conservación de las vacunas
__ Cadena de frio

6.10. El tiempo dedicado á este entrenamiento fue: _____ horas en la samana antes del día del Van.

6.11. Las metodologias empleadas en el entrenamiento fueron:

__ Exposiciones/Dialogo
__ Trabajo del Grupo/Seminarios
__ Preguntas & Repuestas
__ Sociodramas - como observador
__ Sociodramas - como participante
__ Revisión del Manual

6.12. Cuan facil le resulta a Ud. saber si esta haciendo su labor correctamente?

MUY DIFICIL DIFICIL FACIL BASTANTE FACIL MUY FACIL

6.13. En que proporcion le da su trabajo información referente a cuan bien lo viene realizando, sin tener en cuenta comentarios o sugerencias de la gente a la que atiende o su supervisor?

NINGUNA INFORMACION POCA INFORMACION ALGUNA INFORMACION BASTANTE INFORMACION MUCHA INFORMACION

6.14. De cuanta gente que Ud. atiende en la campaña recibe Ud. comentarios o sugerencias?

NINGUNA	DE POCAS PERSONAS	DE LA MITAD	DE LA MAYORIA	DE CASI TODO EL MUNDO

6.15. Cuan recargado fue su trabajo durante la campaña

MUY HOLGADA	RELATIVAMENTE HOLGADA	NORMAL	RECARGADO	MUY RECARGADA

6.16. En que medida conversó su(s) supervisor(es) con Ud. en relación a su desempeño durante esta campaña?

NINGUNA DISCUSION	SOLO LO MENCIONO EN TERMINOS GENERALES	DISCUTIO ALGUNAS COSAS ESPECIFICAS	LO DISCUTIO BASTANTE EN TERMINOS CLAROS	LO DISCUTIO MUCHO EN TERMINOS CONCRETOS Y MUY CLAROS

6.17. Cuan satisfecho(a) se siente Ud. en relacion a los siguientes puntos:

	MUY DESCONTENTO	BASTANTE DESCONTENTO	UN POCO DESCONTENTO	BASTANTE CONTENTO	MUY CONTENTO
a. Su cargo en la campaña					
b. El nivel de supervisión					
c. El entrenamiento para la campaña					
d. La disponibilidad de materiales escritos (Manuales, posters etc)					
e. La organización en su Centro					
f. El apoyo logistico para su Puesto					
g. La movilidad disponible para su Puesto					
h. El apoyo de la comunidad a la campaña					
i. La promoción de la campaña en su zona de responsibilidad					

HOJA DE OBSERVACION DEL
II DIA NACIONAL DE LA VACUNACION 1988

Fecha: __/__/__

C.S. - Nombre: _____ Numero: __ __

Observadora - Nombre: _____ Numero: __ __

Dirección: _____

Teléfono o Contacto: _____

Nombre y Dirección del Puesto de Vacunación: _____

Vacunadora - Nombre: _____ Numero: __ __

0. OBSERVACIONES GLOBALES

1) Hay un Manual para el Personal de Vacunación? no si

2) Hay materiales educativos (esquema de vacunación, reacciones secundarias, fecha de regresar, etc.)? no si

3) Hay actividades de propaganda entre la población? no si

1. OBSERVACIONES EN EL PUESTO

a. Cadena de frio

Si usa refrigeradora pase a 5

1) Hay hielo/bolsas suficiente en las cajas térmicas?	no	si	N/A	001: ___
2) Las cajas están en buenas condiciones para mantener su contenido frío?	no	si	N/A	002: ___
3) Las vacunas estan aisladas (no en contacto directo con el hielo/bolsas)?	no	si	N/A	003: ___
4) Desde hace cuántas horas estan las bolsas (o hielo) sin reemplazarlas?	>4	<4	N/A	004: ___
Pase a b.				
5) Hay una refrigeradora en funcionamiento para vacunas?	no	si	N/A	005: ___
Si la respuesta es NO pase a b.				
6) Esta localizada a la sombra y alejada de toda fuente de calor?	no	si	N/A	006: ___
7) Esta a 15 cm de la pared?	no	si	N/A	007: ___
8) Esta perfectamente horizontal (probar con lleno de agua)?	no	si	N/A	008: ___
9) Existen paquetes de hielo en el congelador?	no	si	N/A	009: ___
10) Existen botellas de agua en los espacios libres de la refrigeradora?	no	si	N/A	010: ___
11) Los paquetes de hielo y botellas de agua están colocados con 2.5-5 cm entre ellos y a igual distancia de los paredes de la refrigeradora?	no	si	N/A	011: ___
12) Mantiene los frascos de las vacunas en bandejas, sobre los estantes centrales de la refrigeradora?	no	si	N/A	012: ___
13) Hay un termómetro dentro de la refrigeradora?	no	si	N/A	013: ___
14) El termómetro está en la zona central de la ref.?	no	si	N/A	014: ___
15) Está la temperatura entre el rango de 0-8C?	no	si	N/A	015: ___
16) Hay un registro de temperatura correctamente mantenido con datos precisos?	no	si	N/A	016: ___

b. Materiales para vacunación

Hay sufficiente para los usuarios actuales y 3 más:

Jeringas:	1) 1cc c/a	no	si	N/A	017: ___
	2) 2/3 cc	no	si	N/A	018: ___
	3) 5/10 cc	no	si	N/A	019: ___
Agujas:	4) 22/23G	no	si	N/A	020: ___
	5) 18/20 G	no	si	N/A	021: ___
Vacunas:	6) Polio	no	si	N/A	022: ___
	7) DPT	no	si	N/A	023: ___
	8) Sarampion	no	si	N/A	024: ___
Solvente:	10) para Saramp	no	si	N/A	025: ___
Otros:	12) Carnets	no	si	N/A	026: ___
	13) Formulario "A"	no	si	N/A	027: ___
	14) Algodon	no	si	N/A	028: ___
	15) Alcohol	no	si	N/A	029: ___
	16) Jabon	no	si	N/A	030: ___
	17) Agua estéril	no	si	N/A	031: ___

OBSERVACIONES DE VACUNACION

a. Hora cuando empieza: __ __:__ __

b. Cuantos niños actualmente en la cola: __ __

c. Nombre del niño: _____

d. Edad del niño: ___ años y ___ ___ meses

e. Examen al niño:

1) Ya tiene carné? NO SI

a) Si no tiene carné da uno nuevo? NO SI N/A

2)

Que dosis de vacunas ha recibido el niño?	Fecha por carné o "X" si el responsable lo dice			
	1	2	3	4
POLIO:				
DPT:				
SARAMPION:				

3)

VAC / OTRO dice que el niño -	POLIO	DPT	SARAMPION
TIENE TODAS LAS DOSIS DE:			
TIENE DEMASIADA EDAD PARA:			
NO TIENE EDAD SUFICIENTE PARA:			
DEBE RECIBIR:			

4) Pregunta si "Su niño está enfermo?": NO SI N/A

5) Observa al niño para determinar estado: NO SI N/A

6)

VAC / OTRO acepta que -	El niño tiene actualmente:	Es razón para rechazar vacunación
DIARREA:		
RESFRIO:		
GRANITOS EN LA PIEL:		
FIEBRE:		
BAJO PESO:		
DESNUTRIDO:		
TOMA ANTIBIOTICOS:		
REACCIONES SERIAS PREV.:		
MADRE ESTA DANDO PECHO:		
NECESITA SER HOSPITALIZ:		
OTROS:		

f. POLIO- Recibe? NO SI

Preparación (Polio):

1)	Coge el frasco verticalmente por el cuello?	no	si N/A
2)	Confirma el nombre y la fecha de expiración?	no	si N/A
3)	Quita el anillo metálico y el tapón de iebe sin tocar el borde del frasco?	no	si N/A
4)	Abre la envoltura del gotero cogiéndolo por el protector?	no	si N/A
5)	Coloca el gotero en la boca del frasco cogido por el cuello y retira la envoltura?	no	si N/A
6)	Coloca la vacuna preparada en la caja térmica auxiliar?	no	si N/A

