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THE MASS MEDIA AND HEALTH PRACTICES EVALUATION IN THE GAMBIA:

A REPORT OF THE MAJOR FINDINGS

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EXECUTIVE SUMMARY

This summary reports the major findings from the evaluation of the USAID Mass Media and Health Practices activity in The Gambia. The program in The Gambia was known as the Mass Media for Infant Health Project, and it was active from mid-1981 to mid-1984. It was an undertaking of the Department of Medical and Health in the Ministry of Health, Labour, and Social Welfare with the collaboration of the Academy for Educational Development. The evaluation was performed by Stanford University's Institute for Communication Research and Food Research Institute, and by Applied Communication Technology. Both the intervention 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. The USAID Mission in Banjul and the Department of Medical and Health have provided additional support and cooperation.

The purposes of the Mass Media for Infant Health Project were: to introduce home-based oral rehydration therapy and other behaviors related to the treatment and prevention of infant diarrhea in the rural areas of The Gambia; and simultaneously to develop improved methods of using mass communication in conjunction with existing health services in an integrated campaign. The target behaviors included treatment of acute cases, preventive actions that mothers can perform, and related nutritional and breastfeeding practices. The treatment behaviors involved mixing and administering in the home an oral rehydration solution made from water, sugar, and salt (WSS).

The Mass Media for Infant Health intervention consisted of an integrated campaign carried out through broadcast, print, and interpersonal 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 project worked with professionals in the Department of Medical and Health and at Radio Gambia to create an environment in which these methods would remain in use after the project was completed.

The evaluation found that the introduction of the oral rehydration solution (ORS) was successful. More than half of all episodes of diarrhea were being treated with WSS during the second year of the campaign. Knowledge of how to mix WSS correctly was high; more than 70 percent of all mothers knew the exact formula. Other behaviors were also changed by the campaign. Feeding of children during and after episodes of diarrhea

improved, and activities for personal hygiene and compound sanitation were increased.

The evaluation tracked the process of the intervention's effects during its two years of effort, as well as measuring the overall impact at the end. It used a model of the program effects that stipulates that, in order for a final health status outcome to be achieved, a series of interim steps must be successfully completed. The evaluation of these steps included investigating whether: the target population had access to the channels of communication used by the campaign; the messages actually reached the population through those channels; the content of the messages was learned and retained by the audience; members of the target audience actually changed their behaviors in response to the campaign; and the health status of children improved as a result of these changes in behavior.

The reporting of findings about these different levels of effect 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 subsequent chapters take up, in turn: access and exposure to campaign elements and cognitive changes resulting from the exposure; behavioral changes related to infant diarrhea; and health status changes. This summary will report the findings in the same order.

The <u>context</u> within which the project operated is representative of many characteristics of West Africa. The climate has clearcut rainy and dry seasons, and the nature of the diarrheal disease problem changes with the seasons. People live in compounds with extended families. Their houses are usually mud or mud-brick with earthen floors. Cooking is done over an open fire. Very few rural communities have electricity. The population is culturally and linguistically diverse. The requirement to use a limited number of languages for broadcast mandated the use of the local trade languages, Wolof and Mandinka. The fundamental heterogeneity of concepts and practices pose special difficulties for mass media-based projects; planning research is all the more important in the face of such variabilities. The media environment is simple, however, because the single central government radio station, Radio Gambia, has little competition, and the general environment is not saturated with broadcast or print messages.

In this context, the Mass Media for Infant Health Project designed and carried out an innovative campaign integrating use of radio, print, and interpersonal channels. The design built on a four-month developmental investigation, using the information acquired there to develop training for health workers, messages directed at mothers, and other activities. Message content was synchronized to seasons to ensure its appropriateness for the most salient current problems. Village volunteers were

trained, and a national contest, the "Happy Baby Lottery" was devised to enhance the distribution of and attention paid to a pictorial instruction sheet, the "Mixing Flyer." The different media channels were carefully developed to play complementary roles in the project.

The evaluation design included a number of different 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 1000 mothers was selected from 20 communities; about 800 of 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 an additional eight 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 The Gambia. 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 very good. Radio reception was clear in the measurement areas (one division was excluded from the very beginning because of unreliable radio coverage). People live in compounds that may contain more than one family, and they often listened to radios that belonged to other people in the compound. Interviewers asked women to demonstrate a working compound radio if they could, and 60.5 percent of the mothers succeeded. A total of 67 percent of women reported that they listened to the radio either daily or several times a week, with the heaviest listening taking place in the evening.

Access through interpersonal channels was also high. The health care system in The Gambia penetrates into the rural areas fairly well, and the small size of the country means the distances to service points are less daunting. Nonetheless, only 15 percent of mothers in the sample lived in communities that had full time health care facilities, and an additional 35 percent lived in places that were served by traveling teams of health workers. Three-quarters of the villages in the sample were served by a "Red Flag volunteer," a local mother who received special training from the project in oral rehydration therapy (ORT) and served as a local training resource.

Print channels were objects of special emphasis in the evaluation. Mothers' literacy was very low (2.9 percent), although a third of the compounds could at the time of the interview, present someone who could read. Printed materials were virtually non-existent in rural homes. Thus print channels had to be utilized in a way that did not depend on ability to read, or even necessarily on pictorial literacy. A special study

on pictorial ability showed that the although the majority of mothers could identify simple line drawings, there were limits even to this. These issues were particularly important because flyers distributed during the campaign had to be designed to be used in conjunction with other channels as well in order to play a major role in disseminating knowledge. The flyers, carefully designed to bypass these limitations, were well understood.

Exposure of mothers to the campaign messages is the second link in the chain of events leading to health status impacts. Radio coverage varied over time but was generally quite high. In the first year, when a lottery was used as a part of the program, radio exposure reached high levels. About two-thirds of the women (68.5 percent) eventually reported having heard radio broadcasts about diarrhea. For topic areas of the campaign that were not treated in the Happy Baby Lottery or that were given less emphasis, exposure levels were lower. A maximum of about one-third of mothers reported that they recalled being exposed to radio messages about feeding.

The lottery, which was held midway into the first year, was associated with high levels of exposure and knowledge change. About half (48.9 percent) of all mothers reported awareness of the lottery when asked about it. When asked to name characteristics of the lottery activity, mothers who had reported awareness were able to describe features of the lottery at high levels. Of mothers who were aware, 94 percent could give at least one detail and 84 percent could give at least two details about the terms of the lottery. The print material associated with the lottery (the mixing flyer) achieved extremely high exposure levels - - much higher than for the lottery itself. After the lottery, 79 percent of mothers reported having seen the flyer, and 71.5 percent of all mothers could actually show the interviewer their copy of it. This points out the importance of having more than one channel of information, since women got the flyer and learned from it even when they didn't receive the radio messages about its relationship to a lottery.

Awareness of the presence of a Red Flag volunteer in town reached a high of 77.8 percent, an indication that there was good exposure to this interpersonal channel. Contact with regular health care personnel was also high. When asked to think back over the three months prior to an interview, 80 percent of mothers of young children said they had been to a health clinic about the health of their children during that time. Because roughly two-thirds (69 percent) of women reported that they received advice or instruction during health worker contacts, this level of exposure to health workers implies that health workers have a very important role as transmitters of campaign messages. In fact, for mothers who were aware of WSS, an average of over 80 percent reported that one of the sources from which they learned about it was from health workers.

Learning of the content of campaign messages was the next area investigated. During the campaign, awareness of and specific knowledge about WSS increased steadily during the first year, when radio messages focused on WSS. Increases in knowledge about WSS leveled off in the second year, when messages focused on feeding and sanitation. The mothers seem to have needed continued high levels of information to maintain learning. Overall awareness of WSS climbed to 90 percent during the campaign.

The largest increase in knowledge was for the mixing proportions to make WSS. At the start of the campaign, only one mother knew how to mix WSS correctly. By the end, 70 percent of the mothers and all of the health workers knew the correct proportions. Thus, the most important of the educational objectives was achieved at a very high level.

Learning of administration instructions started out and remained high for the most important content. The percentage of mothers who knew to start giving WSS at the first sign of diarrhea fluctuated between 72.8 percent and 93.6 percent, while the percentages knowing to administer it with a cup or spoon ranged from a low of 73.1 percent to a high of 93.7 percent. There is some indication that mothers became confused by some of the radio messages about how long to keep giving the solution. Mothers also showed differing rates of learning for different administration instructions, some of which were learned after the lottery had ended. Overall, mothers needed time and continued reinforcement to learn about WSS administration.

One major content area of the campaign was teaching about dehydration. Immediately after the broadcast emphasis on signs of dehydration was completed, mothers could name an average of two signs of dehydration. When an additional year had passed with no emphasis on dehydration signs, they could only name an average of 1.2 signs.

The campaign seems to have had no effect in convincing mothers that WSS does not stop diarrhea. This may be because mothers refused to believe that a medicine recommended for diarrhea wouldn't stop it or because diarrhea tends to stop after two or three days anyway.

Health personnel also learned from the campaign. They received interpersonal training and printed materials, but they too also seemed to have benefited from radio broadcasts. Learning of the material covered in the broadcasts was higher than learning about treatment of different levels of dehydration (only covered in the manual and workshops).

During the campaign, increases in correct knowledge were seen for continuing to breastfeed during episodes of diarrhea and feeding of additional solid foods after diarrhea. The high levels of knowledge were maintained after radio messages de-

creased. The campaign was not successful in teaching mothers that solid foods should be given during diarrhea. A majority of mothers also did not learn that solid foods give more "power" than paps. These two beliefs seem related and may be part of mothers' traditional beliefs about the treatment of sick children.

A separate study examined the relationship between exposure to Radio Gambia and knowledge about WSS after removing the influence that other factors might have on the relationship. The analysis found that: mothers with high radio exposure were significantly more likely to know something about WSS than mothers with low radio exposure; mothers with interpersonal sources of information (health worker, Red Flag volunteer, or other mothers in the compound) were more likely to know about WSS than mothers without such contact; but, for mothers with low interpersonal contact, frequent listening to the radio could teach them about WSS.

Health-related behavior change is the next step in a successful path to summative project impact. The evaluation focused its analysis on three major topics: behaviors related to feeding, behaviors related to treatment of diarrheal episodes, and direct observation of the process of treatment. By far the greatest emphasis in the campaign was on the promotion of home treatment of diarrheal episodes with WSS, and it was in this area that the largest changes were seen. The proportion of cases that were treated with WSS rose from 3.6 percent in the first measurement period to 49.4 percent in the twelfth. Thus, the use of WSS as a home treatment achieved a very high level of adoption within two years. Among the effects of this change were that the percentage of cases being treated at health centers dropped from 80.6 percent to 59.2 percent. This represents a savings for the mothers in the time and cost of visiting the clinic, and for the Ministry of Health in terms of demand on health facilities.

Not only was the proportion of cases treated at home rising because of the adoption of WSS, but the WSS treatment was displacing virtually all other home treatments. If one restricts the analysis to those treatments chosen for cases treated at home, WSS rose from 21.7 percent in the first measurement period to 94.1 percent in the twelfth. Because many of the previously used home treatments were either ineffective or possibly harmful, the displacement effect represents a significant improvement in the "quality of care" beyond the simple rise in percent of cases treated with WSS.

Virtually all mothers in our sample reported that they breastfed their infants. The percentage of mothers breastfeeding their youngest child fluctuated over time but never fell below 87.9 percent. The percentage of mothers who gave only a bottle to their youngest child ranged from 0.7 percent to 9.1 percent.

The only real room for improvement in breastfeeding was change in such aspects as breastfeeding during diarrhea and weaning behaviors. The campaign promoted a better diet for children during and after diarrhea. Breastfeeding continued during a bout of diarrhea for 85 percent or more of the mothers. The inappropriate practice of stopping other feeding during diarrhea fell from 31.5 percent to 3.4 percent, and the giving of solid foods rose from 13.6 to 44.6 percent. The giving of special additional food after diarrhea hovered around two-thirds of the cases, rising briefly to a high of 91 percent after a particular campaign emphasis on it, but falling back to its previous range shortly after the messages were withdrawn. Ages at the beginning and end of the weaning process differed considerably across measurement periods; the changes appear unsystematic, but may be related to season, a drought in 1983, or economic conditions.

A number of additional analyses about WSS use were carried out. Treatment probability appeared to be only very weakly related to age - - the changes over time in proportion of cases treated with WSS by age were consistent across all age groups. There may have been a slight tendency for the oldest children to be treated less frequently in the second year of the campaign.

The relationship between completeness of knowledge and use of WSS was also investigated. The mixing and administration behaviors are complex, but, in the aggregate they were well learned. However, treatment with WSS must be accurately done in order to be clinically effective and risk free. At the time of the first measures, some home treatment with WSS was being done, because of previous Medical and Health Department efforts. However, none of the women treating with WSS at that time knew the proper formula, defined here using the strict criterion of a perfect score on all the mixing questions. By April of 1983, 49.4 percent of all episodes were being treated, and 41.0 percent of all episodes were being treated by women who had perfect scores on the mixing questions. Thus, 83 percent of the treated cases received WSS from mothers who knew exactly how to mix it. This finding provides reassurance that the success of the campaign in WSS adoption is likely to have a positive clinical impact.

A separate observational study was also conducted in order to provide a comparison to the self-reported data of the surveys. The observational study provides strong support for the validity of the basic findings from the survey research - - the proportion of cases being treated was high and correctly mixed WSS was being used.

Fieldworkers carried out direct observation of the morbidity and treatment characteristics of 39 cases of children ill with diarrhea. The children in the study all had acute diarrhea and were fairly sick. The diarrheal episodes had lasted an average

of 3.3 days when the observer arrived, and the children had bowel movements an average of once every hour-and-a-half during the observation period and vomited an average of once every two hours.

The observed feeding practices support the validity of the self-reported levels. Pap was given to 87 percent of the children, 74 percent were breastfed (an unknown number were already weaned), and 64 percent were given solid foods. A total of 67 percent of the observed children were treated with WSS. The treatment was already going on when the fieldworker arrived for 28 percent of the cases, and in the remaining 38 percent of cases that received WSS, the treatment was begun after the fieldworker arrived. For cases that began treatment after the fieldworker arrived, it was possible to observe the mothers' mixing behaviors. All of the mothers got the formula and mixing process exactly right, which is slightly better than the analysis of self-reported levels. All WSS administration was done by cup or spoon. Concurrent treatment with other home remedies was much higher than mothers self-reported - - herbal teas and pills were the other main home treatments, but WSS was still given about two-and-a-half times as often as the next most frequent treatment. Cases that were more severe were significantly more likely to receive larger amounts of WSS and more frequent feedings.

Health status change was the long term objective of the intervention. The analysis of morbidity data on prevalence revealed strong seasonal influences along with marked variation in levels from year to year. Point prevalence estimates ranged from a low of 0.8 percent to a high of 9.0 percent; two week prevalence ranged from 10.4 percent to 33.7 percent. By any standards, these are high rates. Rainy seasons showed higher prevalence rates and longer lasting episodes; dry season cases had a slightly higher tendency to be associated with reduced urine output and dry eyes, both signs of dehydration. Younger children had higher rates of disease, with weaning age showing the peak rates. However, the characteristics of the cases of old and young children, given that they had diarrhea, did not differ by age.

Estimates for historical rates of infant mortality were derived from pregnancy history data after attempts to elicit concurrent measures by surveying communities were thwarted by community resistance. The causes of death reported by mothers for their children of all ages had diarrhea in second place at about a quarter of all deaths. The pregnancy history yielded a historical estimate of infant mortality of 153.7 per thousand. This estimate is very high in an absolute sense, but it may be too low because of poor recall or reluctance by mothers to give out the information.

Extensive anthropometric measurement of sample children was carried out. Gambian children, when compared to NCHS standards, were one to one-and-a-half standard deviations low in height.

Their age-specific weight for height values fell from nearly normal to about one standard deviation below normal over the course of the two-year intervention. The measures of stunting were essentially constant over time, while prevalence of wasting tripled. Measures of skinfold thickness and arm circumference and calculated values for arm muscle area and arm fat area all showed consistent trends - - that children became considerably leaner and more wasted. This is assumed to reflect effects of the drought and economic crisis, rather than an impact of the intervention.

To summarize, the evaluation found that the campaign had the following impacts:

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 relation to the drought and worsening economic situation.

The pattern of 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 expected.

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Chapter I

INTRODUCTION

This document is a report of the findings of the evaluation of the USAID-funded Mass Media and Health Practices Project in The Gambia. The project used an innovative methodology drawn heavily from social marketing to promote health behavior change. The key components in the methodology were: village-level research on practices, cultural concepts and vocabulary for planning and message development; behavioral analysis for defining desired behaviors and planning paths for arriving at them; and use of a highly integrated multi-channel communication strategy that used each channel to its best advantage and to reinforce the messages carried in the other channels.

The project being evaluated, known in The Gambia as the Mass Media for Infant Health Project, used radio broadcasts, interpersonal communication, and print materials to teach mothers about infant diarrhea and to motivate them to change related behaviors. One prime behavioral target was the adoption of a home-mixed water-sugar-salt (WSS) oral rehydration solution as a treatment during diarrhea. Oral rehydration solution reduces death from dehydration by replacing the water and electrolytes lost during diarrhea. Two other targets were change in the feeding of children with diarrhea and change in sanitary practices.

The Agency for International Development and the Department of Medical and Health of the Gambian Ministry of Health, Labour and Social Welfare initiated this project to test a methodology for influencing a large number of mothers to change their behaviors related to infant diarrhea, particularly toward adopting oral rehydration in the home. From a public health perspective, the question was how to get a significantly large

number of mothers to adopt a new behavior, perform it repeatedly, accurately, and effectively, and ultimately to reduce mortality from diarrheal dehydration.

In 1978, the Agency for International Development (AID) established the Mass Media and Health Practices Program to implement and evaluate programs with these objectives. The program was structured to run related projects in two countries in order to learn more about the way the methodology operates in different cultural and environmental contexts. Agreements with the governments of Honduras and The Gambia permitted the program to cooperate with both Ministries of Health in introducing the methodology in support of the country's diarrheal disease programs. The original plans for two sites have since been amended to include several others. This report concerns only the evaluation of the project in The Gambia. The Academy for Educational Development (AED) in Washington, D.C. was competitively selected to work with the Department of Medical and Health to design and implement the program. The Institute for Communication Research of Stanford University was awarded the contract to evaluate it. Responsibility for the evaluation was subsequently transferred to the Food Research Institute of Stanford University and its subcontractor, Applied Communication Technology.

The implementation 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 The Gambia and the Ministry of Health contributed additional resources for many project-related activities.

The report presents the full range of data and longitudinal analyses for the period from February 1982 through July 1984 in The Gambia. The evaluation looks at three general areas of outcomes - - learning, behavior change, and health status - - to assess the overall impact of the project and to trace the processes through which it achieves that impact. This report is structured in four parts. The remainder of the first part

presents the background of the project, the design of the research and descriptive information about the subjects of the research. The second chapter examines access amd exposure to the campaign messages plus learning and attitudes. The third chapter looks at behavioral changes in the areas covered by the campaign. The final chapter reports on changes in the health status of the communities involved.

A. Background

Infant diarrhea is a leading cause of infant and early childhood mortality in many developing countries. Earlier research conducted by the British Medical Research Council staff and the preliminary investigation done by the Academy for Educational Development (AED, 1982) in The Gambia indicated that there are probably two major causes of death from diarrhea: dehydration, and a general wasting from the interaction of disease, diarrhea, and poor nutrition.

In the dry season, from October through May, children tend to contract a type of diarrhea that can rapidly dehydrate them and lead to death from loss of water and electrolytes before the child's immune system can work to fight the illness. Fortunately, most mortality associated with dehydration can be avoided if the fluids and electrolytes are replaced while the child fights the cause of the diarrhea. An effective and inexpensive way of replacing the losses - - oral rehydration solution - - is now available. It consists of administering water in which sugar and salts have been mixed in certain proportions. The World Health Organization has established a standard formula that includes glucose, sodium chloride, potassium chloride, and sodium bicarbonate. However, the WHO formula, while inexpensive, does cost money to package and distribute. A less complex version containing ordinary sugar and salt can be mixed in the home, and provides the minimum cost and maximum availability to families. The Gambia has adopted the second formula, teaching mothers to

mix and administer an oral rehydration solution made from materials routinely available in their homes.

In the rainy season, from June through October, children tend to have milder, but chronic bouts of diarrhea. Occurring at the time of year when food supplies are decreasing and mothers are busy in the fields, this type of diarrhea often works with malnutrition to gradually weaken the child, leading to wasting and possible death. A treatment for this is to emphasize a diet which includes the water-sugar-salt (WSS) solution, solid foods, and continued breastfeeding.

Once solutions had been identified for the problems of dehydration and of wasting, efforts turned to determining how best to inform mothers about oral rehydration therapy and other treatments, and to influence them to adopt new practices for early treatment of infant diarrhea.

