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**Factors Affecting Completion
of Childhood Immunizations in
Rural Ecuador: An Observation Study**

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Introduction

The HEALTHCOM project in Ecuador conducted an observational study to identify possible reasons that parents might fail to complete the childhood immunization series and to recommend possible steps to correct the problem. This study was conducted as part of an ongoing two-year project in collaboration with the Ecuadoran Ministry of Health to increase immunization coverage. The study therefore explores how the clinic experience in general, health personnel and mother interactions, and the transfer of information regarding immunizations might affect completion rates.

The guidelines that the Ministry of Health in Ecuador have established call for BCG vaccination at birth, the first DPT and polio vaccinations at the age of three months, and the second and third DPT and polio vaccinations following at three-month intervals with the measles vaccination given with the last of these at nine months of age. It is important to note that the three month interval is longer than what is medically necessary. It was done to simplify the schedule for parents. Thus, parents should be able to complete the immunization series within the first year of a child's life by going only three times after birth for vaccinations. Nevertheless, many parents who begin the DPT/polio series do not complete the series by the time their child is one year old. A rough estimate suggests that about 30 percent of children who are started on the series do not complete it on time.

Observations taken in this study focused on events occurring in rural health centers when children were brought in for vaccinations or for other purposes. The mother (or other adult) and the child were followed through the center to observe events that might account for their failure to return at the correct time. Findings from these observations served as the basis for recommendations to the Ministry of Health for strengthening the health centers' role in improving immunization completion rates in rural areas.

Method

The purpose of observations and interviews was to identify reasons that women did not complete the immunization series for their infants. Thus, attention was paid to the quality of face-to-face communication between mother and health worker--both the information given (need to return, when to return, etc.) and the manner in which it occurred (politeness, appropriate vocabulary, etc.). How (if) the health worker checked mothers' comprehension was also noted. Mothers who were bringing in a child late for a vaccination were questioned about the delay. General procedural problems resulting in failure to vaccinate eligible children were also identified.

Since home follow-up interviews were not possible in this study to tap reasons for clinic dropouts, information was gathered indirectly through interviews with outreach workers from the clinic. They were questioned as to why they thought parents did not complete the series.

Observations were made over a ten-day period by five teams of observers in five different provinces. Each team had three members; all but three were students who had some training in behavior analysis prior to the study, and the other three were especially recruited for their ability to speak Quichua (the language of the Andean Indians in two of the provinces). All observers were trained to conduct behavioral observations in a two-week program.

The five provinces were chosen because they had large rural populations and were considered to have relatively low immunization coverage. They also represented the different regions of Ecuador with two coastal provinces (Manabi and Los Rios), two sierra provinces (Chimborazo and Bolivar), and one province in the oriente (Morano-Santiago).

The observers used five different instruments for observations and interviews. These instruments included:

- **Treatment Observation Form:** This was used in recording events during the child's passage through the center, recording what was communicated and how it was communicated, whether or not vaccinations were given, etc. The observers followed the first available child through treatment so as to avoid any possible selection bias.
- **Exit Interview:** The exit interview was used with each mother who had been followed through treatment to determine what she retained from interacting with the health workers. In addition, mothers shown by their records to be late were interviewed regarding the reasons for their late return.
- **Home Visitors Interview:** Home visitors were interviewed as expert informants as to why some mothers fail to bring children for vaccinations.
- **Medical Personnel Interview:** A brief interview was conducted with medical personnel regarding their practices and beliefs about vaccinations for sick children and their views of the rewards and frustrations of their work.
- **Site Report:** General information about the site which might be useful in the interpretation of the other data was also gathered.

Results and Discussion

Incidence of vaccinations observed: A total of 253 children were followed through treatment at the participating clinics; of these, 183 were vaccinated and 70 were not. Only 16 measles vaccinations were observed, while 40 of the third DPT/polio

vaccinations were administered. (see Table 1) The recommended three-month cycle for DPT and polio was designed to have the measles vaccine administered at the same time as the third DPT/polio vaccinations. Thus, if the schedule were followed perfectly, the same numbers of DPT3 and measles vaccinations should have been observed. Eleven of the third DPT vaccinations were late, yet the measles vaccinations had already been administered. In the remaining cases, the measles vaccine was not given due to lack of vaccine, unwillingness to open new vials, or other clinic-based reasons.

