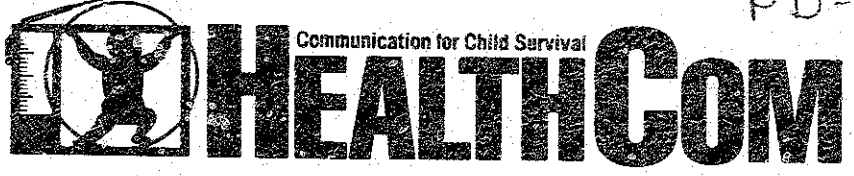

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RESULTS FROM THE EVALUATION OF THE PREMI/HEALTHCOM PROJECT IN ECUADOR 1985-1988

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LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

PREMI was a milestone in the HEALTHCOM program and, indeed, in child survival efforts worldwide. It was a sustained national program focusing on four major child survival technologies (immunization, diarrhea, growth monitoring, and breastfeeding). It married the technologies of social marketing to both mobilization strategies of UNICEF and to the strategies for routine maintenance of health practices. It brought together the Ministry of Health (MOH) with the National Institute of the Child and Family (INNFA), the agency of the country's First Lady, to realize its goals. It put a great emphasis on research about the program's clients and about the functioning of the health system as the basis for its programming.

As we will see it had some striking successes and some failures. Its obvious successes were in realizing a massive education and promotion effort, in sharply increasing immunization rates and, probably, in moderately increasing use of Oral Rehydration Solution (ORS). Its failures were in falling short of somewhat unrealistic goals, particularly in diarrheal treatment and of greater moment, in producing little long-term change in how child survival efforts were done in the Ministry of Health.

In brief, PREMI promoted complete immunizations and appropriate diarrheal disease treatment, including the use of ORS packets, and to a lesser extent, growth monitoring and breastfeeding, between October 1985 and June 1988. A major feature of its activities were *jornadas* (vaccination days) where children were to be vaccinated and, often, could receive ORS packets and be weighed. This complemented continuous promotion on child survival themes during the rest of the period, through both the health system and mass media.

The research and evaluation program included many forms of data collection from many different audiences, much of which was used for formative purposes. This evaluation report stresses two of those forms of data collection: The narrative history and the chapter on institutionalization reflect both formal and informal interviews and observations by the evaluation team, and documents written by others who worked in the project. The other chapters which stress quantitative analyses of effects and the process through which the effects were achieved depend on four knowledge-attitude-practice (KAP) surveys.

PREMI was directed through two institutions, the National Institute of the Child and Family (INNFA) and the Ministry of Health (see Figure 1). INNFA was a non-profit, semi-autonomous government agency directed personally by the First Lady of Ecuador, Doña Eugenia Cordovez de Febres Cordero, providing child and family services, especially to less-privileged sectors of the population. Detailed planning for PREMI mobilizations was carried out by a technical commission made up of the PREMI coordinators at INNFA, MOH, Ministry of Education and USAID. A national executive committee, presided over by the First Lady, approved guidelines, strategies and plans prepared by the commission. It was made up of high-level operational representatives of INNFA, the Ministries of Health, Education, Social Welfare, and Defense, plus representatives of Congress, the National Bishops Conference, the medical schools and the media. Donor agencies USAID, UNICEF, and PAHO were also represented.

Communication was a central feature of PREMI's social marketing methodology. Messages about the PREMI campaign were carried on mass media of all types as well as through interpersonal channels. The Department of Communication and Social Marketing of INNFA prepared and distributed various materials, and new promotional materials for the campaign were continuously produced. For each *jornada* there were new materials, and between *jornadas* support materials were put into circulation. The materials produced fell into several categories: those to promote a specific date or activity such as a *jornada* or a contest; educational materials for mass distribution; and support materials for interpersonal promotion and educational activities.

RESULTS OF THE IMMUNIZATION PROGRAM

The PREMI immunization program involved seven focused vaccination campaigns (called *jornadas*) between October 1985 and May 1988. Each *jornada* was preceded to a varying degree by:

1) mass communication promotion encouraging participation just before each *jornada*,

2) social mobilization at the local level by Ministry of Health staff and members of other governmental and non-governmental institutions, and

3) the organization of special immunization sites in addition to the normal health facilities to ease access to vaccination.

The evaluation addressed three issues:

1. Did the PREMI program affect immunization rates?
2. Were its effects equitably distributed across the socioeconomic spectrum?
3. What was the process through which PREMI's communication activities affected vaccination behavior?

The answer to the first question was yes, although not to the degree that had been sought. The original objective of the immunization program was to increase coverage of children under one year old from 48% to 80%. That objective was not met, but in part because it assumed a level of baseline coverage much higher than had been realized.

In Figure 1, the 12 month complete coverage rate (relying on dated, card evidence) was around 15% for children who reached their first birthday before the start of PREMI. The comparable proportion was 31% for children who reached their first birthday after the initiation of PREMI.

Both of those numbers, however, understate the true coverage rates because they relied on dated, card evidence. It was not possible to estimate the degree of underestimation for pre-PREMI coverage. However, for April 1987 we can adjust the estimate. In Table 2, a 'best picture' estimate (including self-report as well as card data) of April 1987 concurrent coverage put 12 month complete coverage at 43%, while the comparable card-based, dated estimate was 32%. Thus the conservative estimate was about two-thirds of the best picture estimate. If we make a similar correction for the pre-PREMI estimates, the best picture shift would be from 20% to 43% coverage of children under one year old .

Under one year old coverage is the ideal criterion because it captures on-time behavior. However the international standard is 12 to 23 month old coverage. In our analyses we approximated that criterion by using complete coverage by 18 months. For children who reached 18 months before PREMI, complete, dated coverage was 21%; for children who reached 18 months who had at least 11 months under the PREMI program, the coverage was about 55%. Adjusting each estimate to give a 'best picture'

view (based on an apparent 17% underestimation for 18 month coverage in April 1987, according to Table 2) would credit PREMI with a corrected shift of 25% to 66%.

Thus the most stringent view, dated card evidence of 12 month complete coverage, suggested the PREMI shift was 15% to 31%. The rosiest picture, accepting card or self-reported data about complete coverage at 18 months, claimed a shift from 25% to 66%.

In addition, by Survey 3, even most of those left incompletely covered at eighteen months were on their way to complete coverage by two years of age, approximately. Of children over 27 months of age, 80% to 90% were completely covered.

Overall, PREMI had led to a major increase in coverage -- all estimates suggested that complete coverage doubled -- and an increasingly early age for achieving that coverage. While the rates achieved fell short of the goal of 80% by one year of age, the goal was unrealistic as it was based on a greatly overestimated baseline level. The major work left to do was to maintain coverage rates and continue to lower the age of completion.

The second question, about equity of effects, also deserves a positive answer. Prior immunization programs had left poorer Ecuadorans with a much lower rate of coverage than better-off Ecuadorans. This changed with the introduction of PREMI. The substantial increases of PREMI were shared at least equally among social groups and possibly were relatively larger among the worse-off groups. The poorer groups continued to have substantially lower vaccination rates than better off groups. Nonetheless they had not lost ground as overall rates increased, and possibly gained somewhat.

The third question about the process of effects gains the most complex answer. The evidence used to answer the process questions were a mix of comparisons over time and cross-sectional analysis. They did not provide definitive answers about causal processes that might come from quasi-experimental data. Nonetheless, the data were consistent with several alternative causal models. All three of the proposed paths through which the PREMI communication program might have affected its audience were consistent with the data.

a) Individuals were exposed to PREMI messages, learned new information from that exposure, and turned that knowledge into better vaccination practice.

b) Communities with greater levels of exposure to PREMI messages also had higher aggregate levels of knowledge about vaccination. And, at least for individuals whose own knowledge about vaccination was less, community knowledge replaced individual vaccination knowledge in producing better practice.

c) Community level of practice predicted individual level of practice, over and above the effects of individual characteristics, like education, wealth, knowledge of vaccination and individual exposure to PREMI messages. Indeed community average behavior was the single best predictor of individual behavior.

We were unable to sort out the influences on community behavior since many community characteristics (including average education, wealth, vaccination knowledge and exposure to PREMI messages) were highly inter-correlated. There separate effects could not be separated. Thus the data were consistent with an argument that PREMI influenced individual behavior both because it taught individuals and because it changed the climate in the community as a whole.

RESULTS OF THE DIARRHEAL DISEASE PROGRAM

1. PREMI produced an increase in ORS use from around 5% to around 20% of all cases of diarrhea.

2. This increase occurred in the context of sharp increases in awareness, trial, and knowledge about how to mix ORS. By eighteen months into the PREMI program, virtually everyone was aware of ORS, 60% had tried it, and nearly 80% could prepare it accurately (of the 95% of those who said they knew how to prepare it).

3. There was substantial evidence that PREMI efforts were responsible for the sharp increases in use as well as in knowledge. A major source was the distribution of packets at vaccination *jornadas*, but other efforts, including mass media promotion and actions of health clinics, also mattered.

4. ORS was used more readily in more serious cases. For example, 15% of children whose cases lasted one day were given ORS, which was half the rate (30%) for children whose cases had lasted four or more days. Nonetheless many cases described as being substantially serious were not given ORS.

5. There were two major constraints on higher use of ORS:

   a) About 30% of all cases were said to have been treated at a clinic. Only about one-third of those cases were given ORS. If all cases brought to the clinic had been given ORS, the whole sample ORS use rate would have been nearly 35% instead of 22%.

   b) Nearly 60% of all cases were treated at home, and about one-quarter of them used ORS. However almost all caretakers who used ORS had obtained it either from a clinic (assumedly on a previous visit) or from a PREMI *jornada*. With the end of PREMI *jornadas* and their free distribution of packets, and with the apparently inconsistent distribution of ORS through clinics, one can only assume that home use of ORS was likely to decline further after Survey 3. Lack of easy access to ORS packets for home use was a sure constraint on expansion in its use. Also, this constraint on access will likely have exacerbated the apparent social inequity in ORS use. While prior trial of ORS was about equal across social groups, last case use was highest among the most advantaged class (33% vs 18%.)

6) To some extent home use of ORS was supplemented by other forms of ORT, including various teas. However one-half of home treaters were not using any form of ORT.

The PREMI program's efforts in promoting improved treatment of diarrheal disease were a success; they greatly increased the stock of information and experience with ORS in the Ecuadoran population and they increased overall use from 5% to 20%. On the other hand PREMI's efforts may have fallen short in that they did not create stable change in the practices of the health facility personnel or establish adequate access to ORS packets on a permanent basis for home use. In a sense, the promotion side of the PREMI program was an outstanding success; the attempt to modify the infrastructure of treatment and of distribution was not.

INSTITUTIONALIZATION OF PREMI

How well this particular and novel mix of social marketing and traditional Ministry of Health procedures work from an institutional perspective? Our answer has three parts: first, it actually worked in some elements; second, the mismatch between these two approaches limited other success; finally the two pronged institutional structure which served as the basis for allowing the two approaches to operate proved to undermine integration of the approaches and thus institutionalization of the PREMI activities.

1. There were massive mobilizations integrating the actions of INNFA and of the MOH: the mass media and other forms of promotion and the vaccination and ORS packet delivery worked together over several *jornadas*. For all the disappointment associated with later failures to match promotion with service delivery, there was a great deal of successful coordination.

2. The major area where PREMI fell short of realistic goals due to an INNFA/MOH mismatch was in achieving only a 20% rate of ORS use. In the diarrheal disease chapter we pointed to two major concerns: evidence that only one-third of the cases that were taken to the clinics were given ORS, and the failure to establish any stable mechanism for supply of ORS packets for the many cases that were treated at home. For ORS, there was a substantial mismatch between INNFA's aggressive social marketing of ORS and the MOH's adaptation of its diarrheal disease policies and practices. While distribution of packets at *jornadas* and heavy and effective mass media promotion were producing quite high levels of awareness, mixing knowledge and trial, MOH practices at clinics and policies for continued use outside of clinic availability of ORS did not match.

3. It is when we turn to the issue of long term institutionalization of this social marketing capacity that the institutional tensions loom much larger. Essentially the social marketing effort was entirely located in INNFA; it received both the funds and the technical advice to support this area. Those activities were run within the broad PREMI framework and reflected many joint meetings with MOH personnel. Nonetheless, operationally they were carried out in isolation. It was clear that these activities were not part of the MOH. Also, it was generally believed that the entire social marketing approach with its heavy emphasis on mass media promotion was also ideologically alien to many MOH personnel, particularly in the health education department. This department historically had emphasized smaller

scale community-level promotion efforts; their failure to be incorporated into, or be funded by, or obtain any credit for, the social marketing efforts of PREMI did little to win them over.

A major goal in the institutionalization process was the integration of social marketing into the Ministry of Health. This plan never materialized. In the third year of the program, INNFA decided to reduce its involvement with PREMI. This decision, made at a time of pressure in the Ministry of Health to take leadership, was logical but it destroyed the possible link between INNFA and the Ministry of Health for the transition.

There are two views which might be taken of this undoubted institutional failure. A pessimistic view is the obvious one: what was the point of doing all of the communication and social marketing if nothing was to be left behind. Another view asks whether the long term problems should not be balanced with a positive view of what was accomplished -- for three years there was something good happening which likely influenced the health status of children for the better. Implicitly, this view asks an unanswerable question: what would have happened if the entire PREMI program had been housed in the MOH and the First Lady and INNFA had been uninvolved? Would the effective communication program still have been there? Would it have been better integrated with ongoing MOH service delivery? Might its perspectives and some of its actions have continued to be part of the routine MOH operating system? Or, alternately, would the dynamic and novel efforts been swallowed by the traditional bureaucracy of the MOH, which only would have sacrificed the successes documented in this volume without any better institutionalization outcome?

In a sense, the things that made INNFA's promotion effort work: its autonomy, its ability to act in ways not customary in traditional ministries, its focus and single-mindedness, its affiliation with the First Lady, were also the things that got in the way of its integration with the MOH. It is not clear that the goal of institutionalization could have been accomplished without sacrificing the goal of having an effect.
Thus it is easy to lament the institutional division between INNFA and the MOH in retrospect. Nonetheless, PREMI did accomplish a great deal even with its two-headed organizational structure. Perhaps it would have given up its substantial successes without producing long term institutionalization had it been completely integrated within the MOH.

From the current perspective it certainly seems as though something more could have been done to integrate MOH personnel into the ongoing social marketing effort and then to improve the training effort supporting the transition to MOH control. It would likely have been worth the effort, although its outcome cannot be predicted confidently.

As this story of PREMI and its communication effort ends, we repeat the need to balance, on the one hand, failure to develop social marketing and communication capacity for the long term and speculation that it might have been done better some other way, with a recognition of substantial successes during its years of operation. The potential for public health communication seems clearly documented, even if the ways of permanently institutionalizing are not.

INTRODUCTION

BACKGROUND AND DESCRIPTION OF THE HEALTHCOM PROGRAM

Health Communication for Child Survival (HEALTHCOM) was a five-year communication program designed to assist developing countries promote the widespread use of effective child survival strategies. HEALTHCOM was sponsored by the Office of Health and the Office of Education within the Bureau for Science and Technology of the U.S. Agency for International Development. The program was administered by the Academy for Educational Development. The Center for International, Health, and Development Communication (CIHDC) at the Annenberg School for Communication, University of Pennsylvania was responsible for evaluating the impact of HEALTHCOM activities under sub-contract to the Academy for Educational Development.

The program worked in 17 countries, using a research and development approach to promote changes in behavior that affect child health. The approach draws from the disciplines of social marketing, communications, behavioral analysis, instructional design, and anthropology, among others. Specific activities focused on immunization, the control of diarrhea, breastfeeding, nutrition, growth monitoring, hygiene, and other behavior that promote child survival.

While its application varied from country to country, the HEALTHCOM approach use in all sites generally combined pre-program and continuing research with a multiple channel communication program to address public health problems on a national level. The approach has three important stages: pre-program planning and development, the instructional interventions, and ongoing monitoring and evaluation. The planning phase gathers information so that each project can be tailored to the specific needs of the target population. The instructional interventions combine some or all of radio, television, print, and face-to-face communication channels to educate an audience about a specific health theme. Ongoing monitoring and evaluation contribute feedback about the relative success of different aspects of the program, allowing for adjustments during the campaign. The final evaluation serves as an example

for subsequent programs using the public health communication approach, in the same country or elsewhere.[1]

PREMI PROGRAM

PREMI was a milestone in the HEALTHCOM program and, indeed, in child survival efforts worldwide. It was a sustained national program focusing on four major child survival technologies (immunization, diarrhea, growth monitoring, and breastfeeding). It married the technologies of social marketing to both mobilization strategies of UNICEF and to the strategies for routine maintenance of health practices. It brought together the Ministry of Health (MOH) with the National Institute of the Child and Family (INNFA), the agency headed by the country's First Lady, to realize its goals. It put a great emphasis on research about the program's clients and about the functioning of the health system as the basis for its programming.

As we will see it had some striking successes and some failures. Its obvious successes were in realizing a massive education and promotion effort, in sharply increasing immunization rates and, probably, in moderately increasing use of Oral Rehydration Solution (ORS). Its failures were in falling short of somewhat unrealistic goals, particularly in diarrheal treatment and of greater moment, in producing little long-term change in how child survival efforts were done in the Ministry of Health.

This document is a partial evaluation of the PREMI program. It is a "partial" evaluation because its focus is on the effects of the communication component of PREMI rather than on the whole of the PREMI program. It was commissioned under the HEALTHCOM program which was providing advice in that area. Also it is "partial" because the major data collection activities reported here ended in April 1987 although PREMI continued through June 1988. Nonetheless, there is a good deal to be said even within this partial view.

In brief, PREMI promoted complete immunizations and appropriate diarrheal disease treatment, including the use of ORS packets, and to a lesser extent, growth monitoring and breastfeeding, between October 1985 and June 1988. A major feature of its activities were *jornadas* (vaccination days) where children

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[1]For more information on the HEALTHCOM methodology see Rasmuson, M.R., Seidel, R.E., Smith, W.A., & Booth, E.M. Communication for Child Survival. Prepared by the Academy for Educational Development for the U.S. Agency for International Development, June 1988.

were to be vaccinated and, often, could receive ORS packets and be weighed. This complemented continuous promotion on child survival themes during the rest of the period, through both the health system and mass media.

The research and evaluation program included many forms of data collection from many different audiences, much of which was used for formative purposes. This evaluation report stresses two of those forms of data collection: The narrative history and the chapter on institutionalization reflect both formal and informal interviews and observations by the evaluation team, and documents written by others who worked in the project. The other chapters which stress quantitative analyses of effects and the process through which the effects were achieved depend on four knowledge-attitude-practice (KAP) surveys.

A KAP survey in December 1985 included urban, semi-urban, and some rural caretakers of children under five years old. The 940 respondents reported on exposure to PREMI, knowledge and attitudes about vaccination, diarrheal treatments, and other areas of PREMI focus, diarrheal treatment and vaccination practices, and socio-demographic background. This is referred to as Survey 1.

There was a supplemental KAP survey in April 1986. After data from the December 1985 survey was complete, analysis revealed that the prior sampling procedures substantially underrepresented rural people. An additional 500 rural caretakers were sampled, responding to virtually the same questionnaire as had been used in December. This data is used only sparingly in the presentation; instead the December survey was adjusted to make up for its underrepresentation of rural caretakers since that data was collected closer to the initiation of PREMI.

A representative national survey of caretakers was undertaken in July and August 1986. In that survey 2,702 mothers and caretakers of young children responded to a new survey instrument, which included some of the questions from the previous questionnaire. This instrument was developed in collaboration with another cooperating USAID project (Project REACH) and reflected the needs of that project, as well as the evolving needs of the PREMI program itself. These changes produced a far richer data set but also one where comparability over time was reduced. This is referred to as Survey 2.

A final KAP survey, with 1460 caretakers, was undertaken in April 1987. Both the sampling procedures and the instrument were basically parallel to the July/August 1986 survey. This is referred to as Survey 3.

This report presents the results in four chapters. The first provides a narrative history of the PREMI program. The second examines the results of the immunization program, considering first the extent of effects on vaccination rates and then tracing the process of the influence of the PREMI communication program. The third chapter presents results of the diarrheal disease treatment program. The evaluation closes with a chapter considering some of the institutional issues, borrowing heavily from a thoughtful personal memoir by Marco Polo Torres, Director of the National Institute of the Child and Family (INNFA) communication program.

HEALTHCOM in Ecuador was an extended project and many people have played important roles in the evaluation as well as in PREMI itself. Some are listed as co-authors, but others contributed substantially to the evaluation as interviewers, as compilers of documents on which we relied, or as critics of earlier documents we have produced. They are not co-authors since they cannot be held responsible for what we say, but their contributions are greatly appreciated. They include Martita Marx, formerly PREMI USAID coordinator, Marjorie Pollack, who worked on the design of the questionnaires on behalf of Project REACH, as well as Iván Laspina who headed the Research Unit at INNFA/PREMI. Data collection coding and some preliminary analysis was undertaken by two Ecuadoran research firms, E. Pinto & Co. and the Center for Planning and Social Studies (CEPLAES). CEPLAES in particular and its leaders Rafael Urriolla and Francisco Carrión, were central collaborators for surveys 2 and 3.

NARRATIVE HISTORY OF THE PREMI PROGRAM

NATIONAL AND INSTITUTIONAL SETTINGS

In 1985 Ecuador had a population of approximately eight million people of which one million were children under five years of age. Infant and child mortality were high: official estimates put infant mortality in 1985 at 64 per 1000 live births with the rate higher, up to 200 per 1000, in rural areas. The leading causes of child death were diarrheal and respiratory diseases.

In 1985 the government of Ecuador created the country's first National Child Survival Program directed specifically at lowering mortality and morbidity from four principal causes: diarrheal disease, vaccine-preventable childhood diseases, malnutrition, and acute respiratory infection. This program, PREMI (Plan de Reducción de Enfermedad y Muerte Infantil), was supported by the United States Agency for International Development (USAID), UNICEF, the World Health Organization (WHO), and the Pan American Health Organization (PAHO).

PREMI was the outgrowth of several previous government efforts. For diarrheal disease control (DDC), the Ministry of Health had begun a program centered around Oral Rehydration Therapy (ORT) in 1979. ORT was to be promoted in government health facilities, in medical schools and among health workers. Also, oral rehydration salts packets (ORS), used to treat dehydration resulting from diarrhea, were to be distributed through the health system and community leaders. This program increased the number of ORS packets in circulation, but by 1984 the distribution was still far below the level needed to fully cover the target population. A 1981 USAID Integrated Rural Health Delivery System program included a DDC component also focused on ORT in three Integrated Rural Development areas. That program was judged to be a success and ready to be expanded to the nation as a whole.

For immunizations, Ecuador had established a nationwide Expanded Program of Immunizations in 1977, part of the WHO worldwide child immunization initiative. The Ministry of Health program began as an outreach house-to-house program and shifted to one providing routine availability of vaccinations on demand at health facilities. In 1982 the program expanded to include "intensive phases," three one-week

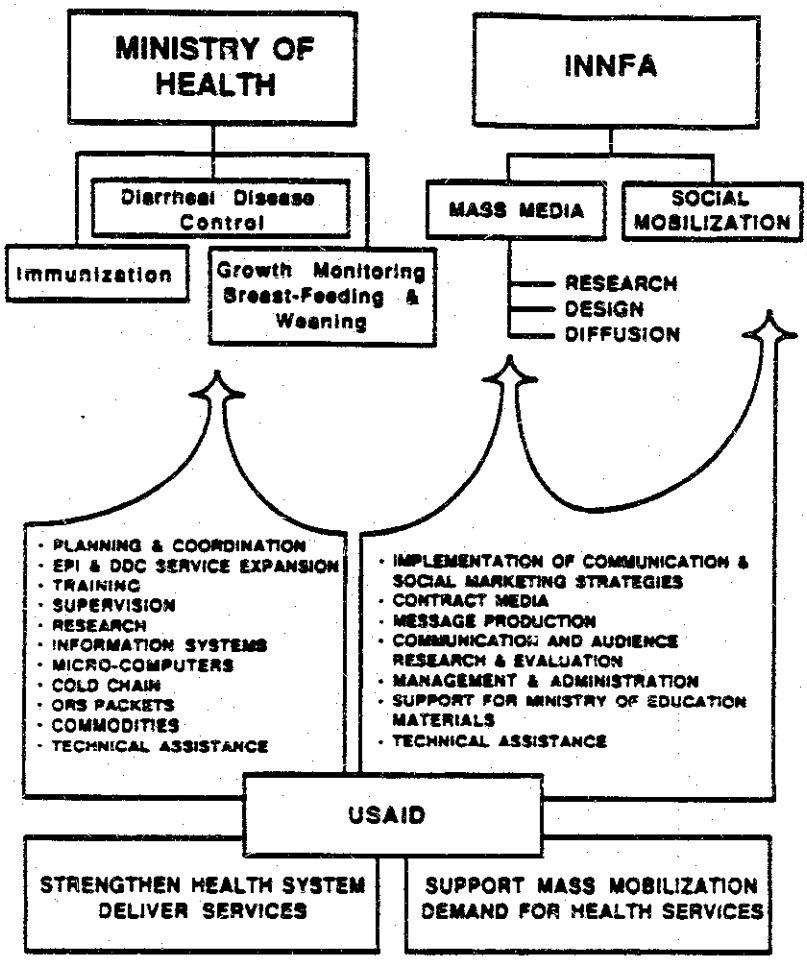
vaccination campaigns annually, during which the entire health system mobilized to vaccinate children. While these campaigns had improved coverage rates, morbidity and mortality were not reduced to desired levels.

This was the background for PREMI which was supported under the USAID Child Survival Initiative. Building on the previous efforts, PREMI's goal was to improve children's health through a four-pronged program of child survival activities: immunization, oral rehydration therapy, breastfeeding, and growth monitoring. These four components would be addressed simultaneously through a systematic campaign for child survival directed at mothers of children under five years of age, health care and community workers, and policy-makers. PREMI's basic plan was to develop mass demand for child survival services using a social marketing model including research with the consumer and development and implementation of a massive promotion and education campaign. A variety of communication channels, both mass media and interpersonal, would be employed to disseminate health and campaign related messages to Ecuador's population. The program also featured training of health care personnel and a strong evaluation component which included a variety of quantitative and qualitative methods.

This was one of the first attempts in the world to carry out a large-scale mass mobilization strategy combining multiple child survival themes in a single coherent attack on infant mortality. The campaign was the first to promote the mass distribution of ORS to all mothers who attended mass vaccination days, and the first to carry out mass weighing of infants.

PREMI was directed through two institutions, the National Institute of the Child and Family (INNFA) and the Ministry of Health (see Figure 1). INNFA was a non-profit, semi-autonomous government agency directed personally by the First Lady of Ecuador, Doña Eugenia Cordovez de Febres Cordero, providing child and family services, especially to less-privileged sectors of the population. Detailed planning for PREMI mobilizations was carried out by a technical commission made up of the PREMI coordinators at INNFA, MOH, Ministry of Education and USAID. A national executive committee, presided over by the First Lady, approved guidelines, strategies and plans prepared by the commission. It was made up of high-level operational representatives of INNFA, the Ministries of Health, Education, Social Welfare, and Defense, plus representatives of Congress, the National Bishops Conference, the medical schools and the media. Donor agencies USAID, UNICEF, and PAHO were also represented.

Figure 1



A limited version of this central organization was copied in Ecuador's 20 provinces with some variations. Each province's executive committee was headed by the governor. A provincial technical committee, headed by a representative of the Ministry of Health, was in charge of determining the process for carrying out national directives. Later on, provincial communication committees were set up.