B. Description of the Mass Media for Infant Health Project

The Mass Media for Infant Health Project intervention 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 were:

- intensive use of village-level research on practices, cultural constraints, and vocabulary 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 infant diarrhea. In the first year, the program focused on the promotion of the water-sugar-salt solution (WSS) that mothers could mix and administer at home when their children were ill. In the second year, messages about WSS were continued, but the focus shifted more toward feeding of children during and after diarrhea. Throughout the two years, messages about compound sanitation were also disseminated.

AED followed the steps described below in developing the intervention in The Gambia. First, a four-month <u>developmental investigation</u> of health problems and behaviors within the Gambian culture was conducted. A multi-measure research approach was developed to collect the information. This consisted of (1) collection of existing health information (statistics, review of literature, etc.); (2) focus group discussions and interviews; (3) direct observation in the field; (4) extensive interviews and questionnaires administered to the staff at health centers, dispensaries and sub-dispensaries; and (5) rural WSS mixing trials. 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. Complementary radio messages, training programs for health workers, and pictorial print materials were developed using pretesting and formative evaluation techniques. The timing of the introduction of the components of the media campaign was planned to coordinate with the peak seasons of diarrhea.

The messages of the campaign were grouped into five phases:

PHASE 1 (May to June, 1982): dehydration, diarrhea and malnutrition, "diet for diarrhea" (WSS, breastmilk, solid foods), training of rural health workers in WSS mixing and administration;

PHASE 2 (Rainy season, July to October, 1982): "Happy Baby" Lottery, mixing and administration of WSS, feeding during diarrhea, proper disposal of feces;

PHASE 3 (Dry season, November 1982 to March 1983): reinforcement of WSS mixing instructions, the need for immediate administration of WSS, feces disposal;

PHASE 4 (Rainy season, July to October 1983): feeding during and after diarrhea, reminders about breastfeeding and WSS, feeding messages, methods for teaching mothers; and

PHASE 5 (Dry season, February to April 1984): mini-campaign on protection of community wells, personal hygiene, and the educational role of Village Development Committees.

A summary of each radio spot grouped according to phase is included in Appendix A.

Before the start of the campaign, AED worked with the Gambian Medical and Health Department to develop a definitive manual for health workers to standardize the treatment of acute diarrhea. This manual covered methods for assessing dehydration status, determining a treatment plan, treating different types of diarrhea, and educating mothers in prevention and treatment of diarrhea.

At the start of the campaign (April to June 1982), a series of five-day training workshops was held for rural health workers. These workshops included all community health nurses and health inspectors, the two groups who were the most mobile and

who were already involved in health education. Key curative personnel (dresser-dispensers and nurse-midwives) from each health center were also included. Shorter workshops were held for leprosy inspectors, Peace Corps volunteers, and community health nurse trainees. A total of 182 health personnel attended these workshops. The workshops focused on diarrheal management, teaching rural health workers to: assess a child's hydration status and treat different levels of dehydration, mix WSS correctly and teach mothers and other health workers about WSS and the Diet for Diarrhea. Each trainee was given a set of printed materials: a poster detailing treatments, a Diet for Diarrhea poster, and a copy of the Health Worker's Manual for the Management of Acute Diarrhoea in The Gambia.

A second objective, after teaching health workers directly, was to prepare health inspectors and community health nurses to train village volunteers to be local sources of support and information. After the workshops, the inspectors and nurses returned to their posting areas, identified a volunteer in each of ten villages, and trained these volunteers in the mixing and administration of WSS. The volunteers were given a red flag to fly above their compound and were known as "Red Flag Volunteers." A total of 840 volunteers were trained.

The main campaign activity during Phase 2 (July to October 1982) was to publicize and teach WSS to as many mothers as possible. To this end, a rural lottery (the "Happy Baby Lottery") was held during September and October. An important component of the lottery was a pictorial flyer detailing mixing proportions and instructions. These flyers were distributed to rural health centers throughout the country during the month of August. From there they were then distributed to rural dispensaries, sub-dispensaries, and Red Flag Volunteers. Before the lottery, radio spots gave mothers step-by-step instructions on how to read the flyer.

The lottery was designed to motivate mothers to obtain the flyer and listen to the radio spots. The flyer was an entry ticket to participate in the lottery. For four weeks, 18

villages were randomly selected each week to be lottery villages (a total of 72 villages participated).

In each village, twenty of the mothers with flyers were randomly drawn and asked to demonstrate their WSS mixing knowledge. Each mother who correctly mixed WSS was given a prize, a one-liter cup. If she could also answer administration questions, she received a bar of soap. All mothers with correct knowledge were then eligible for the Grand Prize Drawing during which fifteen mothers were selected to receive a radio-cassette player.

Distribution of the flyers and participation in the lottery were widespread. Approximately 150,000 mixing flyers were distributed. The lottery was widely attended: 6,580 women came to the village contests with a flyer in hand and participants and spectators totaled 10,728.

In the second year of the campaign, two other topics received wide coverage: feeding during and after diarrhea and a mini-campaign on sanitation. New print materials were designed for each of these phases and workshops were held for rural health workers. These activities are described more fully in Chapter II in the sections on feeding knowledge and on the mini-campaign.

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:

- <u>treatment variables</u>: those related to the project activity and access and exposure to the messages themselves;

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

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

- health status outcomes: variables related 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 describes a sequential series of steps that were expected to 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, are as follows:

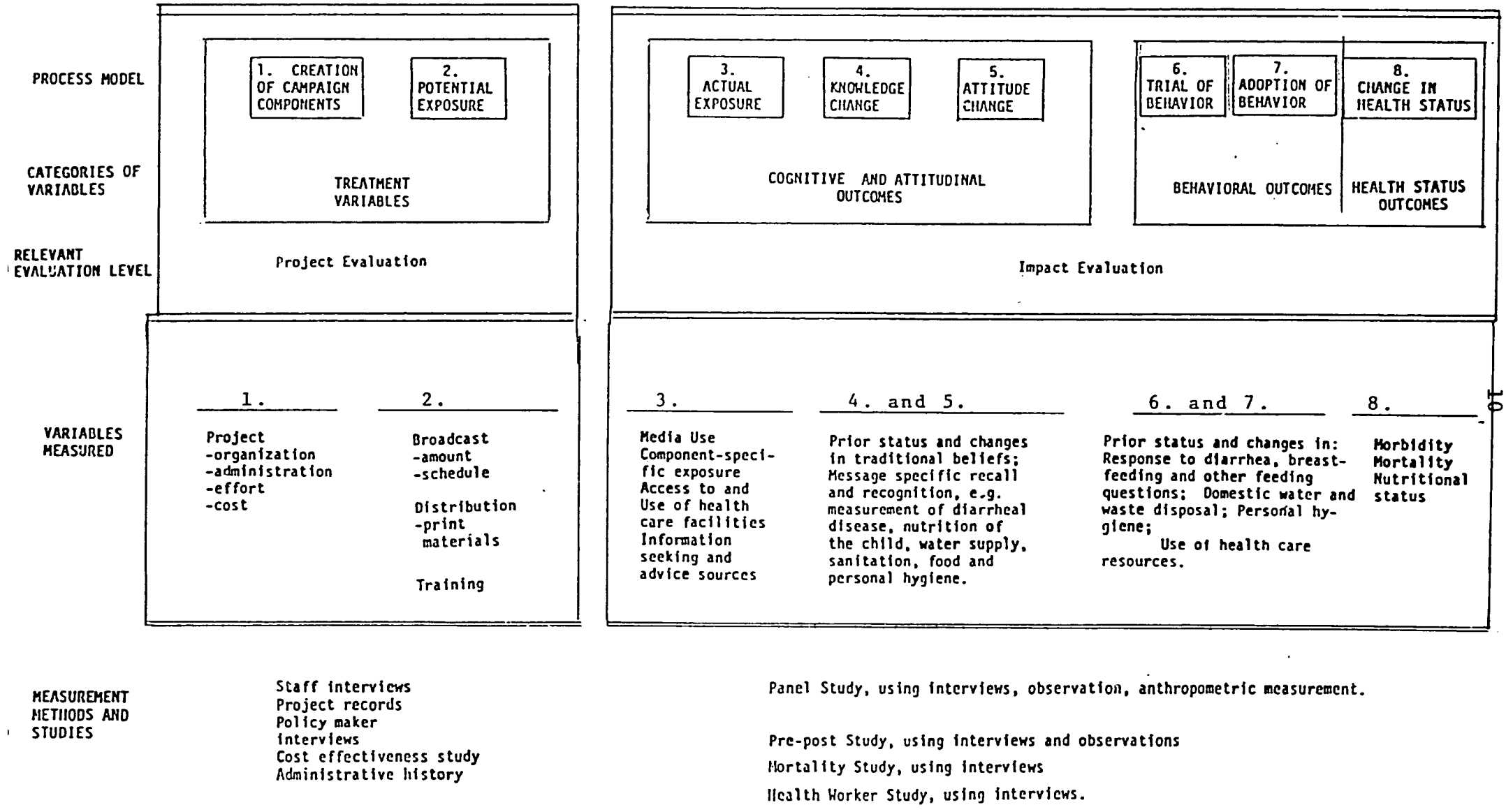
1. Creation of campaign components. Were products and activities generated using the project's special approach?

2. Potential exposure. How much exposure to the campaign was possible? Where and to what extent were spots broadcast, flyers 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 did 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

At each step in the process model a domain of variables was represented as specific variables or issues that were investigated. The main groups of these variables are shown on row four of Figure I-1. In the most general sense, they include: access and exposure to intervention components; knowledge and behavior related to management of diarrheal disease, child nutrition and feeding practices, sanitation and personal hygiene; and nutritional status, morbidity, and mortality.

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

(3) Measurement method and organization

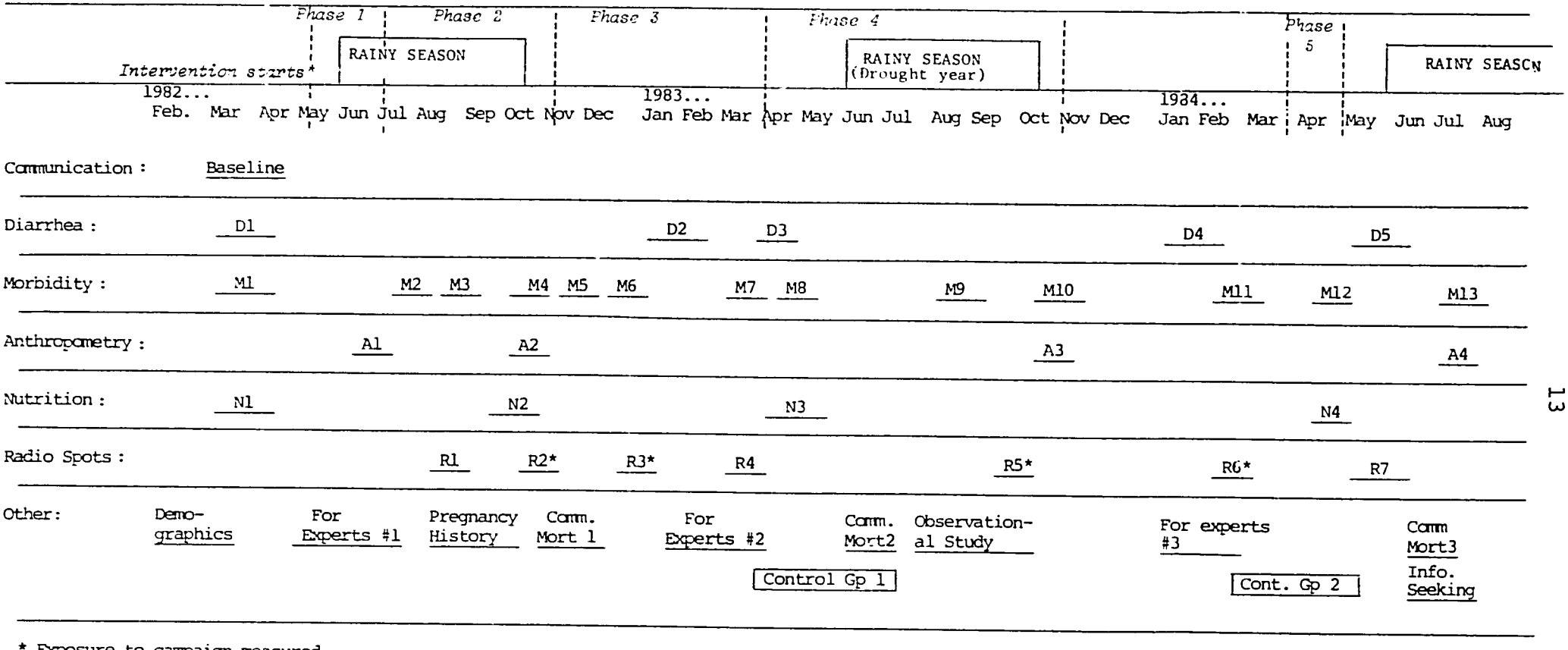
The above description has outlined the basic research areas and methods. Because of differences among the variables and audiences, we divided the work into a number of discrete studies. The largest of these was the longitudinal study, which is the main topic of this report. Results from other studies, the mortality study, the health professional interview study, and the behavioral observation study will also be included in this report.

The longitudinal study investigated: (1) population demographics and intervening variables, (2) media use patterns, (3) exposure to intervention elements, (4) knowledge and attitude measures, (5) self reports of practices, (6) observational measures of practices, (7) self reports of morbidity, and (8) anthropometric measurements. These were measured using repeated administration of several different instruments on subsamples of approximately 800 women in a cohort of 1029 women over a period of a little over two years.

Variables were measured in a variety of ways, including interviews, direct observation, physical measurement, use of archives, and case finding or tracer studies. 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.

Figure I- 2 Timing of administration of evaluation survey instruments in The Gambia



* Exposure to campaign measured.

Phase Topics:
- Phase 1: Dryness, diarrhea, malnutrition can be prevented through diet
- Phase 2: Emphasis on water-sugar-salt solution (WSS); proper mixing and administration, feeding, Happy Baby lottery, sanitation
- Phase 3: Reinforcement of mixing behaviors, diarrhea prevention through feces removal, dry season diarrhea - give WSS immediately
- Phase 4: Feeding of children, reminder of breastfeeding and WSS, training methods,
- Phase 5: "Minicampaign"on prevention - wells, hygiene, VDC's

(4) Sample used in the longitudinal study

The organization of the Gambian social structure, family life, and access to health care and radio reception influenced the sampling process.

a. The socio-cultural context in The Gambia

The household organization in The Gambia is typical of many parts of Africa. The basic physical organization is the compound, which typically is much larger than a nuclear family household. A compound also is likely to have more than one married male in it, and may have unrelated people living in it. In addition, married males are frequently polygamous; their wives may come from different tribal or linguistic backgrounds and probably retain greater variability in diet, home remedies, and childraising practices than otherwise would be expected.

The cultural and linguistic situation in The Gambia is also quite diverse. The different tribal groups present include the Mandinkas, Wolofs, Fulas, Jolas, Serahules, and others, and also immigrants from Mauritania, Senegal, and Guinea-Bissau. The first languages of these groups differ, although most people have some degree of fluency in Wolof and/or Mandinka, which serve as the primary languages for local trade. English, the official language, is spoken by a relatively small proportion of the population.

The health care structure in The Gambia consists of several overlapping systems, some of which are more active than others. The main system is a hierarchical one, descending from the hospital in Banjul (the capital city) to the health centers, dispensaries, and sub-dispensaries in other towns. In addition to this, some communities are served by maternal-child health (MCH) workers who visit communities on a fixed schedule, holding clinics. There appeared to be no constant relationship between the fixed centers of the main health care system and the communi-

ties served by MCH workers. During the course of the project, a new system of village health workers (VHW's) was being implemented on a region by region basis. These workers were intended to fill gaps in the existing system and were assigned to communities of more than 400 people who did not have a fixed facility. A separate system of health inspectors carry out public health inspection and education tasks on an itinerant basis. There is also a Peace Corps program in health which places volunteers in some government facilities in rural areas. Finally, there are non-governmental sources of care - - various Islamic and Christian missionary clinics, clinics run by the British Medical Research Council (MRC), and private health care sources.

The Gambia has two radio stations, one governmental and one private. The governmental station, Radio Gambia, covers most of the country with a transmitter near the coast; a relay transmitter upriver at Basse offers unreliable service in the easternmost section of the country. All project broadcasts were transmitted on the government station.

b. Sampling plan

The ultimate sampling unit for the study was a woman with responsibility for the care of children. The criteria applied to determine this were that the woman had to be between 15 and 45 years of age or to have responsibility for one or more children between 0 and 60 months of age. To arrive at a sample of such women, the sampling plan was structured on a multi-stage design incorporating purposive, stratified, and random sampling at the various stages. The objective of the sampling was to be able to generalize to the full range of conditions that are represented in the country, rather than to be able to make precise statements about the aggregate national levels in a given country. This tactic was developed because of the importance of being able to generalize to conditions that might prevail in many developing countries.

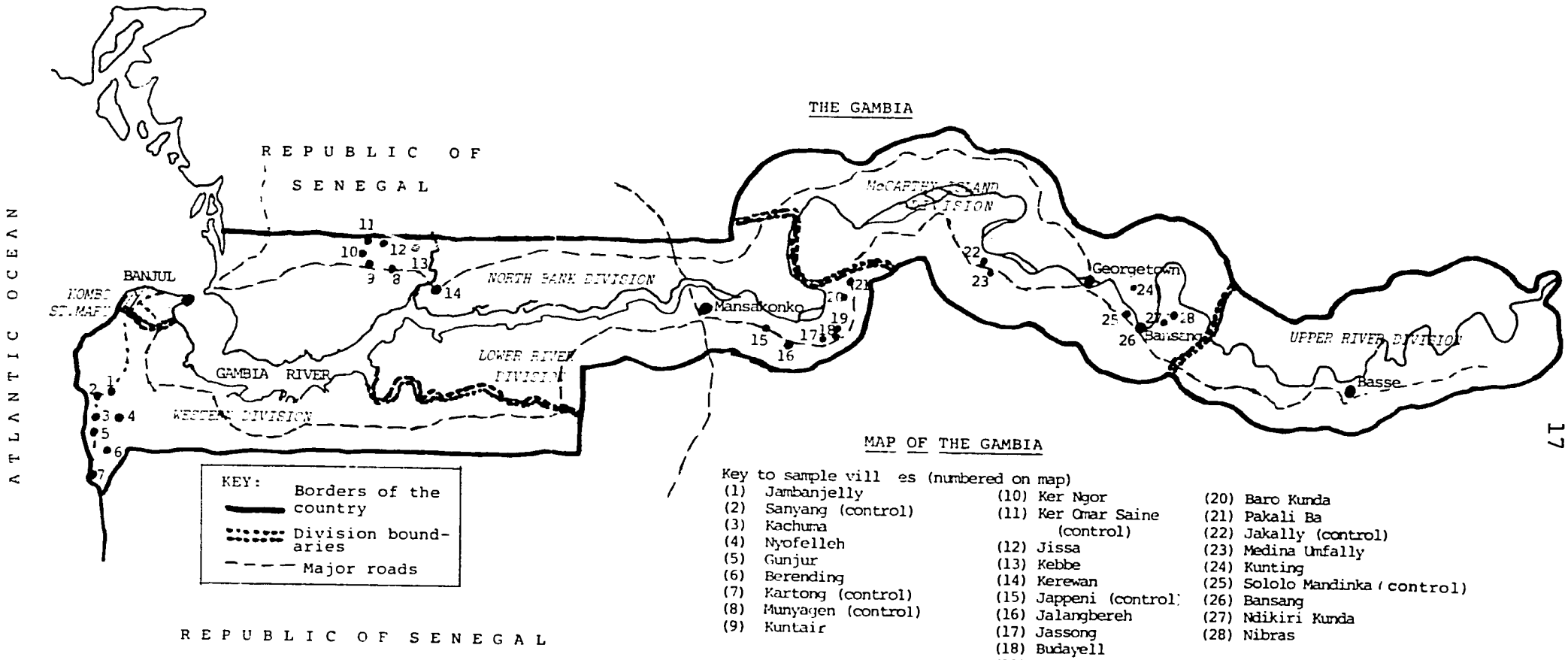
We therefore set about trying to determine what the likely

range of variability in The Gambia would include, and what sampling frame might exist or be developed that could reflect this range. One of the first steps was to develop a list of "stratification variables", or factors we would expect to be related in some way to the outcome variables. A lengthy list emerged, a shortened version of which is presented in Appendix B. The general stratification categories included availability of health care services, tribal identity, language of preference, radio coverage, location relative to the river and the main roads, administrative division (since services are implemented and administered on a divisional basis), type of livelihood, types of non-health community services available, and size of community.

