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THE MASS MEDIA AND HEALTH PRACTICES EVALUATION IN HONDURAS:

THE FINAL REPORT OF THE MAJOR FINDINGS

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Applied Communication Technology
1010 Doyle Street, Suite 17
Menlo Park, California 94025 U.S.A.
(415) 322-6466

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Contributors: Dennis R. Foote, Leslie Hughes-Lind, Carl Kendall, Reynaldo Martorell, Judith A. McDivitt, Leslie Snyder, Susan M. Stone, and J. Douglas Storey.

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THE MASS MEDIA AND HEALTH PRACTICES EVALUATION IN HONDURAS: A REPORT OF THE MAJOR FINDINGS

EXECUTIVE SUMMARY

This is a report of the major findings from the evaluation of the Mass Media and Health Practices Project in Honduras. The project was an undertaking of the Ministry of Public Health, with technical assistance from the Academy for Educational Development. It was known in Honduras as the Proyecto de Comunicacion Masiva Aplicada a la Salud Infantil (PROCOMSI). The project and the evaluation were funded by the Office of Education and the Office of Health of the Bureau for Science and Technology, United States Agency for International Development (USAID), with additional support from the USAID Mission in Honduras and the Ministry of Public Health. The evaluation was performed by the Institute for Communication Research and the Food Research Institute of Stanford University and by Applied Communication Technology.

The purpose of the PROCOMSI project was to introduce oral rehydration therapy (ORT) and other behaviors related to the treatment and prevention of infant diarrhea in rural Honduras. The target behaviors included treatment of acute cases, preventive actions that mothers could perform, and related nutritional and breastfeeding activities. The treatment behaviors involved the administration of an oral rehydration solution mixed from packets of salts containing the World Health Organization ORT formula. The packets were manufactured in Honduras and distributed at clinic and community levels by the Ministry of Health.

The project and the evaluation were also designed to test the efficacy of an intervention strategy that tied elements of several different approaches into an integrated campaign. The PROCOMSI intervention used broadcast, print, and interpersonal communication channels to deliver a coordinated set of messages about a fairly narrow set of issues - - responses to infant diarrhea. The knowledge and behavioral objectives and the strategies for behavioral change were developed using intensive planning research and the principles of behavioral analysis. The campaign incorporated elements of social marketing and systematic development of messages using formative evaluation.

The evaluation tracked the process of the intervention's effects, as well as measured the impact of the entire effort. It used a model of the program effects that stipulated that, in order for a final outcome to be achieved, a series of interim steps must be successfully completed. These steps included determining: that the population had access to the channels of

communication used by the campaign; that the messages actually reached the population through those channels; that the content of the messages was learned and retained by the audience; that members of the target audience actually changed their behaviors in response to the campaign; and that the health status of children was improved as a result of these changes in behavior.

The reporting of findings about these different levels is organized into three major categories, which correspond to the second, third, and fourth chapters of this report. Following an introductory chapter describing the context and the research and measurement plans of the evaluation, the remaining chapters take up, in turn: the access and exposure to campaign elements and cognitive changes resulting from that exposure; behavioral changes related to infant diarrhea; and health status changes. This summary will report the findings in the same order.

The context in which the project took place is typical of many parts of Central America. The area is in South-Central Honduras, with terrain ranging from rolling hills and valleys to steep mountains. It is populated primarily by subsistence farmers, although some parts support large-scale commercial agriculture. Half of the subsistence farmers own land, and their major crops are corn and beans. Communities are small (seldom larger than 1000 people), and houses are often widely separated from one another. The county seats have service infrastructure (roads, bus service, a health center, and telephone service), but services in the other communities are usually limited to a primary school.

The evaluation design included a number of studies with different methodologies, but relied primarily on large-scale survey data from repeated visits to a panel of mothers of small children. A sample of roughly 750 mothers was selected from among 20 communities; these mothers were visited monthly for interviews about various aspects of the campaign. To control for the influence of repeated measurements on the sample mothers' knowledge and behaviors, comparison groups were also measured in additional communities that received all the elements of the campaign but not of the evaluation. The experimental and control samples were structured to yield quasi-equivalent groups of women of child-rearing age that were representative of the full range of differences found in Honduras. Examples of the other study approaches include anthropometric measurement, behavioral observations, community mortality, and health professional interviews.

Access to the channels used by the campaign was high. Radio carried the largest portion of the campaign's messages. On the average, two thirds (67.4 percent) of the families had a radio that worked on any given day. Radio ownership was higher (79.5 percent of families) but radios went in and out of service, usually due to dead batteries. Radio listening peaked in the early morning and at noon, and tapered off fairly abruptly after

eight to nine in the evening. An average of 60.0 percent of mothers listened to the radio on any day. These levels represent strong evidence that access to the population through radio is a feasible strategy.

Access through interpersonal and print channels was also confirmed. Interpersonal contacts with health care workers and traditional healers were measured. In general, families reported about one contact every six months with some type of care worker, with the majority of contacts taking place at fixed facilities. When contacts with traditional sources of care were included, the cosmopolitan health care workers at both community and fixed facility levels accounted for four out of five contacts (80.5 percent). Traditional healers accounted for the rest. There was clearly enough contact with the health care system for it to function as an instructional channel. Print access was conditioned by literacy. Over half of the mothers in the sample (56.8 percent) could read well by themselves; the household literacy rate was 86.8 percent, so there was almost always at least someone in a household who could read print materials.

Exposure to campaign messages through the different channels was the second link in the chain. Radio coverage with PROCOMSI spots or programs was extremely high, as might be expected given the saturation of the airwaves with campaign messages. For mothers actually listening to the radio in a given hour, the odds of hearing a spot were two out of three (66.7 percent). When mothers who were not listening at that time were included, the total population coverage was 11.4 percent of the mothers reporting hearing a PROCOMSI message each hour from four a.m. to nine p.m. Reaching roughly ten percent of the population every hour of the day with a campaign message was an extraordinarily high rate of coverage. Over the course of an entire day, nearly three-quarters (73.2 percent) of women who listened to the radio at all during the day reported hearing at least one spot. Even if women who did not listen to the radio were included, coverage was still 43.9 percent of all women hearing a PROCOMSI spot every day. Obviously, women who listen to the radio were getting high exposure, and enough women were listening for messages to be very well diffused in the population.

Print media exposure consisted primarily of seeing posters printed for the campaign or the instructional materials in which the salts were usually packaged. When mothers in the experimental group were asked to describe health posters they had seen, an average of over 40 percent could describe a poster thoroughly enough that it could be identified as a PROCOMSI poster. Most of the posters were seen during visits to the health center.

Learning changes resulting from exposure to campaign messages were investigated. The content of some messages was known long enough in advance to permit collection of baseline information prior to the first broadcasts. In general, these measures showed an extremely rapid rise in knowledge within a

short time after broadcasts start, with the rate of gain gradually diminishing over time. For those messages which were not identified far enough in advance to permit the gathering of pre-broadcast baseline information, the learning curves showed a truncated version of the general pattern. These variables show a pattern of starting at a moderately high level and continuing a gradual rise to a still higher plateau. A separate analysis of the effect of withdrawal of some messages (as in the seasonal phasing of message content) shows clear evidence of "forgetting" of information at a slow rate, beginning as soon as the messages are discontinued. It appeared that the relationship between exposure and learning was consistent and stable across item-types and content areas. It followed a pattern of extremely rapid initial rise, followed by slow arrival at a high plateau. A gradual decline in knowledge level about specific topics began as soon as messages on that topic were stopped, but reintroduction of those messages recovered the lost ground very quickly.

Learning results on specific items or topic areas are reported in detail in the main body of the report. Two examples of measurement of learning in major areas are knowledge about Litrosol (the name given to the oral rehydration salts), and knowledge about breastfeeding. Litrosol awareness was not measured prior to the broadcasts because it had never existed before. Within six months after broadcasts began, however, half the mothers (49.5 percent) could name it as the medicine being promoted. By the end of the period, this figure seemed to have leveled off at about three-fourths of all mothers able to remember the name of the medicine. A composite index of breastfeeding knowledge rose from 9.2 percent before any significant broadcasting about breastfeeding began to 41.1 percent at the end of the project. An index of the ability of mothers to complete the jingles used in the campaign, which is obviously zero before the campaign, had jumped to 50.5 percent within six months and continued to rise to 56.0 percent by the end of the study period.

Thus the evidence is clear that a great deal of learning of the specific content of campaign messages took place. The pattern of acquisition and retention of the knowledge, plus evidence from various control groups, indicated that the measured changes reflected real learning, and not merely the effects of repeated measurement of the population.

<u>Health-related behavior change</u> is the next step in a successful path to overall project impact. The evaluation focused its analysis in three major categories - - diarrheal disease and the use of Litrosol, feeding behaviors, and observation of the preparation and administration of Litrosol. Prevalence of diarrhea was high and showed seasonal fluctuations. Point prevalence among children five years or less in age averaged 14.3 percent in the rainy season and 9.9 percent in the dry season The distribution of cases by age shows the expected concentration of cases among younger children, with a peak roughly between 12 and 24 months. There was a slight tendency

for male children to be reported sick more than females - - males accounted for 55 percent of the total reported episodes.

Litrosol use was measured both as a percentage of mothers who had ever tried it and as a percentage of episodes being treated. Within six months of the start of broadcasting, over a third of the mothers (36.7 percent) said they had tried Litrosol. This percentage rose to 62.4 percent by the end of the intensive campaign. This is a very high level of trial usage by any standards. When calculated as a percentage of episodes occurring in the two weeks prior to the interview (the most reliable reporting period used) the proportion of episodes treated rose from none before the start of the project to a maximum of 35.7 percent, with an average of roughly 28 percent of episodes over the final 18 months of the campaign. For cases recalled from the last six months, mothers reported much higher usage rates, averaging 45 percent of episodes over the final 18 months of the campaign. The most likely interpretation of this discrepancy was that mothers tended to forget milder cases and hence unconsciously selected the more severe episodes in recalling past behavior.

Younger children were more likely to be treated than older ones (33.6 percent of episodes in children under 12 months were treated, while only 23 percent of episodes for children older than 48 months received Litrosol). There were no consistent differences in treatment probability by sex. One municipio (Yuscaran) was consistently better than the rest, and cases occurring in villages were much more likely to be treated than those occurring in the county seats, but there was no clear explanation for the difference. More serious cases were slightly more likely to be treated, but no single indicator of severity was a consistent predictor of high treatment probability.

Mothers received their Litrosol from a variety of sources. Although the distribution of particular sources changed over time, sources in the community accounted for over half of the distribution, with clinics accounting for most of the rest. The single most useful source of information for learning about how to mix and administer Litrosol was the packet itself, which came in an envelope printed with instructions. However, interpersonal instruction (from health care workers) and learning from the radio also were significant information sources. Mothers who had used Litrosol were generally using it according to campaign instructions. They reported correct mixing behaviors in using a liter of water and using the whole packet of salts over 90 percent of the time. However, they did much less well at behaviors such as throwing away unused liquid after one day (an average of 36 percent of mothers) and knowing that they should seek help if three days of Litrosol use did not improve the situation (an average of 10 percent).

Use of other medicines concurrently with Litrosol was common - - an average of 43 percent of Litrosol-treated cases were also reported to be treated with other medicines. About 20 percent of all episodes were taken to the clinic for treatment. Slightly over ten percent of cases were seen by village health workers. Both these numbers remained stable over time. Reported treatment by sobadoras or other traditional healers averaged four percent of episodes, but fluctuated more over time. The relationship between Litrosol use and the seeking of care from those sources for diarrhea episodes occurring in the last two weeks and in the last six months was tested for significance; clinic contact was significantly more likely to result in Litrosol treatment in eight out of twelve comparisons, while village health worker contact was significantly related to Litrosol treatment in ten out of twelve comparisons. Village health workers clearly played an important role in providing Litrosol, probably because they were easily available and because they had few available responses other than offering Litrosol. Clinics were also important sources, but they may have made more flexible responses than village health workers. Interestingly, use of traditional care sources had no effect on the likelihood of Litrosol use - - people who sought help from healers were just as likely to use Litrosol as those who did not.

Feeding behaviors, particularly breastfeeding and feeding during episodes of diarrhea were also targets of the campaign. Breastfeeding prevalence and duration were high in rural Honduras and appeared to have been increased by the campaign. Early in the intervention, 65 percent of children under 18 months were breastfeeding; by the end of the campaign, the number had risen to 81 percent of children under 18 months. Similarly, bottlefeeding of the young children dropped from 64 percent to 50 percent over the same time period. Continuation of breastfeeding and bottlefeeding during episodes of diarrhea was at about the same levels (i.e., virtually all mothers who were breastfeeding or bottlefeeding reported that they continued to do so during episodes of diarrhea). There was a slight rise in the giving of other liquids during episodes, and the rise was slightly sharper for younger children than for older ones.

An observational study was conducted for a small number of mothers to measure treatment behaviors directly. The mothers were selected when they brought their children to clinics complaining of diarrhea and observed afterwards in their homes. A total of 50 percent of these cases were treated with Litrosol, either before coming to the clinic or during the observation period at home. Mothers who did treat during the observation period gave Litrosol at a rate that would, if sustained, result in the consumption of a liter in 10 to 15 hours. Mothers were tested on their mixing skills after the observation period and performed quite well. The average mixing volume was 926 cubic centimeters, with a standard deviation of 218. Only one mother in five had a bottle of exactly a liter volume. They used all the salts (94 percent) and surprisingly, used boiled water (97

percent) even though the instructions did not require it. Thus, mothers were observed to mix accurately and to administer in amounts that would be clinically effective, if they gave Litrosol at all.

Health status change was the ultimate objective of the campaign effort. Health status was measured with a variety of anthropometric measurements as well as mortality rates. There was evidence that the overall nutritional and growth status declined during the campaign period. The percent of stunting went from 27.8 percent to 33.4 percent for boys and from 31.1 percent to 38.3 percent for girls. The percent "normal" under the Gomez categories fell from 43.4 percent to 36.7 percent for boys and from 40.9 percent to 33.3 percent for girls. However, wasting was essentially zero throughout, and there may even have been a slight improvement in arm circumference measures over time. The decline in nutritional or growth status seemed to be a secular trend toward increased growth retardation. It was consistent across sex, age, municipio, and type of village. However, there was no evidence of acute wasting.

Mortality data were collected from the official Death Registries kept in the county seats. An analysis of mortality for children less than five using the cause of death reported by the mother showed marked declines in deaths involving diarrhea in any way. In the two years prior to the campaign, death of children under five involved diarrhea in 39.8 percent of the cases. In the two years after the start of the campaign, deaths involving diarrhea fell to 24.4 percent of all mortality, a statistically significant drop. Total mortality dropped, although by a slightly smaller amount. Virtually identical reductions in the percentages of cases involving diarrhea before and after the campaign are found when the analysis is restricted to children less than two years and to children less than one year, but the drop in total mortality is smaller. The changes are also consistent when analyzed by time relative to the start of the intervention. There may be multiple causes for these reductions in reported diarrheal mortality, but it does appear that there has been a reduction in diarrheal deaths that can be attributed to the oral rehydration intervention.

In sum, the evaluation has found that the campaign environment and impacts were as follows:

-there was good access to all the communication channels used by the campaign;

-the target audience was heavily exposed to campaign messages through those channels;

-the exposure resulted in learning gains across virtually all the topics covered in campaign messages;

-the audience adopted the promoted behaviors at high rates and sustained the behavior changes over time at high enough rates and with sufficient accuracy that an impact on health status could be expected;

-the nutritional status of children worsened over time in ways that suggest a secular trend related to Honduras' difficult economic situation;

-and mortality involving diarrhea has declined sharply, with a corresponding, though smaller, drop in total mortality.

The pattern of the findings is consistent and provides strong support for the conclusion that the approach used by the campaign can be a very effective tool for accomplishing change in health behaviors in rural populations. It also suggests strongly that when the behavioral change being advocated is adoption of home-based oral rehydration therapy, the complex behaviors involved can be taught to a sufficient degree of accuracy that impact on aggregate health status can be detected.

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Chapter I

Introduction

A. Background

This document is a report of the major findings of an evaluation of the USAID Mass Media and Health Practices Project in Honduras. It covers the period from February, 1981 through June, 1983. The purpose of this particular report is to assemble in a single place the full range of data and longitudinal analyses that have resulted to date from the work in Honduras.

The activity being evaluated, known in Honduras as the Proyecto de Comunicacion Masiva Aplicada a la Salud Infantil (PROCOMSI), is a program of the Ministry of Public Health of Honduras. It uses radio, interpersonal communication, and print materials to teach rural mothers about infant diarrhea and to induce them to change relevant behaviors, particularly to adopt oral rehydration therapy (ORT). The ORT approach being used is a packet-based strategy with locally produced packets called Litrosol. The evaluation of the project looks at three general areas of outcomes - - learning, behavior change, and health status - - to assess overall impact of the project and trace the processes through which it achieves that impact.

Both the project and the evaluation are funded by the Office of Education and the Office of Health, Bureau of Science and Technology, United States Agency for International Development. The USAID Mission in Honduras and the Ministry of Public Health contributed additional funding and resources for many project-related activities.

Infant diarrhea is a leading cause of infant and early childhood mortality in practically all developing countries. Children die from dehydration - - they lose too much water and electrolytes - - before their bodies can recover from the diarrhea. Fortunately, most mortality associated with

dehydration can be avoided if these fluids and electrolytes are replaced quickly enough while the child fights off the diarrhea. An effective and inexpensive way of replacing the losses - - oral rehydration therapy - - is now available. From the public health perspective, a pressing question is how best to inform large numbers of mothers about this therapy and to get them to adopt it accurately and effectively for early treatment of infant diarrhea and thus reduce the associated mortality.

In 1978, the Agency for International Development (AID) set out to answer these questions. It established contracts to implement and evaluate programs in two countries to develop a communication methodology for teaching mothers and changing their behaviors. The group competitively selected to design and implement the programs was the Academy for Educational Development (AED) in Washington, D.C. The Institute for Communication Research of Stanford University was awarded a contract to evaluate them. The two countries that agreed to host the first projects were Honduras and The Gambia. After preliminary indications of success in the first sites, the project expanded to incorporate additional countries. This report deals only with the project in Honduras. Responsibility for the evaluation has subsequently been transferred to the Food Research Institute of Stanford University and its subcontractor, Applied Communication Technology.

B. The PROCOMSI Project

The goals of the project in Honduras were twofold:

- to develop and implement an effective methodology for teaching mothers and changing behaviors and health status that could be used on this and other problems;

- and to institutionalize the capacity to carry out the methodology within Honduras' Ministry of Public Health.

The intervention has used an integrated program of radio, print materials, and health worker training to teach or reinforce changes in a variety of skills and beliefs surrounding infant diarrhea. The salient characteristics of the methodology are:

- intensive use of research for planning;
- adoption of a social marketing perspective;
- intensive use of pretesting and formative evaluation in message and project design;
- use of an integrated campaign format through multiple channels;
- use of behavioral analysis in project design and implementation;
- and concentration on a focused set of objectives.

The primary objective of the program was to use an optimal combination of inexpensive radio communication in combination with more expensive interpersonal and print communication to teach mothers to prevent and treat acute infant diarrhea. The program focused on the promotion of a pre-packaged oral rehydration solution (ORS) that mothers could mix and administer at home when their children were ill. The pre-packaged salts for the mixture were produced in Honduras by PANE, an organization under the control of the Ministry of Public Health, using the World Health Organization formula for ORS. The package of salts is mixed with a liter of water, and hence received the name, Litrosol.

The PROCOMSI project followed the steps described below in developing the intervention. First, a nine-month investigation of health problems and behaviors within the Honduran culture was conducted. A multi-measure research approach was developed to collect the information. This consisted of (1) collection of

existing health information (statistics, etc.); (2) focus group discussions and interviews with mothers and health care workers at the village level; (3) direct observation in the field; (4) extensive interviews and questionnaires administered to rural residents, traditional health workers, professional health workers, local leaders, pharmaceutical workers and rural store owners. Information was sought in the areas of current diarrhea related beliefs and practices, possible distribution systems for information and materials, media use and habits, and the networks of local leaders in relation to interpersonal communication in rural areas.

With the information gained in the developmental investigation, planning of the integrated campaign began. Objectives were chosen using principles of behavioral analysis and instructional design. Complementary radio messages, training programs for health workers, and print materials were developed using pretesting and formative evaluation techniques. The timing of the introduction of components of the media campaign was planned to coordinate with the peak seasons of diarrhea. Intensive face-to-face training of local and professional health workers in administration of oral rehydration therapy (ORT) was stressed early on in order to have the information ready when mothers began to make demands.

The media-based mass communication was first directed to educating the target audience - - rural mothers and caretakers of children - - in the diagnosis of diarrhea and dehydration, and preparation and administration of ORT. After the seasonal peak of acute diarrhea, the treatment messages to reinforce therapy continued and the pre-diarrheal peak focus shifted to prevention techniques. During the second diarrhea peak, media were used to reinstate treatment behaviors learned in the previous year and to continue reinforcement of prevention measures. The principal means of reaching rural mothers and grandmothers was through radio messages, with print materials (posters, promotional and educational material) used to reinforce messages and train health workers.

The level of effort in this campaign was very high. The interpersonal training component directly trained over 500 health care workers, who subsequently trained an additional 1000 village workers. Radio broadcasting included more than 40,000 spots, educationl programs, and other transmissions. The print materials production and distribution entailed 93,000 posters and 155,000 flyers. Over 300,000 packets of Litrosol bearing an instructional label were distributed by the project, as well as other unlabeled versions.

Two basic messages were stressed in all these channels during the campaign:

(1) administer ORT correctly when your child has diarrhea, and
(2) seek help if the child gets worse.

Supplementing these were messages on prevention behaviors such as continued breastfeeding, basic hygiene, and food preparation for children and infants. Treatment messages were stressed over prevention messages because of the importance of introducing and establishing ORT use in Honduras.

C. Evaluation Design

Stanford developed a "process model" for evaluating a range of complex outcomes that would help answer questions posed by different constituencies. The model was designed to monitor the process of change over time and to link specific intervention activities with changes in individuals. The variables implicit in the process model were divided into four general categories:

- treatment variables: those related to the project activity and the messages themselves;

- cognitive and attitudinal variables: those relating to voluntary exposure to, learning of, and acceptance of campaign content;

- behavioral outcomes: those relating to changes in the practices of the target audience; and

- health status outcomes: variables relating to the actual health of children in the target audience.

Then specific variables were chosen within each category and measurement techniques developed. Figure I-1 reviews the overall plan.

(1) The Process Model

The process model described a sequential series of steps that must take place in order for the campaign to have an effect on health status. The steps in the model, shown in the first row of Figure I-1, were as follows:

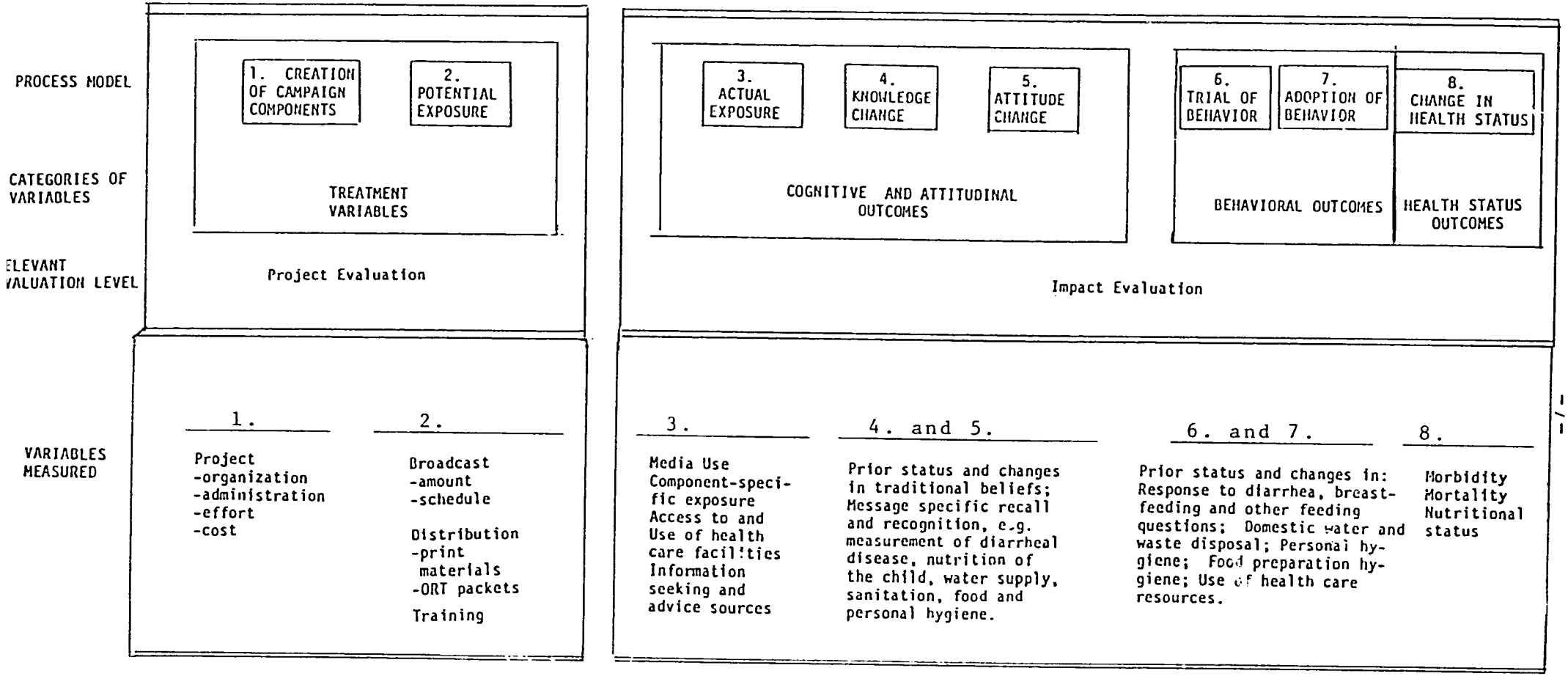
1. Creation of campaign components. Were appropriate products and activities generated using the project's special approach?

2. Potential exposure. How much exposure to the campaign was possible? Where and to what extent were spots broadcast, ORT packets distributed, health workers trained?

3. Actual exposure. Which individuals actually had contact with the campaign, and in what amounts?

4. Knowledge change. Who learned what, and with what accuracy?

Figure I-1 The process model and the elaboration of its components



5. Attitude change. How did audiences react to the information?

6. Trial of advocated behavior. Who tried the new behavior at least once, and with what accuracy?

7. Adoption of advocated behavior. To what extent do people keep doing the new behavior, and incorporate it into their habitual responses?

8. Change in health status. Were there any improvements in nutritional status, morbidity, or mortality?

The categories of variables in the model are shown in the second row of the table, while the third row shows the difference between project evaluation, which examines the execution of the intervention, and impact evaluation, which measures the effects of the intervention.

(2) Variables Measured

Each step in the process model or domain of variables is represented as specific variables or issues that are investigated. The main groups of these variables are shown on row four of Figure I-1. In the most general sense, they include: exposure to intervention components; behaviors related to management of diarrheal disease, child nutrition and feeding practices, water supply, sanitation, food preparation, and personal hygiene; and nutritional status, morbidity, and mortality.

Included in the evaluation planning but not shown on the diagram are a large group of intervening variables, such as demographic information, socio-economic status, literacy, wealth, and productivity measures, etc., that are used to refine understanding of the net effects in each of the categories.

(3) Measurement Method and Organization

Once the variables were specified, operational measures were developed. Many variables needed to be measured only once or twice. Others required repeated measurement to follow change over time. Items were grouped accordingly into either a pre-post ("before/after") survey, a panel study, or an ethnographic study. The largest of these was the panel study, in which different instruments were administered repeatedly (usually monthly) with each instrument repeated approximately every four months. The items clustered in the panel study instruments were in several categories: anthropometric measurements of infant growth, exposure to and learning from the communication campaign components; feeding and nutritional practices; and morbidity and response to disease. The pre-post survey measured cover some of the same variables as the panel study in order to establish baseline levels, and they collected information on the socio-economic and demographic control variables. There were separate studies covering mortality, direct observation of mothers' behavior, ethnography, health care worker knowledge and attitudes, evaluation of the implementation process, and cost-effectiveness. This report incorporates data from the mortality and observational studies.

Variables were measured in a variety of ways, including interviews, questionnaires, direct observation, physical measurement, use of archives, and ethnographic techniques. To the extent possible, more than one technique was used to measure each variable, in order to exclude problems of measurement bias resulting from measurement techniques.

Figure I-2 shows the timing of the administration of the various instruments discussed in this report, as well as the timing of the message phases and the rainy season. The baseline measures included a great deal of demographic and socio-economic status information that was not repeated; hence the substantive coverage in the baseline survey was less intensive than

Figure I-2: Timing of administration of evaluation survey instruments

	Intervention begins *																													
							RAINY								DRY				RAINY								DRY					RAINY
			Phase 1					*Phase 2*				*Phase 3*					*Trans-ition*		*Phase 4*						*Phase 5*					
	1981 . .														1982 . .												1983 . . .			
	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
B	*	*	*																											
A				1								2												3				4		Cont.
M							1							2					3					4					5	Cont.
C								1								2				3						4		P		Cont.
N									1										2			3						4		Cont.

Legend:

B = Baseline
A = Anthropometry
M = Morbidity
C = Communication
N = Nutrition and Breastfeeding
P = Post sweep measure
Cont. = Control group

subsequent focused surveys. The text of this report identifies the time of measurement for the data being discussed.

(4) Sampling and Structure of Design

The constraints of the field situation led us to adopt an evaluation using a relatively large sample to detect small changes and infrequent events. This group was followed over two years in order to reduce vulnerability to seasonal fluctuations and to minimize error variance. The design entailed a sample of 750 families distributed over 20 communities within Health Region I of Honduras, the area within which PROCOMSI functions. Each family was visited monthly by a fieldworker who asked survey questions, made observations, and/or measured the children. The unit of analysis was the household because so many of the behaviors of interest function at a household rather than an individual level. The households were randomly selected after enumerating the households of the village. Villages in the sample were purposively chosen to reflect the full range of characteristics in the rural environment, particularly availability of different levels of health care facilities, general accessibility, and ethnic diversity.

To understand the way the sites were selected a brief explanation of the administrative/political divisions of Honduras is necessary. Honduras is divided into departments which are roughly equivalent to states in the United States. Each department is composed of many <u>municipios</u> or counties. Within the department one municipality is designated as the department capital (like a state capital). Within each municipio, there is a headquarters called the <u>cabecera</u> which is the equivalent of a county seat and which often carries the same name as the municipio. All other smaller towns within the municipio are called <u>aldeas</u>. These are the most rural towns and make up the bulk of our sample of communities. Figure I-3 summarizes these correspondences. The divisions reflect levels of population density,

location of government offices and health facilities, and availability of such services as transportation, communication, education, and commerce.

Figure I-3: Parallels between United States/Honduran administrative units

United States	=	Honduras
States	=	Departments
Counties	=	Municipios
County Seats	=	Cabeceras
Rural Towns	=	Aldeas

Within Health Region I, three municipios of varying size, location, and health service were chosen. These were the municipios of Danli, Sabanagrande, and Yuscaran. Within each municipio, the cabecera and a number of smaller, more rural aldeas were chosen for the sample. The choice was guided by an objective of including communities representative of the full range of variability found in rural Honduras. The sampling plan was a multiphase design incorporating stratification and random sampling. The final sampling unit was the family. The selection of a sample of families in Health Region #1 was complicated because of the lack of sampling frame in the region. Available listings suffered from one or more deficiencies and necessitated the preparation of enumeration lists by the evaluation team. Due to the expense of preparing these lists and the logistical constraints for data collection, a procedure that purposively selected 20 sites was adopted.

The strategy of selecting sites in three municipios reduced the transportation difficulties of reaching small villages. A field worker could be stationed at the center of the cluster and efficiently visit the surrounding sites. In each municipio, the

municipal headquarters or cabecera was included as an "urban" site. From the cabecera 50 families were randomly selected from the enumeration lists.

A total of 200 additional families were selected in the rural sites in Sabanagrande. The rural sites were selected based on three criteria: (1) distance from the cabecera (by foot or vehicle), (2) level of health service availability, and (3) size of the population. Information about health facilities, geography and population of each aldea and municipio was collected from each prospective site. From this information, several aldeas representing the different combinations of these three criteria were selected. The selection was stratified to assure that for each municipio rural sites with varying degrees of difficulty of access to health care facilities and a range of variance for the number 1 and 3 criteria were selected.

After selection of the communities, all the households in each community were enumerated to create a sampling frame for random selection of households. Roughly 35 households were sampled in each community. In these households, the mother or caretaker of the young children was interviewed. Information about the counties and communities selected for study is included in Appendix A of this report.

A control group for post-experimental measures only was selected using the same procedures as with the experimental group. The control group consists of villages located in the municipio of Moroceli. It received the standard PROCOMSI coverage, and is included as a control for the possible effect on the dependent variables of participation in the evaluation.

(5) Structure of Data Collection

Questionnaires were organized around similar topics. Four major topic areas were each treated by a separate questionnaire -- Communication, Morbidity, Nutrition, and Anthropometry. The first data collection consisted of a broad series of baseline

items. After the baseline, each questionnaire was administered at intervals, with each of the topics being covered before the next administration cycle began. Administration of one set of instruments usually took a little over a month, so a given questionnaire was usually administered at roughly four to six-month intervals. In discussing the results, we refer to each questionnaire administration as a "wave" of that particular questionnaire. Hence data are reported for waves 1 through 4 of Anthropometry, for example. Between wave 1 and wave 2 of Anthropometry, the other questionnaires would have been administered.

In addition to the repeated administrations of the questionnaires on the study sample, a control group was incorporated. The control is intended to provide a check on the possible influence on answers and behaviors that participation in the study might have. Hence a group of villages in Health Region I was selected that received all the elements of the campaign but did not participate in the evaluation. This control group was measured at the end of the project using an instrument containing items from the baseline and other questionnaires. The control area was located around the town of Moroceli, and was sampled similarly to the experimental area. The same instrument was also used as a post-experimental measure on the groups in the experimental communities.

An additional control for the effect of repeated measures was incorporated in the communication instrument. It was felt that the communication items, measuring exposure to and recall of measures as well as learning and attitudes, would be the most vulnerable to validity threats from repeated measures. This might happen because mothers would become more aware of and learn more from messages if those same messages were made very salient by participation in the survey. For this reason, for the communication instruments only, the experimental group was randomly divided into two equal groups. The first group participated in waves 1 to 4 of the Communication questionnaire. The second group was not questioned during that time on the

communication items, although they were measured for Morbidity, Nutrition and Anthropometry. At the end of the fourth wave of Communication, the second group was finally tested using all the items in the communication questionnaire. This administration is referred to as the "post" measure for communication.

Thus communication measures were given to the entire experimental sample in baseline, to one half the sample in waves 1 to 4, to the other half of the sample in "Post" and to the control group in "Control." The comparison in the analysis of the communication data of wave 4, Post, and Control provides estimates from three separate, similar groups of the impact of the campaign. Those groups received the same PROCOMSI inputs but different evaluation inputs. (The evaluation inputs were, in order, all evaluation measures, all evaluation measures except waves 1 to 4 of communication, and only the post-experimental measures.) The similarity of the results reported in the section on communication findings gives confidence that the effects of repeated measurements, if any, were small, and that what is being measured by the instruments is probably a true effect of the campaign.

D. Structure of the Report

The report that follows divides the analysis and reporting into three main units, structured by the levels of dependent variables specified by the evaluation's process model. The first level, cognitive changes, is examined together with information about access to and exposure to the campaign elements in Chapter II. The behavioral changes are described in Chapter III. The final set of variables, health status indicators, are reported in Chapter IV.

Chapter II

Communication Variables and Cognitive Change

The first class of dependent variables concerns cognitive outcomes (changes in knowledge and attitudes) that result from exposure to campaign elements. This chapter reports measures of that exposure and of the cognitive changes that resulted. The first section describes the access to and exposure through channels used to disseminate campaign information. The second section examines changes in knowledge related to campaign topics. A third section looks at the relationship between exposure to the radio messages over time and retention of the content of those messages.

A. Exposure to Campaign Elements

(1) Radio

Radio was the primary channel of communication throughout the implementation campaign. The evaluation team collected information on availability of radios and the patterns of radio use among the mothers in the sample households at several points during the intervention.

a. Access to Radios

The results obtained from the measurements in the second year of data collection are consistent with the percentages obtained from the first year. Four out of five families (average

of 79.5 percent) in the study sample owned radios. In the control group, the level was somewhat lower with only 70.1 percent of the families owning a radio.

For predicting exposure, it is more important to measure whether the family had a working radio than to measure simple ownership rates. To ascertain this, families were asked to turn on their radio to demonstrate that it was currently functional. Over time the percentage of radios that weren't working on the day the evaluation interviewer visited fluctuated widely - - going, for instance, from a low of about 6 to a high of 22 percent of radios not currently working. The average percentage of nonworking radios among the study group came out to be 15.3 percent.

The important comparison is thus between radios that were working at different times. In this, the groups appear to be quite stable and evenly matched. The percent of families in the study group with a working radio remained reasonably consistent across all waves, with the average of five measures being 67.4 percent. This is quite similar to the figure for the control group - - 64.8 percent with a working radio. The post-intervention measurement in the experimental communities shows a lower rate of working radio ownership, although the difference is barely statistically significant when compared with wave 1, and is not a significant difference in comparison to wave 4 or the control group. The percent of radios that were out of service fluctuated widely but seemed to rise over time. However, the control group had among the lowest rates of radio outage. This variable, which is simple and empirically confirmed, should be among the most reliable of measures. It is surprising to find such variability in it, but it probably does reflect real changes in the environment.

Thus, about two-thirds of both the sample and control group families owned a radio that worked. Table II-1 details the percentages across waves for radio ownership and function, and Figure II-1 illustrates the average percent of families who owned a working radio.

Table II-1 Radio ownership among families in sample, Honduras

Item	Baseline n=750 2/81	Wave 1 n=325 8/81	Wave 2 n=285 4/82	Wave 3 n=281 8&9/82	Wave 4 n=285 2&3/83	Post n=322 4&5/83	Average	Control n=244 5/83
Percent of families owning one or more radios	76.9%	80.0	85.3	83.3	78.9	72.6	79.5	70.1
Percent of radio-owning families with none currently working	6.2	19.5	9.1	16.3	18.2	22.2	15.3	7.6
Percent of families with a working radio	72.1	64.6	77.2	69.4	64.6	56.5	67.4	64.8

CONT:RADNUMX,RADWORK,YRBADX

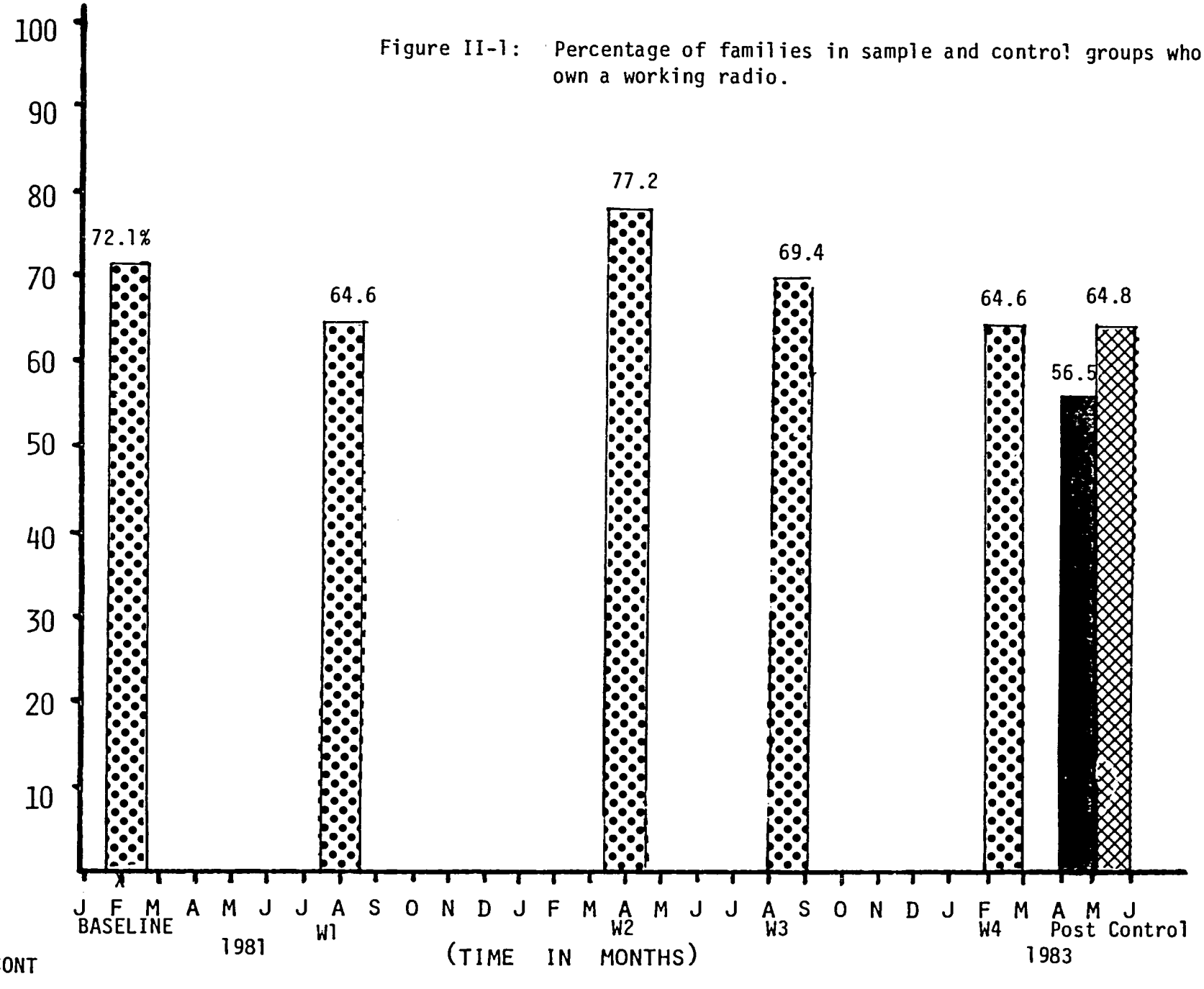


Figure II-1: Percentage of families in sample and control groups who own a working radio.

CONT

b. Radio Listening Patterns

Table II-2 shows people's description of their radio listening habits. About a third of the sample mothers, on the average, described themselves as "continuous or frequent" listeners. This pattern remains steady over time, and the control group also has about the same percentage.

The actual pattern of listening over the course of a day was measured a final time in the second year of data collection. The pattern was quite similar to findings from the first year. Using the 24-hour recall test, respondents were asked to recall when they had listened to the radio the previous day. Table II-3 shows the percentages of households listening at any given hour of the day.

Listening starts out very high in the morning, with 36.6 percent of the households listening to the radio between six and seven a.m. The percent of people listening gradually drops during the course of the morning and peaks again at lunch time (between 12 noon and one p.m). After that, the percent of people listening continues its gradual drop throughout the afternoon and evening. The control group pattern of listening is almost identical, although with lower percentages listening overall. The early morning is a prime listening time, but the noon hour peak starts earlier. The pattern for the remainder of the day is consistent with that of the study group.

Over three measurements, radio listening patterns have stayed the same with peaks in the early morning and at around noon, with a gradual decline in listening population in the rest of the day. Figure II-2 graphs waves 1 and 3 for the study group plus the control group's listening patterns over the course of 24 hours. The noteworthy thing about this graph is the high level of agreement in the patterns exhibited over time and across groups.

Over 95 percent of the listening population listened to just six Honduran radio stations. Table II-4 has the percentage of market share held by the six stations at three points in time, as

Table II.2 How people in sample describe their radio listening habits, by wave.

	Wave 1 8/81 N=293	Wave 2 4/82 N=272	Wave 3 8&9/82 N=272	Wave 4 2&3/83 N=263	Wave 5 4&5/83 N=292	Wgt. Avg.	Ctrl. 5/83 N=213
Continuously and Frequently	43.7 1/	32.4	28.3	31.2 2/	31.5	33.5	32.9
Other	56.3	67.6	71.7	68.8	68.5	66.5	67.1

Note: CONT1-4,P,PM:LISTNRDX

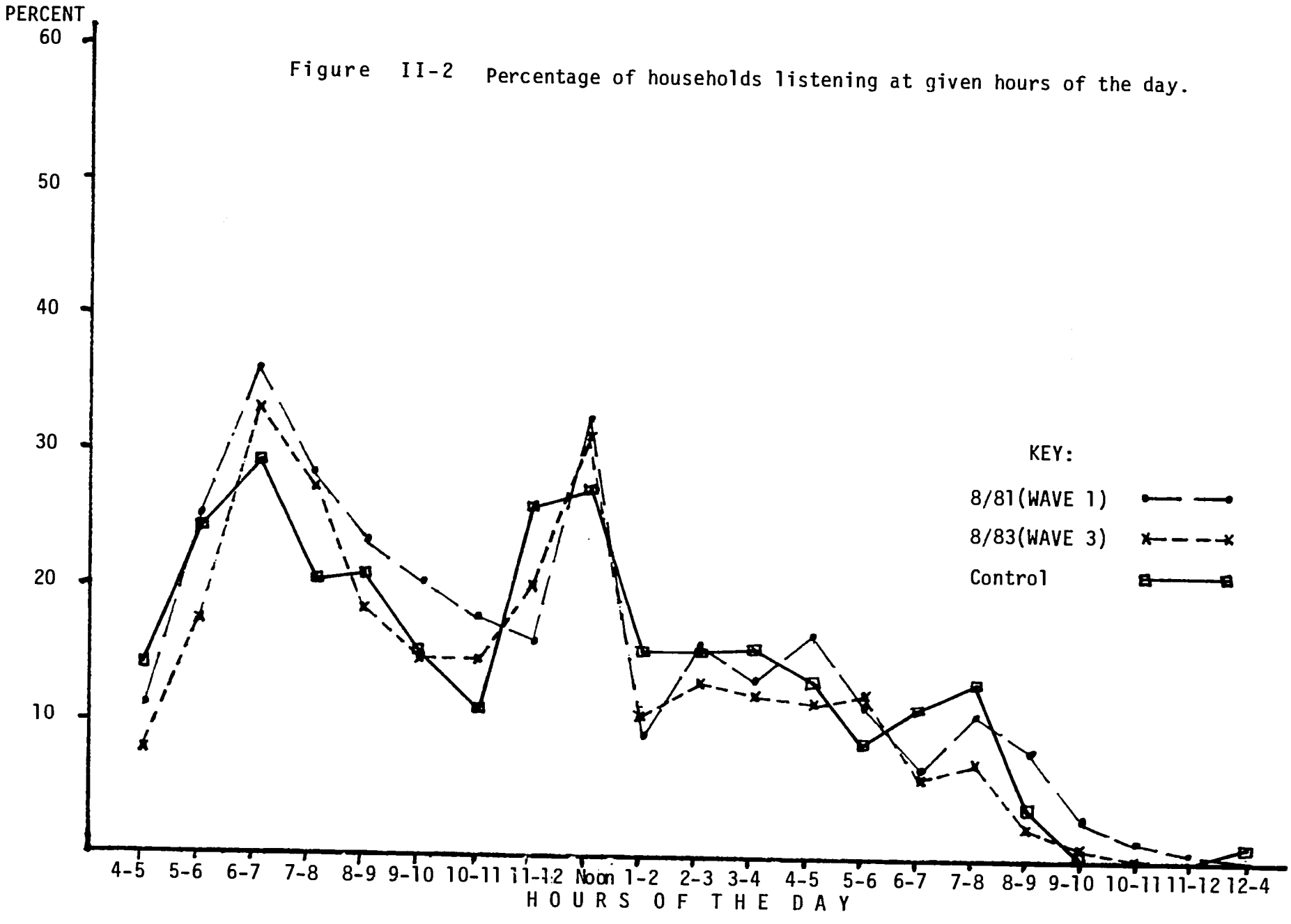
1. The difference between wave 1 and wave five is significant, $p < .005$
2. The difference between wave 4 and control is not significant.

TABLE II-3 Percentage of the total number of households listening to the radio at given hours of the day.

	HOUR OF THE DAY																				
	4-5am	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-4am
WAVE 1 8/81 (n=291)	11.0	24.7	35.7	28.2	23.0	20.3	17.5	16.2	32.3	8.9	16.2	13.1	16.5	11.0	6.5	10.7	7.9	3.1	1.4	0.7	0.3
WAVE 2 4/82 (n=283)	6.4	19.4	41.0	32.2	25.8	22.6	18.7	19.1	40.6	18.4	18.0	11.0	13.4	7.8	4.9	4.2	2.8	1.1	0.4	0	0
WAVE 3 8&9/82 (n=287)	7.7	17.4	33.1	27.2	18.1	14.6	14.6	20.2	31.0	10.1	13.2	11.8	11.1	12.2	6.3	7.3	2.4	1.0	0.3	0	0
Average	8.4	20.5	36.6	29.2	22.3	19.2	16.9	18.5	34.6	12.5	15.8	12.0	13.7	10.3	5.9	7.4	4.4	1.7	0.7	0.2	0.1
CONTROL GROUP (n=168)	14.3	24.4	29.2	20.2	20.8	14.9	10.7	25.6	27.4	14.9	14.9	15.5	13.1	8.3	11.3	13.1	3.6	0.6	0	0	1.2

NOTE: RECL:LISN1V-21V

Figure II-2 Percentage of households listening at given hours of the day.



Note: RECL:STN1V-21V

Table II-4 Overall market share of top six Honduran radio stations (in listener hours).

Station	PERCENTAGE OF MARKET WAVE 1 N=749	WAVE 2 N=835	WAVE 3 N=654	Weighted Average	Control N=459
HRN	43.7%	43.4	46.8	44.5	34.9
Radio Central	17.8	16.4	16.5	16.9	12.0
Radio Oriental	14.8	15.6	15.3	15.2	1.3
Radio America	11.3	15.4	10.2	12.6	22.0
Radio Satellite	6.5	5.3	9.0	6.8	22.9
Radio El Paraiso	2.0	3.8	1.7	2.6	1.7
Total percentage of market accounted for:	96.1	99.9	99.5	98.6	94.8

Note: RECL, HDRAD.M86:STN1V-21V

well as the control group percentage. HRN, a national chain of transmitters, received the highest percentage of the market in the experimental group, with Radio Central and Radio Oriental being distant seconds. The control group showed a slightly different division among the stations. HRN still was the most popular, with about a third of the respondents' listening to it. However, Radio America and Radio Satellite also each received about 20 percent (22.0 and 22.9 percent, respectively) of the control group market. The difference in radio station popularity might have been due to a slight regional difference in radio station signal coverage.

c. Exposure to the PROCOMSI Campaign Radio Messages

During the second year of data collection, women in the study sample were asked for a third time to recall if, on the previous day, they had heard one of the PROCOMSI campaign messages from the Honduras Ministry of Public Health. Figure II-3 and Table II-5 show the level of recall among the study population and the control group over the course of a day of radio listening. Table II-5 is divided into two parts: the percentage of the listening population who reported hearing a PROCOMSI radio spot, and the percentage out of the total sample population who recalled hearing a spot. The data from the third measurement (August 1982) indicate that recall levels remained high, with much higher recall among listening mothers in the early peak hours with lower peaks in the later afternoon. In the control group (measured in May/June 1983) recall percentages were much lower, but followed the same general listening patterns. Figure II-3 illustrates this pattern.

There are two possible explanations of why the control group levels were substantially lower than the experimental group. One possibility is that there was, in fact, much lower exposure, since many of the spots were broadcast on local stations with limited broadcast radii, and the total coverage within the control group area could be less. This would be particularly

Table II -5 Coverage of the population with radio spots, tabulated by hour of the day.

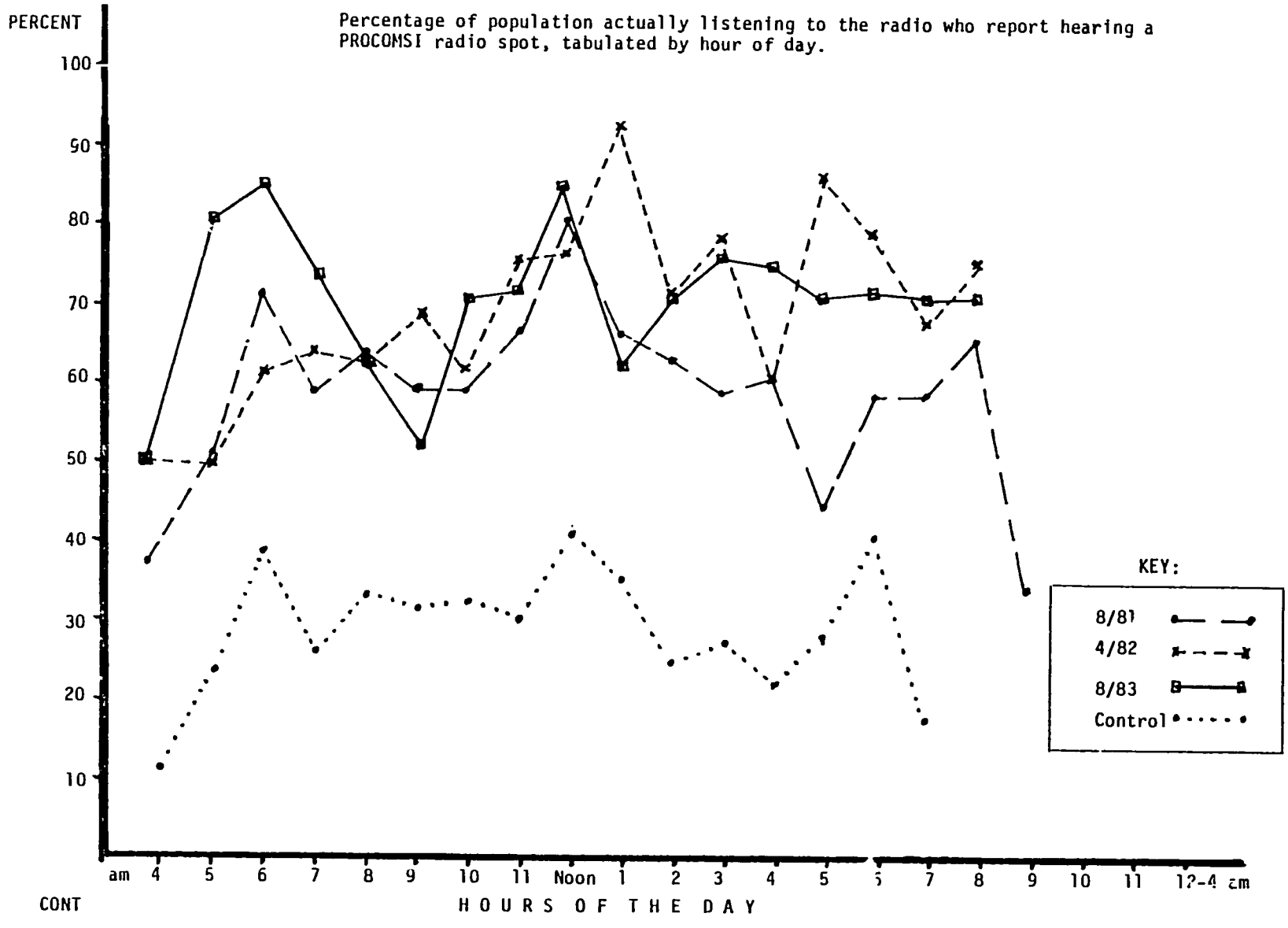
		HOUR OF THE DAY																			
		4-5am	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
Percentage of population actually listening who report hearing a PROCOMSI spot	8/81	37.5	51.4	72.1	58.5	64.2	59.3	58.8	66.0	80.9	65.4	63.8	57.9	60.4	43.8	57.9	58.1	65.2	33.3	*	*
	4/82	50.0	49.1	60.3	64.8	63.0	68.8	62.3	75.9	76.5	92.3	70.6	77.4	60.5	86.4	78.6	66.7	75.0	*	*	*
	8/82	50.0	80.0	84.2	74.4	63.5	52.4	69.0	70.7	84.3	62.0	71.1	76.5	75.0	71.4	72.2	71.4	71.4	*	*	*
	Avg.	45.8	60.2	72.2	65.9	63.6	60.2	63.6	70.9	80.6	73.2	68.5	70.6	65.3	67.2	69.6	65.5	70.5	11.1	*	*
	Ctrl.	12.5	24.4	38.8	26.5	34.3	32.0	33.3	30.2	41.3	36.0	24.0	26.9	22.7	28.6	42.1	18.2	66.6	*	*	*
Percentage of total population reporting hearing a PROCOMSI spot	8/81	4.1	12.7	25.8	16.5	14.8	12.0	10.3	10.7	26.1	5.8	10.3	7.6	10.0	4.8	3.8	6.2	5.2	1.0	*	*
	4/82	3.2	9.5	24.7	20.8	16.3	15.5	11.7	14.5	31.1	17.0	12.7	8.5	8.1	6.7	3.9	2.8	2.1	*	*	*
	8/82	3.8	13.9	27.9	20.2	11.5	7.7	10.1	14.3	26.1	6.3	9.4	9.1	8.4	8.7	4.5	5.2	1.7	1.0	*	*
	Avg.	3.7	12.0	26.1	19.2	14.2	11.7	10.7	13.2	27.8	9.7	10.8	8.4	8.8	6.7	4.1	4.7	3.0	0.7	*	*
	Ctrl.	1.8	6.0	11.3	5.3	7.1	4.8	3.6	7.7	11.3	5.3	3.6	4.2	3.0	2.4	4.8	2.4	2.4	*	*	*

Note: RECL: LISN1V-21V, HLTH1V-21V

* number of listeners less than 5; too small for reliable calculation

Figure II-3

Percentage of population actually listening to the radio who report hearing a PROCOMSI radio spot, tabulated by hour of day.