Table 1.
Vaccinations Observed
N=183

Province	BCG	DPT and Polio			Measles
		1	2	3	
Bolivar	16	7	4	13	8
Chimborazo	14	3	4	4	0
Los Rios	7	17	12	16	6
Manabi	9	7	1	5	1
Morona Santiago	16	9	1	2	1
Total	62	43	22	40	16

The researchers were particularly interested in the number of children who left the centers without being vaccinated. As Table 2 shows, of the 70 children who were not vaccinated, 13 were sick but should have been vaccinated according to MOH guidelines. In another nine cases, the full three months had not elapsed since the last vaccination in the series, but the medically required one month had. This suggests that health workers do not understand the guidelines in that the three-month cycle is just a scheduling device to make completion of the three DPT, three polio, and one measles vaccinations possible through only three contacts with the medical system. When an earlier contact is made, vaccines should be administered. Another 21 cases involved some failure in vaccine

supply or a health worker's unwillingness to open a new vial. Of all the children who might have been vaccinated, over 20 percent were not vaccinated due to some failure on the part of health center personnel or the medical system in general.

Table 2.
Reasons No Vaccine was Administered
(determined by observer)
N=70

Reasons	Bolivar	Chimborazo	Los Rios	Manabi	Morona	Total
Possible Errors of Procedure						
Sick	4	3	0	6	0	13
Returned Before 3 mos.	0	1	0	8	0	9
No Vaccine	3	10	0	1	0	14
No Doctor	0	0	0	1	0	1
Not A Vaccination Day	0	1	0	5	0	6
Under Weight Child	1	0	0	0	1	2
No Card	0	2	0	0	0	2
Not Errors						
Under 1 Month	0	0	0	1	0	1
Series Complete	2	3	0	14	0	19
Observer Couldn't Determine Reason	1	2	0	0	0	3

Mothers' information concerning need for and date of return: Exploratory observations had suggested that a major problem would be that mothers leave the centers without a clear understanding of when they should return for the next vaccination. Instances of poor communication by nurses, aides, and doctors had been observed. In part the expectation was confirmed as can be seen in Table 3 and 3a. Table 3 shows how many mothers received critical messages about the immunization process during their clinic visit, by region. Table 3a is a summative table of the same data showing the percent of all mothers observed who received health information. As can be seen in only 19 percent of the cases, mothers were told when to return, and 41 percent had the return date recorded in the child's health card.

Suprisingly, however, when asked in the exit interview whether they needed to return, mothers in overwhelming numbers were aware of the need to return. Table 4 shows that of the 226 mothers who had not completed the series only nine mistakenly indicated that they did not need to return for additional vaccinations. When they were asked the source of information about returning, about half indicated that doctors or nurses had told them, 15 percent referred to the card, 13 percent indicated media (especially radio), and 12 percent indicated that it was just general knowledge. This suggests that multiple sources of information are working to keep those people who use the medical centers well-informed.

Table 4.
Mother's Response in Exit Interview to
the Question "Is it Necessary to Bring
Back the Baby for another Vaccination?"
 N=236

Province	Yes	Appropriate No Series Complete	Inappropriate No Series Incomplete
Bolivar	48	0	4
Chimborazo	44	1	3
Los Rios	48	0	0
Manabi	51	8	2
Morona	26	1	0
Totals	217	10	9

Many fewer mothers however, were completely accurate in their report to the observers of when they were to return. Fifty-five mothers of 219 (series incomplete) stated an incorrect return time. When those mothers whose cards were marked with a

return date were asked what the marking meant, 105 said that it indicated when to return (although many of them could not read) and the remaining 30 said they did not know.

Besides what information was or was not given, observers noted other communication behaviors of health workers. Some interesting patterns of language usage emerged. In many of the clinics, even though most of the clientele were primarily dialect speakers (Quichua), the health workers used Spanish both to interact individually and to give health education sessions. Observations also revealed that health workers used the informal form ("tu") more often with indigenous women than with the Latino women. Although Table 5 shows only 9% of women were addressed informally, all of those women were Quichua. These practices suggest condescending health worker behavior toward indigenous clients.

Table 5 also shows that health worker-mother interactions were one way. Rarely did the health worker ask the mother to explain or to demonstrate what she had understood about the immunization process from the clinic visit.

In summary, this study has shown that communication concerning the importance of completing the immunization series and when mothers are to return could be improved in the centers. Nevertheless mothers are relatively well-informed even in the face of such poor communication, so information transmission would not seem to be the highest priority for program emphasis. More importantly, how the information is transmitted and how the mothers are treated during a clinic visit bear further investigation.