No sampling plan was possible that would represent all the potential combination of these factors - - there aren't enough villages in The Gambia, and the resources required would have been enormous. We therefore purposively selected communities tnat encompassed the full range of characteristics in which we were interested. A major constraint on this was to ensure that research communities were close enough together to enable a single field data collector to live in one of the communities and travel to nearby ones to collect additional data. This constraint was required by resource limitations and the scarcity of qualified people who could be employed as survey workers.

We gathered the available information on which choices could be based: the Census Bureau had lists of communities and the size of local populations; tribal identity could sometimes be deduced from the names of villages, maps of soil type and agricultural activity as well as maps showing road access and public services were available; and local language of preference could be inferred with considerable accuracy by informants in the capital. Based on this information, we chose twenty villages, five in each of four administrative divisions (see Figure I-3 for a map indicating the location of the sample villages). Kombo St. Mary Division was not included because it is primarily urban, including the capital city and its suburbs. Upper River Division

Figure I-3 Map of The Gambia showing sample and control villages



MAP OF THE GAMBIA

Key to sample vill es (numbered on map)

(1) Jambanjelly
(2) Sanyang (control)
(3) Kachuma
(4) Nyofelleh
(5) Gunjur
(6) Berending
(7) Kartong (control)
(8) Munyagen (control)
(9) Kuntair
(10) Ker Ngor
(11) Ker Omar Saine (control)
(12) Jissa
(13) Kebbe
(14) Kerewan
(15) Jappeni (control)
(16) Jalangbereh
(17) Jassong
(18) Budayell
(19) Bureng
(20) Baro Kunda
(21) Pakali Ba
(22) Jakally (control)
(23) Medina Umfally
(24) Kunting
(25) Sololo Mandinka (control)
(26) Bansang
(27) Ndikiri Kunda
(28) Nibras

also was not sampled because of poor reception of Radio Gambia.

The decisions about how to sample particular compounds and mothers were guided by a series of sometimes contradictory principles. We wanted to maintain a roughly equal likelihood for every eligible woman in a village to be selected into the cohort. However, the compounds vary widely in size within a community and a randomly sampled very large compound could easily dominate a village's estimates, so we set the following conditions for sampling at the intermediate level. Our first objective was to get individuals from as many different compounds in a village as possible, up to a maximum of 30 compounds in a village; our second objective was to sample at least 40 women per village, or as many as possible, if the villages had fewer than 40 women of fertile age.

The was drawn in the following way. When the compound lists for a village had been drawn up, compounds were sampled randomly without replacement until the list was exhausted or 30 compounds had been selected. The entire population of a sampled compound was enumerated, including information required for identifying women eligible for sampling. Within a compound, the sampling frame for individuals was the list of eligible women. From each compound, one-half of the eligible women were sampled, with a minimum sample of two, or one if there was only one. Thus, in compounds with four or more eligible women, one-half of the eligible women were sampled. In compounds with two or three women, two were sampled. In compounds with only one eligible woman, she was sampled.

In summary, the sampling plan devised for this project was a multi-stage plan with different sampling rules applied at each stage. This combination of criteria produced a sample with a total size of 1029, averaging 50 women in each of twenty villages. It gave us a group of women representing the largest possible range of characteristics found in The Gambia, while at the same time being unbiased representatives of their particular characteristics. Approximately 800 women were interviewed in each sweep.

c. Characteristics of the sample

The major characteristics of the sample villages are in Table I-1. A more detailed description of the villages and of the socio-economic characteristics of the sample are in Appendix C. Only a few of the sample characteristics are reported here

The population of rural Gambia is poor. Housing is in earthen-floor (94 percent) mud or mud-brick houses (89 percent). The majority (55 percent) have two or fewer rooms. Houses are organized into compouds, usually occupied by an extended family. We encountered some compounds with more than 100 residents, but typical sizes are a tenth of that. About three out of four compounds (77 percent) have latrines, and 80 percent of adults say they use them. All families say they cook over an open fire.

The families are subsistence farmers, and most of what cash they ear comes from sale of farm and garden produce. More than half the families grow peanuts, rice, and millet, and more than half also have chickens, goats, and sheep. Almost all water comes from wells (99 percent), but many of the individual wells go dry seasonally or daily.

(5) Measurement strategy in the longitudinal study

The first "measures" were taken during the phase of enumeration of the population of the sample compounds, February 1982. Once specific mothers had been sampled within compounds, a baseline measure of the full range of relevant variables was taken in March/April of 1982, immediately prior to the start of the campaign. The baseline includes the breadth of the topics to be covered in the study, but obviously not the full depth in each area. The more detailed measures of each subject area constituted a full set of the core variables, but they were far too numerous to administer in a single instrument. The strategy followed was to break them into separate instruments.

Table I-1 Summary of characteristics of villages in The Gambia sample

Division and village	Number of compounds	Number of mothers in base sample	Number of children 5 yrs and under in sample over time	Main Tribe	Type of health facility	Type of school	Distance from main road	Agriculture
WESTERN DIVISION:								
Gunjur	732	46	80	Mandinka	Full-time center	Primary, Catholic primary, secondary, technical Arabic	on main road	Gardens/citrus rice/millet groundnuts
Berending	72	47	81	Jola	Part-time clinic	Catholic primary	6 km.	Groundnuts/ gardens/citrus rice
Kachuma	12	17	26	Manjago	None*	Catholic primary	3 km.	Palm wine/ oil
Nyofelleh	85	51	86	Mandinka/Jola	None	Arabic	5 km.	Citrus/groundnuts/millet/ gardens
Jambanjelly	238	66	120	Mandinka/Jola	Part-time clinic	Primary,Arabic	on main road	Citrus/millet gardens/groundnuts
NORTH BANK:								
Kuntair	43	46	74	Fula/Bambara	Part-time clinic	Primary,Arabic	on main road	Groundnuts/ rice/millet
Ker Njor	23	40	77	Serere/Mandinka	None*	None	5 km.	Groundnuts/ millet
Kebbeh	17	32	56	Wolof/Bambara	None	None	5 km.	Groundnut/ millet
Jissa	37	72	119	Toucouleur/Fula	None	Primary	7 km.	Groundnuts/ millet
Kerewan	275	56	97	Mandinka	Full-time center	Primary, secondary, technical, Arabic	on main road, ferry stop	Groundnut/ rice/millet
LOWER RIVER								
Burena	47	72	105	Mandinka	Part-time clinic	Primary,Arabic	4.5 km.	Groundnuts/ rice
Jolangbereh	39	54	104	Serahule	None*	Arabic	1 km	Groundnuts/ millet
Jassong	38	94	127	Mandinka	None	Arabic	4 km	Groundnuts/ rice
Budayell	11	16	30	Fula	None*	Arabic	1 km	Groundnuts/ millet
Bato Kunda	40	64	122	Mandinka	None	Primary,Arabic	5 km.	Groundnuts/ rice
McCARTHY ISLAND								
Bansang	442	50	85	Mandinka/Fula/ Wolof	Hospital/clinic	Primary, secondary	on main road, ferry stop	Groundnuts/ ride
Medina Umfally	85	44	77	Serahula	None	Arabic	on main road	Groundnuts/ millet
Nibras	15	49	89	Jakanka/Mandinka	None	Arabic	10 km.	Groundnuts/ millet/rice
Kdikiri Kunda	44	56	80	Fula/Mandinka	None	Primary,Arabic	8 km.	Groundnuts/ millet/rice
Kunting	65	55	95	Mandinka	Part-time clinic	Primary, Arabic	15 km. from ferry	Groundnuts/ millet

*Not a red flag village

The main measurement items were grouped into four questionnaires covering nutrition and feeding behaviors, exposure to and learning from campaign messages, morbidity from and treatment of diarrhea, and anthropometry. Questionnaires were given one at a time, and each took approximately one month to administer to the whole cohort. When all four instruments were completed, the cycle began again. Within this general structure, a number of smaller studies were interspersed, such as measurement of exposure, learning and attitude change in response to the different radio spots, community mortality, testing of samples of oral rehydration fluids, behavioral observation, and pregnancy histories.

Figure I-2 shows the administration dates of the instruments. The successive administrations of the instruments are referred to in this document as "waves." Hence, the second administration of anthropometric measures is referred to as the second wave of anthropometry and was conducted in October/November of 1982; the second wave of morbidity, however, was administered in June/July of 1982.

(6) Control groups

In The Gambia, the intervention covered the entire country. This made the question of external, non-treatment controls moot. The other internal controls were available, although they were hardly a perfect solution. We therefore pursued a strategy in The Gambia of using control groups consisting of women interviewed only once, to try to assess the effect of the measurement itself on the longitudinal cohort's behavior. We sampled two quasi-equivalent control groups using the same sampling plan in eight other communities. These people were measured using a combined instrument similar to the baseline measure, but updated to include communication measures and other items developed since the baseline. The first control group of 226 mothers was measured after a full year of broadcasting; a different second

quasi-equivalent control group of 208 mothers was sampled and measured near the end of the project. Some characteristics of the control villages are summarized in Table I-2. The location of the villages can be seen on the map of The Gambia (Figure I-3).

(7) Fieldworker training and data handling logistics

The four permanent fieldworkers were selected from 130 applicants after a long process of screening and training. Eighteen people participated in an initial two-week training course, from which eight final candidates were selected. These eight worked on baseline data collection and on the basis of their performance in that role, four were selected. All four were women; it seems easier for women to gain access and carry out interviews about child-health related topics. The women were given small motorbikes to permit them to travel from their home villages to the other four in their cluster, as well as to the control group villages. Training in riding and maintaining the motorbikes was extensive.

Fieldworkers then took up residence in one village of each of the five-village clusters. They interviewed approximately 200 mothers a month, using formal questionnaires and answer sheets. At the end of each wave of a questionnaire, they brought their data into the main office in Banjul, at which time they received retraining on the administration of the next questionnaire. The four fieldworkers were supervised by a full-time supervisor, who was based in Banjul. His responsibilities included coordination and field support, reliability checking, and continuing training.

When the fieldworkers delivered each months' data, it was checked for correct coding and then transcribed onto coding sheets. The coding sheets were sent to Stanford University where they were entered into machine-readable form and verified. Analysis was conducted on Stanford's IBM mainframe computer.

Table I-2: Summary of characteristics of villages in control samples

Division and Village	Number of mothers in sample		Main tribes	Type of health facility	Type of school	Distance from main road
	Control 1	Control 2				
WESTERN DIVISION:						
Sanyang	27	26	Mandinka/Jola/Fula	Part-time clinic	Primary	5 km.
Kartong	29	25	Mandinka/Jola	Part-time clinic	Primary	13 km.
NORTH BANK DIVISION:						
Munyagen	29	27	Wolof	None	Primary, Arabic	On main road
Ker Omar Saine	27	26	Wolof	Part-time clinic	None	8 km.
LOWER RIVER DIVISION:						
Jappeni	29	25	Mandinka	Part-time clinic	Primary	On main road
Pakali Ba	26	26	Mandinka	Part-time clinic	Primary	On main road
McCARTHY ISLAND DIV.:						
Jakally	29	28	Serahule	None	Arabic	On main road
Sololo Mandinka	30	25	Mandinka	None	Arabic	1/2 km.

Chapter II

COMMUNICATION VARIABLES AND COGNITIVE CHANGE

As seen in the process model described in Chapter I, before mothers and caretakers could change their behavior, they needed to learn about new practices. In this chapter, we look at the steps in the model prior to behavior change: access to the campaign, exposure to the messages, and learning from the campaign.

Before the messages started, mothers were asked a series of questions measuring radio access and listening, health care access, availability of ingredients to make the water-sugar-salt solution (WSS), and literacy. Throughout the campaign, seven different radio spot instruments and five administrations of the diarrhea instrument measured exposure to the campaign messages and changes in knowledge. This chapter will first present data on access and exposure to the campaign. This section also includes the results of a separate study on the factors influencing mothers' ability to understand the pictorial flyer used to teach mothers to mix WSS. The second major section of this chapter presents the results of analyses of knowledge change.

A. Access and Exposure

In order to have been exposed to messages about new health practices and to learn about them, a mother must first have had access to sources of information. The MMHP project used multiple channels - - radio, health workers and Red Flag volunteers, and print materials (pictorial flyers and posters). Red Flag volunteers were mothers in the community who received special training in oral rehydration therapy and who functioned as a

community resource for expertise. They were given red flags to mark their houses. This section describes mothers' access to these channels. In the case of print materials, access was not only determined by whether a person could obtain or see a poster or flyer, but by whether he or she could read it or interpret the pictures. For this reason, figures on literacy and pictorial ability will also be presented. A mother's ability to adopt the use of WSS for her child's diarrhea depended on whether she had access to the necessary ingredients (i.e., sugar, salt, a Julpearl bottle, and a bottle cap).

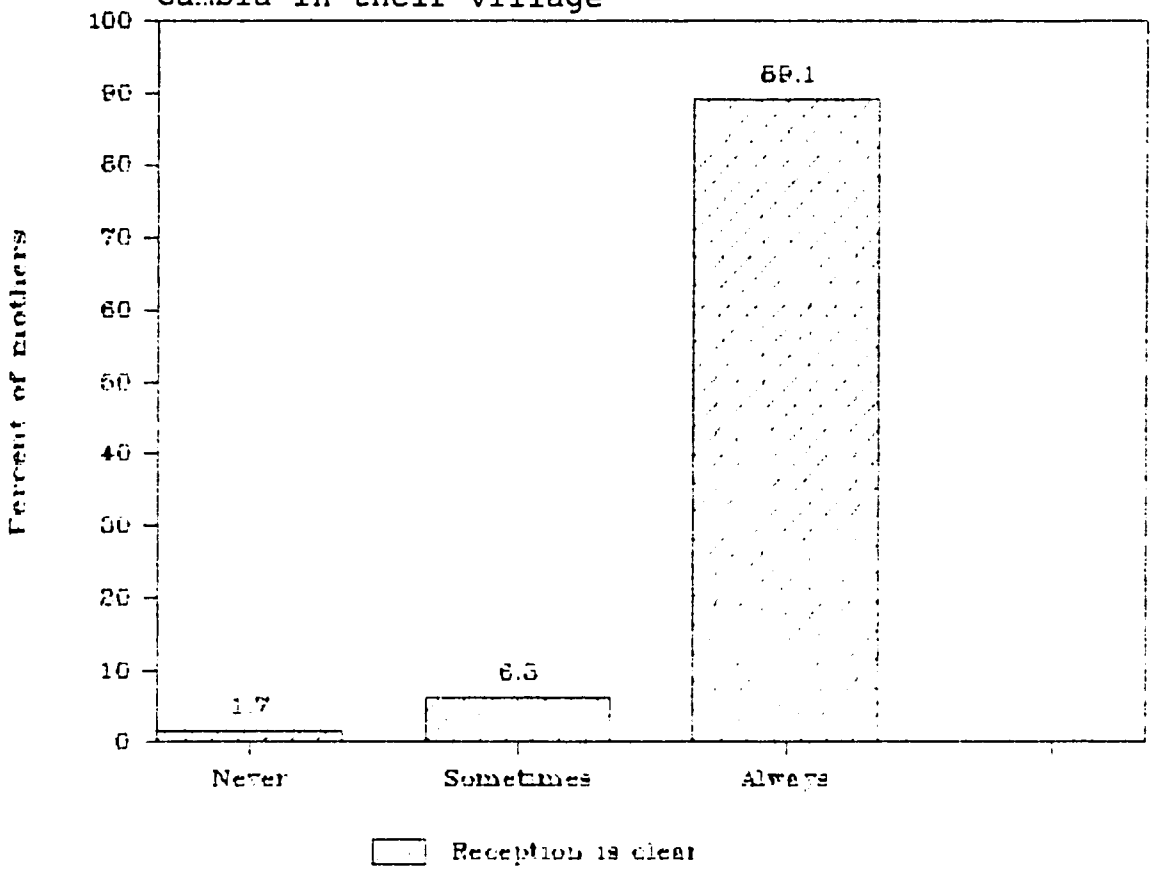
In the baseline interviews in March and April 1982, the mothers in the sample were asked about radio ownership and listening, and sources of information about child health. They or someone else in the compound were also given a simple reading test. Pictorial ability was measured in a separate study in August 1983. Access to WSS ingredients was measured several times during the project.

Overall, the results show that mothers had good access to the channels used by the campaign. This will be discussed in more detail below.

(1) Radio access and listening

The radio messages of the campaign were broadcast over Radio Gambia, the national radio station. The developmental investigation carried out by AED before the campaign discovered that Radio Gambia frequently could not be heard in the far-eastern part of the country. For this reason, the sample did not include women in the Upper River Division. Women in the four divisions included in the sample generally reported clear reception of Radio Gambia in their village - - 89 percent reported clear reception always, 6 percent reported clear reception sometimes, and only two percent reported never having good reception. Three percent didn't know. All but one of the twenty-one mothers who didn't know lived in a compound with no radio. Figure II-1 displays these percentages.

Figure II-1 Sample mothers' reports of clear reception of Radio Gambia in their village



Gen.Comm:RECEPTGF
n=772

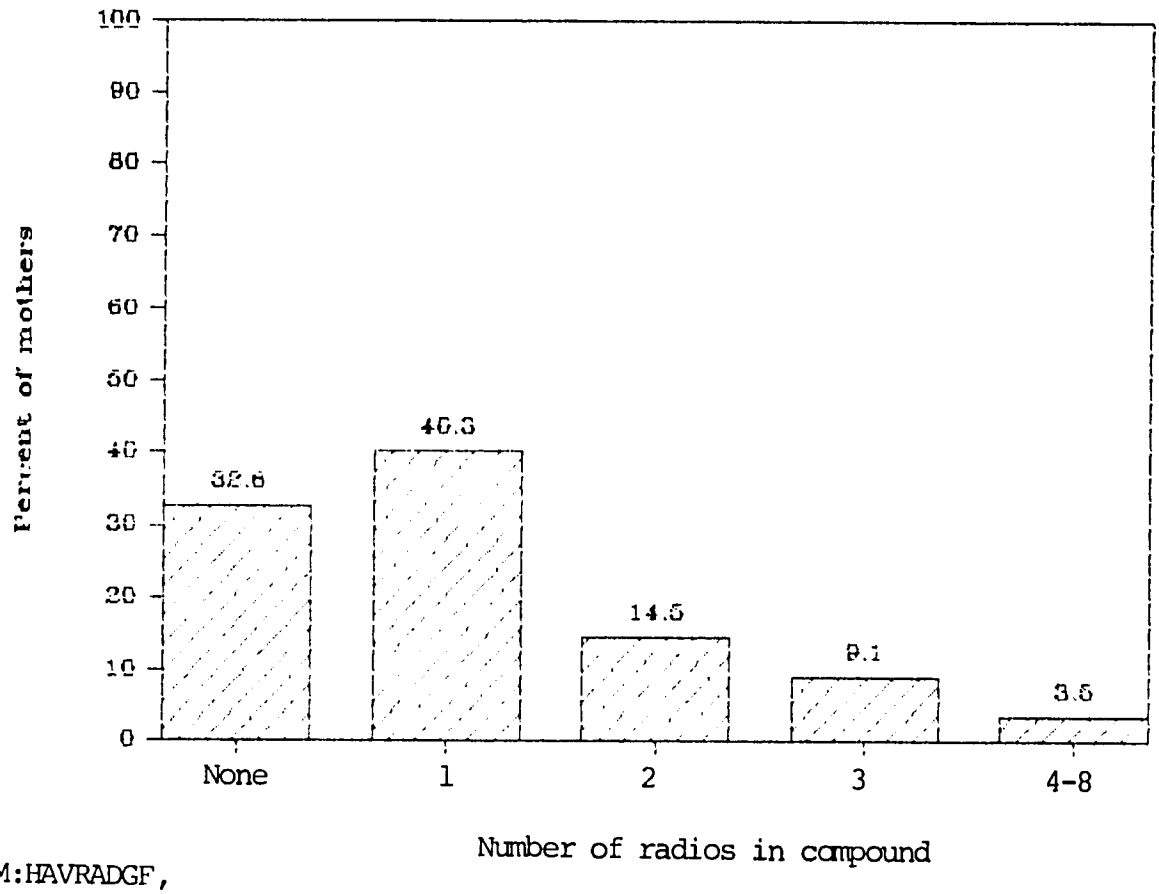
At the individual level, radio access was measured by asking about the number of radios in the compound and their ownership. Sixty-eight percent of the mothers reported that they had a radio in the compound. Most had only one radio (see Figure II-2). When asked to show the interviewer the radio they used most often, 90.6 percent of the mothers in compounds with a radio produced a working radio. Thus, 60.5 of the women had access in their compound to a radio that was working at the time of the interview. Batteries for these radios were generally easily available. 80.6 percent of the mothers reported being able to buy batteries in their own village rather than having to go to a larger town.

A second important factor determining a mother's access to radio messages was whether she had control over the compound radio. During the AED developmental investigation visits to villages, no women were seen listening to the radio whereas many men were observed with radios, leading project personnel to question mothers' actual access to radio messages (AED, 1982).