Aplicación (Polio): SI NO

7)	Coloca al lactante en decúbito dorsal sobre la falda de su madre - o - al niño mayor sentado sobre la falda de su madre?	no	si N/A
8)	Saca el protector de gotero?	no	si N/A
9)	Coge al niño de los carillos, abriéndole la boca?	no	si N/A
10)	Aplica 2 gotas en la boca evitando contacto con el gotero?	no	si N/A
11)	Coloca el protector al gotero y lo deja en la caja térmica?	no	si N/A

g. DPT- Recibe? NO SI

Preparación (DPT):

1)	Usa una jeringa para dosis múltiple?	no	si N/A
	(Si usa una jeringa múltiple ya llena pase á 16)		
2)	Saca una jeringa nueva de su envoltura?	no	si N/A
3)	Mantiene la esterilidad de la jeringa?	no	si N/A
4)	Usa una aguja nueva en su envoltura?	no	si N/A
5)	Mantiene la esterilidad cuando asegura la aguja a la jeringa?	no	si N/A
6)	Coge el frasco por el cuello?	no	si N/A
7)	Si es el primer dosis, confirma el nombre y la fecha de expiración?	no	si N/A
8)	Retira el sello de protección sin tocar el jebe?	no	si N/A
9)	Limpia el jebe con alcohol y/o agua estéril	no	si N/A

a) Si sú, espera hasta que evapore? no si N/A
10) Agita lentamente en forma circular hasta que la solución sea homogénea? no si N/A
11) Mira si hay sedimento en el frasco? no si N/A
12) Inyecta aire al frasco? no si N/A
13) Extrae (1 dosis=0.5cc;multi dosis=2.5cc) de vacuna del frasco? no si N/A
14) Saca el aire de la jeringa? no si N/A
15) Si queda vacuna coloca el frasco en la caja térmica auxiliar? no si N/A

Solo para jeringa múltiple ya llena:

16) Mantiene la esterilidad de la jeringa y aguja? no si N/A

Aplicación (DPT):

17) Coloca al niño en decúbito ventral sobre la falda de su madre? no si N/A
18) Limpia con agua jabonosa y luego agua estéril la zona de aplicación y seca con algodón - o - limpia con alcohol y deja evaporar? no si N/A
19) Ubica la inyección en el cuadrante superior exterior de la nalga? no si N/A
20) Coge la zona de aplicación? no si N/A
21) Introduce en ángulo recto la aguja? no si N/A
22) Aspira y verifica si no sale sangre? no si N/A
23) Verifica que inyecta 0.5cc de vacuna? no si N/A
24) Cuando retira la jeringa, presiona sin sobar la zona de aplicación con algodón seco? no si N/A

Cuidados con la jeringa (DPT):

25) Si es de uso único, la descartó? - o - no si NA
Si es de uso múltiple ...
26) cambio inmediatemente la aguja usada? no si N/A
27) mantiene la esterilidad de jeringa y aguja nueva? no si N/A
28) coloca la jeringa en la caja auxiliar? no si N/A

h. SARAMPION - Recibe? NO SI

Preparación (Sarampion):

1) Usa una jeringa con dosis múltiple? no si N/A

(Si usa una jeringa múltiple ya llena pase a 24)
(Si el frasco ya está preparado pase a 14)

Preparación del frasco:

2) Coge el frasco verticalmente por el cuello? no si N/A
3) Confirma el nombre y la fecha de expiración? no si N/A
4) Retira el sello protector sin tocar el jebe? no si N/A
5) Limpia el jebe con agua estéril o con alcohol? no si N/A
a) Si sú, espera hasta que evapore? no si N/A
6) Rompe la ampolla de diluyente? no si N/A
7) Saca jeringa de 3cc (o 10cc) de envoltura? no si N/A
8) Usa una aguja nueva en su envoltura? no si N/A
9) Mantiene la esterilidad cuando asegura la aguja a la jeringa? no si N/A
10) Carga todo el diluyente del frasco en la jeringa? no si N/A
11) Inyecta el diluyente lentamente por la pared del frasco? no si N/A
12) Agita lentamente el frasco en forma circular hasta que se diluya completamente (cambia de color a rosado)? no si N/A
13) Si no pasa directamente a preparar la jeringa ... coloca algodón estéril sobre el jebe y coloca el frasco en la caja térmica auxiliar? no si N/A

Preparación de la jeringa (Sarampión):

14) Saca una jeringa nueva de su envoltura? no si N/A
15) Mantiene la esterilidad de la jeringa? no si N/A
16) Usa una aguja nueva en su envoltura? no si N/A

17) Mantiene la esterilidad cuando asegura la aguja a la jeringa? no si N/A
18) Coge el frasco por el cuello? no si N/A
19) Limpia el jebe con agua estéril (no usa alcohol)? no si N/A
20) Inyecta aire al frasco? no si N/A
21) Extrae (1 dosis=0.5cc;multi dosis=2.5cc) de vacuna del frasco? no si N/A
22) Saca el aire de la jeringa? no si N/A
23) Si queda vacuna coloca el frasco en la caja térmica auxiliar? no si N/A

Solo para jeringa múltiple ya llena:

24) Mantiene la esterilidad de la jeringa y aguja? no si N/A

Aplicación (Sarampión):

25) Coloca al niño sentado sobre la falda de su madre? no si N/A
26) Le descubre su brazo izquierdo? no si N/A
27) Limpia con agua jabonosa el tercio medio del brazo izquierdo? no si N/A
28) Limpia con agua estéril y seca con torunda de algodón estéril? no si N/A
29) Coge el tercer medio del brazo izquierdo formando pliegue? no si N/A
30) Introduce la aguja en ángulo del 45 grado con el bisel hacia arriba (subcutánea)? no si N/A
31) Verifica que no sale sangre? no si N/A
32) Verifica que inyecta 0.5cc de vacuna? no si N/A
33) Inyecta la vacuna lentamente? no si N/A
34) Cuando retira la jeringa, presiona la zona con algodón seco sin frotar? no si N/A

Cuidados con la jeringa (Sarampión):

35) Si es de uso único, la descartó - o no si N/A
Si es de uso múltiple ...
36) cambio imediatemente la aguja usada? no si N/A
37) mantiene la esterilidad de jeringa y aguja nueva? no si N/A
38) coloca la jeringa en la caja térmica auxiliar? no si N/A

L Educación del responsable

La vacunadora explica al responsable ...

1) cuales vacunas se aplican? no si N/A
2) las razones? no si N/A
3) el esquema de vacunaciones? no si N/A

La vacunadora explica reacciones y cuidados: ...

Si recibe POL pase a 4
Si recibe DPT o DPT+POL pase a 6
Si recibe SAR o SAR+POL pase a 12
Si recibe DPT+SAR o DPT+SAR+POL pase a 17

4) No deben haber reacciones por recibir antipolio solo no si N/A
5) Si se presentan síntomas lleve al niño al C.S. no si N/A

Pase a 24

6) Puede haber dolor local en el sitio de inyección no si N/A
7) Puede haber fiebre leve dentro de un día no si N/A
8) No aplique nada para el dolor local no si N/A
9) No rascarse en la zona de inyección no si N/A
10) Si la fiebre dura lleve al niño al C.S. no si N/A
11) Si occuren otros súntomas lleve al niño al C.S. no si N/A