Reasons for late returns: Table 6 is a tabulation of all mothers who were late according to the three-month cycle specified by the ministry guidelines. The table shows the total number of months the child is behind schedule as indicated by the birth date on the card. Many fewer children were being vaccinated behind schedule than had been expected. Most striking is the small number (21) of tardy cases among the mothers who use the centers regularly for immunization. The drop off between the first DPT and the third DPT vaccination seems to occur mostly for mothers who use the other two means of receiving vaccinations--the intensive vaccination campaigns and the travelling vaccination teams. To the extent possible then, it would be worthwhile to promote the regular use of the centers for immunization. Historically, intensive campaigns have occurred at intervals longer than three months, thereby producing late vaccinations for anyone using them exclusively. Moreover, if a mother misses either the campaign or the visit of a travelling vaccination team (because the child is ill, perhaps), then a long delay results before a mother has the opportunity to obtain a vaccination outside a health center.

Table 6.
Number of Late Vaccinations Observed
N=21

Vaccine Administered	Total Late	Months Late					
		<1	1-2	2-3	3-6	6-12	>12
DPT #3 / Polio #3 With or without Measles	8	2	1	1	1	3	0
DPT #2 / Polio #2	2	0	0	0	0	1	1
DPT #1 / Polio #1	8	2	3	0	1	2	0
Reinforcement DPT and Polio	2	0	1	0	0	0	1
Measles	1	0	0	1	0	0	0

Mothers returning late were questioned during the exit interview as to their reasons for being late. Only one mother indicated that she was deterred by her child's reaction to a prior vaccination. This is consistent with the hypothesis that mothers tend to accept reactions to vaccinations, and that reactions are not a deterrent to continuing the series. This is also consistent with findings of a KAP study done in Ecuador. It is possible, however, that the mothers who are distressed by reactions may not return to the clinics at all and therefore their responses are not reflected in this study.

Other mothers indicated some lack of knowledge of the return date or need to return. This is consistent with the above observations concerning knowledge--a problem, but not a highly frequent one.

The most frequently cited problem for being late was the child's illness. Some mothers reported instances in which, contrary to the guidelines, the child was seen by a doctor or nurse while sick and was not vaccinated. Others mentioned illness, so they delayed coming to the clinic for the vaccination (i.e., no doctor or nurse was seen).

Other reasons cited were distance and travel time to the clinic and no vaccine available at the time they presented their children at the health centers.

Personnel who regularly travel in the area to locate and vaccinate children were interviewed to gain information about possible reasons mothers stop seeking vaccinations. Table 7 shows both spontaneous and prompted responses. Spontaneous responses were recorded on the interview form. The interviewers prompted health workers for other possible reasons mothers might stop vaccinating their children. Health workers mentioned most often the distance the mother must travel to reach the center. A second frequent response was lack of knowledge of the need, importance, or date for return. A substantial number of health workers mentioned a mother's negligence, irresponsibility, or lack of concern. This is not a behaviorally useful category however, because it fails to point toward any causal factor which might explain why some mothers give low priority to having the child vaccinated.

Table 7.
Reasons Mothers Fail to Complete Series
According to Home Visitors
(From Home Visitors Interviews)
 N=41

Reasons	Prompted Plus Spontaneous Responses	Spontaneous Responses
Distance	46	16
Lack of Knowledge --of Need --of When to Return --of Importance	40	9
(Descuido) Negligence, Indifference	39	13*
Took Infant But Vaccine Not Given	23	1
Superstitions	22	4

*Ten of these responses came from the province of Chimborazo.

Twelve percent of the mothers observed in the center said that they had travelled two hours or more to reach the center. Waiting time at the center was more than two hours for 24 percent of the mothers observed. These observations cast some doubt as to the actual role distance and time play in immunization completion. Related to these logistical issues is the high frequency of closed centers. In one province (Los Rios), ten centers were found to be closed at times generally designated to be open.

Why are sick children not vaccinated? Many cases were observed in which children were seen who were sick and, contrary to guidelines, were not vaccinated. This was also reported by mothers and home visitors as a frequent reason for delays in completing the series. Medical personnel who were observed in these centers were asked whether they vaccinated children with moderate fevers and if not, why not. Of the 67 interviewed, 36 said that they did not vaccinate children with fevers, ten said sometimes, and 21 said that they did. Of those that reported not regularly vaccinating children with fevers, almost all claimed that this was correct practice. They said that it was unhealthy to vaccinate sick children, that it elevated the temperature, or that not vaccinating sick children was simply the correct practice. A few said that the parents or the community would disapprove of vaccinating a sick child.