Mothers' access was examined by asking mothers in compounds with a radio about who owned the radio they usually used. In the majority of the cases (58%) the mother listened to a radio owned by her husband. Ten percent of the mothers owned a radio themselves, 15 percent listened to the radio of a male relative, and ten percent used a radio owned by another woman in the compound - - see the bar on the left of Figure II-3.

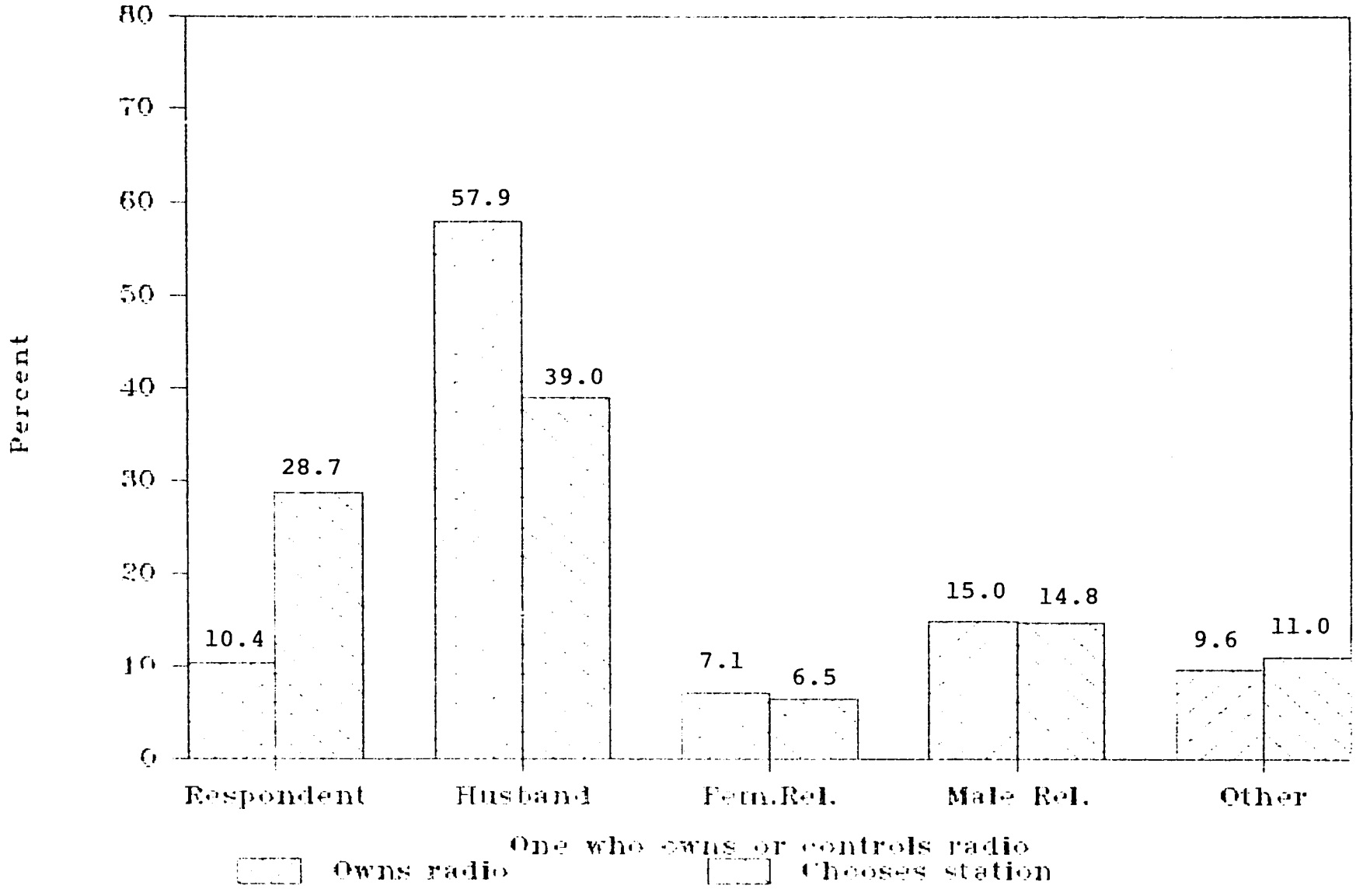
However, mothers had more control over the compound radio than these figures would suggest. Mothers who listened to Radio Gambia were asked who chose the station if a group was listening. When we juxtaposed the figures for mothers who were asked both questions (who owns the radio and who chooses the station) it can be seen that a mother did not need to own a radio in order to have some control over the station to which she listens (see bar on right in Figure II-3). Although ten percent of the mothers had their own radio, 29 percent reported choosing the station when listening in a group. We found that a woman also had some control over her husband's radio and those of other

Figure II-2 Number of radios in mother's compound



n=795
GENCOMM:HAVRADGF,
NUMRADGF

Figure II-3 Radio ownership and control among mothers who lived in compounds with a radio and who listened to Radio Gambia



n=520
Gen.Comm: WHOOWNGF,WHOCHSGF

females in the compound.

To measure level of exposure to Radio Gambia, mothers in the sample were asked how often they listened to Radio Gambia. Their responses are in Figure II-4. A quarter of the mothers in the sample reported never listening to Radio Gambia. Those who did listen to the station, reported frequent listening. Fifty-two percent of the mothers reported daily listening and 15 percent of the mothers reported listening several times a week.

Of the mothers who listened to Radio Gambia, 62.7 percent reported listening in the morning, 58.9 percent in the afternoon, and 95.3 percent in the evening. It is estimated that approximately half of the MMHP broadcasts occurred in the evening, thus it was possible for at least half of the mothers to be heavily exposed to the campaign's messages. (Actual exposure to the campaign messages will be discussed later in this report.)

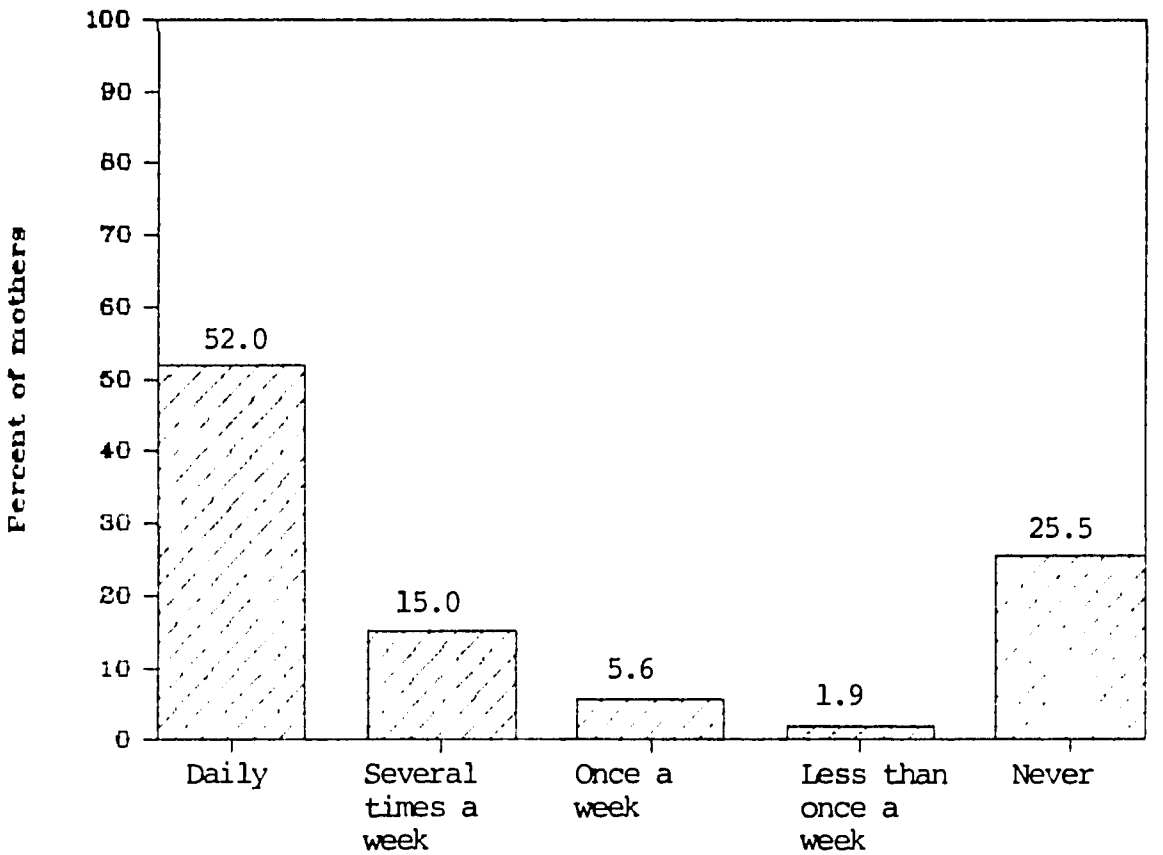
Access to a radio in the compound was an important factor in frequency of radio exposure. The association between the two was significant at $p < .001$. Eighty-six percent of the mothers who lived in a compound with a radio listened to Radio Gambia every day or several times a week compared to 26 percent of mothers with no compound radio (see Table II-1). Having more than one radio in the compound made no difference.

Table II-1 Mother's exposure to Radio Gambia by radio ownership

Mother listens:	No radio in compound	Has radio in compound
Never	63.1%	7.8
Once a week or less	10.7	6.1
Daily or several times a week	26.2	86.1
	100.0 (n=244)	100.0 (n=526)

GCOMM1: HAVRADGF,LISTRGF

Figure II-4 Frequency of mothers' listening to Radio Gambia



N=773
GCOMM1:LISTRGGF

It is important to note that having no radio in the compound did not mean that the mother had no chance to listen at all. Twenty-six percent of the mothers with no radio in their compound reported frequent listening, and thus they must have had access to a radio in another compound.

An examination of the two variables, having a radio in the compound and exposure to Radio Gambia, by division indicated that mothers in Western and McCarthy Island divisions had significantly less access to a radio ($p < .0006$), approximately 75 percent of the mothers in North Bank and Lower River divisions had compound radios as compared to 63 percent in Western Division and 59 percent in McCarthy Island.

Listening to Radio Gambia also differed significantly by division ($p < .0006$). As can be seen in Table II-2, mothers in McCarthy Island Division were less likely to listen to Radio Gambia than mothers in other divisions. In Western Division, where radio ownership was also lower, mothers still reported a high level of listening, suggesting that there is more communal radio listening between compounds than in some of the other divisions. In Western Division, all of the mothers in Kachuma reported that they never listened to Radio Gambia (probably because they don't speak the languages used in the broadcasts). In McCarthy Island Division, from 30 to 55 percent of the mothers in the four smaller villages (Bansang excluded) reported never listening to the radio.

In summary, reception of Radio Gambia was generally reported to be good throughout the study area, a majority of mothers (60 percent) had access to a working radio in their compound, and a large proportion of the mothers reported frequent listening to Radio Gambia (67 percent).

Table II-2 Radio Gambia listening by division

Listens to Radio Gambia	Division			
	Western	North Bank	Lower River	McCarthy I
Every day	58.2%	57.0	55.5	36.8
Several times a week	14.7	14.0	11.4	20.5
Once a week or less	9.2	5.2	7.6	8.1
Never	17.9	23.8	25.6	34.6
n =	184	193	211	185

GCOMM1:LISTRGGF

Having a radio in the compound was significantly related to listening to Radio Gambia. Mothers were more likely to listen frequently if they had a radio in the compound. However, there was also evidence that mothers went to other compounds to listen. The AED supposition that Gambian mothers had low control over the radio was supported. Only ten percent of the mothers owned a radio themselves. Thirty percent reported being able to choose the station when a group was listening. In the majority of cases, the compound radio was controlled by a male member of the compound.

(2) Access and exposure to interpersonal channels

The interpersonal component of the MMHP campaign was very important. Before the start of the campaign, 182 health workers, community health nurses, dresser-dispensers and other health personnel were given extensive training about diarrheal management, WSS, and how to teach mothers about oral rehydration therapy. Health workers also received training before the feeding campaign in 1983. In addition, in 840 villages, a

volunteer was given some training by health workers and given a Red Flag to fly above her compound. About a third of all villages in the country were served by these Red Flag ladies.

Half the women in the sample lived in a village with no formal health care facilities, thirty-five percent lived in villages visited by a maternal child health team from one to four times a month, and 15 percent of the mothers lived in villages with a full-time clinic and, in the case of Bansang, a hospital. One-quarter of the villages had no Red Flag volunteer. Table II-3 gives details on the health system in each village.

As can be seen, regular health care nearby was not available to most women. Many women had to travel several kilometers to reach a health care facility. For many women, the nearest clinic was only available once a week or less. Clinic visits and medicines were generally free of charge. However, those who took public taxis or a bus incurred some expenses. Approximately 78 to 88 percent of the mothers reported walking to the health center at different times during the two years of measurement. A majority of the mothers from Kebbeh, Jalangbereh, Baro Kunda, Bansang, and Medina Umfally reported taking a taxi to the health center, although some walked.

Availability of health care changed over the course of the campaign. Table II-3 also shows the health services available in each village at three different times: March/April 1982, April 1983, and June 1984. Two major changes in health services during the course of the project were a reduction in Maternal Child Health (MCH) team treks to villages and the implementation of the government's Primary Health Care (PHC) system. Severe country-wide gasoline shortages started in August 1982 and continued at intervals throughout the rest of the project. During these shortages, MCH treks stopped or were reduced, which might explain the reduction in service in some villages in April 1983. In 1982, a new Primary Health Care system was begun. In this system, a member of the village was trained and given supplies of several commonly used medicines. These Village Health Workers were assigned to villages of more than 400 people

Table II-3 Changes in health services in the villages in the main sample

Division and village name	March/April 1982	April 1983	June 1984
Western Division:			
Gunjur	Full-time health center, open daily, weekly MCH clinic	Same as 3/82	Same as 4/83
Berending	Part-time clinic, open 2 days/month (5 km from Gunjur)	Clinic reduced to 1 day/month	Clinic increased to 1 day per week
Kachuma*	None, to Gunjur (5 km)	Same as 3/82	Same as 4/83
Nyofelleh	None, to Gunjur (5 km)	Part-time clinic, open 1 day/mo.	Clinic open 2 days/mo.
Jambanjelly	Part-time clinic, open 2 days/month, dresser-dispenser (full time)	Same as 3/82	Clinic open 1 day/week
North Bank Division:			
Kuntair	Part-time clinic, open 1 day/week, community health nurse (full-time)	Same as 3/82	Addition of PHC (12/83)
Ker Ngor*	None, to Kuntair (2.5 km)	Same as 3/82	Same as 4/83
Kebbeh	None, to Kuntair (1 km.) or Kerewan (8 km and ferry)	Same as 3/82	Same as 4/83
Jissa	None, to Kuntair (6 km)	Same as 3/82	Addition of PHC (12/83)
Kerewan	Full-time health center, open daily	Same as 3/82	Same as 4/83
Lower River Division:			
Bureng	Part-time clinic, open 2 times/month, PHC (2/82)	Clinic reduced to 1 day/month	Same as 4/83
Jalangbereh*	None, to Jappeni (4.5 km, open weekly) PHC (2/82)	Jappeni clinic open only 1 day/ month	Same as 4/83
Jassong	None, to Bureng (4 km.), PHC (2/82)	Bureng clinic reduced to 1 day/mo.	Same as 4/83
Budayell*	None, to Bureng (4 km)	Bureng clinic reduced to 1 day/ month	Same as 4/83
Baro Kunda	None, to Bureng (8 km), PHC 2/82)	Bureng clinic reduced to 1 day	Same as 4/83
McCarthy Island Division:			
Bansang	Hospital/clinic, British doctors, weekly MCH clinic	Same as 3/82	Same as 4/83
Medina Umfally	None, to Bansang (37 km) or Brikamaba (3 km), open 2 days/month	Addition of PHC (12/82)	Same as 4/83
Nibras	None, to Bansang (12 km)	Same as 3/82	Same as 4/83
Ndikiri Kunda	None, to Bansang (9 km)	Same as 3/82	Same as 4/83
Kunting*	Part-time clinic, open 2 times/month	Same as 3/82	Addition of PHC (12/83)

*Village has no red flag volunteer

with no fixed health facility. The Primary Health Care system was implemented first in the Lower River Division (in February 1982), then in McCarthy Island and North Bank Divisions (December 1982, and December 1983)

A summary of health facilities by division follows. In Western Division, one village had a full-time clinic, one had a part-time clinic and a full-time dresser-dispenser, and two had part-time clinics. Only Kachuma had no clinic, but used a full-time clinic five kilometers away. North Bank Division had one village with a full-time center and another with a part-time clinic and full-time community health nurse. These facilities served the other three villages in the sample. Mothers living in Western and North Bank divisions had some access by bus or communal taxi and ferry (for North Bank mothers) to the Royal Victoria Hospital in the capital city, Banjul. However, such a trip could take all day, especially for mothers from the North Bank. For mothers in the North Bank villages, the nearest full-time health center was in Kerewan, about 20-25 km. from the sample villages. Lower River Division mothers had the lowest access to health care of the mothers in our sample. Only one village in Lower River Division had any health facility, a part-time clinic. Mothers in the other four villages had to travel to part-time clinics elsewhere. The nearest full-time health center was in Mansakonko, approximately 40 km. away. Mothers in McCarthy Island Division had relatively high access to advanced medical care (the Chinese hospital and British doctors). However, many had to go quite long distances on foot or by taxi to get this service.

(3) Access to the ingredients to make water-sugar-salt solution

In order to properly mix the water-sugar-salt solution (WSS), mothers needed to have available salt, sugar, a Julpearl bottle, and a bottle cap. Over the course of the campaign, we asked mothers about their access to these items five times.

Figure II-5 and Table II-4 show their access to each of the four ingredients over time.

Availability of salt, a common cooking ingredient, was high across all five waves; 96 to 99 percent of the mothers reported that they had or could get salt. Approximately 75 percent of the mothers reported access to sugar in the first year of the campaign. Availability of sugar rose in 1983 and leveled off at 85 percent of the mothers reporting access.

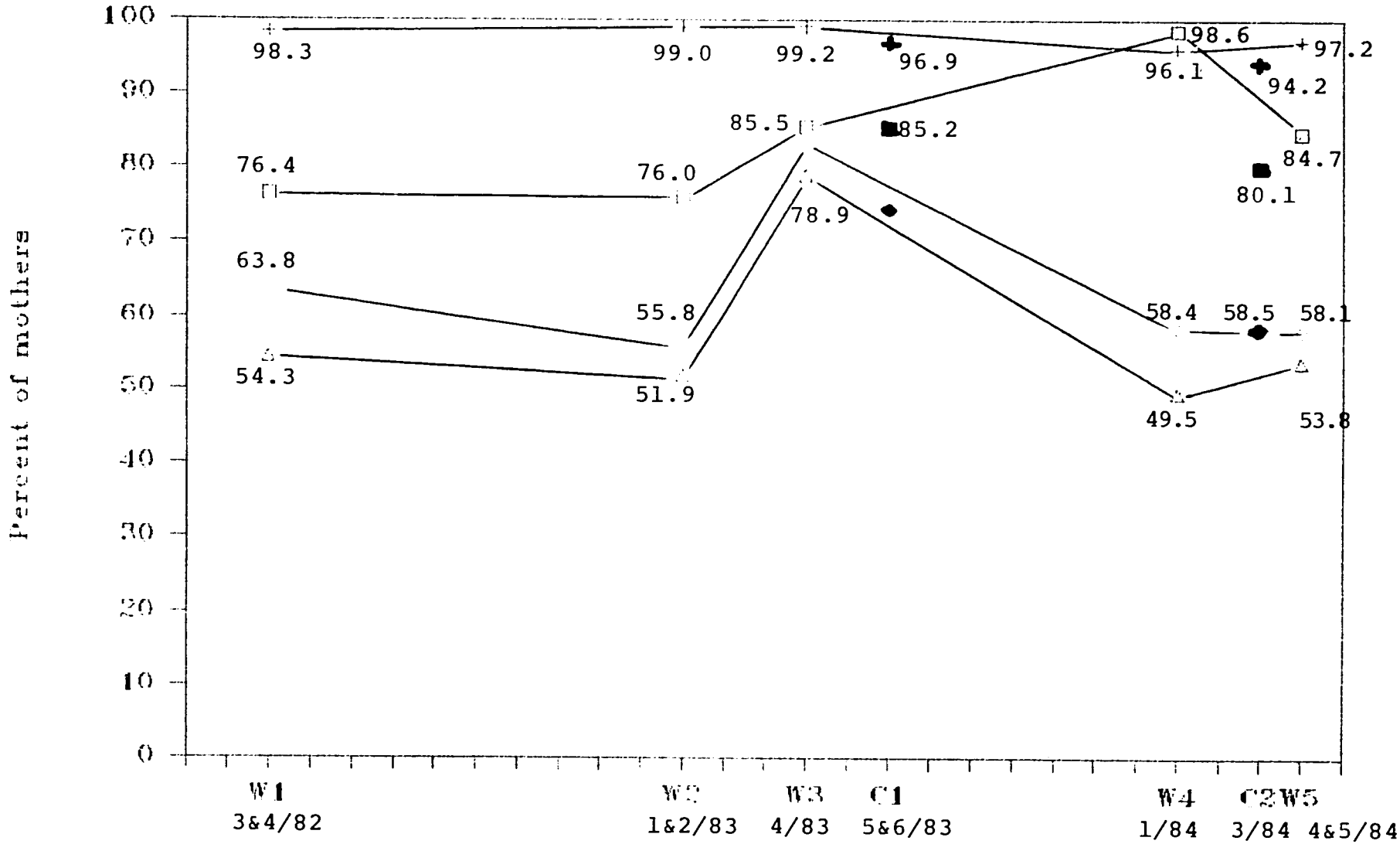
Some care must be taken in interpreting the rsults for access to a bottle and a bottle cap. Examination of these results showed unexplainable variations over time by fieldworker suggesting some unreliability in the results. In addition, the questions asked about bottles and caps were more strict than those about salt and sugar. Mothers were asked if they had salt or sugar or could get it, but were required to actually show the fieldworkers a bottle and bottle cap. If the interview took place outside the compound, the mother would not be able to produce her bottle. Also, it is probable that mothers could go to another compound to borrow a bottle or cap if they needed it to mix WSS. It is unlikely that they would go to another compound to get a bottle during the interview.