Pase a 24

12) Puede tener fiebre leve dentro de 7-10 días no si N/A

13) Puede presentar erupción dentro de 7-10 días no si N/A
14) No rascarse en la zona de inyección no si N/A
15) Si la fiebre dura lleve al niño al C.S. no si N/A
16) Si occuren otras súntomas lleve al niño al C.S. no si N/A
Pase a 24
17) Puede haber dolor local en el sitio de inyección no si N/A
18) Puede tener fiebre leve dentro de 7-10 días no si N/A
19) Puede presentar erupción dentro de 7-10 días no si N/A
20) No rascarse en la zona de inyección no si N/A
21) No aplique nada para el dolor local no si N/A
22) Si la fiebre dura lleve al niño al C.S. no si N/A
23) Si occure otras síntomas lleve al niño a C.S. no si N/A
Pase a 24
24) Si el niño tiene diarrea y recibe POL dice al responsable: lleve al niño al C.S. para que reciba otra vacunación cuando se mejore no si N/A
25) Indica la fecha que debe regresar no si N/A

j. Indicadores de la actitud de la vacunadora
Durante la prestación del servicio, la vacunadora ...
1) Saludí a la madre y/o al niño? no si N/A
2) Se presentí a si misma? no si N/A
3) Sonrió? no si N/A
4) Acarició al niño? no si N/A
5) Escuchó con interés? no si N/A

k. Documentación
1) Llena correctamente el carné no si N/A
2) Llena correctamente el registro no si N/A

l. Hora cuando termina: __ __:__ __

INTERIM REPORT

RELIABILITY AND PERFORMANCE ANALYSIS OF SYSTEMS ASSESSMENT INDICATORS:

Analysis of indicators used for the assessment of EPI services delivery during the AN88 immunization campaign of the Peruvian Ministry of Health in Lima's Cono Sur during July 1988

SYSTEMS ASSESSMENT OF EPI SERVICE DELIVERY IN THE *CONO SUR* OF LIMA, PERU DURING THE 1988 NATIONAL VACCINATION CAMPAIGN

The PRISM Group

31 May 1989

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INTRODUCTION

The PRISM Group has been doing public health research in Peru for the past five years. It has become clearer to us that while basic public health research (research on new interventions) is necessary, great improvements in health status can be achieved by improving the delivery of existing services. Thus, we have directed our efforts on service delivery research. We are committed to working within the framework of government supported health programs in existence in the country. Our focus has been on applied research in the areas of quality of care, management information systems, and the strengthening of support services.

The Cono Sur Project began in 1987 with funding from PRICOR II, a centrally funded U.S.A.I.D. project. The project had a mandate to perform a "systems analysis" and organizational assessment of two program areas, EPI and diarrhea management. This report is a summary of the findings from the EPI systems analysis.

Background

The *Cono Sur*, or Southern Cone, of Lima, Peru comprises approximately 650,000 people living in peri-urban marginal communities along the southern rim of the Lima metropolitan area. Politically, this area is divided into three well-defined Districts: San Juan de Miraflores, Villa Maria del Triunfo and Villa El Salvador.

The Peruvian Ministry of Health (PMOH) provides health and medical services to the Cono Sur through a network of 14 Health Centers (H.P.), each with up to six ancillary Health Posts and a single support hospital, Hopital del Apoyo "Maria Auxiliadora" (HAMA).
The 14 health centers are administered from an office known as the "Entidad Ejecutivo Presupuestal" (EEP), which has responsibility for budget and finances, and serves as the coordinating entity for PMOH activities in the Cono Sur. HAMA is a separate budgetary entity and functions independently of the EEP.

The PMOH Program in EPI.

The PMOH has, for over five years, placed heavy emphasis on annual vaccination campaigns (of 3 days, 1-to-2 months apart) to extend immunization coverage. These national campaigns have enlisted the assistance of thousands of volunteer workers from schools, charitable and social organizations, etc., but have consistently fallen short of coverage targets.

The current trend in the PMOH is to integrate immunizations into general service delivery as much as possible, while continuing to run annual campaigns, particularly in rural areas where a constant source of vaccine is difficult to maintain.

A PMOH decision to carry out a national vaccination campaign (VAN) in May and

July of 1988 offered a concrete opportunity for the PRICOR Peru Project to carry out a limited systems analysis and to test key instruments for EPI service evaluation that The PRISM Group has been developing as part of the project.

The Cono Sur Project

The objective of the Cono Sur Project is two-fold: 1) to develop a methodology for systems analysis and organizational assessment* that can be applied by local and intermediate managers for the routine monitoring of service delivery; and 2) to concentrate this methodology mainly on the processes of service delivery and support services rather than on inputs and outcomes.

Systems Analysis

Systems analysis is a methodology for understanding how a primary health care system works. It is distinct from the main body of International health services research in that it concentrates on the actual process of service delivery. It does not dispute that other factors play large roles in the "total picture" of international health, it simply places priority on the process of service delivery and on the workings of the health care delivery organizations.

There is a large body of research that studies the process of service delivery in the United States and Europe. This type of research is generally referred to as "quality of care" research. Process quality of care research was largely defined by the work of Arvedis Donabedian at the University of Michigan. Our approach is modelled on that of Donabedian.

Thus, the primary objective of this study was to describe how service delivery personnel assigned to the VAN actually provided the requisite services. Issues addressed included the quality of care and counselling as part of direct service delivery; and planning, supervision, training, logistics and record-keeping as part of support service delivery.

Measurement of Service Delivery Performance

An important part of the PRICOR Peru Project is the development of efficient methods for the measurement of quality of care given during direct service encounters. Observing actual service delivery can be efficient when it is known that a large number of patients will be present at one time. National vaccination days and growth monitoring sessions are examples of such a situation. However, in most cases patients come to the health centers for all sorts of reasons and waiting for a representative sample of cases of some specific service, say moderately dehydrated children in need of oral rehydration therapy, can be a

* The organizational assessment methodology was not used for the vaccination campaign. It was later developed and used for a full assessment of the diarrhea management program. Results are forthcoming.

time-consuming and prohibitively expensive undertaking. It is clear that some method must be developed that permits quality of care assessment without depending on observing actual service delivery.

Records or charts provide the information most often used in domestic quality of care studies. Where appropriate, records designed specifically to collect necessary information are used. However, the records kept in Peru are not of sufficiently high quality to base a study on, indeed, record keeping is one of the areas we are observing for quality.

Furthermore there are theoretical limitations to direct observation of actual service delivery, these are particularly acute if relatively infrequent events are being monitored. Rarely will the range of cases observed at one health facility correspond in severity and patient characteristics to those at other facilities. While this limitation may not be unacceptable if an overall description of service delivery is all that is wanted, it seriously undermines the validity of making the comparisons between units that would be necessary to establish a viable system of accountability and quality control. There is also a difficulty imposed by lack of knowledge of previous contact between the provider and the patient. As an example, if the provider skips items while taking the patient's history, is it indicative of poor service delivery or has the provider served the patient enough times that they can safely skip some items of the history?

In an attempt to get around the limitations imposed by observations of actual patient encounters, we have introduced a major innovation to the existing PRICOR systems analysis methodology. Our approach has been to employ simulation exercises using analogue patients to test the performance of health service delivery personnel in basic care-giving and educational activities.

Simulation exercises have been used extensively in the assessment of management potential and a large body of management literature exists on this subject. The use of such exercises for evaluation in the area of health has been much less. When used for health research or evaluation, most of the studies have concentrated on the measurement of physician behavior through the use of analogue patients.

On the other hand, simulation exercises are used as a training methodology in many health organizations that do in-service training. The basic concepts of a simulation exercise (often referred to as role-playing) are not, therefore, unknown to the individuals who will be asked to use it as an assessment tool. What is lacking is the development of a sound analytical model for its application in this role.

From preliminary experience with the Cono Sur health system, we had reason to suspect that the delivery of EPI services would not be found to be grossly deficient and that support services, in general, would prove to be adequate to the need. Therefore, work on the second day of VAN focused exclusively on quality of care items as part of an effort to validate simulation exercises as a substitute for observation of actual service delivery.