CONT

true if the Radio Oriental national chain carried any substantial proportion of the national transmissions, because it apparently did not cover the control group. A second possible explanation is that the control group was measured after the PROCOMSI campaign emphasis had shifted to breastfeeding from diarrheal disease. The measurement item asked whether mothers had heard a Ministry of Health spot about diarrhea. There may be some ambiguity, with some mothers saying, yes, they had heard a Ministry of Health spot, and others responding, no, they had not heard a diarrhea spot. Thus the measured level of exposure may not reliably reflect the control group's true exposure.

The difference between the experimental and control groups is consistent across all measures of exposure. The measurement of the control group took place about nine months after the last measure of the experimental group on these variables, so it is possible that the levels were in fact the same, and the apparently lower control group values are a result of the differences in spot content rather than true exposure.

Table II-6 shows the percentage of mothers, both total and just those who claimed to have listened the previous day, who recalled hearing a PROCOMSI spot. Out of all the mothers in the study sample, an average of 43.9 percent (over three measurements) remembered hearing a PROCOMSI spot the previous day. Among just those mothers claiming to have been listening to the radio the previous day, an average of 73.2 percent said they had heard at least one PROCOMSI spot. Thus, in the listening population, almost three-quarters recalled hearing a campaign radio spot on the previous day. In contrast, control group recall levels were lower. Only 39.3 percent of the women who listened to the radio recalled hearing a PROCOMSI spot the previous day, although 66.7 percent of the total control group listened to the radio at some point the day before. These differences are subject to the same considerations as were discussed above.

There are two perspectives from which to analyze radio spot exposure. One asks how well one is covering the population as a

Table II-6 Measures of mothers' exposure to campaign radio spots

	Wave 1 8/81	Wave 2 4/82	Wave 3 8&9/82	Average	Control
Percent of all mothers who listened to the radio on the previous day:	66.3% (n=291)	59.4 1/ (n=283)	54.4 (n=287)	60.0	66.7 (n=168)
Percent of all mothers who remember hearing at least one spot on the previous day:	49.1 (n=291)	38.9 2/ (n=283)	43.6 (n=287)	43.9	26.2 (n=168)
Percent of mothers listening on the previous day who remember hearing at least one radio spot:	74.1 (n=193)	65.5 1/ (n=168)	80.1 (n=156)	73.2	39.3 4/ (n=112)
Average number of radio spots reported heard on the previous day, including non-listening mothers:	1.88 (n=291)	2.10 1/ (n=283)	1.90 (n=287)	1.96	0.88 5/ (n=168)
Average number of radio spots reported heard on the previous day by listening mothers:	2.83 (n=193)	3.48 3/ (n=168)	3.50 (n=156)	3.27	1.31 (n=112)

NOTE: RECL: LISNR1V-21V x HLTH1-21V = MOMLISNV x HRSPOTV

1. The difference between the first and second measure is not significant.
2. The difference between the first and second measure is significant, $p < .025$.
3. The difference between the first and second measure is significant, $p < .05$.
4. The difference is significant, $p < .01$.
5. The difference is significant, $p < .001$.

TABLE II.7 Contacts with different categories of health care worker, expressed as a percentage of total contacts reported in the six months prior to the interview.

Category	Percentage of total contacts reported in six mos. prior to interview						
	Wave 1 (8/81) N=245	Wave 2 (4/82) N=473	Wave 3 (8&9/82) N=515	Wave 4 (2&3/83) N=424	Post (4&5/83) N=386	Weighted Average 1/	Control (5/83) N=316
Traditional 2/	11.8%	22.2	23.3	17.0 5/	18.4	19.4	17.7
Community Level 3/	39.6 6/	18.8	25.8	27.8 5/	27.2	26.5	30.4
Fixed Facility 4/	48.6 7/	59.0	50.9	55.2 5/	54.4	54.0	51.9

1/ Weighted average of percentage of all contacts in the five time periods.

2/ Includes curandero, sobadora, espiritista.

3/ Includes partera, representante de salud, guardian de salud, and promotor de salud.

4/ Includes enfermera auxiliar, Ministry of Health physician, and private physician.

5/ The difference between wave 4 and the control group is not significant.

6/ The difference between wave 1 and the post wave is significant, $p < .005$

7/ The difference between wave 1 and the post wave is not significant.

Note: CONT1-4,P,PM:DATECURX,DATESOBX,DATESPX,DATERESX,DATEGUSX,DATEPARX,DATEPROX, DATEDRM,DATEDRPX,DATEENF.

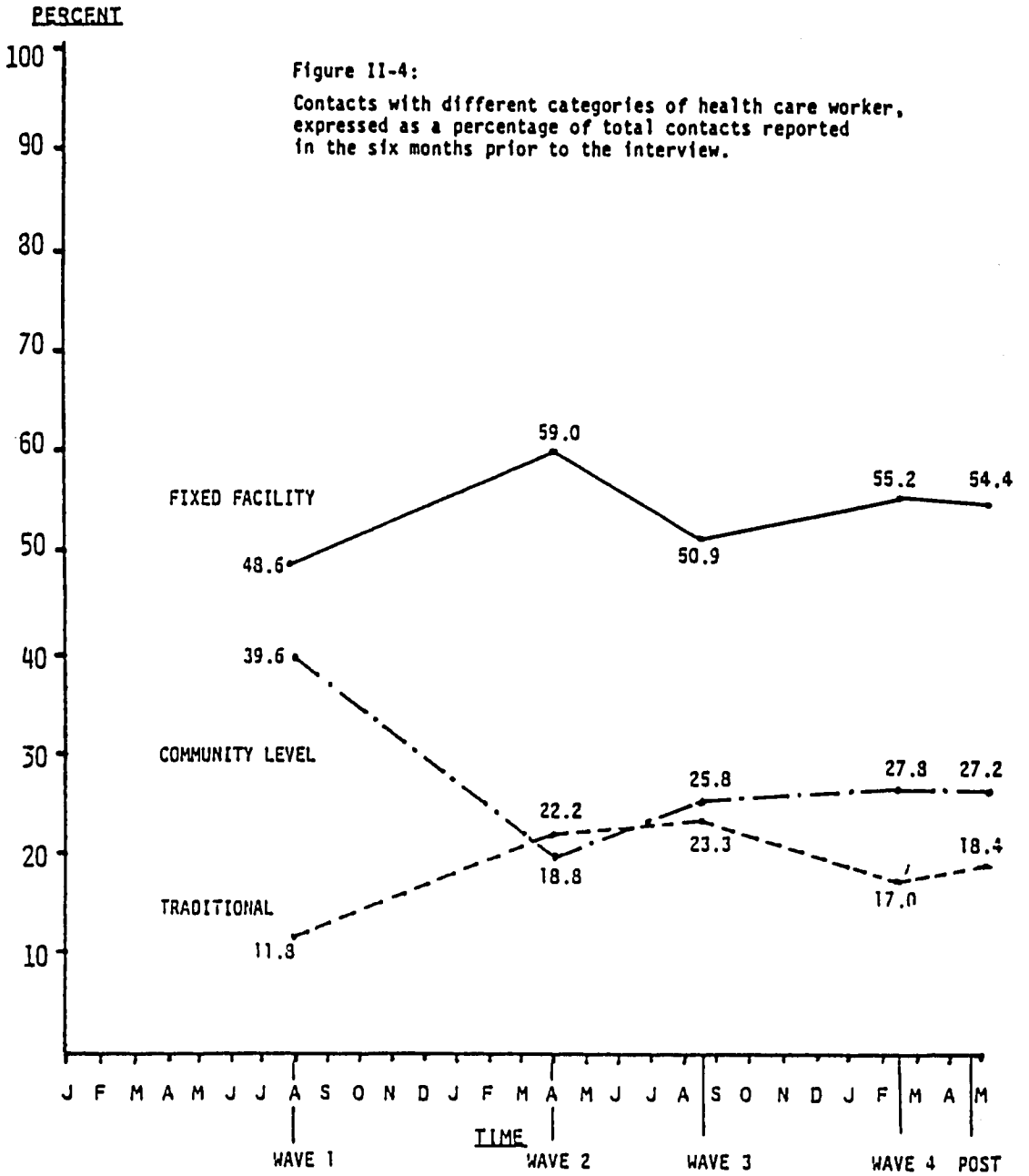


Figure II-4:

Contacts with different categories of health care worker, expressed as a percentage of total contacts reported in the six months prior to the interview.

CONT:DAT...X

whole; the other asks how well one is reaching those who are actually tuned in. The first tells one how large overall impact might be expected to be, whereas the second reflects the relative efficacy of the campaign compared to its own competition. We have analyzed the exposure data both ways. Population coverage during the period of emphasis on diarrheal disease was high and stable - - the mythical average mother in the population heard about two spots a day. However, when analysis is done only on those mothers who were listening to the radio, it can be seen that PROCOMSI dramatically improved its coverage between the first and second waves of measurement and sustained this improvement through the third wave. Coverage of listening mothers improved from about 2.8 spots to about 3.5 spots per listening mother. As noted before, control group figures are not directly comparable.

Perhaps between the second wave (April 1982) and the third (August 1982), more women who habitually listened to the radio were becoming aware of the PROCOMSI messages. There was a very high frequency of broadcast of radio messages. Over the two years of the implementation campaigns (from March 1, 1981 to March 30, 1983) the various radio spots being aired were broadcast a total of 36,455 times. Radio spot coverage was indeed impressive, and the percentages reflect that listening mothers became aware early on of the PROCOMSI spots and maintained a high awareness of the messages, with more mothers remembering hearing a spot between the second and third waves. The third measurement of the evaluation took place at mid point of "Phase Four" in the implementation campaign, when the frequency of broadcasts rose to a high of 14,408 in a six-month period. Listening mothers obviously were being saturated with PROCOMSI messages about infant care and health.

It is clear from the data that women in the sample had good enough access to radios to listen frequently, and that those that did listen could hardly help but hear a PROCOMSI spot during the months the implementation campaign was carried out.

(2) Health Worker Contacts

This section reports levels of contact between sample households and the various health care workers as measured at five points in time. Families were asked a variety of questions about their contacts with health care workers. The interviewers wished to find out what the access to care was, and whether there was any change over time in their selection of the kinds of health care worker they sought.

Respondents were asked specifically about their contacts with each of many different types of health care workers, including people from both the cosmopolitan and the traditional (folk) health communities. The categories of health workers were: curandero (healer), sobadora (masseuse), and espiritista (spiritualist), all of which are classed as representatives of the folk medicine arena; partera (midwife), representante de salud (health administrator), guardian de salud (village primary health care worker) and promotor de salud (public health promotion and health education worker), all of which represent the community level of health contacts; and enfermera auxiliar (auxiliary nurse), physician at the Ministry of Health clinic, and private physicians, all of which represent care given at the level of fixed facilities.

Households were asked whether they had had any contacts with a health worker in the last six months and if so, what type were they, and where and when had they seen them. Table II-7 reports the contacts with different categories of health care worker, expressed as a percentage of the total contacts reported in the six months prior to the interview. These results are also shown on Figure II-4.

The percentages show that of the families who visited any type of health worker in the previous six months, an average of 19.4 percent of the reported contacts were with traditional health care workers, with the actual numbers ranging between 11 and 23 percent of the contacts. Contacts with community-level workers were higher, but dropped from a high of 39.6 percent in

the first wave and then leveled off at around 25 percent for the last three measurements. Contacts with health workers at fixed facilities account for just about half of all the contacts reported. Over time then, the sample population was reasonably consistent in contacts it made with health care workers.

The high percentage of contacts with community-level workers in the first wave possibly could be due to the fact that interviewees wished to make a good impression on the interviewer in order to display their modern health habits, or were reluctant to report their contacts with folk healers. In the second wave, interviewers were asked to probe about contacts with traditional health workers, so traditional contacts rose markedly while community-level contacts dropped sharply. In the third and fourth waves the average contacts remained steady. The first wave measures are sufficiently different from the others to suspect that the subsequent waves represent a better estimate of actual behavior. We are not inclined to interpret the apparent difference between wave 1 and other waves as an effect of the campaign, nor as a true secular trend.

The average percentages for the sample group compare nicely with those of the control group, and the slight differences in the percentages are not significant.

Table II-8 displays the same information expressed as the average number of health worker contacts per family over time rather than as a percentage of total contacts. These show wider fluctuations, yet the weighted average for each category is similar to the percentages found in the control group, a group with similar access to various types of health worker, but only measured once at the end of the evaluation. In the study group, contacts with traditional health workers dropped over time. The average number of contacts with community-level workers remained fairly constant, while the number of contacts with fixed facility workers started off low, and rose dramatically in the second wave and stayed high through the fourth wave.

Thus, the evaluation's data show that the sample population, and the population at large, had reasonably good access to

Table II.8 Contact with different categories of health care worker, expressed as the average number of contacts per family in the six months prior to the interview.

Health Worker Category	Average number of contacts per family in six mos. prior to interview						
	Wave 1 8/81 N=326	Wave 2 4/82 N=285	Wave 3 8&9/82 N=281	Wave 4 2&3/83 N=285	Post 4&5/83 N=322	Weighted Average1/	Control 5/83 N=244
Traditional2/	0.088	0.368	0.427	0.253	0.220	0.265	0.230
Community Level3/	0.298	0.312	0.473	0.414	0.326	0.362	0.393
Fixed Facility4/	0.365	0.979	0.932	0.821	0.652	0.736	0.672

1/ Weighted average of the average number of contacts per family in the five time periods.

2/ Includes curandero, sobadora, and espiritista.

3/ Includes partera, representante de salud, guardian de salud, and promotor de salud.

4/ Includes enfermera auxiliar, Ministry of Health physician, and private physician.

Note: CONT1-4,P,PM:DATECURX,DATESOBX,DATESPX,DATEPARX,DATERESX,DATEGUSX,DATEPROX,DATEDRMX,DATEDRPX.

health care. The figures from Table II-7 show that households preferred going to health workers (doctors and nurses) at fixed facilities, but also chose traditional healers as well. It is likely that households, depending on how they defined the illness, used either a combination of types of health workers, or perhaps first sought out one type and then another in an attempt to find the appropriate cures.

(3) Print Media

a. Literacy Levels

This is a short summary of findings on literacy discussed in the report from the first year of data collection.

The test for literacy consisted of having the interviewer hand the mother in the family a card with three lines of text, each increasing in difficulty. The card was handed to the woman with the text upside-down, and the interviewer noted if the mother turned it around in order to read it. Additional points were given for each line of text the mother was able to read. In the evaluation's test, a person was considered literate only if they could read all three lines of text. This is a very stringent test of literacy. If the mother could not pass the test, a family member said by the mother to be literate was tested. The results indicate that 56.8 percent of the mothers could read, all three lines, although 34.5 percent did not even reverse the card when it was handed to them. Thus it seems that mothers in our sample either could read fairly well or they were completely unable to read. When another family member was tested, 81.8 percent were shown to be literate. The combination of data from these two tests shows that in 86.8 percent of households there was at least one person who could read. This is a high household literacy rate and gives confidence that it was reasonable to use print materials in the campaign.

b. Exposure to Posters

In the questionnaires administered in the second year of data collection, women in the study group were again asked to describe any health posters they had seen. From their description, an answer was coded for the particular PROCOMSI print material it matched. This was an unaided recall test which is a very demanding measure of what people know. Table II-9 shows the percentage of exposure to print materials over time.

As in the first two measures, about half of the total sample had seen a health poster, not necessarily a PROCOMSI one, at one time or another. Out of the total sample, between a third and half of the women again described what they saw well enough for it to be coded as PROCOMSI material. The figures were stable in the third wave (46.7 percent) and the fourth wave (47.4 percent). In the post wave group, the percentage describing a PROCOMSI poster was much lower (28.8 percent) and the control group (measured in May/June 1983) was lower still, with 21.0 percent recalling a PROCOMSI poster. Overall, the control group women showed a lower percentage of recall for any health poster (33.9 percent). It could be that repeated measurements on the experimental group increased their awareness of PROCOMSI print media, so that the group questioned in waves 1 to 4 actually did remember better the health posters they had seen. Otherwise there is no particular reason to expect a difference between the post-only experimental group (post) and the previous measures on the randomly selected other half of the experimental group (waves 1-4), which lives in the same communities. There may be a regional difference underlying the difference between the control group and the others, but the similarity between the post-only and control groups would indicate that this is less likely to be the case. The most plausible interpretation is that the salience of the posters was increased for the group asked repeatedly about them, and that they tended to pay more attention to and remember better the posters to which they were exposed.

Table II -9 Exposure to print materials

	Wave 1 8/81(n=316)	Wave 2 4/82(n=281)	Wave 3 9&10/82(n=290)	Wave 4 3/83(n=259)	Post 5/83(n=312)	Control (n=224)
Percentage of women reporting that they have seen a health poster	46.8%	55.2	57.6	51.7	47.4	33.9
Percentage of sample that can describe one or more PROCOMSI posters from memory	37.0	46.6	46.7	47.4	28.8	21.0
Mean number of posters described per mother	0.550	0.804	0.776	0.845	0.506	0.326

Note: POST1-5W, CPOSTERW, POSTR1W-POSTR7W

Women were asked to recall where they had seen the PROCOMSI posters. Table II-10 and Figure II-5 show the results. As with the results from the first year, the health center continued to be the facility where most posters were spotted. In fact, the incidence of sightings at the health center steadily increased. The guardian's house was the second most likely place the posters were seen, with "other locations" being third.

As in the first year's data, the poster with the breastfeeding mother was the one most frequently recalled (average of 36.2 percent) by those mothers who said they had seen a PROCOMSI poster. There was quite a bit of variation in the percentages of specific posters remembered, as Table II-11 shows. The poster showing a dead child was the second most frequently recalled poster. In the control group, a lower percentage of women reported seeing any health poster (33.9 percent), but half of these recalled seeing the breastfeeding poster (52.1 percent), with the "Signs of Dehydration" poster being second (19.2 percent).

The results indicate that the campaign print media were memorable to the women in the sample. Among the members of the study sample, almost half of the mothers could describe a PROCOMSI poster from memory. Although there are signs that the study sample got better over time in recalling posters, the lower numbers for the post and control groups indicate that the evaluation interviews improved the salience of the posters to the women who were interviewed a number of times.

(4) Conclusions

The foregoing data present a clearcut case on the issues of access to communication channels and exposure to campaign messages. There were high levels of access to all three channels used by the campaign (broadcast, print, and interpersonal). The exposure to campaign messages through these channels and the awareness of mothers about the campaign and its content were both

Table II-10 Distribution of poster sightings over five points in time

Location where poster was seen	WAVE 1 8/81 (n=144)	WAVE 2 4/82 (n=155)	WAVE 3 8&9/82 (n=167)	WAVE 4 3/83 (n=124)	WAVE 5 5/83 (n=136)	Control (n=69)
Health Center	50.7%	56.8	68.8	71.0	77.9	88.4
Guardian's House	6.9	10.9	13.2	16.9	8.8	5.8
Neighbor's House	11.8	15.5	4.8	4.0	0	0
Auxiliar Alcalde's House	3.5	3.9	2.4	1.6	4.4	0
Other Locations	16.0	12.9	10.8	6.5	8.1	5.8

Note: POST1-5: WRSEN1W-WRSEN7W

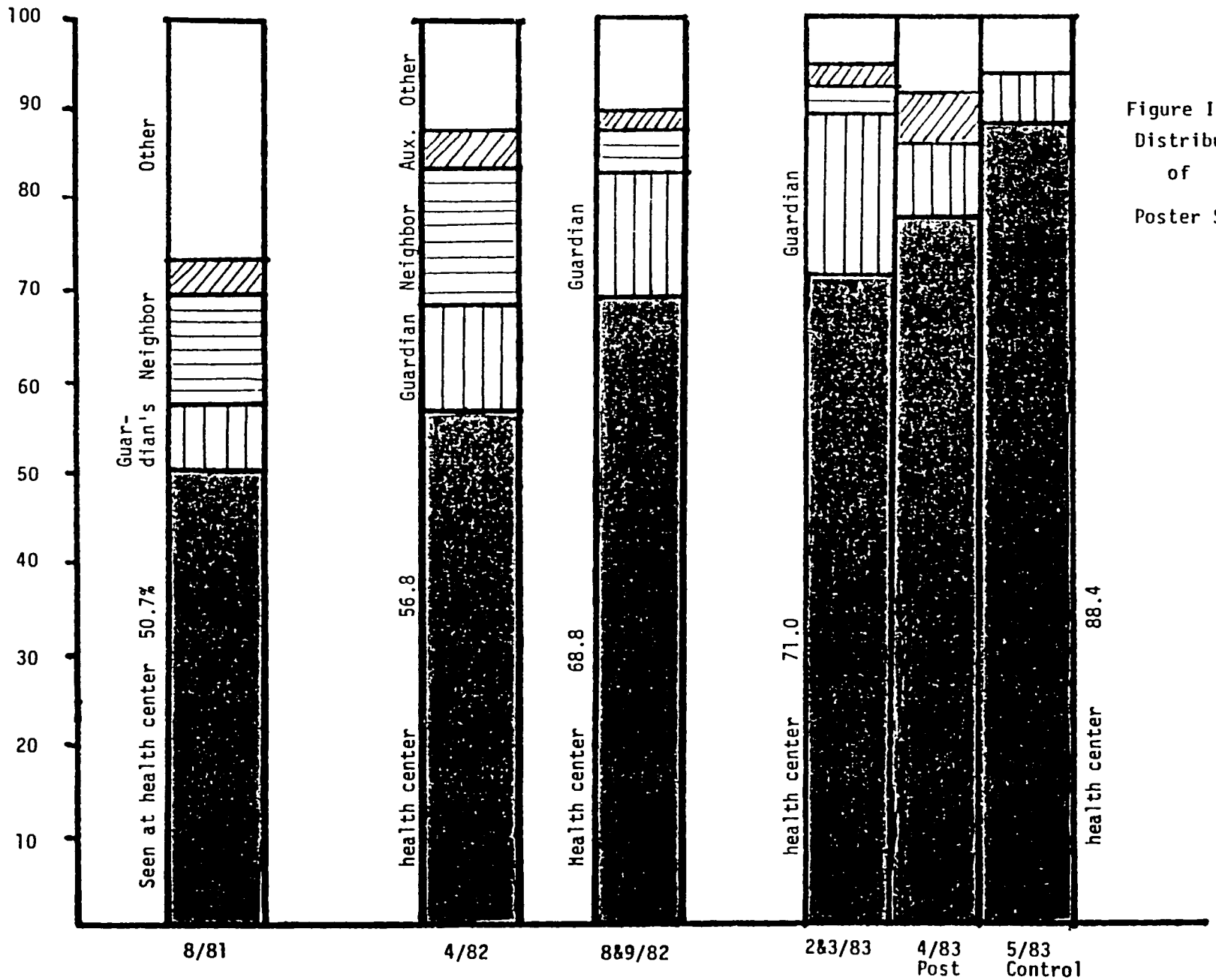


Figure II-5
Distribution
of
Poster Sightings

Table II-11 Percentage of specific posters recalled out of all the PROCOMSI posters recalled by women, over time

Poster	Wave 1 (n=174)	Wave 2 (n=226)	Wave 3 (n=226)	Wave 4 (n=219)	Wave 5 (n=158)	Avg.	Control (n=73)
Signs of Dehydration	7.5%	5.8	12.4	19.6	13.9	11.8	19.2
Little Kid	9.8	8.8	6.6	2.7	3.8	6.3	6.8
Breastfeeding	35.1	32.3	34.1	32.9	46.8	36.2	52.1
Red Heart	13.2	14.6	8.8	1.8	5.1	8.7	5.6
Litrosol Banner	3.4	4.4	3.5	1.3	2.5	3.0	5.6
Dead Child	19.5	20.4	15.0	16.0	10.8	16.3	-
Para Que No Muera	-	6.1	12.8	11.4	15.8	9.2	8.2
Hoja Paquete	-	1.6	1.8	0.9	1.3	1.1	1.4
Other	11.5	6.1	4.8	13.2	0	7.1	1.4

Note: POST1-5
POSTR1W-7W

very high. It is safe to conclude that the campaign actually "arrived" at the mothers' doorsteps. The next section of this chapter examines the degree to which mothers learned from the messages to which they were exposed.

B. Learning of Campaign Information

(1) Prior Health Beliefs

Folk medical beliefs about diarrhea are common in rural Honduras. Traditional therapies have included a wide range of agents, such as purgatives, teas, and antibiotics. Multiple recourses to cosmopolitan and traditional care is the pattern.

In the report from the first year of data collection, the baseline survey (Jan/Feb. 1981) included questions about the perceived causes of diarrhea. These questions were also posed to women in the last wave (May 1983) and to the control group (May/June 1983). The results are shown on Table II-12.

The percent answering "dirty water" hardly changed over time, and the slight percentage difference is not significant. The percent of women responding that worms cause diarrhea did change over time, from 21.0 percent to 36.9 percent.

Interpretation of these findings is made difficult by the fact that many responses have been "masked" by the interviewer's use of "others and combinations" category. For mothers who named only one cause, the only category showing marked change is "worms." Here the gain of about 15 percentage points from baseline to post-test is almost exactly equal to the drop in "others and combinations." Thus it is difficult to say that it reflects a real change - - it may be that mothers who previously mentioned worms and other causes together are now giving more concise answers. Another possibility is that the traditional concept of worm-caused diarrhea was legitimized as an answer to

Table II-12 Response to question "What are the main causes of diarrhea?"

Response	Baseline n=753	Last Wave(5/83) n-570	Control n=226
Dirty water	25.1 1/	28.2 2/	24.0
Sunken fontanel	0.6	1.2	1.4
Ojo	0.3	0.2	-
Empacho	4.3	1.4	0.4
Worms	21.0	36.9	35.4
The rains	0.7	-	-
Amoebas	1.2	1.6	3.1
Other and Combinations	45.2	30.2	33.6

CAUSEDCC

1/ The difference between baseline and last wave is not significant.

2/ The difference between the last wave and the control group is not significant.

Table II-13 Health beliefs among women in sample and control groups

Item	Baseline n=753 1&2/81	Post n=570 4/83	Control n=226 5&6/83
Diarrhea can cause death	98.8%	98.9	99.6
Do worm movements in the body cause diarrhea?			
Yes:	87.6	90.9	91.2
No:	6.0	7.4	7.1

INFO,DIAR: CANDIEC,MORALCC,MOVECC,MOVTCC
MOVMTWCC,RDWRMSC,WORMSCC

the question by a series of humorous radio spots which used worms as characters in making a point about sanitation and diarrhea. However, the masking of the change by the change in the "others and combinations" category makes it impossible to conclude that a change really took place.

What the women's answers do show is that women named a variety of causes of diarrhea which are both cosmopolitan and folk in origin. Answering "dirty water" probably indicates an understanding of unsanitary conditions and is categorized as a cosmopolitan belief. Answering "worms" may indicate that many women may attribute diarrhea to parasites or to traditional causes. Ethnographic data revealed that some rural women believe that certain kinds of diarrhea are brought on by conditions related to the human maturation process, by envy or anger, or other non-cosmopolitan causes, and feel that cosmopolitan medicine does not help or cure this diarrhea. The child is better off being taken to a folk healer or treated at home. On the other hand, they also identified dirty water as a cause of diarrhea, and recognized the link between sanitation and health.

The traditional medical beliefs held about the causes of diarrhea among rural Hondurans were not extensively dealt with by the implementation campaign, and changing the traditional beliefs was not a direct objective. Worms were discussed in one campaign radio spot, but the subject in the message remained within a traditional context and merely used the worm concept as a way to pass on cautions about dirty water and contaminated food. The aim of the spot was not to attack the traditional belief.

The traditional perceived causes of diarrhea besides worms - - ojo, empacho, and sunken fontanels - - were not often given as answers when mothers were asked what causes diarrhea. It is possible that women were cautious about naming traditional causes at first, and then became more at ease with the interviewers and were more apt to discuss their traditional medical ideas. Overall, though, it looks as if women ascribe diarrhea to both cosmopolitan and traditional causes and these beliefs were not shifted by the campaign. The percentages shown on Table II-13

support this. The questions in these evaluation instruments were worded in an agree/disagree format, and virtually the entire sample of women agreed that diarrhea can cause death. A slightly lower percentage agreed that worm movements in the body can cause diarrhea.

A more thorough discussion of the Mass Media and Health Practices Evaluation's findings on Honduran folk medical beliefs are presented in another MMHP project report ("The Process Evaluation in Honduras") and in two articles by Carl Kendall, Ph.D., who was the evaluation field director.

(2) Response to Illness

The findings from the first year indicated that mothers have ideas about causes and cures of diarrheal disease, and that the task set before the implementors was to offer new information in a constructive and clear manner. In two of the evaluation's questionnaires, interviewers asked parents "how do you know when a child has diarrhea?" The results are shown on Table II-14. They clearly indicate that stool appearance was the most frequently described symptom, and that the percentage of people identifying it increased from 50.2 percent prior to the beginning of the campaign to 71 percent two years later..

The idea that a child sick with diarrhea should be on some sort of special diet ("dieta") was popular prior to the beginning of the campaign (80.9 percent in Jan/Feb 1981) and became more so during the campaign with 88.0 percent of the sample agreeing by April 1983. In addition, the control group also understood this - - 89.3 percent felt a regimen was needed. There is evidence (reported later in the Feeding During Diarrhea section of Chapter 3) that the definition of the feeding regimen changed as a result of the campaign. Thus the change measured in this variable represents both an increase in absolute level and a change for the better in the type of regimen applied.

Table II-14 Response to question "How do you know when a child has diarrhea?

Response	Baseline Survey 1&2/81 (n=753)	Last Wave 5/83 (n=570)	Control 5/83 (n=226)
Stomach ache	11.2%	6.2%	13.5%
Stool appearance	50.2 1/	71.0 2/	82.7
Lack of appetite	3.2	6.6	0.9
Combination	12.1	6.0	0.4
Other	22.3	5.2	1.3
Dont' Know	0.9	0.2	-

DIAR:SIGNOFDC
INFO:KNOWSCC

1/ The difference between the baseline and the last wave is significant, $p < .001$

2/ The difference between the last wave and the control group is significant, $p < .001$

Prior to the beginning of the campaign, the sample was evenly split between feeding the child in a special way just until the diarrheal bout was over (24.4 percent), for 2-3 days after the bout (19.8 percent), or for 3-6 days after the bout had ended (27.6 percent). At the end of the campaign in 1983, more people felt that the special regimen should continue 2-3 days after the bout (40.9 percent) or even 3-6 days afterwards (33.1 percent). Table II-15 shows the complete percentages among the sample and control groups. Other responses to a child's illness include not bathing a child. Although there were no campaign messages on this issue, the percentage saying that a child should not be bathed during a diarrheal bout dropped from 71.0 percent prior to the radio campaign to 63.3 percent at the end of the campaign.

The percentage of parents using purgatives to treat their child's diarrhea dropped during the course of the campaign. Table II-16 shows the percentage of people who used various kinds of laxatives and purgatives, and also the percentage who claimed that they didn't give any purgatives. The differences between the figures on giving no purgatives for the baseline and post wave groups is significant (chi-square = 3.99, df=1, $p < .05$), and the percentage of people in the control group choosing not to give a purgative was even higher - - 39.8 percent. Figure II-6 graphs the use of any laxative versus no use of laxatives in the sample and control groups.

Thus, there was some improvement in the response to a child's diarrheal episode that can be directly related to the campaign's message content. More parents agreed that children should be given special care during and after a diarrheal bout. Fewer purgatives were being administered to children with diarrhea, and parents identifed symptoms of diarrhea with somewhat more accuracy.

Table II-15 Response to illness among sample and control group women

	Baseline n=753 1&2/81	Post n=570 4/83	Control n=226 5/83
Should a child who has diarrhea be on a special diet regimen?			
Yes:	80.9%	88.0	89.3
No:	19.1	11.8	10.7
How long is the diet regimen continued?			
Until bout is over	24.4	12.2	18.6
2-3 days after bout	19.8	40.9	47.5
3-6 days after bout	27.6	33.1	28.9
A few weeks	3.1	9.9	3.4
Do you bathe children who are on a diet regimen? Yes:	21.5	33.0	28.4
No:	71.0	63.3	65.3

INFO:DIETACC,BATHCC,BATHEC,DIETMCC

Table II-16 Response to question "What purgatives do you give to a child who has diarrhea?"

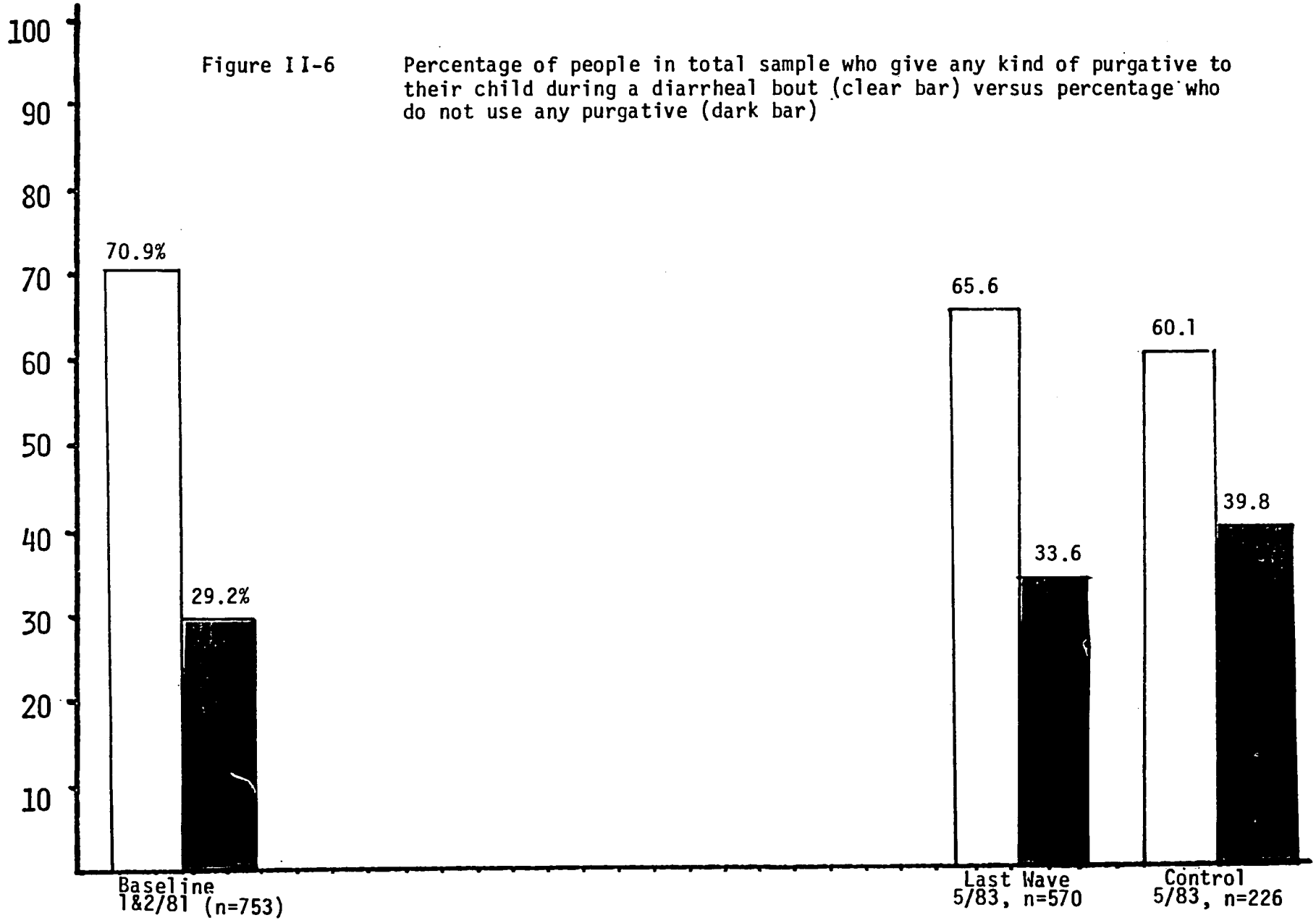
Response	Baseline Survey 1&2/81 (n=753)	Last Wave 5/83 (n=570)	Control 5/83 (n=226)
Laxol	9.5%	7.2	12.8
Magnesia	14.9	13.0	9.7
Bismuto	9.8	22.0	24.8
Oils	9.5	4.2	1.3
Other	27.2	19.2	11.5
Give no purgative	29.2	33.6 1/	39.8 2/

DIAR:PURGTVEC
INFO:PURGACC

1/ The difference between the baseline and the last wave is significant, $p < .05$

2/ The difference between the last wave and the control group is not significant.

Figure II-6 Percentage of people in total sample who give any kind of purgative to their child during a diarrheal bout (clear bar) versus percentage who do not use any purgative (dark bar)



DIAR,INFO:PURG

(3) Learning from the Campaign's Messages

In this section, the changes in knowledge related to campaign content are discussed. Knowledge changes were measured in a variety of ways, including unaided recall items, recognition items, completion items, agreement items, and corollary evidence, such as familiarity with characters and slogans from the campaign. The use of different measures is intentional, and is done to provide protection from any possibility that bias might be introduced by a specific type of question. When measures of different types are all seen to trend in the same direction, they are said to converge. Such convergence, when it occurs, strengthens the inference that real change is taking place and that it is being captured by the measurement items.

This section presents knowledge measures organized around campaign symbols (such as characters or jingles) and concepts (such as Litrosol and dehydration).

a. Dr. Salustiano

Dr. Salustiano, a fictitious radio personality, was the primary character in most of the implementation radio spots. The project began airing spots featuring Dr. Salustiano during the first phase of its campaign, March to June 1981. Over the five phases of the radio campaign, about twenty-one spots featuring either Dr. Salustiano or other characters discussing what he taught were aired. In the first eighteen months of the radio campaign, Dr. Salustiano spots were broadcast a possible total of 24,067 times on local and national radio stations. The breakdown of the number and frequency of the spots is as follows:

Phase No.	Date	# of Spots	# Times Broadcast
1	Mar-June 1981	2	738
2	June-Oct. 1981	7	7,752
3	Oct.1981-Mar.1982	3	5,263
4	May-Oct. 1982	5	10,314
			24,067
5	Oct. 1982-Mar.1983	4	(unknown)

The women in the sample achieved a high recognition of Dr. Salustiano during the campaign. Table II-17 shows the percentage of women who replied that they had heard spots with Dr. Salustiano.

The percentages indicate that awareness of Dr. Salustiano was extremely high during the first four phases of the radio campaign (up to October 1982). The control group, which received the same radio coverage on the national stations, but not necessarily on the local stations, over the life of the campaign shows lower recall among the women, as does the Post wave group. This may be because when the post wave and control groups were administered the questionnaires, the radio messages of the PROCOMSI project had a new emphasis, a breastfeeding radio course, AMA-MAS. Dr. Salustiano may not have had the same level of prominence in this campaign.

Mothers in the study were asked twice more, in an unaided recall test, to describe the topics Dr. Salustiano talked about. The results are shown on Table II-18 and Figure II-7.

The data for this analysis are reported in two ways, as a percentage of all mothers (coverage) and as a percentage of mothers who heard any spots of Dr. Salustiano's (relative accuracy of recall). The first figure shows how much impact one was having on the entire population; the second gives a more sensitive measure of how well things were working with mothers

Table II-17 Percentage of all women in sample who say they have heard a radio spot featuring Dr. Salustiano

Wave 1 8/81	Wave 2 4/82	Wave 3 8&9/82	Wave 4 2&3/83	Post 4/83	Control Group 5&6/83
59.0% 193/327	64.2 183/285	78.6 231/294	83.8 [1] 238/284	78.4[2] 280/357	69.4 159/229

RECG:DRSALUST

[1] The difference between Wave 4 and the Post wave is not significant.

[2] The difference between the Post wave and the Control Group is significant, $p < .02$.

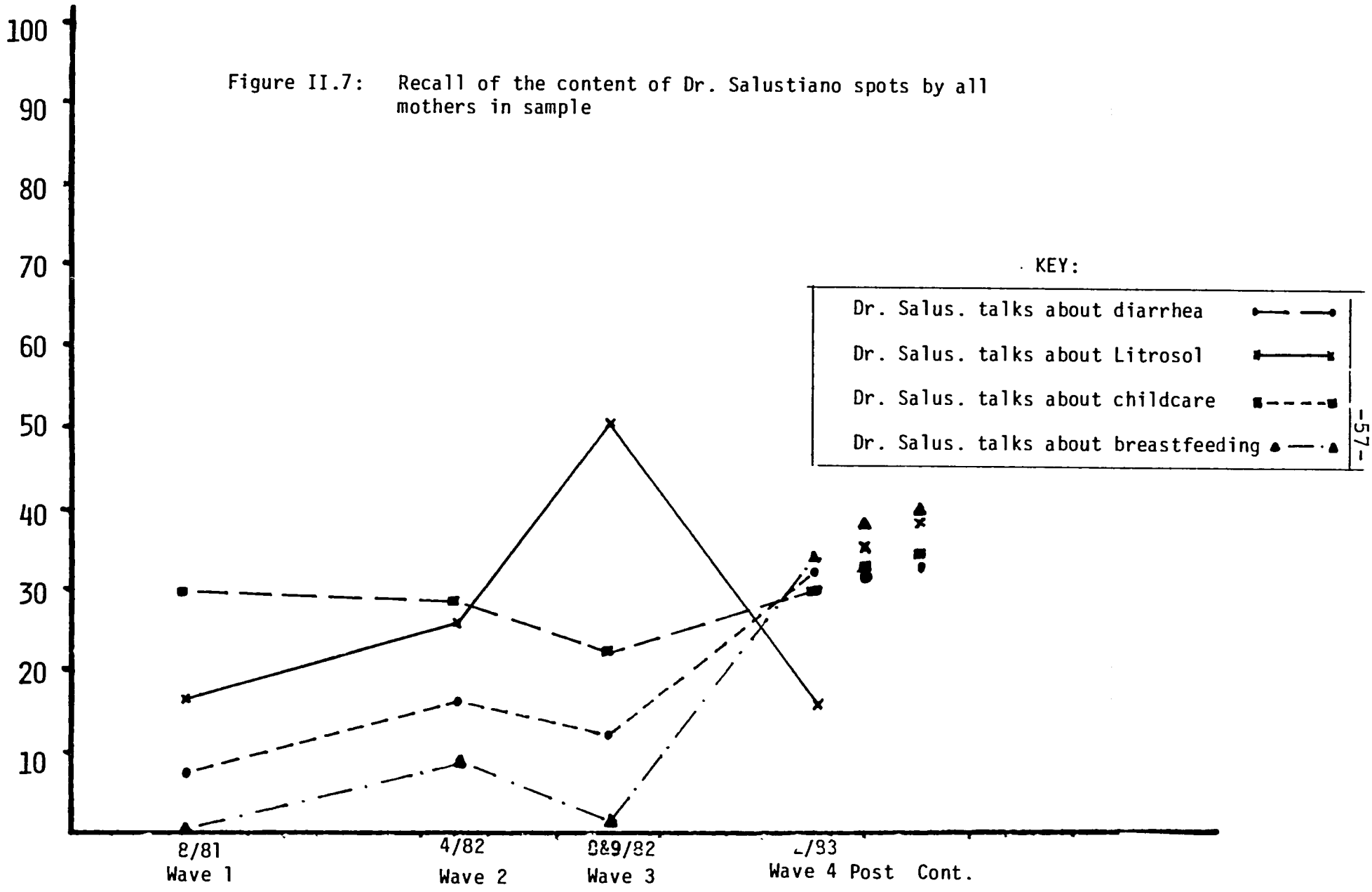
Table II.18 Recall of the content of the Dr. Salustiano radio spots by all mothers in sample, and by those mothers who claim to have heard Dr. Salustiano spots.

Dr. Salustiano talks about:	Percent accurately describing the message content at: Wave 1 n=327 8/81	Wave 2 n=285 4/82	Wave 3 n=294 8&9/82	Wave 4 n=284 2&3/83	Post n=357 4/83	Control n=229 5/83
Diarrhea	29.1%	27.7	22.4	29.2 1/	33.1 2/	34.5
Litrosol	16.5	25.3	50.3	24.3 3/	35.0 4/	38.9
Child care	7.6	15.1	11.9	31.3 1/	33.1 2/	33.2
Breastfeeding	0.3	8.1	1.7	34.2 1/	38.4 2/	39.7
Recall of content by mothers claiming to have heard the Dr. Salustiano spots:						
	(n=193)	(n=183)	(n=231)	(n=238)	(n=280)	(n=159)
Diarrhea	49.2	43.2	28.6	34.9	42.1	49.7
Litrosol	28.0	39.3	64.1	29.0	44.6	56.0
Child care	13.0	23.5	15.2	37.4	42.1	47.8
Breastfeeding	0.5	12.6	2.2	58.0	48.9	57.2

Note: DRSALUST,DRSBRSTT,DRSDIART,DRSCARET,DRSLITRT:RECG

1/ The difference between Wave 4 and Post is not significant.
2/ The difference between Post and Control is not significant.
3/ The difference between Wave 4 and Post is significant, $p < .001$
4/ The difference between Post and Control is significant, $p < .05$

Figure II.7: Recall of the content of Dr. Salustiano spots by all mothers in sample



RECG

who had definitely been exposed to the campaign. The levels of reported topics accurately reflected the current emphasis of Dr. Salustiano's messages. For example, when the AMA-MAS campaign was active in the spring of 1983, breastfeeding responses jumped from negligible levels to about fifty percent of mothers who reported they had heard any Dr. Salustiano spots.

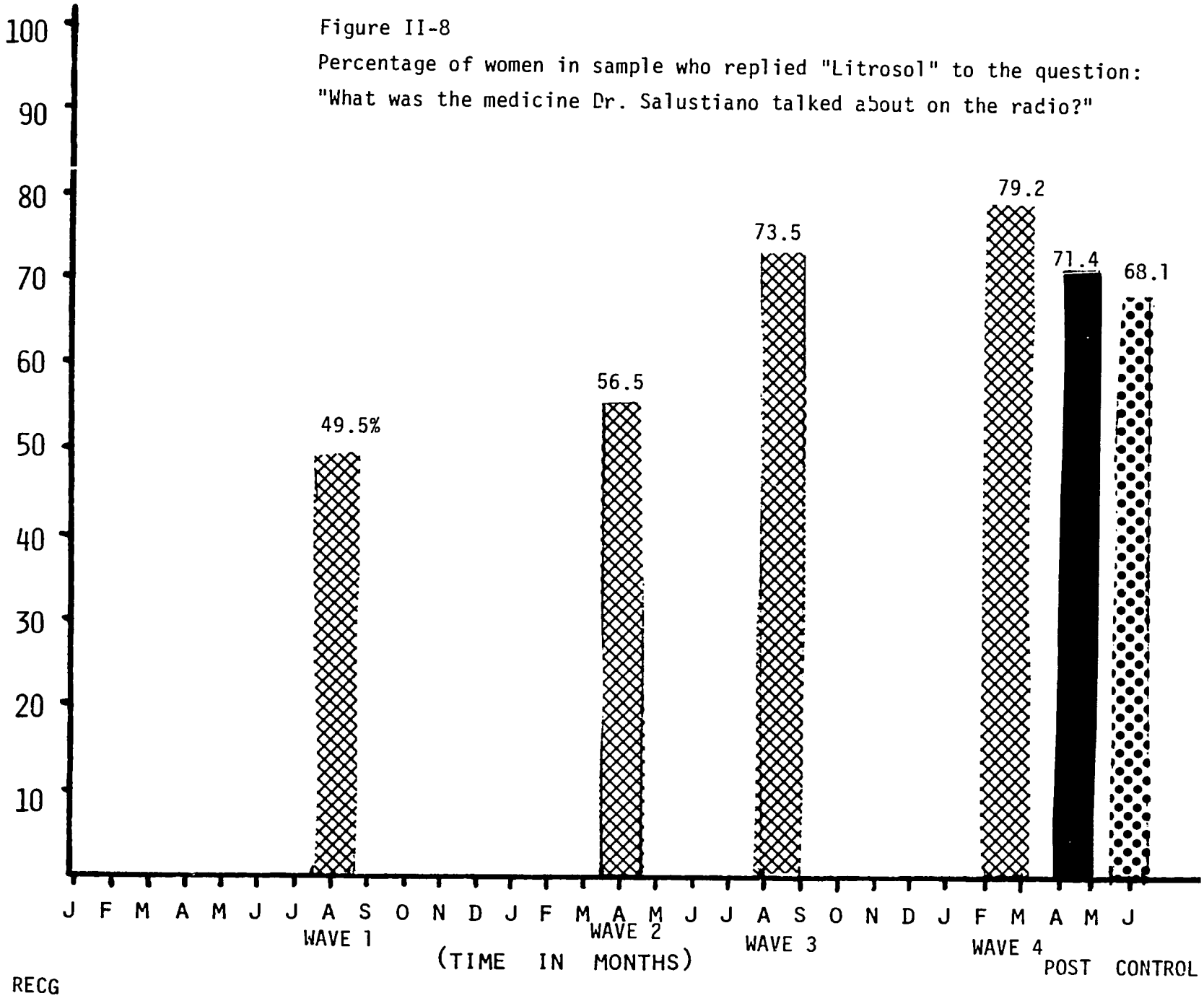
Similarly, in the lower half of Table II-18, note that in wave 3 recall of Dr. Salustiano's spots on Litrosol shot up dramatically among the women who say they've heard any Dr. Salustiano spot. The third wave coincided with Phase 4 of the radio campaign, in which great emphasis was placed on proper Litrosol administration. Figure II-8 illustrates the increase in the percentage of women correctly identifying Litrosol as the medicine Dr. Salustiano talked about. This item was not an unaided recall question as were the items in Table II-18.

Ethnographic evidence from the beginning of the campaign showed that dehydration was a concept that rural Honduran women appeared to have little or no understanding of. In several radio spots, the Dr. Salustiano character discussed dehydration and ways to identify it. In an unaided recall test, women were asked to describe what Dr. Salustiano says about dehydration. Table II-19 shows the percentage of women over time who could recall correctly the content of the dehydration spots. Two-fifths of the women who had heard any Dr. Salustiano spot in the first wave recalled him saying that dehydration causes death. This number dropped in the second wave (but not a significant amount), and then went back up again during the third and fourth waves. The women in the post wave group had a much lower recall of this message. Repeated interviews in waves one through four may have caused a higher overall awareness for Dr. Salustiano's messages, or, the content of the spots being broadcast may have changed by the time the post wave women were interviewed.

The message "Litrosol prevents dehydration" was received loud and clear among women who had heard Dr. Salustiano's spots, and the percentage remembering this message increased over time from 26.9 percent in the first wave to 48.2 percent in the post

Figure II-8

Percentage of women in sample who replied "Litrosol" to the question: "What was the medicine Dr. Salustiano talked about on the radio?"



RECG

Table II-19 Percentage of women who claim to have heard the Dr. Salustiano spots who can recall the content of the spots about dehydration.

Dr. Salustiano says:	Wave 1 8/81 (n=193)	Wave 2 4/82 (n=183)	Wave 3 8&9/82 (n=231)	Wave 4 2&3/83 (n=238)	Post 4/83 (n=280)	Control 5/83 (n=159)
Dehydration causes death	41.5%	33.3	45.5	46.6	29.3	33.3
Litrosol prevents dehydration	26.9	40.4	44.6	42.4	48.2	52.8
Lack of liquids causes dehydration	6.7	12.0	7.8	11.7	16.4	12.6
Dehydration is caused by diarrhea	2.1	13.7	8.2	22.7	24.3	31.4

RECG:DEHYDEDT,DEHYSOLT,DEHYLIQT,DEHYDIAT

wave and 52.8 percent in the control group. The other two messages, "Lack of liquids causes dehydration" and "Dehydration is caused by diarrhea", seemed to be more difficult for the women to understand. The figures do show some gain in the fourth wave. The concept of dehydration will be more thoroughly discussed later in this chapter.

Hence, the Dr. Salustiano radio character seems to have been a highly effective means for getting Litrosol and dehydration messages across to mothers.

b. Dona Chela

Another radio character used to promote the use of Litrosol and other health behaviors was Dona Chela. Her character was featured in about four radio spots. Overall, Dona Chela achieved less recognition than Dr. Salustiano. Still, over a third of all the women in the first wave (38.8 percent) recognized her name, and by the second wave 46.0 percent knew of her, and in the third, 59.9 percent.

Table II-20 shows the recall of content of the Dona Chela spots over three points in time. The biggest gain appears to have been in remembering the childcare spots. The gains are significant at the $p < .001$ level between the first and third waves.

The Dona Chela spots were eventually dropped from the broadcasts as a result of lackluster reception in the formative evaluation of messages carried out by the implementation contractor. When the spots were dropped, the items were also dropped from the questionnaires, so measurements do not extend beyond the third wave.

Table II.20 Recall of the content of Dona Chela's radio spots at three points in time*, by all mothers in sample, and by just those mothers claiming to have heard the Dona Chela spots.

	Percent accurately describing the message content		
Dona Chela talks about:	Wave 1 (n=327) 8/81	Wave 2 (n=285) 4/82	Wave 3 (n=294) 8&9/82
Diarrhea	14.1%	14.4	19.7 1/
Child care	8.3	14.7	24.8 2/
Breastfeeding	6.7	10.2	5.8 1/
	Recall among those women claiming to have heard Dona Chela		
	(n=127)	(n=131)	(n=176)
Diarrhea	36.2	31.3	33.0
Child care	21.3	32.1	41.5
Breastfeeding	17.3	22.1	9.7

*Questions about the content of the Dona Chela radio spots were dropped in fourth wave, post measurement, and control group.

Note: DNCHELAT,CHEBRSTT,CHEDIART,CHECARET:RECG

1/ The difference between Wave 1 and Wave 3 is not significant.

2/ The difference between Wave 1 and Wave 3 is significant, $p < .001$

c. The Concept of Dehydration

The concept of dehydration was introduced in the radio campaign. It was a difficult concept for many women to grasp. Table II-21 shows the percentage of women correctly answering the question "What is dehydration?" The answer was considered correct as long as they mentioned fluid loss. The results indicate that over a third of the women in the sample grasped the concept well enough to define it. However, the percentage who learned its meaning did not increase over time.

Women were given an unaided recall question about what one should do to avoid dehydration. We examined these responses in two ways, first looking at the distributions of the responses, then looking at the distribution of mothers who gave correct responses. The frequency distribution of all the answers is documented in Table II-22. Forty-two percent of all responses in the first wave concerned giving liquids to avoid dehydration. This percentage dropped rapidly between the first and second waves, and about a quarter of all responses on the average dealt with giving liquids. The drop could be due to the fact that prior to the first wave measurement, giving liquids was emphasized in the radio campaign. After the first wave, the radio campaign changed its focus more toward giving Litrosol and breastfeeding.

Other answers such as taking the child to the guardian, sobadora, or alcalde auxiliar remained low throughout the campaign. The percentage of responses for doing something else hovered between 20 and 30 percent of all the responses, but was much lower in the control group.

Figure II-9 illustrates the percentage of responses for giving Litrosol, liquids and taking the child to the health center.

The percentage of women giving the correct answers to the question "What does one do to avoid dehydration?" are shown in Table II-23 and Figure II-10. The percentage saying that one should give Litrosol jumped between wave 1 and wave 3 (17.4

Table II-21 Percentage of women in sample who correctly answer the question "What is dehydration?"

Wave 1 8/81	Wave 2 4/82	Wave 3 8&9/82	Wave 4 2&3/83	Post 4/83	Control Group 5&6/83
37.9%	31.9	36.1	32.4	38.7	37.1
n=327	n=285	n=294	n=284	n=357	n=229

RECG:WATDEHYT

Table II.22: Distribution of all responses to questions given about what one should do to avoid dehydration.

To avoid dehydration...	Wave 1 n=237 (8/81)	Wave 2 n=335 (4/82)	Wave 3 n=322 (8&9/82)	Wave 4 n=410 (2&3/83)	Post Wave n=540 (4/83)	Wt. Avg.	Control n=364 (5/83)
Give liquids	42.2%	27.5	18.6	25.4	24.3	25.1	24.4
Give Litrosol	24.1	23.8	51.9	32.2	27.4	30.0	31.3
Take child to health center	10.1	12.5	10.2	14.1	16.5	12.7	22.0
Take child to guardian de salud	0.8	0.9	0.6	2.4	4.2	2.1	7.7
Take child to sobadora	0.4	0.9	0.3	0.2	2.4	1.0	1.9
Take child to alcalde auxiliar	0.0	0.6	0.0	0.2	1.9	0.7	1.4
Do other	22.8	30.7	18.3	25.4	23.3	23.5	11.3

RECG:GIVLIQT,GIVLITRT,TOCENTRT,TOGUARDT,TOSOBAT,TOALCALT,GIVOTHT

Figure II-9
Percentage of responses to question as to how to avoid dehydration.