Examination of the responses to these questions at the community level indicated that there was high community availability of bottles and bottle caps over time. If a mother had no bottle or cap of her own, she could easily borrow one from another mother in her community. Thus mothers have consistently high access to the ingredients and tools needed to mix WSS within their communities, even though an individual mother will often not have everything she needs in her own home.

(4) Literacy and pictorial ability

Mothers who reported being able to read were given a simple literacy test in which the most difficult task was to correctly read one sentence in a language of their choice. If the mother

Figure II-5 Mothers' access to sugar, salt, a Julpearl bottle and a bottlecap, over time



□ Mother has sugar or could get it

+ Mother has salt or could get it

Mother shows Julpearl bottle

△ Mother shows bottlecap

GDIAR:GETSUG,GETSLT,GETBOT,BOTCAP

C1 = Control group 1, C2 = Control group 2

Table II-4 Mothers' access to sugar, salt, a Julpearl bottle and a bottle cap, over time

Item	Wave 1 3&4/82 (n=758)	Wave 2 2/83 (n=801)	Wave 3 4/83 (n=785)	Control 1 5&6/83 (n=223)	Wave 4 1/84 (n=802)	Control 2 3/84 (n=207)	Wave 5 4&5/84 (n=826)
Mother has sugar or could get it	76.4%	76.0	85.5	85.2	98.6	80.1	84.7
Mother has salt or could get it	98.3	99.0	99.2	96.9	96.1	94.2	97.2
Mother shows Julpearl bottle	63.8	55.8	83.4	74.4	58.4	58.5	58.1
Mother shows bottle cap	54.3	51.9	78.9	(not asked)	49.5	(not asked)	53.8

GDIAR:GETSUGGC to GETSUGG5, GETSLTGC to GETSLTG5, GETBOTGC to GETBOTG5, BOTCAPGC to BOTCAPG5

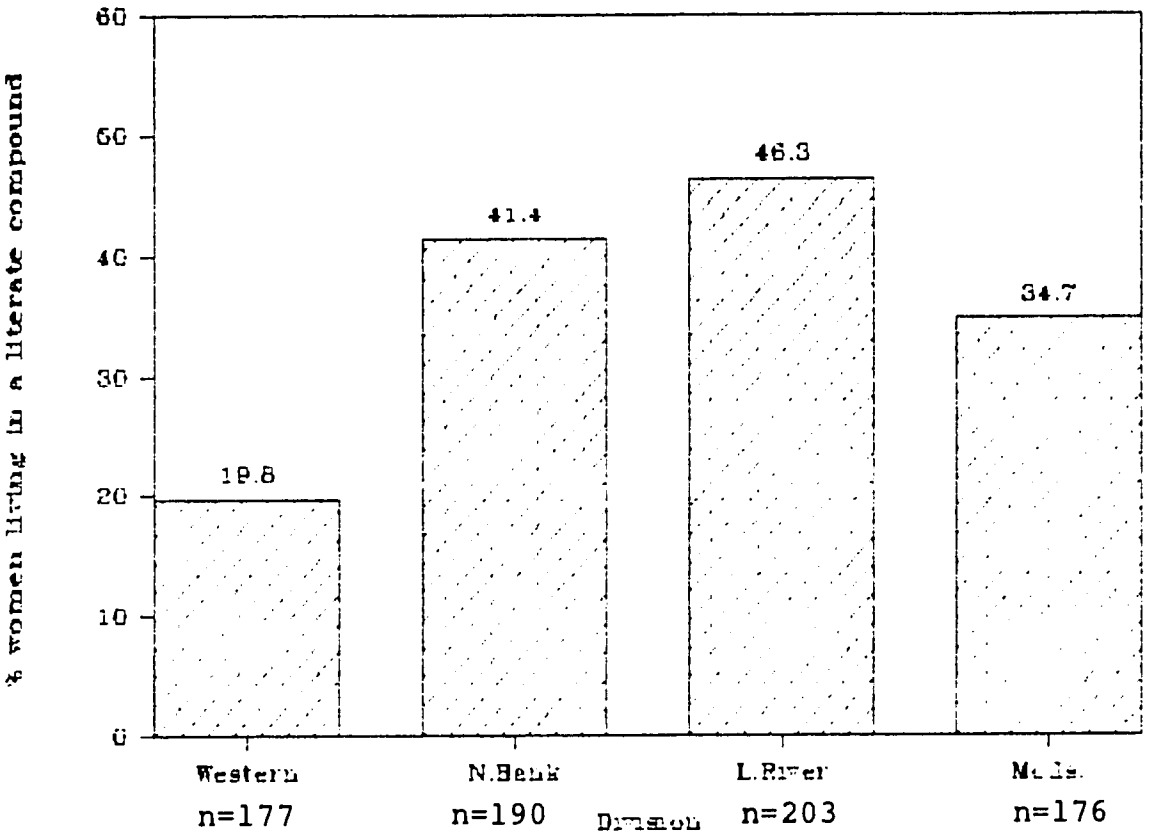
said she couldn't read, another member of the compound identified as literate was tested. Only 2.9 percent of the women in the sample could read the sentence. When other members of the compound were tested, 33.9 percent of those available for testing could read the sentence. Overall 35.9 percent of the mothers lived in a compound with at least one literate member.

Literacy levels were found to differ significantly by division ($p < .001$). Figure II-6 illustrates that sample compounds in Western Division had particularly low literacy rates (only 20 percent of the mothers lived in a literate compound). Much of this low rate was due to low literacy in two villages, the Manjago village of Kachuma and the village of Nyofelleh. Literacy was also lower in McCarthy Island Division.

Pictorial ability was measured in a survey administered in August 1983. Mothers were shown line drawings of several items (e.g., an eye, and a fire) and of a scene showing several huts, a well, and two women going to the well. They were then asked to identify the objects pictured, to identify some of the activities in the scene, and to make interpretations about what was happening in the scene. A more detailed description of the test is in S. Spain, 1983. The frequency distribution of mothers' pictorial ability is in Figure II-7. Only four percent of the mothers could not identify any of the six items or actions in the pictures. Over half the mothers correctly answered four or more questions about the picture.

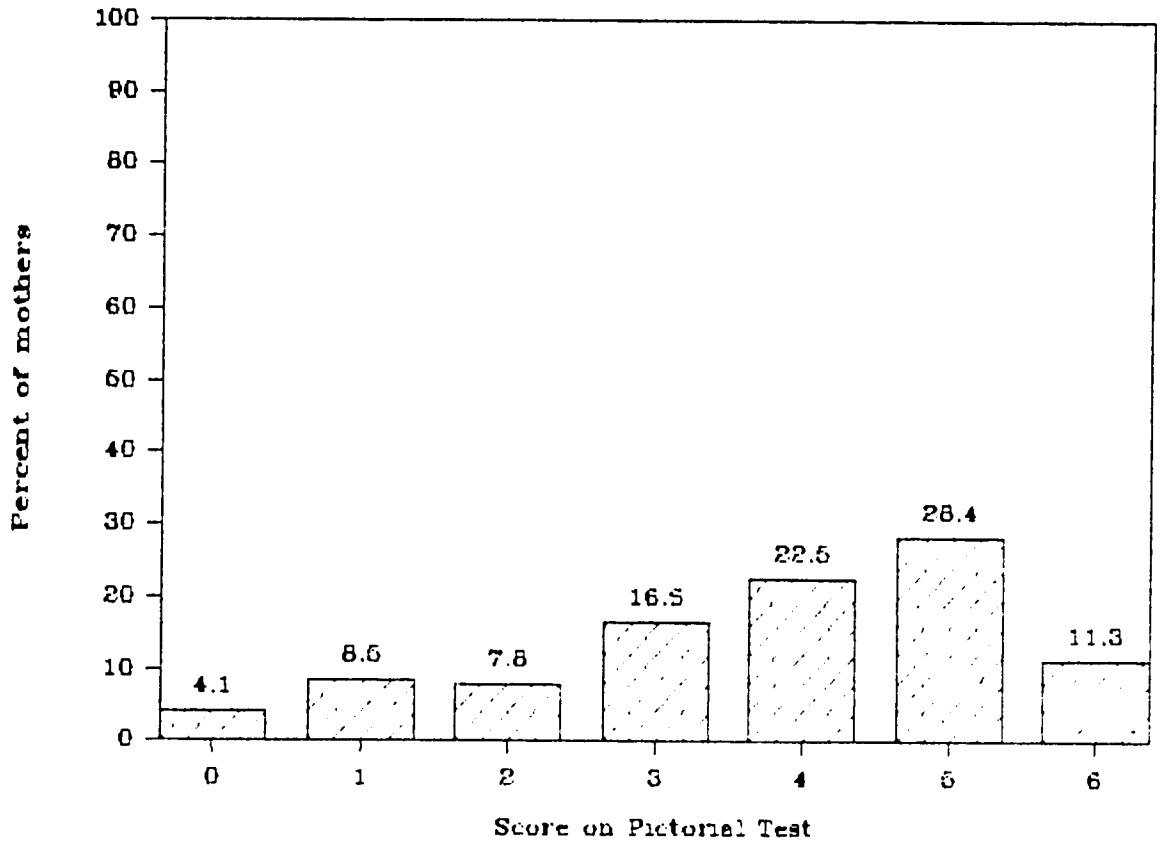
In summary, few women could read a simple sentence, but a majority could understand basic line drawings. Approximately one-third of the women lived in a compound where someone could read Mandinka, Wolof, Arabic, or English.

Figure II-6 Compound literacy by division: Percent of mothers who live in a compound with at least one literate member



Gen.Comm:TURNSGF,TURNITGF

Figure II-7 Frequency distribution of mothers' pictorial ability scores



n=862
S.Spain:PEYE,PFIRE,PACTION,PSIZE
PCLOSER,PROAD

B. Factors Affecting Comprehension of the Mixing Flyer

Before the campaign messages were designed, visits to Gambian villages had shown a low level of print and visual materials (photographs, posters, and drawings) in compounds or public places. AED reported having little information about the level of visual literacy among the Gambian women (AED, 1982). Because of the possibility that visual literacy might be low, they used a limited amount of print material and they designed the two pictorial flyers in such a way that the radio could help teach the mothers to understand the pictures.

A special study was done in August 1983 to examine factors which might influence mothers' comprehension of the mixing flyer, and to look particularly at previous exposure to the flyer and training in "reading" the flyer (Spain, 1983). The results have implications for future efforts using visual materials. They indicate that in a community with low pictorial ability, pictorial materials can be used successfully if training is given in interpretation of the pictures.

(1) Description of the mixing flyer and radio broadcasts

The mixing flyer was a 3-color 8" x 11" page with a picture on the front of a mixing bowl with 3 Julpearl bottles of water, 8 bottle caps of sugar, and one bottle cap of salt being poured into it. The back showed a hand leveling a bottle cap of sugar or salt with a chew stick. The pictures showing the amount of water, sugar, and salt were each drawn in a box of a different color, to facilitate teaching the mothers to understand the flyer. Radio broadcasts during the Happy Baby Lottery (August to October 1982) taught mothers to interpret the flyer (see Appendix A, Radio Spot #29).

(2) Study methodology

This study used a specially designed survey instrument administered as part of the regular interview process in August 1983. The instrument included questions measuring detailed comprehension of the flyer, questions measuring pictorial ability, and questions about pictorial experience, prior exposure to the flyer, and whether the flyer had been explained to the mother. Because of unexplainable interviewer differences the study only used the data for North Bank and Lower River Divisions.

Flyer comprehension was measured by showing the mothers the flyer and asking them to describe what they saw in each section of the flyer and what it meant. The final measure used for comprehension of the flyer was a summative scale consisting of 17 items coded 0 for incorrect and 1 for correct. The frequency distribution of the scale is presented in Figure II-8.

As can be seen in the figure, in August 1983, understanding of the flyer was high: approximately three-quarters of the mothers in the two divisions in the sample received a score of at least ten points. A mother who recognized all the items on the flyer (e.g., bottle, cap, sugar) but mentioned none of the descriptive details or actions (e.g., three bottles, pour) would have received a score of ten. Approximately 20 percent of the sample mothers could correctly identify all the parts of the flyer. The mean score on flyer comprehension was 12.05, with a standard deviation of 4.08 points.

Pictorial ability was measured by showing the mothers several line drawings, one of a mosquito, one of an eye, another of a fire, and a fourth of a village scene of women going to the well. Mothers were asked to identify the objects in the pictures and scene, and were also asked questions measuring their ability to make inferences about where the women were going and to distinguish depth cues.

The pictorial comprehension measure used in the analyses

Figure II- 8 Distribution of mothers' flyer comprehension scores

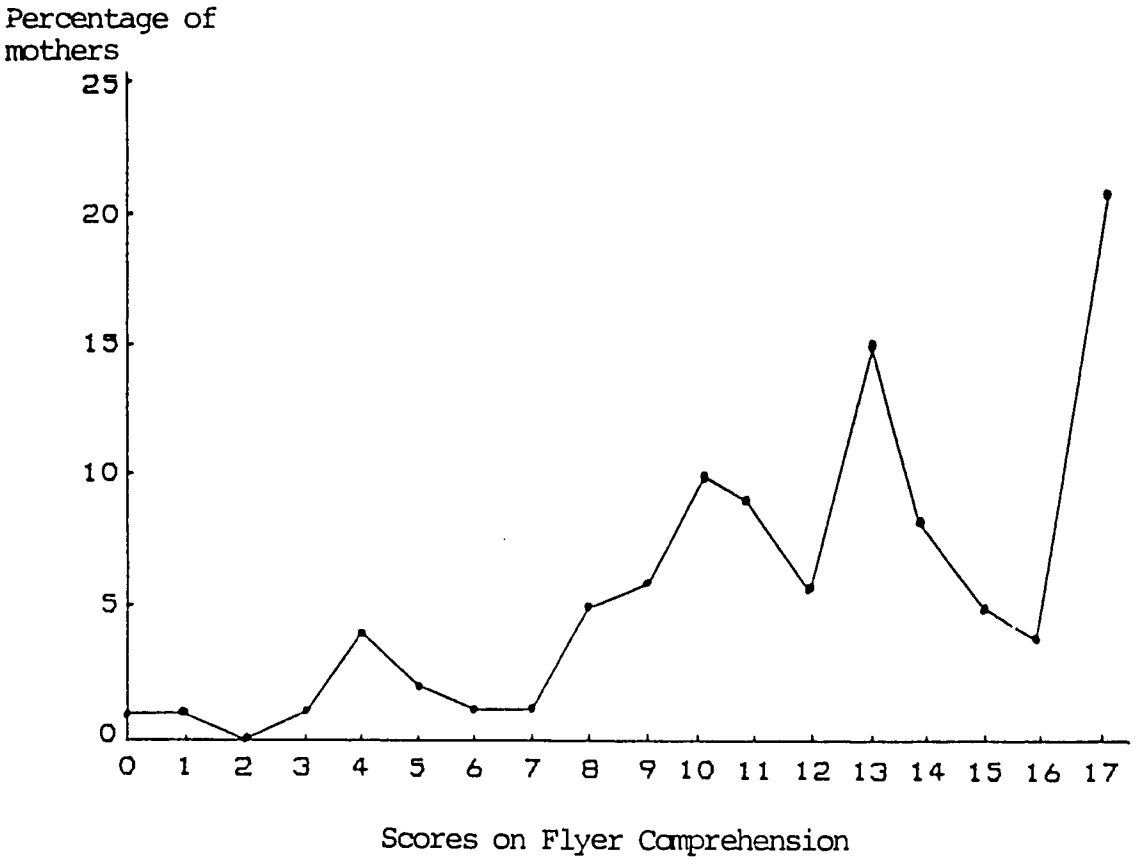
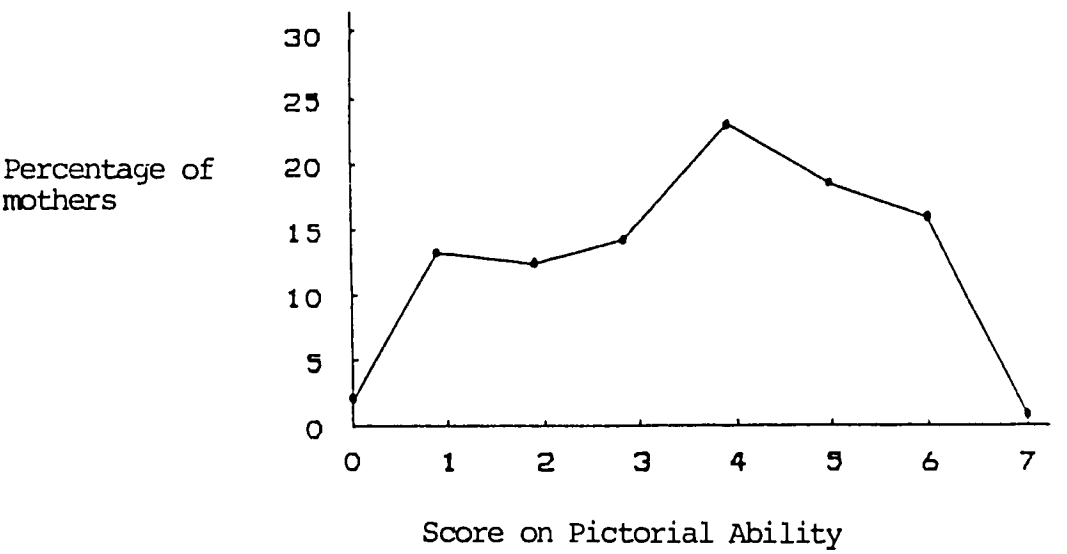


Figure II- 9 Distribution of pictorial ability scores



was a summative scale of seven items. The frequency distribution of this scale can be seen in Figure II-9. Twenty-nine percent of the mothers had low pictorial ability scores (0 to 2), 37 percent had scores of 3 to 4, and 34 percent had high scores (5 to 7).

Pictorial experience was measured by asking mothers about their exposure to pictures in books, family photographs, and other pictures (e.g., calendars, religious illustrations). The responses to these questions were used to create a four-point scale. Over half the respondents, 54.4 percent, reported being exposed to all three types of pictures, 18.8 percent to two types, 12.5 percent to one, and 14.4 percent to none.

Prior exposure to the flyer was measured with three questions which asked if respondents had seen the flyer, if they owned a copy, and if they could show that copy. These were combined into a single variable, prior exposure to the flyer, with four values. Only 2.9 percent of the sample had never seen the flyer before (other than in previous interviews), 29 percent had seen it but had never owned a copy, 9.9 percent reported that they had owned a copy but could not show it, and 58.2 percent could show their copy.

Mothers' training in reading the flyer was measured by asking them if they had received explanations from the radio, healthworkers, or others. The majority of the sample, 53.1 percent, had heard both radio and personal explanations, while 27.6 percent had heard only radio explanations, 3.5 percent had heard personal explanations only, and 15.8 percent had heard no explanation.

(3) Results

The relationships examined in this study were those between:

- pictorial experience and pictorial ability;
- pictorial experience and flyer comprehension;

- prior flyer exposure and flyer comprehension;
- training and flyer comprehension;
- the relationship of the interaction between pictorial ability and flyer exposure with flyer comprehension; and
- the interaction between pictorial ability and training with flyer comprehension.

The results showed a very strong relationship between pictorial experience (having seen photographs, drawings and other pictures) and pictorial ability (see Table II-5). Fifty-five percent of the mothers who had seen all three types of pictures had high scores on the pictorial comprehension test as compared to 15 percent of mothers with exposure to two kinds of pictures, and under five percent of mothers who had seen only one kind of picture or no pictures. The relationship had a gamma of 0.78 and was significant at $p < .001$.