THE INFORMANT GROUP PROCESS

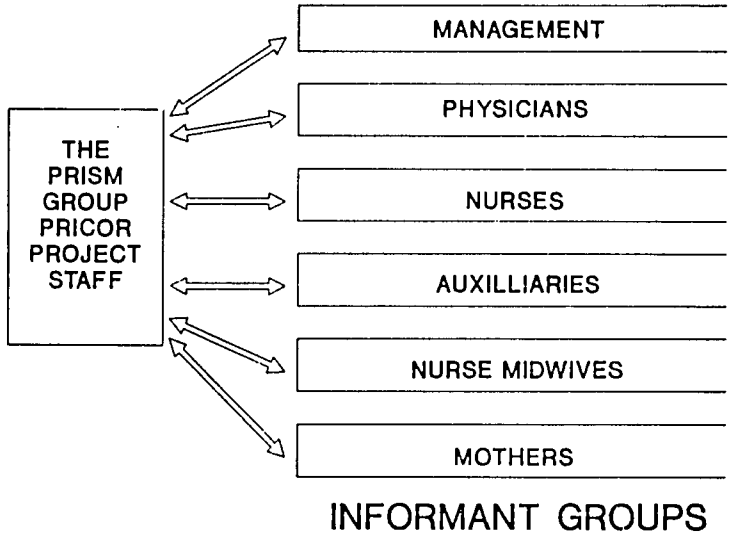


Figure 1

Coverage Assessment.

While the emphasis of the PRICOR systems analysis methodology is on the process of service delivery, it is not intended that the outcomes arising from that process be ignored. It is clear that a complete description of the EPI system in the Cono Sur must include some information about the immunization coverage it is attaining in the catchment population.

As a practical matter, the PMOH directorship in the Cono Sur specifically requested that the project provide an answer as to whether or not the coverage from routine service delivery was already meeting the standards of the EPI program (i.e., 80% of children in appropriate age groups protected).

SECTION 1 - MEASUREMENT

MEASUREMENT INSTRUMENT DEVELOPMENT

A systems analysis involves the measurement of hundreds of aspects of a health system. The development of reliable and valid measurement instruments is therefore critical to the success of the study. For the instruments to be reliable and valid they must take advantage of as much "inside information" as is possible to obtain. The Cono Sur Project obtained this inside information through the use of informant groups as illustrated in Figure 1.

Each group consists of 8-12 people drawn as representatives of their job position. An attempt was made to include all 14 health centers in roughly equal proportions among all the groups. It is important to include representatives of the poorly performing health centers as well as those from high performance health centers (the latter are much easier to recruit).

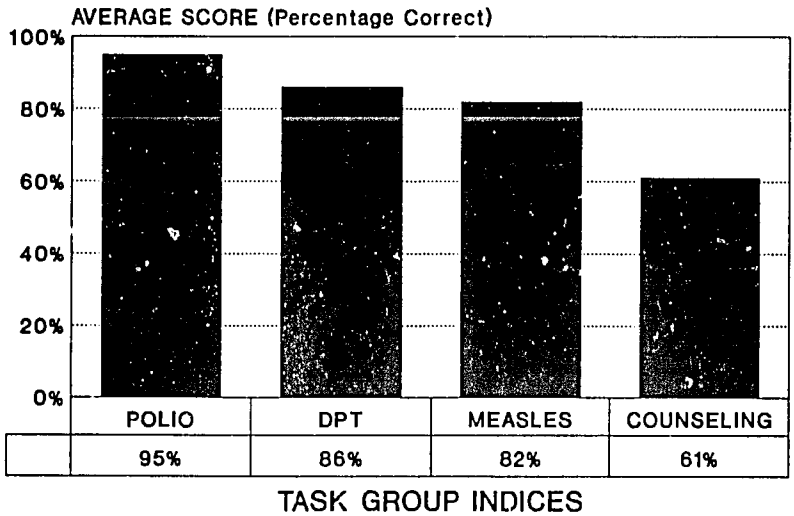
The management group is composed of representatives from the EEP offices and of health center directors. This group acts somewhat like the technical advisory groups (TAG) common to large research projects funded by U.S.A.I.D. It makes recommendations and suggestions concerning what should be studied and provides considerable "entry power" to the project. It provides a biweekly forum for communication between the project and the health system.

The other informant groups are mainly used in the development of the measurement instruments (structured observation checklists and questionnaires) used by the project. Their purpose is two-fold:

1) They determine criteria to be observed. A quality of care study cannot be imposed from the outside or from the top. The service delivery process differs subtly place to place. There are international norms for many of the programs, but they undergo countless minor variations in each locale. The study must balance the need to establish whether service delivery is being performed in a manner consistent with established norms with the demand that the providers be measured against what they perceive as the correct manner to perform the services. The informant groups provide a forum to discuss these issues before implementing the study.

2) They legitimize the study's findings. The informant groups are representative of the area under study. Thus, criteria developed by the groups are not easy to dismiss as solely the result of outsiders' meddling. A health center director whose workers perform poorly knows that this head nurse was part of the process that developed the criteria. Auxiliaries know that the health center director was a member of the management informant group. This benefit of using the informant group process is invaluable as the purpose of the project is to effect change in the system (as opposed to simply describing a level of service delivery for outside purposes).

QUALITY OF CARE SCORES
FIRST VACCINATION DAY



Graph 1

SECTION 2 - INDICES

NEED FOR INDICES

The data sets collected in a quality of care study can be quite large. The raw data is of little use, as it is patterns of behavior that are of interest more than particular instances. So the results must be aggregated in some form. The measures can be integrated by immunization type: Polio, DPT, and Measles. That leaves a set of measures dealing with counselling and social skills that cover all three immunizations, thus must be aggregated separately.

Graph 1 illustrates this form of aggregation, by immunization (with counselling separate, as discussed above). While this form of aggregation sheds some light on the state of EPI quality of care in the Cono Sur, it leaves questions. The 95% success rate for Polio looks pretty good, but what about the 82% success rate for Measles? It could be acceptable, but perhaps the 18% error rate includes some really important tasks. It would help to see the results in a more specific format. More information can be teased out by aggregating the data into indices that reflect specific topics of interest and that crosscut each specific immunization. For instance, delivering each of the three immunizations involves tasks relating to maintaining sterility. These can be grouped together into an index that reflects how well a provider or a clinic maintains sterility across all immunization types. Below is a list of the 8 indices we developed. The specific questions are included as Appendix 1.

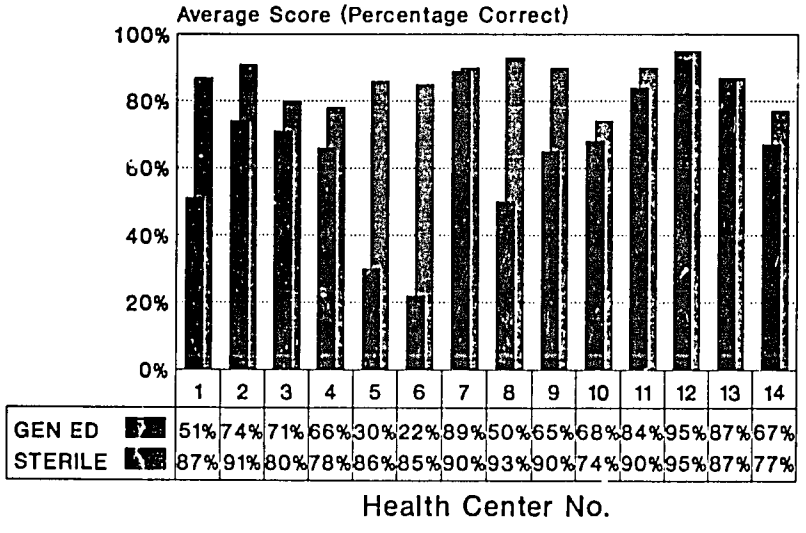
INDEX	DESCRIPTION
STERILE	An index of 33 items that measures how well the provider maintains sterility.
TECH	An index of 28 items that measures the provider's technical skill in performing immunizations.
C.CHAIN	An index of 3 items measuring whether the cold chain was maintained during the course of the immunizations.
EXPIRE	An index of 4 items measuring whether the provider checks to see in the vaccine has expired or deteriorated.
RX ED	An index of 14 items that measures how well the provider counsels the mother concerning possible reactions and side effects of the vaccines delivered to the child.

GEN ED	An index of 4 items that measures whether the provider explains to the mother what vaccinations were given, why they were given and when to return.
RECORD	An index of 2 items measuring whether the provider filled out the child's carnet and the health center's registry.
AFFECT	An index of 5 measures that measures the provider's social skills during the interaction. These skills include greeting the mother, smiling, and listening.