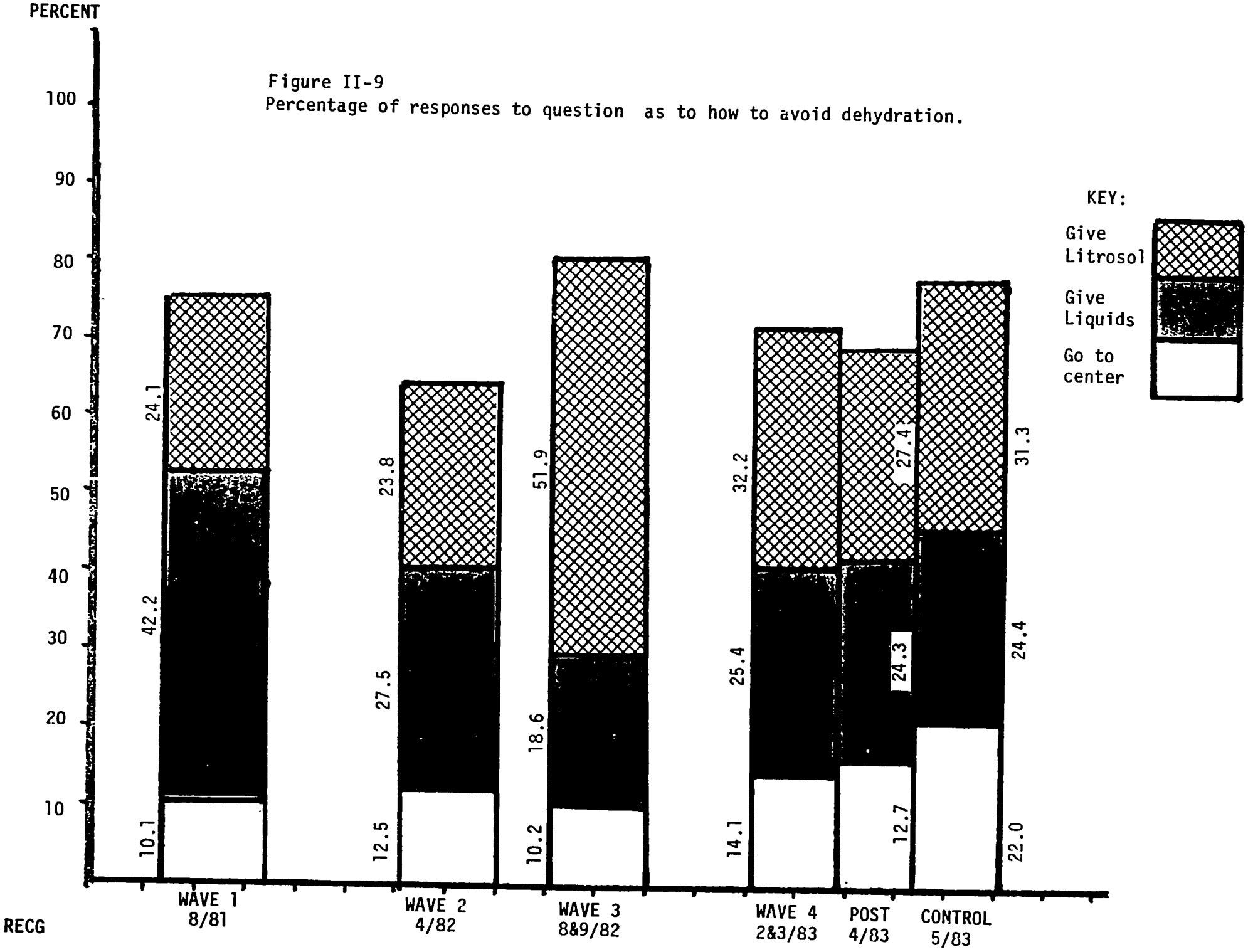


Table II.23 Percentage of women in sample giving the correct answers to the question about what to do to avoid dehydration.

	Wave 1 (n=327) 8/81	Wave 2 (n=285) 4/82	Wave 3 (n=294) 8&9/82	Wave 4 (n=284) 2&3/83	Post (n=357) 4/83	Control (n=229) 5/83
To avoid dehydration:						
Give liquids	30.6%	32.3	20.4	36.6 1/	36.7 2/	38.9
Give Litrosol	17.4	28.1	56.8	46.5 1/	41.4 3/	49.8
Take child to health center	7.3	14.7	11.2	20.4 1/	24.9 4/	34.9

Note: GIVLIQT,GIVLITRT,TOCENTRT:RECG

1/ The difference between Wave 4 and Post is not significant.

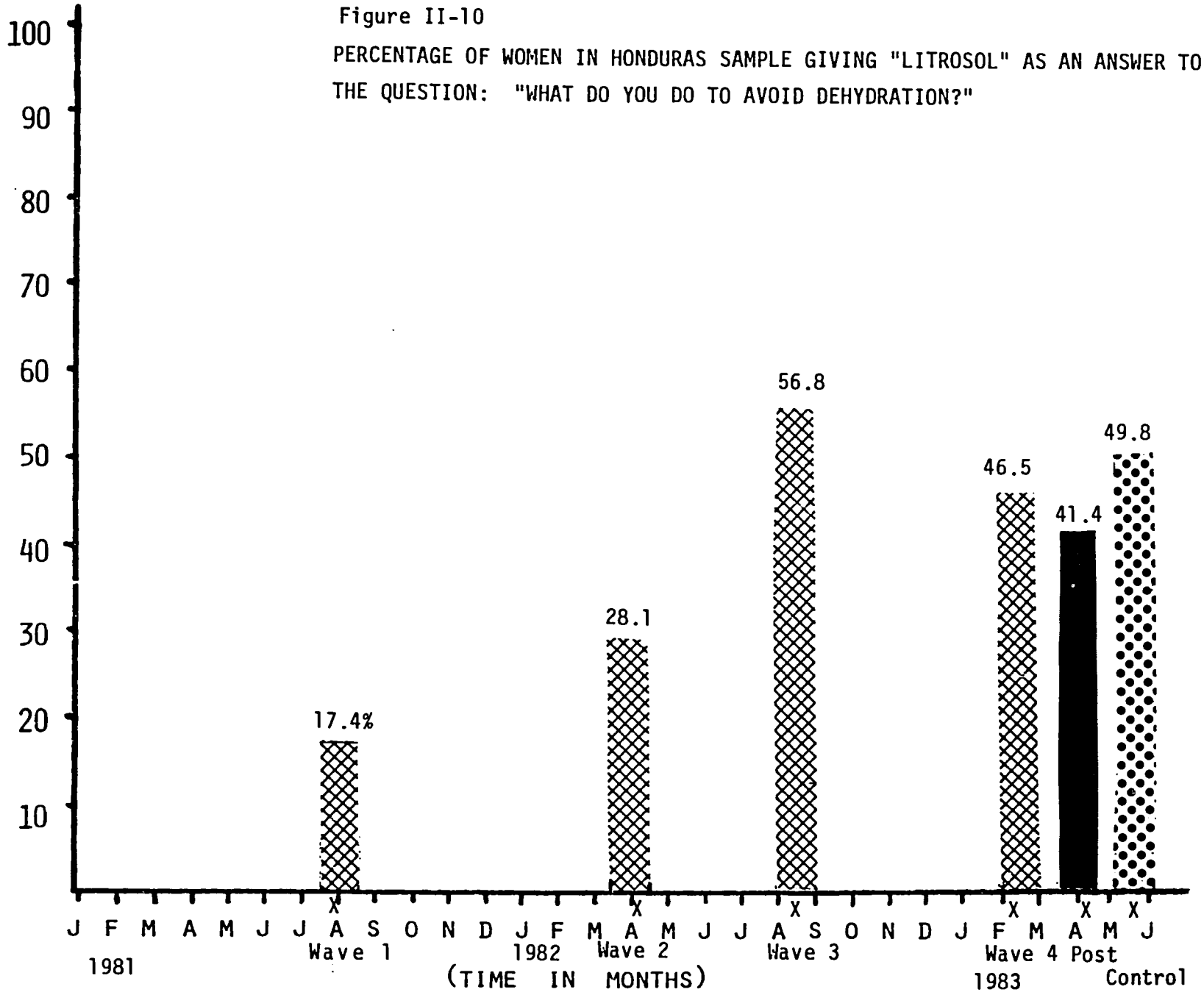
2/ The difference between Post and Control is not significant.

3/ The difference between Post and Control is significant, $p < .05$

4/ The difference between Post and Control is significant, $p < .01$

Figure II-10

PERCENTAGE OF WOMEN IN HONDURAS SAMPLE GIVING "LITROSOL" AS AN ANSWER TO THE QUESTION: "WHAT DO YOU DO TO AVOID DEHYDRATION?"



RECG:GIVLITRT

percent to 56.8 percent of all women in sample). This leap reflects the high frequency of radio messages being broadcast on the subject at this time. However, the numbers fell off a bit after wave 3, possibly due to forgetting, or because the Litrosol spots were being broadcast at somewhat lower frequencies. Still, about half of the women in the entire sample said that one should give Litrosol to avoid dehydration, and that reflects well on the implementation.

Thus, although women seemed to have difficulty with conceptualizing dehydration, they clearly understood the correct actions to take in response to it. Many of the women who answered incorrectly, indicated that they thought dehydration was malnutrition, a misunderstanding that is at least consistent with the promoted practices. The radio campaign succeeded in transmitting this complex, new concept to a fairly large proportion of the audience.

d. Knowledge about Breastfeeding

The implementors of the PROCOMSI project also created messages about breastfeeding. The evaluation began testing women about their knowledge of breastfeeding by first asking them what the best milk for a baby was. Table II-24 shows the percentages out of the total sample answering that human milk was the best milk. The greatest gains came between the first and second wave and remained consistently high. The post wave group showed a lower percentage than women in wave 4 (89.4 vs. 97.5), but the absolute levels of correct responding are extraordinarily high. The results show an impressive gain between the first and second waves, and a continuing high level throughout the remainder of the project.

Mothers in the sample were asked to name the benefits of breastmilk. Again, we examined the distributions of responses and also of mothers. Table II-25 shows the percentages of women in the total sample who successfully named the benefits of breastmilk. All the percentages for the responses rose between

Table II-24 Percentage of women in total sample who correctly answered that human milk was the best milk for an infant.

Wave 1 8/81	Wave 2 4/82	Wave 3 8&9/82	Wave 4 2&3/83	Post Wave 4/83	Control Gp. 5/83
61.2%	94.4	94.6	97.5	89.4*	90.0**
(200/327)	(269/285)	(278/294)	(277/284)	(319/357)	(206/229)

RECG:BESTMLKT

* The difference between Wave 4 and the Post wave is significant, p .001.

** The difference between the Post Wave and Control Group is not significant.

Table II. 25 Percentage of mothers correctly naming the benefits of breastmilk.

Benefits	Percentage of total sample successfully naming benefits of breastmilk					
	Wave 1 (n=327) 8/81	Wave 2 (n=285) 4/82	Wave 3 (n=294) 8&9/82	Wave 4 (n=284) 2&3/83	Post Wave (n=357) 4/83	Control (n=229 5/83
Is always there	2.1%	9.8	3.4	26.8 [4]	15.1 [5]	21.0
Don't need to buy it	17.1	28.8	20.7	33.5 [6]	16.5	26.2
Protects against illness	18.0	46.0	41.2	61.6 [7]	65.5 [1]	62.9
It's clean	0.9	12.6	9.2	32.4 [8]	39.2 [5]	47.6
Has more vitamins	15.3	39.6	51.4	66.5 [2]	55.2 [1]	55.5
Kids like it more	1.5	18.2	11.9	25.7 [3]	19.6 [1]	25.8

Note: RECG:ALWAYST,NOBYMLKT,ANTIILLT,ISCLEANT,MOREVITT,KIDLIKET

1. The difference between the post wave and control is not significant.
2. The difference between wave 4 versus post is significant, $p < .01$
3. The difference between wave 4 and post is not significant.
4. The difference between wave 4 and post is significant, $p < .001$
5. The difference between post and control is significant, $p < .05$
6. The difference between wave 4 and post is significant, $p < .001$
7. The difference between wave 4 and post not significant.
8. The difference between wave 4 and post is significant, $p < .05$

the first and second wave, and then fluctuated at higher levels than before. Most mothers felt that breastmilk protects a child against illness. This percentage went from 18 percent at the first wave to 65.5 percent in the post wave. The implication of this rise is that mothers identified breastmilk as a factor in keeping their children healthy, which would encourage them to breastfeed rather than bottlefeed. Other benefits that were perceived by more mothers over time included the idea the breastmilk "has more vitamins" and thus is healthy for the child, and "it's clean" - - a factor related to the mother's understanding of cleanliness.

The post wave and control group percentages were somewhat more varied. The post group women showed great similarities to the other sample women in their answers about breastmilk protecting against illness, that it is cleaner, and has more vitamins. Among the control group women, more women focused on the fact that breastmilk is cleaner than bottled milk, and one doesn't need to buy it. However, both the post wave and control group percentages were not markedly different than the numbers for the first four waves.

Table II-26 looks at the correct answers in a different way by showing the distribution of affirmative <u>responses</u> to the benefits of breastmilk. In this table, one can see that about a quarter of all the responses centered on breastmilk protecting a child against illness, and about another quarter of the responses on it having more vitamins. Again, there were variations from wave to wave, but the post and control groups do not differ markedly from the first four waves. The use of the numbers of correct responses as a proportion of total responses in the context of multiple responding gives a measure that reflects the richness of the mothers' understanding. The mothers who previously knew at least one correct response can still show improvement by giving more than one. The use of all correct answers thus shows to what extent people continued to learn.

The mothers' abilities to respond with the correct answers about the benefits of breastmilk were also measured as a

Table II. 26 Distribution of affirmative responses regarding the benefits of breastmilk.

Benefits	Wave 1 n=207 (8/81)	Wave 2 n=491 (4/82)	Wave 3 n=446 (8&9/82)	Wave 4 n=723 (2&3/83)	Post n=786 (4/83)	Weighted Average	Control n=560 (5/83)
Breastmilk is always there	3.4%	5.7	2.2	10.5	6.9	6.6	8.6
Don't need to buy it	27.1	16.7	13.7	13.1	7.5	13.3	10.7
Protects against illness	28.5	26.7	27.1	24.2	29.8	27.1	25.7
Breastmilk is clean	1.4	7.3	6.1	12.7	17.8	11.2	19.5
Has more vitamins	24.2	23.0	33.9	26.1	25.1	26.4	22.7
Kids like it	2.4	10.6	7.8	10.1	8.9	8.9	10.5
Other answers	13.0	10.0	9.2	3.2	4.1	6.5	2.3

RECG:ALWAYS,NOBYMLKT,ANTILLT,ISCLEANT,MOREVITT,KIDLIKET,OTHRANT

percentage out of all possible responses. The bar graph (Figure II-11) reveals that in the first wave only 9.2 percent of all the responses were labelled as accurate. By the second wave, the figure has risen to 25.8 percent, and by the fourth wave, 41.1 percent of all the responses were classified as correct.

Figure II-12 portrays the number of correct responses per woman about breastmilk benefits. Again, there was a dramatic rise over time in the number of correct answers per woman. The very high percentages for wave 4 women, the post group and control attest to the fact that many breastfeeding messages were being aired as part of the AMA-MAS breastfeeding course, a sub-project of the implementation's radio campaign.

Thus, it is very clear that women's knowledge levels about the benefits of breastmilk became far more accurate and extensive over time. The radio campaign was able to increase the population's knowledge about the connection between breastmilk and healthy babies.

Lastly, mothers were asked to agree or disagree on two statements about breastfeeding: (1) "In the first three or four months of an infant's life, only breastmilk should be fed to the infant" and (2) "mothers should give colostrum (first milk) to their infants." Table II-27 shows the proportion agreeing to the statements. The percentage of women agreeing to the first statement declined over the first three waves, perhaps as a result of the emphasis on other feeding messages. However, as soon as the AMA-MAS breastfeeding campaign begins, a very rapid rise occurs to levels that are much higher than the previous peaks.

The percent of mothers agreeing with the statement about colostrum was fairly high to begin with, 77.2 percent in the first wave, then fluctuated within a fairly narrow range through the post wave measurement when the effects of AMA-MAS can again be seen. In the post wave, the percentage agreeing was 79.8 percent which is significantly higher than wave 4 ($p < .05$). The control percentage was about equal with the post wave.

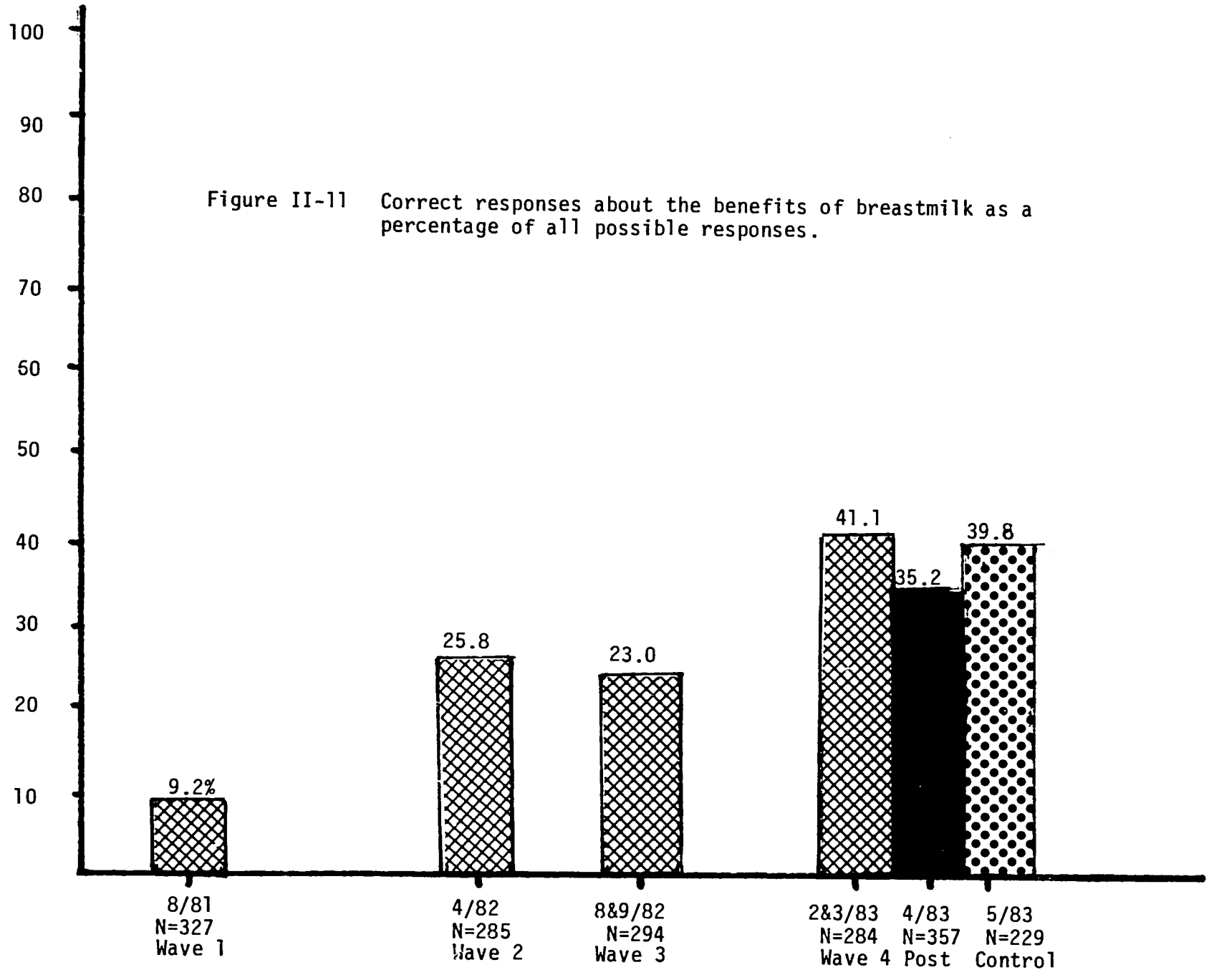


Figure II-11 Correct responses about the benefits of breastmilk as a percentage of all possible responses.

RECG

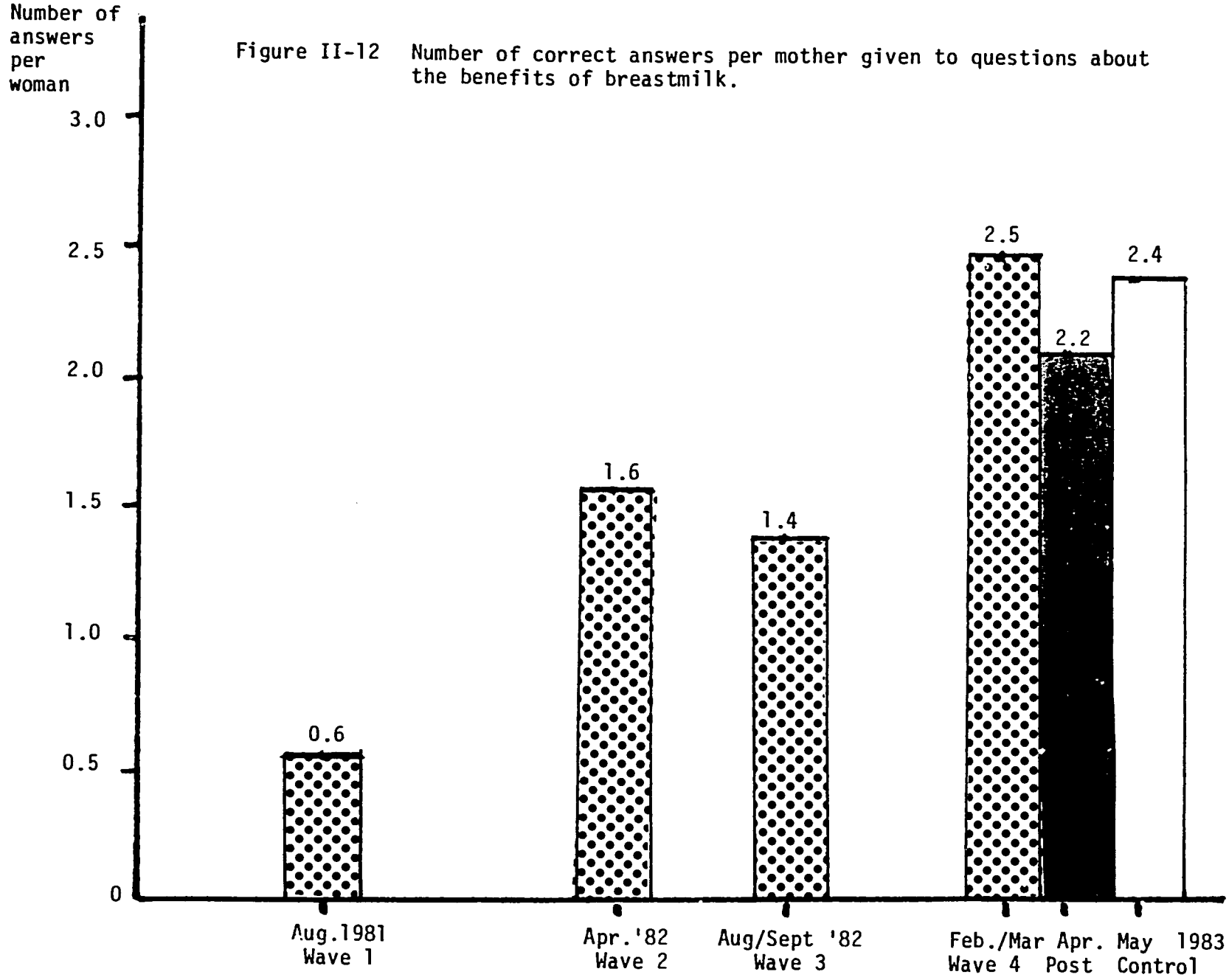


Figure II-12 Number of correct answers per mother given to questions about the benefits of breastmilk.

RECG

Table II-27 Percentage of women in sample who agree with statements about whether one should feed a child only on breastmilk in its first few months of life, and whether one should give the child colostrum.

Item	Wave 1 8/81 (n=327)	Wave 2 4/82 (n=285)	Wave 3 8&9/82 (n=294)	Wave 4 2&3/83 (n=284)	Post Gp 4/83 (n=357)	Control Group 5/83 (n=229)
Breastmilk only in first few months	55.4%	42.8	29.3	56.7	84.6	88.2[1]
Give colostrum to infant	72.2	64.6	72.4	71.8	79.8[2]	79.0[1]

RECG:BRSONLYT,COLGIVET

[1]The difference between the Post group and control is not significant.

[2]The difference between wave 4 and post group is significant, $p < .05$.

It seems clear that the breastfeeding messages had a strong effect on the women's knowledge levels. While about 65 percent of mothers were breastfeeding their children at the beginning of the evaluation's study (see Chapter III, Section B), it is probable that many of them were not clear on why breastmilk was good for their child. The radio messages offered clear reasons why breastmilk was good for an infant, and at the end of the campaign, many more women were equipped with accurate knowledge about breastfeeding and many more were breastfeeding their infants.

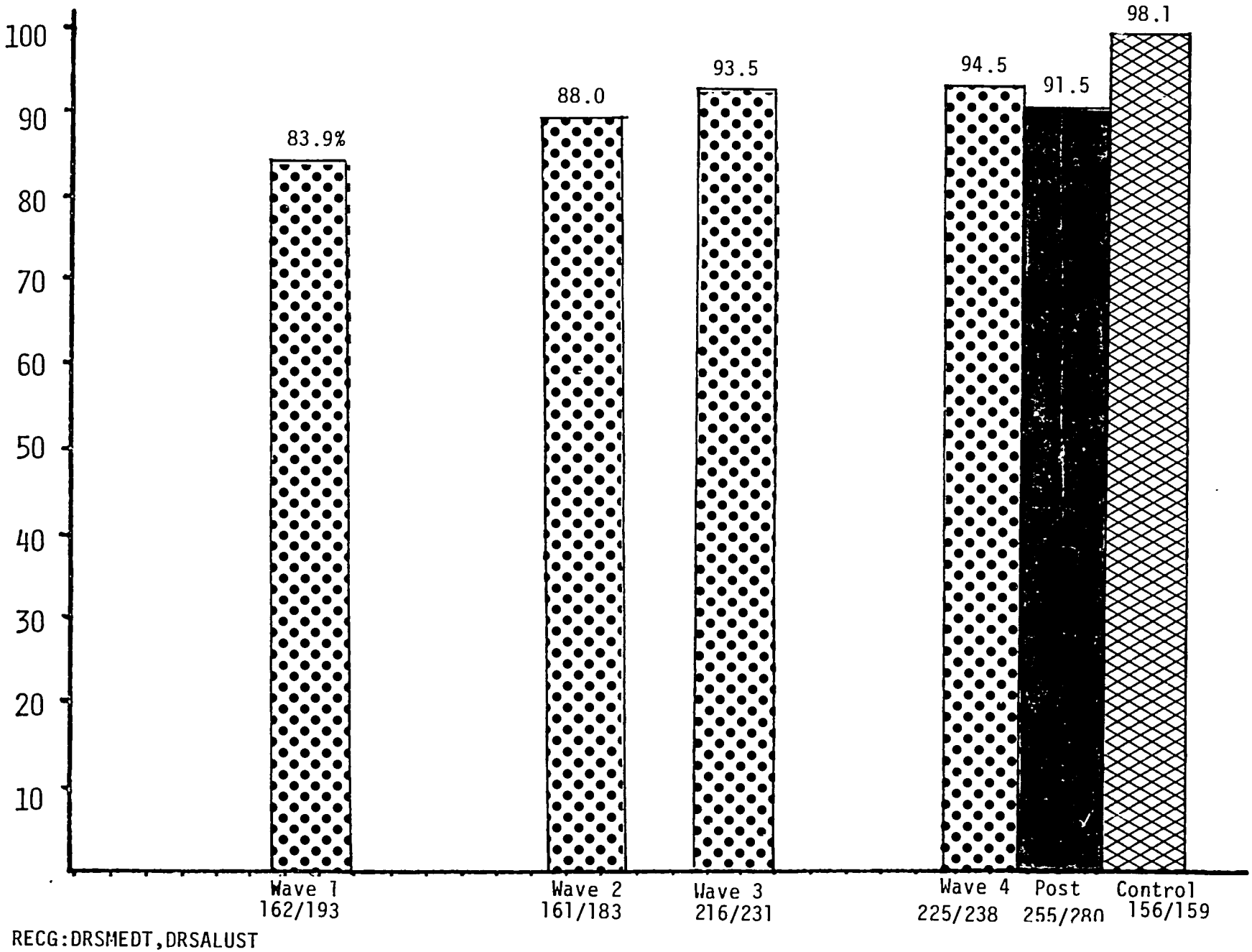
e. Knowledge about Litrosol

Women were questioned about Litrosol as part of the test of their ability to pick up health knowledge via radio. The subject of Litrosol and the behaviors needed to properly use it are discussed in Chapter III of this report.

An index of Litrosol knowledge showing the percentage of correct answers to a series of questions posed by the evaluation was developed. The questions that compose the index are listed in more detail in Section 4 of this chapter. The percentage of women correctly answering all the items started off high (52.0 percent) and rose to 66.9 percent, and dropped in wave 4 to 60.6 percent. Thus, even after many of the Litrosol spots had ceased being aired the women in the sample could correctly answer almost two-thirds of all the questions about Litrosol.

A name recall question was asked in a communication instrument administered in each measurement cycle. Referring back to Figure II-8, one can see the percentage of correct responses to the question "What was the medicine Dr. Salustiano talked about?" Over time, the answer ("Litrosol") gained a larger proportion of the answers, with between two-thirds and three-quarters being correct. Figure II-13 illustrates the percentage of mothers who heard any Dr. Salustiano spot who identified Litrosol as the medicine he was talking about. The percent of mothers who knew it was Litrosol was very high to begin with

Figure II.13: Percentage of mothers who heard a Dr. Salustiano spot who identified Litrosol as the medicine he mentioned.



RECG:DRSMEDT,DRSALUST

(83.9 percent in wave 1) and climbed slowly during the campaign and continued to do so after many spots were no longer being aired, as witnessed by the percent of women in the control group who knew the answer. Fully all of the women in the control group who knew of Dr. Salustiano knew that he talked about Litrosol. The percentages demonstrate that high frequency of broadcast and a high profile personality can be extremely important factors in getting messages across.

Table II-28 shows two other items related to knowledge about Litrosol. The women were asked to state why the product was called Litrosol. As the table indicates, about a third of all responses were correct until the fourth wave, when over half of all the responses were correct. In the post wave and control groups, the numbers are lower. There are several reasons why wave 4 shows such a gain, and why the post and control are lower. By wave 4, in addition to greater exposure to the spots, women who had been interviewed had had more practice just answering the questions, plus the messages may have become more salient because the women knew they probably would be asked about them again in the future. On the other hand, women in the post and control groups had never received this treatment; thus the radio messages, although obviously memorable to many of them, had less salience.

The third item in the table, how many soda bottles are needed to make a liter, also shows the heightened awareness among mothers who had been repeatedly interviewed combined perhaps with forgetting among post and control group women, who had not heard specific messages about Litrosol for a few months. However, just about two-fifths of the women in the post and control groups did know how many bottles it took to make a liter.

f. Radio Jingle Recognition

The implementation designed several catchy jingles that covered infant care, breastfeeding, and the need to give liquids

Table II.28 Awareness of Litrosol among women in sample: Percentage of correct answers

	Wave 1 n=327 8/81	Wave 2 n=285 4/82	Wave 3 n=294 8&9/82	Wave 4 n=284 2&3/83	Post Wave n=357 4/83	Control n=229 5/83
What was the medicine Dr. Salustiano talked about? (Litrosol)	49.5%	56.5	73.5	79.2 [2]	71.4 [1]	68.1
Why is it called Litrosol? (Uses a liter of water)	35.8	31.2	38.1	54.6 [3]	31.9 [1]	30.6
How many soda bottles are needed to make up a liter? (3 bottles)	53.8	43.9	58.2	56.3 [4]	39.5 [1]	38.0

RECG:DRSMEDT,YLTRSOLT,LITERST

1/ The difference between the post wave and control is not significant.
2/ The difference between wave 4 and post is not significant.
3/ The difference between wave 4 and post is significant, $p < .005$.
4/ The difference between wave 4 and post is significant, $p < .05$.

during diarrheal bouts. The evaluation tested mothers on this message recognition by having the interviewer recite all but the last line of the campaign jingle, and then seeing if the interviewee could complete the last line correctly.

Figure II-14 shows the average percent of correct responses for all four campaign jingles that were tested. Half of all responses in the first wave were correct, and rose to 56.0 percent by wave 4, versus 46.9 percent in the post group and 42.7 percent in the control. As with the knowledge levels on Litrosol, it is possible that women who were repeatedly visited by evaluation interviewers had a higher probability of knowing the correct answers just by being more aware of the campaign, while women in the post and control waves had less rehearsal of their responses.

In the post and control groups though the percentages are lower, two-fifths of the responses were correct. This is quite respectable considering that many of the messages had not been aired for quite a few months.

Table II-29 shows the percent of women from the total sample who correctly finished the jingles and also identified the Ministry of Public Health as the creator of the jingles. The radio messages had begun prior to the first evaluation measurement in August 1981, so that by the time the women were interviewed, many knew the jingles already, especially "give liquids during diarrhea" and "a true mother breastfeeds". Throughout the first four waves, mothers showed a remarkable ability in completing the jingles. The breastfeeding song was broadcast often and coverage extended all through the radio campaign, and the high percentages reflect the women's recall of it. The "give liquids during diarrhea" message was broadcast early in the campaign - - the post and control groups show lower percentages than the first four waves. However, the numbers are quite impressive; about half of all the women in both post and control groups were able to complete a jingle they probably had not heard on the radio in a long time.

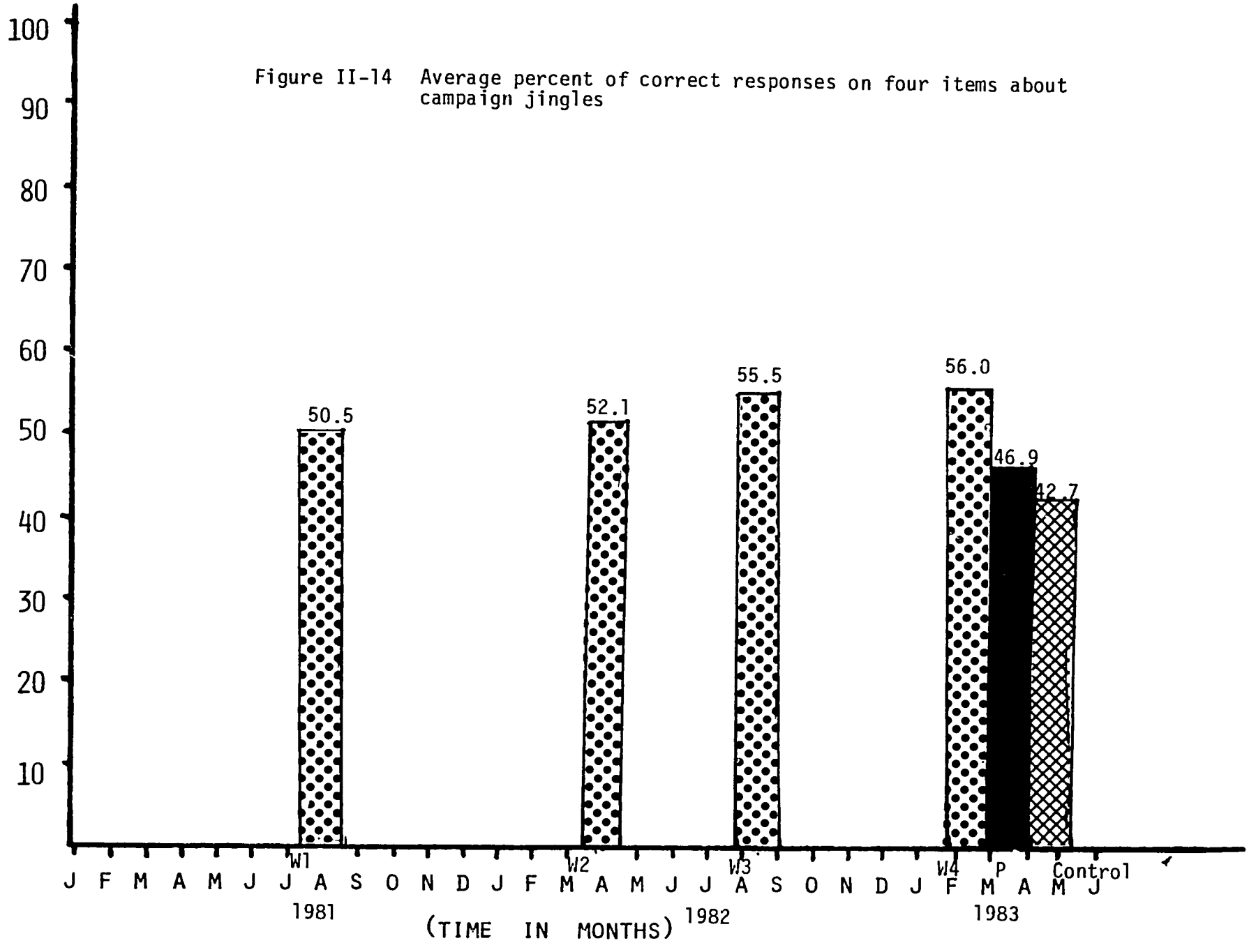


Figure II-14 Average percent of correct responses on four items about campaign jingles

Table II. 29 Percentage of women in total sample who were able to successfully complete jingles used in the campaign.

	Wave 1 (n=327) 8/81	Wave 2 (n=285) 4/82	Wave 3 (n=294) 8&9/82	Wave 4 (n=284) 2&3/83	Post (n=357) 4/83	Control (n=229) 5/83
Knows "give liquids during diarrhea" jingle	70.0	70.5	75.5	73.9 [1]	56.9 [2]	48.5
Knows " 'true' mothers breastfeed" jingle	65.4	69.5	74.1	83.1 [3]	82.9 [4]	71.6
Knows "infants need extra care" jingle	49.5	45.6	51.7	44.7 [1]	30.3 [2]	28.4
Can identify the Ministry of Health as the creator of the campaign jingles	16.8	22.8	20.7	22.2 [3]	17.6 [2]	22.3

Note: RECG:LIQDEADT,MOMTRUET,KIDCARET,CREATORT

1/ The difference between wave 4 and post is significant, $p < .001$
2/ The difference between the post wave and control is not significant.
3/ The difference between wave 4 and post is not significant.
4/ The difference between the post wave and control is significant, $p < .001$

Recognition of the Ministry of Public Health as the creator of the jingles was low in all waves, although it was mentioned at the end of the radio messages.

g. Conclusions

This review of learning of campaign information has demonstrated several points. One is that the absolute level of awareness of the campaign was extremely high. Variations exist across different topics and across time, but the main point is that people could name topics and characters, complete jingles, and answer knowledge questions about the campaign. This is a level of awareness that exceeds the impact of most commercial campaigns by a wide margin.

A second point is that knowledge levels about campaign topics rose quickly after the start of broadcasting and usually soon attained a plateau where only minor improvements were made. However, there is evidence that knowledge as measured by specific items began to decay soon after the messages were withdrawn. The relationship between aggregate indicators of knowledge and the timing and amount of broadcasting is explored more thoroughly in the next section.

A third point is that the knowledge levels were at high enough levels to consider the educational aspect of the campaign a strong success, and to focus the next step of the investigation on the question of what behavior changes occurred in the target population.

(4) Relationship Between Exposure and Message Retention

One of the critical pieces of information for the planners of communication-based campaigns has to do with how much, how often, and for how long they must broadcast their messages in

order to achieve and sustain knowledge levels. For this reason, a special analysis of the relationship between the intensity and duration of broadcasts of specific messages and the knowledge measures related to that specific content was undertaken. The purpose of the analysis was to investigate what happened in this campaign and to try to draw conclusions from it that might help other undertakings.

a. Structure of the Broadcast Plan

The PROCOMSI campaign set objectives in relation to the seasons and cumulative impact from current plus prior broadcasts. The messages were grouped into phases according to seasonally appropriate knowledge and behavior objectives.

Phase 1, March 1-June 26, 1981, was called the Enabling Phase. This phase of messages introduced the campaign and informed the audience of the existence of ORS. The messages were created to enable the mothers to recognize two main points: (1) the danger of their children dying from dehydration caused by diarrhea, and (2) the need to give their children more liquids when they have cases of diarrhea. At this point, the mothers became familiar with the previously unknown concept of dehydration and how to care for a child with diarrhea. They were also exposed to preventive health spots dealing with germ theory, special care for infants, and breastfeeding.

Phase 2, or the first Treatment Phase, coincided with the 1981 rainy season, and ran from June 26-October 26, 1981. In this phase, the ORS product, Litrosol, was introduced. Many radio spots were concentrated on what Litrosol was, where to get it, how and when to use it, and why it was important to give it to your child to stop dehydration. This phase was given over completely to introducing and reinforcing treatment behaviors related to ORT.

Once the rainy season was over, Phase 3, from October 26, 1981 to March 3, 1982, was dedicated to reinforcing prevention behaviors. The phase stressed continued breastfeeding while the

child suffered from diarrhea. The Prevention Phase reinstated the same messages used in the enabling phase, adding a jingle to each spot to stress that Litrosol saved babies from dehydration. The phase also included some treatment radio spots to insure proper use of Litrosol, and testimonial spots from mothers who had successfully used ORS. The Transition Phase, from March 3-May 3, 1982, further stressed the success and proper use of Litrosol by repeating the same treatment messages that were aired in Phase 3.

The second Treatment Phase was introduced in Phase 4 from May 3-October 3, 1982. These spots were created to coincide with the 1982 rainy season. They emphasized correct and continued use of Litrosol for all cases of diarrhea, the signs of dehydration, and getting your child to the health clinic in case of dehydration. Other spots were added to clear up some confusion discovered during the first year formative evaluation. Mothers were told that they should mix <u>all</u> the contents of the packet in an entire liter of water and that Litrosol <u>can</u> be given with other medicines.

Phase 5, from October 3, 1982 to March 30, 1983, was almost entirely dedicated to preventive behaviors. A breastfeeding course called AMA-MAS was offered to the mothers to promote breastfeeding and child weaning practices. Information about the number and distribution of Phase 5 radio broadcasts was not available for this analysis, although the breastfeeding analysis shows some of the impact of the AMA-MAS campaign.

The radio spots broadcast during the various phases were aired on both local and national radio stations. The stations were chosen based on the data collected during the investigative research. The research demonstrated which stations had the largest listening audience and overall appeal to the rural population. One implication of this is that the frequencies of broadcasts on local stations are not directly comparable to those on national stations because the audience size and listenership patterns are quite different.

The data available for the transmission frequencies and content of the PROCOMSI spots are attached as Appendix B, translated from material supplied by the Academy for Educational Development.

b. Procedure of the Analysis

In order to investigate the hypothesis that learning and behavior are related to the frequency of radio messages, we developed a methodology to measure and present this information in a concise and comprehensible manner.

This first task was to find some way to group the radio spots into measurable units. This was facilitated by the basic design of the program. PROCOMSI had grouped the spots into four different topics: Germ Theory, Special Care for Infants, Breast-feeding, and Dehydration/Litrosol.

The only change made to the original method of spot classification was to expand the four categories to five, making Litrosol a separate classification from Dehydration. This was done because the initial phase of radio spots deals only with dehydration and should not be included in an analysis of Litrosol use and related information. In order to measure the amount of change strictly related to Litrosol use and understanding, a separate analysis of this information was done.

Once all the radio spots were divided into five categories, a tally was made of the number of spots per topic that were broadcast in each of the first four phases. This tally summarizes the number of transmissions of radio spots on both local and national radio stations and the total number aired each phase by topic. This information is derived from the translation of AED's "Frequency of Radio Spots" document.

A standardized system for presenting the information was devised using histograms whose area represents the broadcasts of spots in every phase for each category. The histograms for each category displayed the information over the first four phases in the years 1981 and 1982 (see Figures II-15 to II-19).

To show the length of time the spots were broadcast, the x-axis was a linear representation of time and the y-axis represented the number of radio broadcasts over a specified period of time. The area within the histogram thus represents the total number of broadcasts during that time period, separated into national and local broadcasts.

The second task was the creation of indices of knowledge specifically related to the content of the spots. The radio spots created by AED were translated so that exact content of the messages could be determined. They were then categorized according to the previously mentioned five topics (1) Germ Theory, (2) Special Care for Infants, (3) Breastfeeding, (4) Dehydration and (5) Litrosol Use, and arranged by the phases in which they were aired. These spots were then numbered from 1 to 31 so that they could be referred to and represented in a systematic way on the graphs. (See Appendix B for copy of translation and groupings into topics.)

Next, each instrument from Stanford's surveys was examined and all the questions that evaluated behavior or knowledge change promoted by the radio spots were separated into the five existing categories. There was a considerable amount of variation in the number and types of questions asked about each topic. In addition, a question had to be asked in all four waves of the surveys in order to be included in the index. The types of questions varied from informational recall items to questions that evaluated behavioral change. The variability in types and structures of questions means that the index values for one topic are not comparable to each other, although the index values for the same topic <u>are</u> directly comparable across time. The values also have no absolute meaning, since the "difficulty" of component items varies. Hence the reader should pay attention only to the ways the index levels change over time.

The indexes for each of the five categories were calculated from the baseline data and four subsequent waves of survey data from the communication instruments. The waves of data are

numbered W-0, W1, W2, W3, and W4, representing the baseline, wave 1, wave 2, wave 3, and wave 4, respectively.

The values of the indexes for each wave were computed as weighted averages of correct responses for all the individual survey items that fell within the five previously mentioned categories. The averages of each item were weighted so that they would reflect the different number of respondents answering each survey question.

The results from this analysis are presented in the following graphs with a line graph of the index values superimposed on a histogram of the exposure. Both share a common x-axis, the time line. The y-axis shows the percentage value of the index, and the heights of the histogram bars are adjusted so that the area shows the total number of broadcasts.

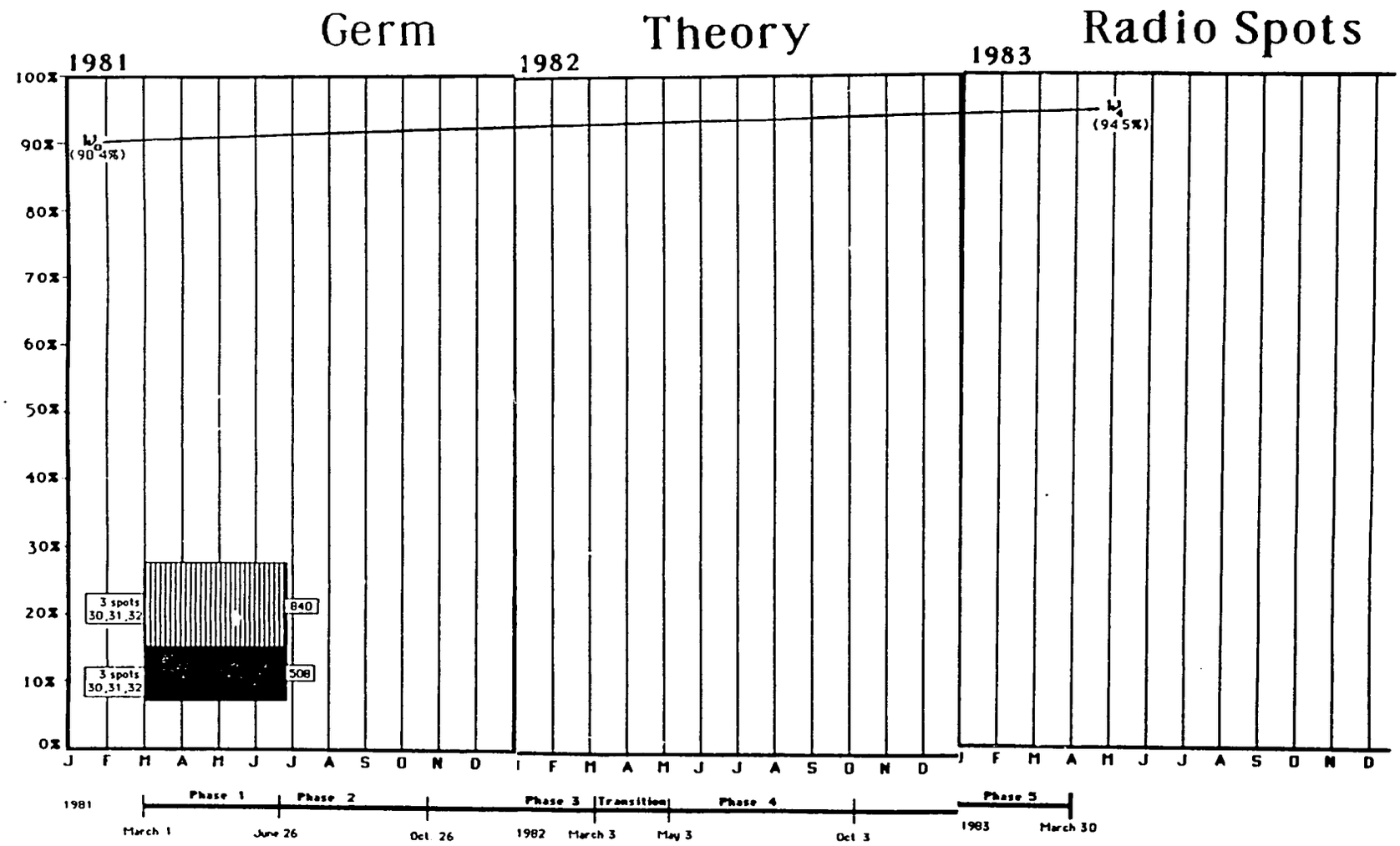
c. Results

The following are the calculated indexes of learning and behavior changes for the five different categories.

(i) Germ Theory

The index of germ theory items are distinctive in that there was only baseline (wave 0) and final sweep (wave 4) data collected about this topic. As can be seen on Figure II-15, the index of the baseline data demonstrates a high degree of pre-broadcast understanding of germ theory (90.4 percent) before the radio spots began. After the relatively small number of radio spots (840 local and 508 national) were aired, the index shows a small, but significant increase in knowledge to 94.5 percent. These increases in knowledge about germ theory are probably not influenced by the process of measurement, because there is a two-year gap between the only two measures. It is possible that the rate immediately after the period of broadcasts was even higher and has fallen back down to the wave 4 level after two years of no reinforcement.

Figure II-15



W = Percentage that answered yes to the questions:

"Can germs cause diarrhea?" (Spot 31)

"If germs live in water, does boiling the water kill them?" (Spot 31)

"Does washing your hands get rid of germs?" (Spot 31)

"Do worms live in filth (dirty things)?" (Spot 30)

Note: See the text in section b for instructions on how to interpret this and the following figures.

(ii) Special Care for Infants

Another category for which there were relatively few radio spots was that of Special Care for Infants. Looking at Figure II-16, you see that a small number of spots were broadcast on this topic (360 local and 153 national) in the first phase of the project. There is no pre-broadcast measurement available, since the content of the spots was not known in time for the baseline. By the first wave measurement, all the exposure (and presumably all learning) had already taken place. The stability of the measure over time indicates little or no forgetting of the information, and provide indirect evidence of the reliability of the measures. The lack of forgetting of message content over time is a little surprising, particularly since the amount of exposure to the messages was so limited.

(iii) Dehydration

There were many more radio spots carried about the topic of dehydration. As can be seen in Figure II-17, close to 3,000 radio spots were aired about dehydration in the first phase. The wave 1 data represented by the index were collected after the first round of broadcasts about dehydration, for the same reason as in infant care. Hence they do not show what is almost certainly a dramatic gain prior to wave 1. Other evidence indicates that knowledge of dehydration was virtually non-existent prior to the campaign.

The pattern demonstrated here is one of an implicit large gain from the first batch followed by steady but much smaller gains resulting from continuing broadcasts. The net change between wave 1 and wave 4 is eight percentage points, or an additional gain of about 25 percent over the wave 1 level.

(iv) Litrosol Use

Close to 24,000 radio spots were broadcast about the use, availability and administration of the Litrosol packets. This category had by far the greatest number of radio spots dedicated to it, while the second-ranked topic, dehydration, had only

Figure II-16

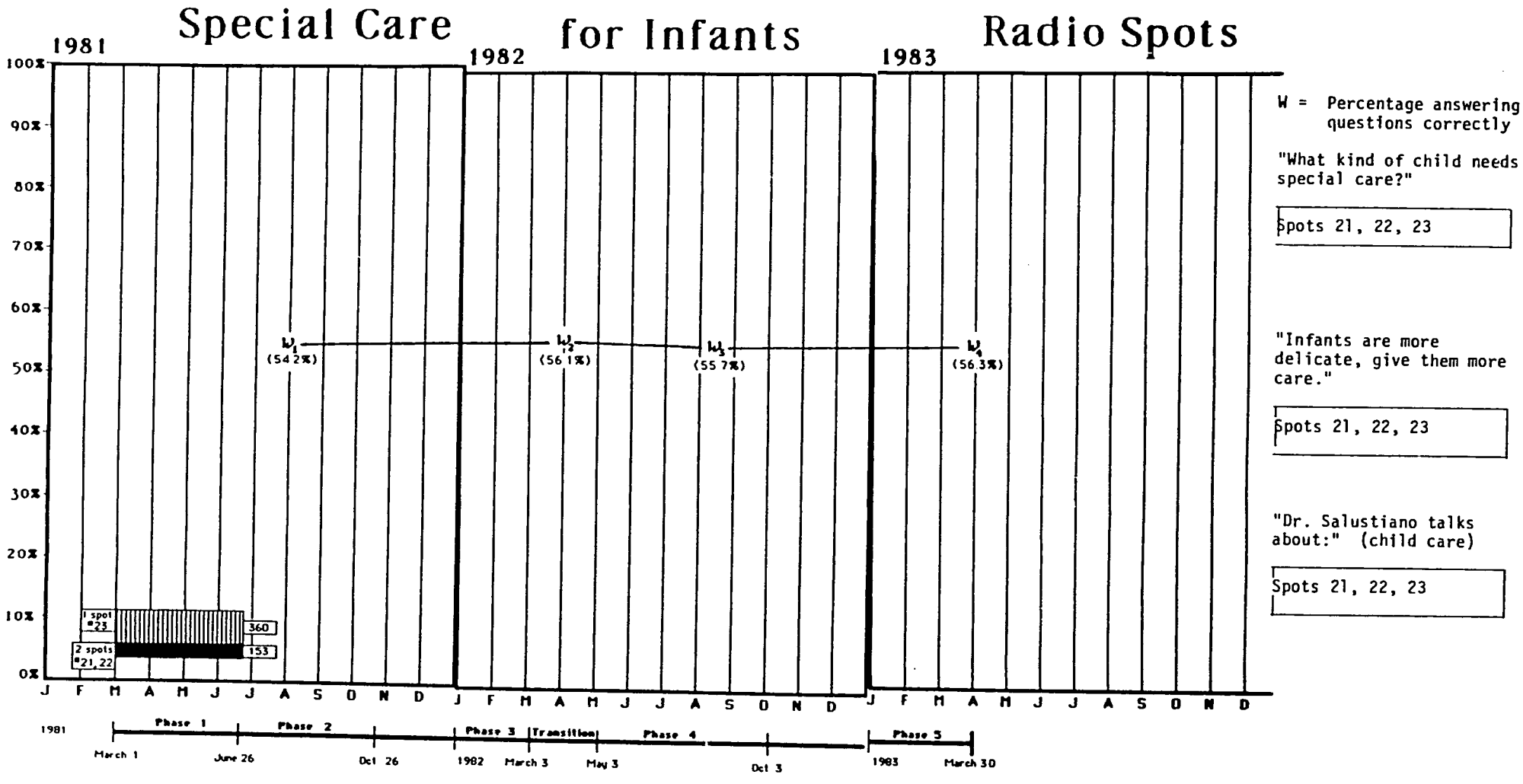

Special Care for Infants Radio Spots
1981
1982
1983
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
J F M A M J J A S O N D
J F M A M J J A S O N D
J F M A M J J A S O N D
(54.2%)
(56.1%)
(55.7%)
(56.3%)
1 spot #23
2 spots #21, 22
360
153
1981
Phase 1
Phase 2
Phase 3
Transition
Phase 4
Phase 5
March 1
June 26
Oct 26
1982
March 3
May 3
Oct 3
1983
March 30
W = Percentage answering questions correctly
"What kind of child needs special care?"
Spots 21, 22, 23
"Infants are more delicate, give them more care."
Spots 21, 22, 23
"Dr. Salustiano talks about:" (child care)
Spots 21, 22, 23

Figure II-17

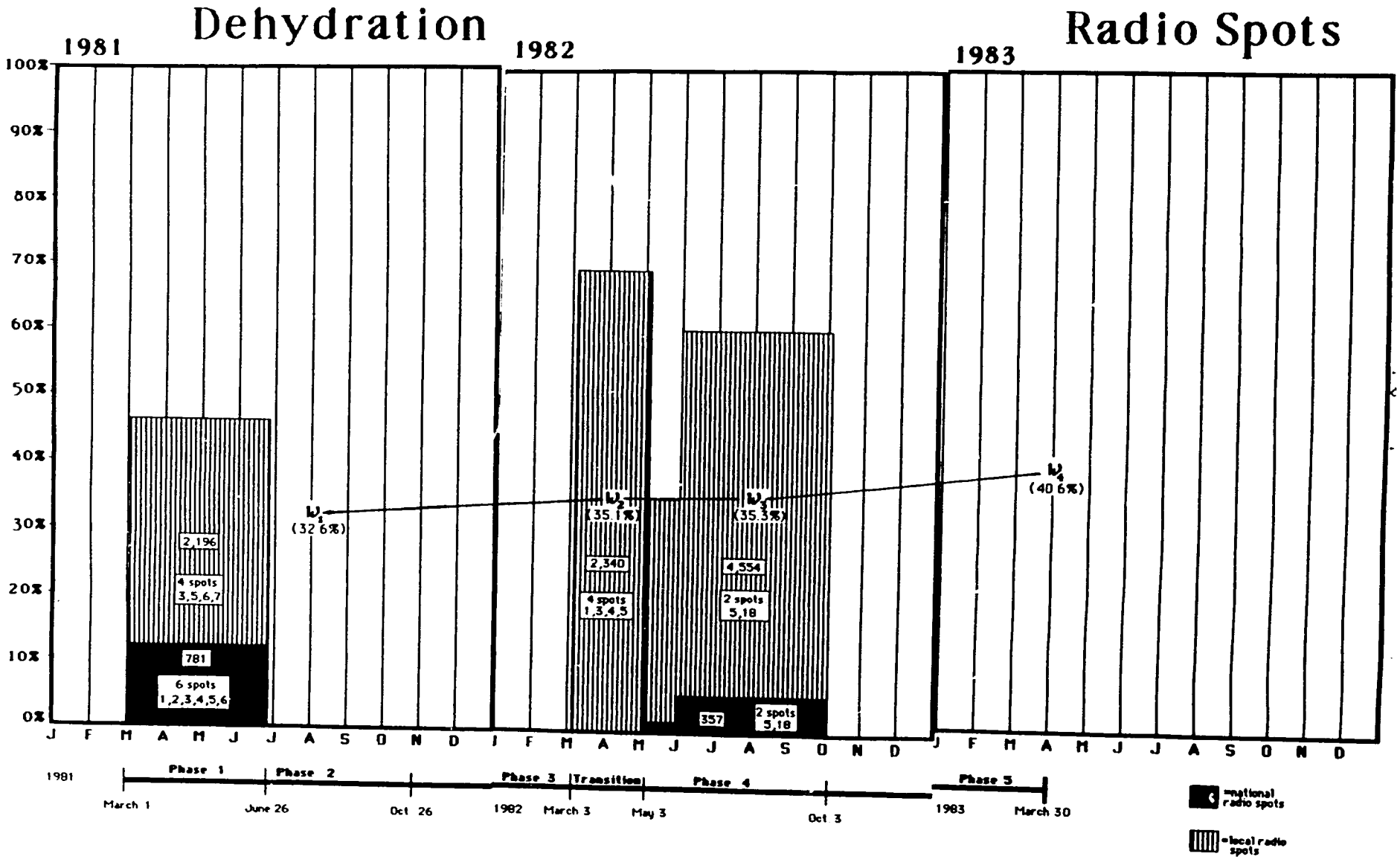

Dehydration
Radio Spots
1981
1982
1983
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
2,196
4 spots
3,5,6,7
781
6 spots
1,2,3,4,5,6
2,340
4 spots
1,3,4,5
4,554
2 spots
5,18
357
2 spots
5,18
(32.6%)
(35.1%)
(35.3%)
(40.6%)
1981
Phase 1
March 1
Phase 2
June 26
Oct 26
Phase 3
1982
Transition
March 3
May 3
Phase 4
Oct 3
Phase 5
1983
March 30
=national radio spots
=local radio spots

Figure II-17 (continued)

Index for Dehydration Radio Spots

W = percentage that answered these questions correctly:

"What does dehydration mean?"