They were next asked if they were aware of the WHO recommendation that most sick children should be vaccinated. Thirty said that they were aware, and 35 were not, but few could state the rationale for the recommendation. Eight said it was research-based, and six said that since many children are seen only when sick, it made sense to vaccinate then. It is clear that a significant number of those who administer vaccinations hold strongly to the belief that they should not vaccinate sick children and are largely unaware of the argument for vaccinating all children according to the schedule. Health care providers, then, are a priority target for a communication program.

Summary of Results

A. Many opportunities to vaccinate are lost because of health care providers' failure to understand and follow WHO guidelines. Children who are sick are often not vaccinated; children who return earlier than the recommended scheduling interval of three months are frequently sent away with instructions to return at the "correct" interval; health workers do not want to open a new vial or vaccinate on a day not designated as a "vaccination day". Moreover, health workers frequently fail to inform the mother of the importance of the next vaccine or the specific time to return.

B. Mothers seen in the centers are surprisingly well-informed regarding immunizations, although they are sometimes unclear of the correct return date for their specific infant.

C. Very few mothers were more than a little behind schedule. It appears that the overall drop-off in completing the series within the first year is traceable to mothers who do not use the regular service in the centers but instead rely on the intensive campaigns and travelling immunization teams. Coupled with the widespread belief that the three-month scheduling cycle defines the earliest time that the next dose can be received, this virtually assures late vaccinations.

D. A number of factors make taking the child to the center particularly aversive. Mothers have considerable distance to travel; long waits occur at the centers; sometimes a center is unexpectedly closed; the child may be refused a vaccination and sometimes mothers are not treated with respect. These difficulties are not offset by any special rewards for or acknowledgements of the mother's considerable

effort and care in bringing her child for vaccination.

Recommendations

A. A reinforcement-based management system for the medical personnel could do a great deal to solve many of the clinic-based problems. Medical personnel should be reinforced for increased immunization coverage in the area they serve.

B. Perhaps as a part of the behavior management system, medical personnel need to be trained in procedures that will increase coverage. Information on the need to vaccinate earlier than the three-month interval should be fairly easy to provide. Education on the need to vaccinate sick children will be more difficult, because of the firm belief opposing the practice. Training on effective communication with mothers and other ways to improve the clinic experience would also help.

C. There should be an intensive effort to increase regular use of the centers. This is not meant as an argument against the intensive campaigns which seem essential to reach many people, but increasing use of the centers will improve the rate of timely completion of immunization series. It would also help in tracking immunization coverage.

D. Use of the centers could be increased by a strong peer and community leader reinforcement system. A centrally displayed map of each dwelling in a community should contain up-to-date labeling of the vaccination status of each infant in a household.

E. The "Diploma for the Protected Child" issued in the July 1986 campaign should be used regularly in the centers.

Table 3.
Number of Women Given Information by
Health Workers over Number of Interviews
Number Informed/Number Interviewed

Health Topic	Bolivar	Chimborazo Rios	Los	Manabi Santiago	Morora	Total	%
Reaction to be expected for DPT	39/52	8/11	19/44	11/15	7/14	84/109	62%
Nature of Protection for Administered Vaccine	7/40	15/27	13/49	14/24	0/27	49/167	29%
Importance of Next Scheduled Vaccine	12/40	14/27	5/49	15/24	2/27	48/167	29%
When to Return	6/40	10/27	7/49	3/24	5/27	31/167	19%
Recorded Return Date on Health Card	10/40	21/27	9/49	8/23	20/27	68/166	41%

Table 5.
Health Worker (HW) Communication Techniques
Observations of Clinic Visits

Provinces	HW Used Informal ("Tu")	HW Used Formal ("Usted")	Mother Asked to Explain		Mother Asked to Demonstrate	
			Yes	No	Yes	No
Bolívar	6	36	2	38	1	39
Chimborazo	6	21	5	22	20	7
Los Ríos	5	44	0	49	5	44
Manabí	0	58	2	44	1	45
Morona- Santiago	2	25	1	26	27	0
Total	19	184	10	179	54	135
Percentage	9	91	5	95	29	71