These indexes are specifically designed to crosscut the specific vaccination procedures. The thought is that if a health care worker is not maintaining sterility while delivering the measles vaccination she is not likely to maintain sterility during a DPT vaccination. Supervision or in-service training should therefore focus not on the whole process of delivering the vaccination, but on the aspects that relate to maintaining sterility. Furthermore, general instruction on the importance of maintaining sterility would be appropriate.

The graph on the next page shows how placing the quality of care items into specific indices reveals patterns that are hidden in higher level aggregations.

USE OF INDICES
COMPARISON BY CLINIC

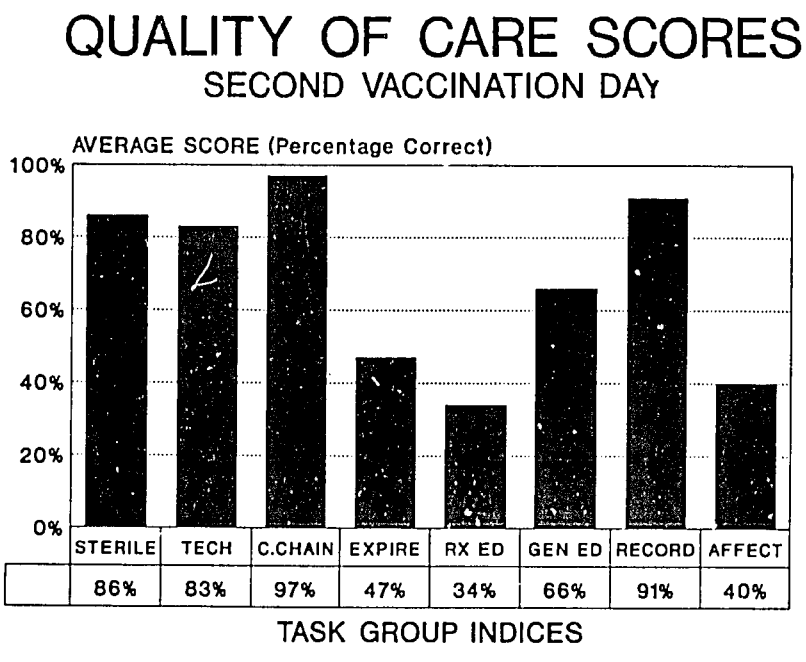


Graph 2

USE OF INDICES

Graph 2 illustrates the scores by health center of two indices, General Education and Maintaining Sterility. The average score for Maintaining Sterility is quite high (86%), and there is not much variation between the health centers. The average score for the General Education index is lower (66%) and there is much more variation among health centers. Furthermore, four health centers scored below 60% in General Education and above 80% for Maintaining Sterility. Simply by bringing these four clinics up to the other clinics average score for the General Education index would improve the average score for the index to 77%.

Clearly, results presented in the form of indices are more useful than results presented by vaccination. The General Education index contained 6 items, so it would not be too much work to go back to the raw data and look at the four health centers that performed poorly and determine exactly what messages were not being presented to the mother. This would enable management to target in-service training to very specific problems. It is this specificity that lies at the heart of both systems analysis and quality of care studies. It is far more helpful to managers to tell them that their health auxiliaries are not passing on specific messages to mothers (for example, when the mother should bring the child back for the next vaccination) than it is to say that they need to improve the delivery of the DPT vaccine because they are not reaching specified coverage levels.



Graph 3

SECTION 3 - RESULTS

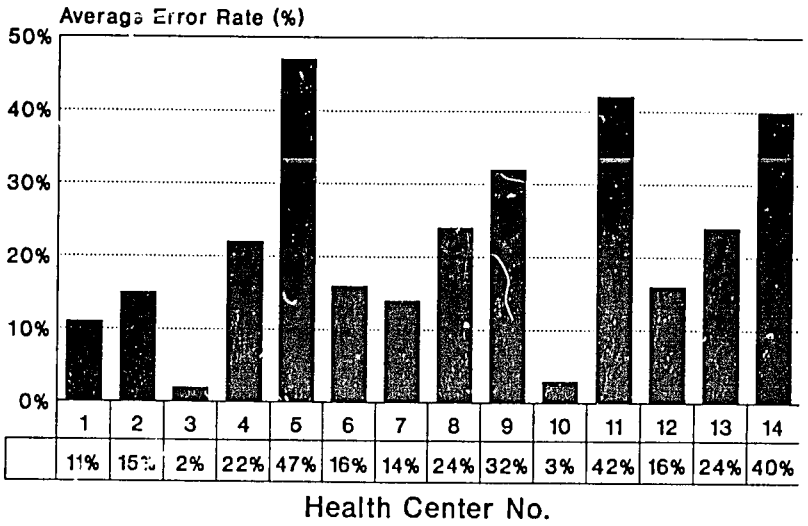
AVERAGE SCORES

This graph represents the average scores of the 14 health centers in the Cono Sur for the 8 quality of care indices. As discussed above, the scores could be further broken down by clinic (or by provider). 4 of the 8 indices scored higher than 80%. While there are no absolute standards for acceptable performance, it is unrealistic to expect performance levels of 100% and scores above 80% were classified by both the researchers and the Cono Sur health center directors as good. These 4 indices included the 2 largest (STERILE and TECH), and these four indices comprise 72% of all items measured.

The remaining 4 indices are less satisfactory. Poor performance in education and counseling tasks (RX ED and GEN ED) are often excused during national campaign due to the time pressure caused by long lines of waiting patients. However there were few lines during this, the second, vaccination day. The Checking for expiration index (EXPIRE) was not very reliable thus few conclusions can be drawn from the score. The AFFECT index was very reliable, thus we can conclude that the poor scores reflect actual performance and are not an artifact of measurement.* However, the providers in the Cono Sur are given little to no instruction in the areas covered by the index. Given the interest by informants in including the measures, it will be of interest to see if the poor results lead to increased training and higher scores in the future.

* The reliability of the measurement instruments is discussed in Section 4.

AVERAGE ERROR RATES
FIRST VACCINATION DAY



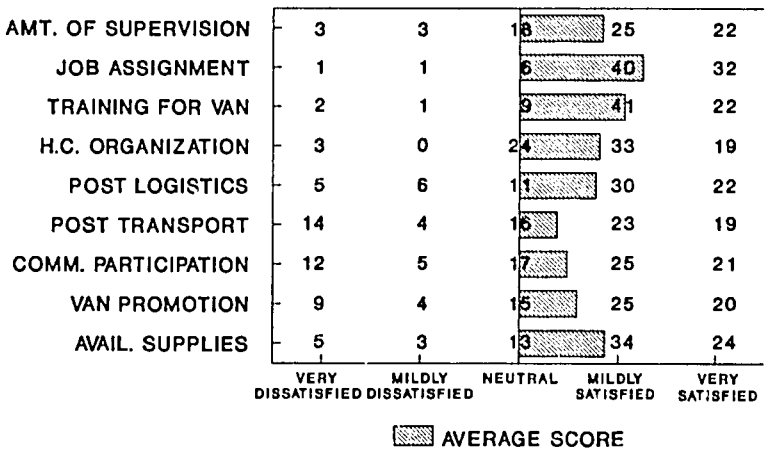
Graph 4

VARIABILITY BETWEEN HEALTH CENTERS

This graph illustrates the cumulative error rates by health center for all quality of care measures for the first vaccination day. There is a 24 fold difference between the best health center (3) and the worst (5). An average of 7 providers were observed for each health center, thus the sample was large enough to provide confidence in the results.

It must be stressed that these health centers are in a geographically constrained urban area 3 miles wide by 8 miles long with a relatively homogenous population. Furthermore, health center directors have little control over the providers assigned to them. Yet something is occurring within the health centers to create large differences in the quality of care that they provide.