Spots 1, 3, 4, 5, 6, 7, 10

"What can one do to prevent dehydration?"

--give liquids	Spots 1, 2, 3, 4, 6, 7
--give Litrosol	Spots 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
--take child to clinic	Spot 18

"Did you take your child to the clinic during her last diarrheal episode?"

Spot 18

"What does Dr. Salustiano talk about?

--diarrhea/dehydration	Spots 5, 7, 8, 9, 10, 12, 14, 16, 17, 18, 29

"What does Dr. Salustiano say about dehydration?"

--it is caused by diarrhea	Spots 7, 9, 10, 16, 17
--it can cause death	Spots 5, 7, 8, 9, 10, 12, 17
--it is a loss of liquids	Spots 7, 10
--Litrosol prevents it	Spots 5, 8, 9, 10, 12

around 10,000 radio spots. As one would expect, the index showing knowledge and behavior change reflects the large amount of targeted radio messages arriving over the air waves to the listening audience, as can be seen in Figure II-18.

The first wave data were collected only one month after the messages about Litrosol began to be aired. By that time, knowledge about a product that had never existed before had risen to about 52 percent on the index. Subsequent waves during the broadcast period show continuing improvements, up to nearly 67 percent about a month before those messages go off the air, an increase of about 15 percentage points and more than a 25 percent improvement over the wave 1 base. Interestingly, the pattern is reversed as soon as the messages are discontinued, with a decline of about six percentage points or about a nine percent drop from the wave 3 base. This may indicate that for highly specific knowledge, like product awareness and mixing and administration skills, a sustained broadcasting effort is required to maintain knowledge levels.

(v) Breastfeeding

The first wave data were collected after the Phase 1 broadcasts, about 1,000 transmissions of spots that had been aired. Between the wave 1 and wave 2 measures, another 3600 transmissions took place, and the index climbed from 48 percent to about 55 percent. There were additional broadcasts between waves 2 and 3, and the index declines from 55 percent to 50 percent. This pattern closely parallels the forgetting patterns evident in the Litrosol spots.

Then came the full force breastfeeding course (AMA-MAS) with a large number of spots that were not included in the data available for this analysis. During Phase 5, an intensive focus on breastfeeding dominated the PROCOMSI activity. It is clear from the wave 4 measures that this narrowly focused effort produced a large impact. The index value jumps from 50 percent to nearly 74 percent. Figure II-19 shows the broadcasting levels for the non-AMA-MAS spots and the mothers' performance on the

Figure II-18

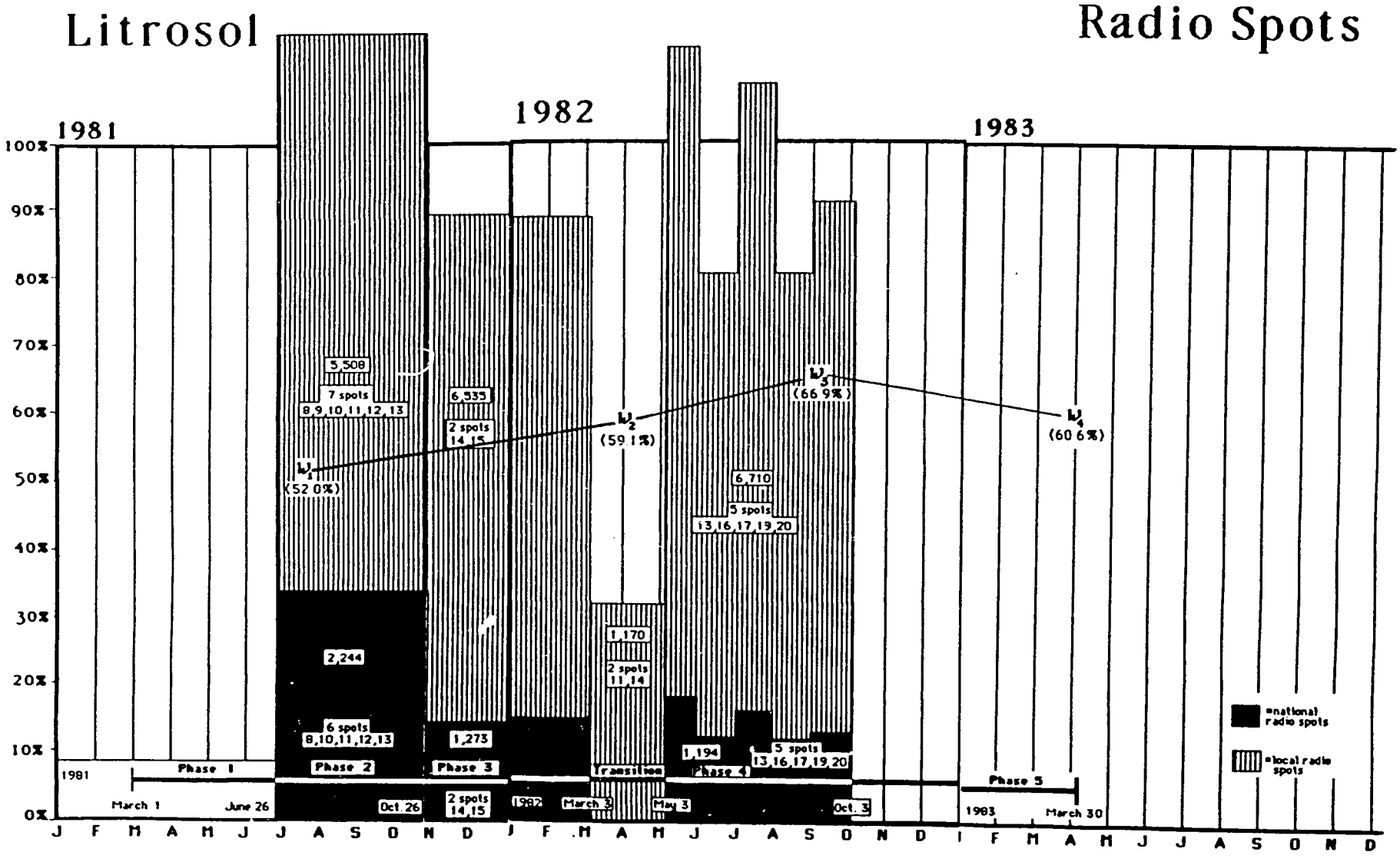

Litrosol
Radio Spots
1981
1982
1983
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
5,508
7 spots
8,9,10,11,12,13
W_1
(52.0%)
2,244
6 spots
8,10,11,12,13
6,535
2 spots
14,15
1,273
2 spots
14,15
W_2
(59.1%)
1,170
2 spots
11,14
W_3
(66.9%)
6,710
5 spots
13,16,17,19,20
1,194
5 spots
13,16,17,19,20
W_4
(60.6%)
1981
Phase 1
March 1
June 26
Phase 2
Oct. 26
Phase 3
1982
March 3
Transition
May 3
Phase 4
Oct. 3
Phase 5
1983
March 30
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
national radio spots
local radio spots

Figure II-18 (continued)

Index for Litrosol Radio Spots

W = percentage that answered these questions correctly:

"What medicine does the Dr. Salustiano spots talk about?"

Spots 5, 8, 9, 10, 12, 17, 18, 19, 20

"What does Dr. Salustiano talk about?"... (Litrosol)

Spots 5, 8, 9, 10, 12, 17, 18, 19, 20

"Why do they call the medicine Litrosol?"

Spots 8, 9

"How many soda bottles equal a liter?"

Spot 13

"Complete the phrase: "When your child has diarrhea give him Litrosol so that he doesn't _____"

Spots 1, 2, 6, 7

"Have you ever tried Litrosol?"

Spots 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

"During your child's case of diarrhea, did you give Litrosol?"

Spots 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 18, 19, 20

"Did he take other medicines while taking Litrosol?"

Spot 20

"How do you prepared Litrosol?"

Spots 8, 9, 13, 19

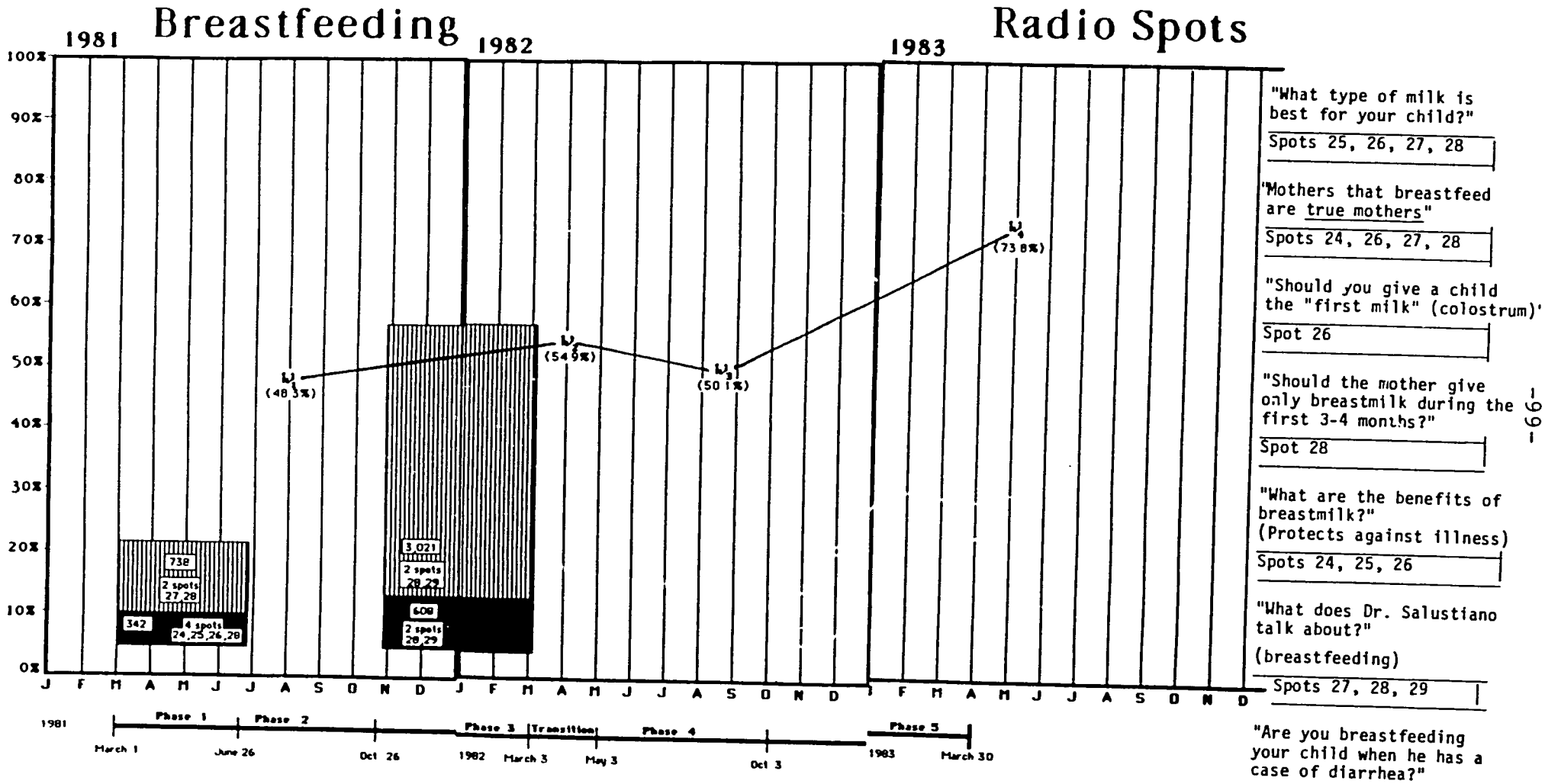
--mix the packet in a liter or three soda bottles of water

Spots 8, 9, 13

--use the entire packet

Spots 8, 9, 13

Figure II-19



"What type of milk is best for your child?"

Spots 25, 26, 27, 28

"Mothers that breastfeed are true mothers"

Spots 24, 26, 27, 28

"Should you give a child the "first milk" (colostrum)'

Spot 26

"Should the mother give only breastmilk during the first 3-4 months?"

Spot 28

"What are the benefits of breastmilk?"
(Protects against illness)

Spots 24, 25, 26

"What does Dr. Salustiano talk about?"
(breastfeeding)

Spots 27, 28, 29

"Are you breastfeeding your child when he has a case of diarrhea?"

Spots 28, 29

index. This set of outcomes strongly support the proposition that continued or intermittent broadcasts can quickly reverse the forgetting of content and raise performance above the previous high levels.

d. Discussion

The data presented in this analysis indicate a fairly clear pattern of rapid initial gain from exposure to campaign messages, followed by smaller continued gains as broadcasting continues. When messages are discontinued, there is evidence of a tendency for a gradual decline of knowledge levels. Reintroduction of messages about the same topics raises the knowledge levels quickly to a new level that appears to be somewhat higher than the previous peak. Perhaps the most reasonable model for what is happening here is that the audience members learn readily during exposure, and the rise in the overall level of knowledge slows as most people come to possess at least some knowledge. When broadcasting is withdrawn, no new people are added to the "knowers," and those who do know something begin to forget bits of it. The rapid recovery on re-initiation of broadcasting may best be attributed to reminding "knowers" of things they had forgotten, plus introducing new people and new knowledge into the "knowing" group.

This pattern, if true, has implications for the design of program strategies. An initial intense focus on a topic, followed by intermittent "refresher" broadcasts would seem to be the best way to achieve and sustain high levels of knowledge and performance. Without the continued broadcasting, at least over a period of two years, it appears that the levels of knowledge will slowly decay. It is not possible to tell from these data whether there is a point at which the knowledge can become "self-sustaining" and the educational effort terminated. However, given that there is a steady turnover of people in the target audience (i.e., first-time mothers entering the pool and mothers whose children have grown leaving it) it seems unlikely that the effort

can ever be considered finished. It may be that the optimum "transmission" channel would change over time, but some continuing effort would be required. For example, it might be more efficient to shift from radio broadcasts for the general audience to targeted instruction in pre-natal clinics if the knowledge is well established in the general population.

Chapter III

Changes in Health-Related Behaviors

The objective of Chapter III is to examine whether there have been changes in health-related behaviors. Specifically, the focus is on changes in diarrheal disease and in the use of oral rehydration therapy (Section A), feeding behavior (Section B), and actual observation of behavior (Section C).

A. Diarrheal Disease and the Use of ORT

(1) Changes in the Prevalence of Diarrheal Diseases

The information available about diarrheal disease and Litrosol use comes from five morbidity rounds or waves as shown at the top of Table III-1. The very last round also included the "Municipio" (county) of Moroceli which had not been previously visited by our field workers but which was exposed to the media intervention.

Field workers visited homes and asked mothers a series of questions about the occurrence of diarrheal diseases in their children and about the treatment which they followed. Mothers were asked whether young children had diarrhea in the last weeks and when that was the case, whether the children were sick on the day of the interview and two weeks before the interview (the beginning of the recall period). In this manner, it is possible to establish whether the duration of an episode is contained during the two week recall period or whether it is truncated at either end. Finally, mothers reporting healthy children during the last two weeks were asked about episodes of diarrhea in their children during the previous six months.

It was originally intended that all mothers in the study cohort were to have been interviewed at each wave so as to monitor changes that might occur in the prevalence of diarrhea during the course of the study. However, due to an oversight, the field workers frequently did not turn in a questionnaire when children were healthy during waves 4 and 5. We therefore do not know the true denominator and can not assess whether there were changes in the prevalence of morbidity symptoms during waves 4 and 5. For the first three waves, we do have an unbiased denominator and hence it is appropriate to ask whether there were any changes over this period in the prevalence of diarrhea and related symptoms. The data for all waves are shown in Table III-1 and those for waves 1 through 3 only are shown in Figure III-1. It appears that the values for wave 2 are lower than for those of either wave 1 or 3. This can easily be explained as a seasonal effect for waves 1 and 3 were collected during the rainy season, a time when diarrheal diseases are generally more frequent, and wave 2 during the dry season, a time of less frequent diarrhea. On the basis of the available information, we conclude that the mass media intervention does not appear to have reduced the prevalence of diarrheal diseases.

(2) Changes in the Characteristics of Subjects by Wave

We have information on 382 episodes of diarrhea in the last two weeks for the baseline period (wave 1) and for 682 cases during the intervention period (waves 2 to 5; not including Moroceli). However, the pattern of occurrence of a given child in different waves makes it seem that there is an as yet unresolved problem with the identification codes for the children. Table III-2 shows the number of children providing data for any two waves. For example, 67 children in wave 2 were also sick in wave 1, 86 of those in wave 3 were also sick in wave 1, and 66 of those in wave 3 were also sick in wave 2. Twenty-five cases sick in wave 5 were also sick in wave 4. Similar data are provided in

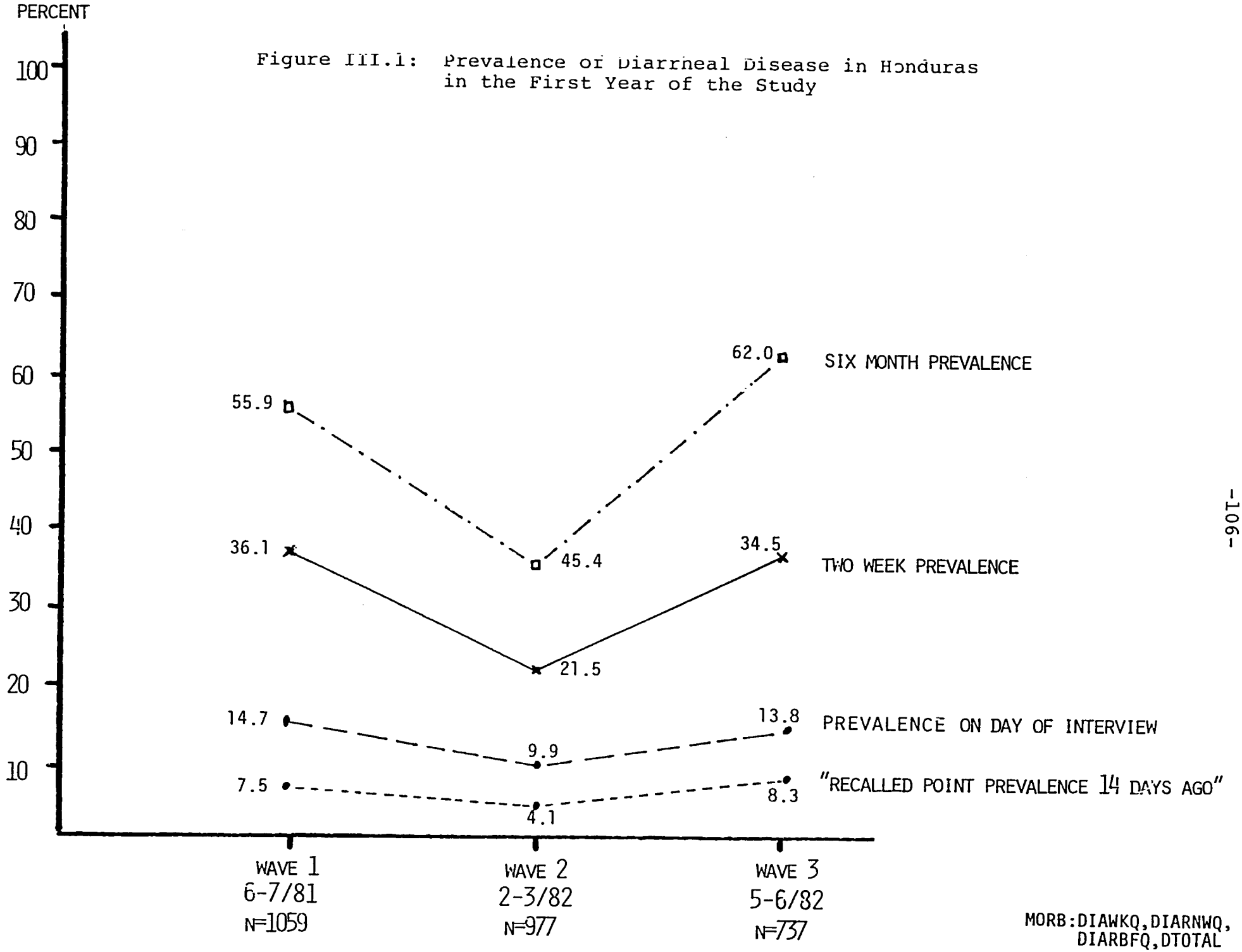
Table III.1 Cases of Diarrheal Disease by Wave in Honduras

Variable	Wave 1 6,7/81	Wave 2 2,3/82	Wave 3 5,6/82	Wave 4 1/83[3,4]	Wave 5[4] (5,6/83) All Sites	Wave 5[4] (5,6/83) Study only	Wave 5[4] (5,6/83) Control group
Percent and number of cases of diarrhea in the last two weeks	36.1 (382/1059)	21.5 (210/977)	34.5 (252/731)	45.2 (122/270)	29.8 (117/393)	35.6 (98/275)	16.1 (19/118)
For cases in the last two weeks, percent and number with diarrhea on the day of the interview[1]	40.9 (156/381)	46.4 (97/209)	40.1 (101/252)	38.5 (47/122)	29.9 (35/117)	32.7 (32/98)	15.8 (3/19)
For cases in the last two weeks, percent and number with diarrhea 14 days before the interview[2]	20.8 (79/380)	19.0 (40/210)	24.2 (61/252)	15.6 (19/122)	17.9 (21/117)	18.4 (18/98)	15.8 (3/19)
Percent and number of cases of diarrhea on day of interview	14.7 (196/1059)	9.9 (97/977)	13.8 (101/731)	17.4 (47/270)	8.9 (35/393)	11.6 (32/275)	2.5 (3/118)
Percent and number of cases of diarrhea in last six months	55.8 (591/1059)	45.4 (444/977)	62.0 (453/731)	98.9 (267/270)	89.8 (353/393)	97.5 (268/275)	72.0 (85/118)

[1] Asked of cases with diarrhea in last two weeks
[2] Asked of cases without diarrhea in the last two weeks
[3] Wave 4 also administered 12/82
[4] Responses for healthy children were often not turned in by field workers, thus we don't know the true denominator for these figures.

MORB:DIA1WKQ,DIARNWQ,DIARBFQ,DITOTAL

Figure III.1: Prevalence of Diarrheal Disease in Honduras in the First Year of the Study



MORB:DIAWKQ,DIARNWQ,
DIARBFQ,DTOTAL

Tables III-3 and III-4, respectively, for the variables: diarrhea in the last six months but not in the last two weeks (PRIORQ="yes") and diarrhea anytime in the last six months (DTOTAL). The pattern which emerges from Tables III-2 through III-4 is one of overlap among the first three waves and between waves 4 and 5 and an obvious discontinuity between the first three and the last two waves.

Table III-2: Individuals with diarrhea in the last two weeks in any two waves

	W1	W2	W3	W4	W5
W1	-	67	86	1	0
W2		-	66	1	0
W3			-	1	0
W4				-	25
W5					-
Total cases per wave	382	210	252	122	98

*W1=wave 1, etc.

The sharpness of the discontinuity implies that something must be awry with the recording or calculation of the child's identification number in the morbidity instruments of waves 4 and 5. Our best hypothesis is that it reflects a change related to the change in field worker reporting practice in waves 4 and 5, but our investigations have not yet revealed the problem. Until the problem is identified and corrected, we have limited the analyses based on morbidity to cross-sectional analyses. For cross-sectional analysis the individual identification numbers are not required. Hence, as long as the composition of the fourth and fifth waves is comparable, there is no difficulty in making comparisons among waves. In the next section, we show that the samples are, in fact, quite comparable. This code problem occurs only in the morbidity instruments.

Table III-3: Individuals with diarrhea in the last six months but not in the last two weeks.*

	W1	W2	W3	W4	W5
W1	-	38	36	0	0
W2		-	55	0	0
W3			-	0	0
W4				-	40
W5					-
Total cases per wave	209	234	201	145	170

W1=wave 1, etc.
*PRIORQ="yes"

Table III-4: Diarrhea anytime in the last six months (DTOTAL)

	W1	W2	W3	W4	W5
W1	-	214	204	1	0
W2		-	222	1	0
W3			-	1	0
W4				-	112
W5					-
Total cases per wave	591	444	453	267	268

W1=wave 1, etc.

(3) Comparability of Sample Representation by Wave

Because the comparison of waves 1, 2 and 3 with waves 4 and 5 required that the groups be equivalent, some effort has been dedicated to showing that the distribution of cases by age, sex and locality was similar across waves. The results are presented below for those cases reporting diarrhea in the last two weeks. Analyses for other samples were carried out with similar results and are not presented here (i.e., for all children about whom we have a morbidity questionnaire, for all cases reporting diarrhea in the past six months to two weeks ago and for all cases reporting an episode of diarrhea anytime in the last six months).

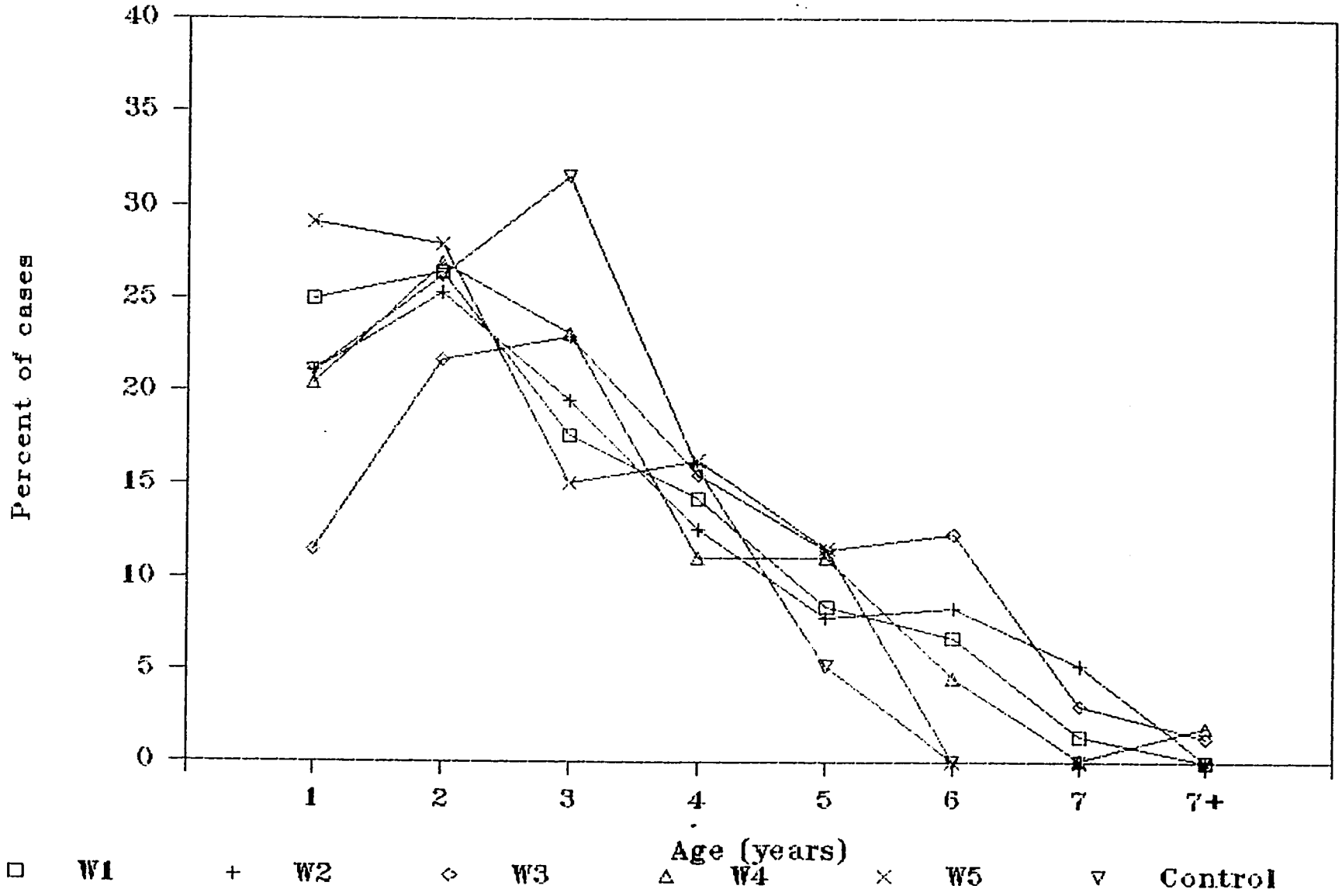
(a) Age

Figure III-2 and Table III-5 present the frequency distribution of cases by categories of age for each of the waves. These data reveal a similar pattern of sample selection with respect to age in all waves. Slightly more older children appeared to have been included in wave 3 and a few more younger children in wave 5.

(b) Sex

Data are presented in Figure III-3 and Table III-6 to answer the question whether there have been changes in the proportion of boys and girls who were measured in each wave. Throughout the study, we have more boys providing data about diarrheal disease episodes than girls. Whether this is because boys are sick more often or because boys are oversampled we do not know. There appear to be no marked changes over time in the proportion of boys and girls measured. wave 4, however, seems to have a greater percentage of boys than all other waves.

Figure III-2 Distribution of Cases by Age and Wave for the Sample Reporting Diarrhea in the Last Two Weeks.



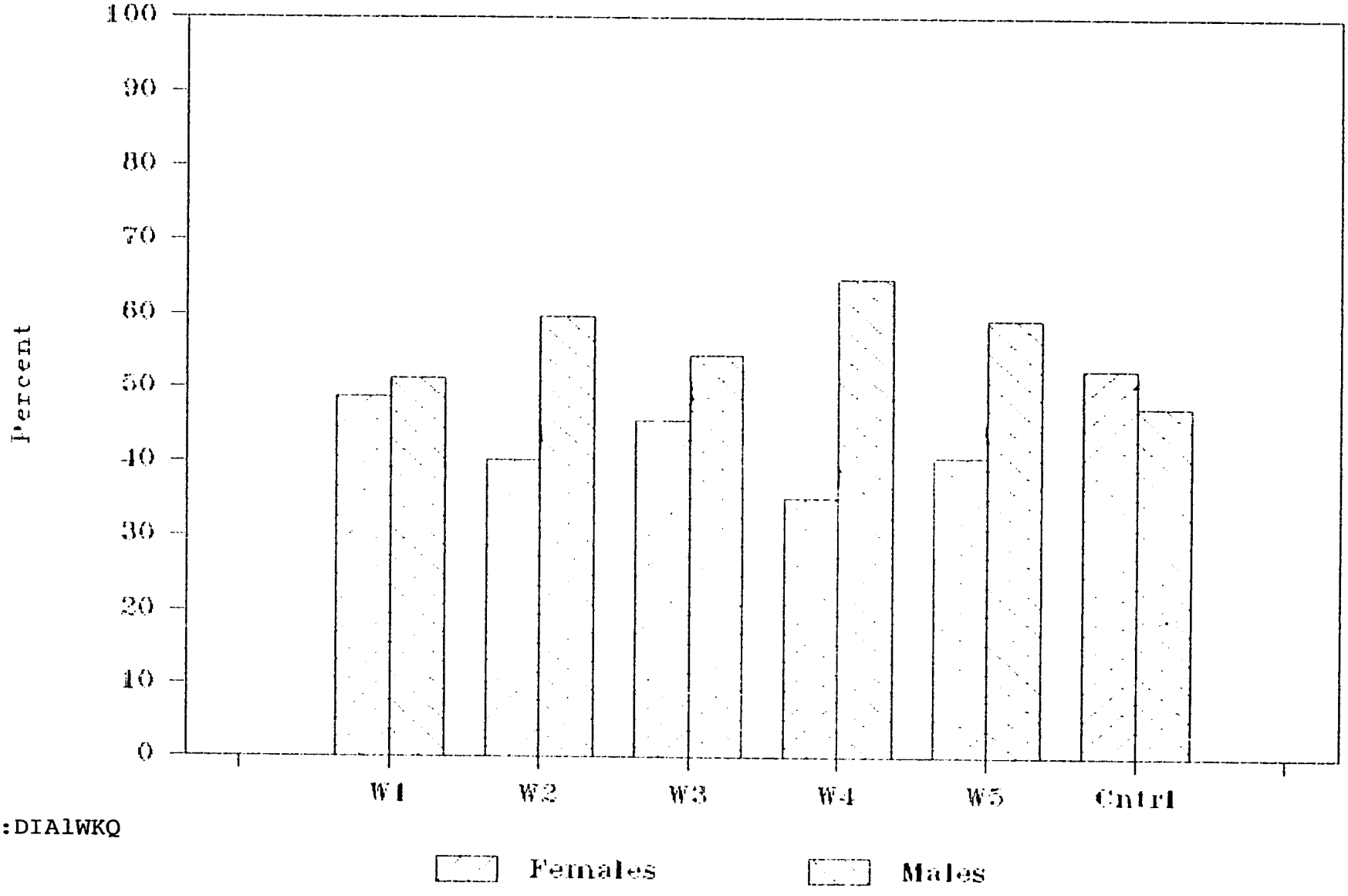
MORB

Table III-5: Distribution of Cases by Age and Wave for the Sample Reporting Diarrhea in the last Two Weeks.

N	Wave No.	Age (in years)							
		1	2	3	4	5	6	7	7+
352	1	25.0%	26.4	17.6	14.2	8.5	6.8	1.4	0
190	2	21.1	25.3	19.5	12.6	7.9	8.4	5.3	0
226	3	11.5	21.7	23.0	15.5	11.5	12.4	3.1	1.3
108	4	20.4	26.9	23.1	11.1	11.1	4.6	0.1	1.9
86	5	29.1	27.9	15.1	16.3	11.6	0	0	0
19	Control	21.1	26.3	31.6	15.8	5.3	0	0	0

MORB:DIA1WKQ

Figure III-3 Distribution of Cases by Sex and Wave for Children Reporting Diarrhea in Past Two Weeks



MORB:DIA1WKQ

Table III.6: Distribution of Cases by Sex and Wave for Children Reporting Diarrhea in the Past Two Weeks (DIA1WKQ)

	Wave 1 (6,7/81)	Wave 2 (2,3/82)	Wave 3 (5,6/82)	Wave 4 (12/82-1/83)	Wave 5 (5,6/83)	Control (5,6/83)
FEMALES	48.7% (173)	40.3 (77)	45.6 (103)	35.2 (38)	40.7 (35)	52.6 (10)
MALES	51.3 (182)	59.7 (114)	54.4 (123)	64.8 (70)	59.3 (51)	47.4 (9)
TOTAL	100.0 (355)	100.0 (191)	100.0 (226)	100.0 (108)	100.0 (86)	100.0 (19)

Note: MORB:DIA1WKQ

(c) Municipio

Finally, we have considered whether the proportion of cases obtained from each of the three municipios has changed over time. Figure III-4 and Table III-7 show that there appears to be some slight differences with respect to representation from the municipios of Sabanagrande and Yuscaran. Reported cases in Sabanagrande appear to have fallen between wave 1 and wave 3, but increased greatly in waves 4 and 5. There were fewer cases from Yuscaran in waves 4 and 5 than there had been in the first three waves.

(d) Conclusions

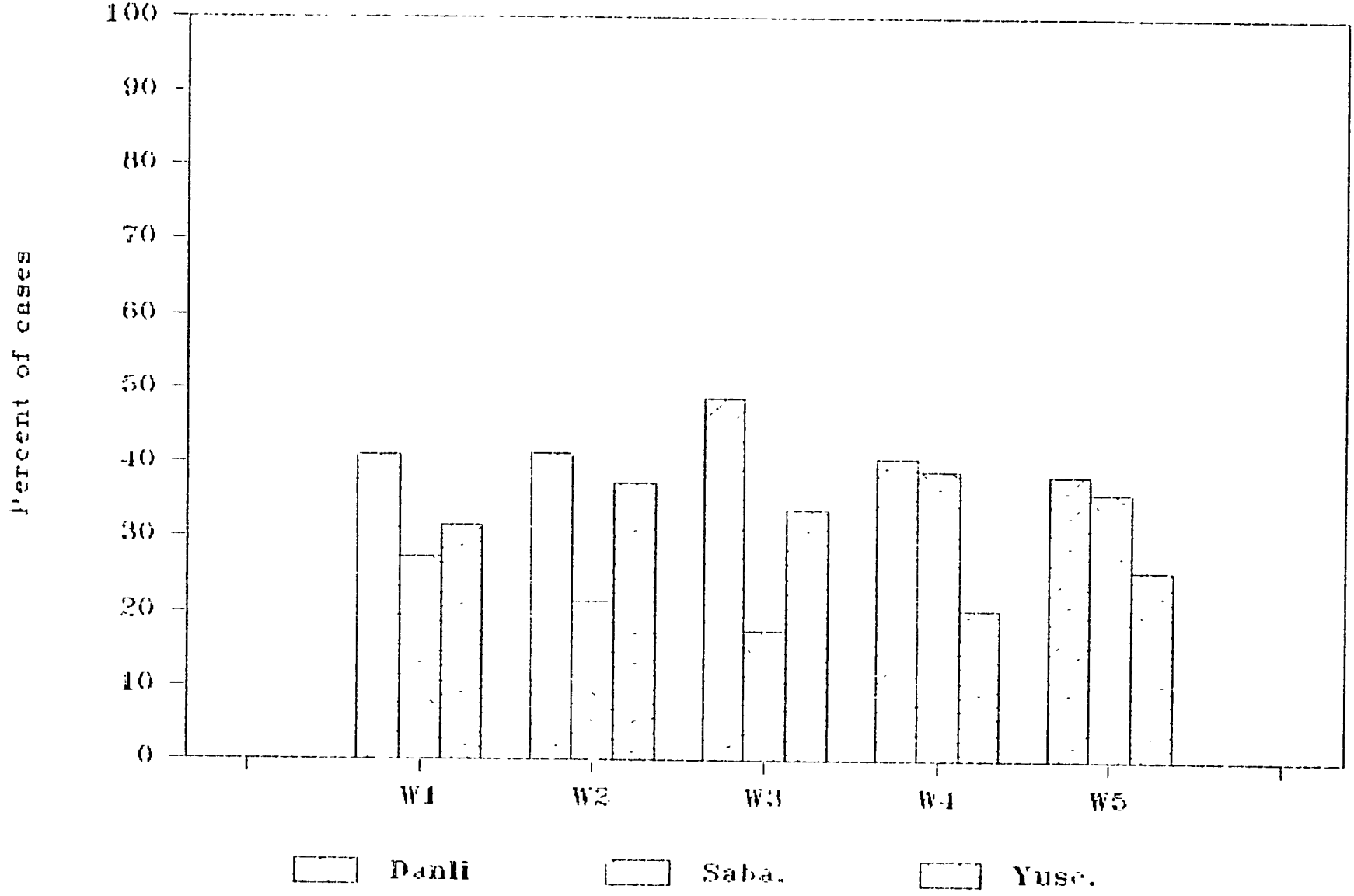
The preceding data show that the various samples included in each wave are comparable with respect to age, sex and municipio. While there is some variability between waves, there is no systematic difference between the first three waves and the last two. Thus, a cross-sectional analysis will be unaffected.

(4) Trends in Severity Indicators

Data about the characteristics of episodes of diarrhea for each of the waves are given in Tables III-8 and III-9. Information about the presence of fever, mucus or blood in the stools, occurrence and frequency of vomiting, number of bowel movements, duration of the episode and maternal impression of the child's appetite and the severity of the episode were collected by recall only for cases of diarrhea reported for the two week interview period. Information about specific signs of dehydration (mouth, eyes, urine, fontanel) was recorded by the interviewer by direct observation only for children who were ill with diarrhea on the day of the interview.

There does not appear to be a consistent overall pattern of change across waves even when considering waves 1, 3, and 5 separately since these were collected during the rainy season.

Figure III-4 Distribution of Cases by Municipio and Wave for All Children Reporting Diarrhea in Past Two Weeks



MORB:DIA1WKQ

Table III.7: Distribution of Cases by Municipio and Wave for All Children Reporting Diarrhea in the Past Two Weeks (DIA1WKQ)

Municipio	Wave 1 (6,7/81)	Wave 2 (2,3/82)	Wave 3 (5,6/82)	Wave 4 (12/82-1/83)	Wave 5 (5,6/83)
Danli	41.1 (146)	41.4 (79)	48.7 (110)	40.7 (44)	38.4 (33)
Sabanagrande	27.3 (97)	21.5 (41)	17.7 (40)	38.9 (42)	36.0 (31)
Yuscaran	31.6 (112)	37.2 (71)	33.6 (76)	20.4 (22)	25.6 (22)
TOTAL	100.0 (355)	100.0 (191)	100.0 (226)	100.0 (108)	100.0 (86)

MORB:DIA1WKQ

Table III-8: Changes in the Prevalence of Indicators of Severity and Dehydration

Variable	Description	(rainy) Wave 1	(dry) Wave 2	(rainy) Wave 3	(dry) Wave 4	(rainy) Wave 5	Control
FEVER1Q+	Fever during the episode	29.2 (111/380)	29.5 (62/210)	46.4 (115/248)	35.2 (43/122)	31.6 (31/98)	31.6 (6/19)
MUCUS1Q+	Mucous in the stools	52.1 (198/380)	65.7 (138/210)	64.1 (159/248)	61.5 (75/122)	60.2 (59/98)	42.1 (8/19)
BLOOD1Q+	Blood in stools	14.5 (55/380)	18.2 (38/209)	20.6 (51/248)	15.6 (19/122)	22.4 (22/98)	21.1 (4/19)
PBARFS+	Vomiting during the episode	26.2 (100/382)	22.9 (48/210)	20.1 (51/252)	26.2 (32/122)	24.5 (24/98)	26.3 (5/19)
MTH1Q++	Dry mouth	12.2 (19/156)	5.2 (5/97)	4.0 (4/101)	2.1 (1/47)	9.4 (3/32)	0 (0/100)
FONT1Q++	Fallen fontanelle	2.6 (4/156)	0 (0/97)	1.0 (1/101)	2.1 (1/47)	3.1 (1/32)	0 (0/100)
EYES1Q++	Sunken eyes	16.7 (26/156)	2.1 (2/97)	5.0 (5/101)	10.6 (5/47)	6.3 (2/32)	0 (0/100)
DRYEY1Q++	Dry eyes	13.0 (20/54)	2.1 (2/97)	8.9 (9/101)	4.3 (2/47)	3.1 (1/32)	0 (0/100)
URINE1Q++	Dark colored urine	15.0 (23/153)	8.2 (8/97)	9.0 (9/100)	10.6 (5/47)	31.3 (10/32)	0 (0/100)
HNGR1Q+	Hunger according to mother:						
	No change	36.5	44.8	37.0	48.4	39.6	47.1
	Somewhat different	31.2(375)	27.6(210)	27.2(246)	30.3(122)	42.7(96)	52.9(17)
	Very apathetic	32.3	27.6	35.8	21.3	17.7	0
EPSD1Q+	Mother's view of episode:						
	Light	38.8	33.3	28.5	46.8	29.9	62.5
	Moderate	31.7(363)	27.0(204)	32.3(235)	28.8(111)	32.2(87)	12.5(16)
	Severe	29.5	39.7	39.1	24.3	37.9	25.0
SEVERE1Q+++	Severe case according to mother:	34.3 (72/210)	50.6 (119/235)	50.7 (103/203)	35.2 (51/145)	58.2 (99/170)	48.4 (31/64)

+ Data collected if child had diarrhea in the previous two weeks. ++Data collected if child had diarrhea on the day of the interview. +++Data collected if child had diarrhea in last six months but not in the previous two weeks.

Table III-9: Changes in the Duration, Number of Bowel Movements and Frequency of Vomiting during Episodes in the Previous Two Weeks.

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control
DAYSDIQ Days with diarrhea in the past two weeks:						
Mean:	5.12	5.20	5.56	4.85	4.71	5.53
s.d.:	3.71	3.95	2.89	3.63	3.05	4.13
n:	374	194	245	122	96	19
DUMPS1Q Number of stools on worst day:						
Mean:	5.87	5.67	5.83	5.76	7.32	6.84
s.d.:	3.00	4.16	3.05	3.14	4.28	2.50
n:	377	207	245	122	96	19
BARFS1Q Number of times vomited on worst day:						
Mean:	0.91	0.82	0.85	0.87	0.94	2.00
s.d.:	2.14	1.83	2.18	2.00	2.00	4.31
n:	377	207	247	122	96	19

MORB

(5) Litrosol Use

a. General Pattern

The pattern of Litrosol use by wave is shown in Table III-10 for episodes of diarrhea occurring in the last two weeks, cases in the last six months but not in last two weeks, and for any episode in the last six months. These same data are presented in Figure III-5. The findings are clear. Around July 1981, less than ten percent of the cases of diarrhea were being treated with Litrosol. The use of Litrosol climbed dramatically in wave 2, remained at similar levels in wave 3, declined somewhat in wave 4 and rose again in wave 5. Statistics for the control communities were only slightly lower than for the study sites for wave 5. As shown in Figure III-5, Litrosol use is lower for cases in the last two weeks than for cases occurring from that point to six months before. We believe this occurs because mothers are more likely to remember the last serious episode of diarrhea and because the probability of Litrosol use rises with the severity of the episode (see Section 6).

The findings regarding Litrosol use are of primary importance and hence, we explored how use varied by sex and age of the child and by municipio and type of community.

(i) Age

We had predicted that Litrosol use would be highest in very young children because of the greater severity of cases in the very young. The data regarding Litrosol use and age are shown in Tables III-11, III-12, and III-13 for episodes occurring respectively, two weeks, two weeks to six months, and any time in the last six months before the interview. Our hypothesis appears to have been confirmed as shown in Figure III-6 which presents the data for episodes in the last two weeks occurring in waves 2 to 5, the intervention period proper. Thus, Litrosol was used in

Table III.10 Percent of episodes of diarrhea treated with Litrosol

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control
Used Litrosol for episodes within last two weeks (LITSOLQ)	9.2% (35/381)	26.2 (55/210)	33.3 (84/252)	18.0 (22/122)	35.7 (35/98)	26.3 (5/19)
Used Litrosol for episodes in last 6 months but not in last two weeks (PLITSQ)	7.6 (16/210)	45.3 (106/234)	45.3 (92/203)	39.3 (57/145)	49.4 (84/170)	40.9 (27/66)
Used Litrosol for any episode in last 6 months (TREATD)	8.6 (51/591)	36.0 (160/444)	38.6 (175/453)	29.6 (79/267)	44.4 (119/268)	37.6 (32/85)

Figure III-5 Percentage of Episodes of Diarrhea Treated with Litrosol

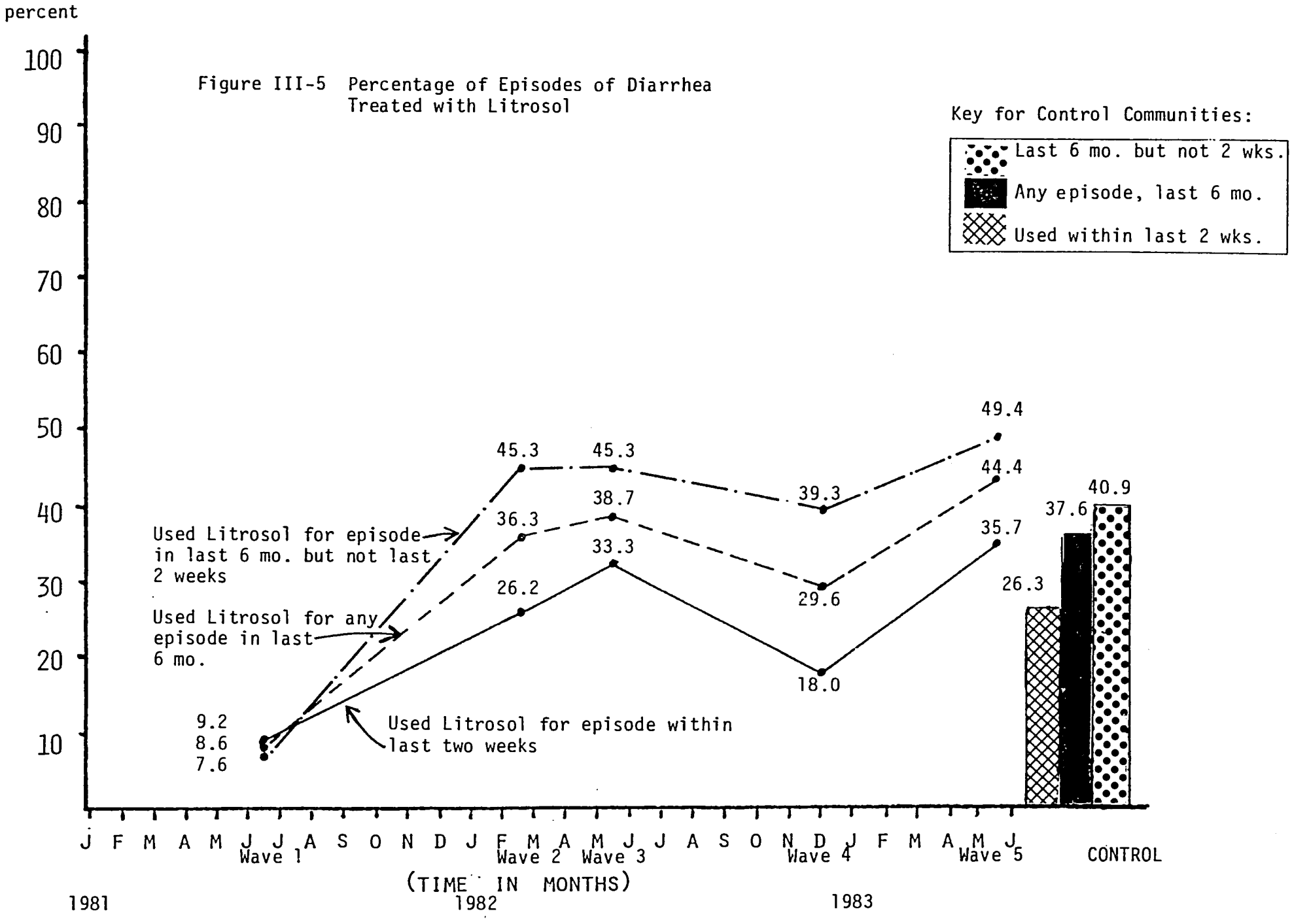


Table III.11 Percent of cases of diarrhea treated with Litrosol by age and wave (cases in the last two weeks)

Age (mos.)	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control	Total+ All data	Total+ Waves 2-5
0 - 11.9	9.1% 8/88	35.0 14/40	34.6 9/26	31.8 7/22	32.0 8/25	75.0 3/4	22.9 46/201	33.6 38/113
12 - 23.9	11.8 11/93	27.1 13/48	40.8 20/49	17.2 5/29	37.5 9/24	0	23.9 58/243	31.3 47/150
24 - 35.9	9.7 6/62	27.0 10/37	28.8 15/52	8.0 2/25	46.2 6/13	16.7 1/6	20.6 39/189	30.0 33/127
36 - 47.9	8.0 4/50	20.8 5/24	31.4 11/35	16.7 2/12	50.0 7/14	33.3 1/3	21.5 29/135	29.4 25/85
> 48.0	10.3 6/58	26.8 11/41	26.6 17/64	5.0 1/20	20.0 2/10	0	19.2 37/193	23.0 31/135

+ Total by age excludes control group

MORB

Table III.12 Percent of cases of diarrhea treated with Litrosol by age and by wave (cases in the last six months but not in the last two weeks)

Age (mos.)	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control	Total+ All data	Total+ Waves 2-5
0 - 11.9	17.2% 5/29	63.6 14/22	35.3 6/17	50.0 6/12	46.2 6/13	55.6 5/9	39.8 37/93	50.0 32/64
12 - 23.9	5.3 2/38	48.1 25/52	54.1 20/37	37.1 13/35	48.5 16/33	44.4 8/18	39.0 76/195	47.1 74/157
24 - 35.9	7.5 3/40	46.3 19/41	41.7 15/36	40.5 15/37	50.0 16/32	50.0 6/12	36.6 68/186	44.5 65/146
36 - 47.9	5.4 2/37	37.1 13/35	48.1 13/27	41.7 10/24	63.9 23/36	37.5 6/16	38.4 61/159	48.4 59/122
> 48	4.2 2/48	47.0 31/66	42.4 25/59	29.6 8/27	28.9 11/38	20.0 2/10	32.4 77/238	39.5 75/190
TOTAL	7.3 14/194	47.2 102/216	44.9 79/176	38.5 52/135	47.4 72/152	41.5 27/65		

+ Total by age excludes control group

MORB

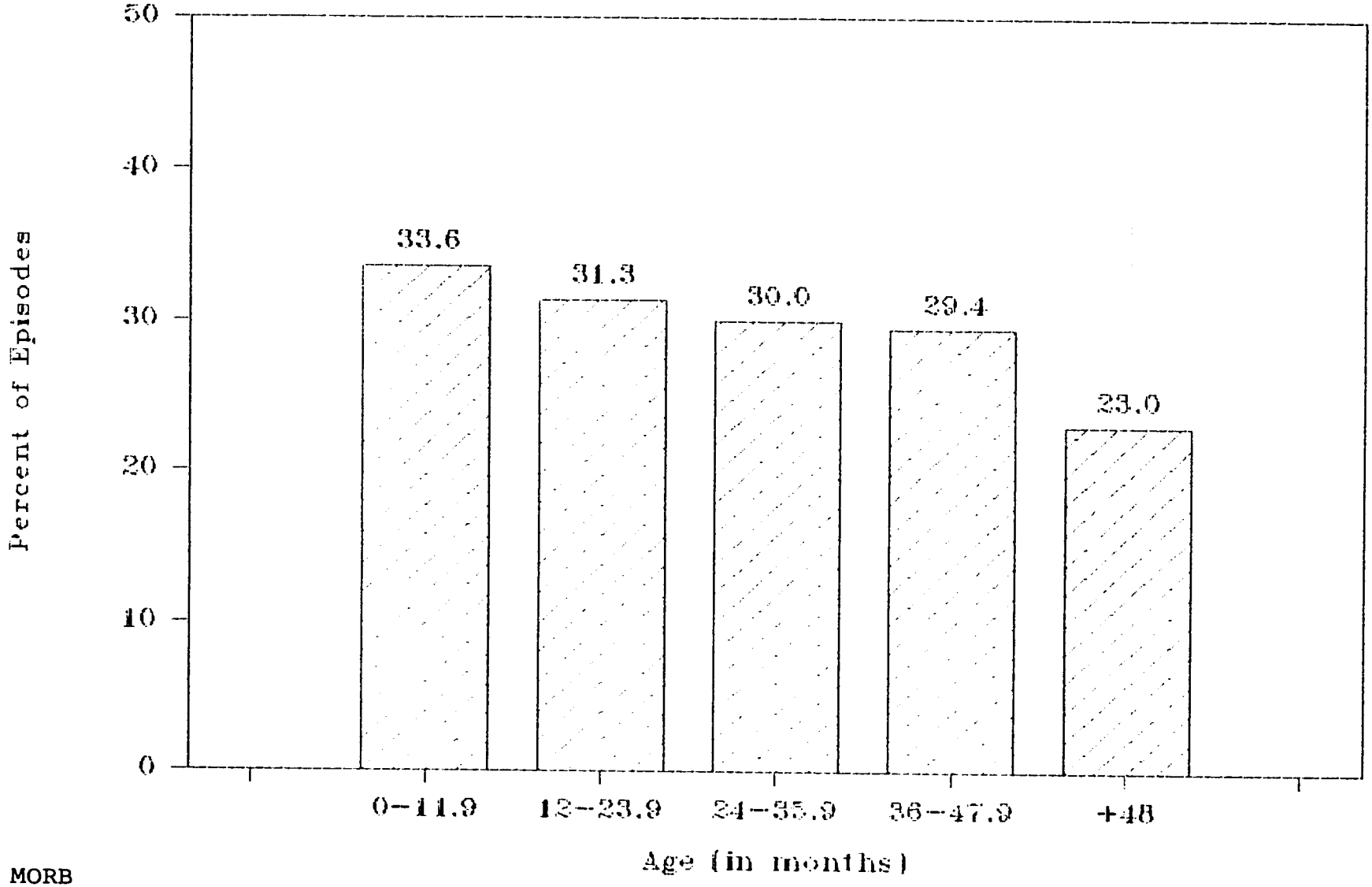
Table III.13 Percent of cases of diarrhea treated with Litrosol by age and by wave (cases in the last six months)

Age (mos.)	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control	Total + All data	Total + Waves 2-5
0 - 11.9	11.1% 13/117	45.2 28/62	34.9 6/17	38.2 13/34	36.8 14/38	61.5 8/13	28.2 83/294	39.5 70/177
12 - 23.9	10.7 13/121	38.0 38/100	46.5 40/86	28.1 18/64	43.9 25/57	44.4 8/18	39.6 134/338	39.4 121/307
24 - 35.9	8.8 9/102	37.2 29/78	32.3 30/93	27.4 17/62	48.9 22/45	38.9 7/18	28.5 107/375	35.9 98/273
36 - 47.9	6.9 6/87	30.5 18/59	38.7 24/62	33.3 12/36	60.0 30/50	36.8 7/19	30.6 90/294	40.6 84/207
> 48	7.5 8/106	39.3 42/107	25.8 42/163	19.1 9/47	27.1 13/48	20.0 2/10	26.5 114/431	32.6 106/325

+ Total by age excludes control group

MORB

Figure III-6 Litrosol Use by Age in Waves 2 through 5 for Diarrheal Episodes in the Last Two Weeks.