The PREMI project had a specified division of labor. INNFA was in charge of communications and mass media, including developing radio and TV spots and print materials, coordination with a local advertising agency for media planning and placement, and the development of an overall social marketing strategy for the program. The Ministry of Health provided public health technical direction and the services that PREMI advertised and maintained continuity with previous child survival efforts.

The PREMI program had a director and staff within the MOH who coordinated the offices responsible for specific immunization, diarrheal disease and other child survival areas, and maintained close links

with the INNFA director of communications. USAID provided advisors on each side of the PREMI program, including a counterpart to the national MOH PREMI coordinator, an information systems and evaluation advisor, a training advisor to the MOH, and a communications advisor and a communication research and evaluation advisor to INNFA.

GOALS

The primary aim of PREMI was to reduce mortality and morbidity, especially of children under five years old and of mothers in Ecuador's poor and rural areas. Specifically, infant mortality was to be reduced from 72 to 50 per 1000 live births by 1989. Immunization coverage of children under one year of age was to be increased from 48% to 80%, tetanus coverage for pregnant women from 11% to 50%. ORT use was to be increased from 21% to 85% in government health facilities and from 2% to 50% at the community level. In addition, 80% of mothers of children under one year of age and 30% of mothers of children aged 1-4 were to receive the child's health card and learn to interpret it.

In order to achieve these quantitative goals, the project sought to increase both the supply of and the demand for immunizations and ORS. This expansion of both supply and demand was recognized as the central project objective. Nationwide demand for ORT and immunizations would be increased through the comprehensive marketing strategy. At the same time, supply was to be increased by expanding existing ORS and immunization services to new geographical areas and by establishing the ability to provide ORT and immunizations at all times rather than solely during mobilization periods. Related sub-goals included the improvement of the Ministry of Health's supervision and information systems, training of health workers at all levels in the program ideology and administration, and the cold chain improvements necessary to keep vaccine available at health centers. At the institutional level, the goal was to enable the Ministry of Health to implement the four child survival strategies on a continuing basis -- that is, to make lasting changes in the primary health care delivery system and to increase INNFA's abilities in mobilization and mass communication.

ACTIVITIES

PREMI activities directed at the public centered on weighing children and vaccination campaigns, with distribution of ORS packets to mothers who brought children to be vaccinated. The communication campaign involved mass media use and interpersonal channels at both the national and the local level. The project also included internal research and training activities important to support the public activities. This section outlines the broad set of activities; the next section presents a chronology detailing PREMI activities, focusing on the communication program.

PUBLIC ACTIVITIES

Seven national vaccination mobilizations, or *jornadas*, were carried out between October, 1985, and August, 1987. The purpose of the campaigns was to have mothers bring their children to be completely vaccinated. The first four mobilizations lasted three days each. To reduce extraordinary demands on health clinics, the last three *jornadas* were shortened to one day. In addition, ORS packets were distributed to all mothers who brought a child during the early *jornadas*.

ORS distribution presented special problems. Not only did packets have to be distributed, but mothers needed to be educated to use them correctly. Recognizing that during the vaccination *jornadas* there would not be time to provide individual instructions to each mother, PREMI planners sought another means of instruction. A plastic bag was developed on which was printed a set of easily understood visual instructions on how to mix ORS. At the same time, the bag provided an accurate means to measure the one liter of water needed to correctly prepare ORS. The plastic bag and two packets of ORS were given to each mother who brought a child for vaccination.

Publicity for the campaigns was undertaken at many levels. One innovative interpersonal channel was house-to-house visits by schoolchildren organized by their schools. Churches and other non-governmental organizations (the Red Cross, etc.) also were encouraged to mobilize the population. Advertising channels included extensive radio and television spots and newspaper spreads. Promotional materials included posters, flyers, banners, and stickers. A PREMI song received wide play on radio stations. In later years, in addition to commercial advertising, mass media were used for education. A radio series

covering health topics was broadcast, and accompanying printed material was distributed to listeners who requested it.

The *jornadas* represented a tremendous mobilization effort. The massive publicity was just one part of the process. The complexities of promotional material distribution were just a shadow of the logistical effort involved in organizing and distributing staff and material to vaccination posts, which required up to 6000 vehicles and 120 aircraft for the first *jornada*. Vaccination supplies had to be delivered to clinics and to temporary vaccination sites, vaccinations had to be prepared, tables for distribution of ORS packets and for weighing children had to be readied.

While the *jornadas* were the most intensive part of the PREMI program, there were complementary efforts throughout the time of the PREMI program. Promotion of immunization and promotion of appropriate treatment of diarrhea, and instruction in the correct preparation of ORS went on consistently, particularly through radio and television. Later there were also efforts to promote breastfeeding and growth monitoring, although at a lesser level than for vaccinations and diarrhea.

RESEARCH ACTIVITIES

The promotional activity of PREMI was based on and supported by research. HEALTHCOM sponsored three large sample KAP (knowledge-attitude-practice) surveys which formed the basis for the overall program evaluation, while numerous small studies were undertaken to clarify issues or provide mid-point information. Supporting research for the KAPs included a survey of 200 mothers to get quick feedback about the first mobilization, numerous focus groups and in-depth interviews, a cluster instrument at the sites of the three KAPs to get community-level data, and in-depth interviews with mothers to clarify information garnered from the KAPs. PREMI also conducted concept development and materials pretesting studies, two KAPs of Ministry of Health personnel, behavioral studies, a cost-effectiveness study of vaccination delivery costs, surveillance and observational studies of health facilities, pharmacists and pediatricians surveys. Unfortunately the final KAP was in April 1987 which precluded evaluation of the final stages of the PREMI program.

TRAINING ACTIVITIES

The PREMI project included a large training component. Among the many training activities were orientation for primary health care personnel in the goals and activities of the child survival program, seminars for community leaders about the PREMI strategy, seminars in research strategies and the HEALTHCOM methodology for PREMI personnel, workshops for health educators, and a cold chain maintenance course for technicians. The training component at MOH was delayed and except for the Jornada related preparation of health personnel, it was only in full operation by mid-1987.

CHRONOLOGY

The PREMI program can be roughly divided into three stages. During the first, 'intensive' stage, of 18 months, the entire public sector was mobilized to deliver services. The second stage, calendar year 1987, was a period of strengthening service delivery, expansion of desired health practices, and maintenance of the awareness and coverage levels achieved during the *jornadas* of the first stage. The third stage was a time of winding down the program with full responsibility turned back to the Ministry of Health.

1985

The first task at PREMI's inception was to restructure the government's child survival efforts. In April, the First Lady was invited to Washington where a USAID/AED seminar on child survival was prepared for her. By mid-1985, the project agreement with USAID had been signed, PREMI was officially launched, and all organizational efforts were aimed at the first campaign. There were as yet no long-term strategies, and institutional and implementation arrangements were unclear. A small communication team was housed at INNFA. (The Ministry of Health had a conventional Health Education Unit. For reasons discussed later, this unit played a limited role in PREMI. In fact, INNFA/PREMI developed a closer relationship with health educators at the Ministry of Education for which it could legally provide some funding.)

PREMI activities were focused around national mobilization campaigns. The first campaign, October 25 to 27, 1985, required an intensive effort to put into effect the campaign strategy and organize advertising and materials distribution. McCann-Erikson, a commercial advertising agency, was contracted to handle advertising materials development and media placement. The Ministry of Education mobilized students who made house-to-house visits to mothers of children under five years old to deliver a printed invitation to the vaccination days from the First Lady. Radio and TV spots announcing the *jornada* and explaining PREMI's goals were broadcast at saturation levels. During the three days of the campaign the First Lady traveled throughout the country generating additional publicity.

The first KAP study was supposed to have been carried out before the first campaign in order to have a baseline measure for comparison with post-campaign data. However, the intensity of the preparations for the first mobilization did not leave room to plan a major survey, so the survey was delayed until December, 1985, a month after the first vaccination campaign.

In order to prepare for the second mobilization, a survey of 200 mothers was carried out to get quick feedback about the October mobilization. Because mass distribution of ORS had never been undertaken before the first mobilization, there was concern that the ORS might be misused. In order to make decisions about future mass distribution, this small study focused on the issue of ORS safety: Did mothers understand that it was for diarrhea? Did they know how to mix it accurately? The study suggested there had been little problem.

1986

The second mobilization campaign took place in late January, 1986. The basic format was the same as for the first campaign. One difference was the reduced role of the First Lady during the first few days. Plans for the second mobilization had called again for home visits by schoolchildren, but the timing in relation to the school calendar was not as propitious as it had been for the first *jornada*. Media coverage was poor because spots were not ready in time due to the short production and pre-testing time. This problem was exacerbated by the absence of a contract with the Ecuadoran Radio Association due to delays in obtaining the proper legal documents. Thus radio messages were not broadcast. All of these factors may have contributed to the noted decline in attendance levels from those of the first *jornada*, particularly

for children over 1 year of age which still had to "catch up" in vaccination doses. One additional factor was the weather: rain during the *jornada* discouraged attendance.

In early February, a USAID-funded seminar was held with the purpose of establishing a lasting interinstitutional structure for PREMI. The participants were PREMI coordinators and representatives of PAHO, UNICEF, USAID, medical schools, and the Ministries of Health, Education, Social Welfare, and Defense. A centralized program was developed that was then to be extended to the provinces. The post of Executive Secretary outside of the Ministry of Health was created, but many sticking points were not cleared up, and the undefined role of the Executive Secretary later caused problems and confusion. However, an offshoot was that an MOH PREMI coordinator was named shortly thereafter, and stayed in post until late 1987 as overall coordinator.

The attention of researchers was focused on the first KAP survey, which had taken place the previous December. It was found that this survey had included urban and semi-urban areas, plus some nearby rural areas only and so in order to provide information about the country as a whole, a rural KAP, to be combined with the first KAP, was undertaken in the spring of 1986

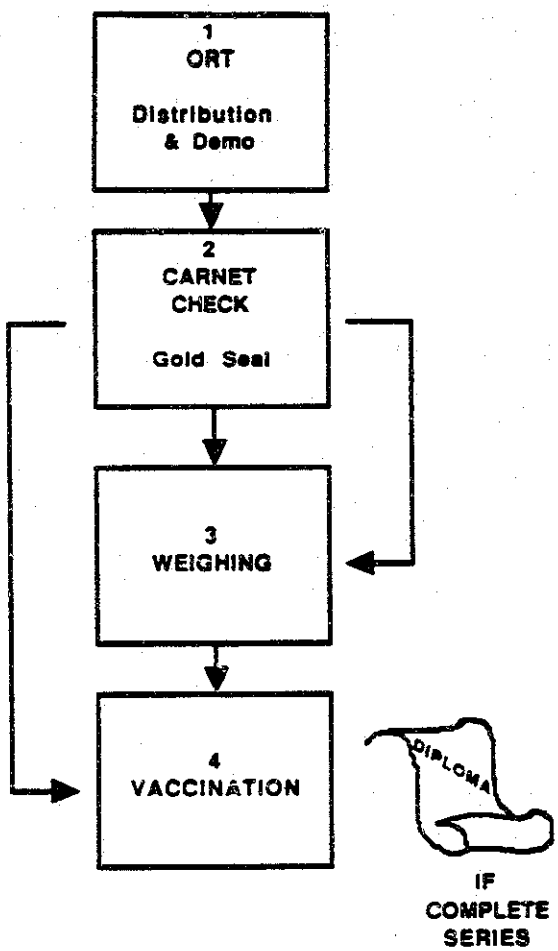
The third mobilization was held in June, 1986, after successful efforts to delay it in order to avoid the flurry of political activities and advertising around the May mid-term national election. During the week before the mobilization, high school students distributed 250,000 posters for health facilities and 500,000 flyers promoting the campaign. This campaign featured a new incentive developed in response to the decline in attendance at the second mobilization. To help persuade mothers to complete the full three-dose vaccination cycle for their children, PREMI created a vaccination diploma. The diploma was widely promoted through mass media with the message "every child needs three visits for complete protection," and was awarded to mothers whose children under five years old had completed all of their vaccinations. Women interviewed afterward identified the diploma as an important incentive and 153,000 mothers received the diploma.

Also during this campaign, the growth monitoring component of the PREMI program was officially inaugurated with children under two years of age being weighed at stationary vaccination posts. The number of children under 2 weighed was reported as 145,000. A third component was face-to-face instruction in ORS preparation which was demonstrated to parents at vaccination posts by high school

students or health personnel. To coordinate these three distinct activities taking place at vaccination centers, a specific spatial organization of the tables at the vaccination posts was developed. (See Figure 2.) The devising of this arrangement exemplifies the kinds of thinking and planning that took place as PREMI planners attempted to implement this multifaceted program.

FIGURE 2

MOBILIZATION TABLES



During the third mobilization, a special effort was made to reach rural areas in response to the discovery that during the previous campaigns rural vaccination teams were arriving at unscheduled times in rural villages. It often took hours for the community get organized and sometimes the vaccination team tired of waiting and left afte vaccinating only a few children. To correct this problem, literacy volunteers and

rural teachers from the Ministry of Education were mobilized for four days before the campaign to visit rural communities and inform them of exactly when immunization teams would arrive.

Prior to this jornada, INNFA-sponsored teams (with MOH and MOE help) held regional and provincial training events for health educators and Provincial Communication Committees to tailor the jornada to local conditions and train trainers for such community outreach with consistent approaches in promotion and mobilization.

In August, 1986, the services of the McCann-Erickson advertising agency were terminated, leaving the Communication Division of INNFA to carry out communication activities. Research activities continued. Survey 2 took place in July and August 1986 shortly after the third *jornada*. To enhance PREMI's research capabilities, a HEALTHCOM consultant conducted a training session in focus groups for the PREMI staff and others from August 4 to 30. A number of qualitative studies at INNFA were subsequently fielded.

The fourth campaign was held in late November, 1986. As an incentive for mothers to bring their infants for vaccination, this campaign featured a gold star that was added to the vaccination diplomas that had been distributed during the previous campaign. The star was for mothers whose children under the age of one year were completely vaccinated. ORS packets were also distributed during this campaign.

Publicity was again massive. Posters and mass media spots publicized the gold star. PREMI developed a 16-page almanac on the four child survival practices, which was carried in the Sunday editions of all major national newspapers . Additionally, a stream of technical bulletins was sent to newspapers before and after the *jornada*. Numerous radio and television spots with specific messages about diarrheal disease, immunizations, and growth monitoring, as well as general spots announcing dates of the *jornada*, were broadcast throughout the country.

Research continued on various aspects of the PREMI program. A cost-effectiveness study of vaccination delivery costs (routine availability vs. mobilizations) was done by the REACH project. (*The Cost-Effectiveness of Immunization Strategies in Ecuador*. 9/28/87. HIID. Donald S. Shepard, R. Robertson, C. Cameron, P. Saturno, M. Pollack, J. Manceau.) A national morbidity and mortality study - piggy-backed onto a carefully planned National Nutrition survey - was completed under MOH

sponsorship, the results of which were to be analyzed by PREMI to determine any program impact. (CONADE [Consejo Nacional de Desarrollo], MSP [Min. Salud Pública]: *Diagnóstico de la Situación Alimentaria, Nutricional y de Salud de la Población Ecuatoriana Menor de 5 Años - DANS. Wilma Freire et al. Quito, 1988.*). A surveillance study of 40 health facilities was designed to assess the quality and quantity of PREMI services delivered on a regular basis through MOH health centers. Focus groups were conducted with both highland and coastal groups to probe the earlier finding that mothers were not bringing their children under one year of age for vaccination. A behavioral study addressing the same problem was also fielded. PREMI also conducted two studies of MOH personnel in 80 health facilities to look at the knowledge, attitudes, and practices of health personnel and the quality of services at their facilities.

1987

In March 1987 an earthquake struck Ecuador. Subsequent relief efforts absorbed the attention of USAID, the Ministry of Health, and INNFA, delaying PREMI project actions.

Training was enhanced throughout 1987. A series of INNFA-led seminars was held on qualitative research techniques for health educators, social marketing, methodology of training, and implementation planning. The Ministry of Health also held training seminars in growth monitoring, calibration of weighing scales, pediatrics, clinical oral rehydration therapy, and epidemiological surveillance methodology. By 1987, the Ministry of Health reported training 1600 primary health care personnel in child survival strategies, with an additional 19,000 receiving some child survival training.

In April 1987, between the fourth and fifth *jornadas*, a major strategy readjustment shifted the orientation of the campaigns away from intensive campaigns to promotion of routine service delivery. Survey 3 was carried out in April, before this strategic shift, and several months after the fourth *jornada*. This shift reflected a growing frustration within the MOH about the administrative logistical burden of managing the *jornadas*. A "Crystal Bell" campaign was launched as part of this strategy to promote ongoing services offered by health units. A distinct bell sound was featured in monthly radio and television spots to remind mothers to take their children under two to health centers for growth monitoring. This continuing monthly reminder was combined with a year-long "Healthy Baby" contest. Mothers who fulfilled the contest requirements (completed vaccinations for children, five well-baby visits, knowledge

of one of two PREMI promotional jingles) received diplomas as well as the chance to participate in a drawing for 180 children's education scholarships

Radio was heavily used for educational purposes in late 1987. A radio series of 30 eight-minute programs on the importance of growth monitoring and proper nutrition was broadcast on 71 commercial stations and 25 cultural radio stations. In addition to this radio series, a 35-chapter seven-week radio course on three PREMI themes (diarrhea, immunizations, growth monitoring and feeding) began airing in October on 93 radio stations. The course was accompanied by a printed guide, and auxiliary nurses at local health centers were trained to act as liaisons for mothers listening to the programs. The course offered various incentives and prizes. Also, printed child survival materials were distributed as supplements to a widely-circulated national lottery schedule, and through the Catholic Church.

The fifth *jornada* was planned for May but delayed until June due to the rainy season. It lasted one day only, as did the sixth *jornada*, in August of 1987. As always, the *jornadas* were publicized extensively. During this time, as another facet of the ORT-related child survival efforts, the Ministry of Health established 15 Oral Rehydration Units (UROs) in hospital health units. New norms for diarrheal disease treatment were established according to severity of episode.

Various research endeavors continued at INNFA-PREMI. Rationale for such research was double: to continue fine-tune the communication component in the light of some lack of progress evidenced in KAP surveys, and also as an attempt to deal with a challenge of institutionalization: balancing demand with provision of health services. In response to results from the surveys, focus groups were carried out by INNFA-PREMI to find out why mothers were not using ORS as expected. A surveillance study sponsored by PRICOR at MOH was set up in some 40 health facilities in order to test a pilot information system, with a new daily reporting form. Simple data obtained as a spinoff of said project would have provided INNFA with information about the impact of the Crystal Bell campaign in increasing health center attendance, but the main study met with insurmountable difficulties. Another INNFA pioneer study was aimed at 100 pharmacists found in the clusters where surveys 2 or 3 had been fielded, to ascertain their views as health providers and their role in advising and prescribing for diarrhea and respiratory infections. Still another INNFA study was directed to 20 health units in five provinces: health workers' interaction with mothers and children was discussed and observed, the sequence of steps in mother-child attention was recorded, and exit interviews with mothers probed their perceptions of

interactions there. Quality of service was also observed. During the same period, in-depth interviews were conducted with approximately 80 mothers in five provinces to clarify survey and focus group findings

Training activities included a one-day training session of provincial communication committees, sponsored by INNFA and the Ministries of Health and Education in late 1987. In a similar vein, in December, 1987, and February, 1988, three one-week supervision skill-improvement seminars for Ministry of Health and Social Security health workers were held. In November, 20 vaccine bank caretakers participated in a cold chain maintenance and repair course conducted by a technician from the Pan-American Health Organization.

In the first half of 1987, a setback in ORS distribution occurred when two million ORS packets that had arrived the year before had to be destroyed. The packets had been held up in customs and then stored in a humid area, perhaps causing growth of a fungus. The problem originated with the manufacturer of the salts, whose mixing machines had been used earlier for a different foodstuff preparation. The salts were not dangerous or unfit for consumption. In a totally unrelated incident which likely increased MOH wariness about the packets, neighboring Peru had indeed encountered faulty ORS packages presumably causing the death of a few children. Although the Ecuadoran packets were thought to be safe, it was understood that there was a considerable risk of a sharp backlash if the packets were distributed. The risk was that people would be reluctant to use ORS packets in the future if they opened a packet and believed it was contaminated. The net result was a severe shortage of ORS packages which grew increasingly dramatic over the following months.

1988

PREMI, and particularly the communication component at INNFA, was definitively ending. Two "transition-to-MOH" documents by Marco Polo Torres were presented to PREMI MOH and AID officials, and discussed with HEALTHCOM advisors. The papers dealt with alternative scenarios for organization and implementation of health communications at or around MOH. No actions ensued.

Earlier in January, 1988, as the final step toward institutionalization, the First Lady voluntarily resigned as the President of PREMI, turning this responsibility over to the Minister of Health. The First Lady's

presence and the reliance on the independent INNFA agency for many PREMI activities had created an extraordinary impetus and permitted a flexibility and operational intensity. The President's term was ending August 10, and thus the First Lady's term and her personal focus for INNFA would be ending with it. Maintenance of child survival activities would necessarily remain in the MOH. It was unknown what future role, if any, INNFA would have in child survival efforts. Instead of slowing down, INNFA ended with a flurry of activities, impervious to the highly politicized environment. (The presidential elections had a first round in late January, and then runoffs in late May).

In March 1988 a two-week workshop at the International Higher Education Center for Studies of Communication in Latin America (CIESPAL–Centro Internacional de Estudios Superiores para la Comunicación en America Latina) was held for 18 participants from INNFA and the Ministries of Education and Health. The objective of this workshop was to design a communication program for health education in schools. Participants worked on a radio infant health course and the accompanying teachers' guide, and materials (flipcharts and guides) for primary school instruction. Also in March/April, 1988, the radio health course was rebroadcast, with auxiliary nurses again in charge of liaison with mothers.

Several research pieces were in the final stages of analysis: a study of the characteristics of communities surveyed to provide supplementary structural information for analysis of the survey data; the health units, pharmacists and in-depth interviews. Still another was starting: a longitudinal study of diarrhea morbidity in hospitals. It was expected that research and evaluation activities would be continued at MOH. A final internal evaluation seminar was conducted in June.

The seventh national mobilization campaign took place on May 28, 1988. During this campaign a five hour international radio broadcast was undertaken jointly with Colombian national radio, to link with the Colombian campaign which was taking place at the same time.

The PREMI program formally closed down at the end of June 1988. A closing ceremony was held at the Presidential Palace, presided over by the Ministers of Health and Education, the First Lady and the Armed Forces. USAID sponsored work on child survival at MOH continued as the Child Survival Project as a new administration came to power. INNFA ceased all activities that could be understood as part of MOH's scope of concern. USAID had been preparing a new project throughout 1988.

COMMUNICATION COMPONENT

As has been detailed earlier, communication was a central feature of PREMI's social marketing methodology. Messages about the PREMI campaign were carried on mass media of all types as well as through interpersonal channels. The Department of Communication and Social Marketing of INNFA prepared and distributed various materials, and new promotional materials for the campaign were continuously produced. For each *jornada* there were new materials, and between *jornadas* support materials were put into circulation. The materials produced fell into several categories: those to promote a specific date or activity such as a *jornada* or a contest; educational materials for mass distribution; and support materials for interpersonal promotion and educational activities.

Among these materials were:

Posters (300,000) on child survival themes: five on vaccination and jornadas, for massive distribution; • one each on norms for immunization, diarrhea treatments, proper feeding practices, for the health units and personnel; • one calendar for rural households with information about the four survival practices; • two for indigenous populations on vaccination
Vaccination Diploma (500,000) and Gold Star stickers (250,000)
A comic strip on child survival themes included in the country's newspapers for six months, in 90 chapters
Millions of flyers, many locally produced
Pamphlets and booklets (over 400,000 total) on the four themes, the growth chart, diarrheal disease, training, research results, social marketing, educational modules, a "Vademecum" for pediatricians
54 different radio spots, including the PREMI long song and two songs on dehydration and ORS preparation
27 different TV spots, a TV docu-drama, an animated TV movie on PREMI accomplishments, plus several national "hook-ups" for campaign days
Over 2,500 press notes published
A wide variety of promotional objects, such as PREMI stickers and weight control mini-stickers (happy face - sad face), small plastic cards for campaign helpers and mothers who participated in contests; matchboxes, postage stamps, vaccination posts id
Local production of materials by Ministry of Health educators: pamphlets, flyers, banners, radio spots, posters, bulletin boards and "mural newspapers"
The radio course "We Work for Health Children", 30 chapters, 18 minutes each, on the four child survival themes, with accompanying booklets (15,000 sets of modules)
500,000 PREMI Health plastic bags with calendar
About 2 million ORS plastic mixing bags with instructions
Flipcharts and teacher's guides for health education at all primary schools

Distribution of centrally-produced materials was a frequent problem. There was no efficient, established, timely distribution system at the Ministries of Health or Education. Also, there were insufficient quantities of some of the posters and other printed materials, while others simply did not get to outlying areas of the country in time or at all. INNFA's Department of Communication and Social Marketing took care of much of the distribution itself. On one occasion a private delivery firm was hired to handle

distribution of more than 1000 packets to some 80 destinations in Ecuador's 20 provinces, but it did not do an adequate job. In addition to centrally produced and distributed materials, locally-oriented materials were produced at the provincial level under the supervision of the Ministry of Education with supplies provided by INNFA.

Audiovisual production covered the entire range of possibilities from radio and television spots to documentaries and cassettes. Between campaigns educational sequences were broadcast, and during each *jornada* promotion for the event itself was featured. On radio there were short spots in a variety of formats, usually aired for 7-15 days, about 10 daily, prior to campaigns, and promoting health *jornadas*, dates, the need to complete vaccination dosages, emphasis on under-one-year-olds, signs of dehydration, asking for an ORS packet and keeping one at home, preparation instructions, well-baby control, and weighing opportunities. A series dealing with malnourishment featured a fictional character, Dr. Adriana Bravo, and was aired by September 1987 (30 8 minute chapters). The radio course, aired in October 1987 and repeated in April 1988 consisted of 30 chapters (18 minutes each) dealing with management of diarrheal episodes, vaccinations, growth monitoring, breastfeeding and weaning. It was accompanied by illustrated learning booklets and directed to mothers assembled and monitored by an auxiliary nurse.

Television spots were prepared in a variety of formats, portraying different ethnic groups, rural and urban marginal mothers in coastal and highland settings; animated spots were aired later in the project. All TV spots went through careful development and pretesting. In fact, virtually no TV or radio spot or printed material escaped this meticulous preparation process. A video docu-drama on child survival was aired in November 1986, and an animated story highlighting PREMI accomplishments, based on research results, was broadcast by the end of PREMI.

While the prestige and persuasive powers of the First Lady resulted in free TV coverage for PREMI in the first jornada, eventually TV spots were paid for, to ensure best positioning to reach the intended populations. During the World Cup soccer competition (mid-86), some TV time was donated and throughout time was bought at very substantial discounts. The same happened with radio: the contracts with AER (the radio owners' association) provided PREMI with very inexpensive radio broadcast time in good time slots.

Overall, throughout the PREMI project, radio and television coverage was high. Messages were broadcast on 225 member radio stations of the Ecuadoran Radio Association and 32 nonmember cultural and religious stations, four national television networks and three local channels. However, monitoring carried out during the PREMI campaign revealed that during at least one mobilization up to 25 percent of the spots contracted for broadcast were not actually aired.