Table II-5 Comparison of mother's pictorial ability by prior experience with pictures (percent of mothers)

Pictorial Ability	EXPOSURE TO PICTURES (Types of pictures mother has seen*)			
	No pictures	One type of picture	Two types of pictures	Three types of pictures
Low: 0-2	64%	75	40	6
Moderate: 3-4	33	23	45	39
High: 5-7	3	2	15	55
n =	61	52	80	231

* The different types of pictures include family photographs, pictures in books, and other pictures (e.g., calendars, illustrations from the Koran).

The relationship between pictorial ability and comprehension of the flyer was also positive and significant ($p < .001$) but was

not as strong (gamma was 0.2). We can see in Table II-6 and Figure II-10 that, as the respondent went up on pictorial ability, she also went up on flyer comprehension.

Table II-6 Comparison of mothers' comprehension of the flyer pictorial ability

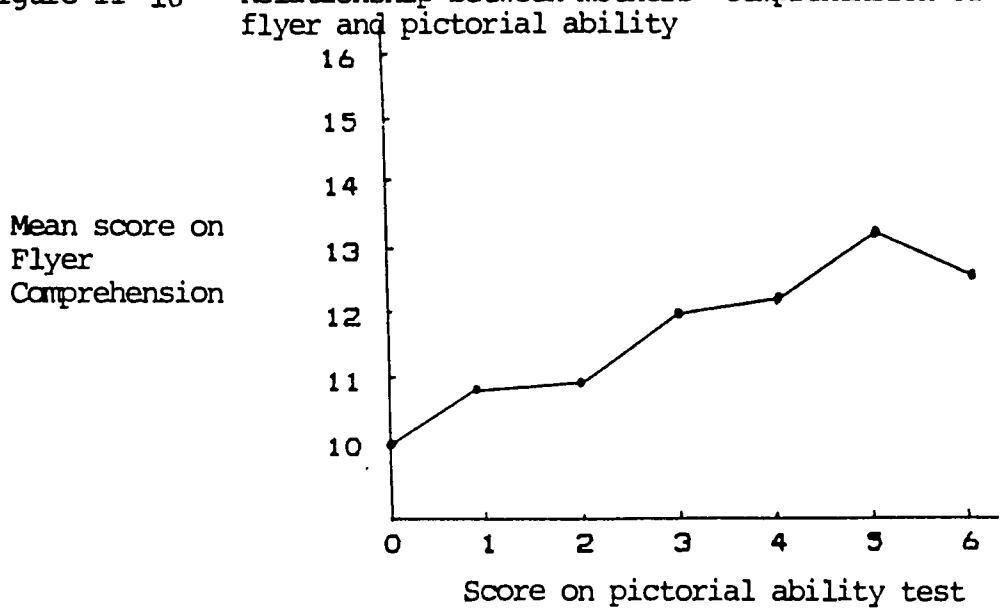
Flyer Comprehension	PICTORIAL ABILITY (percent of mothers) Low (0-2)	Moderate (3-4)	High (5-7)
Poor: 0-9	34%	18	17
Fair: 10-14	39	58	46
Good: 15-17	27	24	37
n =	124	166	154

The relationship between previous exposure to the flyer and comprehension was also positive (gamma was 0.326) and significant at $p < .001$ (see Table II-7). Mothers who could show the fieldworker their flyer were more likely to have high scores on flyer comprehension than mothers who had seen or had a copy but didn't have a copy at the time of the interview.

Table II-7 Relationship between mothers' previous exposure to the flyer and comprehension of the flyer

Flyer comprehension score	EXPOSURE TO FLYER (percent of mothers) Flyer seen only	Flyer owned, but not shown	Flyer owned and shown
Poor: 0-9	27	4	14
Fair: 10-14	55	30	50
Good: 15-17	18	30	36
n =	129	44	259

Figure II-10 Relationship between mothers' comprehension of the flyer and pictorial ability



(for values with five or more cases)

Analysis of the relationship between training and flyer comprehension indicated that the two were clearly and positively related (gamma was 0.34, $p < .001$). As can be seen in Table II-8, mothers who had no training scored the lowest in flyer comprehension, those with only radio training scored higher, and those with both radio and personal training scored highest in flyer comprehension.

The study went on to examine the interactive effect of pictorial ability and previous flyer exposure on comprehension and that of pictorial ability and training on flyer comprehension. The question asked was: does exposure or training affect people with different levels of pictorial ability to different degrees?

Previous flyer exposure seemed to make the largest difference in flyer comprehension for women of low pictorial ability (see Figure II-11). Mothers with low pictorial ability had a mean comprehension score 3.92 points higher if they owned a flyer than if they didn't, whereas mothers of moderate pictorial ability had mean scores 1.17 points higher and mothers of high pictorial ability had means score 1.92 points higher. This association was significant at $p < .05$.

Table II-8 Relationship between training in the use of the flyer and flyer comprehension

Flyer comprehension	TRAINING IN USE OF FLYER (% of mothers) None	Radio only	Radio and person
Poor: 0-9	38	26	12
Fair: 10-14	47	45	52
Good: 15-17	15	29	35
	n = 68	119	229

The interactive effect of training and pictorial ability was similar. Training had the largest effect for mothers with low

Figure II- 11 Relationship between flyer comprehension and flyer exposure for different levels of ability

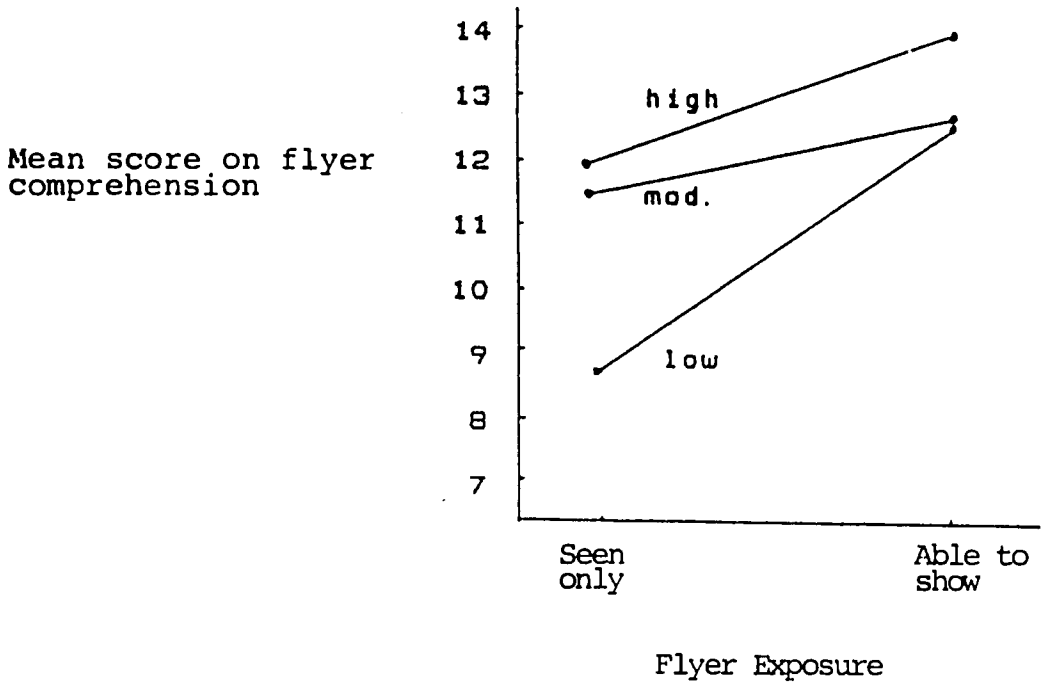
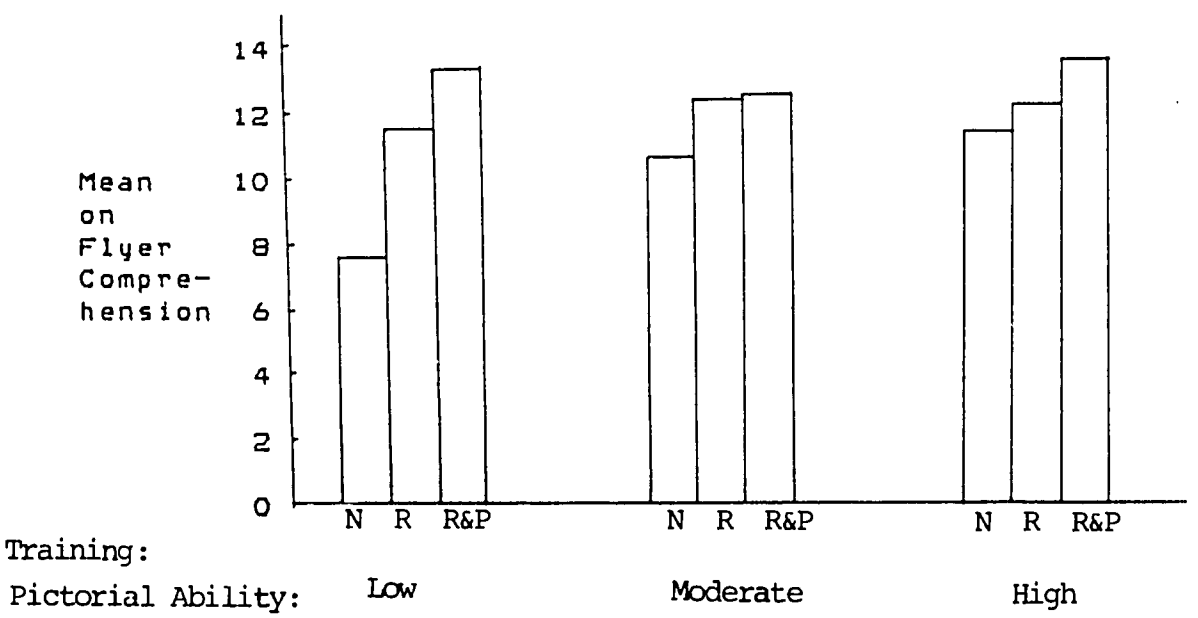


Figure II- 12 Relationship between flyer comprehension and training for difference levels of pictorial ability



N=None
R=Radio only
R&P= Radio and person

pictorial ability, as can be seen in Figure II-12. Radio training alone clearly enhanced the mean flyer comprehension score of mothers with low pictorial ability. Radio and personal training together increased the mean score for this group even further. The effect was far less pronounced among the moderate and high pictorial ability groups. For mothers with no training, the difference in mean scores between the high and low pictorial score groups was 3.76 points, but for mothers with radio training it was only 0.81 points, and for those with both, 0.61 points. A multiple regression analysis indicated that the difference in the interaction effect of pictorial ability with radio training and pictorial ability with no training was statistically significant at $p < .05$. The interaction between both personal and radio training with pictorial ability did not add significantly over and above the interactive effect of radio alone with ability.

(4) Summary and discussion

The data presented in this analysis can be summarized as follows. In August 1983, over one year after the start of the campaign, among the sample respondents in North Bank and Lower River Divisions:

1. Mothers who had seen pictures or photographs, or who had pictures in their compound were more likely to have higher pictorial ability than mothers with less pictorial experience.

2. Mothers with greater pictorial ability were more likely to understand the mixing flyer than mothers with less ability.

3. Mothers who owned a flyer were more likely to understand it than those who had only seen one or no longer owned one.

4. Mothers who had received training in the use of the flyer were more likely to understand it than mothers with no training.

5. Mothers of low pictorial ability had higher flyer comprehension scores if they either owned a flyer

> or if they had received training in its interpretation. This effect was less pronounced for women of moderate or high pictorial ability.

The findings here support the view of AED that the lack of visual materials in the villages might be an indicator of low visual literacy among mothers in The Gambia. They also show that the mothers could be taught to "read" the mixing flyer and that they would remember what they had learned. Providing the mothers with a flyer they could keep for themselves and giving them training in interpreting the flyers increased their ability to understand the flyer. Radio alone was found to be effective in training mothers to understand the flyer.

However, of greater importance were the findings that prior exposure to the flyer (ownership of a flyer) and radio training could close the gap in flyer comprehension between mothers of low and high pictorial ability. This finding has possible implications for other development programs using communications. The study suggests that determining the general level of pictorial ability among the target population would be a useful planning activity for projects planning to use pictorial materials. This could be done through a pictorial ability test, as was done in this study, or through a survey of the level of pictorial exposure.

This study also indicates that, if a population has a relatively high level of pictorial ability, continued exposure to the pictorial materials of a campaign and training in their interpretation are of some use, but are not absolutely necessary for the comprehension of the pictures. However, if the population has generally low levels of pictorial ability, extended exposure and training may be required for adequate understanding of any pictorial materials used.

In terms of this project, the results show that AED's use of pictorial materials with radio and health worker explanation was a successful teaching tool for mothers with low literacy levels.

C. Exposure to the Campaign

After examining whether mothers had access to the campaign, the next step in the process model was to study the mothers' actual exposure to the messages of the campaign. The women in the sample were asked at different times whether they had heard messages about diarrhea or feeding on the radio. They were also asked questions measuring their awareness of the Happy Baby Lottery and their exposure to the two flyers. In addition, several questions were asked to determine mothers' exposure to interpersonal sources of campaign messages.

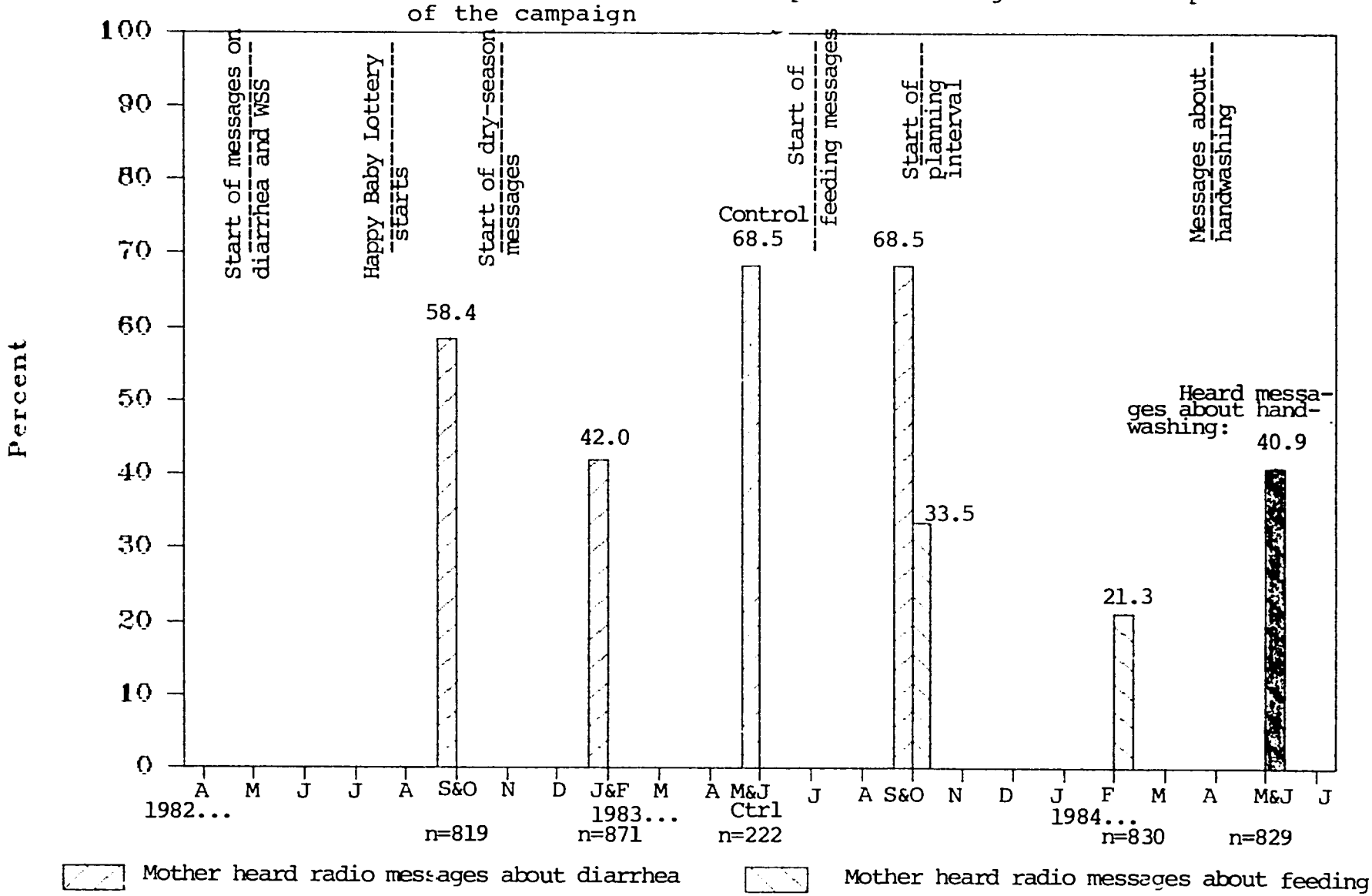
Overall, exposure to radio messages, print materials, and the interpersonal sources of information was quite high. The following sections describe exposure results in detail.

(1) Radio messages

Radio broadcasts about diarrhea, dryness and WSS started in May, 1982. Appendix A provides summaries of the radio spots. In September/October 1982, January/February 1983, and September 1983, mothers were asked whether they had heard radio messages about caring for a child with diarrhea in the recent months. After the message phase on feeding, they were also asked about hearing messages about feeding and, after the handwashing messages of the minicampaign, they were asked if they had heard the handwashing campaign messages. Figure II-13 shows the responses to these questions.

During the Happy Baby Lottery (September and October 1982) 58.4 percent of the mothers reported having heard recent messages about diarrhea. This is a high rate of exposure, considering that the lottery occurred during the busiest time of the year when women are in their fields for most of the daylight hours. Exposure to recent messages dropped by January and February 1983, a time when mothers have less work to do and more time to listen to the radio. This pattern suggests that using the lottery to

Figure II-13 Percent of mothers who reported hearing the radio spots of the campaign



GRAD2,3,5,CONTROL:RADIO
GRAD 5,6: HRFD
GRAD7:HRWSH

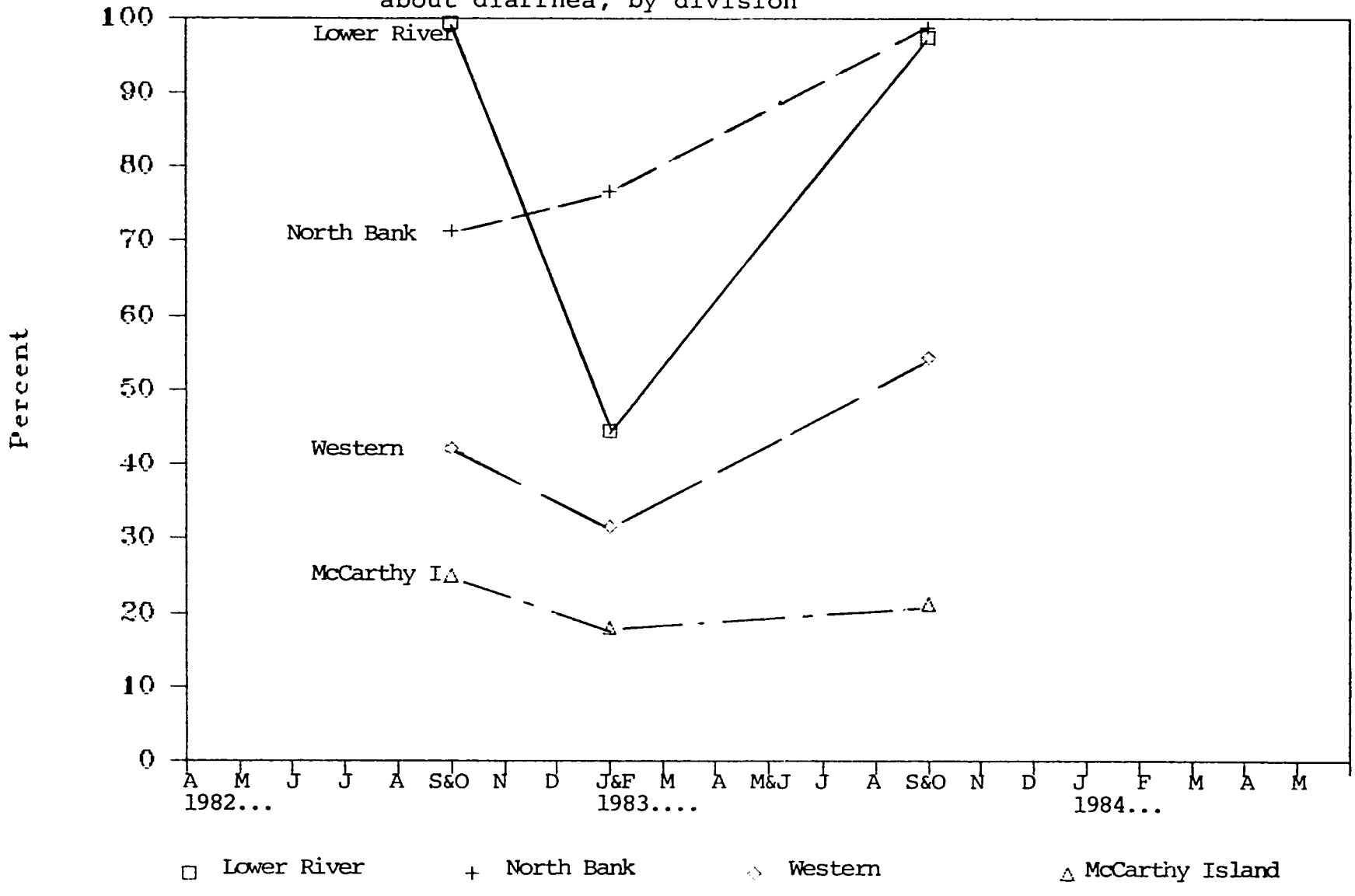
publicize the campaign was a successful strategy in gaining the attention of a majority of rural mothers. The lower initial levels of message awareness of the feeding messages (33.5 percent) and of the handwashing messages (40.9 percent) also indicate the importance of the lottery in focusing mothers' attention on the previous messages.