MORB

33.6 percent of the cases if the child was an infant but only in 23.0 percent of the cases if the child was four years or older.

(ii) Sex

Differential treatment favoring boys over girls has been reported consistently for the Indian subcontinent but rarely for Latin America. For this reason, we had not expected to find major differences in the pattern of Litrosol use by sex of the child. As shown in Tables III-14 through III-16, this is indeed the case as differences by sex are minor and not consistent across waves. Thus, for episodes of diarrhea in the last two weeks which occurred during waves 2 to 5, 30.0 percent of females received Litrosol versus 28.2 percent of males.

(iii) Municipio

Data on Litrosol use by municipio are shown in Tables III-17, III-18 and III-19. Variations in the rate of Litrosol use are not consistent except perhaps for the municipio of Yuscaran. Overall, as shown in Figure III-7, the rate of Litrosol use for cases occurring in the last two weeks in waves 2 to 5 is about the same, around 25 percent for all municipios but Yuscaran where the value is 35 percent.

(iv) Type of Village

The strongest finding in this series of analyses is with regards to Litrosol use by type of village (which refers to the contrast between the county seat and its surrounding villages). As shown in Tables III-20, III-21, and III-22 and very clearly in Figure III-8 for cases in the last two weeks, Litrosol use is considerably and consistently higher in the villages. This may reflect the emphasis put on village level distribution of Litrosol, or conversely, the ease of access to fixed facility care for people living in communities with clinics.

Table III.14: Percent of episodes of diarrhea treated with Litrosol by sex by wave (treatment of cases in the past two weeks).

Sex	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
Females	9.8% 17/173	26.0 20/77	28.2 29/103	21.1 8/28	45.7 16/35	20.0 2/10
Males	9.9 18/181	28.9 33/114	35.0 43/123	12.9 9/70	31.4 16/51	33.3 3/9
TOTAL+	9.2 35/381	26.2 55/210	33.3 84/252	18.0 22/122	35.7 35/98	26.3 5/19

+ Total includes kids with sex=missing

MORB

Table III-15: Percent of episodes of diarrhea treated with Litrosol by sex by wave (cases treated in the last six months but not in the last two weeks).

Sex	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
Females	5.1% 5/98	47.2 51/108	45.3 34/75	40.3 25/62	42.3 30/71	44.1 15/34
Males	10.4 10/96	47.2 51/108	44.6 45/101	37.0 27/73	51.9 42/81	38.7 12/31
TOTAL+	7.7 16/209	45.1 105/233	44.8 90/201	39.3 57/145	49.4 84/170	40.9 27/66

+ Total includes cases for which sex=missing

MORB

Table III.16: Percent of episodes of diarrhea treated with Litrosol by sex by wave (treatment of all cases in the last six months)

Sex	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
Females	8.1% 22/271	38.4 71/185	35.4 63/178	33.0 33/100	43.4 46/106	38.6 17/44
Males	10.1 28/277	37.8 84/222	39.3 88/224	25.2 36/143	43.9 58/132	37.5 15/40
TOTAL+	8.6 51/590	36.1 160/443	38.4 174/453	29.6 79/267	44.4 119/268	37.6 32/85

+ Total includes kids with sex=missing

MORB

Table III-17 Percent of episodes of diarrhea treated with Litrosol by municipio by wave (cases in the past two weeks)

Municipio	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
Danli	15.2% 22/145	22.8 18/79	26.4 29/110	15.9 7/44	30.3 10/33	--
Sabanagrande	6.2 6/97	39.0 16/41	25.0 10/40	11.9 5/42	38.7 12/31	--
Yuscaran	6.3 7/112	26.8 19/71	43.4 33/76	22.7 5/22	45.5 10/22	--
Moroceli (control)	--	--	--	--	--	26.3 5/19
Total (all locations)	9.9 35/354	27.7 53/191	31.9 72/276	15.7 17/108	37.2 32/86	26.3 5/19

MORB

Table III.18: Percent of episodes of diarrhea treated with Litrosol by municipio by wave (treatment of cases in the past six months but not in the last two weeks)

Municipio	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
Danli	0 0/85	52.7 49/93	49.1 27/55	47.4 27/57	48.5 33/68	--
Sabanagrande	13.2 14/106	51.7 31/60	30.6 19/62	23.7 9/30	29.2 14/48	--
Yuscaran	33.3 1/3	34.9 22/63	55.9 33/59	40.0 16/40	69.4 25/36	--
Moroceli	--	--	--	--	--	41.5 27/65
Total (all locations)	7.7 15/194	47.2 102/216	44.9 79/176	38.5 52/135	47.4 72/152	41.5 27/65

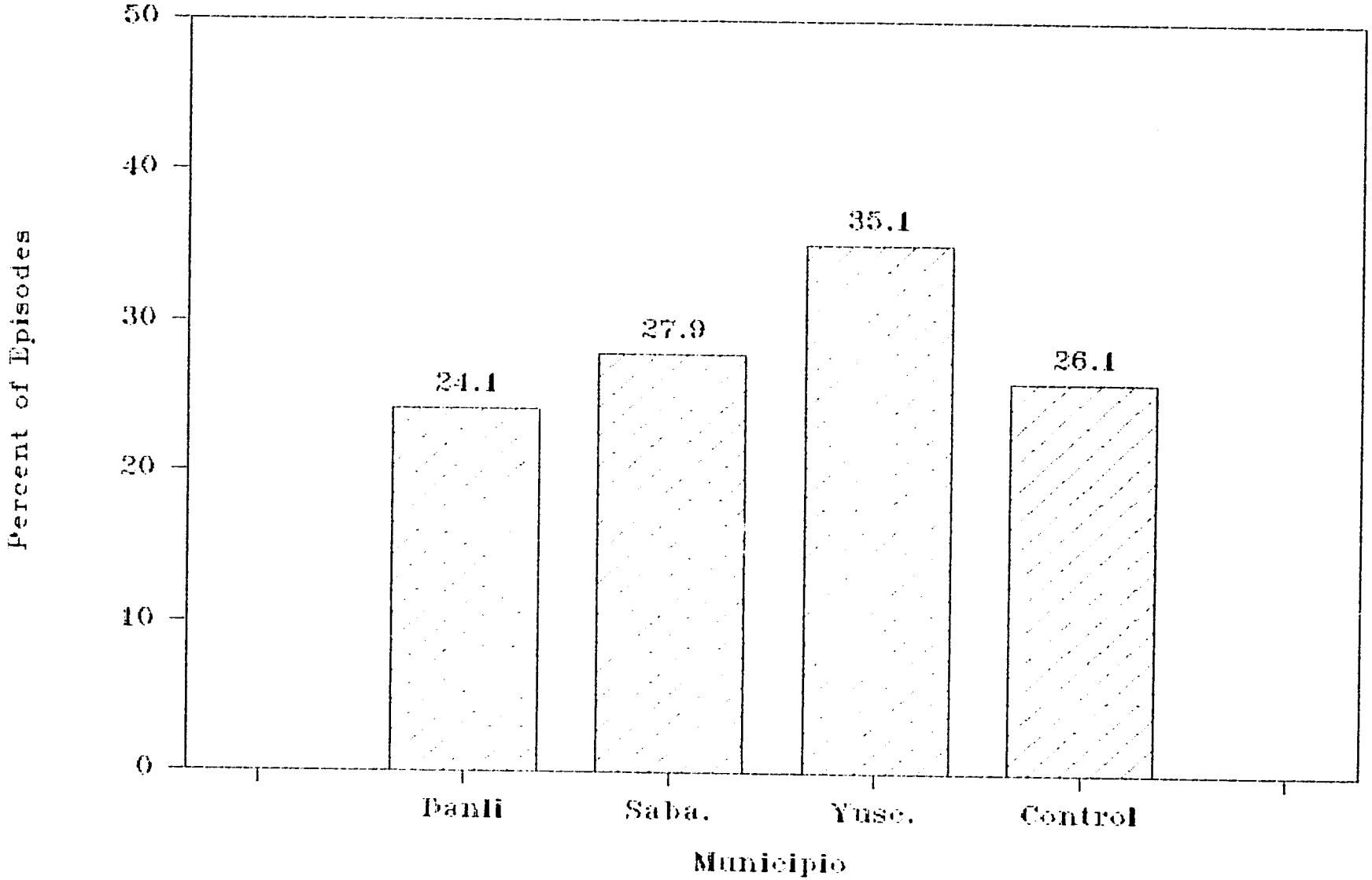
MORB:PRIOR1Q

Table III.19: Percent of episodes of diarrhea treated with Litrosol by municipio by wave (cases in the last six months)

Municipio	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
Danli	9.6 22/230	41.4 67/172	33.9 56/165	33.7 34/101	42.6 43/101	--
Sabanagrande	9.9 20/203	46.5 47/101	28.4 29/102	19.4 14/72	32.9 26/79	--
Yuscaran	7.0 8/115	30.6 41/134	48.9 66/135	33.9 21/62	60.3 35/58	--
Moroceli (control)	--	--	--	--	--	38.1 32/84
Total (all locations)	9.1 50/548	38.1 155/407	37.6 151/402	29.4 69/235	43.7 104/238	38.1 32/84

MORB

Figure III-7 Litrosol Use by Municipio in Waves 2 through 5 for Diarrheal Episodes in the Last Two Weeks.



MORB:LITSOLQ
Note: Control municipio of Moroceli only has data from one wave.

Table III.20 Percent of episodes treated with Litrosol by type of community by wave (treatment of cases in past two weeks)

Community Type	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
County seat	4.3% 3/70	0 0/32	7.4 2/27	7.7 1/13	33.3 5/15	0 0/19
Village	10.3 32/311	30.9 55/178	36.4 82/275	19.3 21/109	36.1 30/83	26.3 5/19
TOTAL	9.2 35/381	26.2 55/210	33.3 84/252	18.0 22/122	35.7 35/98	26.3 5/19

MORB

Table III-21 Percent of episodes treated with Litrosol by type of community by wave (cases in the last six months but not the last two weeks)

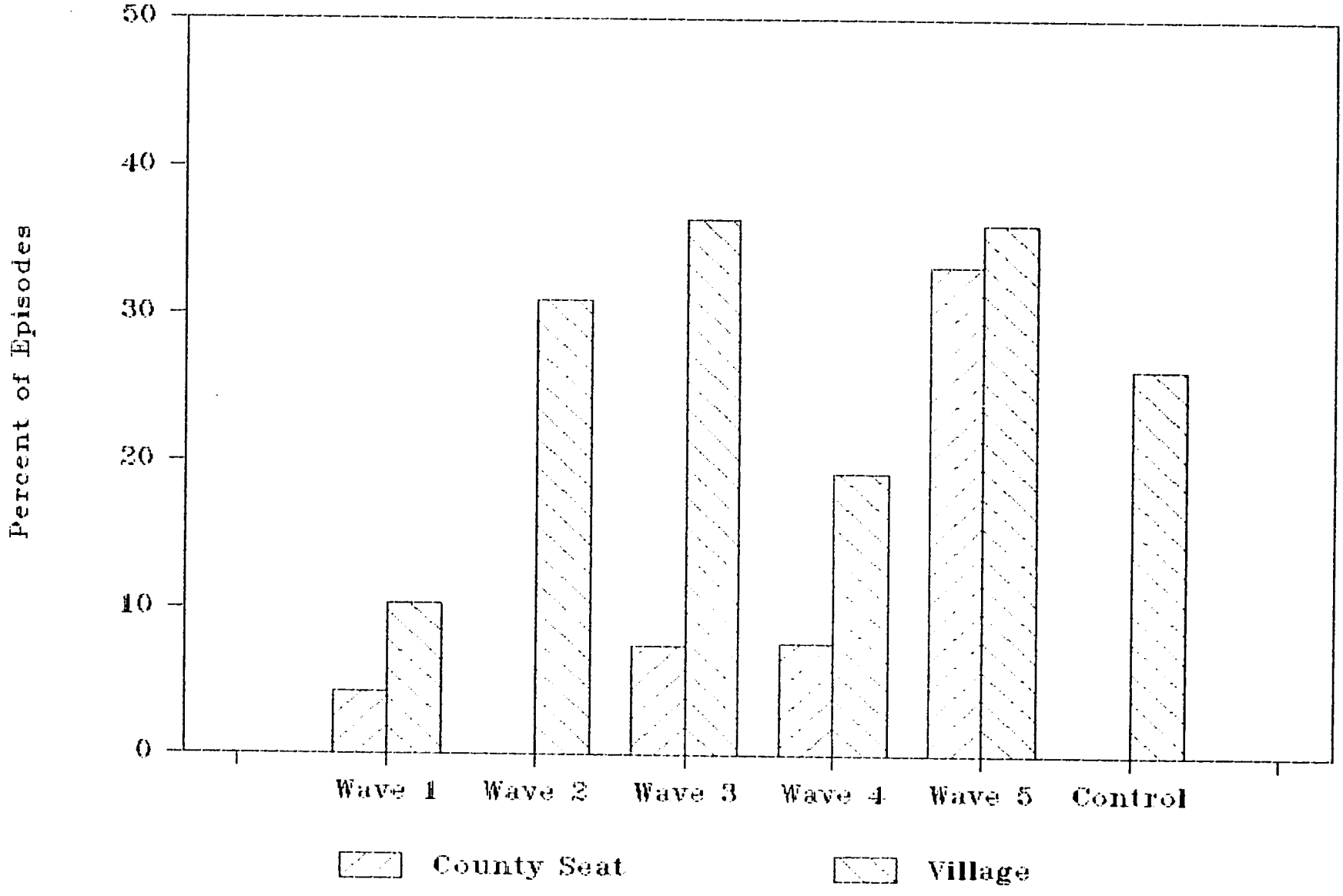
Community Type	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
County Seat	7.7% 2/26	33.3 5/15	33.3 3/9	30.0 3/10	18.8 3/10	37.5 3/8
Village	7.7 14/183	45.9 100/218	45.3 87/192	40.0 54/135	52.6 81/154	41.4 24/58
TOTAL	7.7 16/209	45.1 105/233	44.8 90/201	39.3 57/145	49.4 84/170	40.9 27/66

MORB

Table III.22 Percent of episodes treated with Litrosol by type of community by wave (cases in the last six months)

Community Type	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
County Seat	5.2 5/96	10.6 5/47	13.9 5/36	17.9 4/23	32.0 8/25	11.1 3/27
Village	9.3 46/494	39.1 155/396	36.2 169/467	30.7 75/244	46.8 111/237	37.7 29/77
TOTAL	8.6 51/590	36.1 160/443	38.4 174/453	29.6 79/267	44.4 119/268	37.6 32/85

Figure III-8 Percent of Episodes Treated with Litrosol by Type of Community by Wave (treatment of cases in the past two weeks).



MORB

(6) Litrosol Use and Severity indicators

Data on a number of indicators of the severity of episodes of diarrhea and about signs of dehydration were collected with the view of ascertaining whether the use of Litrosol would vary as a function of these characteristics. The hypothesis formulated was that mothers would be more likely to use Litrosol when they perceive the episode of diarrhea was more serious than usual or when it involved signs of dehydration.

A detailed look at the relationship between Litrosol use and each of the symptoms of severity and the signs of dehydration is presented in Table III-23. None of the items show a consistently significant relationship with Litrosol use but an overall pattern supporting the hypothesis proposed is clearly evident. This is particularly the case for variables such as the number of stools and the mother's impression about the severity of the episode.

We then examined the relationship between the characteristics of the episode and Litrosol use by multivariate regression analyses. The definitions for the variables used are shown in Table III-24. Ordinary least squares (OLS) regression analyses were carried out as a preliminary step prior to running the more appropriate but more costly logistic regressions. The results of the OLS analyses are shown in Table III-25 for cases of diarrhea in the last two weeks and in Table III-26 for cases of diarrhea on the day of the interview. As may be recalled, if a child was sick on the day of the interview, the interviewer observed and recorded the presence of any signs of dehydration. The regression in Table III-25 contain data on fewer variables but include more cases than those of Table III-26. The statistics shown in Tables III-25 and 26 include sample sizes, univariate correlations, beta values (only if t is greater than 1.00), t values (only if greater than 1.00), and the multiple r.

The regressions presented in Table III-25 strongly suggest that mothers use Litrosol more often for cases they perceive to be more serious. A number of variables behave in very consistent

Table III- 23 Relationship between Litrosol Use and Severity Indicators Over Time++++

Variable	Wave 1 N	Wave 1 %	Wave 2 N	Wave 2 %	Wave 3 N	Wave 3 %	Wave 4 N	Wave 4 %	Wave 5 N	Wave 5 %	Control N	Control %
Duration+of episode:												
Short (≤5 days)	20/259	7.7	26/128	20.3	45/148	30.4	15/82	18.3	27/70	38.6	1/14	7.1
Long (>5 days)	14/119	11.8	23/69	33.3	39/100	39.0	7/40	17.5	8/28	28.6	4/5	80.0
	N.S.		p < .0652		N.S.		N.S.		N.S.		p < .0061	
Fever +												
No	25/268	9.3	35/148	23.6	44/133	33.1	13/79	16.5	23/67	34.3	2/13	15.4
Yes	10/111	9.0	20/62	32.3	40/115	34.8	9/43	20.9	12/31	38.7	3/6	50.0
	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
Blood in stools+												
No	27/324	8.3	44/171	25.7	66/197	33.5	17/103	16.5	25/76	32.9	4/15	26.7
Yes	8/55	14.5	10/38	26.3	18/51	19.6	5/19	26.3	10/22	45.5	1/4	25.0
	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
No. of stools +												
Few (≤ 6)	15/271	5.5	39/156	25.0	54/175	30.9	9/87	10.3	35/97	36.1	1/8	12.5
Many (>6)	20/110	18.2	15/53	28.3	29/75	38.7	13/35	37.1	0/1	0	4/11	36.4
	p < .0002		N.S.		N.S.		p < .0013		N.S.		N.S.	
Vomiting+												
No	21/282	7.4	40/162	24.7	62/201	30.8	17/90	18.9	24/74	32.4	3/14	21.4
Yes	14/99	14.1	15/48	31.3	21/50	42.0	5/32	15.6	11/24	45.8	1/4	25.0
	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	

(cont'd . . .)

Table III- 23 Relationship between Litrosol Use and Severity Indicators Over Time[++++]

Variable	Wave 1 N	Wave 1 %	Wave 2 N	Wave 2 %	Wave 3 N	Wave 3 %	Wave 4 N	Wave 4 %	Wave 5 N	Wave 5 %	Control N	Control %
Child's appetite[†]												
No change	6/136	4.4	23/94	24.5	28/91	30.8	7/59	11.9	15/38	39.5	1/8	12.5
Somewhat different	10/117	8.5	14/58	24.1	25/67	37.3	9/37	24.3	12/41	29.3	4/9	44.4
Very apathetic	19/121	15.7	18/58	31.0	29/88	31.8	6/26	23.1	8/17	47.1	--	
	$p < .0076$		N.S.		N.S.		N.S.		N.S.		N.S.	
Severity of episode:[+]												
Mild	8/140	5.7	11/68	16.2	17/67	25.4	5/52	9.6	7/26	26.9	2/10	20.0
Moderate	11/115	9.6	16/55	29.1	20/76	26.3	7/32	21.9	7/28	25.0	1/2	50.0
Severe	12/107	11.2	27/81	33.3	41/92	44.6	8/27	29.6	17/33	51.5	1/4	25.0
	N.S.		$p < .0535$		$p < .0121$		$p < .0716$		$p < .0531$		N.S.	
Dry mouth:[++]												
No	7/136	5.1	21/92	22.8	29/97	29.9	6/46	13.0	8/29	27.6	2/3	66.7
Yes	5/19	26.3	2/5	40.0	1/4	25.0	0/1	0	1/3	33.3	-	-
	$p < .0055$		N.S.		N.S.		N.S.		N.S.		N.S.	
Fallen fontanelle:[++]												
No	10/151	6.6	23/97	23.7	30/100	30.0	6/46	13.0	8/31	25.8	2/3	66.7
Yes	2/4	50.0	-	-	0/1	0	0/1	0	1/1	100.0	-	-
	$p < .0241$		-		N.S.		N.S.		N.S.		-	

(cont'd...)

Table III-23 Relationship between Litrosol Use and Severity Indicators Over Time++++

Variable	Wave 1 N	Wave 1 %	Wave 2 N	Wave 2 %	Wave 3 N	Wave 3 %	Wave 4 N	Wave 4 %	Wave 5 N	Wave 5 %	Control N	Control %
Sunken eyes++												
No	8/129	6.2	22/95	23.2	29/96	30.2	5/42	11.9	9/30	30.0	2/3	66.7
Yes	4/26	15.4	1/2	50.0	1/5	20.0	1/5	20.0	0/2	0	-	-
	N.S.		N.S.		N.S.		N.S.		N.S.		-	
Dry eyes ++												
No	9/133	6.8	23/95	24.2	29/92	31.5	5/45	11.1	9/31	29.0	2/3	66.7
Yes	3/20	15.0	0/2	0	1/9	11.1	1/2	50.0	0/1	0	-	-
	N.S.		N.S.		N.S.		N.S.		N.S.		-	
Urine++												
Normal	9/129	7.0	23/89	25.8	25/91	27.5	5/42	11.9	5/22	22.7	2/3	66.7
Dark	3/23	13.0	0/8	0	5/9	55.6	1/5	20.0	4/10	40.0	-	-
	N.S.		N.S.		N.S.		N.S.		N.S.		-	
Severity of episode: +++												
Not severe	4/138	2.9	39/116	33.6	30/100	30.0	27/94	28.7	34/71	47.9	11/33	33.3
Severe	12/72	16.7	67/118	56.8	62/103	60.2	30/51	58.8	50/99	50.5	15/31	48.4
	$p < .001$		$p < .0006$		$p < .0000$		$p < .0008$		N.S.		N.S.	

+ Data collected if child had diarrhea in previous two weeks
++ Data collected if child had diarrhea on day of the interview
+++ Data collected if child had diarrhea in the last six months, but not in previous two weeks.
++++ Significance test was chi-square with Yates correction for continuity

Variables: MORB:DURAQ, FEVERQ,BLOODQ, DUMPSQ, BARFSQ, HNGRQ, EPSDQ, MOUTHQ, FONTQ, EYESQ, DRYEYQ, URINEQ, SEVEREQ

Table III-24 Variables used in multiple regressions

Variables	Coding	Description
LITSOL1Q	1=yes, 0=no	Litrosol use
SEX	1=female, 0=male	Sex of child
D1	Municipl=1, other=0	Sabanagrande county+
D2	Municip2=1, others=0	Yuscaran county+
URBAN	Urban=1, rural=0	Urban/rural
DAYSD	Continuous	Days with diarrhea
FEVER	1=yes, 0=no	Fever
MUCUS	1=yes, 0=no	Mucous in stools
BLOOD	1=yes, 0=no	Blood in stools
DUMPS	Continuous, 1 or more	Number of stools on worst day
BARFS	Continuous, 0 or more	Instances of vomiting on worst day
HNGR	1=same, 2=less, 3=much less	Child's appetite
EPSD	1=mild, 2=moderate, 3=serious	Seriousness of case
MTH	1=yes, 0=no	Dry mouth
FONT	1=yes, 0=no	Fallen fontanel
EYES	1=yes, 0=no	Sunken eyes
DRYEY	1=yes, 0=no	Dry eyes
URINE	1=yes, 0=no	Dark urine

+ Reference would be the municipio of Danli

Table III-25 OLS regressions of symptoms of severity and Litrosol use for diarrhea cases in the last two weeks[+]

Variable	Wave 1			Wave 2			Wave 3			Wave 4			Wave 5			Control		
	r	beta	t	r	beta	t	r	beta	t	r	beta	t	r	beta	t	r	beta	t
MUNICIPIO 1	.186	.180	2.86[b]	-.048			-.208	-.185	-2.67[b]	-.057	-.106	-1.03	-.193	-.186	-1.61	-	-	-
MUNICIPIO 2	-.090			.028			-.120	-.252	-3.65[b]	-.115			.028			-	-	-
URBAN	-.098	-.075	-1.40	-.260	-.278	-3.71[b]	-.208	-.272	-4.05[b]	-.098			-.087			-	-	-
DAYS	.001			.121			.105	.168	2.40[a]	.020			.012	-.125	-1.00	.654	1.11	3.92[a]
FEVER	.029			.120	.091	1.09	.028			.048			.044			.213		
MUCUS	.070			.155	.157	1.93	.007			.148			.168	.136	1.14	.262	1.26	2.74[a]
BLOOD	.068			.021	-.087	-1.14	.036			.075			.062			.075	-.570	-1.80
DUMPS	.177	.163	2.84[b]	.079			.109			.349	.315	2.66[b]	.163			.244		
BARFS	.059			.063			.060			.112			.112			-.182		
HUNGER	.165	.111	1.81	.059			.011			.148			.012	-.181	-1.41	.262	-.863	-1.99
EPISODF	.081			.166	.144	1.51	.179	.155	1.94	.216			.224	.219	1.67	.058		
MULTIPLE R		.3007			.3661			.4211			.3865			.4015			.8940	
N		344			185			222			111			85			15	

a) $p < .05$ b) $p < .01$ Variables: MORB:D1,D2,URBAN, DAYSDQ, FEVERQ, MUCUSQ,BLOODQ, DUMPSQ, BARFSQ, HNGRQ, EPSDQ

+ Beta and t values provided only if $-1.00 < t < +1.00$

Table III-26 OLS regressions of symptoms and signs of severity for cases of diarrhea on the day of the interview+

Variable:	Wave 1 r	Wave 1 beta++	Wave 1 t++	Wave 2 r	Wave 2 beta++	Wave 2 t++	Wave 3 r	Wave 3 beta++	Wave 3 t++	Wave 4 r	Wave 4 beta++	Wave 4 t++	Wave 5 r	Wave 5 beta++	Wave 5 t++
MUNICIP1	.145	.187	1.87	-.035			-.157			-.043			-.159		
MUNICIP2	-.143			.116	.202	1.49	-.194	-.358	-2.70[b]	-.211	-.184	-1.13	-.164	.324	1.27
URBAN	-.036			-.242	-.168	-1.44	-.155	-.184	-1.45	-.100	-.196	-1.18	.112	.430	1.46
DAYS	.053			.217			.013	.192	1.40	-.011			.106	.313	1.02
FEVER	.047			-.035	-.134	-1.06	.129			-.125	-.258	-1.42	.144		
MUCUS	.017			.119			.082			.140			.295	.381	1.55
BLOOD	.055			.153			.168	.149	1.16	-.004	-.306	-1.63	-.268	-.221	-1.07
DUMPS	.324	.317	3.39[b]	.188	.137	1.01	.223	.176	1.33	.356	.272	1.29	.008		
BARFS	.212			.142			.117			-.173			.313		
HUNGER	.135			-.039			.023			-.039			.124		
EPISODE	.137			.175			.170	.203	1.43	.242			.183		
MOUTH	-.297	-.364	-3.65[b]	-.105			.012			N.A.			-.017		
FONTANEL	-.151			N.A.			.065			.056	.507	1.96	-.282	-.509	-1.41
EYES	-.091	.206	1.51	-.102	-.156	-1.12	.132			-.075			.183		
DRYEYES	-.055			.084			.191	.292	1.78	-.235	-.597	-2.12[a]	N.A.		
URINE	-.112			.175	.189	1.44	-.208			-.075			-.194		
MULTIPLE R		.5078			.4996			.5142			.6593			.7921	
N		144			85			91			47			29	

MORB: D1, D2, URBAN, DAYSQ, FEVERQ, MUCUSQ, BLOODQ, DUMPSQ, BARFSQ, HNGRQ, EPSDQ, MTHQ, FONTQ, EYESQ, DRYEYQ, URINEQ

+ Data for control community are not presented because the sample size is too small.

++ Beta and t values provided only if $-1.00 < t < +1.00$

a) $p < .05$ b) $p < .01$ N.A.=not applicable, no cases

ways. Urban (living in a county seat) is most often negative, suggesting higher rates of Litrosol use in rural areas. This is quite plausible, given the easier access to other types of care in the urban centers, such as visits to clinics. However, urban cases classed as clinic visits may still have received Litrosol from the clinic. If one looks at the signs of the sample correlations for the last eight variables of Table III-25, one can observe that only one out of 48 correlations is negative suggesting very strongly that fever, mucus or blood in the stools, frequent bowel movements, vomiting, and impressions of poor appetite and high severity make the mother more likely to use Litrosol. The number of bowel movements has strong positive correlations in all waves and is a significant predictor in two of the waves; clearly, the likelihood of Litrosol use increases with the frequency of bowel movements. The other variables to be significant predictors are days (duration of the episode) and mucus in the stools. Further analyses will be carried out in the combined sample of all waves in order to increase sample size and statistical power.

The regression in Table III-26 is more difficult to interpret for two reasons. First, sample sizes are smaller and this makes all parameters unstable, and second, the new variables (mouth, fontanel, eyes, dryeyes, and urine) have very uneven distributions with only a few cases having a value of 1 (e.g., few cases have a fallen fontanel). We expected, as in Table III-25, that signs of severity would have a positive relationship with Litrosol use. This is not always the case. In fact, "mouth" (dry mouth) and "dryeyes" (dry eyes) are significant negative predictors in two waves. The use of logistical regressions and the pooling of waves may yield more consistent results than the ones in Table III-26.

(7) Sources of Litrosol Packets

Mothers who used Litrosol to treat cases of diarrhea in the past two weeks were asked to report where they obtained the Litrosol packets. The distribution by source is shown in Table III-27 and the same data are also shown in Figure III-9. The data clearly indicate that the guardianes became an important source of Litrosol while the alcalde auxiliares decreased in importance. This shift resulted from a deliberate change in policy by the implementors of the program who began but later abandoned distribution schemes built around the alcaldes auxiliares. The importance of the clinics as a source of Litrosol was maintained throughout the study with the possible exception of wave 4 when a decline was observed; however, the small sample sizes of wave 4 make the certainty of this last observation very tenuous. Hospitals were never an important source of Litrosol. Finally, throughout the study, a variety of mechanisms became important as sources of Litrosol as indicated by the increased values for the variable "other."

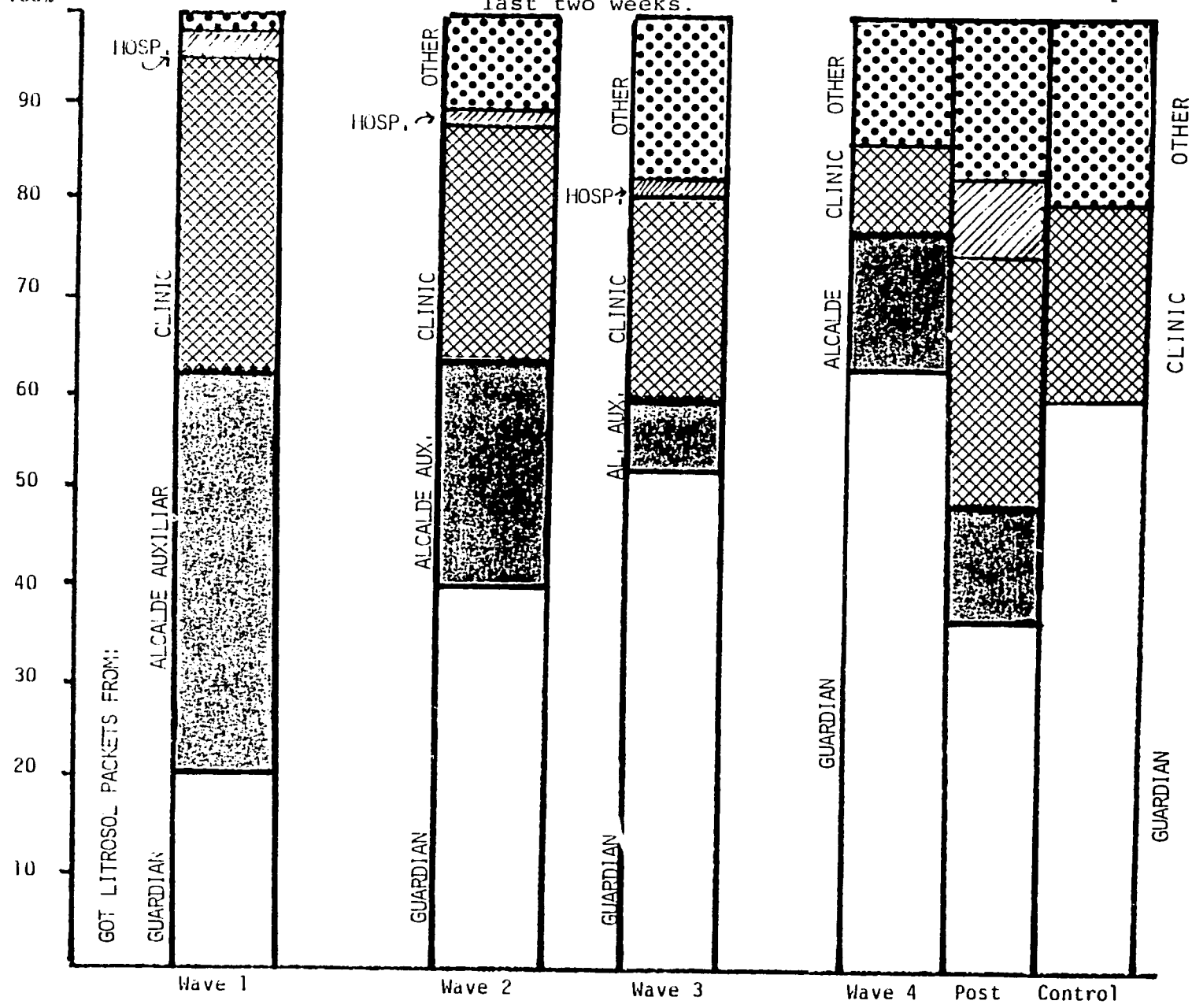
(8) Sources of Information about Litrosol Preparation and Methods of Preparing Litrosol Solutions.

Respondents were asked about Litrosol use by means of a different instrument than the morbidity survey. The sample was a randomly selected panel of half of the mothers interviewed in the baseline families. This panel was visited a number of times except at the final survey when the mothers not visited since the baseline were interviewed. The purpose of this procedure is to provide a check on the effects of the interviewing process per se. In contrast to the morbidity instrument, the health status of children of the respondents was irrelevant for answering questions about Litrosol use. In other words, whether a child had been sick in the previous six months or two weeks was not a criterion for answering the questions in this instrument.

Table III-27 Changes in Source of Litrosol Used to Treat Episodes in Past Two Weeks

Source	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control Group
Guardian	20.0% (7)	40.0 (22)	52.4 (44)	63.6 (14)	37.1 (13)	60.0 (3)
Alcalde auxiliar	42.9 (15)	23.6 (13)	7.1 (6)	13.6 (3)	11.4 (4)	0
Clinic	31.4 (11)	23.6 (13)	21.4 (18)	9.1 (2)	25.7 (9)	20.0 (1)
Hospital	2.9 (1)	1.8 (1)	1.2 (1)	0	8.6 (3)	0
Other	2.9 (1)	10.9 (6)	17.9 (15)	13.6 (3)	17.1 (6)	20.0 (1)
TOTAL	100.0 (35)	100.0 (55)	100.0 (84)	100.0 (22)	100.0 (35)	100.0 (5)

Figure III-9 Change in Source of Litrosol Used to Treat Episodes in last two weeks.



The objective of the instrument was to obtain data on (a) sources of information regarding Litrosol preparation and (b) methods of preparing Litrosol solutions.

The instrument began with questions about Litrosol use. In this broader sample of mothers, Litrosol use increased from 36.7 percent to over 60.0 percent in the final three waves. In the control, Litrosol use was reported to be around 47 percent. The values in Figure III-10 exceed those shown for the morbidity questionnaire in Figure III-5 where over 45 percent of the mothers used Litrosol to treat cases of diarrhea occurring in their children in the six months prior to the interview. Perhaps the discrepancy is explained by confusion regarding the verb "probar" which was used in the question asked of mothers. "Probar" means to try as well as to taste and conceivably mothers who may have tasted the Litrosol solution but who may not have actually used it to treat their children may have answered "yes" to the question "ha probado Litrosol?" (have you ever tasted/used Litrosol?).

Mothers who reported having tried Litrosol were then asked a series of questions regarding the method of preparation of Litrosol and the answers to these questions are shown in Table III-28. The percent of mothers reporting correct techniques generally increased throughout the study period. The first item, mixing the contents of one packet of Litrosol in one liter of water, seems to have reached a ceiling of 97-99 percent correct responses. Mothers improve behaviors regarding using all of one packet, using the whole liter in one day, and shaking the bottle. However, in all these three behaviors there appears to have been a decrease in correct responses in the post-intervention measure. Another explanation is that the decline may actually reflect the effect of interviewing mothers in the active panel who may have responded in ways to please the interviewers, while the mothers in the post-wave may not have been as compelled to do so. Curiously, the control sample reports more correct responses in the post wave than the study sample. Fewer mothers followed the prescribed behaviors of throwing away the leftover

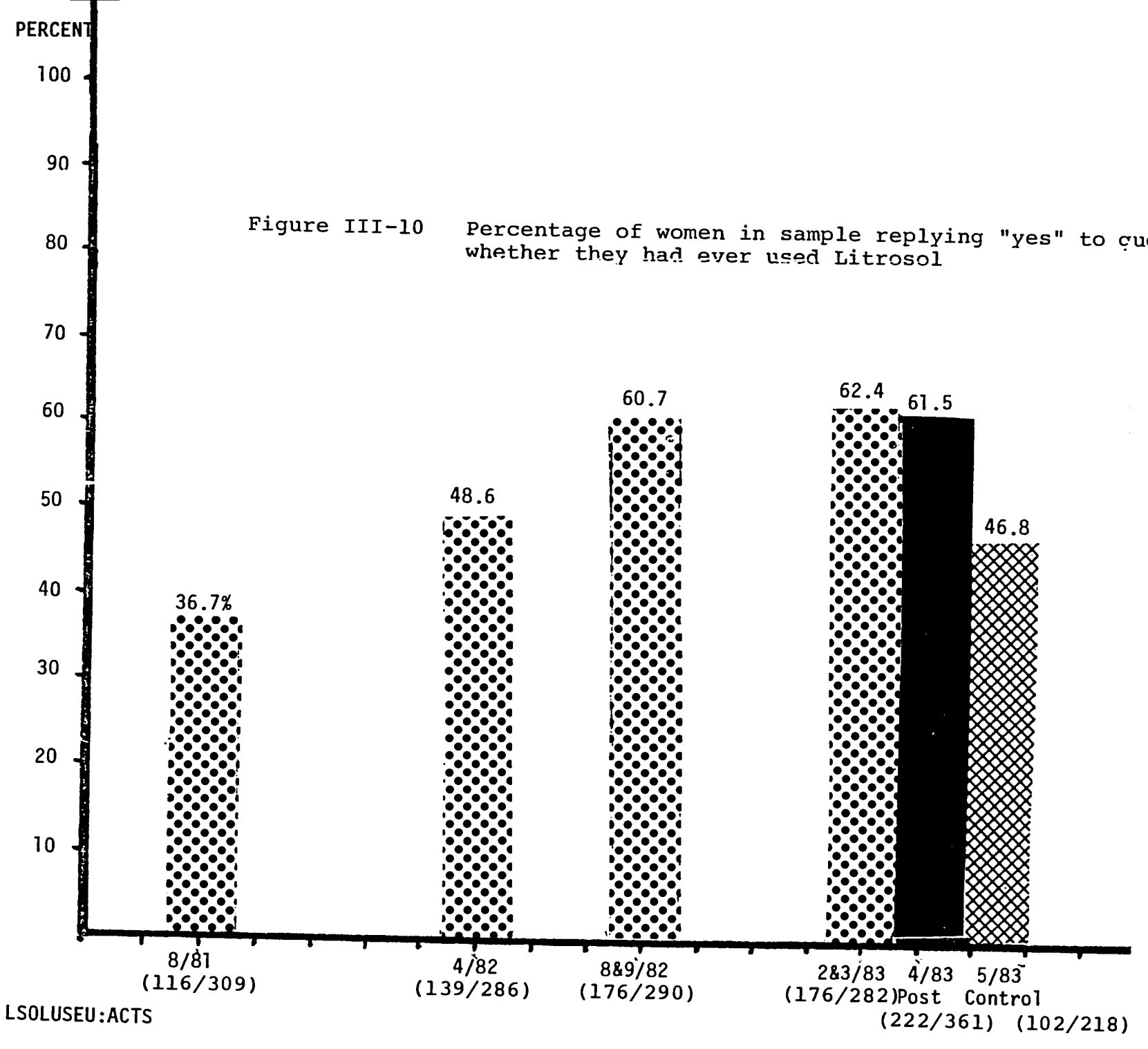


Figure III-10 Percentage of women in sample replying "yes" to question whether they had ever used Litrosol

LSOLUSEU:ACTS

Table III-28. Percentage of women who say they have used Litrosol correctly preparing Litrosol.

	Wave 1 8/81 n=116	Wave 2 4/82 n=139	Wave 3 8&9/82 n=176	Wave 4 2&3/83 n=176	Post 4/83 n=222	Control 5/83 n=102
Mixes in one liter of water	94.0	94.2	94.3	98.9	97.7	90.2
Uses all of one packet	66.4	95.7	94.9	98.3	84.7	90.2
Uses whole bottle in one day	54.3	59.7	81.3	87.5	57.7	70.6
Shakes the bottle	69.0	83.5	88.6	93.8	76.1	91.2
Throws away liquid after one day	35.3	31.7	27.8	51.1	33.8	64.7
Knows to use Litrosol for three days and then take child to health center	12.1	11.2	6.3	9.7	10.4	26.6

ACTS:LSOLMIXU,ONEPACKU,LITRDAYU,DOSHAKEU,ONEADAYU,STOPON3U

amounts after one day and/or using Litrosol for no more than three days. In terms of throwing away the solution after one day, the post measure also indicates a apparent decline in the study sites but higher values in the control site. For the behavior of not using Litrosol for more than three days, the "post" measure does not suggest a decline but the control shows a greater percentage of the correct behavior.

Mothers were questioned about the most useful source of information about Litrosol preparation and these data are shown in Table III-29. Mothers report that they learned most about the preparation of Litrosol from the packet itself. After an increase from 40.4 percent of respondents in wave 1 to 58.0 percent in wave 2, there was a minor decline such that wave 3 was 54.9 percent, wave 4 51.5 percent and the post measure was 49.1 percent. The values for the control site were much greater, 62.0 percent. Part of the reason for the saliency of the packet is that the radio campaign emphasized that directions could be found on the packet. The percentage of mothers that reported about the preparation from guardianes, nurses and doctors decreased initially, but then rose again. The percentage reporting learning from posters was very low throughout the study. Finally, the importance of radio appears to have increased over time.

The questionnaire provided data on two other aspects: (1) the number of days mothers give Litrosol and (2) the use of other medications concurrently with Litrosol.

The distribution of number of days of Litrosol use is shown in Table III-30. There is no apparent trend in these data over time.

The percentage of mothers using other medications concurrently with Litrosol is shown in Table III-31. Mothers report in this questionnaire that they used other medications along with Litrosol in a high percentage of instances. This value was 30.2 percent in wave 1 and then it increased up to wave 4 when it reached 53.1 percent. The post figures are lower, being 38.7

Table III-29 Where mothers learned about the preparation of Litrosol (percent)

	Wave 1 8/81 n=114	Wave 2 4/82 n=138	Wave 3 8&9/82 n=173	Wave 4 2&3/83 n=176	Post 4/83 n=118	Control 5/83 n=99
Litrosol packet itself	40.4%	58.0	54.9	51.1	49.1	62.0
Guardian	21.1	18.8	16.2	27.3	28.6	31.3
Alcalde auxiliar	9.6	10.1	3.5	8.0	6.9	6.1
Doctor/nurse	21.7	14.5	13.9	15.9	38.9	37.4
Poster	0.9	0.7	0	1.1	5.1	1.0
Radio	10.9	14.0	13.7	22.7	27.3	23.4

ACTS:USEPKTU,GUARSHOU,AUXSHOU,DOSHOU,SEEPOSTU,RADSAYU

Table III-30 Number of days Litrosol treatment is given

Days Used	Wave 1 n=112	Wave 2 n=139	Wave 3 n=173	Wave 4 n=175	Wave 5 n=220	Control n=100
1	41.1%	27.3	42.8	35.4	44.5	25.0
2	33.0	35.3	30.6	37.7	23.2	34.0
3	14.3	23.0	18.5	17.1	19.1	23.0
4	4.5	4.3	2.3	2.9	5.9	5.0
5 or more	7.1	10.1	5.8	6.9	7.3	13.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

ACTS:DAYUSEU

Table III-31 Use of other medications concurrently with Litrosol

	Wave 1 8/81 n=86	Wave 2 4/82 n=139	Wave 3 8&9/82 n=175	Wave 4 2&3/83 n=174	Post 4/83 n=222	Control 5/83 n=100
Use of other medication	30.2	45.3	51.4	53.1	38.7	40.0

ACTS:ANYELSEU

Table III-32 Percentage of mothers reporting having a bottle, pacifier, and Litrosol packets

Item	Wave 4 N=282	Post n=361	Control n=218
Has bottle?	77.7%	66.8	53.2
Has pacifier?	41.1	47.4	42.7
Has Litrosol packet?	23.8	17.2	8.3

ACTS:HASBOTLU,HASNIPLU,HASLITSU

percent in the study sites and 40.0 percent in the control communities.

Finally, new questions were added to the fourth and post waves regarding the percentage of mothers owning bottles or pacifiers and having Litrosol packets. These data are given in Table III-32. Around three-quarters of the mothers have bottles and about half have pacifiers; children in these families are therefore at greater risk of contamination by diarrheal disease pathogens. Twenty-three percent had Litrosol packets in the home in wave 4, a figure which declined slightly (17 percent) in the post wave and which was much lower in the control sites.

(9) Trends in Treatments for Diarrheal Diseases

Through the morbidity questionnaire we have also collected data on treatments followed for cases of diarrheal diseases including information about traditional and cosmopolitan remedies and about visits to folk healers and medical and public health personnel. Table III-33 shows the percent of mothers (who had a child ill with diarrhea in the two weeks or six months prior to the interview) following specific treatments or behaviors. Mothers may have followed one or more courses of action.

None of the traditional treatments (oil, laxative, sulfa, bismuto, pildora de la vida, resin, and other laxatives) were reported as frequently as Litrosol (see Table III-10 and Figure III-5). Earlier in the course of the study, it appeared that the use of popular laxatives and medications was declining. However, this phenomenon was transient because in the post-intervention survey (wave 5), use of these remedies was as high or higher than earlier in the study sites. Of course, it could also be that the reported use of these remedies was lower in the active panel because of a deliberate attempt to appear more "modern." Use was also similar or greater in the control sites in comparison to values for wave 1 in the study sites.

Table III.33: Changes in treatments for recent bouts of diarrhea

Behavior	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control
Uses oil (EATOILQ)	7.1% (27/378)	4.8 (10/209)	5.7 (14/244)	2.5 (3/122)	6.3 (6/95)	5.6 (1/18)
Uses laxative (EATLAXQ)	5.6 (21/378)	3.3 (7/209)	0.8 (2/244)	2.5 (3/122)	7.2 (7/97)	10.5 (2/19)
Uses sulfa (EATSUFQ)	7.1 (27/378)	7.2 (15/209)	12.7 (31/244)	1.6 (2/122)	13.5 (13/96)	5.3 (1/19)
Uses bismuto (EATBISQ)	18.3 (69/378)	15.3 (32/209)	13.5 (33/244)	23.8 (29/122)	22.9 (22/96)	15.8 (3/19)
Uses pildora de la vida (EATPILQ)	5.3 (20/378)	1.0 (2/209)	3.3 (8/244)	0	16.3 (6/96)	5.3 (1/19)
Uses resin (EATRESQ)	3.4 (13/378)	1.4 (3/209)	0.8 (2/244)	1.6 (2/122)	3.2 (3/95)	5.3 (1/19)
Uses other laxatives (EATORQ)	7.9 (29/368)	8.6 (18/210)	4.5 (11/245)	8.3 (10/122)	19.6 (18/92)	21.1 (4/19)
Child taken to clinic for episode in last 2 weeks (CLINICQ)	20.1 (76/379)	19.0 (40/210)	17.1 (42/245)	19.0 (11/122)	20.2 (19/95)	21.1 (4/19)
Child taken to VHW for episode in last 2 weeks (VHWQ)	12.4 (47/379)	9.0 (19/210)	13.9 (34/245)	10.7 (13/122)	10.4 (10/96)	21.1 (4/19)
Child taken to sobadora for episode in last 2 weeks (SOBQ)	10.3 (39/379)	2.9 (6/210)	3.7 (9/245)	0.8 (1/122)	3.1 (3/96)	0 (0/19)

continued . . ./

Table III -33 Changes in treatments for diarrheal disease (continued)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Control
Child taken to clinic for a prior episode (PCLINICQ)[1]	31.0 (65/210)	28.1 (66/235)	31.0 (63/203)	22.1 (32.145)	29.2 (49/168)	27.3 (18/66)
Child taken to village health worker for prior episode (PVHWQ)[1]	8.6 (18/210)	9.8 (23/235)	12.3 (25/203)	14.5 (21/145)	15.3 (26/170)	15.2 (10/66)
Child taken to sobadora for a prior episode (PSOBQ)[1]	2.4 (5/210)	7.2 (17/235)	2.5 (5/203)	6.2 (9/145)	3.6 (6/167)	10.6 (7/66)

[1]These categories include children who were sick in the last six months but not in the last two weeks.

Table III-33 also shows data on whether the child was taken to the clinic, the village health worker or the sobadora (folk healer, masseuse). Visits to the sobadora appear to have declined according to the data for diarrhea in the previous two weeks. The frequency of visits to the village health worker or to the clinic appear to have remained stable for the more reliable data of cases in the last two weeks. When data for cases of diarrhea in the previous six months (but not in the last two weeks) are examined, the popularity of visits to the village health worker appear to have increased.

It may be recalled that in Table III-31 data were shown about the use of other medications concurrently with Litrosol. There, nearly half of the mothers who were asked reported using multiple approaches to treatments. More specific data on this issue were collected through the morbidity questionnaire. One perspective holds that Litrosol use is a "modern" behavior and for this reason we felt that Litrosol use would be negatively associated with the use of traditional treatments. A test of this hypothesis is shown in Table III-34. None of the associations are significant and if anything, there is a tendency for traditional treatments and Litrosol use to be associated.

Other analyses also tested associations between use of Litrosol and "curers." We expected Litrosol use to be associated with visits to the clinic and to visits to the village health worker. Table III-35 (for episodes in the previous two weeks) and Table III-36 (for episodes in the previous six months) present data on this hypothesis. Litrosol use, as expected, is strongly associated with visits to the clinic and with contacts with the village health worker but not with <u>sobadoras</u>.

Table III-34 Association between Litrosol use and other popular diarrheal disease treatments

Variable		Wave 1 n	Wave 1 %	Wave 2 n	Wave 2 %	Wave 3 n	Wave 3 %	Wave 4 n	Wave 4 %	Wave 5 n	Wave 5 %	Control n	Control %
Oils:	No	32/350	9.1	51/199	25.6	77/230	33.5	22/119	18.5	31/89	34.8	4/17	23.5
	Yes	3/27	11.1	4/10	40.0	6/14	42.9	0/3	0	4/6	66.7	1/1	100.0
		N.S.+		N.S.		N.S.		N.S.		N.S.		N.S.	
Laxatives:	No	31/356	8.7	52/202	25.7	82/242	33.9	21/119	17.6	30/90	33.3	4/17	23.5
	Yes	4/21	19.0	3/7	42.9	1/2	50.0	1/3	33.3	5/7	71.4	1/2	50.0
		N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
Sulfa:	No	34/350	9.7	51/194	26.3	74/213	34.7	22/120	17.3	27/83	32.5	5/18	27.8
	Yes	1/27	3.7	4/15	26.7	9/31	29.0	0/2	0	7/13	53.8	0/1	0
		N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
Bismuto:	No	27/308	9.7	51/194	26.3	74/213	34.7	22/120	18.3	27/83	32.5	5/18	27.8
	Yes	8/69	11.6	10/32	31.3	9/33	27.3	5/29	17.2	8/22	36.4	2/3	66.7
		N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
Pildora de la Vida:	No	31/357	8.7	55/207	26.6	80/236	33.9	22/122	18.0	33/90	36.7	5/18	27.8
	Yes	4/20	20.0	0/2	0	3/8	37.5	-	-	2/6	33.3	0/1	0
		N.S.		N.S.		N.S.		N.A.++		N.S.		N.S.	
Resins:	No	33/364	9.1	54/206	26.2	81/242	33.5	22/120	18.3	33/92	35.9	5/18	27.8
	Yes	2/13	15.4	1/3	33.3	2/2	100.0	0/2	0	1/3	33.3	0/1	0
		N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	
Other Laxatives:	No	32/338	9.5	51/192	26.6	81/234	34.6	21/111	18.9	27/74	36.5	4/15	26.7
	Yes	2/29	6.9	4/18	22.2	3/11	27.3	1/10	10.0	5/18	27.8	1/4	25.0
		N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	

+ Significance test used was chi-square with Yates' correction for continuity

++ Cannot be computed when number of non-empty columns is one.