The communication program of PREMI incorporated a great range of materials and channels, over the approximately three years that it operated. Torres (1990) estimated the entire direct cost of the communication component to be approximately $1,000,000. In later chapters, evidence for the reach of the communication component will be presented. A conservative measure of campaign reach would be the 65% of mothers/caretakers of children under five who could identify the PREMI acronym correctly (see Figure 7). In 1987, the midpoint of the PREMI program, there were approximately 1.51 million children in the 0-4 year old target group. If 65% of the caretakers of such children were reached, the exposed population would be slightly less that one million children. This would set the per-child cost of the communication component over three years at about $1.00[2]. Since the caretaker of the average child would have been exposed many times during the three years of PREMI, the cost per exposure would have been much lower than $1.00. If, for example, a caretaker was exposed once per month over the 30 months of PREMI, the cost per exposure would be about $.03. Despite frequent criticism of the communication budget by the MOH, these estimates do not appear excessive. Proportion of expenditures for each type of communication material were:

[2] This estimate is based on an estimate of government budget expenditures for production and distribution of communication materials. A somewhat higher estimate would be made if non-government costs, including the cost of volunteer time, would be included. The mass media provided time at relatively lower cost than full retail commercial rates; the jornadas involved substantial volunteer time; the government clinic staff worked longer hours than customary. All of these are components that have costs but which were not costs to the government.

Printed materials			34%	
	Posters	10%		
	Pamphlets	17%		
	Flyers	3%		
	Booklets	4%		
Radio spots			11%	
TV spots			26%	
Local Production			14%	(mostly print materials)
Promotional Objects			14%	(including diplomas, stars, stickers, plastic bags, identifying banners, records)

Throughout PREMI, the communication component was phased with what was supposed to be happening at the Ministry of Health and the delivery of health services. Strategic guidelines and technical contents came from the MOH and the PREMI Executive Committee, but also from INNFA's use of research and evaluation regarding service delivery, coverage rates and trends, mothers' barriers to new practices.

Most communication processes revolved around campaigns and the "campaign syndrome" dominated the project. The shift towards emphasis on regular services only started in early 1987. Through mid-86, no strategy for the period between campaigns had really developed. An excessive emphasis on vaccination themes delayed intensive promotion for ORT and particularly the growth monitoring and nutrition components.

Nonetheless, the content of the communication component addressed to each child survival practice evolved as PREMI matured. Immunization messages progressed over time from the general, all-out mobilization efforts for the first campaign, and the promotion of when and where to vaccinate all children, to more specific foci: special focus on the under-one-year-old children, a message emphasizing "three times for three dosages" for complete protection, the Diploma for successful vaccination.

Similarly, ORT started with information on diarrhea and ORS and the risks of dehydration with a recommendation that people ask for ORS packages; subsequently, there was an emphasis on "having one (a packet) at home", the teaching of adequate preparation and administration of ORS, ORS as the best remedy for diarrhea and restoration of liquids, ORS does not stop diarrhea, and feeding during and after episodes.

The complex component dealing with growth monitoring, breastfeeding and weaning plus well-baby control was a late starter, in part because of the extended attention given to the above-mentioned components, but mainly because not everything was ready at MOH to actually deliver what was to be promoted. Thus, it started with promotion for the new Health Card which included a growth chart, continued with encouragement for weighing children under 2 by the third jornada, and with the Crystal Bell campaign promotion (in the spring of 1987) of well-baby monthly control. Feeding messages were considerably delayed because MOH was just establishing its national program and empirical results on mothers' weaning practices as well as the first results of childrens' malnutrition status were just coming in. In fact, the topics were only addressed by the end of PREMI, through the radio course and series and the poster "The Health House".

CHAPTER 2

RESULTS OF THE IMMUNIZATION PROGRAM

INTRODUCTION

The PREMI immunization program was described in a preceding section. In summary, it involved seven focused vaccination campaigns (called *jornadas*) between October 1985 and May 1988. Each *jornada* was preceded to a varying degree by:

1) mass communication promotion encouraging participation just before each *jornada*,

2) social mobilization at the local level by Ministry of Health staff and members of other governmental and non-governmental institutions, and

3) the organization of special immunization sites in addition to the normal health facilities to ease access to vaccination.

In addition there was additional immunization promotion through mass media throughout non-*jornada* times of the PREMI program.

In this section results are presented for the PREMI immunization effort through four *jornadas* until April, 1987, which was the last survey data collection. The section starts with a straightforward presentation of outcome evidence: was there change in vaccination rates that can be attributed to the PREMI program? Then, the effects of the PREMI immunization program are contrasted for different strata of Ecuadoran society, looking for evidence of the equity of effects. Finally, it turns to evidence for the process through which the observed changes occurred -- in particular, evidence that the communication component was an independent contributor to the improvement in rates.

ESTIMATES OF OVERALL EFFECTS

There are many ways to estimate immunization rates; studies are constrained both by the available data and the evaluation questions. As described previously, CIHDC has the following data:

1. Evidence of current levels of vaccinations from a predominantly urban sample in December 1985 and a predominantly rural sample in April 1986, was based on documentary evidence from vaccination cards (*verified*), and if no card were available, on the basis of caretaker claims of coverage (*claimed*). These surveys also questioned respondents about knowledge and attitudes about immunization, as did each of the subsequent surveys.

2. Evidence from representative national samples surveyed in July 1986 and April 1987 about vaccination rates was based in part on dated vaccination cards, in part on undated but card-verified vaccination notation, and in part on caretaker claims. The dated card evidence was used for estimating rates of coverage for earlier time periods and for earlier ages for the children studied.

Interviews were undertaken with caretakers of children under five years of age. The great majority of those caretakers were mothers of the children. For the December 1985 and April 1986 surveys, vaccination status data were gathered about the youngest child only. In the subsequent surveys data were gathered for all children under five years old in a family. Almost all of the major vaccination practice analyses (presented below) were based on children studied in Survey 3 in April 1987. In that survey 1460 caretakers were interviewed and they provided data on 1966 children. They were a good sample of the entire Ecuadoran population, although the sparsely populated Eastern (Oriente) region was not represented.

Much of the data reported here was based on evidence from vaccination cards. Usually such card data included the name and type of the vaccination and the date that it was given. When card data was not available, mothers were asked to report on what vaccinations their children had received. All analyses separated these two types of vaccination coverage estimates.

The sub-section is organized by conclusions that we have drawn. First, an answer to an implicit evaluation question is presented and then the data supporting the conclusion is displayed and discussed.

As the result of PREMI a large number of children were vaccinated, many more than were being vaccinated by the routine system.

Table 1
Children Vaccinated Each Month
Compared to Pre-PREMI Period
(dated evidence, 4/87, n=1966)

	DPT1 (Average per month)	Measles (Average per month)
Average: 6 months previous to PREMI: (4/85-9/85)	100 (18.7)	100 (10.7)
PREMI *jornada* months (11/85, 1/86, 6/86, 11/86)	387 (72.3)	715 (76.3)
Non-*jornada* Months during 11/85-11/86	124 (23.1)	135 (14.4)

Table 1 contrasts the number of children who were being vaccinated during PREMI campaign months with the number receiving vaccinations both in the six months before PREMI and during the non-PREMI months during the period of PREMI's operation. For clarity just two types of vaccinations are presented -- DPT1 and Measles --- but they are representative of all the vaccinations.

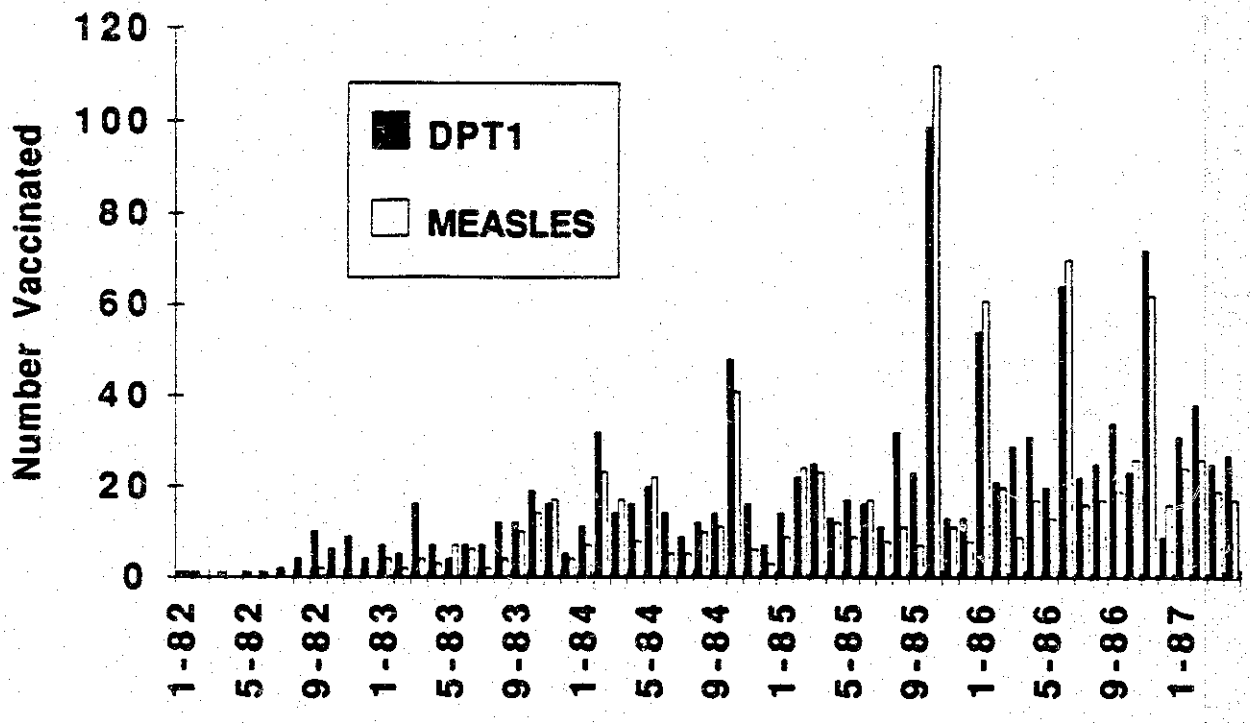
For the sake of comparison in the table, the average number of children who obtained a particular vaccination in the pre-PREMI period was set to an index value of 100. That is, in an average pre-PREMI month (April through September, 1985), 18.7 children in a sample of 1966 children between 0 to 60 months old had dated card evidence that they had received DPT1. Thus, 18.7 was set to the index value of 100. During each month of the four *jornadas*, an average of 72.3 children in the same sample received DPT1. The relative index value, then, is 387 ([72.3/18.7]*100).

Table 1 permits two conclusions: first, PREMI produced many extra vaccinations that would not have been produced through the operation of the routine system. Second, the PREMI increase was not purchased by simply shifting to PREMI months the vaccinations that would have occurred in non-PREMI months.

If PREMI months were simply absorbing the vaccinations that would have been given in the surrounding months then one would have expected that the non-*jornada* months during the PREMI period would have few vaccinations. However, in fact, their index levels are roughly equivalent to those for the pre-PREMI period, good evidence that the *jornada* produced new vaccinations, not just a shifting of vaccinations that would have occurred anyway.

A methodological risk with this analysis was its dependence on retrospective data based on dated cards. Was there some risk that there were fewer older children in the sample who were eligible for the appropriate vaccinations during the pre-PREMI period? Also, was there some tendency for older children to be without card evidence, either because vaccination cards were not so widely available when these children were younger or because their caretakers had more time to have misplaced them? Indeed both of these factors did operate to some extent, but neither was sufficiently powerful to explain the contrast between PREMI and pre-PREMI periods. Appendix A addresses the issue of differences between estimates based on the survey versus estimates based on Ministry of Public Health archives. The archives do not consistently support the conclusions drawn here.

FIGURE 3
DPT1 AND MEASLES VACCINATIONS BY DATE



In Figure 3, month by month data for DPT1 and measles are presented. The extreme increases associated with PREMI months are unmistakable. While the easy-to-see gradual upward trend over time may be, in part, a reflection of the biases of retrospective data, they cannot explain the PREMI peaks. As a side note, there are several smaller pre-PREMI peaks in Figure 3. They correspond to earlier campaign days (called pulses).

The PREMI jornadas produced a large increase in the number of children who were fully immunized.

The ideal outcome of a vaccination program is to have every child fully vaccinated by the time he or she is twelve months old. For the evaluators of a vaccination campaign, the achievement of that goal would

be established if every child could show dated evidence of having achieved full coverage (including BCG, DPT1, 2, 3, Polio 1, 2, 3, and measles) before he or she turned one year old.

Figure 4 is a complex graph, but measures the achievement of this goal with some precision. It makes use of the data gathered in April, 1987. Each point[3] on the line represents the proportion of all children who were born during a particular month whose vaccination cards provided dated evidence that they were fully covered (had DPT3, Polio3 and Measles) before they were twelve months old. The assumption is that if a mother could provide evidence that her child was vaccinated for DPT3, Polio3, and measles, then the child probably had the preceding vaccines as well. Children whose caretakers claimed but had no card evidence that they were covered in a timely fashion are treated as not covered, as are children who achieved full coverage after their first birthday.

[3] These points are actually smoothed data. Since there were only relatively small samples for each monthly birth cohort (approximately 25 children) an easier to read graph resulted when estimates from sets of three adjacent birth cohorts were combined for each data point. Thus the May 1985 birth cohort point represents the average proportion with timely, dated coverage for April, May and June birth cohorts.

FIGURE 4
COMPLETE COVERAGE AT 12 MONTHS BY BIRTHDATE (N=1501)

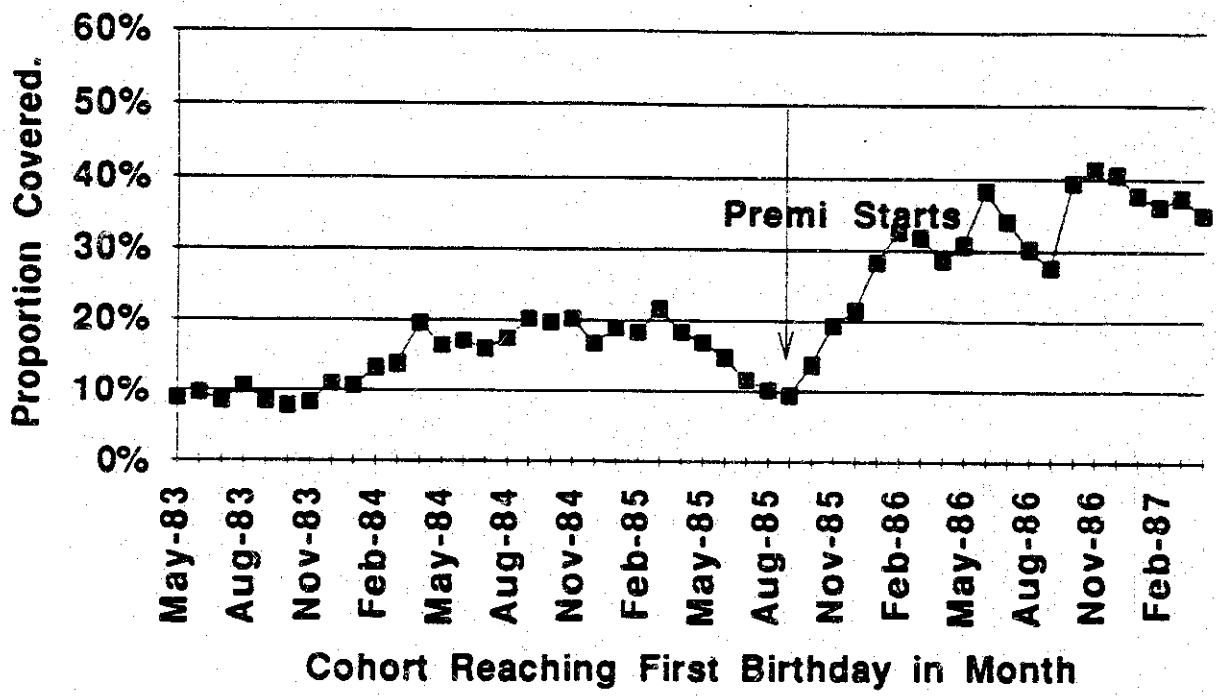
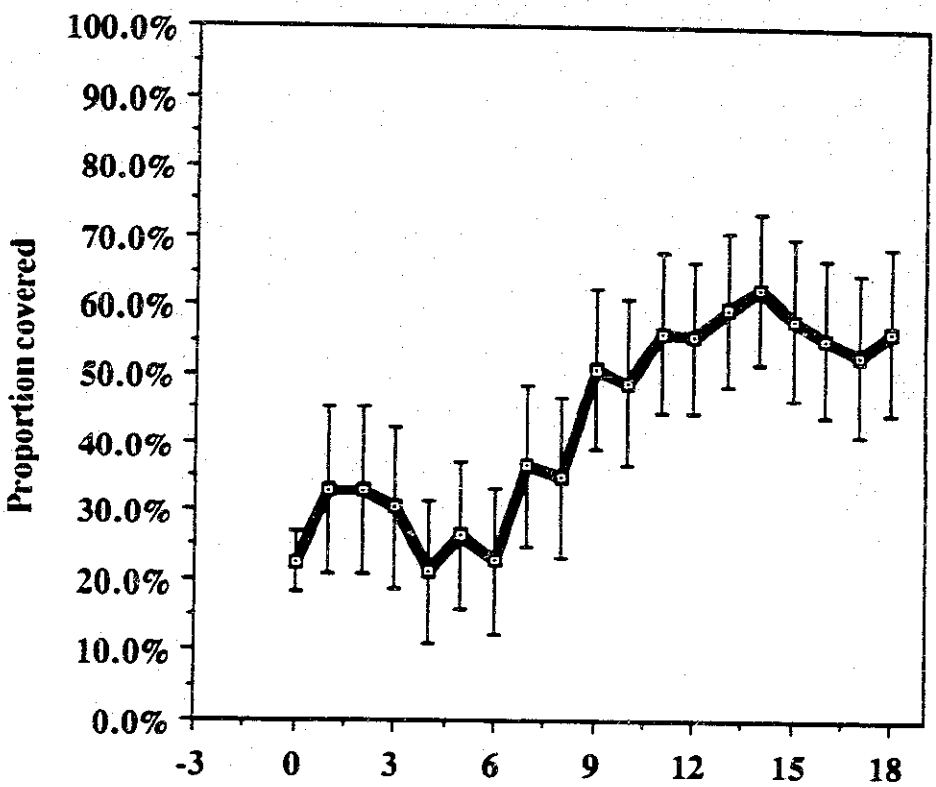


Figure 4 makes the effects of the PREMI program clear. Starting with the birth cohorts who reached their first birthdays after the initiation of PREMI (children born after September, 1984) there is a continuing strong upward trend. For children who reached their first birthdays in the year before PREMI began, only 15% on average were fully covered. For all children who reached their first birthdays in the 18 months after PREMI's initiation 31% satisfied the timely coverage criterion. However it is also clear that the more months before a child's first birthday in which PREMI operated, the more likely he or she was to have timely dated vaccination. Among children who did not reach their first birthday until at least six months into PREMI's operation, the coverage level was 35%.

A possible counter-explanation for these results might be that PREMI didn't so much produce a burst of vaccinations as it produced a burst of vaccination card distribution and dating. We can compare the proportion of children who had vaccination cards by months under PREMI. While it also shows a substantial upward curve it is by no means as sharp as the full coverage curve.

A complementary and somewhat more straightforward picture of PREMI effects is presented in Figure 5. This graph uses data similar to that in Figure 4 but adds three simplifying elements: a) it uses 18 months coverage as the criterion, b) it accumulates the complex chronological information into a single horizontal axis variable, number of months PREMI operated before a child was eighteen months old, and c) adds error bars around each monthly estimate indicating confidence limits (+/- 2 standard errors). The effects of PREMI were dramatic. Children with zero PREMI months averaged slightly more than 21% coverage. This pattern was unchanged among children who had up to six months under PREMI before the age of 18 months. However it began climbing steeply thereafter, and reached a plateau of about 55% complete coverage among children with 11 or more months under PREMI.

FIGURE 5
COVERAGE AT 18 MONTHS BY MONTHS UNDER PREMI BEFORE REACHING AGE OF 18 MONTHS (N=795)



These estimates for coverage are lower limits for true coverage levels, and in particular, are less than could be claimed using conventional WHO procedures.

These are strict tests of achieved coverage levels, particularly if one focuses on the 'by twelve months' criterion. They are lower limits for such coverage, and it is clear that other approaches, including some more commonly used, will produce higher estimates.

By using dated estimates and focusing on coverage according to birth cohort as in Figure 2, one can picture chronological trends quite sensitively. Moreover, since we had no pre-PREMI survey data, dated card evidence is the only approach we could take to estimate what coverage had been like before PREMI was initiated. However, such estimates are very likely underestimates of true coverage. Surely some children whose caretakers could not produce vaccination cards were actually covered. Also, by focusing on twelfth month coverage, one obtains an underestimate compared to the estimates that countries ordinarily report, following the World Health Organization (WHO) convention. WHO vaccination surveys typically report coverage rates for all children 12 to 23 months old. Such an estimate will exaggerate the level of timely coverage since it includes many children who may not have achieved all vaccinations by 12 months but do complete the series by 23 months. The 18 month coverage figures in Figure 3 do approximate the WHO 12 to 23 month estimates, although they still count all children without dated evidence of coverage as uncovered.

Available data only permits estimation of PREMI effects using the dated coverage data. However it is possible to estimate current levels of coverage at the time of the survey using alternative measurement approaches. In doing so we can provide some indication of the degree to which the previous procedures may have produced reduced estimates of coverage.

Table 2
Coverage Estimates Based on Alternate Procedures and Criteria

	Dated Card Estimate	Verified Card Estimate	Self-report or Card Estimate
12 Months[4] (N=125)	32%	35%	43%
18 Months (N=103)	59%	61%	71%
24 Months (N=96)	61%	64%	75%
12-23 Months (N=430)	55%	58%	66%

Table 2 presents three columns of results. In the first column there are the estimates of coverage that were derived from dated and verified information. In the first line, for example, 32% of those children 12 months old in April, 1987, the time of the final survey, had dated evidence of complete coverage. In the second column evidence from cards is also presented. However, in this case, a child whose vaccination card indicated that he or she had received the appropriate vaccination but had no date attached was included as covered. For the twelve month olds this pushed the estimated coverage rate up, slightly, to 35%.

In the third column of Table 2, children who had no evidence of vaccination on a card (often because they had no card to show) but whose caretakers claimed that the child had received Polio3, DPT3 and measles, were counted as well. Under that more liberal interpretation, 43% of 12 month olds can be counted as being covered. While at first glance, this estimate may be seen as just a reflection of a desire by caretakers to please interviewers, there may be a more charitable interpretation possible.

Some mothers who take their children to private physicians may leave the cards with those physicians. They would be unable to show the cards to interviewers. This interpretation is supported by an examination of the relation between social class and ability to show cards. The highest social class group

[4] These are based on the means of children between 11-13, 17-19 and 23-25 months old, respectively, so as to increase the sample size and thus the stability of the estimates.

(the one most likely to take their children to private physicians) are less likely to show cards than mid-level social class groups.

In addition to cards left with physicians, there are lost cards and cards unavailable because interviews take place away from the home, and cards which weren't filled out or were incompletely or incorrectly filled out at the time of immunization. Even claimed vaccinations may contain an element of underestimation, since they depend on the ability of mothers to recall exactly which vaccinations a child had received. Many mothers whose children had been vaccinated might well be unable to recall and as a result the children would be considered not covered even if they were. Thus claimed rates may have both an upward and a downward bias -- upward because of a tendency to exaggerate to please interviewers, and downward because memory may be faulty.

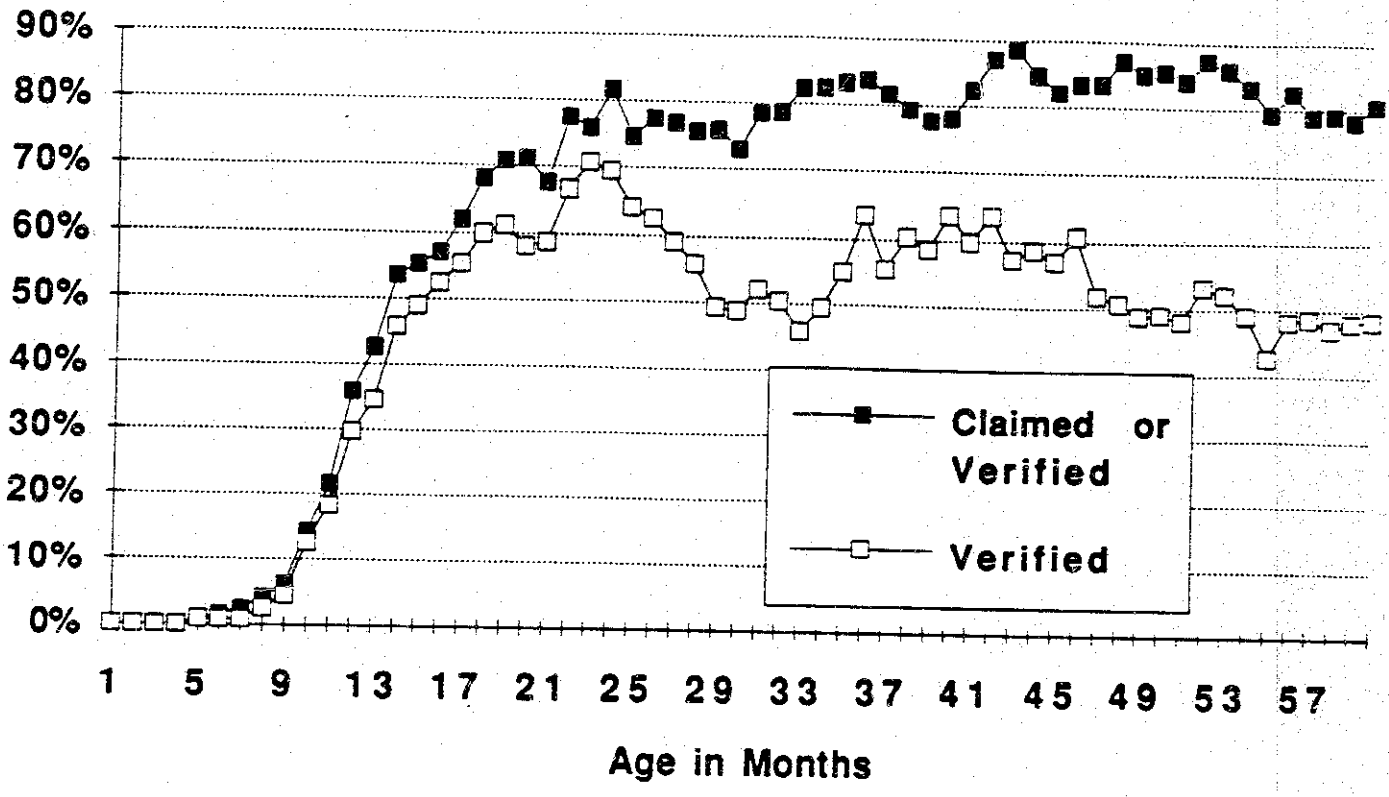
The four rows in the table contrast 12, 18, and 24 month old coverage, and the WHO standard, 12 to 23 month old coverage. The toughest measure of coverage (and the one used in our estimation of PREMI effects) is the 12 month old card verified and dated. It is less than 60% of a comparable WHO standard-based estimate of coverage (verified 12-23 month old coverage).

While we cannot provide over time comparisons to establish that this ratio is constant across time, we would assume that the substantial gap between our conservative criterion and the WHO standard criterion would remain or be even larger for comparisons of past vaccination rates.

By April, 1987, after 18 months of PREMI operation, it appeared that the major immunization problem was timeliness of vaccination rather than failure to obtain vaccination altogether.

Figure 6 displays the level of claimed and verified coverage by age at the time of the final survey. In previous discussion we made the argument that there is good reason to pay attention to claimed levels of coverage as well as card-verified levels of coverage. Figure 6 shows an interesting pattern: claimed and verified and verified-only coverage are very close through eighteen months; after that verified-only coverage starts to decline, while claimed and verified continues an upward trend. The questions is: which pattern is to be believed?