At the end of the message phase on feeding (September and October, 1983), mothers were again asked if they had heard messages about diarrhea and also asked about their awareness of the feeding messages. Sixty-nine percent of the mothers reported having heard messages about diarrhea, the highest level of awareness reached in the campaign. The similar control group percentage suggests that this high percentage is not a function of mothers being interviewed repeatedly. One might expect this percentage to be lower because the interview was done in the rainy season when mothers are busy. One possible explanation for the high percentages is the drought starting in 1983: because of the lack of rain, mothers had less work in the fields and may have spent more time listening to the radio. Exposure may also be related to mothers' need for information. Mothers' awareness of messages about diarrhea was high in interviews during the rainy season, when children have chronic diarrhea. The mothers may have paid more attention to radio messages about diarrhea during the rainy season than during the dry season, when incidence of diarrhea is lower.

The measure concerning what proportion of mothers had heard messages about diarrhea shows a curious drop in September/October 1982, between two high measures. We have analyzed this variable by division and found that most of the difference is accounted for by one division (Lower River). The wild fluctuation in this one division is almost certainly interviewer error. The data are presented in Figure II-14.

Mothers were much less aware of having heard messages about feeding than about diarrhea in general: in September/October 1983, 68.5 percent had heard messages about diarrhea whereas only 33.5 percent had heard messages about feeding during diarrhea.

Figure II-14 Percent of mothers who reported hearing radio spots about diarrhea, by division



GRAD2,3,5:RADIO

It may be that mothers recognized some of the earlier diarrhea messages being broadcast along with the feeding messages or that they only listened to the radio enough to remember the programs as being about diarrhea. During the interval in which planning for the mini-campaign took precedence, the proportion of mothers hearing messages about feeding dropped to 21 percent.

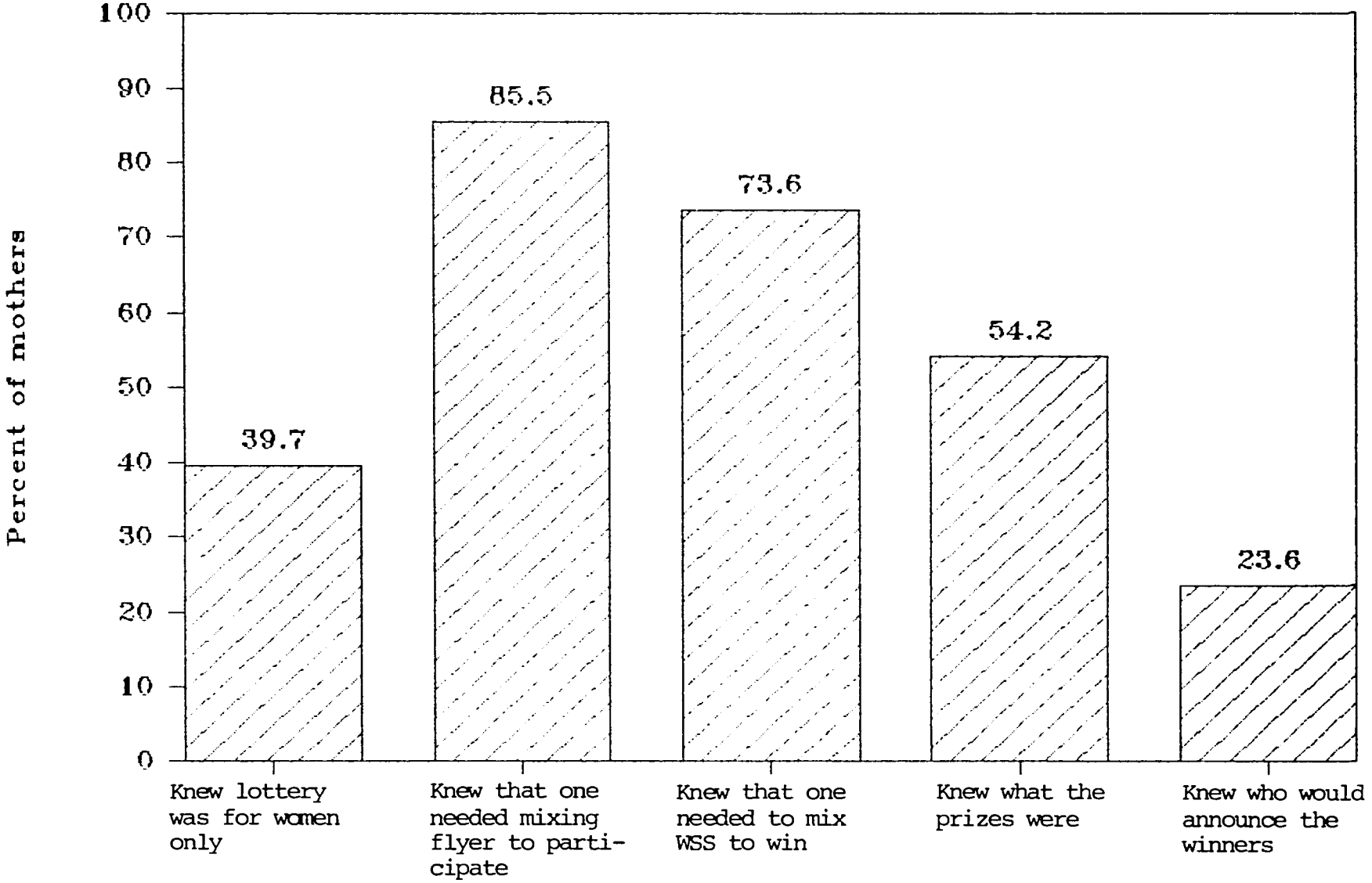
Overall, mothers had a high level of awareness of radio messages about caring for a child with diarrhea during the lottery and a year later. Approximately 60 percent of the mothers remembered hearing messages. A lower proportion recalled hearing messages about feeding and handwashing. The results suggest that the lottery played an important part in gaining women's attention.

(2) Happy Baby Lottery

The mothers in the sample were asked a series of questions about the Happy Baby Lottery in January and February 1983. At this time, 48.9 percent of the mothers reported having heard of the lottery. Twenty-six percent of the mothers in Western Division had heard of it, 41 percent of North Bank mothers, 100 percent of Lower River Division mothers, and 23 percent in McCarthy Island Division. Once again, the high percentage in Lower River Division is surprising. However, when we checked the mothers' recall of aspects of the lottery, 92.9 percent of the mothers in Lower River division could tell us at least two correct things about the lottery. We are not sure why mothers in this division had such high levels of awareness. It may have been that the health workers, the new primary health care workers, or other important villagers were particularly enthusiastic about the lottery.

Mothers who reported awareness of the lottery were asked five questions about the lottery. Their responses to these questions are in Figure II-15. Most of the mothers remembered that one had needed a flyer to participate (85.5%) and that

Figure II- 15 Knowledge of the details of the Happy Baby Lottery among mothers who had heard of the lottery



n=428
GRAD3:FOR to LADY

participants had been required to mix WSS to win a prize (73.6%).

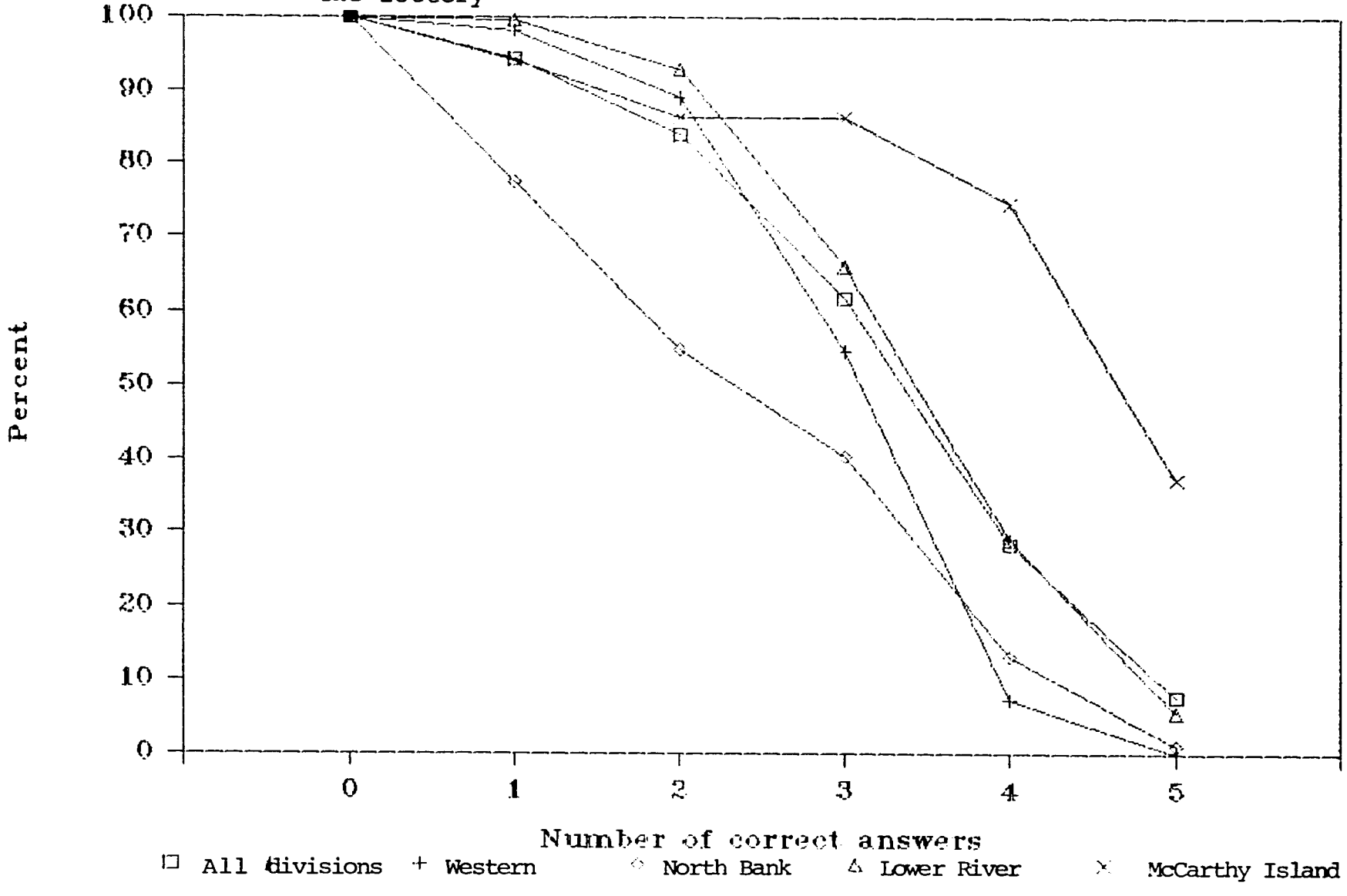
The number of correct responses to each question were summed. See Figure II-16 and Table II-9 for the results for all the mothers and for mothers by division. The lottery seems to have stayed in the minds of rural Gambian mothers. Three months after the lottery, a large proportion of the mothers who had heard about it at all could remember details about it. Among mothers who had heard of the lottery, only six percent had no correct memories of the lottery. Overall, 94 percent of the mothers knew at least one detail, 84 percent could recall two, and 62 percent could recall three details about the lottery. Only 29 percent of the mothers could answer four questions about the lottery and eight percent could answer all the questions. Mothers in North Bank division showed a lower level of knowledge about the lottery than mothers from the other divisions. Mothers in McCarthy Island Division showed a very high level of recall. Seventy-five percent of those who had heard of the lottery correctly recalled four or five aspects of the lottery. Although a small proportion of the mothers in McCarthy Island had heard of the lottery (23 percent), if they had heard about it, they had learned about it thoroughly.

In summary, several months after the lottery, almost half the mothers reported having heard about it. Most of these mothers remembered details about the lottery.

(3) Exposure to the flyers

Two flyers were distributed to rural mothers in The Gambia: one detailing the mixing instructions and the other showing good foods for sick children. The mixing flyer was an important part of the Happy Baby Lottery. A mother needed a flyer as a ticket for the lottery. Mothers were asked about the mixing flyer in January/February 1983 and, six months later, in August 1983. Figure II-17 indicates that approximately three-quarters of the mothers had seen a flyer and could actually show their

Figure II- 16 Mothers' correct recall of details about the Happy Baby Lottery, for whole sample and by division, among mothers who had heard of the lottery



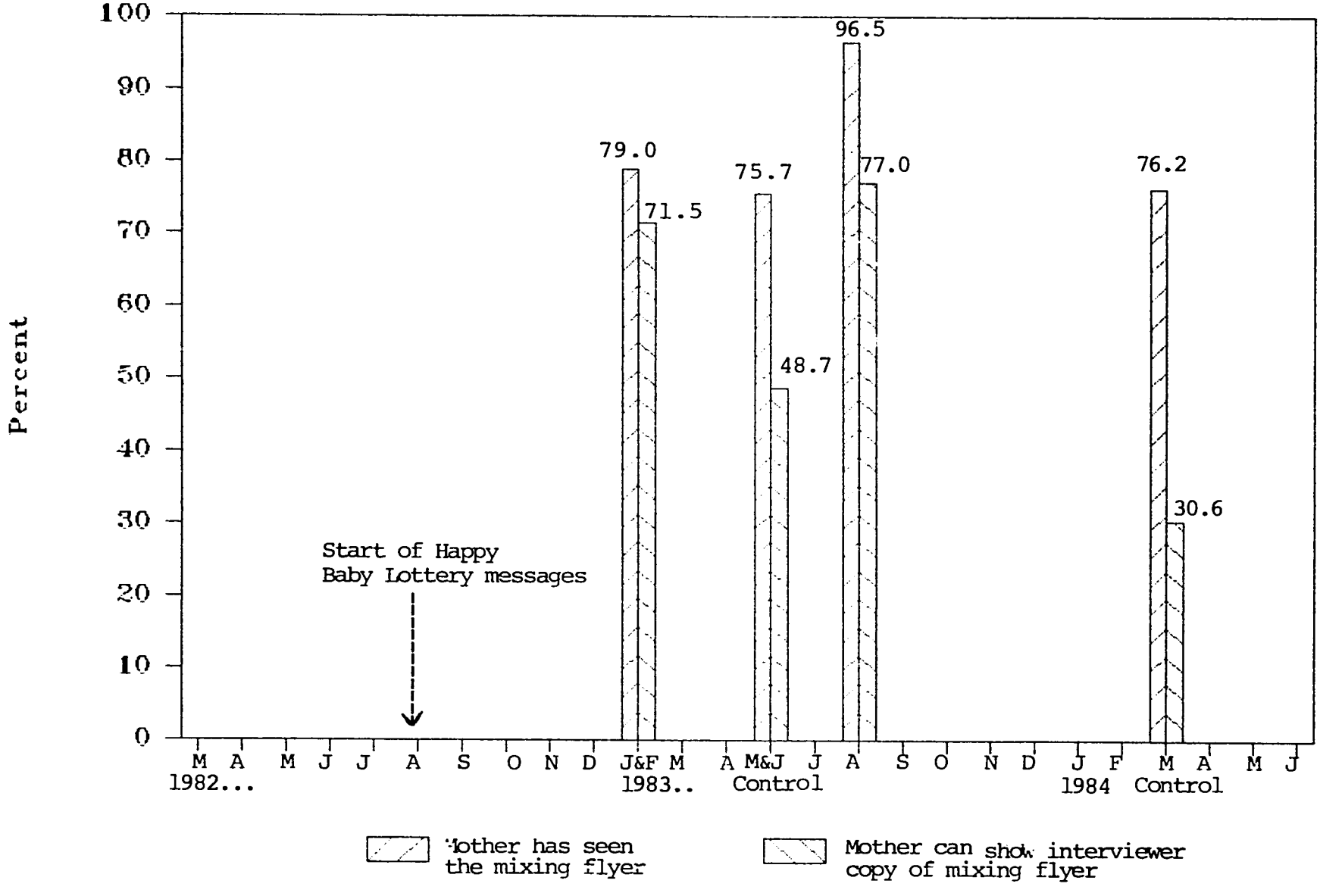
GRAD3:FOR to LADY

Table II-9 Mothers' correct recall of details about the Happy Baby Lottery*

Number of details about lottery recalled	All divisions	Western	North Bank	Lower River	McCarthy Is.
0	5.6%	1.8	22.6	0.4	5.9
1	10.3	9.1	22.6	6.7	7.8
2	22.2	34.5	14.3	26.9	0
3	33.4	47.3	27.4	37.0	11.8
4	20.8	7.3	11.9	23.5	37.3
5	7.7	0	1.2	5.5	37.3
n =	428	55	84	238	51

*Includes only mothers who had heard of the Happy Baby Lottery
GRAD3:FOR to LADY

Figure II- 17 Mothers' exposure to the mixing flyer



GRAD

copy to the fieldworker shortly after the lottery. More than a year later, an equivalent proportion of control group mothers reported having seen the flyers (76%), and a surprisingly high 31 percent could still show their copy.

The last section showed that exposure to the lottery was high. Here we see that exposure to the mixing flyer used in the lottery was even higher. After the lottery, 79 percent of the mothers reported having seen the flyer whereas only 49 percent said they had heard of the lottery. This may result from the fact that flyers were distributed to community officials with instructions to distribute them to the women of the village. This could easily result in a woman who had never heard of the lottery coming into possession of the flyer. This points out the importance of having more than one channel of information. In McCarthy Island division, where radio listening and awareness of the lottery were lower, a large number of mothers were still exposed to the campaign through the flyers and the health workers who distributed them. Mothers in Lower River division had high exposure to both the lottery and the flyer. For some reason, mothers in Western Division, who had relatively high access to health care and who lived closest to the project headquarters, reported low exposure to both the lottery and the flyer.
indicate that awareness of having seen the flyer probably remained constant, but that ownership was decreasing as time passed. The mothers in the main sample may have reported higher levels of awareness in August because they had been questioned about the flyer before. They also may have made more of an effort to keep their flyer for the same reason.

Exposure to the feeding flyer was not as high as that to the mixing flyer. At the end of the feeding message phase (in September and October 1983), only 26.5 percent of the mothers reported having seen the feeding flyer, 23.9 percent had had one, and 21.9 percent could show their flyer to the fieldworker. Distribution of this flyer seems to have been less widespread.

None of the mothers in McCarthy Island Division had a feeding flyer, and only two mothers in North Bank Division could

show one. Twenty-three percent of the mothers in Western Division, that closest to the capital, had a copy. Although supplies of flyers were sent to health personnel in all divisions, flyers seem to have been widely distributed only in Lower River Division, where 59 percent of the mothers had a copy. This suggests that the mechanism of the lottery provided motivation for health workers to distribute the mixing flyers and perhaps also to give the mothers information at the same time. This same mechanism was not present for the feeding flyer.

Of the mothers who had seen the feeding flyer, most knew what it taught. Ninety-four percent said it told mothers to give solids, and 47 percent also mentioned that the solids were to be given to a recovering child. Seventy-two percent could correctly say what the pictures of the foods on the back taught (that these foods give extra power). Radio broadcasts had explained the pictures and health workers had been trained to teach the mothers when they distributed the flyers.

(4) Awareness of the Red Flag volunteer

As described in Chapter I, a large number of local volunteers, "Red Flag Volunteers" were trained to help mothers correctly mix and administer WSS. In the radio spots, mothers were told to go to a Red Flag compound if they couldn't remember the formula or if they needed help. Eighty-three percent of the mothers lived in villages with a Red Flag volunteer. Mothers in the sample were asked if they knew of a compound in their village marked with a red flag and, if so, what the red flag meant. Radio messages about the role of the Red Flag volunteer were broadcast from July 1982 through March 1983, with a particular focus in July 1982.