WORKERS' SATISFACTION
FIRST VACCINATION DAY



NUMBERS • RESPONDENTS IN EACH CATEGORY

Graph 8

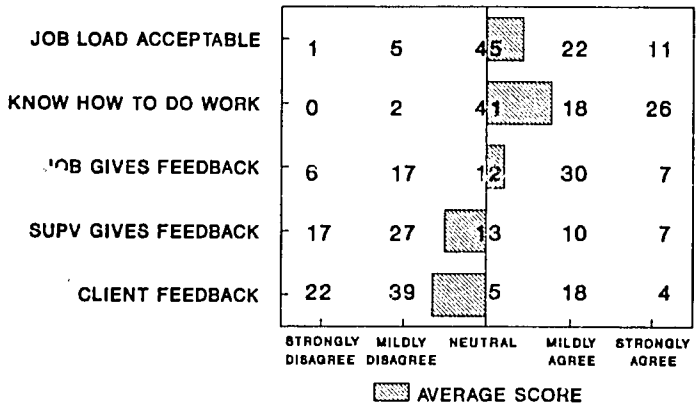
HEALTH CARE PROVIDERS' SATISFACTION

This graph/table illustrates the responses to series of questions dealing with the health care providers' satisfaction with different issues.* Numerous studies in organizational behavior have related workers' satisfaction to performance.

The providers were generally satisfied with all aspects of the VAN. This jibes with what we saw during the systems analysis. There seemed to be few difficulties associated with logistics, transport or organization. The workers received an average of 6-9 hours of training, mostly lectures and demonstrations, aimed directly at the VAN. Their responses indicate that this is an appropriate amount of time to spend in training for a VAN. The breakdown indicates that a few centers might have had difficulty transporting people to vaccination posts and a few other may have had problems getting much community participation.

* All questions related to the national vaccination day.

WORKERS' PERCEPTIONS
JOB AND FEEDBACK



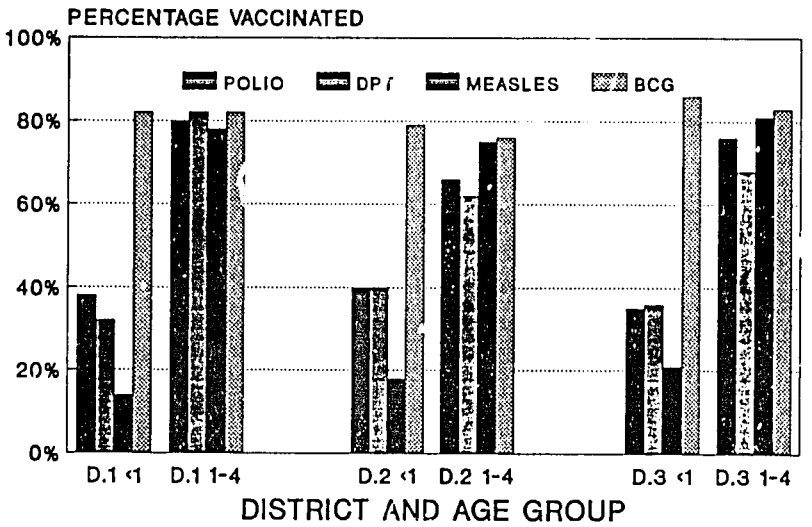
NUMBERS • RESPONDENTS IN EACH CATEGORY

Graph 6

PROVIDERS' PERCEPTIONS

This graph/table illustrates the responses to series of questions dealing with the health care providers' perceptions of aspects of their jobs. The first two questions related to the amount of work they had during the VAN and whether they knew how to do their work. Responses were slightly positive. The last three question related to how they got feedback on their job performance during the VAN. These questions assess the degree to which the health provider receives information about the procedures and results of her efforts. This includes feedback from others (external), the supervisor and the client (here the child's mother), and from the job itself (internal). The Job Feedback questions were included in the EPI systems analysis to pretest them for use in the Diarrhea Management systems analysis, where they interact with a number of other constructs to provide a picture of the organizational environment the providers are working within. What is interesting to note here is that the providers perceive little or no feedback from supervisors, yet are relatively satisfied with the amount of supervision they are receiving (previous page). The implication is that they perceive the role of supervisor as providing logistical support, not technical expertise or support.

CHILDREN VACCINATED
FOR POLIO DPT, MEASLES, AND BCG



Graph 7

IMMUNIZATION COVERAGE

The graph illustrates coverage rates in the three districts of the Cono Sur prior to the VAN. Existing levels of protection in the community just prior to VAN were found to be at or almost at the prescribed norm of 80% for all vaccines in the 1-4 year-old group. Coverage of BCG, which is given at birth at all obstetrical facilities in the Cono Sur, was above 80% in the <1 year-old, as well. The summary figures for DPT, Polio, and Measles in the <1 year-old are below 80%, but not particularly meaningful since this group includes many children too young to have been vaccinated as yet.

Approximately 30% of the coverage is attributable to previous VANs, thus two thirds of the previous vaccinations were delivered routinely in the health centers. This supports the position (held by many health center directors and nurses) that it would be more efficient to move completely to routine delivery of vaccinations.

SECTION 4 - RELIABILITY

INTRODUCTION

The concept of reliability can be approached in a number of ways. One is illustrated by the question, "If we measure the same thing again and again will we get the same results?" The PERU PRICOR Project did measure the same thing again and again - there are four sets of scores for the simulation exercise observations. Four different people observed and recorded the vaccination tasks being performed during the role-playing exercise. Undoubtedly, they all saw the same thing, did they all record it in the same manner?

A second approach relates to the question, "Are the results generated by the measuring instrument the 'true' measures of whatever we are measuring?" This question relates to accuracy. In conducting a systems analysis we are interested in determining how well health system workers perform their routine tasks. We are not particularly interested in how well they do their tasks under our testing procedures except as how that relates to the everyday performance. We observed two situations using the same questionnaire - observations from the field during a vaccination campaign and observations of the simulation exercise. Neither is the 'true' situation, but if the instrument proves to be reliable when measuring two different situations we would have much more confidence that it is approximating the 'true' scores.*

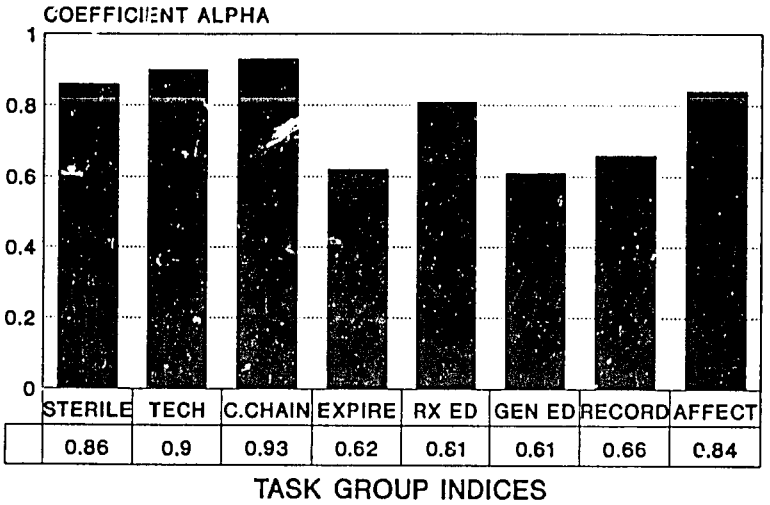
The first approach described above relates to stability and the second to accuracy, which appear to be different things. In practice, however, accuracy implies stability. If the measurement instrument is unstable then it cannot be accurate - i.e., 'true' scores are stable.

The measurement of reliability concentrates on parsing out measurement error. It compares the variance within group to the variance between groups. Reliability is the proportion of error variance to the total variance (yielded by a measurement instrument) subtracted from 1. A reliability score of 1 would therefore be perfect, all the variance is the measurement instrument is "true" variance. There are no absolute standards for acceptable reliability scores. In general, any score above .8 is considered good, between .6 and .8 is acceptable.

To be interpretable, a test must be reliable. If you can't depend on the measurement of the variables you can't look at the relationships between the variables. An unreliable instrument is one that is overloaded with error, not a comfortable situation. Reliability is not the most important aspect of measurement, but is still very important. High reliability does not guarantee good results, but low reliability guarantees bad results.