FIGURE 6
CLAIMED AND VERIFIED FULL VACCINATION COVERAGE BY AGE IN APRIL 1987
(N=1510)



While no absolute answer can be given, we propose that the claimed+verified line is the more credible. There are several justifications for this position:

1. Recognition of claimed coverage required the respondent to claim that his or her child had gotten all three final vaccinations (Polio3, DPT3 and measles.) It wasn't an easy criterion to satisfy.

2. There is a reasonable expectation that some children who had gotten vaccinations would lack the vaccination card -- surely some caretakers had lost it, some were interviewed away from the home; some would have left cards with private physicians; some had not been given them by the health facility.

3. If claims were just exaggerations of real practice, one would expect that the gap between claimed+verified and verified-only would be constant at every age level, or at least after nine

months of age. But the observed pattern is quite different than that; it continues to increase over age, precisely the pattern one would expect if losses of cards or pre-PREMI failures to provide cards were the causes.

4. The notion of monotonically increasing coverage with age at a given point in time is more credible on its face than a pattern of increases through age 21 months and then a decline. While younger children may have been the targets of the PREMI program, and thus one would expect them to be achieving good coverage at earlier ages, the older children have had both the PREMI period and the earlier period to obtain vaccinations. Simply on the basis of available months of eligibility one would expect them to have absolutely higher coverage levels. This expectation is reinforced since PREMI policy was to vaccinate any child who came to a center, regardless of age, so the older children would not have been turned away.

If the claimed+verified curve is accepted as the best estimate of current coverage, it suggests that between 80% and 90% of children older than 27 months of age were fully immunized. That is quite a respectable immunization level and is in substantial part a reflection of the continuing PREMI effort. Unfortunately we do not have a comparable pre-PREMI curve, although given the data already presented, we believe it would be quite a bit lower.

These results suggest that, at least at the time these data were collected, the true problem for Ecuador was not to achieve adequate immunization levels, it was to achieve those levels in a timely fashion, before a child turned one year old. In these graphs (as in the results presented above) about 45% of all children were fully covered by their first birthdays. If a criterion of 80% coverage by first birthday were the goal, PREMI had brought Ecuador substantially forward. It had not completed the task. Since we lack follow-up data after the subsequent *jornadas*, and in particular after the period of *jornadas* was over, we cannot suggest whether there was further progress toward the sought after goal, or whether there was even some decline.

EQUITY OF EFFECTS

The overall effects of PREMI were substantial. However reports about overall effects are only one part of the picture. A massive child survival effort like PREMI seeks to improve the average level of the population; it also has to care, particularly, about reaching the poorest members of the society. The children from the least well-off homes are most likely to suffer from high levels of mortality; if a program (of immunizations) can only reach those who are better off, if it leaves behind those most vulnerable to the immuno-preventible diseases, then it is a program of limited success.

In general, the poorest children in Ecuador did as well or better with PREMI than those with greater socioeconomic advantages.

Figure 7 presents comparative data for all the children over 12 months old from Survey 3. It contrasts children who reached their first birthday before the initiation of PREMI, those who reached their first birthdays within six months of PREMI, and those who had between 7 and 12 months of PREMI before reaching their first birthdays. Each group is divided into three socioeconomic groups (based on a 0 to 6 point reliable scale including television and radio ownership, education, access to water and to sanitation technology, and ruralness). Then level of coverage achieved by the time children in each group reached their first birthday was compared.

PREMI months were significant at the conventional $p < .05$ level, although there was a slight trend toward a negative interaction, suggesting that the less well off children gained more rapidly as a result of PREMI than the better off (Table 3).

Table 3
Parameter Estimates for Ln[p/(1-p)] of Coverage at 12 Months April 1987 Survey

	SES	PREMI Months	Interaction SES*PR.Mths	Constant
Regr. Coeff.	.317	.166	- .012	- 3.114
(st. err)	.056	.034	.073	.268
T Value	5.70	4.90	-1.71	25.70

The results from parallel analyses done with July 1986 data produce consistent inferences, although there are a relatively small number of children with more than six months under PREMI to test this hypothesis clearly.

HOW DID THE EFFECTS COME ABOUT?

The PREMI effects are evident. If PREMI activities were to be maintained over time it is clear that a large number of children would be receiving on-time vaccination coverage (50 to 60%), and 80 to 90% would be completely covered by a little after 24 months of age. Yet, soon after the final measurement wave of this study the PREMI structure that had achieved this outcome began to change. At first this reflected a belief that the intensive *jornadas* associated with PREMI success represented too large an effort and were too much of a burden on the health system. PREMI planners turned to other less demanding approaches. Later, with the political shifts preceding and following the change in government, there were other motivations to move away from the PREMI approach. This history is discussed elsewhere in this document.

However, even if the government of Ecuador has moved away from the PREMI strategy, it is still possible to provide useful advice to those interested in achieving similar outcomes, both for Ecuador and elsewhere. To do so we must extend our analyses past the presentation of outcomes to the explanation of what produced those outcomes.

In particular, this evaluation is charged with establishing whether or not the specific communication/education programs that were central to PREMI (and which complemented service delivery changes including access to and availability of vaccinations) were effective. Since no neat experimental designs were implemented which randomly assigned communication programs to some and service delivery improvements to others, any specific attribution of effects can only be tentative. As evaluators we open a process of exploration in the data, trying to indicate what we think ought to be true if the communication program was effective, and seeing whether the evidence is consistent with our expectations.

Locating evidence for the effectiveness of the communication component of PREMI requires the specification of the several paths through which it might have affected immunization rates. With those proposed paths in front of us it will be possible to search for relevant evidence. What, then, are the possible paths?

1. The individual knowledge hypothesis: Both through mass media and through local mobilization efforts individuals may have learned about vaccination concepts (e.g. which diseases can be avoided) or about vaccination mechanics (e.g. by what age to complete the series or how many vaccinations are required). Either form of learning may have produced higher compliance.

   A parallel but simpler path doesn't require learning in any profound sense, but suggests that the PREMI campaign might have produced short-term knowledge about the opportunity to obtain vaccinations on a specific day. Obviously this would ease compliance without producing any "learning" as it will be operationalized below.

2. The community effects hypothesis: Vaccination practice of most people in a community may be affected by the expectations of others. There are two complementary ways in which the PREMI program might have influenced individual behavior through community processes.

First there is a 'community knowledge' subhypothesis: PREMI produces increased knowledge about vaccination in some people in a community. That knowledge is shared with others in the community who may not have been directly exposed to PREMI messages. Then the community as a whole knows more about vaccinations, and, regardless of individual exposure to PREMI, individuals are likely to bring their children to be vaccinated. Thus the higher the average level of knowledge in the community the more likely all its members are to comply.

Second there is the 'vaccination behavior is social behavior' hypothesis: PREMI reaches some members of the community who, whether they learn more about vaccination or not, increase their vaccination compliance. That changing practice among a critical mass in a community then creates a new climate of social expectation. Other people may be motivated to vaccinate their children without direct PREMI exposure and without detailed knowledge of vaccination concepts or mechanics. They take their children for vaccination because they are expected to do so; they may not know precisely which vaccines are being administered; they may not be able to recite the different schedules for different vaccines. Nonetheless they take their children to clinics with the expectation that they will be vaccinated because that is part of child nurturing in their community. (One suspects that is the best explanation for vaccination compliance among the middle classes in some wealthier countries.) Under this hypothesis PREMI's communication component transmits an expectation to the community at large that children should be brought for vaccination particularly during the *jornadas* without necessarily transmitting detailed knowledge underpinning that practice.

THE INDIVIDUAL KNOWLEDGE HYPOTHESIS

Evidence for the first of these hypotheses is easiest to develop, although as with most evidence deriving from cross-sectional associations, inferences are open to some challenges. We present both the evidence and the threats to inference. We seek to show three results: a) that there was substantial exposure to PREMI's educational programs, b) that exposure to PREMI led to individual knowledge, and c) that individual knowledge led to individual vaccination practice.

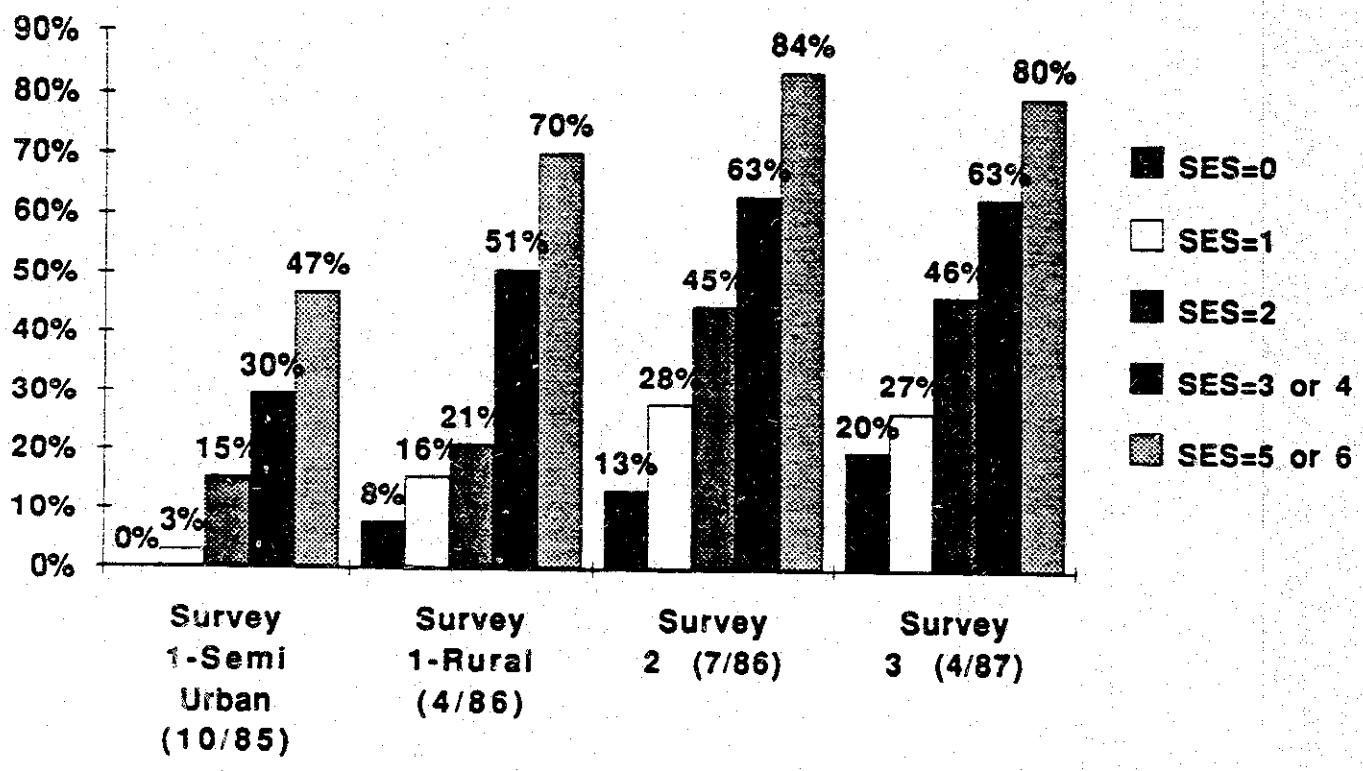
PREMI –> Exposure–> Knowledge–> Practice

PREMI established a presence in the consciousness of the Ecuadoran people.

Immediately after the first *jornada* (in October 1985) about 30% of the population knew the acronym, PREMI, without further prompting. By August 1986, after two more rounds of *jornadas*, about 65% of the population recognized the acronym. This substantial recognition remained eight months later; in April 1987, 65% of the population still remembered the term, although there had been no national *jornada* since the previous October. More than 80% claimed to know about the PREMI vaccination campaign (as opposed to the more difficult recognition of the acronym) in August 1986, once they were reminded of the meaning of PREMI.

As a side note, from the beginning there were some socioeconomic groups which were more likely to know about PREMI than others. At the time of the first survey, the gap between the lowest and highest SES groups in recognition of the acronym was nearly 40%, with the lowest group at 9% and the highest at 50%. By the last measurement wave the gap was nearly 50%: the lowest group at 36% and the highest at 85%. These data are displayed in Figure 7. Obviously, there was substantial improvement in every social group, but original gaps still remained.

FIGURE 8
PREMI RECOGNITION BY SOCIOECONOMIC LEVEL AND TIME OF SURVEY (N=5614)



It was also clear that the recognition of PREMI reflected each of the major channels through which it worked, although the mass media seemed to stand out, particularly in the beginning. During the split surveys which took place in the first six months of PREMI's operation (a mostly urban and semi-urban survey (n=974) in November, 1985, and a rural supplement (n=500) in April, 1986), respondents consistently reported radio and secondarily television as the major source of their knowledge about PREMI.

Table 4
Sources reported in response to
"Where did you learn about the PREMI Vaccination Campaigns?"
among those who knew what PREMI was

Sources	Count	Percent of cases
Radio	460	70%
TV	386	59
Home Visit	37	2
Newspaper	77	12
Posters	274	42
Family-Friends	137	21
Vacc. Centers	74	11
Student Parades	14	2
Other	34	5
Totals	654	228.3

Table 4 includes only the 44% of the respondents in the two early surveys (N=1474) who recognized what PREMI was and who knew about the vaccination campaigns. Clearly the mass media stood out as the major channels from which they recalled hearing about the PREMI program.

The high radio and television source recognition reflects the widespread distribution of radio and television in Ecuador. About 80% claim to own radios and close to 60% claim to own televisions across all of the surveys.

The relatively few people who recalled having someone visit at home or having seen student parades was something of a surprise since in the campaign planning and in the enthusiasm immediately after the campaign launch much was made of the importance of such mobilization channels. If these results are to be believed, the perception in the communities was that contact with organized personal outreach was rare, although one-fifth of the respondents claimed to learn about it from the informal interpersonal channels of family or friends. Clearly one wants to be careful about attributing too much to the precise numbers; however the extreme differences between mass media channels and organized interpersonal channels as perceived sources of information may be worth some attention.

There is little doubt, then, that the PREMI communication program reached its audience. The next question is whether it had any effect on that audience other than creating recognition of the name.

PREMI was associated with significant change in knowledge about vaccinations (insofar as there is interpretable data about such knowledge).

The schedule for and process of data collection was described in a previous chapter. Two characteristics of that process constrain our ability to answer questions about knowledge change: 1) there was no 'before' PREMI study so we lack a clean baseline, and 2) substantial modifications in the survey questionnaire and in administration conditions between the early Survey 1 on the one hand and the later Surveys 2 and 3 on the other provide relatively few specific items which permit comparison, even between early and late PREMI period knowledge.

While these constraints weaken the inferences one can make, we present two types of evidence that are relevant:

1) over-time comparisons of knowledge about vaccination items which are comparable across questionnaires; and

2) correlational evidence that exposure to PREMI messages over the mass media is a significant predictor of knowledge and that knowledge is associated with behavior, even when variables which might threaten that inference are controlled.

Over-Time Comparisons of Vaccination Knowledge

Only two measures allow roughly equivalent estimation of vaccination knowledge over the PREMI period: one shows clear evidence of improvement in knowledge and one shows no effect. The first was about whether or not mothers were able to name particular vaccinations in response to the question "Which

vaccines should children under one year get?"[5] The easiest way to look at the answers is the proportion of mothers at each survey who responded that they did not know the names of any vaccinations which a child must have before he or she is one year old. In the following table the observed proportions at each measurement wave are compared and then a weighted total is given which corrects for differences in SES distribution among the samples at each measurement wave.

Table 5
Proportion of respondents who could not name any vaccinations that children must have before their first birthday by KAP and SES

	Time of Survey			
SES Level	11/85	4/86	7/86	4/87
Lower	51% (98)	44% (330)	53% (747)	46% (391)
Medium	24% (304)	25% (149)	32% (762)	24% (378)
Higher	16% (550)	14% (14)	15% (1189)	14% (684)
Weighted Total	27.6%	25.3%	30.0%	25.7%

Clearly there had been little change in the proportion of people who could name no vaccinations. In contrast, the number of respondents who knew when children were to start the vaccination series improved throughout the PREMI program. The following table, parallel to the preceding one in format, presents the responses to the question "At what age should one begin to vaccinate one's child?"[6] The acceptable correct response was that one should begin before the child was three months old. Because BCG is given at birth, and thus "at birth" should have been the only correct response, a mother may have been confused by the question. Since the BCG vaccination is given automatically at the time of delivery in hospitals, the first time a mother has to bring a child for vaccination is before he or she is

[5] In the first surveys the exact question was "¿Cual o cuales vacunas debe recibir un niño durante su primer año de vida?" In the second and third surveys the exact question was "¿Que vacunas deben recibir los niños menores de un año?"

[6] For the early surveys the exact wording was "¿A qué edad debe empezar a vacunarse a su niño?" For the last two surveys the question was "¿A qué edad debe comenzar a vacunar a su niño?"

three months old under the policy for vaccinations then in place in Ecuador. We then accepted any answer up to three months as correct.

Table 6
Proportion of respondents who knew that children should begin vaccination before three months by KAP and SES

	Time of Survey			
SES Level	11/85	4/86	7/86	4/87
Lower	53% (98)	66% (321)	78% (731)	83% (391)
Medium	65% (297)	65% (148)	93% (762)	92% (378)
Higher	73% (550)	79% (14)	96% (1189)	95% (684)
Weighted Total	65.3%	71.5%	90.3%	90.9%

There is clear improvement in knowledge about when to start vaccinations.

Cross-sectional Associations between PREMI Exposure, Knowledge and Behavior

Unfortunately, only these two questions allow a fair comparison of knowledge over the course of the PREMI program (and even the earliest measures were taken after the initiation of PREMI). Additional evidence for the impact of PREMI must come from cross-sectional evidence that exposure to PREMI messages was associated with both additional knowledge and, directly or indirectly, behavior. In the following pages we present evidence that supports the following inferences:

1. Vaccination knowledge is substantially associated with appropriate vaccination behavior.

2. Exposure to PREMI messages is substantially related to vaccination knowledge.

3. Exposure to radio messages, in particular, is slightly related to vaccination behavior directly as well as (like television message exposure) indirectly through effects on vaccination knowledge.

The analysis involves eight variables which are described below and in Table 7.

Vaccination Level. The number of vaccinations that a child received was substantially a reflection of his or her age. Thus we needed to develop a measure of vaccination performance that allowed fair comparison among children, regardless of their age. A regression equation was used to predict the number of vaccinations on the basis of a child's age in months. Then each child was assigned a residual score, computed by subtracting his or her vaccination performance from the predicted performance for someone of that age. Thus the Vaccination Level estimates how much better or worse someone did relative to the expectation for their age.[7]

Vaccination Knowledge. Vaccination knowledge is a 17-item scale which incorporates measures of both the respondent's 1) ability to name diseases which can be avoided through immunization and 2) ability to recite logistical facts about getting vaccinations (how many for each disease; ages to start and finish). The overall scale was sufficiently reliable with a Cronbach's alpha of .78. It was not possible to create separate acceptable scales for knowledge of diseases and logistical knowledge.

Wealth. Individual wealth was estimated on the basis of a 13-item scale which included what possessions were to be found in the household (stove, sewing machine, refrigerator, bicycle, automobile, telephone), materials used in household construction (roof, walls and floor), access to utilities (water, waste disposal, electricity) and the number of persons per bedroom. The overall scale was quite reliable with all items standardized, with an alpha of .86. Since all items were standardized the scale mean was close to zero. Some of the earlier analyses reported made use of an SES scale which included educational level and ownership of mass media. Since they were to be used as distinct variables in this analysis, they were left out of the wealth scale.

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[7] The analysis regressed the number of vaccinations on age, the square of age and the cube of age since each of those terms added substantially to the power of the prediction. The resulting equation was:

$$V = .64*Age - .017*Age^2 + .00015*Age^3 + .046.$$

This equation accounted for 53% of the variance in vaccination level. Each child was assigned the residual, subtracting the predicted vaccination score from the observed score.

Education. The number of years of education claimed.

Television Watching. The number of hours per day that an individual claimed to watch television. All responses greater than 10 hours were set equal to 10 hours.

Radio Listening. The number of hours per day that an individual claimed to listen to radio.

Radio Message Discrimination. Respondents were asked whether they could recall any health messages they heard on the radio and which ones they were. They were given a point for each topic they cited including vaccination, diarrheal disease, breastfeeding, growth monitoring and general child survival.

Television Message Discrimination. Respondents were asked whether they could recall any health messages they saw on television and which ones they were. They were given a point for each broad topic they cited including vaccination, diarrheal disease, breastfeeding, growth monitoring and general child survival.

Table 7
Means and Standard Deviations of Variables for Cross-sectional Analysis

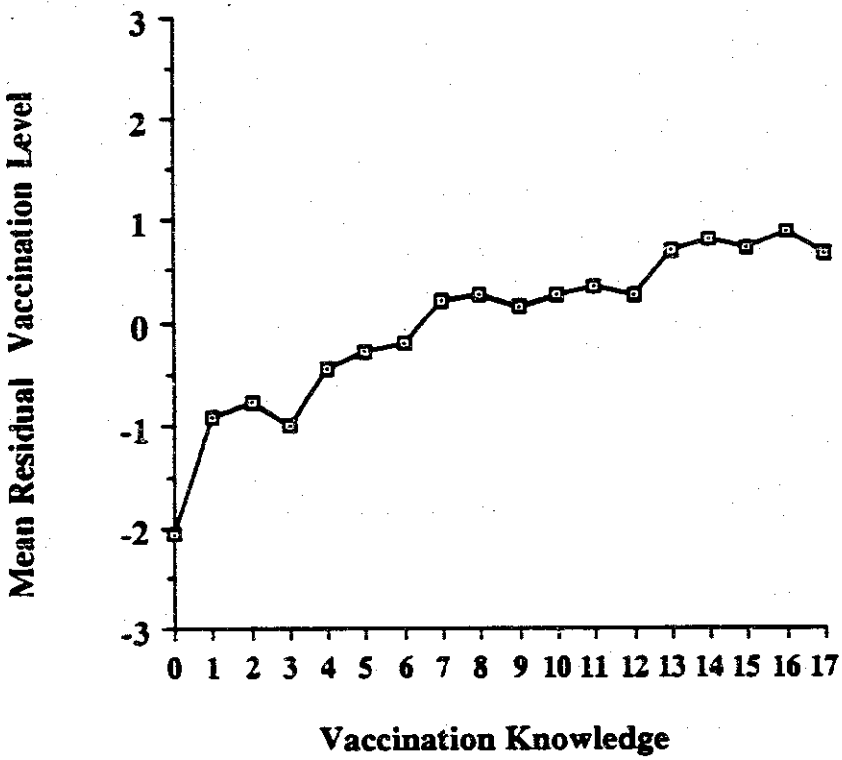
	Mean	Standard Deviation
Vaccination Level Residual	0.00	1.95
Vaccination Knowledge	7.92	3.70
Wealth	0.12	7.81
Education	6.78	4.16
Television Watching	2.96	3.29
Radio Listening	3.52	3.46
TV Message Discrimination	1.46	1.41
Radio Message Discrimination	1.68	1.43

Vaccination Knowledge and Vaccination Level

The correlation between vaccination level and vaccination knowledge was .26. The basic relationship is pictured in Figure 9.

There are two obvious threats to an inference that knowledge influenced vaccination behavior. First there is some risk that the observed association between knowledge and level reflects the influence of other forces on both variables. Thus, for example, wealth or educational level might produce both increased vaccination knowledge and superior vaccination level. However when a statistical control for wealth and education is included there is only a moderate reduction in the level of the association between knowledge and level (partial correlation is .18; $p < .001$).

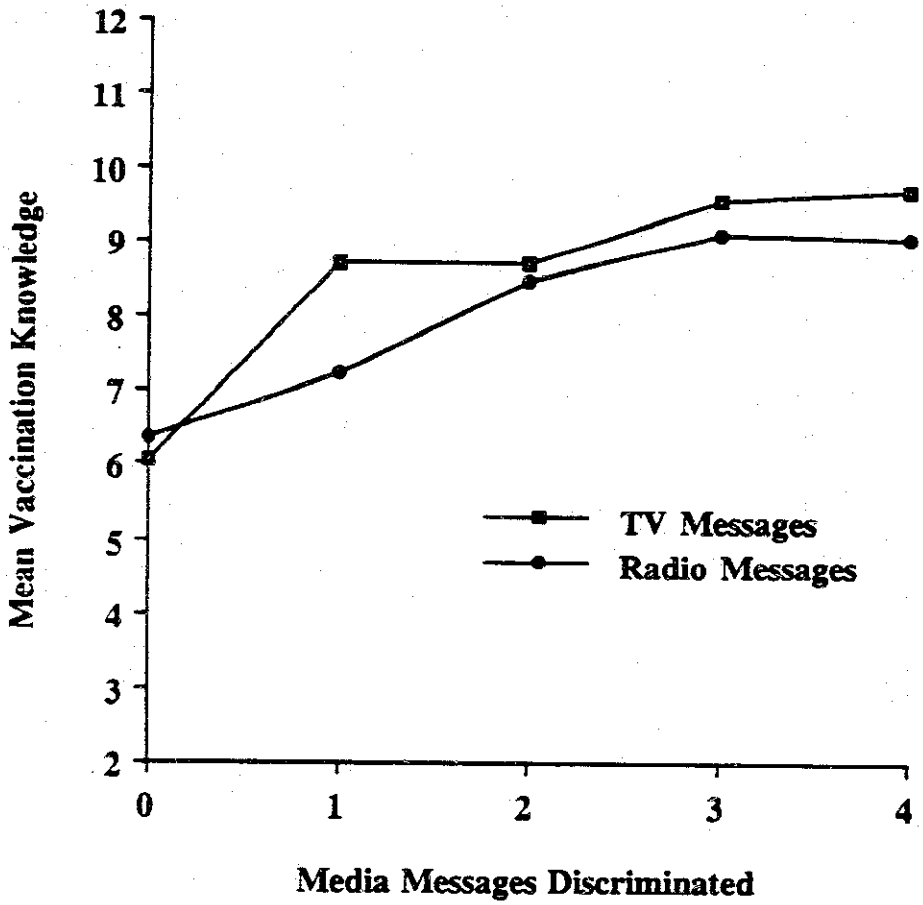
FIGURE 9
VACCINATION LEVEL BY VACCINATION KNOWLEDGE (N=1449)



The second threat is that the true causal direction runs from vaccination level to vaccination knowledge---that is that the more times one takes a child for vaccinations the more one learns about them, rather than the reverse. There is no sure way to sort this issue of causal direction with cross-sectional data. Essentially one must assume the causal direction, or at least that their is mutual causality, while recognizing that statistical analysis will provide no definitive answer.

The second association is that between exposure to PREMI messages and level of knowledge. Again, there are clear (bivariate) associations between exposure to television or radio health messages and vaccination knowledge. (Television message discrimination has a correlation of .406 and radio message discrimination has a correlation of .315 with knowledge.) Figure 10 displays those two results.