MORB: EATOILQ, EATLAXQ, EATSUFQ, EATBISQ, EATPILQ, EATRESQ, EATORQ

Table III-35 Association between Litrosol use and health-seeking behavior for cases in the last two weeks

Variable	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5		Control	
	n	%	n	%	n	%	n	%	n	%	n	%
Child taken to clinic:												
No	24/302	7.9	44/170	25.9	66/203	32.5	17/111	15.3	28/75	37.3	2/15	13.3
Yes	11/76	14.5	11/40	27.5	17/42	42.9	5/11	45.5	6/19	31.6	3/4	75.0
	N.S.+		N.S.		N.S.		$p < .0386$		N.S.		$p < .0374$+++	
Child taken to village health worker:												
No	24/331	7.3	42/191	22.0	56/211	26.5	16/109	14.7	28/86	32.6	2/15	13.3
Yes	11/47	23.4	13/19	68.4	28/34	82.4	6/13	46.2	7/10	70.0	3/4	75.0
	$p < .0009$		$p < .0000$		$p < .0000$		$p < .016$		$p < .0476$		$p < .0374$+++	
Child taken to sobadora:												
No	31/339	9.1	54/204	26.5	80/236	33.9	21/121	17.4	33/93	35.5	5/19	26.3
Yes	4/39	10.3	1/6	16.7	4/9	44.4	1/1	100.0	2/3	66.7	-	-
	N.S.		N.S.		N.S.		N.S.		N.S.		N.A.++	

+Significance test used was chi-square with Yates' correction for continuity
++Cannot be completed when the number of non-empty columns is one. +++Significance test used was Fischer's Exact test. Variables: MORB: CLINICQ, VHWQ, SOBQ, LITSOLQ

Table III-36 Association between Litrosol use and health-seeking behavior for cases in the previous six months but not in the past two weeks

Variable	Wave 1		Wave 2		Wave 3		Wave 4		Post		Control	
	n	%	n	%	n	%	n	%	n	%	n	%
Child taken to clinic:												
No	2/145	1.4	63/168	37.5	50/140	37.5	38/113	33.6	51/119	42.9	12/48	25.0
Yes	14/65	21.5	43/66	65.2	42/63	66.7	19/32	59.4	31/49	63.3	15/18	83.3
	$p < .0000^{+}$		$p < .0002$		$p < .0001$		$p < .0152$		$p < .0254$		$p < .0001$	
Child taken to village health worker:												
No	16/192	8.3	87/211	41.2	72/178	40.4	40/124	32.3	60/144	41.7	21/56	37.5
Yes	0/18	0	19/23	82.6	20/25	80.0	17/21	81.0	24/26	92.3	6/10	60.0
	N.S.		$p < .0004$		$p < .0005$		$p < .0001$		$p < .0000$		N.S.	
Child taken to sobadora:												
No	16/205	7.8	97/217	44.7	89/198	44.9	52/136	38.2	81/161	50.3	25/59	42.4
Yes	0/5	0	9/17	52.9	3/5	60.0	5/9	55.6	2/6	33.3	2/7	28.6
	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	

+ Significance test used was chi-square with Yates' correction for continuity
MORB: CLINICQ, PVHW, PSOBQ, PLITSQ

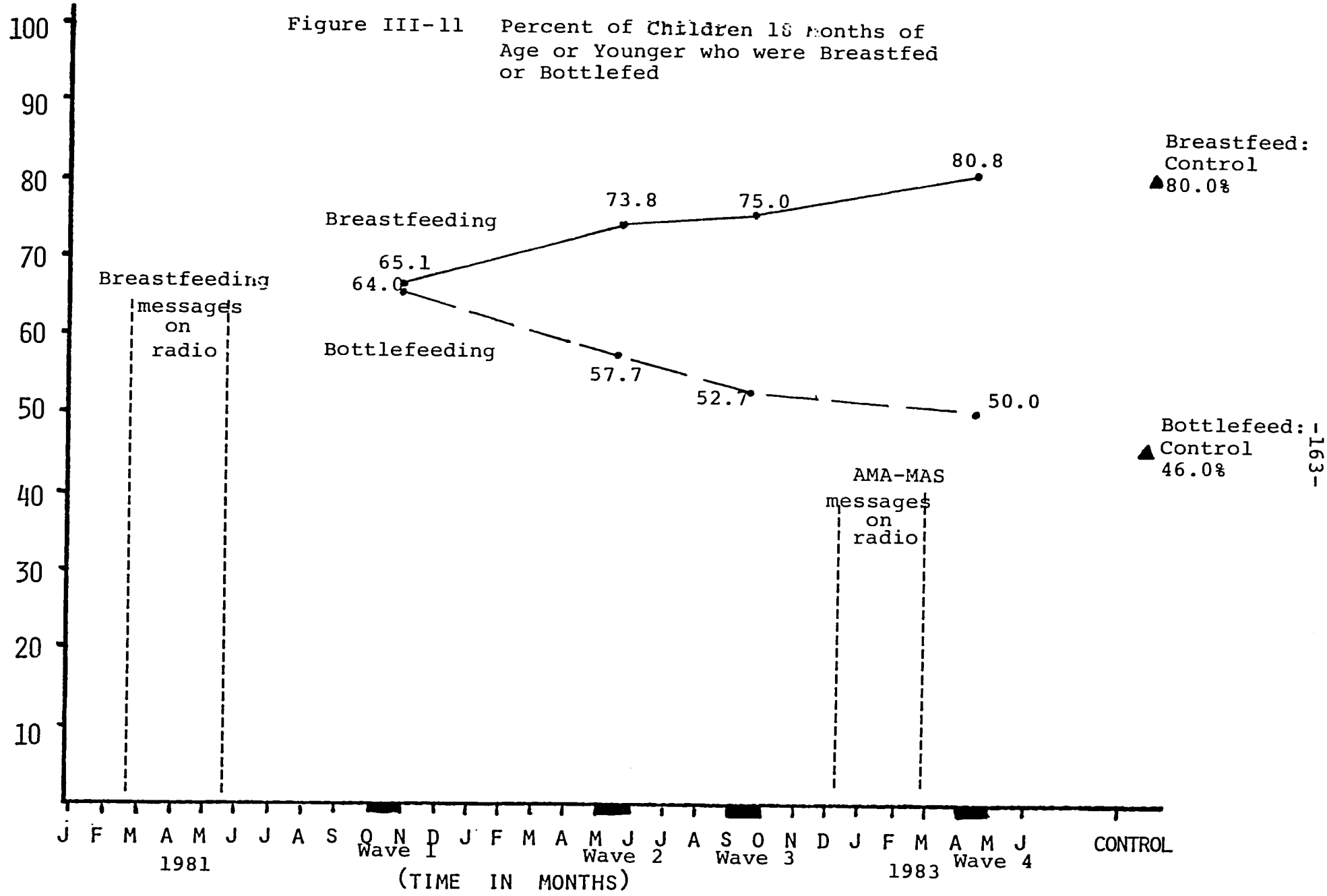
B. Feeding Behavior

(1) Breastfeeding of Young Children

During the campaign, two message phases stressed the importance of breastfeeding and recommended that Honduran women breastfeed their babies. The first group of messages, broadcast with other messages on diarrhea and liquids from March through June 1981, described breastmilk as more nourishing and safer than formula and congratulated mothers who breastfed their babies. From the middle of December 1982 through March 1983, AMA-MAS ("Love More") an intensive breastfeeding radio course was broadcast. The primary messages were that the mother should breastfeed the child exclusively for the first four months, then add supplemental feedings, that breastfeeding is a modern health-giving behavior, and that bottlefeeding leads to increased diarrhea and reduced breastmilk production. Questions were asked about breast and bottlefeeding in the baseline interview (January to March 1981) and in more detailed questionnaires on child nutrition in October/November 1981, May/June 1982, September/October 1982, and April/May 1983. The questions were asked about every child under three years old.

Almost all children in Honduras are breastfed at some time (90.6 percent). However bottlefeeding of young children is also common. Approximately 40 percent of the children in each interview wave were both bottle and breastfed. Figure III-11 shows the change over time in reported breast and bottlefeeding of children 18 months and younger. Over the course of the campaign, there was a steady increase in reported breastfeeding and a decrease in bottlefeeding. At the start of measurement, 65 percent of children 18 months or younger were reportedly breastfed and, at the end of the campaign, 81 percent of the children were breastfed. At the time of the first interview, 64 percent of the mothers reported bottlefeeding of the young children, 50 percent at the end of the campaign. In both cases,

Figure III-11 Percent of Children 18 Months of Age or Younger who were Breastfed or Bottlefed



BABE:TITGIVY1-YM,
MILKPEPY1-YM

the control group responses were very similar to those of the study group (80 percent breastfed and 46 percent bottlefed), suggesting that mother's responses were not influenced by earlier interviews.

The specific influence of the AMA-MAS course on incidence of breastfeeding and bottlefeeding is not clear. Both practices were changing in the direction desired before the AMA-MAS campaign. Because there was no measure immediately before the AMA-MAS course, it is not known whether practice had levelled off before the campaign and changed dramatically immediately after or whether the AMA-MAS campaign contributed further to the already existing behavior change.

Mothers who reported breastfeeding, breastfed their children for an average of 13 months. Approximately one-quarter of these mothers had stopped breastfeeding by the time the child was six months old, approximately 50 percent had stopped by 12 months, and 80 to 85 percent had stopped by the time the child was 18 months. As can be seen in Table III-37 these figures didn't change over the course of the campaign. The most common reasons given for stopping breastfeeding were pregnancy, the child's age, illness of the mother or the child, or work.

Bottlefeeding was started early. As Table III-38 shows, in the three interviews before the AMA-MAS course, slightly over half of the children who were bottlefed had started at one month old and up to 75 percent had started bottlefeeding by four months. The age at which bottlefeeding was started did change during the campaign. There was no change during the first three waves of interviews, but the results of the April/March interviews, after the AMA-MAS course, showed that mothers started bottlefeeding at a later age. Forty percent of the mothers started bottlefeeding a child at one month as compared to 50 percent in the earlier interviews. Sixty-eight percent had started by the time the child was four months old, compared to 75 percent in the previous wave. The AMA-MAS campaign seems to have influenced mothers to start bottlefeeding their children later.

Table III- 37 Age of Child when Breastfeeding was Stopped

Percent of children who had stopped breastfeeding:	Wave 1 n=266 10&11/81	Wave 2 n=168 5&6/82	Wave 3 n=172 9&10/82	Wave 4 n=176 4&5/83	Control n=50 6/83
by six months	23%	24	23	27	18
by 12 months	52	48	51	50	58
by 18 months	82	80	85	84	80
Mean age:	12.8 mo.	13.1	12.7	12.8	13.3

BABE:WNQUITY1-M

Table III- 38 Age of Child when Bottlefeeding was Started

Age by which bottlefeeding was started:	Wave 1 n=330 10&11/81	Wave 2 n=235 5&6/82	Wave 3 n=243 9&10/82	Wave 4 n=242 4&5/83	Control n=97 6/83
One month	52%	52	53	40	43.3
Four months	74	72	75	68	78
Eight months	83	83	88	84	92.8
12 months	92	90	91	92	94.8
Over 12 months	100	100	100	100	100.0
Mean age:	4.1 mo.	4.2	3.7	4.6	3.9

BABE:AGEGIVY1-M

The mean age at which bottlefeeding was stopped was approximately 16 months across all waves.

(2) Feeding During Diarrhea

In addition to recommending general breastfeeding, PROCOMSI messages during the first two years suggested continuing to breastfeed during diarrheal bouts and giving the child lots of liquids to avoid dehydration. Questions about these practices were asked in the morbidity interviews June/July 1981, March 1982, August/September 1982, February/March 1983 and in the post-campaign interviews in April and May 1983.

a. Breastfeeding During Diarrhea

Mothers with a child who had had diarrhea in the last two weeks were asked if they continued breastfeeding the child during the episode and if they continued bottlefeeding. Figure III-12 and Table III-39 below presents the results for children 18 months and younger.

Breastfeeding during diarrhea increased slightly from July 1981 to March 1982, dipped back down by August/September 1982, shot up between September 1982 and February 1983, then dropped back down to a level higher than before the broadcast of the messages (71.7 percent compared to 65.8 percent of the cases in the last two weeks). Reported bottlefeeding decreased between July 1981 and March 1982, then started a steep increase continuing to February/March 1983, and dropping steeply a month later.

The slight increase in reported breastfeeding and the concurrent small decrease in bottlefeeding between July 1981 and March 1982 may reflect mothers' responses to the campaign messages broadcast from November 1981 to March 1982 and also to previous messages that breastfeeding is best. Broadcasts about breastfeeding were replaced by messages about Litrosol from March 1982 until October 1982, when an intensive campaign on

Figure III-12 Breastfeeding and Bottlefeeding of Children 18 months and under during the Last Bout of Diarrhea (percent of children with diarrhea in the last two weeks)

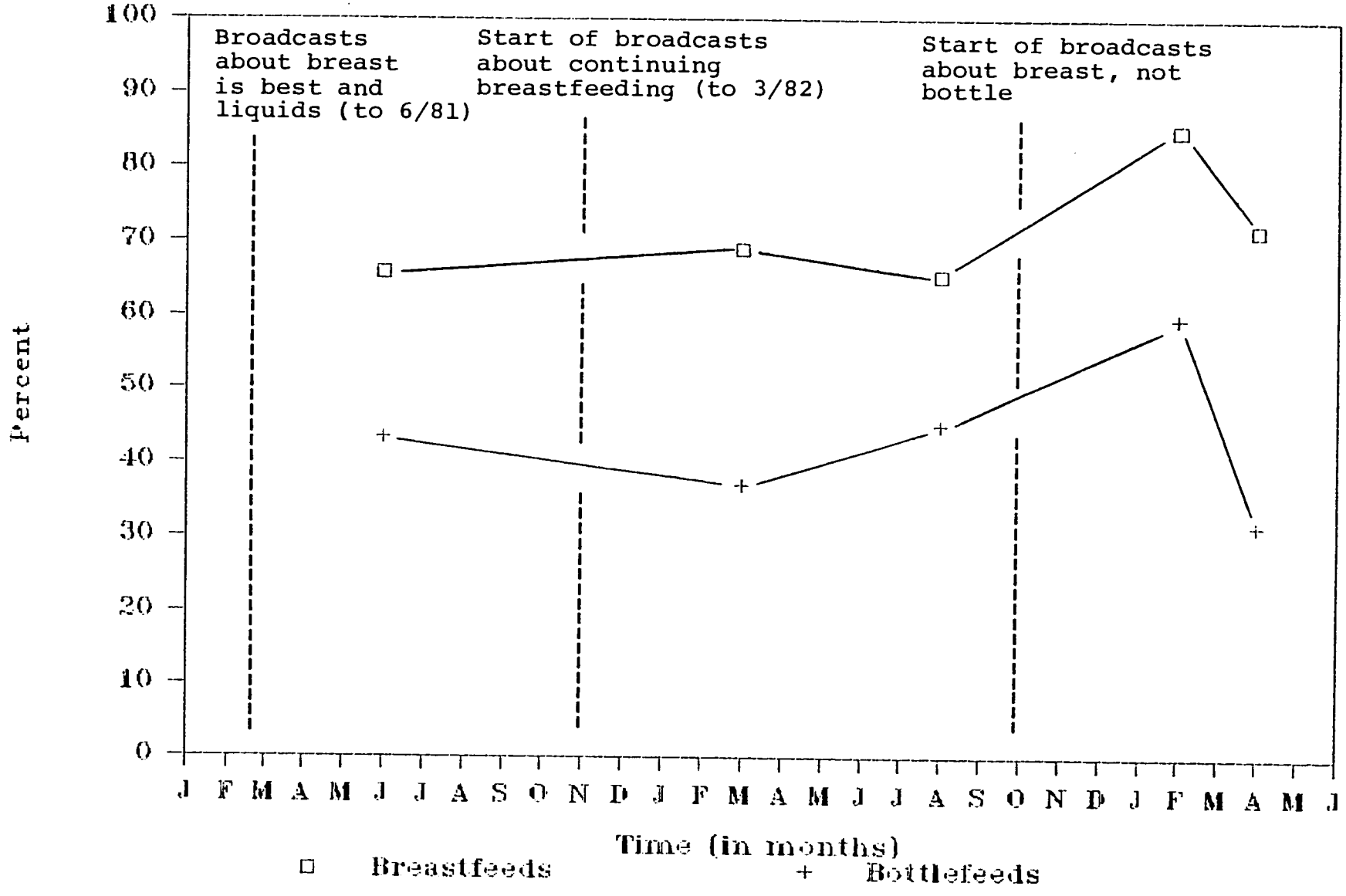


Table III- 39 Breastfeeding and Bottlefeeding of Children 18 months and Under During the Last Bout of Diarrhea (Percent of children with diarrhea in the last two weeks)

	Wave 1 (6,7/81)	Wave 2 (2,3/82)	Wave 3 (5,6/82)	Wave 4 (12/82-1/83)	Post (5,6/83)	Control (5,6/83)
Percent being breastfed	65.8% (98/149)	69.0 (49/71)	65.4 (34/52)	85.1 (40/47)	71.7 (33/46)	67.7 (4/6)
Percent bottlefed	43.5 (64/147)	37.1 (26/70)	45.1 (23/51)	59.6 (28/47)	31.8 (14/44)	40.0 (2/5)

MORB:BRST1Q-PQ,BOTLFD1Q-PQ

breastfeeding was started. During this time, continued breastfeeding dropped and bottlefeeding during diarrhea rose.

The sharp increase in both breastfeeding and bottlefeeding between September 1982 and February/March 1983 and the steep drop in both by April/May 1983 are difficult to understand. A possible explanation for the sudden rise and fall of breastfeeding and bottlefeeding can be seen in Figure III-13 in the next section on giving liquids during diarrhea. For young children (one year and younger), giving liquids such as water, coffee, and juice dropped sharply during the time breast- and bottlefeeding increased, then increased sharply while breastfeeding and bottlefeeding dropped. Perhaps in response to increased messages on breastfeeding and few messages on giving liquids, mothers may have replaced other liquids with milk or stressed milk in the interviews because of its importance in the campaign at that time. In April/May 1983, after the end of the intensive campaign, breastfeeding and bottlefeeding may have lost some of their salience.

Overall, after the end of the campaign, more children were reportedly breastfed during diarrhea than at the beginning (71.7 percent compared to 65.8 percent). Reported bottlefeeding decreased by the end of the campaign, from 43.5 percent to 31.8 percent of the children.

b. Liquids During Diarrhea

Messages broadcast from March-June 1981 stressed that children become very thirsty during diarrhea and that they should be given lots of liquids. Mothers were asked if their child had been more thirsty during the last bout and if she had given him or her water, coffee, juices, soft drinks or other liquids. There was an increase by the end of the campaign in mothers reporting the child to be thirstier; in June/July 1981, 70 percent of the children sick in the last two weeks were reported to be thirstier as compared to 87 percent after the end of the campaign.

Giving any liquids during diarrhea was common behavior from the start and did not change greatly over the course of the campaign. Figure III-13 shows the percentage of children given any kind of liquid during diarrhea. The response by the control group is almost the same as that for the post-campaign group, suggesting that women's responses about giving any liquids were not influenced by being interviewed. Water was the most frequently given liquid, followed by coffee, juice, soda, and other liquids.

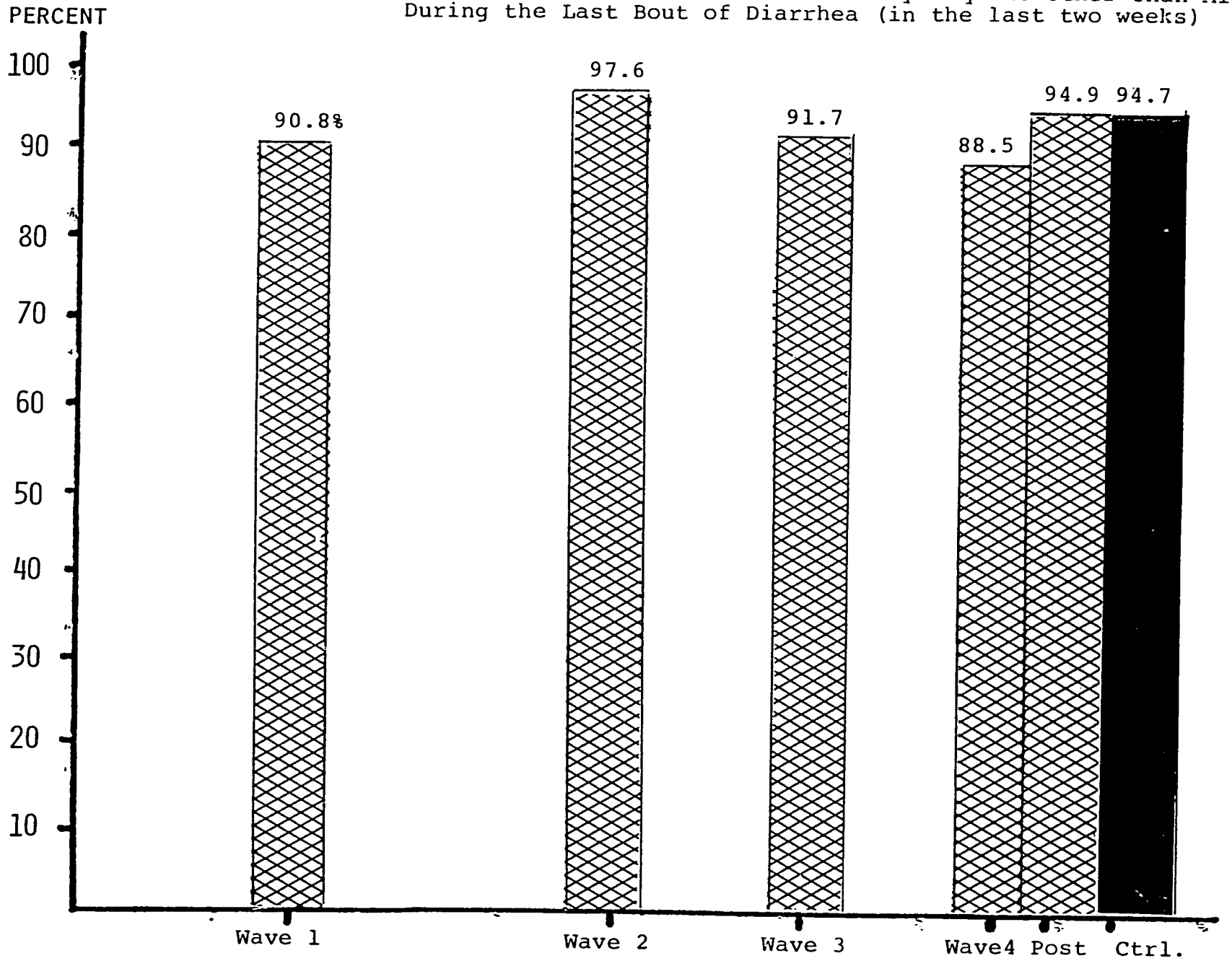
Of greater importance was whether the mother gave the child more liquids than usual. In each question about liquids, the mother was asked if she gave the child more, the same amount, or less of each liquid.

Figure III-14 and Table III-40 shows the distribution of responses to these questions. Initially, the percentage of children receiving more liquids greatly increased (from 64.7 percent to 82.4 percent) from July 1981 to March 1982, the time period immediately after the broadcasts. Giving more liquids declined somewhat in the following year, but stayed higher than in the first interview wave. At the end of the campaign, 79 percent of the children were reportedly being given more liquids, a substantially higher proportion than in the first interview. The figure also illustrates the distribution of responses for each type of liquid.

The responses from the control group suggest that the percentages of children given more of any liquids, and more water in particular, may be slightly inflated due to mothers having been questioned previously. Thirteen of the 19 children in the control group who had had diarrhea in the last two weeks (68.4 percent) were given more liquids as compared to 79.2 percent of the children in the post wave. Although the control group is very small, this result suggests that the increase in giving more liquids may not be as large as the responses indicate.

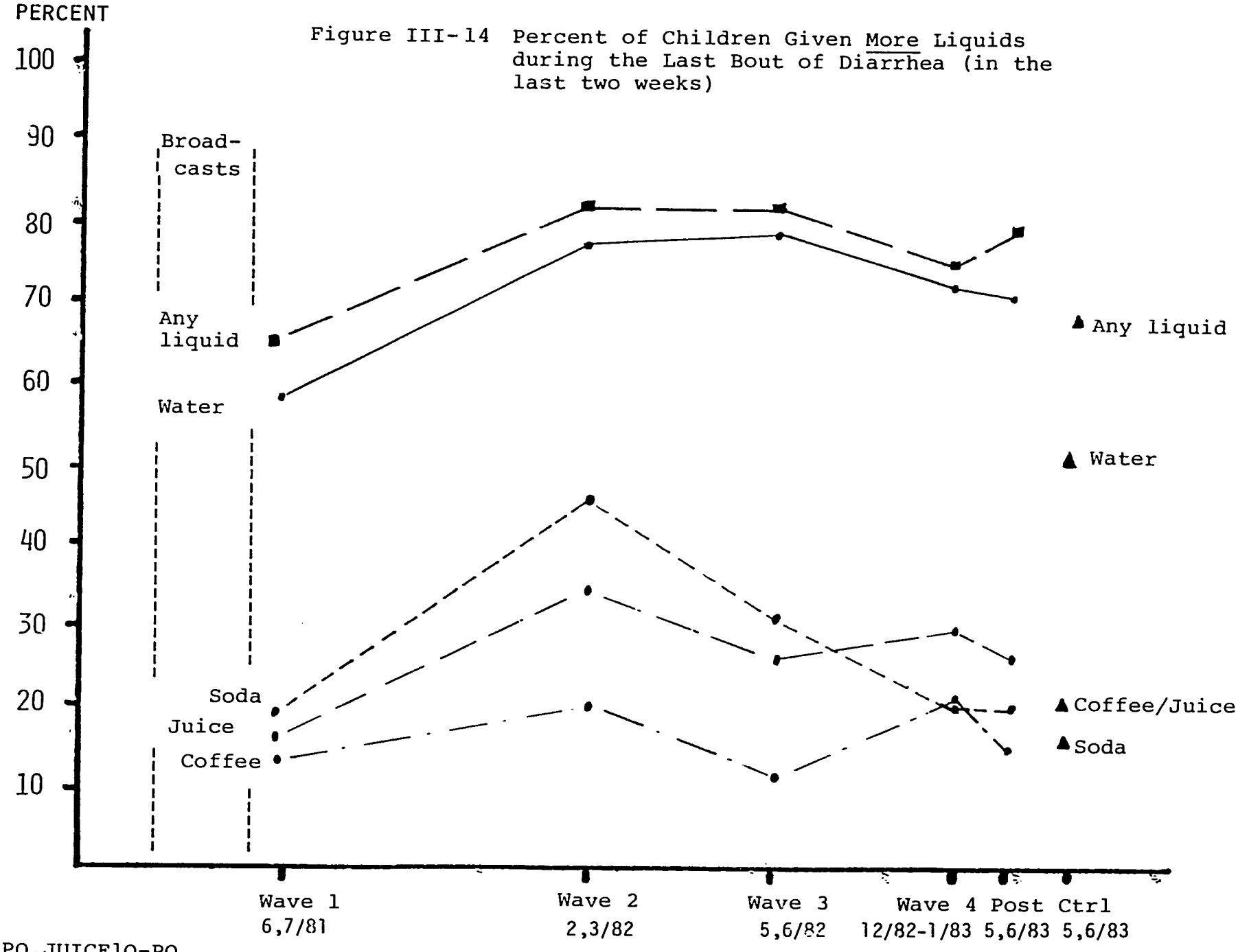
It was thought that mothers might be less likely to give more liquids to younger children (who were receiving breastmilk or other milk) than to older children. Figure III-15 and Table

Figure III-13 Percent of Children who Received Any Liquids Other Than Milk During the Last Bout of Diarrhea (in the last two weeks)



MORB:WTR1Q-PQ,JUICE1Q-PQ,
CAFE1Q-PQ,SODA1Q-PQ

Figure III-14 Percent of Children Given More Liquids during the Last Bout of Diarrhea (in the last two weeks)



MORB:
WTR1Q-PQ,JUICE1Q-PQ,
CAFE1Q-PQ,SODA1Q-PQ

Table III-40 Percent of Children Given More Liquids During the Last Bout of Diarrhea (in the last two weeks)

Child given more:	Wave 1 6,7/81	Wave 2 2,3/82	Wave 3 5,6/82	Wave 4 12/82-1/83	Post 5,6/83	Control 5,6/83
Water	58.9% (225/382)	77.1 (162/210)	79.0 (199/252)	72.1 (88/122)	70.4 (69/98)	52.6 (10/19)
Coffee	13.9 (53/382)	20.5 (43/210)	12.7 (32/252)	22.1 (27/122)	15.3 (15/98)	21.0 (4/19)
Juice	16.2 (62/382)	34.3 (72/210)	26.6 (67/252)	28.7 (35/122)	26.5 (26/98)	21.0 (4/19)
Soda	18.0 (69/382)	45.7 (96/210)	31.0 (78/252)	21.3 (26/122)	20.4 (20/98)	15.8 (3/19)
Any of the four liquids	64.7 (247/382)	82.4 (173/210)	81.7 (206/252)	74.6 (91/122)	79.2 (76/96)	68.4 (13/19)

MORB:WTR1Q-PQ,JUICE1Q-PQ,CAFE1Q-PQ,SODA1Q-PQ

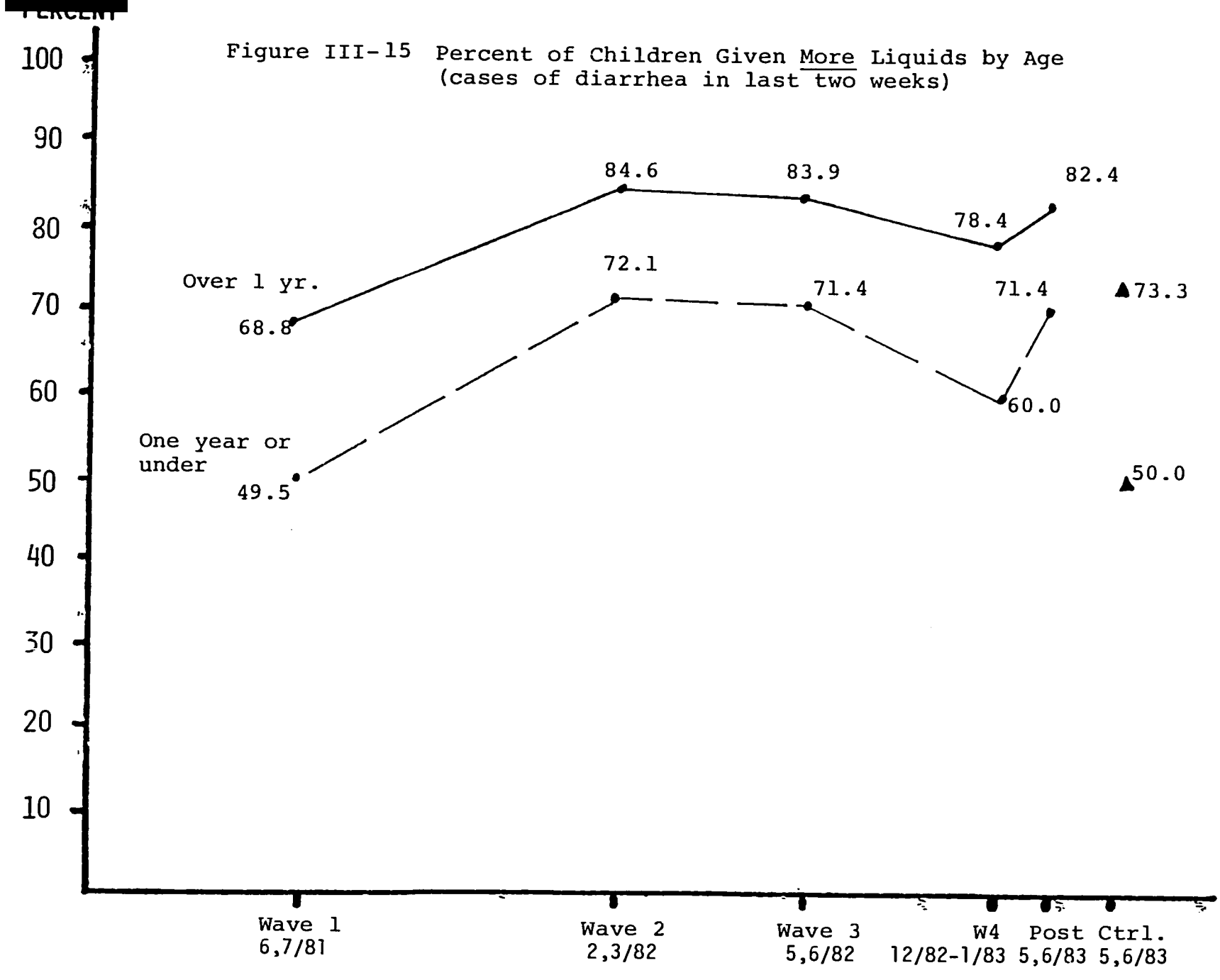


Figure III-15 Percent of Children Given More Liquids by Age (cases of diarrhea in last two weeks)

MORB:WTR1Q,JUICE1Q,CAFEQ,SODAQ

III-41 separate children one year old and younger from those over one year. Mothers were less likely to give more liquids to younger children, however, the pattern of responses over time is essentially the same for both age groups until the relatively large drop for younger children between waves 3 and 4, and a steep rise during the next month. This seems to be related to giving young children milk (breast or in a bottle) which increased greatly between waves 3 and 4, then dropped by wave 5 (see Figure III-12 in the preceding section).

Overall, a larger proportion of children in both age groups were given more liquids by the end of the campaign. As was the case in the responses for all children, the proportion of children in the control group who were given more liquids is lower, suggesting that mothers' responses were influenced by previous questionnaires.

C. Observational Study

(1) Rationale and Procedure

The use of large scale survey methodology in studying the impact of the PROCOMSI campaign has provided a wealth of information about the overall results. However, the survey approach treats the behavioral events in very large time units and must rely on mothers' after the fact descriptions of the actual process of mixing and administering Litrosol. To try to gather a richer feeling for the step-by-step process of oral rehydration, a separate observational study was carried out.

The purpose of the study was to give a basis for judging the accuracy with which mothers performed the oral rehydration therapy (ORT) behaviors, and to try to understand the "real life" meaning of the aggregate measures from the survey method. A research plan was developed that called for identifying cases of

Table III-41 Percent of Children Given More Liquids by Age (cases of diarrhea in the last two weeks)

Percent who are given more liquids:	Wave 1 n=374	Wave 2 n=205	Wave 3 n=246	Wave 4 n=122	Wave 5 n=96	Control
One year and under:	49.5% (47/95)	72.1 (31/43)	71.4 (20/28)	60.0 (15/25)	71.4 (20/28)	50.0 (2/4)
Over one year old	68.8 (192/279)	84.6 (162/205)	83.9 (183/218)	78.4 (76/97)	82.4 (56/68)	73.3 (11/15)

MORB:WTR1Q-PQ,JUICE1Q-PQ,CAFE1Q-PQ,SODA1Q-PQ

diarrhea among young children early in the case and passively observing the mother's actions once the case had been identified. The plan was implemented with the help of the Instituto de Nutricion de Centro America y Panama (INCAP), which permitted us to employ their highly trained field workers on a short term basis.

Several constraints influenced the structuring of the research procedures. One is the logistical problem of identifying cases at an early stage. Cases appear unpredictably in the population and not all cases are treated, so a strategy of looking in the population at large and hoping to arrive at appropriate times would lead to a requirement for massive sampling in order to identify a sufficient number of cases. A second related constraint was that we were only able to use INCAP's specialized resources for a limited period of time. A third limitation we had to take into consideration was the willingness of mothers to permit a sustained intrusion in their lives at a time when, in addition to the usual demands on them, they had a sick child to contend with.

These constraints guided the research activity to a case finding strategy, in which the field workers waited at a clinic for mothers to come in seeking care for their young children with diarrhea. The field worker then sought their agreement to accompany them home and observe and code their behavior for several hours. The first two women to agree each day were followed home in the order of their arrival at the clinic. This approach introduces several departures from "representativeness" that should be kept in mind in interpreting the results.

First, it limits the cases to those that seek care at clinics. One of PROCOMSI's objectives was to establish sources of supply of ORS packets in the communities, so the technique misses cases treated under the guidance of those sources. (The observational study originally tried to use these community supply people rather than clinics as a place to find cases but the effort was eventually abandoned. It soon became apparent

that the smaller numbers of families served by these people led to such low frequency of contact, especially in the pre-rainy season period of data collection, that field workers might have to wait days or in some cases, weeks for an appropriate case to turn up.)

Second, it makes it likely that a child will be at least a day or two into an episode of diarrhea before he arrives at the clinic. This is not a major biasing factor, because it approximates the usual situation, but it does mean that a mother's initial behaviors cannot be observed. Additionally, it makes it likely that the case will be starting to improve of its own accord, since most diarrhea is self-limiting and a typical episode in our study lasts only three to five days.

Third, it imposes a limit on the period of time any given case can be observed. In order to get a sufficiently large sample during the time the specialized field workers were available, each needed to do two observations a day. The combined impact of waiting time for mothers at the clinics, time to walk to and from their homes, reluctance of the mothers to host the observers for long durations or while the family ate, and the relative stability of behavior over longer periods, led to the choice of a two and one-half hour observation period. The observation was divided into fifteen ten-minute periods, plus time before and after for additional questionnaires.

The additional questionnaires were the Morbidity instrument, described elsewhere in this document, which established the characteristics of the diarrhea episode up to that time, and a specially developed instrument for assessing the accuracy of performance of Litrosol mixing. These questionnaires plus the observational period brought the time spent with each mother to roughly four hours.

The clinics in which the research took place were CESAMOs, the higher of the two classes of rural clinics in the Honduran system. They were chosen because the CESAREs, or the lower level, did not provide sufficient volume of patients to provide cases. Thus cases in the sample may be somewhat unrepresentative

because most of them live in towns that are county seats, even though small in terms of absolute numbers.

The case selection procedure deliberately excluded cases in which diarrhea was accompanied by severe complications or was symptomatic of some other ailment. Children with cases of measles or pneumonia, for example, were excluded by this procedure. The same criterion would also exclude children who arrived at the clinic severely dehydrated; these children would be held at the facility for supervised treatment in any case.

(2) Description of the Cases

The implementation of the research plan resulted in the detailed observation of the treatment of thirty-six children who arrived at the clinic complaining of diarrhea. Roughly 90 percent of the cases were less than 36 months old, and all had had diarrhea for at least two days. Table III-42 shows the characteristics of cases as reported by the mothers. The overall impression these figures give is one of fairly severe cases of acute diarrhea. In comparison to the values on the same variables for cases reported by the mothers in the sample survey, the values for cases in the observational study are almost all higher, many of them twice as high. Mothers' estimates of the severity of the cases also reflect this, with nearly 95 percent of the mothers saying that the case is moderate or severe. This is quite consistent with what one would expect, that mothers would be more likely to seek help from the health care system in more serious cases.

(3) Early Responses to the Cases

Prior to coming into our sample, mothers had already made a number of changes in their behavior. For children who are still breastfed, mothers report that the child has prompted some

changes. Roughly equal numbers say the child wants more or less breastfeeding than before. For children who are now bottlefed, the change is much more clearcut - - they want less feeding than before. Table III-43 shows the percentages of children in the different categories.

Table III-42 Characteristics of Diarrhea Cases in the Observational Study (n=36)

Characteristic	Value or Percent of Cases
Mean age in months	13.8 mo.
Fever	52.8%
Mucus in stools	72.2%
Blood in stools	13.9%
Vomiting at least once	52.8%
Mean number of stools on worst day	8.6
Children already eating solid foods whose appetite falls	60.0%
Dry mouth	27.8%
Fallen fontanels	11.1%
Sunken eyes	52.8%
Dry or tearless eyes	38.9%
Urine output reduced	44.4%
Mother's impression of severity of episode:	
Light	5.6%
Moderate	41.7%
Severe	52.8%

Source variables: HONDOBS:KIDAGE,FEVERO,MUCUSO,BLOODO,BARFSO, DUMPSO,HNGRO,MOUTHO,FONTO,EYESO,DRYEYEO,URINEO,EPSDO.

Table III-43 Prior Responses of Mothers in Observational Study

	N of group	Percent
Changes in Breastfeeding	11	
Less		27.3
Same		54.5
More		18.2
Changes in Bottlefeeding	24	
Less		75.0
Same		20.8
More		4.2
Giving of Purges	36	61.1
Giving of Other Medicines	36	80.6
Sources of Care Other than Clinic	36	
Village Health Worker		0
Sobadora		13.9
Midwife		0
Nurse		2.8

Source variables: HONDOBS:BRSTO,BRSTCHO,BOTTLEO,BOTLCHO, ANYLAXO,MEDIO,VHWO,SOBADO,MIDWIFO,NURSEO.

It is worth noting the high level of bottlefeeding in this sample - - over two-thirds of the group receive some of their food in a bottle. This is higher than usual for Honduran children. One can speculate as to the reasons, but the sample is too small and biased to provide any firm conclusions. Possible explanations include: the children are more "urban" than the nation as a whole, and bottlefeeding is more prevalent in the larger communities; bottlefeeding is associated with higher rates of diarrhea, so there may be a selection bias toward it; and mothers who see themselves as "modern" or "better off" may be more likely both to bottlefeed and go to the clinic.

In addition to changing feeding patterns, mothers seek care and try other medicines. Sixty percent of mothers had given a purgative, a popular folk treatment. Medicines, mostly antibiotics, were given by 80 percent of the mothers. Some of these

medicines may have been prescribed for the case during a prior visit to a clinic, but the majority are probably purchased over the counter from small shops or pharmacists. Other sources of care from whom these mothers might seek help were little utilized, probably because the clinic is so convenient.

Some mothers were already treating with Litrosol when they were picked up by the study. One quarter of the mothers, or nine women, report that this case has already been treated with Litrosol, which they obtained at a clinic or hospital. Six of the nine report that they gave the whole liter. These data are summarized in Table III-44. These mothers may respond somewhat differently, as they are in their second day of treatment. In particular, they may be less aggressive in pushing Litrosol if they perceive their children to be past the danger point. All of those who responded to the question about how long they gave Litrosol said they had given it only one day. Litrosol is normally dispensed in an envelope of two packets, a two-day supply. It is not clear why they would be returning to the clinic for more Litrosol after only one day of treatment.

Table III-44 Prior Treatment of this Episode with Litrosol (n=36)

	N of group	Percent
Child already given Litrosol for this episode:	9/36	25%
Source of Litrosol:	9	
Clinic		66.7
Hospital		22.2
Gave whole liter	9	66.7
Days of treatment	9	
One day		77.8
Don't know		22.2

Source variables: HONDOBS: LITSOLO,WHERGO,LITRGVO,DAYSGVO

(4) Responses During the Observation Period

After the administration of the questionnaire about the episode's characteristics and history, the observation period began. The field worker sat in the house with a coding sheet containing a matrix composed of observation periods crossed with a long list of behaviors the mother or others might perform. At the end of each ten minute time "unit" she recorded on the chart all the different behaviors that had occurred by making a mark in the appropriate cell. She was instructed not to interact with the family members, but to make herself as unobtrusive as possible. The observations continued for two and one-half hours.

This is obviously a highly reactive situation, that is, one in which the act of measurement is likely to influence the very thing one is trying to measure. For that reason, the distribution of behaviors that occurred may not be fully representative of the ways in which people normally spend their time or act toward their children. Nonetheless, this measurement technique provides an additional perspective that would otherwise be impossible to obtain. Together with other measurements, it can provide a useful check on how to interpret self-reported events.

In the sections that follow, data are reported in terms of events and periods. An "event" means that the behavior occurred at least once in the 10-minute "period". When related behaviors are combined and compared, they may be reported as "percent of periods with event" (which may loosely be thought of as how much of the time something is happening) and "percent of events" (or how much of this group of behaviors this item accounts for).

a. Events Involving the Child

(i) Caretaking

Caretaking of the child is a shared responsibility, although the heaviest burden falls on the mother. The mother attends to

the child in a quarter of all the observation periods, which is twice as high as the attention paid by all other caretakers combined. The mean number of caretaking events per child is 5.8 out of a possible 15 periods. Table III-45 shows the detailed breakdown of caretaking events. The other sources of care, siblings and other family members, together account for about one-third of all caretaking events.

Some specific caretaking behaviors have been measured separately. Washing and wiping the child occur in relatively fewer of the cases. The average child is washed 1.6 times and is wiped 0.6 times. These events occur in 10 percent and 4 percent of the periods, respectively.

Table III-45 Caretaking behaviors

	Source of care			
	Mother	Sibling	Other	Combined
Total number of events	135	10	65	210
Mean number of events per child	3.7	0.3	1.8	5.8
Percent of periods with event	25%	2%	11%	
Percent of caretaking events	64%	5%	31%	

Source variables: HONDOBS:MOM10 TO MOM150,SIB10 TO SIB150, FAM10 TO FAM150

(ii) Child's Activity

During each period the child's actions are coded to indicate whether the child rests, inactive, cries, defecates, or vomits. These behaviors are summarized in Table III-46. The children are inactive, with resting taking place in two-thirds of the time periods, and active movement in only one quarter. They cry in 20 percent of the time periods, which is probably more than the rate would be for the same children while healthy.

There is an average of 1.1 bowel movements per child during the two and a half-hour period. If this rate were extrapolated

for a 24-hour period, each child would have slightly over 10 stools per day. This is remarkably consistent with the mean of 8.6 stools on the worst day of the episode that is derived from mothers' self-report on these children. It is considerably higher than similar data from the survey, which includes many milder cases. This is also consistent with evidence from other sections, that mothers are more likely to seek treatment and use Litrosol for more serious cases.

Mothers reported that the child had vomited at least once during this episode in slightly more than half the cases. However, no children vomited during the observation periods. One possible interpretation is that vomiting is more likely to occur at the onset of the case, and most of these cases were already at least a day old when the mother sought help and the observation started.

Table III-46 Behaviors displayed by the child

	Type of behavior				
	Rests	Is Active	Cries	Defecates	Vomits
Number of events	364	143	108	38	0
Mean number of events per child	10.1	4.0	3.0	1.1	0
Percent of periods with event	67%	26%	20%	7%	0

Source variables: HONDOBS: REST10 TO REST150,ACTIV10 TO ACTIV-150,CRY10 TO CRY150,OBDEF10 TO OBDEF150,OBVOM10 TO OBVOM150

(iii) Feeding Behaviors

The next category of events involving the child covers feeding behaviors. Events were recorded each time the child was breastfed, bottlefed, or given solid food. Table III-47 shows the analysis of feeding behaviors by both the entire sample and by only those children currently receiving that type of food. The more appropriate figures are those based on only those

children currently in the category (e.g., those currently breastfed for at least part of their diet). That analysis shows that breastfeeding has the highest level among participating children, with 3.7 events per child, versus 2.2 for solid food and 1.2 for bottlefeeding. Breastfeeding is also a frequent event, occurring in 25 percent of time periods for the participating group, versus 15 percent for solid foods and 8 percent for bottlefeeding.

Total feeding rates for an individual child average higher than these figures would indicate, because most children fall into more than one group. The calculated values in Table III-47 should be thought of as minimum estimates, with actual values probably half again as large when considering any feeding event. Thus it appears that children are being fed fairly frequently during the period of observation.

Table III-47 Feeding behaviors

	Breastmilk	Bottle	Solid Food
Total number of children	36	36	36
Number of children whose mothers currently give these types of food	11	25	20
Number of events	41	29	45
Mean number of events/all children	1.1	0.8	1.2
Mean number of events/ participating children	3.7	1.2	2.2
Percent of periods with event, all children	8%	5%	8%
Percent of periods with event, participating children	25%	8%	15%

Source variables: MORB:BRST;HONDOBS:BOTTLEO,HNGRO,BRSTO,BOTLO, FDFDO

(iv) Treatment Behaviors

Treatment behaviors include giving Litrosol, giving other liquids, and giving other medicines. Table III-48 summarizes the data on treatment behaviors. One-third of the children received Litrosol during the observation period, compared with 25 percent of the group who had received Litrosol before the observation began. An examination of the overlap between these two groups shows that five of the nine mothers who treated before observation did not resume treatment during the observation period. Thus, a total of 18, or 50 percent of the cases, were treated this episode with Litrosol either before or during the observation period. After the observation period, the field workers measured the containers used by mothers who did administer Litrosol during the observation period.

Table III-48 Treatment behaviors

	Gives Litrosol	Gives Other Liquid	Gives Other Medicine
Number of events	26	13	15
Mean number of events per child	0.7	0.3	0.4
Percent of periods with event	5%	2%	3%
Number of children receiving item during observation	13	9	11
Number of children receiving Litrosol before observation period	9	-	-
Number of children receiving Litrosol before and/or during observation	18	-	-
Percent of cases receiving Litrosol either before or during observation	50%	-	-

Source variables: HONDOBS:LSOLO,LIQO,MEDIO,LITSOLO,LSOLANYO

At the start of observation, the level in the bottle was marked. At the end, the new level was marked and the volume of the difference was measured. The recorded data from these measurements have a range from zero to one liter. These extreme values are suspect, since at one end, volume was not to be measured if none was administered, and at the other end, the liter volume is nearly three times the next highest value and seems implausible. If the extreme values are retained, the average amount consumed by those who had any at all was 263 cubic centimeters, or about 100 cc per hour. This rate, if it is accurate and if it is maintained all day, will result in the consumption of a liter in about 10 hours. A more conservative approach, given that the extreme values are somewhat suspicious, would be to truncate the range, i.e., exclude those extreme values. When the analysis is redone excluding the 0 and 1000 cc values, the average amount taken by those who took any at all falls to 168 cc. That represents a rate of 67 cc per hour, which would lead to the use of a liter in about 15 hours. Both methods of calculating consumption produce plausible results, and both are at levels that can be assumed to be clinically effective.

b. Events Involving the Mother

The mother has an obvious role in many of the events involving the child, but she also engages in some behaviors that are independent of it. The observational study focused on several everyday activities, as well as on a direct measurement of Litrosol mixing skills.

(i) Mothers' Daily Activities

In the course of the observations, mothers' activities in areas not directly involved with the children were coded. These include handwashing and clotheswashing, food preparation,

resting, and listening to the radio. Six mothers washed their hands with soap a total of seven times, which makes handwashing a relatively rare behavior. The use of the "with soap" criterion was strict, but probably necessary, as soapless wash has been shown to have little effect on fecal contamination. The low level of handwashing is a matter of concern when compared to the amount of time spent preparing food. Sixteen mothers (44 percent of the total) engaged in food preparation at some point during the observation, and about 10 percent of all time periods included food preparation as an activity. The washing of clothes is an equally frequent event. Twenty of the thirty-six mothers washed some clothes during the observation period. About 9 percent of the observation periods include clothes washing.

Mothers also rest by sitting down or lying down with their children. Almost all (97 percent) of the mothers took a rest at least once during the observation, and the average mother rested in eight of the 15 time periods. Both while resting and while working, mothers listened to the radio. Seventeen of the mothers (47 percent) listened at some point. During 85 of the total time periods they listened to the radio, for an average of 5 periods each for those who listened at all, or an average of 2.4 periods for all mothers, regardless of whether they listened. In total, they listened to the radio in 15 percent of all possible time periods. Field workers also coded whether any radio being listened to broadcast a Ministry of Health spot message. At no time in any of the observational periods did the radios that were on carry a PROCOMSI spot.

(ii) Mothers' Accuracy in Mixing Litrosol

After the observational period, the field workers asked the mothers to cooperate in showing them how Litrosol should be mixed. If mothers agreed, they were asked to discard the Litrosol in the container, if any, and were supplied with a fresh packet from the field worker. The field worker then recorded the details of the mother's mixing procedure. The variables examined

included whether the mixing bottle was exactly a liter, how much liquid a mother actually used, what kind of liquid she added, whether she added anything else, whether she shook the bottle, and whether she kept the mixing flyer. Table III-49 presents details on these variables.

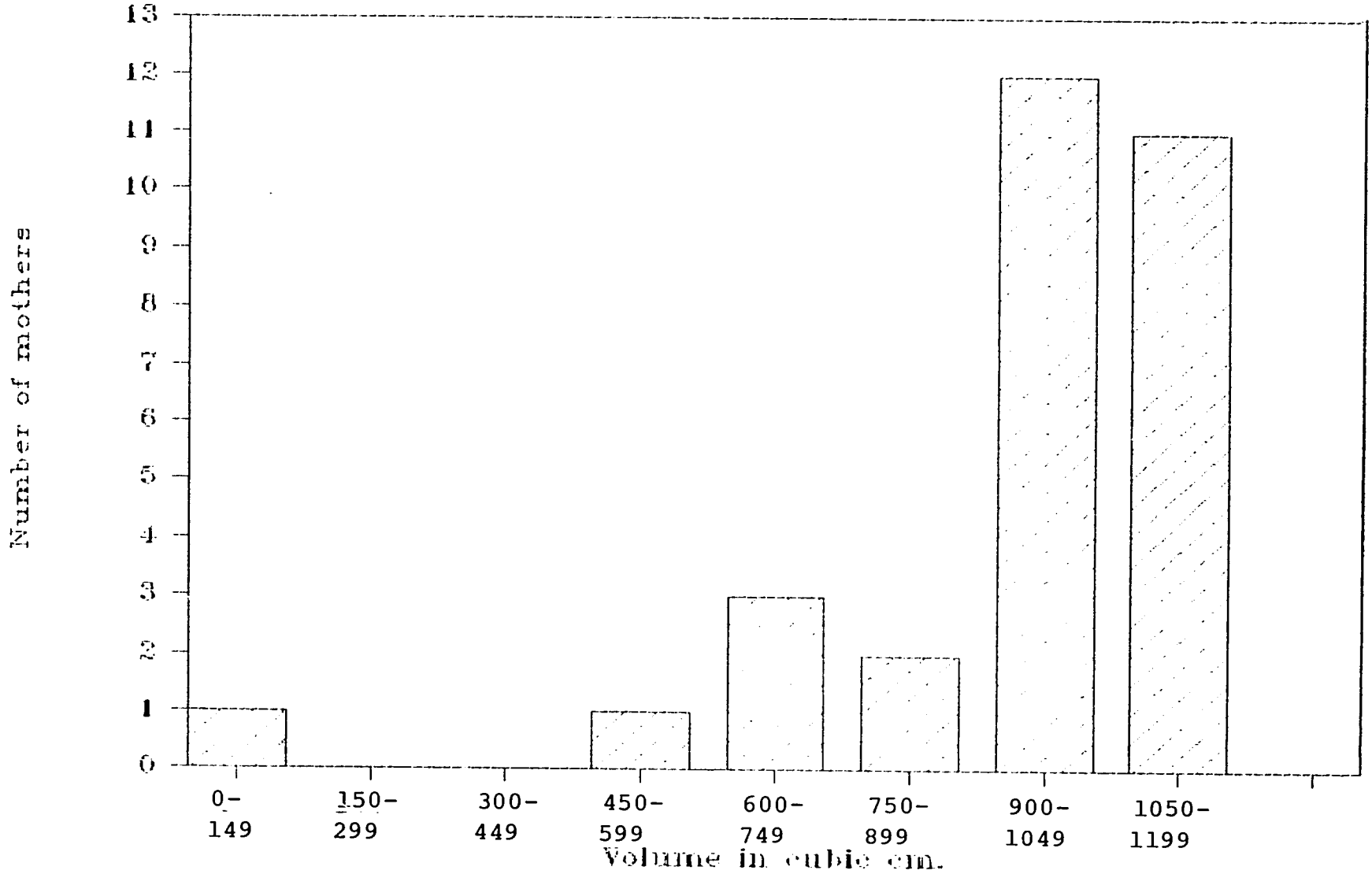
Table III-49 Litrosol mixing behaviors

Variable	N in group	Percent
Has bottle of exactly 1 liter	36	19%
Amount of liquid used:*		
mean volume, all valid cases	30	926 cc**
mean volume, truncated range	28	948 cc***
Uses boiled water	35	97%
Uses all the salts	36	94%
Shakes the bottle	36	97%
Adds other substance	36	0
Keeps the mixing flyer	35	51%

Source variables:HONDOBS:GIVLSOLO,BOTOBSO,MOMADDO,KINDLQO,ALL-SALTO,SHAKEO,ADDOTHO,KPSFLYO
* One liter = 1000 cc.
** Standard deviation = 218.3
***Standard deviation = 156.3

Mothers in general did not have bottles of exactly a liter in which to mix Litrosol. Only about 20 percent used a bottle of exactly one liter for the mixing trial. Nonetheless, they were fairly good at measuring the appropriate quantity of liquids. Field workers measured the exact amount of liquid they used. The mean value for all available measurements was 926 cc, a reasonable approximation of the correct volume (1000 cc). The distribution of actual volumes is presented in Figure III-16. While there are a few very low volumes, the mothers have clustered tightly around the correct amount. If one adopts a skeptical attitude about the validity of the most extreme

Figure III-16 Distribution of actual volumes of Litrosol mixed by women during behavioral observation



HONDOBS

measures and truncates the range by omitting the highest and lowest values, the mean volume changes only slightly, to 948 cc. Mothers' performance on volume measurement was quite good considering that few of them had bottles of the correct size with which to measure.