* Any difference in performance between the two testing situations will be reflected in lower reliability scores.

RELIABILITY - COEFFICIENT ALPHA
STABILITY OVER MULTIPLE OBSERVERS



Graph 8

INTEROBSERVER RELIABILITY

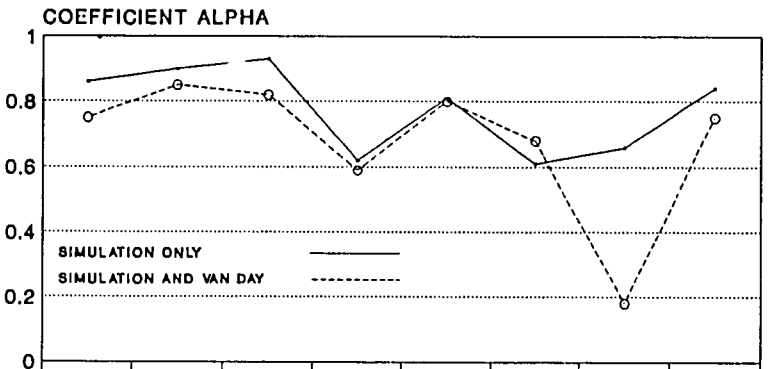
The graph above illustrates the reliability among several observers of the simulation exercise. The observers were therefore watching exactly the same thing. Thus low reliability can only be attributed to interobserver error.

The graph illustrates that the reliability scores between observers were pretty good. 5 of the 8 indices scored above .8, indicative of high reliability. Three of the indices scored closer to .6 (Checking for expiration date and vaccine quality, General education and counselling, and Record keeping). These were three of the smaller indices, containing 3, 4, and 2 measures respectively. Increasing the number of measures in each index would increase their reliability, but other factors are involved, as some of the other indexes are also small and they scored highly.

We suspect that the low score for EXPIRE has to do with the difficulty in interpreting the vaccinators' actions. They must handle and look at the vaccine vial during the course of the vaccination simply to extract the vaccine. The question remains whether she checks the expiration date or looks for sediment. This involves a decision on the part of the observers, and evidently they did not come to unanimous agreement. It suggests that in countries where use of expired vaccines is thought to be a problem, methods other than direct observation should be used to determine whether health care workers are using expired vaccines (Observers could check the expiration date of the vials themselves after the session was completed).

We have not been able to determine why the reliability scores of the GENED and RECORD indices were low. Low interobserver reliability would normally indicate that the measure involved a judgement on the part of the observer (did she or didn't she?, as above). Neither the GENED index or the RECORD index would seem to involve such a judgement and more work is needed to understand the relatively low reliability scores.

RELIABILITY - COEFFICIENT ALPHA
ACCURACY BETWEEN DIFFERENT SITUATIONS



	STERILE	TECH	C.CHAIN	EXPIRE	RX ED	GEN ED	RECORD	AFFECT
	0.86	0.9	0.93	0.62	0.81	0.61	0.66	0.84
	0.75	0.85	0.82	0.59	0.8	0.68	0.18	0.75

TASK GROUP INDICES

Graph 9

RELIABILITY OF THE SIMULATION EXERCISES

The preceding graph compares the inter observer reliability of the simulation exercises to the overall reliability generated by comparing the simulation exercises with the observation of VAN day service delivery. It must be noted that this involves observing the same people, but that they were performing a different set of vaccinations. In itself, this is going to lower the reliability of the comparison. Say, for example, that a particular worker has excellent technique for polio, but not for DPT. The simulation exercises observations have no variation in the number of polio or DPT vaccinations given. During the campaign, however, the worker might have had five polio vaccinations out of the ten vaccinations observed. During the simulation exercises there was only one polio vaccination out of six. The worker is going to score higher on the TECHNIQUE index on the vaccination day than at the simulation exercise. Any differences in performance, either favorable or unfavorable, between the VAN day and the simulation exercise are going to lower the reliability between the two situations. Furthermore, there was a delay of 2-4 weeks between the two observations, which should further lower reliability, as the vaccinators were specially trained in the

week leading up to the Van Day, and the training should have been 'wearing off'.

Nonetheless, the reliability scores are roughly comparable. The only exception is for the RECORD index. We were able to determine that the low reliability for this index was not do to differences in observation, but to differences in behavior. The second VAN day was did not attract many patients, thus there was almost no time pressure on the providers. After each vaccination they carefully filled out both the patient's carnet and the health center's log book. The simulation exercise, in contrast, was designed such that there was always a line of patients waiting to be vaccinated. The providers still filled out the patients' carnets, but they didn't fill out the clinic logs. Questioned afterwards, they indicated that when there were people waiting in line they waited until after the session was over before filling out the logs (obviously increasing the likelihood of error). Thus the low reliability reflects a change in behavior, not low measurement reliability.

This is an example of how simulation exercises can be designed to achieve desired ends. Unlike observing actual service delivery, where many aspects of the encounter are left to chance, a simulation exercise lets the research team design the service encounter in a way that permits observing whatever situation is of interest.

SECTION 5 - FEEDBACK

FRAMES OF REFERENCE

Researchers and managers conducting a systems analysis can use three different frames of reference in regard to the information collected. Systems analysis can be used to:

1) Measure an individual worker's performance in a given task and rating that worker against his/her peers.

2) Measure an entire work group's performance based on the group's average in a given task area and rate that unit against other units.

3) Measure the performance of a given task by individuals, work groups, or all workers in the system and rate that task against other tasks.

Each of these has important, and differing, implications for the process of carrying out a performance analysis. For example, an analysis heavily grounded in Frame 1 is going to be perceived by the individual worker as more threatening to him/her than is an analysis clearly based on Frame 3.

The frame of reference we have developed explicitly excludes Frame 1 for precisely the reason just given. The simulation exercises are perceived by workers as a variant of a familiar training exercise and we are going to great lengths to maintain that viewpoint (e.g., guaranteeing anonymity of participants, focusing mainly on data aggregated at the unit level).

As part of immediate feedback after performance analysis, the observer does go over with the individual worker the tasks he/she did exceptionally well or poorly, but there is no explicit rating of individuals at any time.

The greatest stress in the current assessment is laid on Frame 3: on detailing important tasks and identifying those commonly done well or poorly by the service providers as a group. This is closely allied to the concept of targeted in-service training as the most appropriate control mechanism for improving performance. Within this frame, it is important that performance data be as specific and detailed as possible.

We utilize Frame 3 in emphasizing the management support aspect of the current assessment model. Thus, we feel that it is appropriate and feasible to produce unit ratings that can be compared to those of other units. This is valuable both for the local and middle management teams. Within this frame, it is clearly necessary to reduce the data load by dealing with indices rather than individual items so that comparisons between units can be made.

The manager, thus, has at his/her disposal two sets of data: performance indices showing the mean group score plus some indication of the extremes, and overall item scores showing which item(s) within a given index are exceptional. The manager is able to "zoom" from the first to the second with facility and gain a clear picture of performance in short time.

The reports we provide are anonymous with respect of unit members as individuals, but they establish the range of performance within the unit and the characteristics of service delivery. We expect that local managers should be able to identify by their own observation those workers in their unit who are performing exceptionally.

USE OF FEEDBACK FOR IN-SERVICE TRAINING

Because of the timing of the VAN we were not able to return findings from the first vaccination day in time for the second day. However, a third day was added, providing an opportunity to observe how clinics used the findings of the second VAN day in training for the third VAN day.

Two members of the PRISM-PRICOR Team attended the training sessions in four Health Centers to observe how the feedback report was used to train providers. Information on two other centers was obtained from the informant groups. An observation sheet was developed for the training sessions so that the information noted would be standard. The meetings averaged 2 hours, and were always directed by the nurse in charge of the program, and were attended by all of auxiliary personnel. The theme of the training was vaccination technique. The methodology used was invariably presentation-dialogue and demonstration. They used vaccination supplies and the cold chain (the cold box). One center used overheads.