FIGURE 10
VACCINATION KNOWLEDGE BY MEDIA MESSAGES DISCRIMINATED (N=1449)



The threats to an inference that exposure to media messages leads to knowledge are similar to those for knowledge and level of vaccination. First there is a concern that the exposure to TV and radio health messages variables are but a stand-in for overall media exposure, which is, in turn, but a stand-in for the wealth to be able to afford to purchase a television or radio. Or there is a concern that the ability to discriminate media messages (that is to spontaneously remember and report having heard health messages) is but a function of education. Since both education and wealth are known to be related to

vaccination knowledge ($r_{\text{wealth knowledge}} = .398$ $r_{\text{education knowledge}} = .459$) there has to be a concern that the message discrimination with knowledge relationships are an artifact of the effects of wealth or education or possibly of general access to radio or television rather than attention to PREMI health messages per se. However this concern turns out to be unjustified. The partial correlations for the message discrimination variables and knowledge are reduced compared to the simple correlations when controls for education wealth and general exposure to the medium are included. However for both radio and television they remain substantial and statistically significant at $p < .001$.

$$r_{(\text{knowledge, radio messages}).(\text{wealth, education, radio listening})} = .201$$

$$r_{(\text{knowledge.TV messages}).(\text{wealth, education, TV watching})} = .185$$

The second threat to an inference that exposure to health messages caused improved vaccination knowledge is reverse causation. Is it possible that people who know more about vaccination are more likely to remember having heard health messages on radio and television rather than actually having a higher level of exposure to those messages? As with the previous analysis, no statistical procedure will sort out that issue definitively. Again we will try to make the case for a preferred causal order below.

Vaccination Level and Exposure to PREMI Messages

Exposure to PREMI messages is likely to influence vaccination level through intervening effects on vaccination knowledge. However there is some possibility that there would also be direct effects of exposure to PREMI messages on behavior. Possibly media messages motivate timely visits to vaccination sites (particularly in the context of vaccination days) without producing any increase in knowledge about vaccinations that would show up on the scale. Caretakers may learn only that they are expected to "take your child for vaccination next Monday." If this direct path existed one would expect to find associations between the media message discrimination variables and the vaccination level variable even when one controlled for vaccination level as well as wealth and education. The resulting partial correlations do suggest such a result for exposure to radio messages (partial $r = .07$; $p = .005$) and a parallel trend for exposure to television messages (partial $r = .05$; $p = .03$). However the extent of each relationship is

minimal. The relationships among all eight variables can be summarized effectively in the path diagram shown in Figure 11.[8]

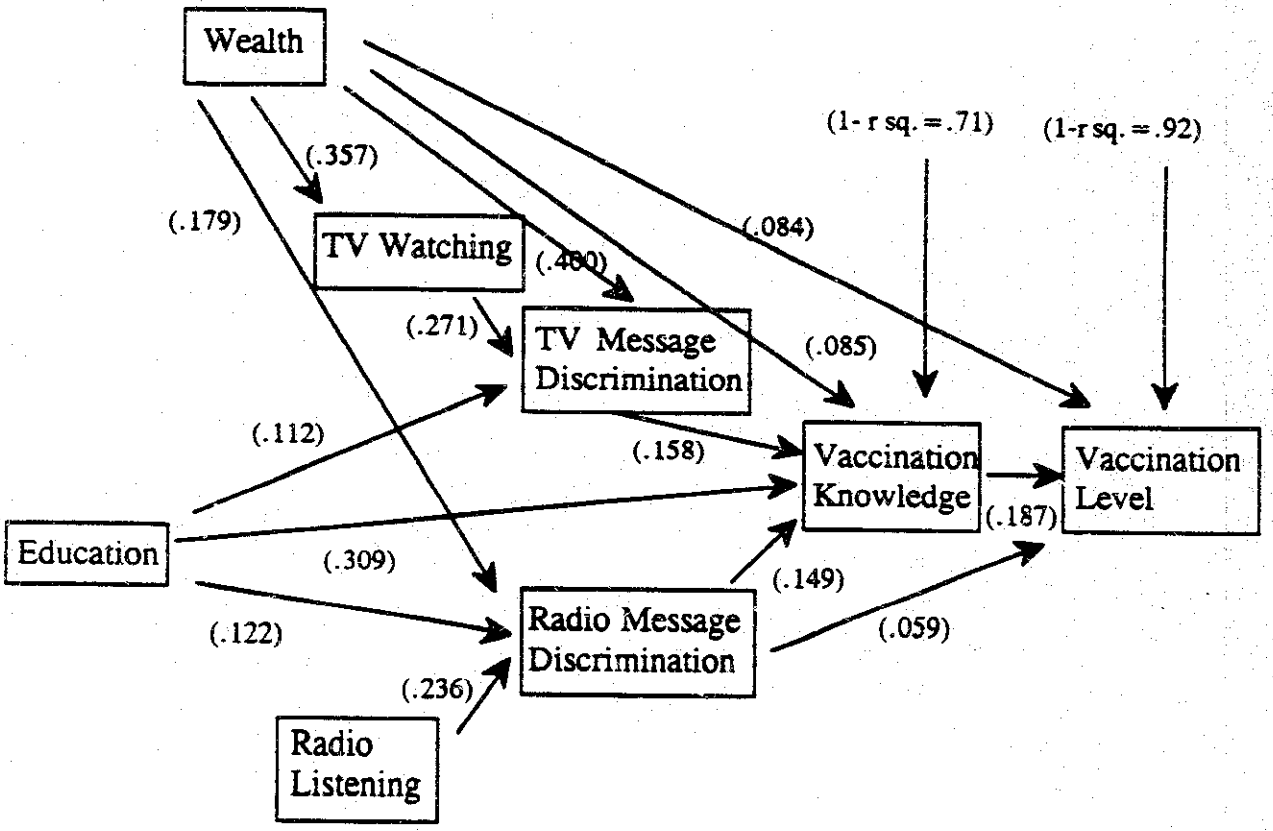
[8] Figure 8 is based on the data gathered in April, 1987. A very similar set of results is produced from the same analysis carried out with data gathered in July, 1986. A few of the variables were created differently given some changes in the questions in each survey. However they are fundamentally parallel and the match in coefficients and in the variance accounted for in what are two independent studies is striking. The following table contrasts all of the coefficients. Some of the coefficients that did not reach the $P < .05$ level of significance in the April 1987 analysis and were left out the Figure 9 are included in the table. Since the July, 1986 sample was larger (n-2700 versus n-1450) coefficients were significant in one analysis but not another. If standardized coefficients were not larger than .05 at either measurement wave they are not reported.

Standardized path coefficients and R^2s from relevant equations from April, 1987 (n = 1440) and *July, 1986 (n = 2700)* surveys.

Predictors	Vac. level	Vac. know	TV m.d.	Radio m.d.	TV Watch	Rad Listen
Vac. Know.	.187/*.134*					
TV msge disc.	.	.159/*.118*				
Rd. msge dis.	.059/*.020*	.143/*.141*				
TV Watching			.271/*.321*			
Radio Listen.				.236/*.189*		
Wealth	.084/*.085*	.085/*.103*	.400/*.139*	.179/*.129*	.357/*.356*	.036/*.068*
Education	.013/*.094*	.309/*.303*	.112/*.124*	.122/*.092*	.051/*.079*	
R^2	.08/*.08*	.29/*.25*	.40/*.22*	.14/*.08*	.15/*.16*	.004/.007

There are a few differences, clearly. Education is more associated with vaccination behavior in July, 1986 than in April, 1987, and wealth is a less powerful predictor of Television message discrimination in July, 1986 than in April, 1987. However, almost all of the other coefficients and the variance accounted for at each wave appear to be consistent.

FIGURE 11
PATH DIAGRAM PREDICTING VACCINATION LEVEL AND KNOWLEDGE
(STANDARDIZED COEFFICIENTS/N=1449)



The essential results for the path diagram reflect the earlier discussion:

1) Age-adjusted vaccination level is not well explained (8% of the variance accounted for). Of the variables that are significant predictors, vaccination knowledge is the strongest predictor with wealth and radio message exposure having small direct relationships.

2) Vaccination knowledge is somewhat better explained by the model (almost 30% of the variance accounted for). Education is a strong determinant, but both television and radio message discrimination are also substantial independent influences.

3) Television message discrimination is the outcome of wealth, television watching and to a lesser extent, education. Radio message discrimination is a function of radio listening and to a lesser extent education and wealth.

4) Television watching reflects wealth (and the ability to own a television). Radio listening is not well explained by either education or wealth. Although it takes some money to purchase a radio, if a household also has enough money to purchase a television, television watching is likely to replace radio listening. Thus heavy radio listeners are to be found at an intermediate socioeconomic level, wealthy enough to purchase a radio but not wealthy enough to own a television.

Figure 9 and the conclusions drawn from it provide some support for the "individual knowledge" path. The data are consistent with an argument that individual exposure to health messages produced better knowledge about vaccinations, which in turn influenced vaccination practice. This is not the whole story, but it may explain PREMI's influence, in part. This is evidence for one conventional view of how mass health promotion campaigns work by changing what people know.

COMMUNITY EFFECTS HYPOTHESES

Thus far we have discussed evidence for individual processes of behavior change; evidence that individual exposure to PREMI messages led to individual vaccination knowledge and behavior. However that was but one of two broad hypotheses put forward to explain how it was that PREMI might have produced its large effects on vaccination practice. The other path to effects included two hypotheses: the "community knowledge" hypothesis and the "vaccination behavior is social behavior" hypothesis. Both suggested that some of the effects of the PREMI campaign occurred through change at the community level. Both arguments say that the effect of the campaign can be seen in individual actions even if individuals have not been directly exposed to campaign messages.

The "community knowledge" hypothesis argues that PREMI message exposure affects the average level of knowledge in the community which, in turn, influences individual knowledge and then individual practice.

The 'vaccination behavior is social behavior' hypothesis does not require the intervention of individual knowledge. It focuses on changes in community expectations regardless of the mechanism through which they change. PREMI mobilization activities, mass media broadcasts and direct action by clinic personnel created a new atmosphere at the community level. There was an increasing sense in the community that one must vaccinate one's children. That led to new patterns of typical community behavior; that typical behavior became expected for each individual whether they were directly exposed to PREMI actions or not..

We examined each influence path in turn. However the examination of these research questions required the creation of parallel community level variables to the eight individual level variables described above. They were created in the following way:

The samples for each study were selected through a two-stage cluster sampling procedure. First 60 villages (and city sectors) were chosen through a random process and then individuals in villages were selected through a second random process. We treated the 60 clusters as communities and the people selected within each community as representative of that community.

Two types of community-level variables were created based on the cluster as the unit of aggregation. The first type was simply the mean of all respondents in the community. This was used for analyses at the community level. The second type was community means corrected for the score of the individual. These were used as additional variables for analyses of individual practice. By eliminating the individual's score in calculating the community mean we avoid the risk of using the individual's score both as the thing to be explained and as a part of the explanatory variable.[9]

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[9] The proper procedures for estimating so-called contextual effects are in dispute. The procedure we adopted is a conservative one. By eliminating the individual's score from the community mean we avoided overestimating the relationship by predicting the score with itself. However in doing so we created a negative bias in our estimate of the correlation between individual scores and the community mean. If the best estimate of the community mean is the mean of the entire community sample, and we take out an individual who has performed well on vaccination, the remaining mean tends to underestimate the true mean. Vice versa, if the individual performed poorly, the remaining mean is likely to overestimate the true community mean. As a result the correlation between community means and individual scores is an underestimate of that relation. Since we generally prefer to make conservative claims we accept this risk rather than choosing to risk overestimation.

The "community knowledge" hypothesis

Community			
PREMI——>Community—>Individual—>Individual			
Exposure	**Knowledge**	**Knowledge**	**Behavior**

If the "community knowledge" path is to be supported each of the following three expectations should be true, starting from right to left in the diagram, above.

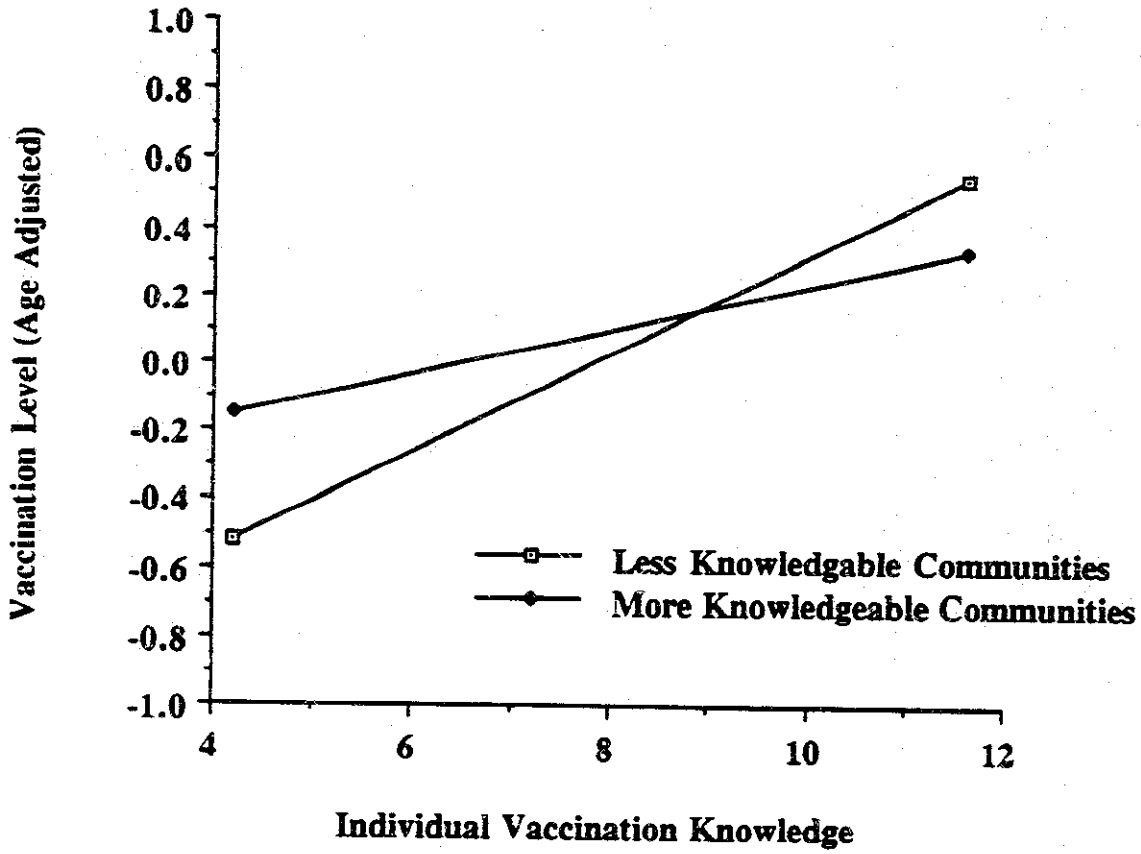
First we need to show that individual vaccination knowledge was related to vaccination behavior. That has already been demonstrated in Figures 9 and 11.

Next, we need to show that community vaccination knowledge was related to individual knowledge. The simple correlation between average community knowledge (excluding the individual's own score) and individual knowledge was substantial, with $r=.395$. However, that isn't really enough. For there to be convincing evidence of the influence of community knowledge, one would want to show that average community knowledge added something to what we could already account for with individual-level variables. If such things as education and exposure to PREMI messages and wealth do as good a job without adding in community knowledge, then a simpler inference would be to deny this path of influence. And, indeed, the results suggest that there was a direct community knowledge influence but that it was small. The individual level variables (education, TV and radio message discrimination, and wealth) accounted for almost 29% of the variance in individual knowledge. Adding in community knowledge adds small additional predictive power, about 1.5%. While the effect is a significant one, it does not suggest a substantial path through community knowledge.

However there is another possible way that community knowledge might have effected individual behavior. Is it possible that community knowledge and individual knowledge interacted (negatively) in affecting individual behavior? This would suggest that among people who lived in communities where relatively few people knew much about vaccination, individual vaccination knowledge might have made an important difference. However in communities where many people already knew about vaccination the effect of individual differences in knowledge may have been much smaller. This hypothesized influence path (although of small magnitude) was consistent with the data. Wealth, education and individual vaccination knowledge together accounted for about 8% of the variance in vaccination level.

Adding in community vaccination knowledge added little to that. However, adding in the interaction between community and individual knowledge added a significant ($P < .005$), albeit small, effect, .8%. The effect can be seen more clearly in Figure 12.[10]

FIGURE 12
VACCINATION LEVEL BY COMMUNITY AND INDIVIDUAL VACCINATION KNOWLEDGE



[10] There may be some apparent inconsistency between our willingness to downplay the direct community knowledge path while attending to this interactive path, even though the first analysis produced a larger gain in variance. There are three subjective justifications for this. First, the additional variance associated was absolutely larger but relatively smaller, given what had been accounted for by other variables. It was tougher to account for variation in vaccination level than in vaccination knowledge and any success in doing so garnered some attention. Second, it is generally more difficult to find statistically significant interaction effects than main effects. Third, the interaction effect was intrinsically interesting. It was a non-obvious finding, and on those grounds deserved some additional pursuit.

Figure 12 portrays the interaction between community and individual knowledge calculated on the basis of the regression equation predicting age-adjusted vaccination level. The curve labeled 'more knowledgeable communities' estimates the effect of individual vaccination knowledge among people who live in communities one standard deviation above the mean on community knowledge. The curve labeled 'less knowledgeable communities' provides a parallel estimate for communities one standard deviation below the mean. In both cases other variables (education and wealth) are assumed to be at their respective means.[11]

How can Figure 12 be interpreted? Among those people who knew very little, (on the left side of the figure) living in a community with many other knowledgeable people increases their vaccination level. Among those people who knew a good deal about vaccination (the right side of Figure 12), the level of vaccination knowledge among others in the community mattered little. Community knowledge pulled up the behavior of those whose own level of knowledge was poor, but did not pull down the behavior of those whose personal knowledge was high.

To summarize, there was some evidence consistent with the second piece of the community knowledge path, both for a direct effect of community knowledge on individual knowledge, and for the effect of community knowledge on behavior in the absence of individual knowledge. We now turn to evidence for the third element of this path: that community PREMI exposure led to community knowledge.

To do this analysis we moved from individual data to community-level data, with each of the 60 communities as a single unit for the analysis. We needed to show that the more the community as a whole was exposed to PREMI messages the more it developed a higher average knowledge level. The simple correlation between radio and television message discrimination measures and the vaccination knowledge measures at the community level were quite strong:

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[11] The regression equation (with unstandardized coefficients) used to generate Figure 12 was:

Vacc Lev = .01*Educ + .02*Wealth + .28*VaccKnow + .20*CommVaccKnow -.02*Interaction -2.42

All coefficients, except for Education, were statistically significant at $P < .01$.

$$r_{(\text{TV discrimination})(\text{vaccination knowledge})} = .807$$

$$r_{(\text{radio discrimination})(\text{vaccination knowledge})} = .721$$

However there was a substantial risk that these observed high correlations were merely an artifact of other causes-- wealthier communities and better educated communities were more likely to have both higher access to media and more people knowledgeable about vaccinations. We tested to see whether the apparent effects of PREMI exposure were merely an artifact of these pre-existing differences among communities. The other characteristics of communities (largely captured by the average education) accounted for 67% of the variance in average community knowledge. The two PREMI exposure measures (radio and TV message discrimination) added an additional 7% ($p < .002$). Almost all of that additional influence is associated with the level of radio message discrimination. Thus the third link in the influence path for the community knowledge hypothesis was supported.

The data were consistent with the operation of the community knowledge path. Figure 13 presents a combined path diagram for the entire route of influence.

FIGURE 13
COMMUNITY KNOWLEDGE PATH DIAGRAM

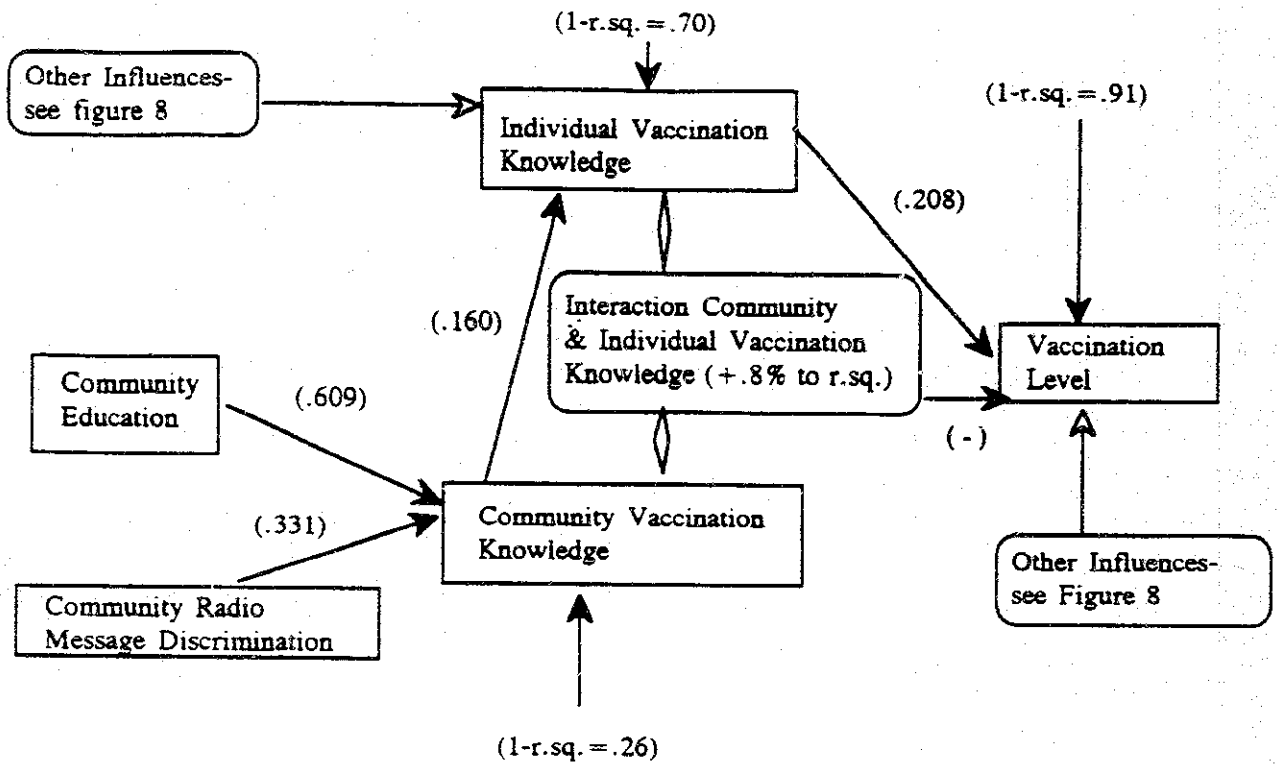

Figure 13 provides data consistent with the second path, with PREMI working through community knowledge. It suggests that community knowledge influences individual knowledge which, in turn, influences individual vaccination behavior. Also, community knowledge is a replacement for individual knowledge as an influence on behavior when an individual's own knowledge is low.

THE "VACCINATION BEHAVIOR IS SOCIAL BEHAVIOR" HYPOTHESIS.

This is the final path proposed as a possible route for PREMI influence. Like the previous model it involves a number of presumed links. Again, the evidence review addresses each link in the diagram below, from left to right. However, evidence about the last link, between community expectations and individual behavior, is only indirect. We move directly to establishing the association between the

second element, community behavior, and the fourth element, individual behavior. We then will argue that the process through which that influence flows is through community expectations.

Community			
PREMI——>	Community—>	Community—>	Individual
Exposure	Behavior	Expectations	Behavior

Individual Behavior is associated with Community Behavior. These analyses establish that, indeed, community behavior was substantially associated with individual behavior. In the previous analyses we have seen that individual vaccination level is poorly explained, in general. All of the individual characteristics accounted for about 8% of the variance in the age-adjusted vaccination level measure. Community behavior added substantially to this predictive power. In total, with both community behavior and individual predictors included, almost 12% of the variance in individual vaccination level was accounted for. [12]

In addition, community vaccination level was the single strongest predictor of individual vaccination level ($r = .272$; $p < .001$). Indeed, three-fifths of the explained variance (or 7.4% of 11.7%) is attributable to community vaccination level if it is entered first. Thus if we know what other people in the community did, we can make a better guess about an individual child's level than we can knowing any individual characteristics of that child or his/her caretaker. Community vaccination levels say more than the level of education of the mother, the wealth of the family or the mother's knowledge about vaccination.

What does that result suggest? Why is it that community behavior and individual behavior are substantially associated? In general there are two likely ways that such an association might occur.

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[12] It is clear that none of our analyses account for a great deal of individual variation in age-adjusted vaccination behavior. There were several possible explanations for this. First, recall that age alone accounted for 53% of the variance in vaccination level. Thus the raw scores were clearly reliable. However when the age effects were removed, the residual scores were left with a much greater proportion of error. Second, it may be that whether or not a caretaker took a child for two more or fewer vaccinations (the standard deviation of the residual score) than her neighbor with a child of the same age was, in fact, substantially a matter of happenstance. She was free on the day the *jornada* occurred and her neighbor wasn't. The next day the situation might have been reversed. The aggregate pattern of vaccination behavior may have been lawful; individual differences may have been much more the reflection of random forces. Some of the analyses that follow will explore this issue in greater detail.

First, there is the possibility that other factors produce both individual behavior and community behavior– that what influences one person in the community influences everyone in the community in the same way, independently. There are obvious hypotheses that fit this logic. For example, people in a community share an ease of access to local clinics; people who live in a rural town without a clinic will have a harder time obtaining vaccinations for their children than people who live near a clinic that is well-supplied with vaccination materials. One would expect a substantial correlation between community behavior and individual behavior as a result. Any other characteristic (e.g. degree of effective outreach activities by local medical staff; the extent of vaccination mobilization efforts) that was shared among people in a community would produce a similar association, without there being a direct causal link.

The alternative explanation is the social explanation: individuals are influenced by their social network and tend to do what their neighbors do regardless of their own characteristics. Community behavior is the best measure of the expectations for behavior that are being communicated in a particular social network. Others' behavior indicates the pressure for conformity which may be explicit or subtle, verbal or non-verbal, but which tends to influence everyone's behavior. People may or may not be able to articulate the nature of local social norms or the process through which they receive pressure to conform to them. Nonetheless, the influence may be present.

We have already shown that community behavior was associated with individual behavior. In the rest of this section, there are two remaining tasks. The first will be to show that other characteristics of communities did not explain the observed association of community behavior and individual behavior, so as to support the claim that the association reflected the social expectations explanation. Second, once that concern has been dealt with, we return to the leftmost arrow in the diagram and examine explanations for differences among communities in vaccination levels and in particular focus on the relation between community PREMI exposure and community behavior.

The correlation between community behavior and individual behavior largely stood up even when other available characteristics held in common by a community were controlled. However the characteristics it was possible to measure were a limited set. In particular, it was not possible to create a measure of outreach and mobilization activities by the local clinic staff which was logically independent of vaccination behavior. It was possible to create each of the following measures:

a) distance from the clinic (in minutes required to get there: mean=31.5, s.d=34),

b) perception of problems with service at the clinic, in particular whether the waiting time was a problem (20% mentioned this), whether the quality of attention was a problem (20%) or any other problems (9%).

c) activity of the clinic, indicated by contact with the clinic for reasons other than vaccination (35% reported getting an ORS packet at the local clinic; 48% reported having learned how to mix ORS at the clinic).

The partial correlation between community and individual behavior was .17 even when each of the available measures was controlled; it remained the best predictor of individual behavior. While there remained some possibility for skepticism largely because of the weakness of the measures to test the alternative explanation, the data were consistent with the social explanation.

The evidence was thus clear that:

1) There was parallel behavior and knowledge within communities.

2) Average vaccination behavior in a community predicted individual behavior better than all individual characteristics put together.

3) Controlling for third variables likely to explain the observed relation between community behavior and individual behavior failed to dislodge a social norm explanation for the association.

In order to complete the presentation of evidence under this third path, we must turn to evidence that community behavior was itself a reflection of community exposure to PREMI. We need to present a model explaining community behavior and consider whether the model suggests that PREMI activities were an important influence on that behavior.

What Accounted for Community Variation in Behavior?