A surprisingly high percentage used boiled water, even though mothers are instructed only to use the best water they have. This may reflect standard practice, but it is possible that mothers are "on their best behavior" because of the presence of the observer. The same interpretation is less applicable to the remainder of the mixing behavior items, because they are less constrained by social values. They are nonetheless quite high. Virtually all the women use all the salts (94 percent), shake the bottle (97 percent), and refrain from adding anything else to the solution (100 percent). About half (51 percent) do not throw away the mixing flyer during the period of observation.

The overall picture that emerges from the direct measurement of mothers' ability to mix Litrosol is very encouraging. They either already know all the steps or can follow them from the accompanying instructions. They make fairly accurate measurements of water volume in spite of not having standardized volumes to measure with. Data from the observation period show that those who do administer the solution do so in volumes that can be considered to be clinically effective.

(5) Factors Related to Litrosol Use

The cases in this study are, as a group, more serious than usual - - serious enough that mothers were motivated to go to the clinic for help. In that sense, they represent both a good and a bad group for investigating what motivates mothers to seek help and what factors are related to successful administration of the treatment. The good side is that we have much more detailed information than usual about the case and the mothers' responses. The bad side is that the cases are already at one

extreme of the distribution of cases (i.e., severe enough that the mother seeks treatment) and relationships that might be evident in a broader range of cases will be masked by the uniform severity of these cases.

Initial exploration of the data gave the impression that the latter case was true. Examination of relationships between the child's age, the severity of the case, other characteristics of the case, and the probability of treatment with Litrosol yielded only a few interesting findings, which are reported here. Our feeling, after analysis, is that with more variability and more cases in the sample, the analysis would produce stronger evidence of the relationships.

Two methods of estimating severity of the cases were used. One used the mother's judgement of the severity of the case on a three point scale. The other computed an index of severity based on the case characteristics. In this index, a point was given for the more severe response on each of thirteen variables. In cases of non-dichotomous variables, the distribution was split around the median. The variables included were measures of whether the case involved:

- more than two days of illness
- fever
- mucus in the stools
- blood in the stools
- more than 7 bowel movements on the worst day
- vomiting
- depressed appetite
- dry mouth
- fallen fontanel
- sunken eyes
- tearless eyes
- reduced urine output
- observed number of bowel movements

The two scales are in agreement with each other. They correlate at $r=0.30$, $p < .04$. This is a fairly low level of

agreement, accounting for less than 10 percent of the variance. Why it should be so low is hard to explain - - it may be that cases are too extreme (although both variables show good distributions) or that mothers' estimates are essentially describing the case on the previous day, while the observational measures are of current status (which might be better or worse, but would in any case be different) or that the numbers of cases are too few to achieve stable estimates of the relationships.

The severity index was also split into a dichotomous variable around its median. These three measures of severity were used for an exploratory analysis of case characteristics and treatment behaviors. Mothers' estimates of severity do not predict anything much at statistically significant levels. Many plausible relationships come close to significance, but curiously, the only one that achieves it is "tearless eyes" (chi-square = 4.54, $p < .04$). Because of the number of comparisons made in the analysis, it is unlikely that this represents anything meaningful; relationships at this level would be likely to occur by chance more frequently than even was found in this analysis. Perhaps the most interesting thing is what is <u>not</u> predicted by mothers' estimates of severity. One would expect that treatment probability or amount of Litrosol given would show a relationship. One variable that came close to significance was days with diarrhea before coming to the clinic. While not significant, there is a strong bias for cases arriving within two days of the beginning of an episode to be ranked more severe. This would be consistent with the notion that mothers seek help quickly when they feel the child is at great risk.

Use of the severity index in the analysis is slightly more productive. Three moderately strong significant relationships emerged between the severity index and: the mother's estimate of severity; the number of time periods in which Litrosol was observed to be administered; and the mother's report of the number of bowel movements on the worst day of the episode (split into a dichotomous variable around its own median). These relationships are presented in Table III-50. Several other "near

miss" relationships with the numbers of observed and reported bowel movements and the amount of Litrosol given were evident. Inexplicably, the relationship between severity and amount of Litrosol administered is negative ($r=0.40$, $p < 0.08$). It is possible that sicker children may be less willing to take Litrosol, but there is no other evidence in the analysis for that supposition.

Table III-50 Relationships between severity index and other variables

Variables	Measure	Significance
Severity index with mother's estimate of severity	$r=0.30$	$p < .036$
Severity index with number of time periods Litrosol administered to child	$r=0.38$	$p < .001$
Severity index with median split reported number of bowel movements on worst day of episode	Kendall's Tau C=0.35	$p > 0.04$

Source variables: HONDOBS; SVRITYO, EPSDO, LSOLO, MEDDUMPO

After examining severity, predicting the use of Litrosol was investigated. Here some relationships also emerged. There were three measures of Litrosol use - - whether administration of Litrosol was observed by the field worker, whether the mother reported having given it prior to the field worker's visit, and whether a case met either of these criteria. As was mentioned before, Litrosol use was related to severity. Being observed giving Litrosol is also related to the age in years of the child, with children less than one year of age much more likely to receive Litrosol (chi-square=7.4, df=1, $p < 0.02$).

Litrosol use is also related to two questions about when and where one learned about it. Women who learned about Litrosol in the last year were significantly more likely to use it than those who learned about it two years ago (chi-square=7.4, df=2, p <

.01). A similar question about having learned it from the radio was nearly significant in its relationship with Litrosol use (chi-square=3.7, df=1, $p < 0.053$).

The striking thing about these analyses, however, is how little they explain about what differentiates users from nonusers of Litrosol. The study was successful in giving a rich base of contextual information for understanding the behaviors measured in the survey, but it is too small a sample to permit extended statistical analysis of the interrelationships among the variables.

Chapter IV

Health Status Changes

A. Anthropometry

(1) Methods

Data on length (called "height" in the rest of this section), weight and arm circumference were collected in preschool children on four separate occasions (referred to as "waves" hereafter). Sub-routines available from the Center for Disease Control (CDC) were used to generate percentage of median values and Z-scores for height, weight, and weight for height (see Table IV-1). These procedures used the National Center for Health Statistics (NCHS) normative data. Children were classified according to commonly used indicators of nutritional status: stunting, wasting, Gomez categories and arm circumference "color" codes (see Table IV-1).

(2) Prevalence of Malnutrition by Wave

The percentage of "malnourished" children in populations is often variously estimated on the basis of the indicators defined in Table IV-1. These indicators measure different aspects of growth and body composition and are based on arbitrary criterion values. Hence, the percentage of "malnourished" children will be different for different indicators. Stunting measures the cumulative, lifespan effect of malnutrition on linear growth. Wasting and arm circumference "color codes" are indicators of current nutritional status (i.e., acute, severe malnutrition).

Table IV-1 Definition of anthropometric indicators

Indicator	Procedure or definition
Percent of median for height, weight, and weight for height	Child's actual value expressed as a percent of the age-sex specific 50th percentile value in the NCHS norms.
Z-scores for height, weight, and weight for height	Child's actual value minus the age-sex specific 50th percentile value of the NCHS norm divided by the age-sex specific standard deviation of the NCHS norm.
Stunting	A child is classified as stunted if the percent of median for height ("height for age") is less than 90%.
Wasting	A child is classified as wasted if the percent of median for weight for height is less than 80%.
Gomez classification	A child is classified into any of four categories depending upon his value for percent of median for weight ("weight for age"):
	Category / Definition Normal / ≥ 90.0 weight for age Grade 1 / 75.0 - 89.9 Grade 2 / 60.0 - 74.9 Grade 3 / ≤ 59.9
Arm circumference color codes	Regardless of age and sex, a child is classified into any of three categories depending upon his or her arm circumference value.
	Green / ≥ 13.5 cm. Yellow / 12.5 - 13.4 cm Red / ≤ 12.4

The Gomez classification of weight for age is widely used to measure the prevalence of "malnutrition." A child's weight can be low with respect to the age-sex specific values because he/she is stunted and/or because he/she is also wasted. Hence, the Gomez classification is a mixed indicator summarizing both past and current nutritional problems.

Table IV-2 shows the prevalence of stunting and wasting by wave. Overall, around a third of the children are stunted and very few, less than one percent, are wasted. The data appear to indicate an increase in the level of stunting through time. Thus, 33 percent of boys were stunted in wave 4 compared to 28 percent in wave 1. For girls, the corresponding values were 38 percent and 31 percent, respectively for waves 4 and 1. These values also indicate a somewhat greater degree of stunting in girls than in boys.

Wasting, a very dangerous state, is fortunately rare in Honduras and its prevalence did not appear to have risen over the course of the study.

Values for stunting and wasting are much lower for the control municipio than for the study municipios. No prior data are available for the control municipio to assess trends in these values.

Data about the prevalence of malnutrition according to the Gomez categories are given in Table IV-3. In wave 1, 43 percent of boys and 41 percent of girls were classified as normal. These values declined to 37 and 33 percent, respectively, for boys and girls by wave 4 (see Figure IV-1).

The arm circumference data does not present the same picture of deterioration of nutritional status (Table IV-4). If anything, an improvement appears to have occurred, particularly in the "red" category for girls. These data refer to the prevalence of wasting and hence do not necessarily contradict the finding of increased stunting in Table IV-2 or the decrease in the percentage of "normal" children according to the Gomez category.

Data on indicators of nutritional status from the Honduran (i.e. PROCOMSI) sample are compared in Table IV-5 to those of

Table I V-2 Prevalence of Stunting and Wasting Across Time +

	Wave 1	Wave 2	Wave 3	Wave 4	Control
Stunting:					
BOYS	27.8 (533)	29.9 (461)	33.4 (410)	33.4 (338)	24.6 (171)
GIRLS	31.1 (508)	32.5 (418)	38.4 (354)	28.3 (311)	23.6 (137)
Wasted:					
BOYS	1.3 (533)	0.9 (461)	0 (410)	0.3 (338)	0 (171)
GIRLS	0.4 (508)	0.2 (418)	0.3 (354)	0.6 (311)	0 (137)
TOTAL	1041	879	764	649	308

ANTH:STUNTN,WASTEDN

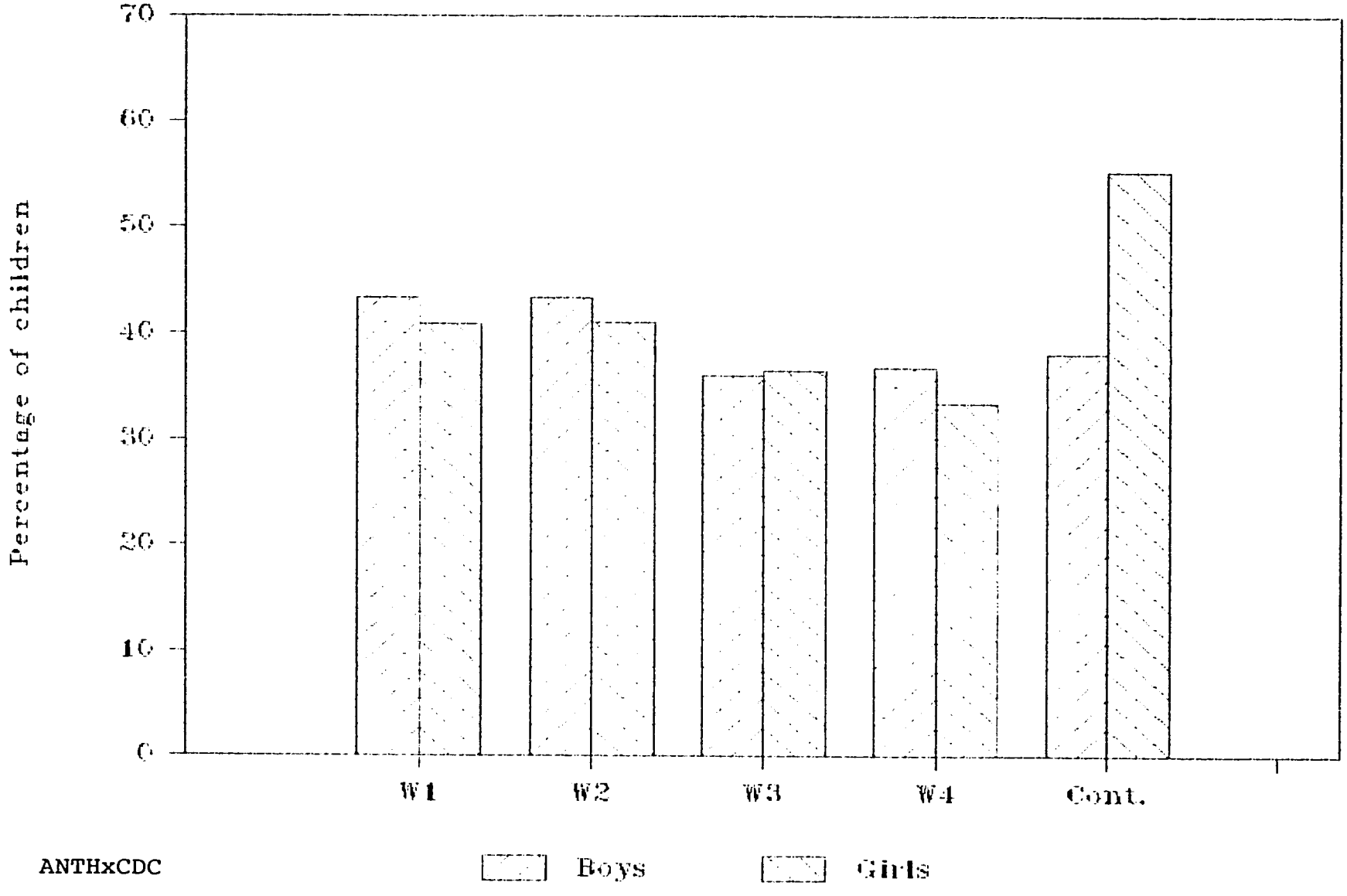
+Dates of measurement: Wave 1 - 3&4/81
Wave 2 - 11&12/81
Wave 3 - 11&12/82
Wave 4 - 3&4/83
Control 5&6/83

Table IV-3 Prevalence of Gomez Categories Across Time

Gomez Categories:		Wave 1	Wave 2	Wave 3	Wave 4	Control
BOYS	Normal	43.4	43.5	36.0	36.7	38.1
	1st Degree	45.5	46.1	51.9	48.6	51.8
	2nd Degree	10.5	9.6	10.4	11.6	8.9
	3rd Degree	0.6	0.9	1.7	3.1	0.7
	TOTAL	100.0 (532)	100.0 (460)	100.0 (403)	100.0 (327)	100.0 (168)
GIRLS	Normal	40.9	41.0	36.5	33.3	55.3
	1st Degree	42.7	47.5	48.1	50.7	34.8
	2nd Degree	15.0	10.8	13.7	14.1	8.3
	3rd Degree	1.4	0.7	1.7	2.0	0.7
	TOTAL	100.0 (506)	100.0 (415)	100.0 (351)	100.0 (306)	100.0 (132)
GRAND TOTAL		1038	875	754	633	300

ANTHxCDC

Figure IV-1 Percentage of children in the Honduras sample classified as "normal" according to the Gomez classification in each of the waves.



ANTHxCDC

Table IV-4 Prevalence of Arm Circumference Color Codes

Arm Circumference		Wave 1	Wave 2	Wave 3	Wave 4	Control
BOYS	"Green"	89.7	93.2	94.6	93.1	89.4
	"Yellow"	8.1	5.2	3.4	3.9	8.8
	"Red"	2.3	1.5	2.0	3.0	1.8
	Total	100.0 (532)	100.0 (459)	100.0 (406)	100.0 (333)	100.0 (170)
GIRLS	"Green"	85.9	88.7	89.5	89.1	88.9
	"Yellow"	9.0	7.9	7.7	8.9	8.9
	"Red"	5.2	3.4	2.8	2.0	2.2
	Total	100.0 (502)	100.0 (415)	100.0 (352)	100.0 (302)	100.0 (135)
GRAND TOTAL		1034	876	758	635	305

ANTHxCDC

Table IV-5 Prevalence of malnutrition in number of samples in developing countries in children less than 5 years of age

Sample	Stunting <90HA	Gomez 2 & 3 <75WA	Wasted <80WH	Arm colors yellow & red < 13.5 cm
Costa Rica+ (n=730)	9.6	9.0	3.6	1.2
Dominican Republic+ (n=1930)	18.8	10.6	1.6	3.5
Columbia+ (n=1412)	28.9	11.5	0.5	5.4
Pakistan+ (n=1212)	29.7	34.3	8.2	24.7
India+ (n=1787)	47.6	55.1	15.1	29.4
Honduras sample++ (n=3607)	30.1	13.2	0.5	10.4

+ Anderson, M.A. Amer. J. Clin. Nutr., 1979, 32:2339-2345

++ The Honduras sample includes some 5-7 year old children. These values represent the combined sample of all waves but do not include the control municipio. The sample size includes children measured in different waves and does not represent the number of distinct children measured.

other populations of preschool children from around the world. The PROCOMSI Honduran sample shows values that are intermediate between those of Costa Rica (best) and India (worst). The PROCOMSI data are very similar to those reported for the Columbian population. Relative to the degree of stunting, the PROCOMSI sample shows greater than expected prevalence of children with thin (<13.5 cm) arm circumferences.

(3) Analyses of Mean Z-Score Values by Age and Sex

Public health officials are often concerned with the monitoring of prevalences as we have done in the preceding sections. In many instances, it may be powerful, in a statistical sense, to assess changes in terms of measures of central tendency. It is for this reason that the objective of this section is to assess changes in z-scores for weight, height and weight for height. Z-score values have the advantage that they are standardized by age and sex. Values for different anthropometric measures have the same meaning as they are expressed in similar units, standard deviations.

Tables IV-6 through IV-8 contain the basic information by wave, age, and sex for height (Table IV-6), weight (Table IV-7), and weight for height (Table IV-8). One point well demonstrated by these tables is the absence of important differences by sex as suggested in Figure IV-2. Values for girls are slightly below those of boys for weight for age and height for age, there being no consistent differences in weight for height. Figure IV-2 indicates a downward time trend in the case of weight for age and height for age.

The lack of differences associated with sex argues for pooling the data as done in Tables IV-9 through IV-11. Overall, mean z-scores for height for age decreased from a value of -1.76 in wave 1 to -2.07 at wave 4 ($p < .05$). A similar order of magnitude of change was observed for weight for age (-1.05 at wave 1 and -1.29 at wave 4) and this change was also

Table IV-6 Anthropometric Z-Scores for Rural Honduran Children Over Time: Height for Age by Sex

HEIGHT FOR AGE	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
BOYS: 0 - 11.9 mo.	-0.82	89	-1.09	56	-0.63	39	-1.02	45	-1.09	25
12 - 23.9	-1.58	96	-1.49	79	-2.12	74	-1.93	44	-2.06	28
24 - 35.9	-1.68	92	-1.60	86	-1.91	76	-2.17	74	-1.82	34
36 - 47.9	-2.17	84	-2.20	68	-2.02	70	-2.13	66	-2.23	32
48 - 59.9	-2.10	91	-1.90	69	-2.43	65	-2.17	54	-2.02	31
60 - 71.9	-2.06	58	-2.01	58	-2.32	39	-2.87	25	-1.82	15
72 - 83.9	-2.19	15	-2.28	37	-2.25	24	-1.92	13	-2.27	1
+84 mo.	0	0	-3.37	2	-3.10	14	-3.07	5	0	0
TOTAL	-1.72	525	-1.77	455	-2.03	401	-2.03	326	-1.87	166
GIRLS 0 - 11.9 mo.	-0.65	70	-0.84	45	-0.67	41	-0.96	30	-0.22	29
12 - 23.9	-1.79	95	-1.83	67	-1.74	44	-1.86	49	-1.61	22
24 - 35.9	-1.87	93	-1.98	73	-2.25	68	-2.22	59	-1.44	15
36 - 47.9	-2.04	79	-2.03	68	-2.46	70	-2.20	60	-2.17	28
48 - 59.9	-2.04	90	-2.20	67	-2.43	58	-2.52	58	-2.12	22
60 - 71.9	-2.08	51	-1.99	56	-2.69	31	-2.31	42	-2.43	12
72 - 83.9	-2.59	19	-2.11	38	-2.12	23	-2.58	7	0	0
+84 mo.	0	0	-3.75	3	-2.49	15	-4.6[illegible]	2	0	0
TOTAL	-1.79	497	-1.90	417	-2.11	350	-2.13	307	-1.56	128
GRAND TOTAL	-1.76	1022	-1.83	872	-2.07	751	-2.08	633	-1.74	294
S.D.	±1.60		±1.38		±1.45		±1.40		±1.55	

ANTH

Table IV-7 Anthropometric Z-Scores for Rural Honduran Children Over Time: Weight for Age by Sex

Weight for Age:		Wave 1		Wave 2		Wave 3		Wave 4		Control	
		$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
BOYS:	0 - 11.9 mo.	-0.30	89	-0.25	56	-0.07	41	-0.42	45	-0.48	25
	12 - 23.9	-1.07	96	-1.03	78	-1.23	74	-1.23	44	-1.34	28
	24 - 35.9	-1.03	92	-1.09	87	-1.08	76	-1.40	74	-1.09	35
	36 - 47.9	-1.32	84	-1.30	68	-1.11	70	-1.29	64	-1.29	32
	48 - 59.9	-1.12	91	-1.05	69	-1.39	65	-1.47	53	-1.02	31
	60 - 71.9	-1.19	58	-1.29	58	-1.38	38	-1.64	25	-1.31	15
	72 - 83.9	-1.56	15	-1.14	39	-1.42	24	-1.46	13	-2.15	1
	+84 mo.	0	0	-2.38	2	-1.87	13	-2.26	5	0	0
	TOTAL	-1.01	525	-1.04	457	-1.14	401	-1.26	323	-1.09	167
GIRLS:	0 - 11.9	-0.34	70	-0.17	45	-0.20	42	-0.53	31	-0.24	29
	12 - 23.9	-1.04	94	-1.18	67	-1.01	45	-1.27	48	-1.02	22
	24 - 35.9	-1.14	94	-1.04	72	-1.40	68	-1.62	59	-1.18	16
	36 - 47.9	-1.29	79	-1.20	68	-1.33	70	-1.90	60	-1.11	28
	48 - 59.9	-1.29	91	-1.20	66	-1.49	58	-1.49	58	-1.07	22
	60 - 71.9	-1.27	51	-1.27	56	-1.37	30	-1.33	41	-1.53	12
	72 - 83.9	-1.48	20	-1.27	37	-1.32	23	-1.45	7	0	0
	+84 mo.	0	0	-1.82	3	-1.37	15	-2.73	2	0	0
	TOTAL	-1.09	499	-1.08	414	-1.20	351	-1.31	306	-0.83	129
GRAND TOTAL		-1.05	1024	-1.06	871	-1.16	752	-1.29	629	-0.98	296
S.D.		±1.27		±1.11		±1.16		±1.16		±1.20	

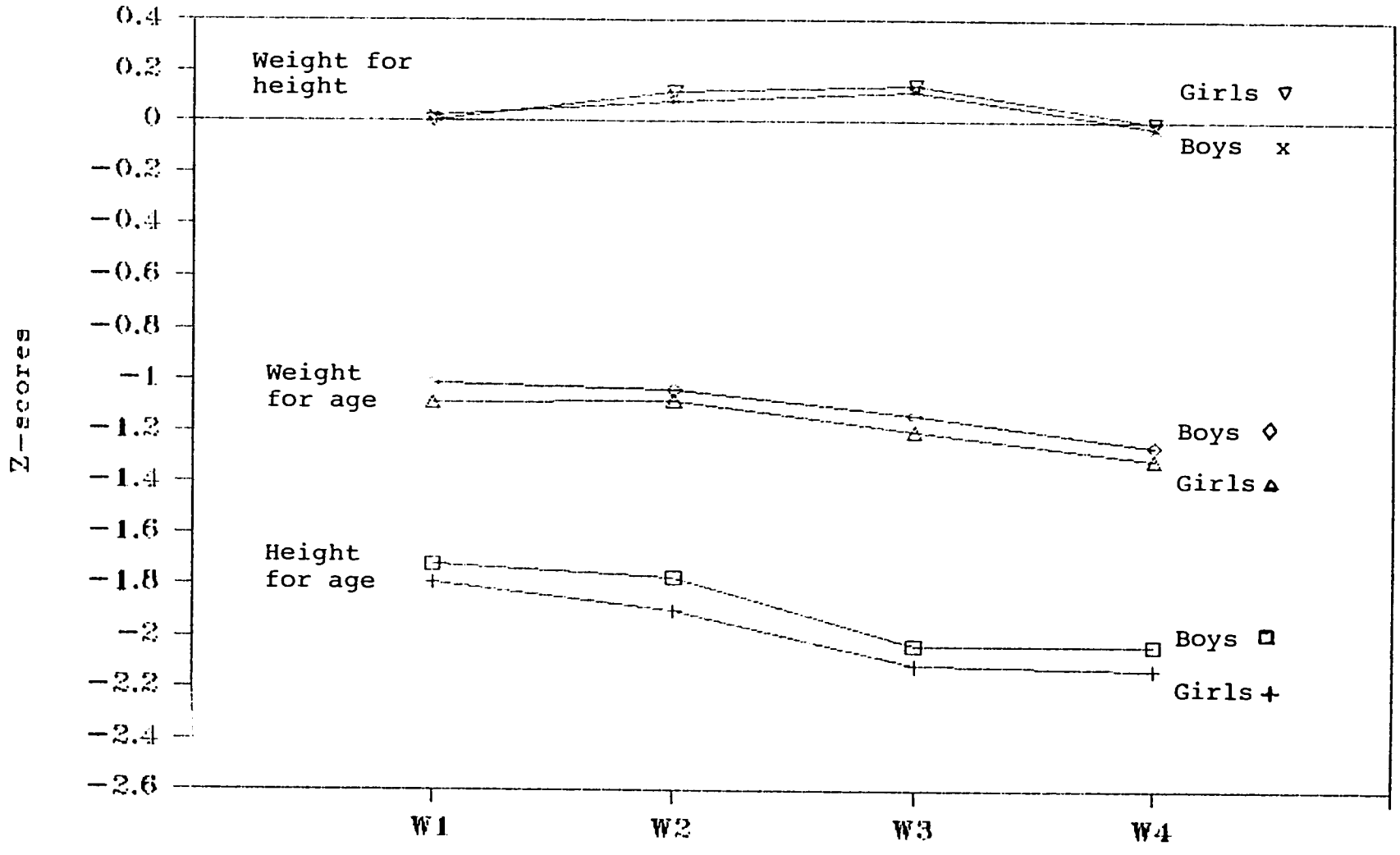
ANTH:WTAGSDN

Table IV-8 Anthropometric Z-Scores for Rural Honduran Children Over Time: Weight for Height by Sex

Weight for Height		Wave 1		Wave 2		Wave 3		Wave 4		Control	
		$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
BOYS:	0 - 11.9 mo.	0.35	89	0.71	56	0.42	38	0.43	45	0.41	25
	12 - 23.9	-0.27	95	-0.25	79	-0.01	74	-0.18	45	0.28	27
	24 - 35.9	-0.16	90	-0.05	87	0.09	77	-0.17	72	-0.04	34
	36 - 47.9	-0.08	84	-0.03	68	0.11	70	-0.06	64	0.01	32
	48 - 59.9	0.21	91	0.14	69	0.09	65	-0.11	52	0.27	31
	60 - 71.9	0.15	58	-0.01	58	0.18	38	0.12	25	-0.21	15
	72 - 83.9	-0.19	15	0.42	37	0.08	24	0.34	13	-0.99	1
	+84	0	0	-0.33	2	0.29	13	-0.67	5	0	0
	TOTAL	0.02	522	0.08	456	0.12	399	-0.02	321	0.03	165
GIRLS	0 - 11.9	0.26	71	0.63	46	0.45	41	0.36	30	0.52	29
	12 - 23.9	0.05	94	-0.13	67	0.06	44	-0.24	48	-0.004	22
	24 - 35.9	-0.10	93	0.20	72	-0.03	68	-0.31	59	-0.31	15
	36 - 47.9	-0.03	79	0.09	68	0.22	70	0.21	60	0.29	28
	48 - 59.9	-0.11	90	0.17	66	-0.05	58	0.02	58	0.27	22
	60 - 71.9	-0.05	51	-0.11	56	0.33	30	0.08	41	-0.10	12
	72 - 83.9	0.05	19	0.03	37	-0.04	23	0.15	7	0	0
	+84	0	0	0.87	3	0.46	15	0.01	2	0	0
	TOTAL	0.00	497	0.12	415	0.14	349	-0.003	305	0.18	128
GRAND TOTAL		0.01	1019	0.10	871	0.13	748	-0.01	626	0.10	293
S.D.		±1.03		±0.94		±0.83		±0.85		±0.81	

ANTH:WTHTSDN

Figure IV-2 Mean z-score changes by wave by sex, Honduras sample



statistically significant ($p < .05$). There were no changes in weight for height ($p < .05$).

It may be that the changes observed occurred only at some ages but not at others. This does not appear to be the case when the data by age is examined (see Tables IV-9, 10 and 11). This point is also demonstrated by Figures IV-3, IV-4, and IV-5. There are few cases for the last age group (>84 months) and these values are erratic. For other age groups, values for wave 4 are consistently more negative than those for wave 1 in the case of height for age (Figure IV-3 and weight for age (Figure IV-4), but not weight for height (Figure IV-5).

(4) Changes by Municipio and Type of Village

Tables IV-12 through IV-14 provide the data to answer the question whether the changes observed in the total sample are consistent by municipio. The answer is that indeed they are. Consistently, values for wave 4 are more negative than those of wave 1 for all three municipios in the case of height for age (Table IV-12), weight for age (Table IV-13), but not weight for height (Table IV-14).

We have also assessed whether the changes occurred only in the villages ("aldeas") and not in the county seats ("cabeceras"). The appropriate data to answer this question appear in Table IV-15. Again, the tendency towards more negative values in later waves appears in both village and county seat data.

(5) Conclusions

Around a third of the children in Honduras are stunted but only a few are wasted. There is a slight tendency for girls to show more stunting than boys but this difference is small and in basic agreement with data from Latin America showing the absence of differences in nutritional status associated with sex.

Table IV-9 Anthropometric Z-Scores for Rural Honduran Children Over Time: Height for Age

Age in months:	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
0 - 11.9	-0.74	159	-0.98	101	-0.65	80	-1.00	75	-0.62	54
12 - 23.9	-1.68	191	-1.64	146	-1.98	118	-1.89	93	-1.86	50
24 - 35.9	-1.78	185	-1.78	159	-2.07	144	-2.19	133	-1.70	49
36 - 47.9	-2.11	163	-2.12	136	-2.24	140	-2.16	126	-2.20	60
48 - 59.9	-2.07	181	-2.05	136	-2.43	123	-2.35	112	-2.06	53
60 - 71.9	-2.07	109	-2.00	114	-2.48	70	-2.52	67	-2.09	27
72 - 83.9	-2.41	34	-2.19	75	-2.18	47	-2.15	20	-2.27	1
+84 mo.	0	0	-3.60	5	-2.79	29	-3.52	7	0	0
TOTAL	-1.76	1022	-1.83	872	-2.07	751	-2.08	633	-1.74	294
S.D.	±1.60		±1.38		±1.48		±1.40		±1.55	

ANTH:HTAGSDN

Table IV-10 Anthropometric Z-Scores for Rural Honduran Children Over Time: Weight for Age

Age in months	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
0 - 11.9	-0.32	159	-0.21	101	-0.13	83	-0.47	76	-0.09	54
12 - 23.9	-1.06	190	-1.10	145	-1.15	119	-1.25	92	-1.20	50
24 - 35.9	-1.09	186	-1.07	159	-1.24	144	-1.50	133	-1.19	51
36 - 47.9	-1.31	163	-1.25	136	-1.22	140	-1.24	124	-1.20	60
48 - 59.9	-1.21	182	-1.12	135	-1.44	123	-1.48	111	-1.04	53
60 - 71.9	-1.23	109	-1.28	114	-1.38	68	-1.45	66	-1.41	27
72 - 83.9	-1.52	35	-1.21	76	-1.37	47	-1.46	20	-2.15	1
+84 mo.	0	0	-2.05	5	-1.60	28	-2.39	7	0	0
TOTAL	-1.05	1022	-1.06	871	-1.16	752	-1.29	629	-0.98	296
S.D.	±1.27		±1.11		±1.16		±1.16		±1.20	

ANTH:WTAGSDN

Table IV-11 Anthropometric Z-Scores for Rural Honduran Children Over Time: Weight for Height

Age in months	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
0 - 11.9	0.31	160	0.67	102	0.44	79	0.40	75	0.47	54
12 - 23.9	-0.11	189	-0.19	146	0.01	118	-0.21	93	-0.16	49
24 - 35.9	-0.13	183	0.07	159	0.03	145	-0.24	131	-0.12	49
36 - 47.9	-0.05	163	0.03	136	0.16	140	0.07	124	0.14	60
48 - 59.9	-0.05	181	0.15	135	0.03	123	-0.04	110	0.27	53
60 - 71.9	-0.05	109	-0.06	114	0.25	68	0.09	66	-0.16	27
72 - 83.9	-0.06	34	0.23	74	0.02	47	0.28	20	-1.00	1
+84 mo.	0	0	0.39	5	0.38	28	-0.47	7	0	0
TOTAL	0.01	1019	0.10	871	0.13	748	-0.01	626	0.10	293
S.D.	±1.03		±0.94		±0.83		±0.85		±0.81	

ANTH:WTHTSDN

Figure IV-3 Anthropometric Z-Scores for Rural Honduran Children Over Time: Height for Age

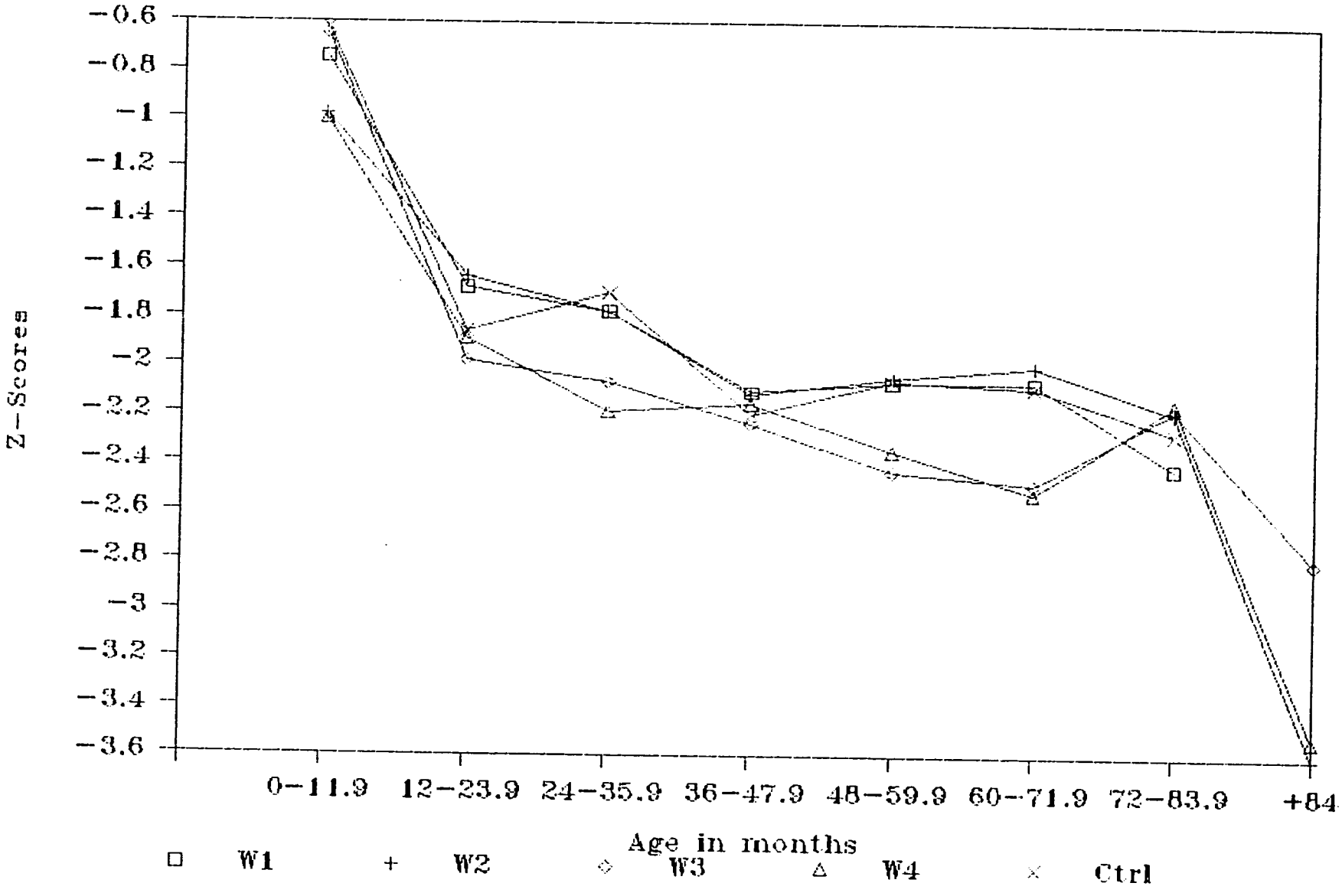


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Figure IV-4 Anthropometric Z-Scores for Rural Honduran Children Over Time: Weight for Age

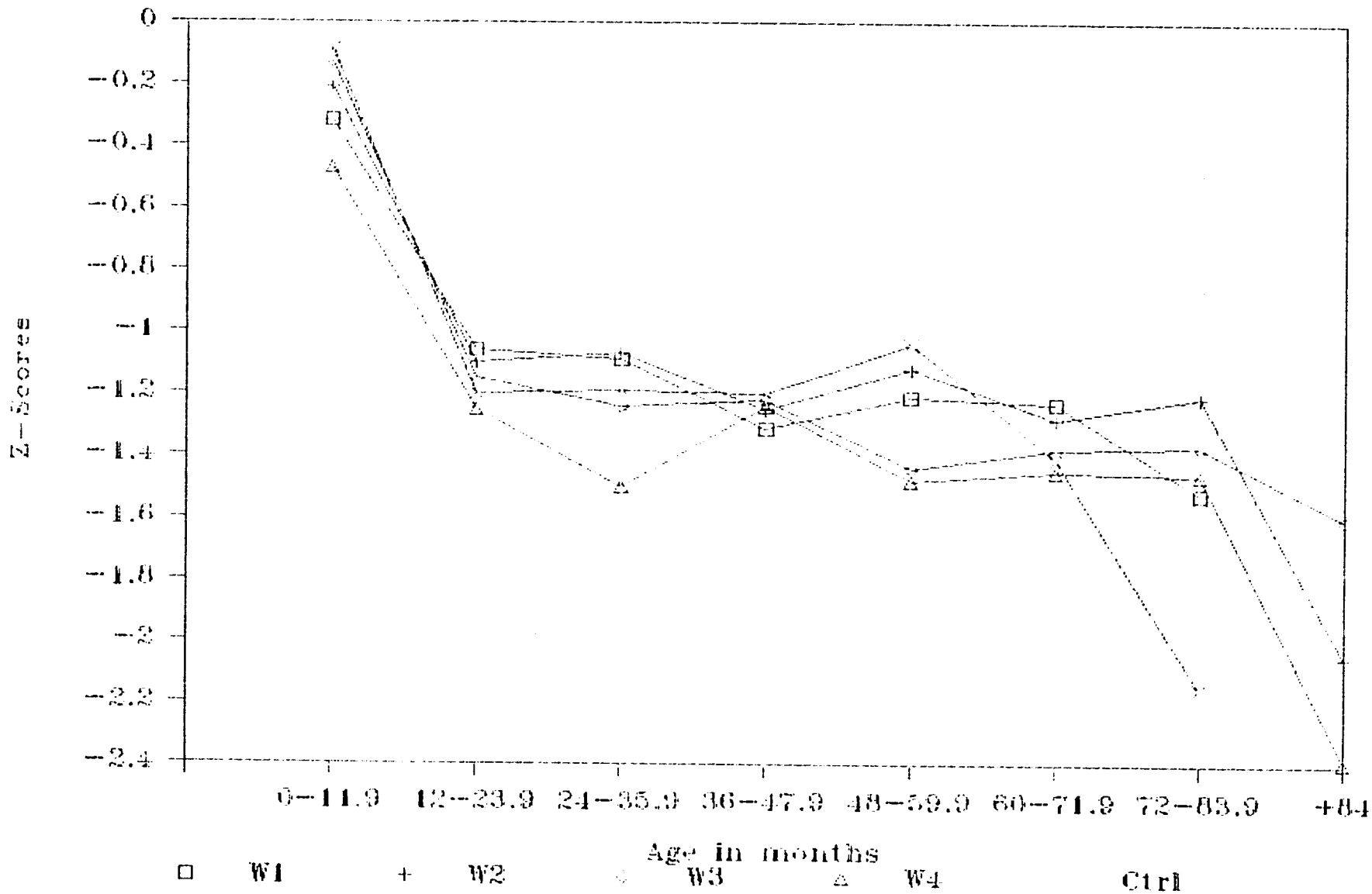

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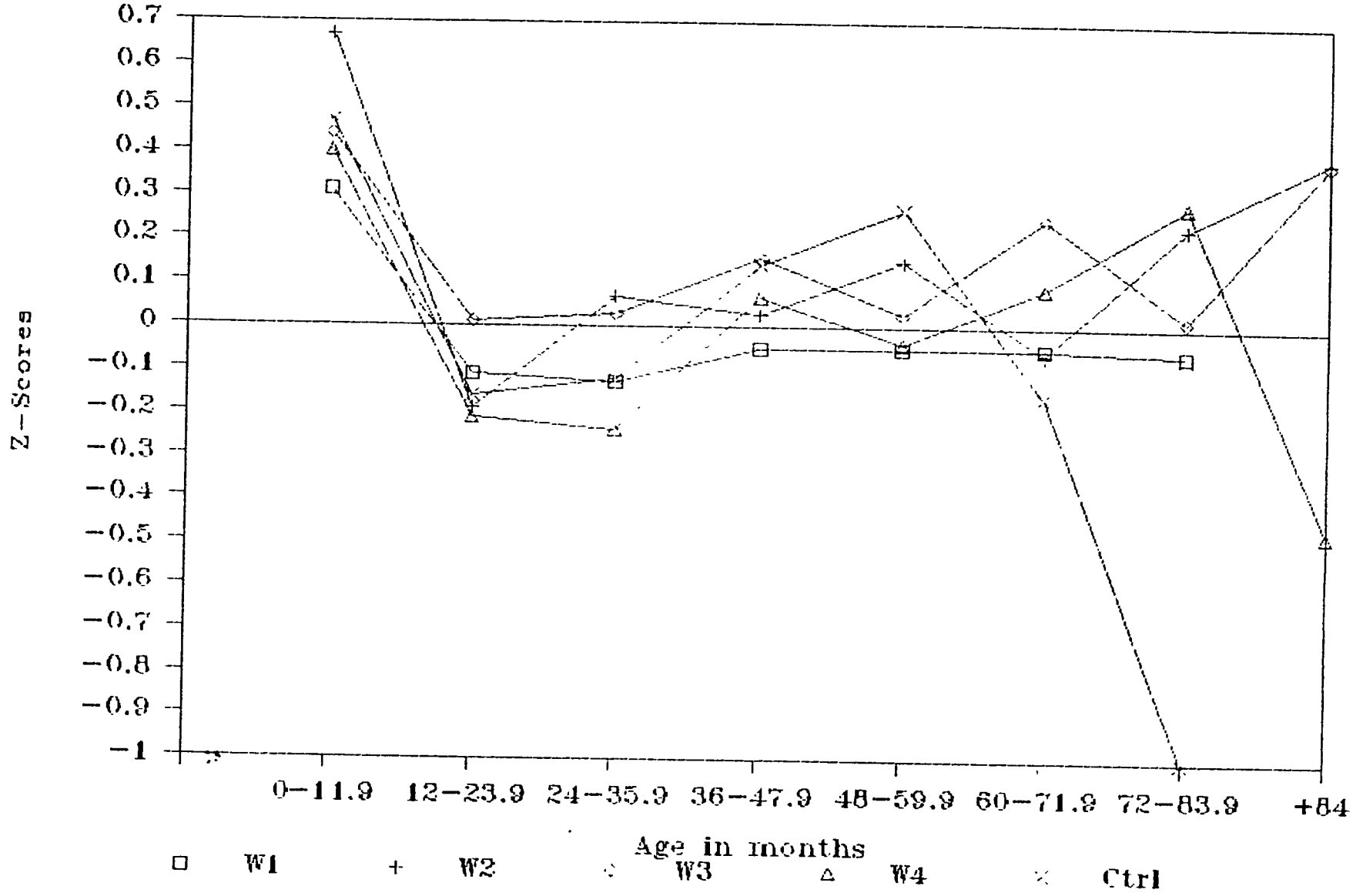
Figure IV-5 Anthropometric Z-Scores for Rural Honduran Children Over Time: Weight for Height



ANTH:WTHTSDN

Table IV-12 Anthropometric Z-Scores by Municipio over Time: Height for Age

Municipio	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
Yuscaran	-1.76	282	-1.90	248	-2.14	191	-2.01	210	-	-
Sabanagrande	-1.83	365	-2.04	323	-2.16	283	-2.12	240	-	-
Danli	-1.68	375	-1.56	301	-1.90	278	-2.09	183	-	-
Moroceli	-	-	-	-	-	-	-	-	-1.71	295
TOTAL	-1.76	1022	-1.83	872	-2.06	752	-2.08	633	-1.71	295
S.D.	±1.60		±1.38		±1.47		±1.40		±1.59	

ANTH:HTAGSDN

Table IV-13 Anthropometric Z-Scores by Municipio Over Time: Weight for Age

Municipio	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
Yuscaran	-1.07	284	-0.93	247	-1.03	193	-1.59	210	-	-
Sabanagrande	-1.31	366	-1.31	324	-1.39	285	-1.46	239	-	-
Danli	-0.78	374	-0.89	300	-1.00	275	-1.21	180	-	-
Moroceli	-	-	-	-	-	-	-	-	-0.98	296
TOTAL	-1.05	1024	-1.06	871	-1.16	753	-1.29	629	-0.98	296
S.D.	±1.27		±1.11		±1.19		±1.16		±1.20	

ANTH:WTAGSDN

Table IV-14 Anthropometric Z-Scores by Municipio Over Time: Weight for Height

Municipio	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
Yuscaran	0.05	284	0.37	248	0.35	192	0.13	211	-	-
Sabanagrande	-0.24	366	-0.10	323	-0.09	284	-0.21	238	-	-
Danli	-0.23	375	0.10	302	0..9	275	0.09	178	-	-
Moroceli	-	-	-	-	-	-	-	-	0.10	298
TOTAL	0.01	1025	0.10	873	0.13	751	-0.01	627	0.10	298
S.D.	±1.03		±0.94		±0.82		±0.85		±0.81	

ANTH:WTHTSDN

Table IV-15 Anthropometric Z-Scores for Children by Location Over Time: Cabecera vs. Others

Variable/Location	Wave 1		Wave 2		Wave 3		Wave 4		Control	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
HEIGHT FOR AGE:										
Cabecera	-1.33	152	-1.66	111	-1.75	90	-1.67	100	-1.21	42
Other	-1.83	870	-1.86	761	-2.10	662	-2.15	533	-1.80	253
Total	-1.76	1022	-1.73	872	-2.06	752	-2.08	633	-1.71	295
S.D.	±1.60		±1.38		±1.47		±1.40		±1.59	
WEIGHT FOR AGE:										
Cabecera	-0.81	152	-0.83	112	-0.91	91	-0.96	101	-0.64	42
Other	-1.09	872	-1.09	759	-1.19	662	-1.35	528	-1.03	254
Total	-1.05	1024	-1.06	871	-1.16	753	-1.29	629	-0.98	296
S.D.	±1.27		±1.11		±1.19		±1.16		±1.20	
WEIGHT FOR HEIGHT:										
Cabecera	0.05	154	0.26	111	0.24	90	0.16	100	0.25	43
Other	0.004	871	0.08	762	0.11	661	-0.04	527	0.07	255
Total	0.01	1025	0.10	873	0.13	751	-0.01	627	0.10	298
S.D.	±1.03		±0.94		±0.82		±0.85		±0.81	

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There were no consistent changes in indicators of wasting by wave and certainly no indications of a worsening situation. On the other hand, there were important negative changes (around a fourth of a standard deviation) in height for age and weight for age z-scores. In other words, as time went on, the degree of growth retardation in these measures increased indicating a worsening of nutritional status. The findings were consistent by sex of the child, age, municipio, and type of village. Hence, these findings cannot be said to be associated with a subgroup but were general and systematic.

We do not for a moment believe that these findings indicate that the oral rehydration program causes growth to be poorer. Rather, we believe that the findings reflect the increasingly difficult economic situation which Honduras is going through. This situation has led, we speculate, to decreased purchasing power and poorer diets and hence poorer nutritional status. Perhaps, the decrement observed would have been greater had the ORT program not been in effect.

B. Effects on Mortality

In the model used by this evaluation, the impact of the campaign is traced through very short range variables (exposure and learning) through mid-range variables (adoption and accuracy of performance) to the most distant variables (growth, health status change, and mortality). At each successive step the direct impact of the campaign becomes smaller in relation to the other factors influencing the variables. In addition, the measurement process at each successive step becomes more difficult and more expensive. Mortality is the furthest removed outcome in the chain; to detect a change of the size that might result from an intervention like PROCOMSI requires a delicate balance between getting detailed and accurate information and getting a large enough number of cases to achieve statistical

significance if a difference is found.

The project initiated several approaches to collection of mortality information. The first, collection of data about children of the 750 sample families who died during the intervention, was modified after it became clear that mothers were underreporting and the numbers involved were too small to be useful. A second effort, expanding the data collection from the families in the sample to all the families in the sample communities provided a hope of generating a large enough base for the statistical calculations. However, it soon became evident that community members were either unwilling or unable to help us identify and follow up on all early childhood deaths occurring in their highly dispersed communities. It was clear from the data that those cases which were identified by interviewing community members were only a small proportion of those cases that must be occurring. After intensified efforts to identify additional cases yielded little improvement, this effort was also discontinued.

The evaluation then turned to an external source for mortality data on large numbers of cases. These data were obtained from the Official Death Registry maintained in each county seat. Honduran law requires that all deaths be entered into the Registry within six months, but in practice an unknown proportion of deaths are not recorded. This source provides data on age at death and the cause of death as described by the person reporting the information to the county clerk, usually a family member. The reported causes of death range from traditional causes such as worm fever (fiebre lombrices) to precise medical terminology, when a physician has told the family what the cause of death was.

(1) Methodology

For cases that are recorded, the data are generally complete. For our analysis, we transcribed the data for all deaths of children five years or less in age at the time of death for a period from late 1978 through March of 1983. Data were taken from the Death Registers in the counties of Yuscaran, Danli, and Sabanagrande, the three locations within which the experimental data had been collected. The transcription was done by a Honduran physician who was experienced in rural health care. The transcribed data included the child's date of death, the reported age at death in months, and the exact textual description of the cause of death. The cause of death was subsequently coded into three categories - - causes for which diarrhea was reported to be the cause of death, causes which involved diarrhea but also involved other reported symptoms (e.g., diarrhea and vomiting), and causes not involving diarrhea. In the analyses that follow, the first two categories are grouped together as those cases involving diarrhea in any way. This is necessitated by two factors - - the ambiguity of many of the reported causes of death, and the small numbers of cases that result from further disaggregation.

The total number of cases copied from the Death Register is 402, with 217 occurring before the start of the intervention and 185 occurring afterwards. In the analyses, some of these cases are excluded usually because the child was actually older than 5 years at death. After the exclusions, 378 cases remain, with 206 occurring before the intervention and 172 occurring after it starts.

The majority of deaths are among children less than one year old, with numbers dropping precipitously in the older age categories. In the "Less than One Year Old" category, a total of 223 deaths were recorded; between one and two years of age, that number drops to 61. In the three year age span from three to five years, only a total of 94 deaths occurred. This

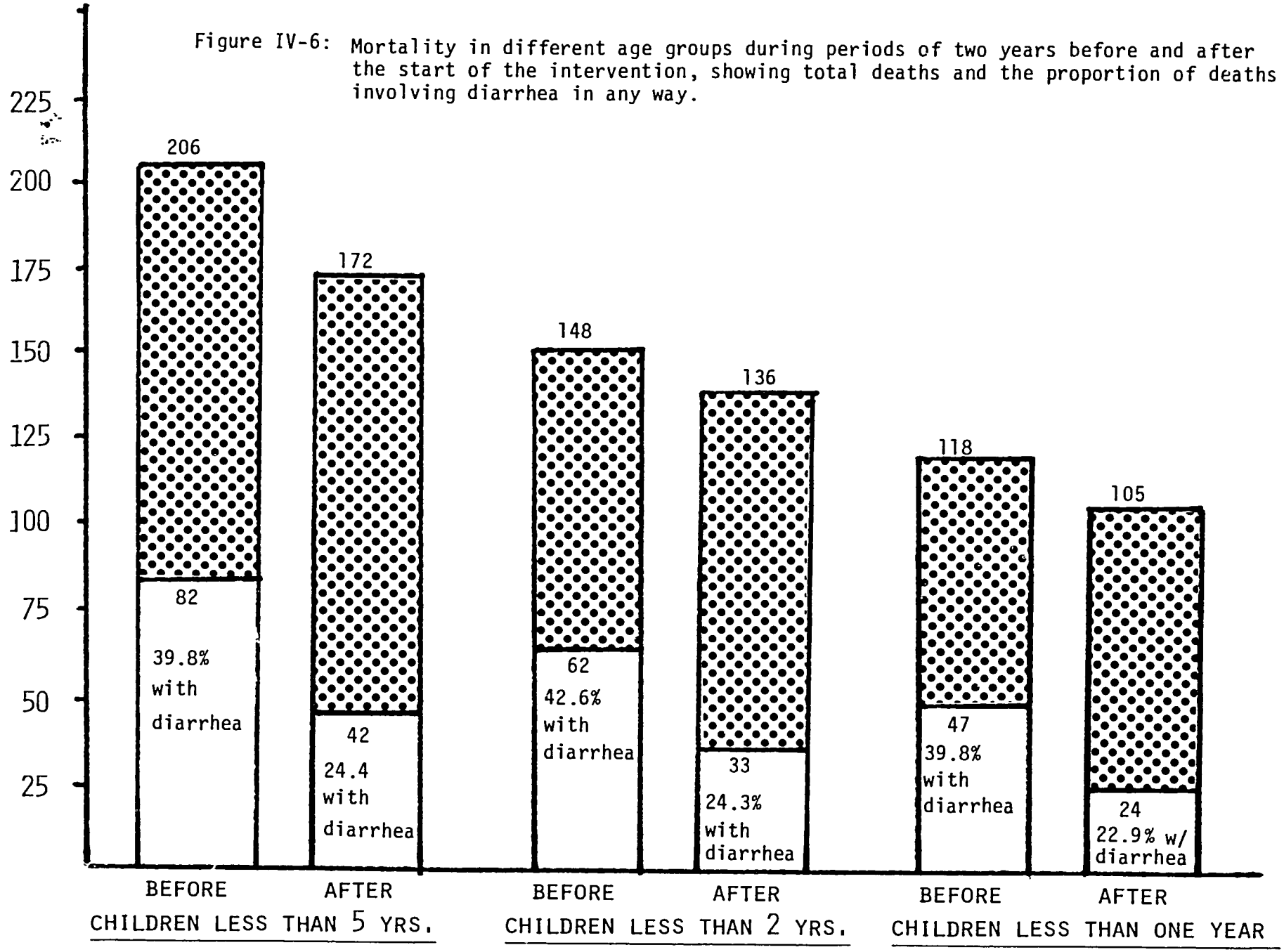
distribution parallels what one would expect, but it adds an analysis problem - - the number of cases in the older age groups are too small for many statistical tests. For that reason, we have grouped children into non-exclusive age groups defined as "Less than One Year," "Less than Two Years," and "Less than Five Years," and divided those groups according to whether the deaths occurred before or after the start of the intervention. Figure IV-6 presents the information on these groups, with each vertical bar showing the total number of deaths in the group and the unshaded portion of the bar giving the number and percentage of deaths that involved diarrhea in any way.

(2) Findings

The most prominent finding is that the proportion of deaths involving diarrhea in any way drops sharply after the intervention starts. For children less than a year old, the percentage of deaths involving diarrhea falls from 39.8 percent before to 22.9 percent after the intervention. This drop is statistically significant (chi-square = 6.6, df=1, $p < .01$). It is paralleled by drops in each of the other age groups; although the numbers are too small to achieve statistical significance, the pattern is completely consistent. The figure shows the proportions for all children less than certain ages. If one considers only those children within a specific age range, the effect is still the same. For example, for those children between one and two years of age, the percentage of diarrhea-involved deaths drops from 50 percent before to 29.0 percent after the intervention, on a total N of 61. Similarly, for children less than five but older than two years, the percentages fall from 34.5 percent before to 25 percent after the intervention, on an N of 94. Thus the data show that there is a large, consistent drop in diarrhea as a reported cause of death across all age groups.