All but one center had very positive attitudes to the feedback of the results. The nurses running the training sessions tended to note that the finding were not an evaluation per se., but were intended simply to provide indications of where service delivery could be improved. Were the findings to be used in a way that affected peoples jobs, say as part of a merit pay or promotion system, we suspect that they would engender great hostility.
The nurses made as much or more use of the observation checklist as they did of the health center specific findings. It served as a tool to guide them through the steps of the vaccination process for the training exercise.

Much work remains to be done on the use of feedback to improve service delivery, but there are clear indications that the quality of care information provided by the project answered a need in the health system for information they did not possess previously.

APPENDIX 1

Table 1. Quality of care items included in comparative analysis

#	Item description	Task Area
1	POL-PICKUP VIAL/STERILITY	STERILE
2	POL-CONFIRM EXPIRY DATE	EXPIRE
3	POL-REMOVE PROTECTIVE RING/STERILITY	STERILE
4	POL-OPEN THE WRAPPING/STERILITY	STERILE
5	POL-PUT DROPPER IN VIAL/STERILITY	STERILE
6	POL-DRAW VACCINE FROM VIAL/STERILITY	STERILE
7	POL-POSITION CHILD CORRECTLY	TECH
8	POL-TAKE PROTECTOR FROM DROPPER/STERILITY	STERILE
9	POL-SQUEEZE CHILD'S CHEEKS	TECH
10	POL-APPLY DROPS CORRECTLY	TECH
11	POL-PUT PROTECTOR BACK ON DROPPER	STERILE
13	DPT-USE NEW STERILE SYRINGE	STERILE
14	DPT-HANDLE SYRINGE TO MAINTAIN STERILITY	STERILE
15	DPT-USE NEW STERILE NEEDLE	STERILE
16	DPT-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	STERILE
17	DPT-PICKUP VIAL/STERILITY	STERILE
18	DPT-CONFIRM EXPIRY DATE	EXPIRE
19	DPT-REMOVE PROTECTIVE COVERING/STERILITY	STERILE
20	DPT-CLEAN RUBBER CAP	STERILE
21	DPT-WAIT UNTIL RUBBER TOP DRIES	STERILE
22	DPT-ROTATE VIAL SLOWLY IN CIRCULAR MOTION	TECH
23	DPT-LOOK FOR SEDIMENT	EXPIRE
24	DPT-INJECT 0.5CC AIR INTO VIAL	TECH
25	DPT-REMOVE VACCINE CORRECTLY	TECH
26	DPT-REMOVE AIR FROM SYRINGE	TECH
27	DPT-PUT VIAL BACK IN COLD BOX	C.CHAIN
28	DPT-IF MULTDOSE SYRINGE MAINTAIN STERILITY	STERILE
29	DPT-POSITION CHILD CORRECTLY	TECH
30	DPT-CLEAN INJECTION SITE	TECH
31	DPT-LOCATE PROPER SITE FOR INJECTION	TECH
32	DPT-GRAB AREA BETWEEN FINGERS	TECH
33	DPT-INTRODUCE NEEDLE AT 90 DEGREE ANGLE	TECH
34	DPT-ASPIRATE AND VERIFY BLOOD	TECH
35	DPT-INJECT VACCINE SLOWLY	TECH
36	DPT-WITHDRAW NEEDLE WITHOUT RUBBING SITE	TECH
37	DPT-SINGLE USE/DISCARD SYRINGE AND NEEDLE	STERILE
39	MEA-PICKUP VIAL/STERILITY	STERILE
40	MEA-CONFIRM EXPIRY DATE	EXPIRE
41	MEA-REMOVE PROTECTIVE COVERING/STERILITY	STERILE
42	MEA-CLEAN RUBBER CAP	STERILE
43	MEA-WAIT UNTIL RUBBER TOP DRIES	STERILE
44	MEA-OPEN VIAL OF DILUENT/STERILITY	STERILE
45	MEA-USE NEW STERILE SYRINGE	STERILE
46	MEA-USE NEW STERILE NEEDLE	STERILE
47	MEA-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	STERILE
48	MEA-DRAW UP ALL DILUENT	STERILE
49	MEA-SLOWLY INJECTS DILUENT INTO VACCINE VIAL	STERILE
50	MEA-ROTATE VIAL SLOWLY IN CIRCULAR MOTION/BC.	STERILE
51	MEA-VIAL INTO COLDBOX DURING PREP.	C.CHAIN

Table 1. Quality of care items included in comparative analysis (continued)

#	Item description	Task Area

52	MEA-USE NEW STERILE SYRINGE	STERILE
53	MEA-HANDLE SYRINGE TO MAINTAIN STERILITY	STERILE
54	MEA-USE NEW STERILE NEEDLE	STERILE
55	MEA-ATTACH NEEDLE SO AS TO MAINTAIN STERILITY	STERILE
56	MEA-PICKUP VIAL/STERILITY	STERILE
57	MEA-CLEAN RUBBER CAP	STERILE
58	MEA-INJECT 0.5CC AIR INTO VIAL	TECH
59	MEA-REMOVE VACCINE CORRECTLY	TECH
60	MEA-REMOVE AIR FROM SYRINGE	TECH
61	MEA-VIAL IN COLD BOX AFTER VAC.	C.CHAIN
62	MEA-POSITION CHILD CORRECTLY	TECH
63	MEA-EXPOSE LEFT ARM	TECH
64	MEA-CLEAN SITE WITH SOAPY WATER	TECH
65	MEA-CLEAN SITE WITH STERILE WATER	TECH
66	MEA-GRAB LEFT ARM	TECH
67	MEA-INTRODUCE NEEDLE CORRECTLY	TECH
68	MEA-ASPIRATE AND VERIFY BLOOD	TECH
69	MEA-INJECT ALL VACCINE	TECH
70	MEA-INJECT VACCINE SLOWLY	TECH
71	MEA-REMOVE NEEDLE WITHOUT RUBBING	TECH
72	MEA-SINGLE USE/DISCARD SYRINGE AND NEEDLE	STERILE
73	EXPLAIN WHICH VACCINES GIVEN	GEN ED
74	EXPLAIN WHY VACCINES GIVEN	GEN ED
75	EXPLAIN VACCINATION SCHEME	GEN ED
76	REACTIONS-NONE FOR POLIO ONLY	RX ED
77	REACTIONS-GO TO H.C. IF OCCUR	RX ED
78	REACTIONS-DPT,POL/PAIN	RX ED
79	REACTIONS-DPT,POL/FEVER	RX ED
80	REACTIONS-DPT,POL/DON'T APPLY ANYTHING	RX ED
81	REACTIONS-DPT,POL/DON'T SCRATCH	RX ED
82	REACTIONS-DPT,POL/FEVER DURATION	RX ED
83	REACTIONS-DPT,POL/OTHER SYMPTOMS	RX ED
84	REACTIONS-DPT,MEA,POL/PAIN	RX ED
85	REACTIONS-DPT,MEA,POL/FEVER	RX ED
86	REACTIONS-DPT,MEA,POL/ERUPTIONS	RX ED
87	REACTIONS-DPT,MEA,POL/DON'T SCRATCH	RX ED
88	REACTIONS-DPT,MEA,POL/DON'T APPLY ANYTHING	RX ED
89	REACTIONS-DPT,MEA,POL/FEVER DURATION	RX ED
90	REACTIONS-DPT,MEA,POL/OTHER SYMPTOMS	RX ED
91	INDICATE RETURN DATE	GEN ED
92	VACCINATOR GREETED THE MOTHER	AFFECT
93	VACCINATOR PRESENTED HIM/HERSELF	AFFECT
94	VACCINATOR SMILED	AFFECT
95	VACCINATOR CARESSED THE CHILD	AFFECT
96	VACCINATOR LISTENED ATTENTIVELY	AFFECT
97	CARNET WAS FILLED OUT CORRECTLY	RECORD
98	REGISTRY WAS FILLED OUT CORRECTLY	RECORD