Communities differed sharply in vaccination behavior. The overall mean on the age-residual vaccination score was zero, by definition, but community means varied from -2.8 to + 1.2, with the middle 50% of community means lying between -.4 and +.56. Thus among the 60 communities there was a great deal of variation relative to the age-predicted mean. The 25th percentile community was virtually one full vaccination lower than the 75th percentile community.

The amount of variation among communities can be compared to the spread of individual scores. One might expect the individual variation to be much larger, but the difference in scores between the 25th and 75th percentile individuals was only about 1.2 vaccinations. It appeared that for the center of the distribution the communities were almost as different from one another as were individuals.

Clearly communities varied in their behavior. What accounted for that variation? Essentially can accounted for about 37% of the variance in community vaccination behavior knowing only community average wealth. We improved predictive power little by adding other variables to a regression equation. However while that was both a powerful finding and not a surprising one, there are some concerns with inferring that only wealth mattered:

1) There were only 60 communities which means that associations had to be substantial before they reach statistical significance.

2) The correlations among predictor variables (average wealth, average education, and so on) were quite substantial. Multivariate analyses found that any one of a number of predictors accounted for the same variation in the outcome variable, however once one predictor was entered the others appear to have little additional predictive power. Thus the tendency for one predictor to represent a series of others limited causal attribution of effects to the one predictor which was present in an equation.

The following table displays the correlations of each series of relevant predictors with the outcome variable, average vaccination level and with each other.

Table 8:
Correlations among community level variables
(N=60)

	Mean Vaccination Residual	Mean Wealth	Mean Education	Mean Radio Messages	Mean TV Messages	Mean Vaccination Knowledge
	(1)	(2)	(3)	(4)	(5)	(6)
(1)		.561	.463	.469	.573	.545
(2)			.906	.683	.916	.789
(3)				.639	.869	.821
(4)					.785	.721
(5)						.807

The equation used to account for variation in the mean vaccination residual forced wealth in as the first predictor set.[13] Once wealth was entered no other variable added substantially to the variance accounted for. (Thus education, exposure to media messages and vaccination knowledge added but an additional [and non-significant] 2% to the equation's power.)

However, re-examining the set of correlations it was clear that wealth had no substantial advantage over the other predictors. For example, vaccination knowledge had virtually the same correlation with vaccination residual (r=.545) as did community wealth (r=.561). However those two predictor variables were highly correlated (r=.789). When wealth was forced in as the first predictor, the predictive power of vaccination knowledge was accounted for. There was no sorting between those two predictors as influences on vaccination behavior except by assumption. The same thing was true for every other one of the predictor variables.

The appropriate inference was that there existed communities that are more or less advantaged in many ways -- in wealth and education, but also in access to mass media (and the messages broadcast on those media) and in knowledge of vaccination. Some of those advantages were pre-existing; some may have reflected access to PREMI although there was no direct evidence one way or another. Thus, this analysis dead ends here. There appeared to be substantial evidence that community influences on individual behavior were powerful, more powerful than any individual influence. However we were unable to sort

[13] The equation used wealth both in its raw form and in a squared and cubed form; the variance accounted for moved from 31% to about 37% when the equation including the polynomial terms was estimated. The final equation was as follows: $V=.028*W-.003*W^2+.0004*W^3+.125$.

out influences on the overall community behavior. In particular, we could not make a clear statement about how PREMI's actions influenced community behavior, even though we knew that community behavior mattered a great deal.

SUMMARY AND CONCLUSIONS

This chapter addressed three issues:

1. Did the PREMI program affect immunization rates?
2. Were its effects equitably distributed across the socioeconomic spectrum?
3. What was the process through which PREMI's communication activities affected vaccination behavior?

The answer to the first question was yes, although not to the degree that had been sought. The original objective of the immunization program was to increase coverage of children under one year old from 48% to 80%. That objective was not met, but in part because it assumed a level of baseline coverage much higher than had been realized.

In Figure 1, the 12 month complete coverage rate (relying on dated, card evidence) was around 15% for children who reached their first birthday before the start of PREMI. The comparable proportion was 31% for children who reached their first birthday after the initiation of PREMI.

Both of those numbers, however, understate the true coverage rates because they relied on dated, card evidence. It was not possible to estimate the degree of underestimation for pre-PREMI coverage. However, for April 1987 we can adjust the estimate. In Table 2, a 'best picture' estimate (including self-report as well as card data) of April 1987 concurrent coverage put 12 month complete coverage at 43%, while the comparable card-based, dated estimate was 32%. Thus the conservative estimate was about two-thirds of the best picture estimate. If we make a similar correction for the pre-PREMI estimates, the best picture shift would be from 20% to 43% coverage of children under one year old .

Under one year old coverage is the ideal criterion because it captures on-time behavior. However the international standard is 12 to 23 month old coverage. In our analyses we approximated that criterion by using complete coverage by 18 months. For children who reached 18 months before PREMI, complete, dated coverage was 21%; for children who reached 18 months who had at least 11 months under the PREMI program, the coverage was about 55%. Adjusting each estimate to give a 'best picture' view (based on an apparent 17% underestimation for 18 month coverage in April 1987, according to Table 2) would credit PREMI with a corrected shift of 25% to 66%.

Thus the most stringent view, dated card evidence of 12 month complete coverage, suggested the PREMI shift was 15% to 31%. The rosiest picture, accepting card or self-reported data about complete coverage at 18 months, claimed a shift from 25% to 66%.

In addition, by Survey 3, even most of those left incompletely covered at eighteen months were on their way to complete coverage by two years of age, approximately. Of children over 27 months of age, 80% to 90% were completely covered.

Overall, PREMI had led to a major increase in coverage -- all estimates suggested that complete coverage doubled -- and an increasingly early age for achieving that coverage. While the rates achieved fell short of the goal of 80% by one year of age, the goal was unrealistic as it was based on a greatly overestimated baseline level. The major work left to do was to maintain coverage rates and continue to lower the age of completion.

The second question, about equity of effects, also deserves a positive answer. Prior immunization programs had left poorer Ecuadorans with a much lower rate of coverage than better-off Ecuadorans. This changed with the introduction of PREMI. The substantial increases of PREMI were shared at least equally among social groups and possibly were relatively larger among the worse-off groups. The poorer groups continued to have substantially lower vaccination rates than better off groups. Nonetheless they had not lost ground as overall rates increased, and possibly gained somewhat.

The third question about the process of effects gains the most complex answer. The evidence used to answer the process questions were a mix of comparisons over time and cross-sectional analysis. They did not provide definitive answers about causal processes that might come from quasi-experimental data. Nonetheless, the data were consistent with several alternative causal models. All three of the proposed paths through which the PREMI communication program might have affected its audience were consistent with the data.

a) Individuals were exposed to PREMI messages, learned new information from that exposure, and turned that knowledge into better vaccination practice.

b) Communities with greater levels of exposure to PREMI messages also had higher aggregate levels of knowledge about vaccination. And, at least for individuals whose own knowledge about vaccination was less, community knowledge replaced individual vaccination knowledge in producing better practice.

c) Community level of practice predicted individual level of practice, over and above the effects of individual characteristics, like education, wealth, knowledge of vaccination and individual exposure to PREMI messages. Indeed community average behavior was the single best predictor of individual behavior.

We were unable to sort out the influences on community behavior since many community characteristics (including average education, wealth, vaccination knowledge and exposure to PREMI messages) were highly inter-correlated. Their discrete effects could not be separated. Thus the data were consistent with an argument that PREMI influenced individual behavior both because it taught individuals and because it changed the climate in the community as a whole.

RESULTS OF THE ORAL REHYDRATION THERAPY PROGRAM

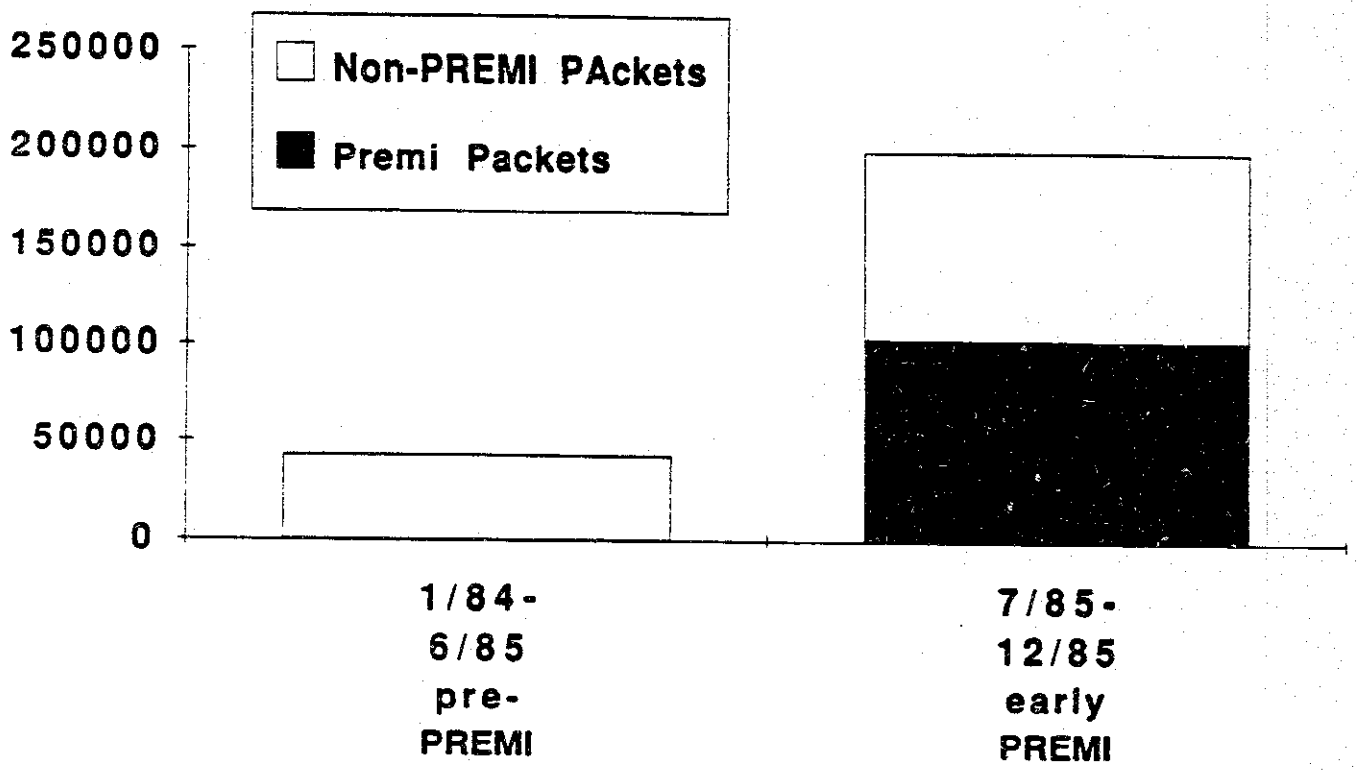
A goal of the PREMI program was to increase the use of Oral Rehydration Salts (ORS) to combat dehydration due to diarrheal disease. Prior to PREMI it was estimated that only 2% of diarrhea cases were treated with ORS. The goal was to increase use to 50%. A major reason for the low level of use before PREMI was due to the lack of ORS availability. Therefore, PREMI sought to increase ORS use both through heavy promotion through mass media and interpersonal channels as well as through distribution efforts centered on the vaccination *jornadas*. The PREMI activities related to ORS were described in a previous chapter. This chapter looks at the results of that program. It begins with a presentation of PREMI effects on ORS use. It then turns to evidence about the process of PREMI effects. Finally it puts the major objective of increasing ORS use in the context of other treatment choices.

Oral Rehydration Solution was introduced on a national scale to the Ecuadoran public simultaneously with, and in large part through, the PREMI program. While there had been some distribution of ORS packets previously, it was focused on a few areas and was otherwise limited. The first PREMI *jornada* in October 1985 was the occasion for the first mass distribution of ORS packets and mixing bags; every caretaker who brought her child for vaccination was given two ORS packets and the mixing bag. In the six month period surrounding the launch of PREMI nearly one packet was distributed for every child in the country. This was four times the rate of the immediate pre-PREMI period.

Unfortunately we do not have survey evidence about ORS use prior to PREMI. The first survey was begun more than one month after the first PREMI *jornada*. However the packet distribution data suggests that ORS was but a minor treatment choice before its introduction with PREMI.

This conclusion is based on Ministry of Health archives concerning the number of ORS packets distributed in the eighteen months prior to PREMI. It was estimated that, based on the data from Figure 14 and other information about diarrheal incidence and population size, no more than 6% of all episodes among children under five years old could have been treated with ORS even if every packet previously distributed had been used. (This was a somewhat higher estimate than the assumption of 2% mentioned above, as used in project planning documents.)

FIGURE 14
AVERAGE ORS PACKETS DISTRIBUTED EACH MONTH BEFORE AND DURING PREMI LAUNCH PERIODS



In contrast, the best estimates for the PREMI launch period (based on both packet distribution data and survey data) were that between 17% and 25% of all cases were treated with ORS. Therefore PREMI, including all its components, appeared to have had a substantial influence on increased use of ORS.

Ideally the evaluation would be able to show such increases in use without the process of combining archives and surveys on which this analysis relies. Nonetheless there were some estimates of increases in last case use which will be discussed later. In contrast, there was not good data about pre-PREMI to PREMI increases in trial, in awareness, or in various forms of knowledge. As this discussion lays out both the effects of PREMI and the process through which effects were produced, it is limited to survey data from the period after the initiation of PREMI. Thus most of the analyses compare early PREMI to later PREMI data, rather than pre-PREMI to PREMI data.

Since the early PREMI survey started after a good deal of ORS promotion and *jornada*-related distribution, it was no surprise to find that ORS awareness, knowledge, and use were already substantial. The assumption is that these substantial early PREMI levels were likely to be the result of PREMI promotion, in large part, rather than measures of the pre-PREMI levels, given low levels of ORS packet availability. Nonetheless, direct evidence is not available that these early levels of awareness, knowledge, and trial were a reflection of PREMI efforts. Thus the analyses below will address PREMI effects in two parts:

1) One part will discuss the effect of the initiation of PREMI on last case use.

2) The next part will discuss the continuing effects of PREMI on all other ORS variables after the first period of operation.

In general, two patterns emerged: On the one hand, the continuation of PREMI produced high levels of ORS trial and detailed mixing knowledge; on the other, despite those effects, there was no continuing increase in last case use. This discussion tries to show that the flat usage rate pattern reflects two contradictory effects. The increases in knowledge and trial were confounded by decreasing availability of packets.

EVIDENCE OF PREMI EFFECTS ON ORS USE

This section will discuss the evidence about pre-PREMI to PREMI shifts in ORS use. Using the packet distribution archival data and a variety of consistent assumptions, comparative use rates in the pre-PREMI and PREMI periods was estimated. Then, the rates comparing early and later PREMI periods based on survey data were re-estimated.

The following assumptions were made:

1) The Ecuadoran population included approximately 1.5 million children under five years of age in 1985 and was growing by 3% per year. (Rodriguez, 1987)
2) One and one-half packets of ORS were used per diarrhea episode. (About one packet was used per episode, and that there was additional wastage amounting to one-half packet per case.)

3) Every packet of ORS was used on a child under five years old.

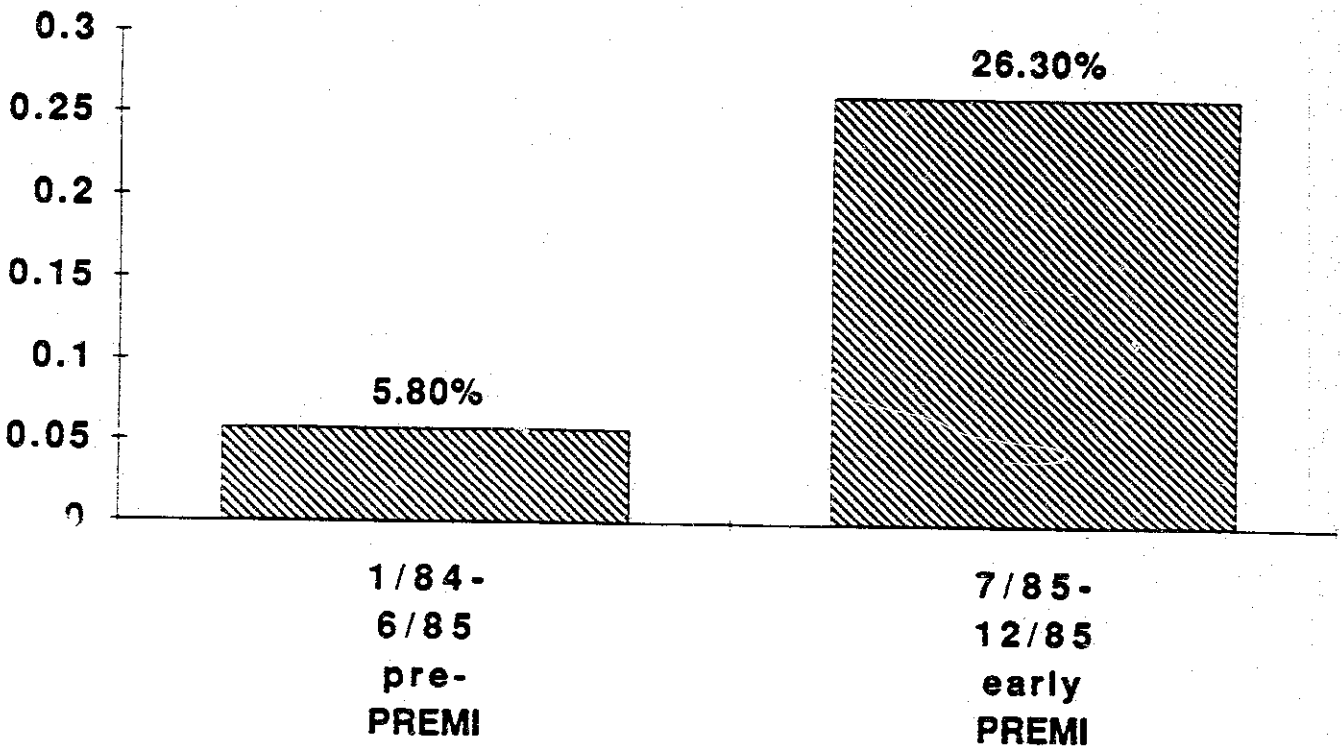
4) Each child had four episodes of diarrhea per year.[14]

Given these assumptions and estimates the pre-PREMI ORS use rate was calculated in the following manner. Before the first *jornada*, 779,000 packets of ORS were distributed over an 18 month period. These packets could have been used to treat roughly 29,000 cases per month (779,000 ÷ 18 months ÷ 1.5 packets per episode). The Ecuadoran population under the age of five had approximately 500,000 cases of diarrhea per month (1,500,000 x 4 episodes per child per year ÷ 12 months per year). The number of treated cases per month (29,000) divided by the number of cases per month (500,000) equals a 5.8% use rate.

Using the same procedures, parallel estimates were made based on the data in Figure 12 for the PREMI launch period and then displayed in Figure 15. By this approach, the ORS rate was 26.3% for the period immediately following PREMI's launch, more than four times the rate for the pre-PREMI period. The immediate question is: How good are these estimates, both absolutely and relatively?

[14] An accepted formula for estimating the annual incidence of disease is the incidence (I) equals duration of cases (D) divided by current cases (P) divided by 100. In the 7/86 survey D=3.62, and P=.09. 3.62/.09/100=4. See MacMahon, B. and Thomas, P. Epidemiology: Principles and Methods. Boston MA:Little Brown and Co. 1970.

FIGURE 15
ESTIMATES OF LAST CASE USE BASED ON PACKETS DISTRIBUTED BEFORE AND DURING PREMI LAUNCH PERIODS



Obviously the accuracy of the estimates in Figure 15 vary with the accuracy of the assumptions. Did each case require two packets? Were there more than four cases per child per year? Were only half the packets used for cases of children under five -- with the rest not distributed or used for children or adults outside of the target population? If so, then the use rate was smaller. Were there fewer episodes per child per year? If so, then the use rate was larger. There was no useful procedure for quantifying the truth of these crucial assumptions. Thus the absolute use rates based on packets distributed are easily challenged and are probably overestimated. However no matter the absolute credibility of the assumptions, if it is assumed they were constant across each period, the relative estimates of use are still credible.

Part of the evidence for the credibility of this estimate of PREMI effects came from the existing survey data. If we could show that estimates based on the survey were similar to the packet-based estimate for time periods when the two forms of data were both available, then the argument that PREMI had the effects described here is enhanced.

This analysis included only caretakers reporting about a diarrhea case in a child under five years old within the two weeks prior to the survey, but not on the day of the interview. (Children with a current case, by definition, may not have received the full treatment that they would have gotten for the case. Reporting treatment already received among current cases risks underestimating treatments.)

When the estimate based on the first survey was compared to the data for the six month period preceding the survey for packet distribution, the packet-based estimate was somewhat higher. Weighted to parallel a representative sample of the entire country, the survey estimate for use was 16.2% (s.e=.021). This was somewhat less than the estimate based on packet distribution for the period six months before the survey (26.2%). However it was certainly consistent with the supposition of a substantial pre-PREMI to early-PREMI jump in ORS use.

One can also compare survey estimates and packet distribution estimates for subsequent survey periods. Figure 16 presents packet distribution data for each six month period before the major surveys. In the figure, one-twelfth of the packets distributed through ordinary channels during each calendar year were assumed to have been distributed each month. They were added to the number of packets made available through the PREMI *jornadas* during the six month period.

FIGURE 16
AVERAGE ORS PACKETS DISTRIBUTED EACH MONTH DURING PERIODS BEFORE EACH SURVEY

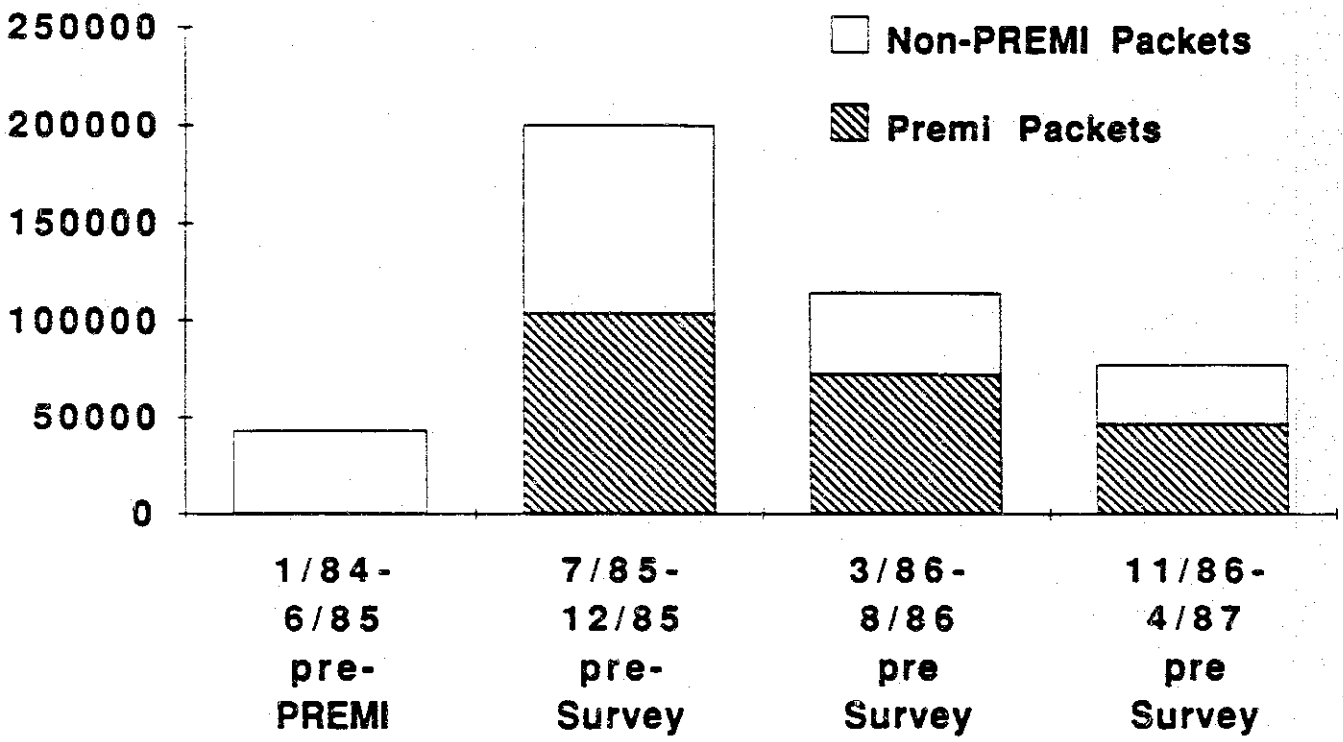
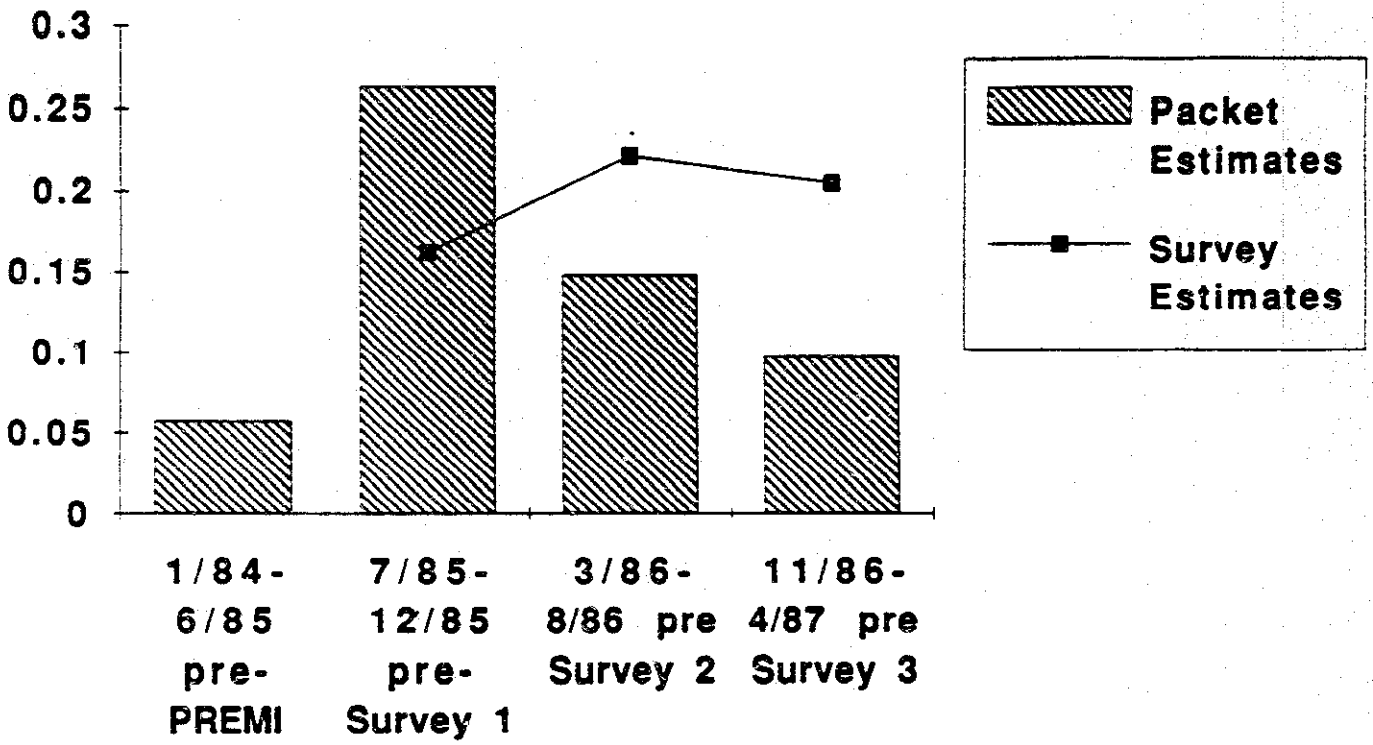


Figure 17 uses the data from Figure 16 and the prior assumptions about pre-PREMI ORS use to create ORS use estimates for each six month period. Figure 17 also displays the matching estimates of ORS use based on the survey data for each period. Survey 1 estimates are adjusted to match the age and socioeconomic status characteristics of Surveys 2 and 3.