In addition to consistency across age groups, we examined consistency across time. The data were categorized according to when the death occurred in relation to the start of the

Figure IV-6: Mortality in different age groups during periods of two years before and after the start of the intervention, showing total deaths and the proportion of deaths involving diarrhea in any way.



intervention. They were categorized into six-month periods, yielding groups of cases that occurred 6, 12, 18, and 24 months before and after the start of the intervention. These data are presented in Figure IV-7, for children less than a year, and for all children under five years. From these data we can see that the effect is stable in time and occurs immediately at the start of the intervention. There is no overlap between the proportions of diarrhea-involved deaths before and after the intervention; every percentage value for both age groups after the intervention is lower than any percentage value before. The abruptness and consistency of this pattern strengthens the interpretation that the drop is related to the campaign.

Overall, mortality during this time also fell slightly, although not as much as the decline in diarrheal mortality. Total mortality for all children less than five fell from 206 before to 172 after, a drop of 16.5 percent. For the same group, diarrhea mortality drops from 82 to 42, a drop of 48.8 percent. Hence, for children under five, the drop in diarrheal mortality is about three times the drop in total mortality. For children less than two years of age, where one might expect to see the most concentrated impact, the situation is similar. There the drop in total mortality is 8.1 percent while the drop in diarrheal mortality is 46.8 percent, for a ratio of over five to one. Thus, while overall mortality is dropping, it is not dropping anywhere near as much as the drops in reported diarrheal mortality.

(3) Conclusions

Three clearcut findings emerge from this analysis. One is that reported diarrheal mortality is sharply lower after the campaign than before, and that this drop occurs precisely and suddenly at the introduction of the ORT campaign. The second is that this effect is stable over time and across age groups, so it is unlikely to be the result of random fluctuations. The third is that total mortality, while lower after the campaign, does not

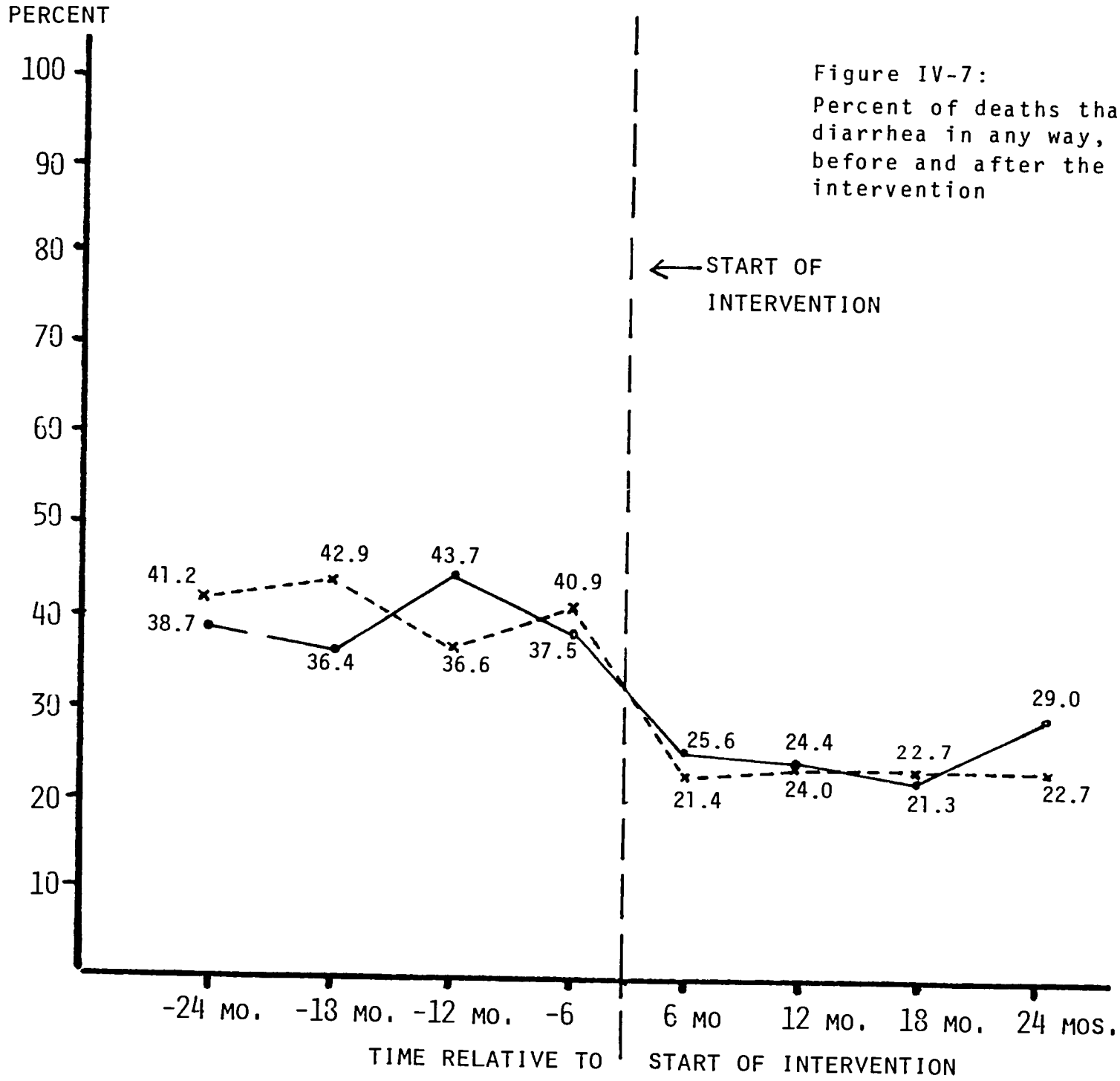


Figure IV-7:
Percent of deaths that involve diarrhea in any way, for two years before and after the start of the intervention

fall as much as diarrheal mortality.

The simplest interpretation of the findings would be that the introduction of ORT was having a strong impact on diarrheal mortality, but that some of the children who were saved from a diarrheal death by ORT soon succumbed to some other malady. There is good corroborating evidence that ORT was available and was practiced with sufficient accuracy by enough mothers to have an impact of this magnitude on the diarrheal mortality rate. However, there are several anomalies in these data that make other interpretations of these findings plausible as well. For one thing, reported diarrheal death rates are relatively constant across age groups, as can be seen in Figures IV-6 and IV-7. This would not normally be expected, as diarrheal mortality is usually much more prevalent among younger children. A second possible anomaly is that the timing of the drop is so abrupt. One might expect to see a more gradual drop as the treatment is gradually adopted by more and more mothers.

A number of possible interpretations can be suggested for these factors, in addition to the straightforward one that ORT is, in fact, having a strong effect. The ORT treatment became available in clinics at about the same time as it was introduced to the population at large. Clinic coverage of rural populations in Honduras is good, so it is possible that the abruptness of the drop reflects the sudden and pervasive availability at both clinic and home treatment levels. Another possible factor is that mothers are the main source of reported cause of death, and that they are responding in some way to the saturation of messages about diarrhea and ORT. They might, for example, be less likely to report diarrhea as a cause of death after exposure to messages pointing out that there is now an effective way to treat it. There might be secular changes in health status, for better or worse, that are masking the drop in total mortality that should otherwise result from the reduction in diarrheal deaths. These hypotheses will be pursued in more detail in a subsequent report on aspects of mortality and morbidity.

At this point there is reason to believe that at least some

of the reduction in reported diarrheal deaths does reflect a direct effect of the introduction of ORT. The evidence on the availability and adoption of the ORT indicates treatment levels that are high enough to have an effect of this magnitude. Other evidence shows that mothers are more likely to treat more serious cases, so the probable death avoidance could be higher than aggregate usage figures would suggest. The accuracy of mothers' knowledge and performance, and the concurrent introduction of ORT in clinics both support the interpretation that ORT is having an effect on mortality from diarrhea. The direction of other indicators in demonstrating adequate use of ORT is consistent and all points toward the interpretation that ORT has reduced diarrheal mortality.

APPENDIX A

All sites in Danli county and Yuscaran county are part of the department (state) of El Paraiso, located in the southeastern section of Honduras. Sabanagrande county is located in the department (state) of Francisco Morazon, which includes the nations' capital, Tegucigalpa. It is located in the south, central part of Honduras.

The Evaluation Communities

DANLI (municipio)	SABANAGRANDE (municipio)	YUSCARAN (municipio)
Danli (cabecera)	Sabanagrande (cabecera)	Yuscaran (cabecera)
San Juan de Linaca	Dulce Nombre	Tenidero
El Porvenir	San Antonio	Las Crucitas
Quebrada Larga	El Tule	Cordoncillos
Chichimoral	Monte Grande	Lainez
Santa Maria	La Ceiba	Chaguite Oriental
		Ocotol
		Robledal

I.D. Description of Evaluation Communities

This section describes the sites in which evaluation data are being collected. The information is summarized on Table I-1.

I.D.1. Municipio of Danli

Danli county is the largest and most urban region in our study. It is an area of large-scale commercial agriculture, supported by rich lands and gently rolling hills, good for cattle ranching. The county seat of Danli has a greater population than all the other sites of our study combined. It is unique in our study in many ways, having the only regional hospital in the area, and the most developed education, transportation, and communication system of all the sites. Even the rural sites in Danli county are generally more developed than those in the other areas. They have greater access to health services and better transportation available to the services available in the cabecera. Only one site in Danli municipio is inaccessible by car.

I.D.2. Municipio of Sabanagrande

Sabanagrande county is an arid area located on the western slope of mountains that link Tegucigalpa with the Gulf of Fonseca. Droughts are common, soils poor and fields are steep. Its warm climate does support many types of fruit trees - - mangoes, avocados and "jocotes" are the most common - - and pine also grows well there. The selection of sites in this area have varying degrees of community services. They range from the urban county seat with good health facilities and only 45 minute access to Tegucigalpa to the isolated rural sites with no communication or transportation facilities and a two to three hour trip by foot or mule to the nearest health facility.

Table I-1: Summary of Site Characteristics

LOCATION CODE	POPULATION	NUMBER OF HOUSES	HIGHWAY ACCESS BY CAR			Bus Service	SCHOOL		PUBLIC SERVICES			LATRINE PROGRAM	PRIMARY BUSINESS OCCUPATIONS	MOH SERVICE
			All Season	Dry Season only	No Access		PRIM.	SEC.	PIPED WATER	ELEC.	SEWERS			
Sabanagrande(10)	3,336	559	X			X	X	X (b)	X	X		X	Business	CESAMO
Dulce Nombre(11)	500 (a)	83 (a)	X			X	X		X				Subsist. Agr.	Guardian
San Antonio (12)	91	20			X		X						Sub. Agr.	Guardian
El Tule (13)	283	47		X	X		X		X				Sub. Agr.	Guardian
Montegrande(14)	99	18	X			X	X						Sub. Agr.	Guardian
La Ceiba (15)	741	155			X		X						Sub. Agr.	Guardian
Danli (20)	14,634	2,765	X			X	X	X (c)	X	X	X(f)		Business	CHE
San Juan de Linaca (21)	600 (a)	100(a)				X	X						Sub. Agric.	Guardian
El Porvenir(22)	400 (a)	67(a)		X		X	X						Sub. Agric.	Guardian
Quebrada Larga(23)	868	168	X			X	X		X			X	Livestock Ag.	CESAR
Chichimoral(25)	133	27			X		X						Sub. Agric.	Guardian
Santa Maria (24)	1,020	173	X			X	X					X	Livestock Ag.	CESAR
Yuscaran (30)	2,316	476	X			X	X	X	X	X (d)		X	Business	CESAMO
Tenidero (31)	422	84			X		X						Sub. Agric.	Guardian
Las Crucitas(33)	476	106			X		X						Sub. Agric.	Guardian
Cordoncillos(33)	250 (a)	41(a)		X			X						Sub. Agric.	Guardian
Lainez (34)	295	52		X			X						Sub. Agric.	Guardian
Chaguite O. (37)	169	37			X		X						Sub. Agric.	Guardian
Ocotal (35)	260 (a)	43(a)			X		X						Sub. Agric.	Guardian
Robledal (36)	295	62	X				X						Sub. Agric.	-- (e)

(a) Approximate estimate
(b) With vocational school
(c) With teachers' school
(d) During hours of 6:00 P.M. to 5:00 A.M.
(e) Uses municipality health center
(f) only for center of town

I.D.3. Municipio of Yuscaran

Yuscaran county has a mountainous terrain with fairly fertile agricultural areas. Like most of Honduras, subsistence agriculture is the main source of income - - major crops being beans, corn, sorghum, and sugar cane. Most of the sites in this area have similar characteristics, having little to no transportation services and receiving few community or health services. Activities unique to this area are organized cooperatives for tapping numerous amounts of pine trees in the rural areas and a large cane liquor manufacturing company in the county seat.

I.D.4 Transportation Services

Of the three cabeceras, Sabanagrande and Danli have the easiest access to the capital city. Sabanagrande, bordered by the Panamerican highway, is only 45 minutes from Tegucigalpa. It is serviced by two bus lines and the frequently passing buses coming from the Salvadoran border. Danli is an hour and a half trip from the capital, and has two bus lines make the trip on the hour. Both highways are paved and well maintained.

Yuscaran is less accessible. It takes 30 minutes from Tegucigalpa on the highway to Danli to get to the Yuscaran turnoff, a poorly maintained dirt road. It takes 40-45 minutes more to get to town, though the distance is just a little over half of that travelled on the paved road. Likewise, the villages surrounding Yuscaran are not easily accessible by car. There is bus service available only to the cabecera and the two out of seven villages that have roads must be reached by private cars. In the rainy season even those roads are impassable at times.

In Sabanagrande, three out of five villages are accessible by car; one has bus service and the other two are not passable during the rainy

season. In the Danli area there is bus service to four out of five villages, though some buses don't brave the muddy roads during the rains.

I.D.5. Communication Services

All three cabeceras have telephone, telegraph and mail services. Telegraph service is available in some aldeas of Danli, with services available to Santa Maria and Linaca. No other villages in the study receive telegraph services, but all towns with bus service receive mail by bus. Those towns without bus service have more informal, personal procedures for mail pickup. During the rainy season, communication services are often in disrepair or almost nonexistent.

I.D.6 Health Facilities

Only the largest cabecera, Danli, is equipped with a regional hospital. The other two cabeceras are served by a local health center staffed by one doctor, one nurse and nurse practitioner. The larger villages have constructed health centers to which a nurse practitioner is assigned. These centers are found only in the Danli communities of Quebrada Larga and Santa Maria.

All the other villages refer local health problems to health guardians (semi-trained unpaid health workers who dispense simple medicines), trained and untrained midwives, and local healers. For acute health problems, patients are referred to municipal health centers or for severe cases to the hospitals in Tegucigalpa.

Within our sample, sites can be divided into four categories of available health service. They are grouped as follows.

(1) local health worker (health guardian)

(2) local health center staffed with para-professional nurse (CESAR)

(3) municipal health center with doctor, nurse, and nurse practitioner (CESAMO)

(4) regional hospital (CHE)

Category 1 includes communities that are serviced by a volunteer local health worker. These health workers are called health guardians, are trained in the municipality health center center and receive refresher health courses there. They are given the responsibility of diagnosing common health problems, dispensing certain medicines, and referring more serious cases to the local health center or hospital.

Category 2 are communities that have a local health center (CESAR) staffed by a public health nurse. She is generally a para-professional having received an 11 month intensive training program in the educational hospital in Tegucigalpa. She has limited equipment and medications available in the health center, and refers more difficult cases to the regional health center or capital.

Category 3 are municipalities with larger health centers (CESAMO) and physician-staffed facilities. The staff includes a doctor, nurse and para-professional nurse. They have limited equipment and various types of medicines available. This health level is the last stop before being referred to a local hospital and receives many referrals from health guardians and CESAR's.

Category 4 has only one community because this service includes a regional hospital (CHE) staffed with many doctors and nurses. Only large communities can maintain this level of service.

Figure I-5: Sites grouped by type of health service

(1) Health guardian	(2) CESAR	(3) CESAMO	(4) CHE
San Antonio	Quebrada Larga	Sabanagrande	Danli
Chichimoral	Santa Maria	Yuscaran	
La Ceiba			
Porvenir			
Lainez			
Robledal			
Chaguite			
Dulce Nombre			
El Tule			
Monte Grande			
San Juan de Linaca			
Tenidero			
Las Crucitas			
Cordoncillos			
Ocotal			

(1) Health Guardian: unpaid health worker who dispenses simple medications.

(2) CESAR: Local health center staffed by auxiliary nurse.

(3) CESAMO: Municipal health center staffed by doctor, nurse, and nurse practitioner.

(4) CHE: Regional hospital

I.D.7 Public Services

Like other types of services, water, electricity and sewer systems are reserved mainly for the cabeceras. In the most populated city, Danli, all three services are available, while in Sabanagrande and Yuscaran only electricity and potable water are found. Sabanagrande is the recipient of more services than Yuscaran. It has electricity 24 hours a day, instead of the limited night-time hours of Yuscaran. It also has potable water systems funded by AID in two communities. The Danli area has only one community with a completed water project and the Yuscaran area has none.

I.D.8. Educational Institutions

Primary school education is available in every town within our study. These are generally locally constructed one-room school houses that are assigned trained teachers to teach grades 1-6. Classes are taught from February to November, recessing for the months of harvesting.

In the cabeceras of Sabanagrande, Yuscaran and Danli, various degrees of secondary education are available. Sabanagrande has two secondary schools, one with 575 students and 15 teachers, the other a semi-official pre-vocational institute with 12 teachers offering only general subjects. Yuscaran offers a secondary education to 380 students instructed by 12 teachers. Danli has one of the few teachers' schools and several large secondary schools to educate its large population.

I.D.9 Religious Affiliations

There are very few towns in our study that don't have some type of church. Even the most remote areas like San Antonio have a priest visit them to perform mass once a month. In the event that the communities are located close to the cabeceras, the towns often do not build their own

church - - as in the cases of Dulce Nombre, Linaca, and Robledal.

There is some competition as to religious affiliation in communities that have both Catholic and Protestant Churches. These are towns like Chichimoral, Monte Grande and Santa Maria.

I.E. Population

The initial baseline data collection activity enumerated 5,345 people in January and February 1981. This section will outline the demographic and certain social characteristics of our sample population.

The population is evenly divided by sex; males predominate slightly. Table I-2 presents the breakdown of population by sex.

Table I-2: Population by sex

	N	Percent
Female	2,657	49.7
Male	2,688	50.3
	5,345	100.0

Ages were collected by asking respondents for the years completed of each household member. Ages were unavailable for 273 household members. As in many developing countries the base of the population pyramid is quite wide. At the time of the census, 24.3% of the population was less than five years of age, and the median age of the population is 12. Table I-3 shows the age distribution of the people residing in the sampled households.

Rural Honduran households are organized into conjugal family households. The 747 households that were censused had a mean household size of 7.16 members per household. 409 couples reported themselves as formally married (casado).

Table I-3: Age at baseline

	N	Percent	Cumulative Percent
0 - 5	1,232	24.3	24.3
6 - 10	986	19.4	43.7
11 - 15	673	13.3	57.0
16 - 20	431	8.5	65.5
21 - 25	329	6.5	72.0
26 - 30	276	5.4	77.4
31 - 35	243	4.8	82.2
36 - 40	226	4.5	86.7
41 - 45	173	3.4	90.1
46 - 50	162	3.2	93.3
51 - 55	106	2.1	95.4
56 - 60	60	1.2	96.5
> 60	175	3.5	100.0
TOTAL	5,072	100.0	

I.F. Socio-Economic Status

This section will discuss the socio-economic status of the Evaluation PROCOMSI sample using the data collected from the Socio-economic Status Instrument administered in January and February of 1981. Specific variables such as amount of land and livestock owned, wage income, house ownership, house construction materials, and other features and items of the home will be discussed here, and will serve to characterize the sample.

Most of the Evaluation PROCOMSI sample members are, for the most part, small landowners producing subsistence crops of corn and beans, the staple of the Honduran diet. Half of the farmers own their own land (50.6%) and 72.3% of those work their land. 18.6% of the farmers in our sample have land that has been loaned to them. The unit of farmland owned is the manzana, which is equivalent to 1.23 acres. 56.8% of the entire sample owned two manzanas or less, with 12.5% owning no land at all. Another 24.4% own between 2.5 and 6.0 manzanas and 14% own between 6.5 and 27 manzanas. At the other end of the amount of land owned, 4.8% of the sample own 30 or more manzanas, or 53% of all the land. Table SES-1 shows a summary of landownership from the sample.

Table I-4: Ownership of land

Amount of land (manzanas)	Percent of Rural (n=466)	Percent of Urban (n=55)	Total sample percent house-holds (N=521)	Percent of total land owned
0	7.7	52.7	12.5	0
0.5 - 2	47.6	16.4	44.3	9.9
2.5 - 6	25.8	12.7	24.4	13.6
7 - 27	14.4	10.9	14.0	22.6
More than 30	4.5	7.3	4.8	53.9
	100.0	100.0		

The majority of these small farmers also consumes its own agricultural products, rather than selling them elsewhere. 67% of the sample did not sell their agricultural products, 15% sold them locally and 18% sold them at an urban center further away.

The main crops are corn and beans. Other crops that are grown in smaller amounts are rice and sugar cane. Some livestock is also kept for the household's own consumption as well. These include fowl, laying hens, pigs, and beasts of burden. 23% of the sample owned no fowl, 43% owned from one to ten, and 31% owned more than ten. 34% had no laying hens, while 61% owned between one and eight laying hens, and 5% owned more than eight. 20% of the sample owned one pig, 11% owned two, 20% owned more than two, while 49% did not own any. Most of the sample (72%) had no cows, while 6% owned one, and 17% owned between two and ten. 12% of the sample owned one donkey, mule or horse, 17% more than one, while 71% had none. Lastly, most of the people in the sample (94.1%) did not own any oxen.

Only 41.2% of all households (311) reported earning any cash income at all, and the average amount earned per year amounted to L. 202.31 per person ($101.16). On a household basis, average reported income was L. 108.13 per month ($54.07) or $648.84 per year. This result is very close to the annual projected expenditures of approximately $650 per year, based on self-estimates of weekly expenses by families in the sample.

Most of the respondents in the sample own their own home (82.4%) as opposed to renting (8.6%), borrowing (7.6%) or other arrangements (1.4%). Most only own this one house and no more (88.6%) and 71.2% have lived in their houses for more than four years. 20.2% have lived in the homes from one to four years, and only 8.4% have lived in their home for less than one year. Most Honduran rural homes in the sample were separated rather than joined with other houses (92.5%) and the homes tended to be within 50 meters of each other (52.3%),

while 25.9% of the sample's houses were between 51-100 meters apart.

Latrines are used by 41.1% of the urban and 16.5% of the rural households in the sample. 2.5% utilize a septic tank, while "the fields" are used by 81% of the rural respondents for urination and defecation. In urban areas, the corresponding figures are 31.8% have a septic tank, while 26.5% use the fields. Garbage from households is disposed of in the surrounding countryside by 88.1% of the rural respondents, while 6.3% burns it. Urban households mostly burn (35%), dispose in countryside (40.1%) or have their trash picked up by collectors (14%). (See Table SES-2).

Table I-5: Waste and Garbage Disposal

	Percent Rural (n = 599)	Percent Urban (n = 151)
Waste Disposal (n = 750)		
Septic tank	2.5	31.8
Latrine	16.5	41.1
Fields	81.0	26.5
Other	0	0.7
	100.0	100.1
Garbage (n = 756)		
In countryside	88.1	40.1
Burn	6.3	35.0
City pickup	1.2	14.0
Bury	0.5	1.9
Other	3.8	8.9
	99.9	99.9

House style and construction materials are strong indicators of socio-economic status among Honduran countrypeople. Rural people build their own homes with the assistance of family and local specialists and houses are usually built, with the exception of the roof, from locally available

materials - - adobe and wood. Some components of the home such as lumber for roof beams and cornerposts must be brought from great distances, and roofing tiles must be bought from kilns and packed carefully.

77.5% of homes have earthen floors. Earthen floors have the advantage of absorbing spills and are easy to clean by virtue of the fact that a fresh coat of mud can be applied over it. Dirt floors do have the disadvantage of harboring and permitting the growth of disease-causing agents. 12.4% of our sample had cement floors, which cost more due to labor and construction, and also require scrubbing to keep clean. The most expensive floors are made of tile. Only 9.5% of the sample had these floors. Earth floors are much more likely in rural areas. Table SES-3 reports floor construction material by urban-rural locale.

Table I-6: Floor construction material by urban-rural locale

Floor type	Locale		
	Urban	Rural	
Earth	8.6 (65)	69.2 (525)	77.7 (590)
Other	12.2 (93)	10.0 (76)	22.2 (169)
	20.8 (158)	79.2 (601)	T = 759

Walls for homes are usually constructured of adobe - - 56.1% of the households used this construction. Another type of wall construction, bajareque, also uses adobe, and is the main component of "other"on Table I-7. Bajareque uses a frame of saplings and an adobe-like mud mixture packed over it. Approximately 22% of the sample had walls built in this manner; however, this construction style, as well as only wood walls, is felt to be less long lasting than walls made from adobe, brick, or cement blocks.

Table I-7: Wall construction material

Type	N	Percentage
Cement	22	2.9
Brick	43	5.7
Adobe	426	56.1
Wood	56	7.4
Mixed	43	5.9
Other	167	22.0
TOTAL	757	100.0

Table I-8 below shows the distribution of roofing materials used in our sample. Palm fronds and thatch (listed under "other") are the least preferred roofing materials. Palm fronds are poor insulators, and both thatch and palm leak and harbor insects. Tile roofs are the most common - - 80.6% of our sample had them, and it is the preferred material because of its insulating properties. Tin roofs are less expensive than tile, but are noisy and poor insulators. Roofs of "Duralita," an asbestos and cement compound, are the most expensive and are almost as good as tile for insulation, and require less maintenance.

Table I-8: Roofing material

Type	N	Percentage
Palm	24	3.2
Other	38	4.9
Tin	70	9.2
Cement	15	2.0
Tile	612	80.6
	759	100.0

In Honduran homes, separate kitchen areas are common. 87.1% (649) of the respondents said they had a separate area for cooking. The cooking area could be a separate room, or separated from the living area by a wall, or be beneath a thatched roof connected to the exterior of the house. Only 12.9% of the households did not have some sort of separate area for cooking.

Separate sleeping areas are found among 54.1% of the respondents. These are areas separated from the living areas by a wall or room divider.

General condition of the house was judged subjectively by the Evaluation PROCOMSI interviewers. They were asked to judge the houses on the basis of completeness of construction, cleanliness by local standards, and neatness. 154 houses (20.2%) were judged as in poor condition, 373 (49%) as average, and 227 (29.8%) as in good condition. Values for seven houses are missing.

Possession of certain items used within the home were also of interest to the Evaluation team. These included the presence of stoves, refrigerators, cars, interior lighting, and sewing machines.

Fully 97.1% (737) of houses for which a response is available reported having a fogon. A fogon is an elevated cooking surface constructed of adobe. A long cylindrical space holds firewood, and the surface immediately above that space is perforated with several large holes for cooking pots, and the comal or griddle used to cook tortillas. The fogon is well insulated so that only the cooking surface is hot, and provides protection for children from accidental burns. Because many of the wealthier families hire cooks from rural areas, even these houses have fogones. 2.9% of the households have kerosene or propane stoves; these are unusual additions to kitchens.

Refrigerators, unlike stoves, are important income generators for households. Refrigerator ownership is shown in Table I-9.

Table I-9: Presence of functioning refrigerator

Response	N	Percentage
Yes	57	7.6
No	695	92.4
Missing	9	-
TOTAL	761	100.0

Fifty-seven households (7.6%) have working refrigerators, powered either by electricity or kerosene. With the exception of a few urban elite households, these refrigerators are found in stores or pulperias in rural areas. Ethnographic investigation indicates that soft drinks, beer and home-made frozen juices are dispensed from these refrigerators. Refrigerators cost about $500 for an electrical refrigerator and $1250 for a new kerosene refrigerator. 21.9% (34) of urban households in our sample have refrigerators, while only 3.9% (23) or rural households have a refrigerator. Most rural communities have one or two refrigerators.

14.3% of the respondents reported having electric lights in their homes, but the majority (60.9%) use oil lamps for their indoor lighting.

14.8% of reporting households have sewing machines, another important addition to households.

Finally, 36 households (4.7%) report owning a car. For the most part, these are urban households and the cars represent a very large investment.

In summary, the socioeconomic status instrument examines a number of features or rural Honduran life. A typical rural community is a locale with a number of town centers connected by paths. Aldeas are subdivided into hamlets (caserios) which are grouped households often no more than 50 meters apart. Many of these adjacent households are connected through ties of kinship.

The houses are of low adobe construction with tile roofs, and are often a single room with an attached cooking area. The houses contain usually two or three beds for the seven inhabitants, so beds are shared. The houseplot surrounding the house is divided into areas for play and reception of guests, the drying of grains, and area for micturation, defecation and disposal of garbage. Since animals are unpenned and children wander from house to house, special problems are created.

Rural farmers grow corn and beans in fields that are often some distance from their houses. Most farm households have chickens, and smaller number of households have pigs, cows, or a donkey, mule or horse. Ethnographic investigation has revealed that farm households consume a number of purchased products: alcohol or gas for lamps, batteries, matches, salt and other spices, cooking oil and soap. Families estimates of weekly consumption averages 23 lempiras ($11.50). This figure is equivalent to the average cash income per household of roughly 1200 lempiras per year ($600).

APPENDIX B

Radio Spots/Frequencies

Phase 1: Enabling Phase----------March 1,-June 26, 1981
Phase 2: 1st Treatment Phase-1981 Rainy Season---June 26-Oct.26,1981
Phase 3: Prevention----------Oct. 26,1981-March 3, 1982
Transition----------March 3-May3, 1982
Phase 4: 2nd Treatment Phase-1982 Rainy Season-----May 3,-Oct 3,1982
Phase 5: ----------Oct.3,1982-March30,1983

Dehydration/Litrosol Spots	Frequency	National	Local
Phase 1:			
Des-hidra-ta-cion	125	125	
Toma mi amor (Dona Chela)	96	96	
Falta de Agua	640	160	480
Noticiero Deshidratacion	99	99	
Song-Deshidratacion	1,175	125	1,050
No descuide ese nino (D. C.)	464	176	288
Dr. Salustiano	378		378
Phase 2:			
Dr. Salustiano's Intro. to Litrosol campaign (60 sec.)	578	374	204
Dr. Salustiano's Intro to Litrsol campaign (30 sec.)	714		714
Acceptance -stops dehydration not diarrhea	1,292	374	918
Litrosol brings back appetite and activity to a child w/diarrhea	1,292	374	918
Give litrosol to child every time she/he has diarrhea	1,292	374	918
Three 8 oz. bottles = 1 liter	1,292	374	918
Dehydration/Litrosol song (when child has diarrhea give Litrosol so she/he won't die)	1,292	374	918
Phase 3:			
Follow instructions on packet to insure proper mixing	1,634	323	1,311
Testemonials: Litrosol brings back a child's appetite and energy after a case of diarrhea	6,174	950	5,224

Transition: (All spots same as Phase 1 with addition of Litrosol slogan)	Frequency	National	Local
Des-hidra-ta-cion	585		585
Noticiero	585		585
La falta de agua	585		585
Dehydration Song	585		585
(spots same as Phase 3:)			
Follow instructions on packet	585		585
Litrosol returns appetite and energy levels after diarrhea cases	585		585
Phase 4:			
Give litrosol for **all** episodes of diarrhea (light and severe)	2,524	376	2,148
Use litrosol throughout complete episode of diarrhea	2,524	376	2,148
Dehydration Song: Give litrosol for every diarrhea case Give it during entire case	2,850	78	2,772
June-Oct. only			
Signs of dehydration: (2 spots) A child with these signs must be rushed to clinic	2,061	279	1,782
June-August only			
Mix all of the contents of packet in 1 liter of water	1,032	150	882
May/July/Sept. only			
Litrosol can be given with other medicines	1,384	208	1,176
May 82 only			
Three 8 oz. bottles = 1 liter	440	84	356
Infants Need Special Care			
Phase 1:			
Mama te quiero	85	85	
Quien rie	68	68	
Dr. Salustiano (tierno)	360		360
Breastfeeding			
Phase 1:			
Felicitaciones	120	120	
Dona Chela (Leche en pecho)	96	96	
Noticiero (Pecho)	81	81	
Dr. Salustiano (Pecho)	360		360
Song about breastfeeding	423	45	378

Phase 3:			
Continue breastfeeding and/or give soft foods during cases of diarrhea (Format Consulta Para Todos)	1,729	418	1,311
Breastfeeding Song (Breast is best, always give breast when child has diarrhea)	1,900	190	1,710
<u>Germ Theory</u>			
Phase 1:			
Lombricio/Lombrolfo	260	60	200
✓ Germs cause diarrhea	208	48	160
Bichos en la escuela	880	400	480

Description of Radio Spots

Phase 1: March 1,-June 26, 1981

(1) Des-hi-dra-ta-cion: Maria and Consuela (Comadres)
1)Children that have diarrhea lose a lot of liquids.
2)If they aren't given water to replace the liquids they will die.
3)This loss of vital fluids is called **dehydration.**
4)Like the radio says, " If your child has diarrhea, give him liquids so he won't die.".
5)Announcer "Working toward making your town healthy, the Ministry of Public Health".

(2) Toma Mi Amor: Dona Chela about dehydration
1)Children lose liquids when they have diarrhea.
2)Dona Chela gives her children with cases of diarrhea liquids, like an entire bottle of rice water.
3)Liquids should be given so that the child won't die.
4)Announcer: " If your child has diarrhea, give him liquids so he won't die."
5)Announcer "Working toward making your town healthy, the Ministry of Public Health".

(3) Dehydration: La Falta de Agua: The Lack of Water: 2 Announcers
1) What causes us to lose our crops; lack of water. What causes our little children to get very thirsty and die of diarrhea; lack of water.
2) If the fields don't get water, the crops die. If an infant doesn't get water, it causes him to die (too).
3) Dehydration, or when your child's body dries out, causes the death (of young children).
4) Parents, don't let your children die of (dehydration) caused by diarrhea. Prevent them from losing the water that keeps them alive. Give them enough liquids when they have diarrhea.
5) Working toward making your town healthy, the Ministry of Public Health.

(6) No Descuide ese Nino: Dona Chela about dehydration
1)Dona Chela says take care of your children! When they heve diarrhea give them lots of liquids so they don't die of dehydration.
2)Dehydration is the loss of vital liquids. It causes your children to be thirsty. They lose liquids because of diarrhea.
3)Dehydration is dangerous. It can cause your child to die.
4)Announcer: " If your child has diarrhea, give him liquids so he won't die."
5)Announcer "Working toward making your town healthy, the Ministry of Public Health".

(7) Dr. Salustiano talks to a mother about dehydration:
1)Mother tells Dr. that she is worried because her child has diarrhea and his skin is all wrinkled, he's thirsty and looks sad.
2)Dr. S. says that her child is dehydrated. Dehydration occurs when the child's body loses vital liquids that it needs to live. He says it is dangerous and that the child could die if she doesn't replenish the liquids he is losing.
3) If your child has diarrhea, give him liquids so he won't die.
4) Announcer: Working for better health in your town, the Ministry of Public Health

(4) Noticiero: Dehydration (done in news format with 2 announcers)
1)We know that the majority of children that die in Honduras die from diarrhea related causes. Very few know that it is not the diarrhea that kills them, but dehydration caused by the diarrhea.
2)Dehydration is the loss of liquids, salts and minerals that are necessary for life. A child with diarrhea loses these liquids and when the dehydration is severe, the child dies.
3) Every year thousands of children all over the nation die from dehydration caused by diarrhea.
4) Dehydration can be prevented by giving children lots of liquids to drink when they have diarrhea.
5)Announcer "Working toward making your town healthy, the Ministry of Public Health".

(3) Dehydration Song: Sung by a doctor and a mother
1)When your child is thirsty, pale, has lots of loose stools, and very little appetite she has **dehydration.**
(Repeated 3 times)

No # Dr. Salustiano: (Am not sure which spot this is) Spoken between a mother and a doctor
1)Diarrhea "gives" dehydration.
2) Dehydration is the loss of vital liquids that your child's little body needs to live.
3) If you don't replace the liquids that your child is losing, she will die.
4) If your child has diarrhea, give her liquids so that she won't die.
5) Announcer: "Working toward making your town healthy, the Ministry of Public Health".

(24) Felicitaciones: Breastfeeding discussion between *comadres*
1) The Ministry of Health congratulates all the mothers that breastfeed their children. (said twice during spot)
2)Breastfed children grow up to be more alert, plump and healthy.

3) Comadre says "It's true, my children never got sick when I was breastfeeding them."
4)Breastfeeding mothers deserve to be congratulated for being good mothers.
5) The mother that breastfeeds, is a mother indeed.
6) Working toward better health in your town, the Ministry of Health

(25) Leche en Pecho: Dona Chela
1) Dona Chela calls herself a woman of *leche en pecho*- a takeoff on the saying *pelo en pecho.*
2) She says the reason that breast is best is because it is more nourishing, prevents children from getting sick as often and helps them grow to be strong and healthy. Your children will love you for it.
3) Announcer: "Working toward making your town healthy, the Ministry of Public Health".

(27) Pecho: Dr. Salustiano
1)There is no better milk than mother's milk for your child.
2) Breastfed babies grow up to be more alert, plump and healthy.
3) Breastmilk is safer and more nutritious than formula and is the best possible milk for your child.
4) Mothers that breastfeed are real mothers (indeed).
5) Announcer: "Working toward making your town healthy, the Ministry of Public Health".

(26) Noticiero: Pecho (Newscast format with 2 announcers)
1) The Ministry of Health wants Honduran mothers to know the results of the latest studies about breastfeeding done throughout the world. They have shown that breastmilk has more nutritive value than any other milk.
2) It says that the colostrum (first milk) acts as a vaccination against diseases.
3) The Ministry wants to congratulate mothers that breastfeed because as the studies show " Mothers that breastfeed are real mothers (indeed)."
4) Announcer: "Working toward making your town healthy, the Ministry of Public Health".

(28) Breastfeeding Song:
1) Your child depends on you to grow. Take care of him by giving breastmilk to help him grow and give him energy . Your child can find this (help) only in your breastmilk.
2) Mothers that breastfeed are real mothers (indeed).
3) Announcer: "Working toward making your town healthy,

the Ministry of Public Health".

Quien Rie: Infants need special care: (1 Announcer)
(22) 1) A mother laughs when her child smiles and her heart is saddened when he cries. The laughter or the tears depend on the mother.
2) Children under 2 years old are more delicate and need more care. (Slogan: Los ninos son mas delicado.....)
3) Announcer: "Working toward making your town healthy, the Ministry of Public Health".

Lombrices (Worms): Lombricio and Lombrolfo (Two worms talking...)
(30) 1)Children get worms from eating things that are dirty drinking unboiled water, and eating foods that have been contaminated.
2)The worms are getting bigger and will get out of the *bolsa* to look for food. The child will sleep with his eyes open and wake up upset. Soon the end will come.
3) Announcer: "Working toward making your town healthy, the Ministry of Public Health".

Dehydration in School: Professor and students: (Phase 1)
no # 1) The lesson for today is **dehydration**. Dehydration is caused by diarrhea.
2)Diarrhea is deadly because you lose vital liquids. This is called dehydration and it kills many children.
3) What can you do? When your child has diarrhea, give him liquids so that he won't die.
4) Working toward making your town healthy, the Ministry of Public Health.

Bichos en la Escuela: A professor teaching hygiene to his students.
(31) 1) Lesson for the day: *bichos* (germs) Bichos are so little we can't see them, but they attack day and night. They cause diarrhea or dysentery which can cause death.
2) You can fight bichos by boiling water, washing your hands after you eat, and reheating fried leftovers before serving them.
3) Announcer: "Working toward making your town healthy, the Ministry of Public Health".

Mama Te Quiero: Announcer talking to mother about infant's special care
(21) 1)Mothers, your children under 2 years old need more care and attention. They are weaker and more delicate, give them special care. They will love you for it !
2) Announcer: "Working toward making your town healthy, the Ministry of Public Health". .

Phase 2: June 26,-Oct. 26, 1981

Aceptacion: Intro to the Campaign by Dr. S. (60 sec. spot)

(8) 1)Dr. S. talks to you from the Ministry of Health. He is worried about the lives of our children during the rainy season. It is easy for them to get diarrhea and dehydration that can cause death in a short amount of time.
2) In order to prevent and treat dehydration in children the Ministry is mounting a campaign in Francisco Morazan and El Paraiso. The midwife, health guardian, or auxilary mayor in these towns will distribute **Litrosol** for free.
3)**Litrosol** is a new and improved treatment for fighting dehydration. It is called **Litrosol** because you mix it one liter of water.
4) **Litrosol** is easily administered. The package has all the instructions you need to follow. **Litrosol** helps to treat and prevent dehydration.
Litrosol is what mothers who care with all their heart give their children.
5) When your child has diarrhea, give him **Litrosol** so that he doesn't die.

Aceptacion: Intro to Campaign by Dr. S. (30 seconds)

(9) 1) Dr. Salustiano from the Ministry of Health talks about his concern for our children. (Especially) during the rainy season, dehydration caused by diarrhea can kill children in very little time.
2) To prevent the death of many children, we are distributing **Litrosol** in the aldeas of Francisco Morazan and El Paraiso. **Litrosol** is the best treatment for dehydration.
3) It is called **Litrosol** because you mix it in one liter of water. The mixing instructions are on every package. Try **Litrosol**.

Give Litrosol Every Case of Diarrhea: Dr. Salustiano and a mother: (Phase 2)

(12) 1) Music: **Litrosol** saves you from dehydration.
2) When should you give **Litrosol** to your child; every time he has diarrhea!
3)This is because an infant can die of dehydration in a few hours.
The infant is more delicate, so give him more care. Give him **Litrosol** every time he has diarrhea.
4) The mother that cares for her child with all her heart uses **Litrosol**--the packet gives you the instructions.
5) The Ministry of Health dispenses **Litrosol** in the aldeas of El Paraiso and Francisco Morazan where you see the banner with the heart.

Aceptacion: Doesn't Stop Dairrhea: A mother listening to Dr. Salustiano on

(10) the radio (Phase 2)
1) Music: **Litrosol** saves you from dehydration.
2) Dr. S says tht diarrhea causes the dehydration of a child, in other words it loses its vital liquids. **Litrosol** serves to replace those vital liquids. 3) So your child doesn't die of dehydration, give **Litrosol** faithfully eventhough he still has diarrhea.
4) The mother that loves her child with all her heart uses **Litrosol**.

It gives you the instructions on the package.
5) The Ministry of Health dispenses **Litrosol** in the aldeas of El Paraiso and Francisco Morazan where you see the banner with the heart.

Three Bottles Make One Liter: A man and a woman and 2 announcers. (Phase 2)
(13)
1)Music: **Litrosol** saves you from dehydration.
2) The woman says that without a liter she can't make **Litrosol**.
3) The man answers that Dr. S on the radio says that three soda bottles make one liter.
3) The woman says that it is easy. She can fill up three pop bottles full of water and pour them into a container and then stir in the package of litrosol.
4) The mother that cares about her child with all her heart uses **Litrosol**. The package has all the instructions you need.
5) The Ministry of Health dispenses **Litrosol** in the aldeas of El Paraiso and Francisco Morazan where you see the banner with the heart.

Aceptacion: **Litrosol** brings back energy and appetite (2 mothers talking) (Phase 2)
(11)
1)Music: **Litrosol** saves you from dehydration.
2)One mother tells another that it is just like Dr. S. said. While her child had diarrhea she gave her **Litrosol** and her appetite and energy returned.
3) The mother said that **Litrosol** made her child happy again and that she can tell she is getting better.
4) The mother that cares for her child with all her heart uses **Litrosol**. The package has all the instructions that you need.
5) The Ministry of Health dispenses **Litrosol** in the aldeas of El Paraiso and Francisco Morazan where you see the banner with the heart.

Dehydration Song: Sung by a doctor and a mother
(5)
1) When your child is thirsty, pale, has frequent loose stools and very little appetite, she has **dehydration**. (Repeat word 3 times)
2) Dr. Salustiano says: "So that your child does not die of dehydration, always give her Litrosol when she has diarrhea. Remember, give her Litrosol during the complete episode of diarrhea so that you can sustain the life of the child while preventing dehydration."
3) The mother says: "So that's why they say on the radio that **Litrosol** saves you from dehydration".
4) Working toward better health in your town, the Ministry of Health.

Phase 3:

(29)
Continue Breastfeeding When the Child Has Diarrhea: Dr. Salustiano in the format "Consultation for Everyone"
1)A mother from La Concepcion asks Dr. S if it is true that a mother should continue breastfeeding her child even it he has diarrhea.
2)Dr. S says yes, that a mother shouldn't stop breastfeeding a child who

has diarrhea because it will become malnourished. Breastmilk will help him recuperate. Always breastfeed your child while he has diarrhea.
3) Another mother from Naranjo asks if it is allright to give solids to a child with a case of diarrhea.
4) The doctor says to give the child soft foods, after having withheld food for one meal. Soft foods don't hurt the child, it actually strengthens him. Remember: When the child has diarrhea always give him breastmilk and/or soft foods after suspending all food for one meal.
5) "Consultation for Everyone" is a service of the MInistry of Health

(14) Follow the Instructions: Dr. Salustiano and 2 mothers
1)Music: **Litrosol** saves you from dehydration.
2)One mother tells another that her child has diarrhea and she has forgotten how to use **Litrosol**. She knows if she doesn't follow all the instructions it (Litrosol) won't work.
3)The other mother says not to worry, the envelope that the packet came in has all the instructions with pictures on it.
4) The mother doesn't know how to read so the other woman tells her that they should look for a neighbor that can help them read the package.
5) Dr. S says that if you want **Litrosol** to work for your child follow all the instructions on the package of **Litrosol** (and on the envelope it came in).

(15) Testimonial: **Litrosol** Renews Appetite and Energy
1) Music: **Litrosol** saves you from dehydration.
2) Litrosol gives energy and renews the appetite of your child that has diarrhea.
3)A rural mother says that her child was going to die from diarrhea. He wouldn't eat and was skinny as a rail. She gave him **Litrosol** and he began eating everything in sight. The child continues to eat and eat....
4) Another rural mother says that her child had diarrhea and absolutely no appetite. She gave her **Litrosol** and saw the improvement. Her appetite returned and she began to play again. She could really see her improvement!
4) Announcer says that the voice of experience shows that **Litrosol** renews the energy and appetite of a child with a case of diarrhea. Try it!

(28) Breastfeeding Song: (Same song as Phase 1 and 2 with different closing message) Woman singing song, Dr. S and a male announcer
1) Your child depends on you to grow. Take care of him by breastfeeding him so that he grows strong and energetic. Your child can get this only from your breastmilk.
2) Dr. S says not to quit breastfeeding when your child has diarrhea. A child can become malnourished and get even sicker. Breastmilk is the beast nourishment that you can give and it won't harm the child. Always breastfeed your child when he has diarrhea. Remember that the mother who breastfeeds is a truly good mother!
3) Working toward making your town healthy, the Ministry of Health.

Phase 4: Second treatment phase-1982 rainy season--May 30-Oct. 3

Litrosol Is For All Kinds Of Diarrhea: Dr. Salustiano and mother

(16) 1)(Music) Litrosol saves you from dehydration....
2)For children with diarrhea, light or severe cases, always use Litrosol.
3)Even if your child has been throwing up or has parasites, use Litrosol.
4)For all types of diarrhea, use Litrosol, because diarrhea can cause dehydration.

Use Litrosol during the entire episode of diarrhea: Dr. Salustiano and an announcer

(17) 1) (Music) Litrosol saves you from dehydration....
2)Diarrhea causes dehydration and dehydration kills children.
3)It is better to prevent dehydration than to have a mother grieve over the death of her child. Give your child Litrosol during the entire episode of diarrhea in order to keep him from dying of dehydration. (Announcer repeats the message above.)

Litrosol with other medicines: Dr. Salustiano, mother and announcer (Consulta Para Todos) (**May/June/Sept.** only)

(20) 1)Mother asks if she can give Litrosol to her child while she is giving her other diarrheal medicines.
2)Dr. Salustiano answers that many times doctors and nurses will prescribe other medicines for diarrhea but it is important that you continue giving Litrosol along with the other medicines.

Signs of Dehydration: Dona Chela and another woman (30 seconds) (**June-Oct.** only)

(18) 1)Dona Chela says the signs of dehydration are sunken eyes, wrinkled skin, sunken fontanel, a dry mouth and listlessness. (The woman repeats all the signs)
2)Dehydration is caused by diarrhea.
3)Woman repeats the signs of dehydration again.
4)Dona Chela says that a child with these signs is dying and must be given Litrosol and taken to the clinic immediately.

Signs of Dehydration: Dr. Salustiano, announcer and a chorus of voices (**June-Oct.** only) (35 seconds)

(18) 1) (Music) Litrosol saves you from dehydration....
2)Announcers (a man and a woman) say if your child has sunken eyes, a dry mouth, and wrinkled skin....
3) Chorus says to take care that the diarrhea doesn't cause dehydration.
4)Announcers say if (your child) is listless, has a sunken fontanel, cries without tears and hardly ever urinates....
5) Chorus says to take care that the diarrhea doesn't cause dehydration.
6)In the background you hear an ambulance and Dr. Salustiano says

that this is an emergency, the child (with these signs) is dying. Take him immediately to the clinic and give him Litrosol on the way there.

Dehydration: Song sung by a doctor and a mother
1) Mother asks about her child who is very thirsty, pale, has frequent loose stools and does not have much of an appetite.
2) Dr. Salustiano says to pay close attention, what the child has is dehydration. (Repeats the word 3 times)
3)Dr. S says that in order for the child not to die from dehydration one should give the child Litrosol during the entire episode of diarrhea. He says to remember to give Litrosol during the complete episode because Litrosol keeps the child alive while he has diarrhea and it prevents dehydration.
4)The mother says "So that's why the radio says that Litrosol saves you from dehydration!"
5)Announcer: "Working toward making your town healthy, the Ministry of Public Health"

All of the Packet: Three campesina mothers and Dr. Salustiano (**June-Aug.** only)
1)All three mothers give testimonials that they always mix all of the packet of Litrosol in a full liter of water.
2) Dr. Salustiano tells them they are correct and that you must always mix all the packet of Litrosol in exactly one liter of water or it won't be effective for the child.

Phase 5:

Litrosol: Name comes from mixing packet in a liter of water: Announcer: (**Oct-Dec. 1982**)(This does not appear in frequency table)
1) The Ministry of Health announces that it is taking the Litrosol program nationwide. You can now get Litrosol for free in all of the health clinics and hospitals in the country.
2) Remember the name Litrosol. It is called this because you mix all of the packet in one liter of water.
3) Don't confuse (Litrosol) with other medicines that you can buy in the drug store that don't cure or prevent dehydration.
4) Remember it's called Litrosol because you mix it in a liter of water.

Pepe: (**Oct-Feb. 1983**) Dr. Salustiano, mother and father
1) Dr. S tells mom that she must decide between the bottle and the breast. He says that bottlefed children have more cases of diarrhea, allergies, vomiting and other diseases that can kill them.
2) The father says "Then let's get rid of the bottles and not the children".
3) The mother asks for her child so she can start breastfeeding and become a real mother..

Introduction to AMA-MAS course: (**Oct-Dec 1982**): Two husbands talking
1) One man tells another that his wife deserves a round of applause for winning first place. The second man thanks him and says that she won because she has always breastfed their children.
2) The first man says that it is true, she has always known that yesterday, today and tomorrow, a good mother only gives her children breastmilk.
3) That's why the man whose wife won is envied by all the other men and they tell him , "You're wife is truly a good mother!".

Padres: Two men talking about support for their wives. (**Oct-Dec**)
1) A man whose wife has just had their first son asks another man what he can do to show his wife how much he cares.
2) The second man tells him a poem that says that a mother that breastfeeds is a mother indeed and because she gives the child this special care her husband should give her larger quantities of nutritious foods.
3) He repeats the important message: When your wife is breastfeeding, care for her by giving her more nutritious foods to eat.

Promotion for the "Voice of Health": A male and female announcer: (**Oct.**)
1) The "Voice" has finally arrived! The "voice" that crosses fields, mountains and cities. The "voice" is what you need to know about the health of your children.
2) The "voice" refers to the "Voice of Health" program that is broadcast by (radio station) at (time of broadcast) on the (days the program is offered).
3) "The Voice of Health" is a program that gives practical advice about health. Don't miss a program broadcast by (station) at (time) on (days).
4) Jingle: Litrosol saves you from dehydration!

Promotion for the AMA-MAS course: A male and female announcer (**Dec. 20-Jan.8**)
1) (Voice of Health Music) Now the AMA-MAS course about breastfeeding will be broadcast on the "Voice of Health".
2) Many mothers say that their milk dries up or never comes down or that their breasts get irritated or start to sag (after breastfeeding).
The solutions to these problems will be given to you during the AMA-MAS breastfeeding course.
3) Sign up now! You can get your card at the health centers in Francisco Morazan and El Paraiso. Follow the course brought to you by the "Voice of Health" beginning January 8
4) Jingle: Today's mother.....(doesn't have the complete jingle)

Promotion #2 for the breastfeeding course AMA-MAS: Two mothers talking about the course (**Dec.20-Jan. 8**)
1)(Music from the program) During the Christmas season in December and January it's AMA-MAS! AMA-MAS is a breastfeeding course that will begin the first week in January on the "Voice of Health".

2) We will listen to nine programs about breastfeeding on this station and at the end they will give us a diploma.
3) Sign up today at the health centers in the departments of Francisco Morazan and El Paraiso.
4) One mother leaves to sign up at the health center for the course on breastfeeding that begins in January on the "Voice of Health".
5) Jingle: Today's mother.....(doesn't have the complete jingle)

Pecho es suficiente: Breastmilk is enough: Dr. Salustiano and a mother
Done in the format of "Consulta Para Todas" **(Dec. 15-March 30, 1983)**
1) A mother asks Dr. S in "Consultation for Everyone" at what age can you start giving your child solid foods.
2) Dr. S says to give them solids after 4 months, and before that the child needs to be given only breastmilk. Other foods before that age are too heavy and not necessary.
3) Dr. S says that breastmilk is enough because it contains all that a baby needs for its development during the first 4 months. Besides (breastfeeding) is the best way to prevent diarrhea.

Aprender a comer: 2 announcers talking about weaning foods
(Dec. 15- March 30, 1983)
1) To learn to eat, like learning to walk, you need time.
2) An infant learns more quickly to eat after she's four months old. Her teeth are developed enough to begin to chew. Before (4 months old) it is hard (for the child to chew) and the foods may be too much for the child.
3) Therefore, just like not trying to make a child walk before she is able, you should not make a child start eating solids before she is able. After four months, first give her breastmilk and then solids . Her teeth will be well formed by then and she will rapidly learn to eat (solids).

Dar Solo Pecho: Just Give Breastmilk: Dr. Salustiano and a mother
(Dec. 15- March 30, 1983)
1) Mother tells Dr. S that she doesn't have any milk--her child is hungry and her milk is drying up.
2) Dr. S tells her that her milk is drying up because she is bottlefeeding her child. A child that is bottlefed suckles the breast less and soon the mother's milk dries up.
3) The mother asks what she can do to help the sufficient amount of milk to come down.
4) Dr. S says don't bottlefeed, only breastfeed and little by little the breastmilk will increase. The more milk the child drinks from the breast the more milk the mother will produce.
5) The mother asks if she gives only breastmilk will she begin producing more milk again and Dr. S tells her , "Yes, you will.".

Pechos Caido: Sagging Breasts (Sounds better in Spanish)

(Jan. 30-March 30, 1983) Two women talking...
1) One woman asks another what she does to stay so nice looking even after breastfeeding all her children..
2) She said she followed the advice of her doctor. He told her that breastfeeding didn't cause breasts to sag, but gaining weight or not wearing a good brassiere while you are pregnant or breastfeeding <u>would</u>. Therefore, she wore a good bra and that kept her breasts from sagging.
3) The first woman said she would do the same and become a truly modern mother.

Breastfeeding Song: (The same song as Phase 1 with a different message) Woman singing and male announcer: (Doesn't have date--assume **Jan-Mar 83**)
1) Your child depends on you to grow. Take care of him giving him your breastmilk to help him grow strong and active. Your child can find this (help) only in your breastmilk.
2) Today's mother gives her little ones only breastmilk. She knows better than anyone that breastmilk is the best milk for her children. Studies show that breastfed babies are more resistant (to disease) and grow to be health(ier) and strong(er).
3) Be a modern mother, a good mother, give your young ones only breastmilk.

Tiernos/Cuidado: Dr. Salustiano and a mother: Radionovella style:
(Phase 5, **Oct-March 83**, I think, there's not a frequency record for this)
1) A mother tells Dr. S that her child just died, he couldn't fight the disease he had.
2) Dr. S says that if she had taken better care of him he wouldn't have died.
3) The mother says she doesn't understand, her husband and the other children had diarrhea, too, and they recovered easily.
4) Dr. S says that they were older and had more resistance. Infants are different, they are weaker, have fewer defenses and they alone cannot protect themselves from diseases.
5) Message: Infants are more delicate, give them more care.
6) Announcer: Working for better health in your town, the Ministry of Health.