FIGURE 17
ESTIMATES OF ORS LAST CASE USE BASED ON
1) PACKET DISTRIBUTION IN SIX MONTHS BEFORE EACH SURVEY AND
2) SURVEY RESPONSES



The survey estimates did not track the packet availability estimates precisely, neither in their relative nor in their absolute numbers. However, a credible narrative can explain the inconsistencies. The high packet distribution estimate (26%) compared to the Survey 1 estimate (16%) reflects the extraordinary level of distribution of packets during the *jornada* of late 1985, just before the survey. A large number of caretakers were given two packets each and many had not had a chance to use them before the survey of that year. However those unused packets were still available for use in the subsequent period. Thus, even though distribution was beginning to flag in the next period (producing a packet-based estimate of 15%), survey-based usage still could climb (22%) based on packets already distributed. By the period captured in Survey 3, the poorer distribution of packets was having a sharper effect. The survey estimate

of usage (20%) was still higher than the packet-based estimate (10%), but it had fallen from the previous period. Also as will be discussed below, relatively less of the Survey 3 use reflected use outside of home-available packets. Perhaps any leftover home surplus stocks were largely gone.

This narrative is particularly telling since it is consistent with other evidence. The fall between the times of Survey 2 and Survey 3 according to both estimation approaches matches in time the widely reported packet shortage associated with the destruction of 200,000 spoiled packets. Also, the declining importance of the PREMI distributions is reflected in caretakers' responses to a question about the PREMI *jornadas* as a source of packets. Table 9 compares caretakers who said they had used ORS for a recent case of diarrhea. Each was asked where they had gotten the last packet they had used. The declining proportion at each survey who had obtained a packet from a PREMI *jornada* supports the inference about packet availability.

Table 9
Source of ORS packets by survey among recent case ORS users

	Survey 1 11/85	Survey 2 6/86	Survey 3 4/87
% Getting ORS from PREMI *jornada* (N)	44% (61)	33% (124)	27% (45)

Summary of PREMI effects on Last Case Use

In sum, there was substantial, although indirect, evidence that the initiation of PREMI produced an increase in use of oral rehydration therapy from no more than 6% to around 20% of all cases. The increased use was, to a certain degree, maintained across the three waves of measurement, an 18 month period. A slight decline before Survey 3 may well have reflected packet shortages during the months before the final questionnaire was administered. It may have also reflected the decline in easy availability of packets when the numbers of people getting packets at PREMI *jornadas* were fewer.

The estimate of 20% use, while much higher than the pre-PREMI use, falls rather short of the objectives of 85% clinic use and 50% community use of ORS. This was an unrealistic goal in hindsight.

Nonetheless, there was less use than there might have been had practice in the clinics and extra-clinic access to packets been greater. These issues will be discussed below.

The next section begins to delve into the process through which PREMI worked, and in particular whether there was evidence that the communication component contributed to whatever effects did occur. The analyses are restricted either to evidence about continuing changes after the initiation of PREMI or to cross-sectional evidence that those more exposed to PREMI were more likely to adopt its recommended behaviors.

THE PROCESS OF PREMI EFFECTS

Eighteen months into the PREMI program, caretakers of children knew a great deal about ORS and had some experience with it. A substantial part of that knowledge and experience surely reflected the actions of the PREMI program. In this section we mix evidence of absolute levels of knowledge and ORS trial achieved by the time of Survey 3 with evidence that such knowledge and trial reflected PREMI actions.

Nearly 90% of the respondents in the July 1986 survey were aware of ORS. (So many people knew about it that the question wasn't repeated at the next survey.) In April 1987, 74% said they had an ORS packet in their home; nearly 60% reported that they had used it at least once, almost always for children's diarrhea. Taken together, these results established that people were well aware of ORS and had some experience with it.

One aspect of knowledge was particularly impressive: 78% of all respondents could show that they knew how to prepare ORS with substantial accuracy and that included almost 95% of those who had ever used it. Respondents were considered to know how to mix ORS with substantial accuracy if they earned at least three points on a four point mixing knowledge scale. The knowledge scale gave one point for accurate responses about a) knowing that clean or boiled water was to be used, b) knowing that the water was to be cooled before mixing with the ORS, c) knowing that one liter of water was to be used, and d) knowing that one full packet of salts was to be used. Of all respondents, 75% of those who had ever used it earned four points on the scale and 87% knew three essential items: 1) to mix one liter 2) of ater 3)with one packet of salts.

Still striking, although less overwhelming, was respondents' knowledge of what ORS actually does for a child with diarrhea. Thirty-eight percent of all respondents (and 43% of the respondents who had ever used ORS) knew that ORS prevents dehydration or that it replaces liquids. Most of the rest said they did not know, with 17% saying it cured and 10% saying it helped the diarrhea.

EVIDENCE FOR THE EFFECTS OF PREMI ON AWARENESS, TRIAL AND KNOWLEDGE

Thus the absolute levels of awareness, trial and knowledge were quite high. However, could it be established that these reflect PREMI effects rather than just pre-existing levels? The following pages bring a variety of data to bear in order to examine this issue.

For awareness and trial, the final levels were substantial increases over the levels shown at the first wave of data collection. As stated earlier, this first wave of data collection occurred after the first PREMI *jornada* and the very substantial level of ORS promotion that had occurred as part of the *jornada*. Nonetheless increases were seen in awareness and, most sharply, in trial after that first wave.

From November 1985 to July 1986 awareness of ORS increased significantly. As shown in Table 10, 77% of Ecuadoran caretakers had heard of ORS in November, 1985. As PREMI progressed, that number increased to 89% in July 1986. It was not possible to assess PREMI's impact on ORS knowledge in general because the questions asked about ORS knowledge were not comparable over time. However, an increase in awareness was probably consistent with some increase in general knowledge.

Table 10
Percentage of Caretakers Who Heard of ORS

	11/87	4/86	7/86
Low SES	61.6% (99)	61.1% (337)	72.2% (748)
Medium SES	79 % (310)	83.2% (149)	92.7% (764)
High SES	85.5% (565)	78.6% (14)	96.9%(1190)
Weighted Total	77.1%	75.1%	88.9%

The PREMI program was successful at increasing ORS trial. One month after the program began, 37% of caretakers had used ORS to treat a child's diarrhea at least once in their life. This number had increased to 53% a year and a half later (Table 11).

Table 11
Ever Use of ORS to Treat a Child With Diarrhea

	11/85	4/86	4/87
Low SES	26.3% (99)	25.2% (337)	48.6% (391)
Medium SES	38.1 (310)	38.3 (149)	57.7 (378)
High SES	42.3 (565)	35.7 (14)	52.5 (684)
Weighted Total	36.8	33.5	52.8

Perhaps the most striking element in Table 11 is that the largest increases in trial occurred for the least advantaged segment of the population. Among that segment, 26% had tried ORS in November 1985 and nearly 49% had tried it by April 1987. Among the highest socioeconomic group the increase was only from 42% to 52%. There was little difference in level of trial among the three socioeconomic groups by the final data collection.

Additional evidence about the effects of PREMI comes from the reports from caretakers about where they had learned to mix ORS. Of the entire sample, 82% said they knew how to prepare it. Of those who said they knew how to prepare ORS, 43% said they had learned it from PREMI, or from radio or television and 42% said they had learned it from government health clinics.

Even more striking was evidence that many people who had never used ORS said they knew how to prepare it and actually could prepare it. Of those who said they had never used ORS, 59% said they knew how to prepare it. And, of that group, 91% earned a three or four on the four point mixing knowledge scale. These were people who lacked any direct experience in ORS use to account for their knowledge. It is easy to speculate that their high level of preparation knowledge reflected the intense PREMI public communication program.

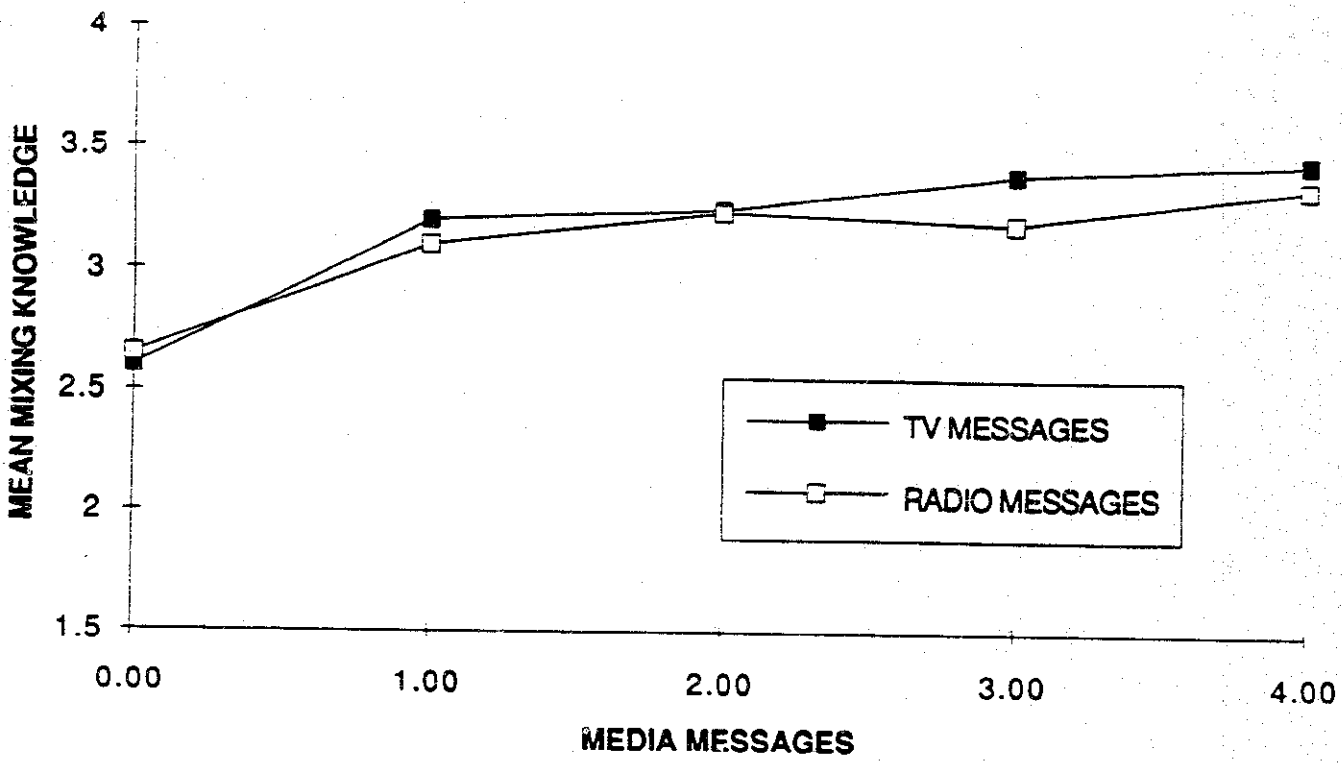
The penetration of PREMI's efforts, particularly around the jornadas, was also supported by the fact that most of those who had seen or used a packet of ORS had also seen the special mixing bag that PREMI had created for it. Nearly 75% of the respondents had a packet of ORS in their home at one time. Almost that number also (65%) recognized and had the special mixing bag. Indeed, almost 23% could still show the interviewer the mixing bag, the same proportion who could show the interviewer an ORS packet (22%).

The effects of PREMI on ORS knowledge could also be seen in the association between exposure to PREMI messages on radio and television and knowledge of how to prepare ORS solution. Two message discrimination measures were created. Each person was asked whether she could recall hearing any health messages on radio and on television. The number of different topics she could remember (e.g. immunization, diarrheal disease, growth monitoring, etc.) was totaled for each medium. The television message discrimination score had a mean of 1.44 (s.d=1.40) and the radio message discrimination score had a mean of 1.67 (s.d=1.43). Each correlated significantly with the mixing knowledge scale, even when controls for education and wealth were included. The respective partial correlations were:

$$R_{(\text{TV messages})(\text{Mixing Knowledge}).(\text{educ.wealth})} = .18$$
$$R_{(\text{Radio messages})(\text{Mixing Knowledge}).(\text{educ.wealth})} = .13.$$

The relationship between media exposure and mixing knowledge was particularly strong comparing those who had no exposure and those who had some exposure. The comparison in Figure 18 between those respondents with a "0" media message score and those with a "1" reflected basic ownership of each medium. However there was a continuing positive relationship at subsequent levels of message exposure as well.

FIGURE 18
MIXING KNOWLEDGE BY MEDIA MESSAGES DISCRIMINATED



Trial of ORS also appeared to reflect, in part, PREMI's efforts. In Table 9, it was noted that 27% of users of ORS in the two weeks previous to survey 3 had obtained the packet from a PREMI *jornada*. This was true even though distribution during *jornadas* had been reduced by April 1987. A parallel analysis done for all respondents who had used an ORS packet, many of whom had used it long before, showed that 36% reported getting the last packet they had used from a PREMI *jornada*. One can assume that many others who would have gotten packets from the PREMI *jornada* once would have since gotten subsequent packets from the clinics or other sources. They would not be included, then, in the 36%, which would be a substantial underestimate of PREMI-related trial.

Trial of ORS was, in addition, related to both television and radio message discrimination. These statistically significant relationships (partial correl. ons of .12 and .11, for television and radio with ORS

trial, controlling for education and wealth) were not large, but they were notable because trial at Survey 3 was unrelated to wealth or education.

This set of results provided a consistent view of the PREMI ORS intervention. Many caretakers found out about ORS, learned how to mix it, and were able to try it through PREMI's efforts. These results testify to the power of the multi-faceted PREMI intervention, both with regard to its distribution of packets and with regard to its communication efforts. However, this discussion next turns to the most important issue, that of continuing appropriate use of ORS.

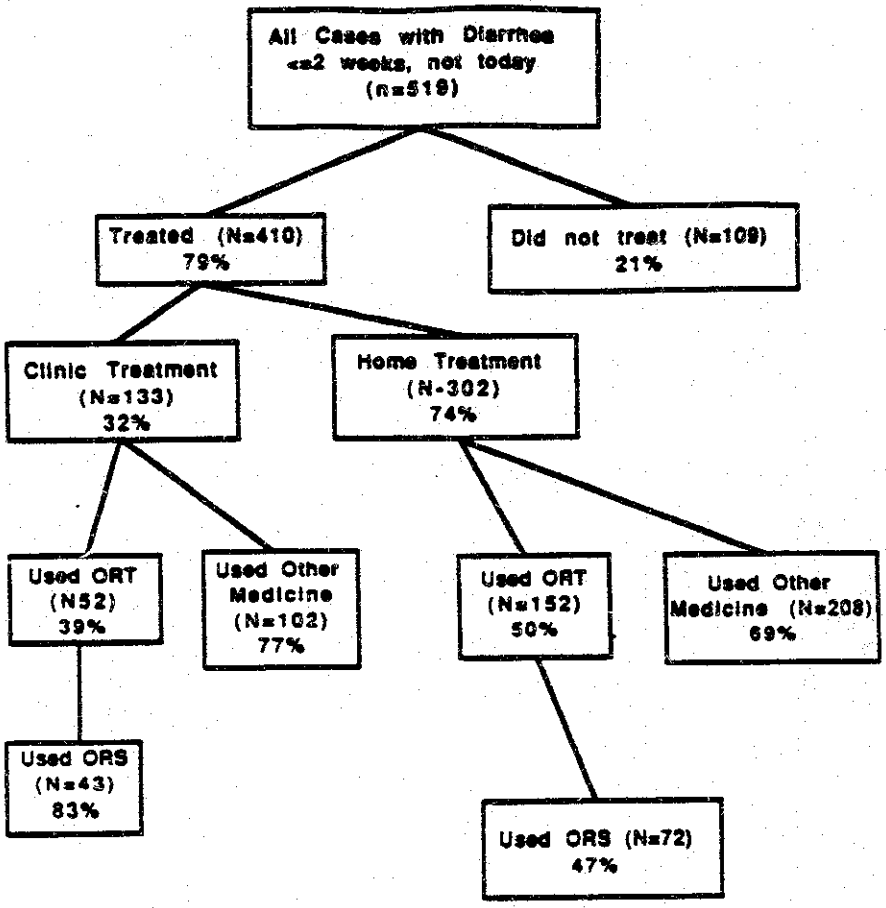
In the first pages of the chapter the case was made that there was a substantial increase in the incidence of use as a reflection of the PREMI intervention, estimating it to be from around 6% to around 20% of all last cases treated by ORS. A somewhat troubling result was that the level of use did not continue to increase after the first burst of PREMI. This concern was further exaggerated by the pattern of results reported above. Awareness and trial were both increasing, while the last case use rate was showing no increase and may even have been decreasing. The best explanation for the mismatch between awareness and trial on one side and use rates on the other may well be a combination of declining access to packets in the six months previous to Survey 3 and failure to recommend or provide ORS at health clinics.

Patterns of Treatment for Diarrhea

This section further explores issues of use. What else were caretakers doing for their children? What were the major factors which predicted (and perhaps produced) ORS and other treatments? This information will assist in trying to understand why the ORS use rate never moved much past 20%.

When caretakers were faced with a case of diarrhea, what did they do? This analysis combined data from Surveys 2 and 3. While there were some differences between the two surveys that will be mentioned, by and large they provided similar basic information.

Figure 19
Diarrhea Treatment Choices



There were 519 caretakers who reported a case of diarrhea in the previous two weeks but not on the day of the interview. Figure 19 displays the proportions of choices made by caretakers in treating diarrhea. Thus 79% of all eligible respondents claimed to have treated a case. Of those, 32% said they went to a medical facility to obtain treatment (or 26% of the whole sample). Of the clinic attenders, 39% used oral rehydration therapy (ORT) as the result of their visit, and of the ORT users, 83% used ORS packets. Thus of the total of 133 who went to the clinic, 43, or 32%, used ORS.

Clinic treatment and home treatment were not mutually exclusive, although the way the questions were asked tended to emphasize treatments at the clinic source if a caretaker said she went to a clinic. Only a few respondents (about 25, or one-fifth of the clinic attenders) reported going to a clinic and treating at home, although surely many more provided some supplementary treatment at home.

What were some of the major results from this tree diagram?

1. There were a total of 112 ORS users, 22% of the entire sample and 27% of all treaters, combining both ORS users at home and those using as the result of clinic advice, but eliminating duplicates.

2. ORS use, however, was but a part of total oral rehydration therapy use. A total of 196 respondents reported use ORS or home prepared teas or, in a few cases, sugar salt solution. This was 38% of all cases and 48% of all people who reported treating the case.

3. ORS had not replaced other forms of recommended treatments for children who were taken to the clinics. Seventy-seven percent of the caretakers reported having been given some other form of medication (antibiotics, antidiarrheals or some other remedy). Of this group who said they received other medication, about 30% also used ORS, but the rest reported only using other medications. This suggests that part of the failure to use ORS reflects its inconsistent recommendation by health facilities. This failure of the health system to distribute ORS consistently and its reported willingness to use alternative medications were major problems. Clearly this is a major explanation for the fact that ORS use did not increase much beyond 20% of the population. In the area of immunization programs much is made of the problem of missed opportunities -- when children eligible for a particular vaccination on a visit to the clinic do not receive it. Clearly there is a parallel 'missed opportunity' problem in treatment of diarrheal disease. Children who are brought to the clinic with diarrhea are often not given ORS and they are given alternative medications.

4. Oral rehydration therapy was quite commonly used as home treatment, with half of the respondents who reported home treatments saying they used some form of ORT; however less than half of the home ORT users used ORS. While there was some commercial distribution of Pedialyte and other ORS brands, few people reported using them (11% of home users reported getting their last packet from a pharmacy). If people were using ORS at home by and large they had to have obtained it from a PREMI *jornada* (34%) or from a previous visit to a clinic (47%). Thus more than 80% reported getting their last packet from one of those two sources.

At the time of this study, use of ORS was constrained by contact with health facilities. Home use of ORS essentially was restricted to those who had obtained a packet at a prior contact with that system. About 70% of the cases of diarrhea were treated without clinic contact; a best guess would be a continuation of that pattern in the future, also. One would then predict a decline in use of ORS in cases treated at

home as leftover packets from PREMI *jornadas* and previous clinic visits are used up. This would result in an overall decline in use of ORS, short of renewed efforts at distribution beyond the limits of the health system.

This likely reduction in use of ORS would be no great problem if it can be shown that the cases treated at home were not severe, and that all cases where dehydration was a risk were treated at clinics. (Then the only problem would be convincing clinic staff to treat appropriately.) Next, the discussion turns to evidence about what produces particular treatment choices.

Correlates of Diarrhea Treatment Choices

The first set of analyses focused on the relationship of perceived symptoms and treatment choices. They produced two contrasting results:

1. There was a substantial association between perceived characteristics of the case and probability of both treating the case and of taking a child to the clinic, but

2. There were many apparently serious cases which were not taken to the clinic.

There were four measures of characteristics of each case (Table 12).

Number of symptoms. Only during Survey 3 was each caretaker was asked to name the symptoms of the last case of diarrhea. She was asked whether the child had displayed each of a list of possible symptoms (frequent stools, abundant diarrhea, very liquid, very bad odor, very bad color, with blood, with mucous, with fever, with a great deal of thirst, very listless, crying a great deal, with vomiting, appearing dehydrated). In this analysis, each case was assigned a total for the number of symptoms which were mentioned as present.

Perceived seriousness of the case. Only during Survey 3 was each caretaker asked to characterize the last case of diarrhea. The interviewer then coded the response in one of four categories: "lightly ill", "moderately ill", "substantially ill" "very seriously ill".

Number of days of diarrhea. In both Surveys 2 and 3 the caretaker was asked how many days the case had lasted. Responses were categorized as 1,2,3, or 4 or more days.

Table 12
Treatment choices by Symptoms

Symptom[15]	% treated	% At Clinic	% Used ORS	(N)
Number of Symptoms				
0-3	75	19	16	32
4-6	86	37	21	43
7-9	92	43	21	61
10+	97	53	23	30
(correlation/p level))	.22/<.01	.22/<.01	.06/n.s.	N=166
How ill was child				
"lightly ill"	82	25	12	84
"moderately ill"	94	51	31	51
"Substantially ill"	92	46	23	26
"Gravely ill"	100	100	40	5
(correlation/p level)	.16/<.05	.29/<.01	.18/<.05	N=166
Number of days ill				
1	66	19	15	86
2	73	15	14	143
3	79	21	23	128
4 or more	90	42	30	162
(correlation/p level)	.20/<.01	.22/<.01	.16/<.01	N=519

Children who were seen as sicker by their caretakers were a good deal more likely to be treated, although even the least ill children were likely to be treated at some level. Ninety percent of those children who showed at least seven symptoms or were seen by their caretakers as at least moderately ill, or those who had been sick for at least four days were likely to get treatment.

Those characteristics of the case were also associated with taking the child to the clinic. However, even those children whose parents reported 10 or more symptoms, who were substantially ill, or who had been

[15] For reasons that are unknown, a smaller percentage of Survey 2 versus Survey 3 respondents reported obtaining treatment (75% vs. 88%), also a smaller proportion claimed to have gone to the clinic for treatment (20% vs. 39%). Their overall ORS use was not very different, however (22% vs. 20%). In both the analyses for "symptoms" and for "how ill was the child" the data are only available for survey 3 respondents. Thus the average proportion reporting treatment and clinic use for those two symptom variables is different than in the tree diagram above, or for the "number of the diarrhea days" variable.

ill for four days or more were not always taken to the clinic. Only around half of those children were taken to the clinic. If these reports of symptoms and of case seriousness are taken at face value, one must be concerned that many children at some risk are not and will not be reached by the clinic. Thus even were the clinic to maintain appropriate treatment of every case that appeared, the treatment pattern would not be satisfactory.

Current treatment standards would likely indicate ORS as the appropriate treatment for most of these high symptom children who were sick over four days. Nonetheless, in Ecuador, the cases were treated with ORS infrequently, and that would only be moderately improved were the clinic to recommend appropriate use of ORS, since many of these cases were not going to the clinic. The implication is that if ORS is to be used in the larger proportion of moderately serious cases it needs to be more easily available to those who will not take their children to clinics.

Evidence suggested that declining access outside of clinics was a problem. During Survey 2, 29% of those who treated at home used ORS. At Survey 3 that number had declined to 16%.

This may lead to some useful speculation. During the period of Survey 2, there were still many people who had packets left over from a visit to a *jornada* or to a clinic. They felt they were able to use those packets and had no need to go to the clinic. They were less likely than Survey 3 respondents to visit a clinic for treatment (20% vs. 39%). Also they were about equally likely to have used ORS if they went to the clinic (35% vs 30%). These two results meant that Survey 2 respondents were less likely overall to have used ORS as the result of a clinic visit: 7% vs 11%. However that disadvantage was more than made up by a slightly greater likelihood to have treated at home (59% vs 55%) and the sharply increased likelihood of having used ORS if they treated at home (29% vs. 16%). This produced a home use rate of 16% for Survey 2 and only 9% for Survey 3. Overall, the use of ORS in both samples was substantially similar: 22% for Survey 2 and 20% for Survey 3. However the similar respective use rates may have reflected sharply different treatment paths. Is it possible that the much larger proportion of Survey 3 versus Survey 2 respondents who went to clinics did so because of their reduced access to ORS packets elsewhere?

The tendency to use ORS was related to perception of seriousness and number of days the child was ill. Thirty percent of the children sick for four or more days had used ORS; only 15% of the children who

were sick for a single day had such use. These relationships were an optimistic sign, but the absolute levels of use among the sickest children fell well short of the ideal. The next set of analyses consider socio-demographic correlates of treatment choices, examining the relationships of wealth, education, age, sex, and urbanization with treating at all, and with use of ORS, and with use of any oral rehydration therapy.

Treatment at all was related to age and essentially not to any of the other socio-demographic variables. The youngest and the oldest children were somewhat less likely to be treated than children of in-between ages. One can speculate that diarrhea among very young children is often perceived as normal and not worth treating and diarrhea among the oldest children is not seen as putting them at much risk.

Table 13
Treatment by Age

Age	0-5	6-11	12-17	18-23	24-35	36-47	46-60	chi-sq
% treated	60%	74%	85%	87%	82%	86%	69%	p < .01
(n)	55	129	112	62	67	55	35	515

Use of ORS, given that one had treated the case, was related to education, wealth and living in a more urban area. It was only slightly related to age (younger children were slightly more likely to get ORS) and unrelated to sex. However use of ORT more broadly, including teas, was not related to any of those variables. The relationships were essentially identical for education, wealth and urbanization. In a multiple regression, when wealth was entered first, neither education nor urbanization account for significantly more variance in ORS use. To illustrate the relationship Table 14 displays the patterns of association with wealth.

Table 14
ORS/ORT Use by Wealth

Wealth	Lower	Medium	Higher	
% using ORS	18%	29%	33%	P < .02
% using ORT	48%	46%	50%	n.s.

It appears that more advantaged families found it easier to make use of ORS, perhaps because they were more likely to attend clinics and take advantage of *jornadas*. However, since they were no more likely to make use of ORT, it may not reflect any great advantage in commitment to appropriate treatment.

SUMMARY AND DISCUSSION

1. PREMI produced an increase in ORS use from around 5% to around 20% of all cases of diarrhea.

2. This increase occurred in the context of sharp increases in awareness, trial, and knowledge about how to mix ORS. By eighteen months into the PREMI program, virtually everyone was aware of ORS, 60% had tried it, and nearly 80% could prepare it accurately (of the 95% of those who said they knew how to prepare it).

3. There was substantial evidence that PREMI efforts were responsible for the sharp increases in use as well as in knowledge. A major force was the distribution of packets at vaccination *jornadas*, but other efforts, including mass media promotion and actions of health clinics, also mattered.

4. ORS was used more readily in more serious cases. For example, 15% of children whose cases lasted one day were given ORS, which was half the rate (30%) for children whose cases had lasted four or more days. Nonetheless many cases described as being substantially serious were not given ORS.

5. There were two major constraints on higher use of ORS:

   a) About 30% of all cases were said to have been treated at a clinic. Only about one-third of those cases were given ORS. If all cases brought to the clinic had been given ORS, the whole sample ORS use rate would have been nearly 35% instead of 22%.

   b) Nearly 60% of all cases were treated at home, and about one-quarter of them used ORS. However almost all caretakers who used ORS had obtained it either from a clinic (assumedly on a previous visit) or from a PREMI *jornada*. With the end of PREMI *jornadas* and their free distribution of packets, and with the apparently inconsistent distribution of ORS through clinics, one can only

assume that home use of ORS was likely to decline further after Survey 3. Lack of easy access to ORS packets for home use was a sure constraint on expansion in its use. Also, this constraint on access will likely have exacerbated the apparent social inequity in ORS use. While prior trial of ORS was about equal across social groups, last case use was highest among the most advantaged class (33% vs 18%.)

6) To some extent home use of ORS was supplemented by other forms of ORT, including various teas. However one-half of home treaters were not using any form of ORT.

The PREMI program's efforts in promoting improved treatment of diarrheal disease were a success; they greatly increased the stock of information and experience with ORS in the Ecuadoran population and they increased overall use from 3% to 20%. On the other hand PREMI's efforts may have fallen short in that they did not create stable change in the practices of the health facility personnel or establish adequate access to ORS packets on a permanent basis for home use. In a sense, the promotion side of the PREMI program was an outstanding success; the attempt to modify the infrastructure of treatment and of distribution was not.

These infrastructural failures both placed a ceiling on the achieved ORS use rate and, of greater moment, forecasted declining levels of use for the future.

The implications for each treatment path can be considered separately. The low, one-third, use rate at the clinics might have had three sources. First, some people who reported clinic visits may not have actually been to a clinic for the last case and may have reported a clinic visit only to look good for the interviewer. Then their report of the treatment received at the clinic may have been based either on a guess as to what the clinic would have provided, or on a memory of some earlier clinic visit. There may have been some such bias, however there is evidence supporting the veracity of these reports. This support includes:

a) the fact that reported clinic visits were substantially associated with all measures of severity. If reports of clinic visits were only designed to please the interviewer, there would be little expectation that such reports would be associated with reports of symptoms and severity. The symptoms and severity questions were not linked to the reports of treatment choice in the questionnaire.

b) the consistency of reports of treatments provided at clinics across surveys. If PREMI had been stimulating an increase in use of ORS at clinics, but people were really reporting on earlier clinic visits rather than for the very recent cases under discussion, the averaged estimate for ORS use across surveys might have been too low. However, if that were the case, one would have still expected increased ORS reporting between the second and third surveys. The reported stability of ORS prescription rate between surveys supports the usefulness of the estimates.

The second possible source of low clinic prescription rates for ORS was a shortage of packets. There were reports that clinics were short of packets, particularly in the aftermath of the destruction of many contaminated packets and the massive earthquake of early 1987 which strained the public health system. However two pieces of evidence argue against this explanation:

a) In a study of 20 health units in 1986, none reported a shortage of ORS packets, although they were reporting a shortage of other supplies.

b) There was no substantial reduction in clinic prescription between Surveys 2 and 3. Both the major causes of likely shortages (the destruction of packets and the earthquake) happened after survey two (August, 1986) and before survey three (April, 1987). If low prescription rates were the result of such shortages a substantial decline between surveys would have been expected.

The third and most credible explanation was that either Ministry of Health policy or individual facility practice limited use of ORS. This response might have taken on a variety of forms. ORS packets were seen as a scarce resource; the clinic feared running out so that they kept them for more serious cases. Or, individual physicians or other clinic staff were unconvinced about the utility of ORS and preferred to prescribe other treatments. Or, people who came to clinics for treatment expected non-ORS treatments and clinic staff felt they had to respond to that demand.

The next chapter focuses on institutionalization issues, discussing the fundamental tension between the aggressive ORS promotion activities of INNFA and the less aggressive actions by the Ministry of health. It seems clear that PREMI's goals and INNFA's actions for ORS use put it well out ahead of MOH's goals, or at least its realized actions. Either enforced policy or retraining of health personnel or both fell short of what was necessary to realize PREMI's goals.

The other treatment path was home use of ORS. It appears that low use at home was largely explained by reduced access to packets once distributed through PREMI *jornadas*. People had no place to get the packets except saving them from a previous visit to the clinic. This low use rate does not appear to reflect low regard for ORS or children's reluctance to use it. Of those caretakers who were asked why they had not used ORS for a recent case, the predominant response was that they did not have a packet (39%). Fewer (11%) suggested that their failure to use packets reflected a low opinion of its usefulness or children's rejection of the solution (13%).

Low home use rates would not have been a problem if a) there was universal use of some other form of oral rehydration therapy, b) all of the more serious cases were taken to a clinic, c) where they received appropriate treatment. However none of these requirements were met. Only one half of the home treated cases were given any form of ORT. Only forty percent of the cases with more than three days duration had been taken to the clinic and, as has already been reported, only one-third of the cases that were taken to the clinic were given ORS.

The possible solutions to the shortfall in overall ORS use rates include:

a) assuring easier access to ORS outside of clinics by making it available at low cost in groceries or through local volunteers,
b) promoting other forms of ORT for all cases,
c) promoting visits to health facilities for cases with specific symptoms (assuming clinics dispense ORS appropriately), and
d) encouraging caretakers to ask for ORS when they go the clinics.

ISSUES OF INSTITUTIONALIZATION

The PREMI program was an extraordinary effort by the Ecuadoran government and the international agencies which supported it. From any short term perspective, it produced important effects in both of its two major areas of focus: immunization and diarrheal disease control. It was highly successful in improving timely vaccination and moderately successful in improving use of ORS. While, in both cases, it fell short of its original objectives, that is mostly the result of setting targets at overly optimistic levels, given baseline practice.

In this chapter we turn from discussing the effects of the program to considering the separate issue of how well this particular and novel mix of social marketing and traditional Ministry of Health procedures worked from an institutional perspective. Our answer has three parts: first, it actually worked in some elements; second, the mismatch between these two approaches limited other success; finally the two pronged institutional structure which served as the basis for allowing the two approaches to operate proved to undermine integration of the approaches and thus institutionalization of the PREMI activities.

During the three years that PREMI operated there was always tension between its two major operating entities, INNFA and the MOH. This set of tensions is laid out in the next few paragraphs. This section relies heavily on the sometimes self-critical personal memoir of Marco Polo Torrez, who was Director of Communication for INNFA and the person who ran the social marketing side of the PREMI program.

INTERAGENCY COORDINATION

The biggest problem to carrying out the campaigns seems to have been coordination between two quite different agencies. INNFA, a nongovernmental agency, was in charge of publicity for the campaign. The Ministry of Health, meanwhile, was to actually provide the services that INNFA was advertising. Although these responsibilities seemed to be specified, there were difficulties in dividing tasks between the two agencies. The statement that INNFA would handle promotion and the Ministry of Health servic delivery is far from a detailed delineation of responsibilities.

"From the beginning the roles of INNFA and the Ministry of Health weren't clearly defined, nor were details of how this teamwork would function."

The campaign's simultaneous focus on increasing both demand and supply was expected to improve coverage dramatically. However, while the program succeeded in expanding demand, the supply of infant health services was unable to keep up with this increased demand.

"The campaign ...required an exceptional increase in supply at times and in quantities that would be synchronized with the promotional activity that would attract the public.... This increase in supply was not at the required level."

Mothers were motivated to go to health facilities, but were frustrated when they did not find the expected services.

"There is a lack of synchronization between the supply of services from the Ministry of Health and the demand generated through promotion and communication. One concrete case is the infant weighing component of the Growth Monitoring program. We are asked to promote this action without the scales being in place, without the personnel who are going to offer the service having been trained, and without broad dissemination of the program's standards and policies."

Another element that hampered service was the lack of uniform training of personnel who interacted directly with the public during the mobilizations.

"The service was not ready to be promoted.... Training activities did not proceed as quickly as was required."

One problem the Ministry of Health had in supplying health services and products had to do with bureaucratic constraints of the government administrative process. While INNFA had some fiscal agility, the rapid, responsive administrative decisions seen as key to implementing communication strategies were not possible in the Ministry, which was subject to regulations controlling government funds.

"Money cannot be channeled quickly enough through the normal financial process, contracts [with the commercial sector] are not paid on time, and the decision-making process is not managed with the speed necessary to deal with multiple clients."

Torres noted that initially 42 steps were necessary to execute a contract, and "although this was reduced to just 20, nonetheless it was a tortuous and even anguishing process."

Related conflicts in defining institutional domains were encountered the widely-recognized problem of shifting from mass mobilizations to systematized routine service delivery. The emphasis on campaigns generated concern that routine services were being slighted. While there was a felt need to strengthen the program of regular vaccinations, no decision was made on establishing a policy of providing vaccinations on demand, which would have entailed accepting the level of waste involved in opening a container of vaccine that might not be used up, and the costs of training volunteer teachers to administer vaccinations.

"Further, the motivation of health center personnel at the level of service delivery in many establishments was low and we had to try to develop a mass communication strategy to heighten their motivation. Unfortunately this plan was seen as undesirable meddling and it was decided that the Ministry of Health training unit would take appropriate actions."

Interinstitutional rivalries were apparent from the beginning. The sudden spotlight on PREMI was viewed with suspicion by some in the Ministry of Health, which was responsible for providing services but did not take the leading public role in the campaigns. The Ministry felt that its role as promoter and guardian of Ecuadorans' health was undermined by the presence of non-health-oriented institutions. Before the PREMI program began, observers noted that the DDC program lacked the financial and political backing within the Ministry of Health to support rapid expansion. There had been reluctance on the part of the Ministry to highlight DDC, yet that was one focus of the PREMI program. PREMI/INNFA were very successful in receiving media coverage and attention which alienated the Ministry of Health.

Similarly, there were problems with acceptance of the program by the medical community, which was somewhat overlooked at the beginning of the PREMI program.

"This strategic aspect was not well understood by [our department]- it was an error not to have included it from the beginning...only in the middle third of the program, after AED-recommended polls of health personnel, were activities designed. One of the reasons this action wasn't considered part of the communication/promotion tasks was lack of knowledge about the medical world and reluctance to invade more Ministry of Health areas."

However, for all of these tensions, there was a great deal accomplished. Perhaps Torrez' comments reflect, in part, the frustration of someone who had hoped for more.

The fact is, there were massive mobilizations integrating the actions of INNFA and of the MOH: the mass media and other forms of promotion and the vaccination and ORS packet delivery worked together over several *jornadas*. For all the disappointment associated with later failures to match promotion with service delivery, there was a great deal of successful coordination.

Looking over the early chapters of this report, the major area where PREMI fell short of realistic goals due to an INNFA/MOH mismatch was in achieving only a 20% rate of ORS use. In the diarrheal disease chapter we pointed to two major concerns: evidence that only one-third of the cases that were taken to the clinics were given ORS, and the failure to establish any stable mechanism for supply of ORS packets for the many cases that were treated at home. For ORS, there was a substantial mismatch between INNFA's aggressive social marketing of ORS and the MOH's adaptation of its diarrheal disease policies and practices. While distribution of packets at *jornadas* and heavy and effective mass media promotion were producing quite high levels of awareness, mixing knowledge and trial, MOH practices at clinics and policies for continued use outside of clinic availability of ORS did not match. It seems unarguable that if the clinic visits had resulted in universal ORS prescription and there was a continuing mechanism for extra-clinic access to packets, achieved ORS rates would have been much higher.

Thus there were INNFA/MOH tensions and mismatched actions; they limited success but there was a great deal accomplished, also. It is when we turn to the issue of long term institutionalization of this social marketing capacity that the institutional tensions loom much larger. Essentially the social marketing effort was entirely located in INNFA; it received both the funds and the technical advice to support this area. Those activities were run within the broad PREMI framework and reflected many joint

meetings with MOH personnel. Nonetheless, operationally they were carried out in isolation. It was clear that these activities were not part of the MOH. Also, it was generally believed that the entire social marketing approach with its heavy emphasis on mass media promotion was also ideologically alien to many MOH personnel, particularly in the health education department. This department historically had emphasized smaller scale community-level promotion efforts; their failure to be incorporated into, or be funded by, or obtain any credit for, the social marketing efforts of PREMI did little to win them over.

This difficult relationship was exacerbated by the inadequate realization of planned efforts for transition between INNFA and the MOH.

A major goal in the institutionalization process was the integration of social marketing into the Ministry of Health. This plan never materialized. In the third year of the program, INNFA decided to reduce its involvement with PREMI. This decision, made at a time of pressure in the Ministry of Health to take leadership, was logical but it destroyed the possible link between INNFA and the Ministry of Health for the transition.

> "Much had been said against the INNFA-MOH marriage, and when it fell apart, this was also lamented."

From Torres' point of view, the Ministry of Health Department Director and at times the MOH/PREMI coordinator were not sympathetic to the social marketing approach.

> "The [project] contract said that once the program was executed the Health Education Unit of the Ministry of Health would have the technology to carry out mobilizations, social communication, and social marketing. Nonetheless, the steps towards this never were taken nor was there interest, involvement, or openness to this methodology on the part of health educators of the Ministry. On the part of the Communications unit of INNFA, effective, systematic actions to transfer were not taken. It seems that everyone -- at INNFA as well as at the Ministry of Health -- thought that the transfer would take place through some sort of osmosis."

Torres attributes the failure of the transfer of social marketing from INNFA to the Ministry of Health to both lack of interest on the part of the Ministry and lack of effort/pressure by INNFA. The MOH did

not understand the social marketing approach and did not see the future benefits of creating a social marketing communication unit within the institution. There was no "structural niche" in the Ministry of Health for social marketing. At the same time

> "The [INNFA] department of Communication and Social Marketing did not have the capacity at the beginning to attend to transfer activities, as it was a team of just three persons. Then it could not dedicate an express period of time: it had to begin by training its own team since there were not professionals of this type in the country who could be simply incorporated and be productive immediately. Thus the experience of the HEALTHCOM advisors was oriented toward the department and this absorbed all of its energies."

When INNFA withdrew and the President and First Lady left office PREMI's social marketing efforts virtually ended. The building resentment between institutions produced in the MOH, now again in complete control of its health program, a complete rejection of the social marketing approach. The PREMI communication evaluation advisor was integrated into the health education unit and provided some link with all that had been learned in INNFA, but little else was left.

There are two views which might be taken of this undoubted institutional failure. A pessimistic view is the obvious one: what was the point of doing all of the communication and social marketing if nothing was to be left behind. Another view asks whether the long term problems should not be balanced with a positive view of what was accomplished -- for three years there was something good happening which likely influenced the health status of children for the better. Implicitly, this view asks an unanswerable question: what would have happened if the entire PREMI program had been housed in the MOH and the First Lady and INNFA had been uninvolved? Would the effective communication program still have been there? Would it have been better integrated with ongoing MOH service delivery? Might its perspectives and some of its actions have continued to be part of the routine MOH operating system? Or, alternately, would the dynamic and novel efforts been swallowed by the traditional bureaucracy of the MOH, which only would have sacrificed the successes documented in this volume without any better institutionalization outcome?

In a sense, the things that made INNFA's promotion effort work: its autonomy, its ability to act in ways not customary in traditional ministries, its focus and single-mindedness, its affiliation with the First Lady,

were also the things that got in the way of its integration with the MOH. It is not clear that the goal of institutionalization could have been accomplished without sacrificing the goal of having an effect.

In other countries we have seen a result much like that. In Guatemala, for example, the HEALTHCOM support of the child survival initiative was substantially integrated into the MOH and suffered substantially from the vagaries of changing personnel and policies. It accomplished far less than did PREMI without any apparent long term advantage in institutionalizing its approach. In other countries it has been possible, by maintaining a HEALTHCOM presence over a very long period (as in Honduras), to obtain both substantial health benefits and realize substantial change in MOH operating procedures. We cannot predict what would have been the pattern in Ecuador.

Thus it is easy to lament the institutional division between INNFA and the MOH in retrospect. Nonetheless, PREMI did accomplish a great deal even with its two-headed organizational structure. Perhaps it would have given up its substantial successes without producing long term institutionalization had it been completely integrated within the MOH.

From the current perspective it certainly seems as though something more could have been done to integrate MOH personnel into the ongoing social marketing effort and then to improve the training effort supporting the transition to MOH control. It would likely have been worth the effort, although its outcome cannot be predicted confidently.

As this story of PREMI and its communication effort ends, we repeat the need to balance, on the one hand, failure to develop social marketing and communication capacity for the long term and speculation that it might have been done better some other way, with a recognition of substantial successes during its years of operation. The potential for public health communication seems clearly documented, even if the ways of permanently institutionalizing are not.

APPENDIX A

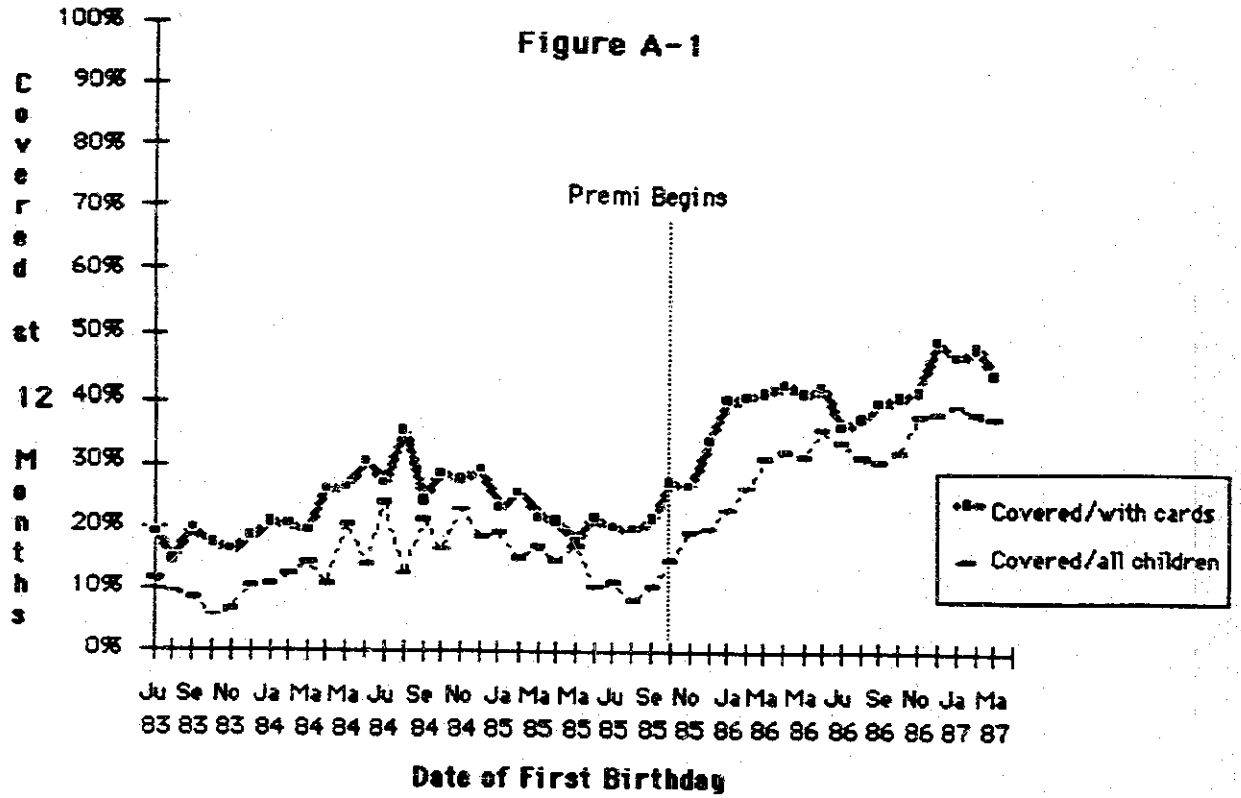
Survey Estimates Versus Ministry Archive Estimates of Vaccination Coverage

All of the immunization coverage data in this report come from knowledge, attitude practice surveys, in which caretakers either provide a vaccination card, or report on their children's vaccination levels. Because all of the surveys took place after the start of PREMI, the only method for estimating coverage before PREMI's first jornada was by crediting coverage only to those children whose caretakers had vaccination cards and estimating what their coverage was on the basis of dates of vaccination reported on the cards. Thus the card of a child whose caretaker was interviewed in July, 1986, could be examined to see what vaccinations the child had before PREMI started in November of 1985. This allowed the comparison of children over time, for example seeing what proportion of children who were exactly 12 months old were vaccinated in the months before and after PREMI began. All children who had no card, or whose cards were undated, were assumed to be unvaccinated for these retrospective analyses.

We have made the case that this method is not useful for estimating the absolute level of coverage at any time, almost surely producing an underestimate of coverage. However it does seem helpful as an approach to estimating the relative change in coverage over time. It does exaggerate the tendency to find increasing coverage over time, since lost cards are more likely among older children. Nonetheless, the clear picture of increasing coverage with the introduction of PREMI remains even if one eliminates the problem of card availability. Figure A-1 makes this quite clear. It is parallel to Figure 4 in the text.

In figure 4, coverage by 12 months was pictured for all children by monthly cohorts. Any child who did not have card evidence was treated as not covered by 12 months, resulting in a likely underestimation of actual coverage. Figure 4 is then a lower bound for actual coverage. In contrast, in Figure A-1, on the upper line only children who had some dated card evidence are included. This becomes an upper bound for coverage, since it eliminates all children who did not have cards, who surely would have had a lower rate of 12 month coverage than would children with cards.

This curve is quite similar, albeit higher, than the curve from Figure 4, also reproduced here. It shows the same unmistakable rise in coverage associated with the initiation of PREMI.



Both of these results contrast with archival data from the Ministry of Public Health which is the official basis for vaccination reports. The archival reports do not show a similar pattern of increasing coverage associated with the PREMI program. In Table A-1 we present official Ministry of Public Health statistics for the years 1981-1987 for DPT1, DPT3 and Measles vaccinations given to children less than one year old during each calendar year. These estimates are generally over-estimates of coverage since they are based on a target population about 90% of the true population of a given age. (Rodriguez, 1987) Next to each estimate we provide a comparison estimate based on the survey data. While the archive estimates are based on the number of children under one who received a given vaccination, the survey estimates are reported according to the year of birth of the child.

The comparison estimate is based on the upper limit calculations similar to those in figure A-1, however it combines the data gathered in July, 1986 as well as the data gathered in April 1987, so as to be able to portray the longest possible time period. It includes only those children who had cards and presents the proportion of them who had card evidence of having received the respective vaccination befor. :e or she was one year old. This is a likely upper limit for the actual coverage among children born in a

given year. It also tends to exaggerate coverage for older compared to younger children. This is because cards are fewer among older children, cardless children are less likely to be covered than children with cards, and thus, children born in earlier years gain more from the restriction of the analysis to children with cards. A higher proportion of their best performing children are incorporated. Thus this way of reporting the survey data tends to downplay any effects of PREMI, which is likely to have affected children born in 1985 or later.

Table A-1

Year:	% DPT1 Archives	% DPT1 Survey (±2 st.er.)	%DPT3 Archives	%DPT3 Survey (±2 st.er.)	%Measles Archives	%Measles Survey (±2 st.er.)	Avge. Months under PREMI
1981	65	61 (±.08)	26	34 (±.07)	31	35 (±.07)	0
1982	87	55 (±.04)	35	27 (±.04)	44	29 (±.04)	0
1983	67	65 (±.04)	31	33 (±.04)	34	37 (±.04)	0
1984	90	73 (±.03)	48	34 (±.04)	54	38 (±.04)	0.5
1985	94	93 (±.02)	41	50 (±.04)	51	55 (±.04)	8.25
1986	85	98 (±.01)	43	53 (±.10)	49	52 (±.10)	12
1987	80	100*	51	54* (±.16)	46	55*(±.10)	12

* Estimate is card-based coverage among 11-13 month olds with cards, 4/87

Archive Source: National Division of Statistics, Ministry of Public Health

The pattern from the surveys is consistent with previously reported results, a sharp increase between 1981-1984 on the one hand and 1985-1987 on the other, as PREMI begins to make its presence felt. This is true despite the tendency to reduce later year effects because of the procedure applied.

The archive data provides estimates moderately consistent with survey estimates, in some years, but in others, for some antigens, is sharply different. In particular, while 1981 and 1983 archive results are largely consistent with the survey estimates for those years, the 1982 and particularly the 1984 archive data suggest a much higher level of coverage than do the survey estimates. 1985-1987 survey data are

mildly to moderately higher than archive data, although usually within the range of sampling error. Clearly, however, the pattern of the archive data, if credible, would produce skepticism about a major PREMI effect, while the survey data, even in this form likely to underestimate effects, suggest a substantial PREMI effect.

We have only speculative explanations for the differences in the patterns. While it would be straightforward to describe the various biases that might be present in each method making the absolute levels non-comparable, they don't explain why the patterns of change over time are so different. Since all of this survey data comes from two studies (but whose results are essentially parallel where they overlap), one must assume that survey result biases are affected constantly over time; there is no reason for it to produce too-high estimates in 1981 and 1983, too-low estimates in 1982 and 1984 and then too-high estimates again in 1985, 1986 and 1987.

On the other hand, it seems as though Ministry of Public Health record gathering is more vulnerable to changes in recordkeeping practice from year to year. In fact, in 1984 there was a reduced estimate of the target population compared to the surrounding years. While that was insufficient to explain the awkward pattern reported, it does suggest some inconsistency in reporting practices.[16] Is it possible that something else in the way data was reported exaggerated coverage rates in the early years, while during

[16] With corrections for the sizes of the under-one target populations based on estimates in Rodriguez, 1987, the table would look as follows:

Year	% DPT1 Archives	% DPT1 Survey (±2 st.er.)	%DPT3 Archives	%DPT3 Survey (±2 st.er.)	%Measles Archives	%Measles Survey (±2 st.er.)	Avge. Months under PREMI
1981	59	61 (±.08)	24	34 (±.07)	29	35 (±.07)	0
1982	81	55 (±.04)	32	27 (±.04)	41	29 (±.04)	0
1983	63	65 (±.04)	29	33 (±.04)	32	37 (±.04)	0
1984	84	73 (±.03)	45	34 (±.04)	50	38 (±.04)	0.5
1985	86	93 (±.02)	37	50 (±.04)	46	55 (±.04)	8.25
1986	85	98 (±.01)	42	53 (±.10)	49	52 (±.10)	12
1987	80	100*	51	54* (±.16)	46	55*(±.10)	12

the PREMI years there was a tendency to underreport vaccination? For example, in those later years, with the heavy use of jornadas with masses of children coming for vaccination, sometimes to temporary vaccination sites, is it possible that some of the vaccinations were not properly recorded?

In the end, we cannot explain the differences between the two ways of estimating coverage. The survey pattern is robust and supported by every form of internal analysis we report here and in the main body of the report. We have relied on that evidence, even though it is inconsistent with Ministry archives, largely because we know that the survey data were gathered in a consistent way, and recognize that data gathered through the Ministry of Health information system may not have been so consistent across all the years included.

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