In September and October 1982, 67 percent of the mothers were aware of a Red Flag volunteer in their village. Of these, 73 percent could correctly identify the Red Flag volunteer's function. By January/February 1983, awareness of the Red Flag

volunteer had increased to 77.8 percent of the mothers and knowledge about the Red Flag volunteer had also increased (to 83.5 percent of the mothers who knew of a volunteer).

(5) Exposure to health workers as sources of information

It was expected that mothers would hear about the campaign messages, not only from the radio, but from health workers and other women in their compound. Exposure to interpersonal information about the campaign was difficult to assess, because we had no clear idea of how often the health workers were passing on their knowledge or how much women were talking among themselves. Anecdotal information from Peace Corps volunteers suggested that health workers were generally telling mothers to use WSS (although some were more informative than others).

In May and June 1984, we asked mothers who had taken one or more of their children to the health center for the last diarrhea bout about the information they had received in these visits. In 69 percent of the cases, the mother reported that the health worker had given her advice on what to do the next time her child had diarrhea (give WSS, bring the child to the health center for rehydration, and proper feeding). In 43 percent of the visits, the health worker explained the cause of diarrhea to the mother (most reportedly saying diarrhea was caused by bad food). In 17 percent of the cases, the health worker was said to have given advice on prevention.

How many of the mothers had contact with a health worker? In September/October 1983, women in the sample who had a child five years or younger at the time of the interview were asked if they had visited the health clinic about their children since the start of Ramadan (approximately three months before). Eighty percent of the mothers reported that they had seen a health worker. Almost all the women in North Bank and McCarthy Island divisions had been to a clinic in the last three months. Twenty-four percent of the mothers in Western Division and Lower

River Division reported no recent health visit. The lack of health center visits in Lower River Division can be explained by the lack of health facilities convenient to the villages. However, that cannot be used as an explanation for lower health center use in Western Division. A high percent of the mothers in Gunjur, the village with a full-time health center, reported having been to the nurse. In the other four villages, from 25 to 30 percent of the mothers had not been to a clinic.

A rough measure of exposure to interpersonal information was a question asked in the diarrhea instrument of mothers who knew about WSS: "Where have you learned about this water-sugar-salt medicine?" They were then read a list of possible sources. See Table II-10 for the results. At the start of the campaign, many women were already aware of WSS, as a result of previous Ministry efforts in this arena. However, the previous efforts had not taught a standardized formula - - that was introduced with the publication of the "Manual for Diarrhoea." Virtually none of the mothers knew the correct formula from the manual at the start of the campaign, even though they were aware of WSS. The formulas they did report were highly varied, and many are certain to have been incomplete or wrong. Before the start of the campaign, health workers had been one of the only sources of information about WSS. Not surprisingly, when mothers were interviewed in the baseline sweep, 95 percent of those who knew about WSS reported having learned about it from a health worker. After the start of the campaign, learning from the health worker continued to be high. Approximately 80 percent of the mothers who knew about WSS in any of the diarrhea interviews reported having learned about it from a health worker. Mothers in Lower River and McCarthy Island Divisions showed particularly high levels of learning from a health worker. Mother in Western Division were less likely to mention learning from a health worker.

Table II-10 Mothers' sources of learning about the water-sugar-salt solution*

Source	3&4/82	1&2/83	4/83	1/84	4&5/84
Health worker	94.5%	82.9	80.5	78.0	89.0
Female peer	0.2	5.8	2.0	14.4	15.4
Older female	1.2	1.7	0	0.8	2.2
Radio	1.9	22.2	23.2	39.1	35.5
Posters	0	5.0	14.8	27.0	22.6
n =	416	626	642	686	734

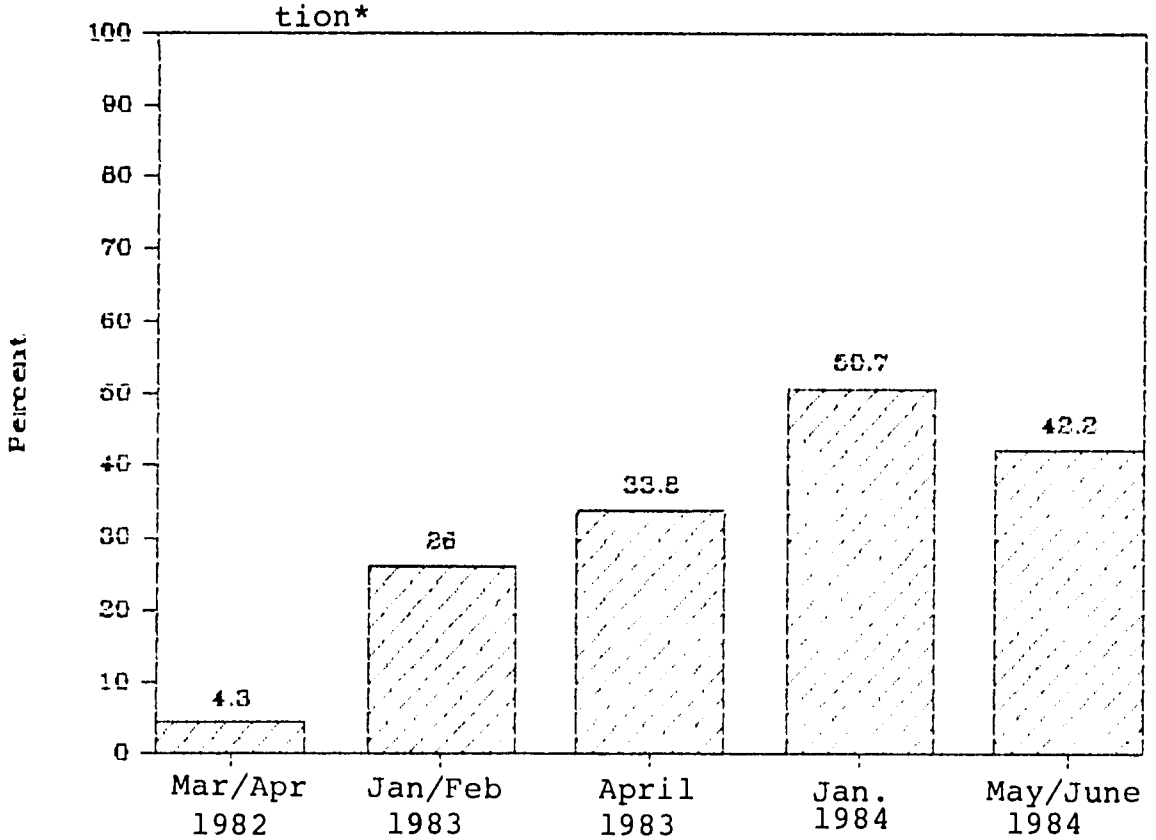
GDIAR:MOMWSS to POSTWS
* Includes only mothers who reported knowing about WSS.

The table also shows a shift in sources of information about WSS after the start of the campaign from health workers to the radio and pictorial materials. Reported learning from the radio averaged 22 to 39 percent over the course of the campaign. In the first year, a larger proportion of mothers from North Bank division reported learning about WSS from the radio than did mothers from other divisions. In the second year, mothers from all the divisions except McCarthy Island tended to report learning from the radio. Learning from posters also increased during the campaign. Many of the mothers who mentioned posters were from Lower River division.

However, although some mothers seem to have replaced health workers with mass-mediated sources of learning, the dominant pattern over time is an increase in the number of sources of information mentioned by mothers (see Figure II-18). As the campaign progressed, mothers seem to have been exposed to more channels of information. Before the campaign, only four percent of the mothers mentioned more than one source of information about WSS. As information became available on more channels (radio, flyers, compound discussions), the percentage of mothers reporting learning from more than one source increased.

It must be remembered that this question was only asked of mothers who knew about WSS. It is unknown whether mothers who

Figure II-18 Percent of mothers reporting that they learned about WSS from more than one source of information*



* Includes only mothers who knew about WSS

GDIARGC to G5:MOMWSS to POSTWS

reported not knowing had fewer contacts with health workers or for some reason didn't learn what they were told. These results do suggest, however, that health workers did play an important role in teaching women about WSS, even after the start of radio broadcasts. Throughout the campaign, health workers remained the major source of information.

Another interpersonal source mentioned by mothers in the second year of the campaign was a female friend of the same age. Older women were almost never mentioned as sources of learning about WSS. During the project, women were seen talking about WSS as they waited at the clinic. We also have one estimate of how often information was exchanged by women in the compound. We asked mothers who reported hearing radio messages about diarrhea whether they had discussed these messages with other women. During the lottery (in September/October 1982), 51 percent of the mothers who had heard radio messages said they talked to others. This increased to 84 percent of mothers who had heard messages by December 1982. In May and June 1984, 60 percent of the mothers who had heard the handwashing spots reported discussing them with others. Thus, it seems that at least half the mothers who received new information on the radio talked to others about it. We don't know if these women passed on the information to others who had not heard the broadcasts or if mothers who had listened together discussed the messages among themselves. In either case, this evidence strongly indicates that secondary transmission through interpersonal channels amplifies the effect of primary transmission through radio and health care workers.

(6) Summary

Access to the channels used by the campaign was generally high among the mothers in the sample. Approximately two-thirds of the mothers had access to a radio in their compound. Mothers also listened to radios in other compounds. Seventy-four percent of the mothers reported that they listened to Radio Gambia, most

of them listening daily or several times a week. Easy access to regular health care seemed low: only 15 percent of the mothers lived in a village with full-time health services, 35 percent lived in villages visited by a health team, and half lived in villages with no formal health services. However, mothers had relatively high exposure to the health workers: eighty percent of sample mothers with children under six reported having seen a healthworker in the previous three months when asked in September 1983. Literacy levels were low: only 3 percent of the mothers could read. Thirty-six percent of the mothers lived in a compound where at least one person could read.

The campaign reached a large proportion of the mothers, particularly during the Happy Baby Lottery. Exposure to messages about feeding and sanitation in the second year was not as high as to WSS messages in the first year. After the lottery, 60 percent of the mothers reported that they had heard recent radio messages about diarrhea and 75 percent had seen the mixing flyer and could show a copy. Several months after the lottery, almost half the mothers reported having heard of the lottery. More than a year afterwards, about a third of the mothers could still show the fieldworker their copy of the mixing flyer. Mothers aware of the lottery tended to remember specific details about it.

When questioned after the feeding messages, only 34 percent of the mothers reported having heard the radio messages and 24 percent could show a fieldworker the flyer. Immediately after the handwashing campaign, 41 percent of the mothers remembered hearing the radio messages. These results suggest that the complex of activities at the start of the campaign (training of a large number of health workers and Red Flag volunteers, wide distribution of the flyer, radio broadcasts, and the Happy Baby Lottery) had a substantial effect on focusing mothers' attention on the campaign. Fewer mothers were aware of later campaign phases, which had no lottery, lower levels of health worker training and uneven distribution of print materials.

Health workers were important sources of information about WSS. Before the campaign, they had been one of the only sources

for mothers to learn about WSS. After the campaign started, when mothers were asked where they had learned about WSS, the majority still named health workers as a source. Mothers also talk about the messages among themselves, which provides for secondary transmission of campaign information.

The campaign made information about WSS available through several channels. This was reflected in an increase in number of sources of learning mentioned by mothers after the start of the campaign.

Mothers' pictorial ability was found to be an important factor in their ability to understand the mixing flyer. However, owning a flyer and receiving training in its interpretation counteracted the influence of low pictorial ability. Mothers of low pictorial ability had high comprehension of the flyer if they owned a copy or if they had been trained on the radio or by a health worker.

Access to sugar, salt, a Julpearl bottle and a bottle cap fluctuated throughout the two years of the campaign. Salt and sugar, the key ingredients, were generally available to mothers. Mothers had some trouble producing a bottle and bottle cap on the spot at the time of the interview. However, bottles and caps were available in the community for mothers to borrow when needed.

D. Learning from Campaign Messages

In the last three sections we have discussed the access and exposure components of the process model. The next step is to examine knowledge gain. Before mothers could practice new behavior, they had to know about it and to learn what to do. The goals of the campaign were to teach mothers to prevent dehydration by using WSS, to feed solid and more nutritional foods during and after diarrhea, and to prevent diarrhea through better sanitation. This required that mothers learn about: dehydration

and its symptoms, correct mixing and administration of WSS, better feeding practices, and sanitation. The following pages discuss each of these topics in turn. They also include results of the evaluation of a mini-campaign on sanitation and of a study examining the relationship between exposure and knowledge about WSS.

(1) Knowledge about dehydration

Throughout the two years of the project, the campaign told mothers about the dangers of diarrheal dehydration, giving them lists of signs of dehydration, telling them to use WSS to prevent dehydration, and urging them to go to the health center if they should see any of the signs of dehydration in their child. The phases that concentrated on recognition of dehydration and its treatment were Phase 1 (April to June 1982) and Phase 3 (November 1982 to March 1983). For summaries of the radio spots, see Appendix A.

In Phase 1, mothers were told about the link between diarrhea and dryness, and were told that dryness is very dangerous and can kill their child. Mothers were also told the symptoms of dehydration. Phase 3 contained special messages for dry-season diarrhea, distinguishing between dry and rainy season diarrhea, repeating the signs of dehydration, and stressing the danger of dry-season diarrhea and dehydration.

a. Signs and treatment of dehydration

The radio broadcasts gave mothers a list of signs by which they could recognize dehydration: dry mouth, sunken eyes, loss of appetite, sudden loss of weight, dry and inelastic skin, thirst, and weakness (inability to hold up head). These signs were also listed in the manual for health workers (in addition to sunken fontanel) and were presented in the health worker training to allow health workers to help mothers learn about dehydration.

The broadcasts particularly stressed sunken eyes, weight loss, and dry skin as danger signs. If a mother saw any of the signs, she was told to go to the health center immediately because her child was very ill.

The findings indicate that the campaign taught mothers to recognize some of the major signs of diarrhea which are signs of dehydration. Mothers' learning was highest for two of the signs stressed by the campaign, sunken eyes and weight loss.

(i) Recall items

Knowledge about dehydration signs was measured using two different types of questions - - recall and recognition. In recall items the respondent has to remember a correct response without any prompts or cues. In recognition items they are typically given a list and merely have to choose the correct alternative. Recall items are much "harder," in the sense that scores are much lower on them than on recognition items, particularly for information with which the respondent is not very familiar. In this subsection we report the items measuring recall of signs of dehydration. The next subsection covers recognition items.

To measure learning about dehydration, mothers were asked to list all the signs of dehydration they knew in March 1983 and in May and June 1984. This question was also asked of the two control groups. Table II-11 lists signs of dehydration mentioned by the mothers. As can be seen in the table, large numbers of mothers recalled the signs of dehydration stressed in the campaign. Mothers also recalled signs of dehydration not mentioned in the radio messages (sunken fontanel, dry eyes). Toward the end of the campaign, mothers were starting to list other signs of diarrhea that were not indicators of dehydration (e.g., fever, vomiting, frequent stools).

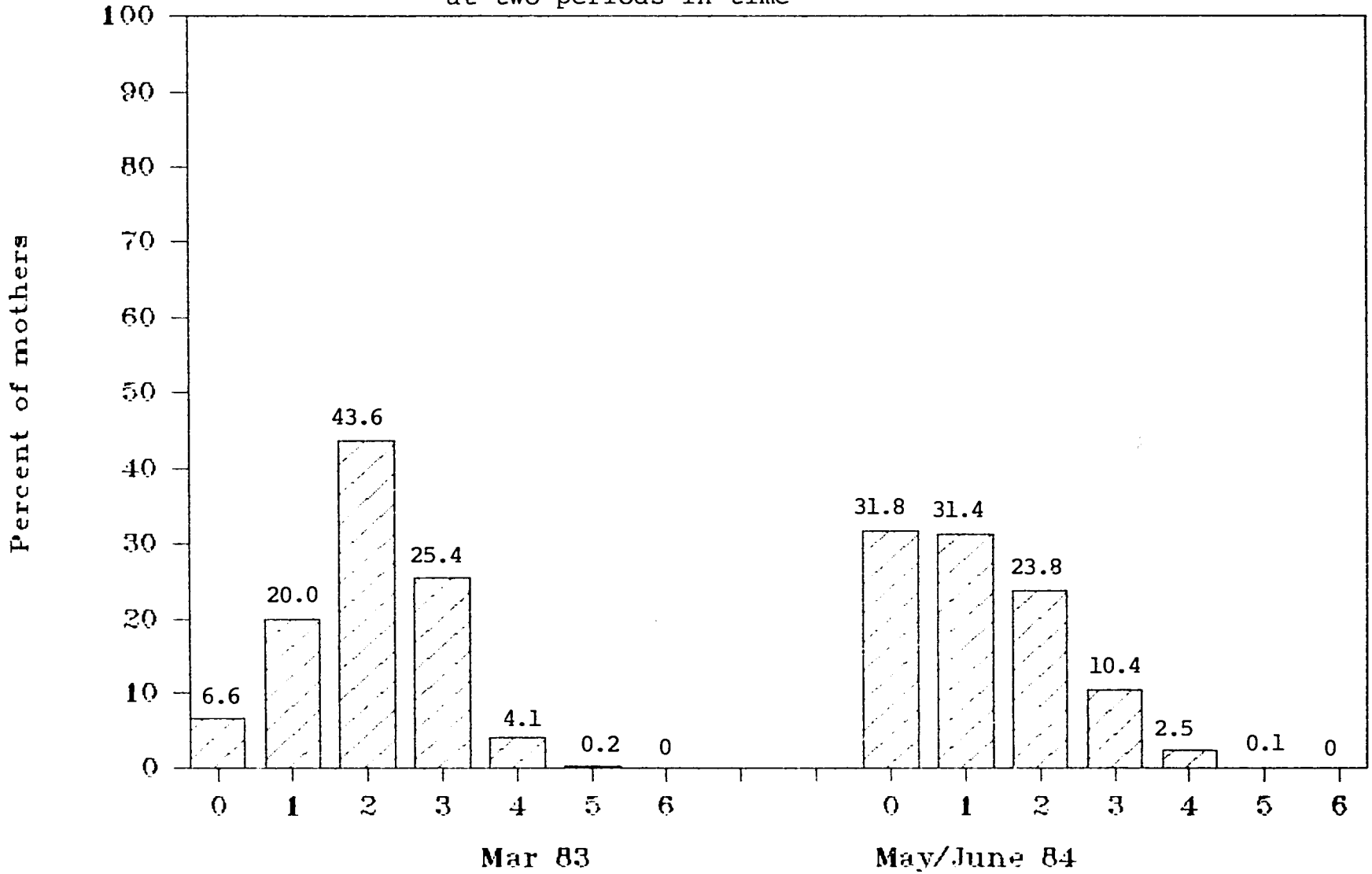
The number of correct signs of dehydration recalled was computed for each mother and is presented in Figure II-19. The figure shows a high level of knowledge of at least one sign of dehydration in March 1983 and a drop in knowledge by May 1984.

Table II-11 Mothers' recall when asked to list signs of dehydration

Signs mentioned by mother	Mar. 1983	Control (5&6/83)	Control (3/84)	May/June 1984
Dry, inelastic skin*	18.1	9.4	8.7	4.5
Loss of weight*	44.5	40.4	32.5	25.4
Sunken eyes*	74.9	59.6	42.2	50.7
Thirst**	0.1	0	0.5	0
Loss of appetite**	23.5	15.2	15.5	10.0
Dry mouth**	23.1	10.3	13.6	20.2
Can't hold head up**	0.1	0	0.5	0
Fever	0.3%	3.1	15.5	17.8
Sunken fontanel	17.2	1.8	5.3	9.9
Dry eyes	8.6	3.6	7.8	9.4
Little or no urine	0.1	0	1.5	2.0
Frequent vomiting	7.1	2.7	16.5	13.5
Inactivity	18.6	22.4	16.0	23.1
Frequent stools	3.0	4.5	17.5	11.0
Yellow eyes	0.2	0.4	0	0
Frequent crying	2.6	0.4	13.1	7.6
Cough	0.1	0	1.0	0.5
Loss of water	0.8	0	0	1.8
Edema, swelling	0.9	0	0	0
Big stomach	1.7	0	1.5	1.1
Other	1.2	2.7	12.6	3.3
n =	861	223	206	837

* Signs of dehydration stressed in the campaign.
**Signs of dehydration mentioned in the campaign.
GRAD4,GRAD7,CONTROL: SFEV TO SFLOP

Figure II-19 Number of signs of dehydration mentioned by mothers at two periods in time



GRAD4, GRAD7: SSEYE,SAPPE,SWGHT,SDSKIN
STHRS,SMTH,SFONT

In March 1983, at the end of the campaign phase on dry-season diarrhea, mothers could recall an average of 2.0 signs. At the end of the campaign, after the feeding and sanitation phases, the number of signs mothers could recall had dropped to an average of 1.2. This pattern was seen across all four divisions.

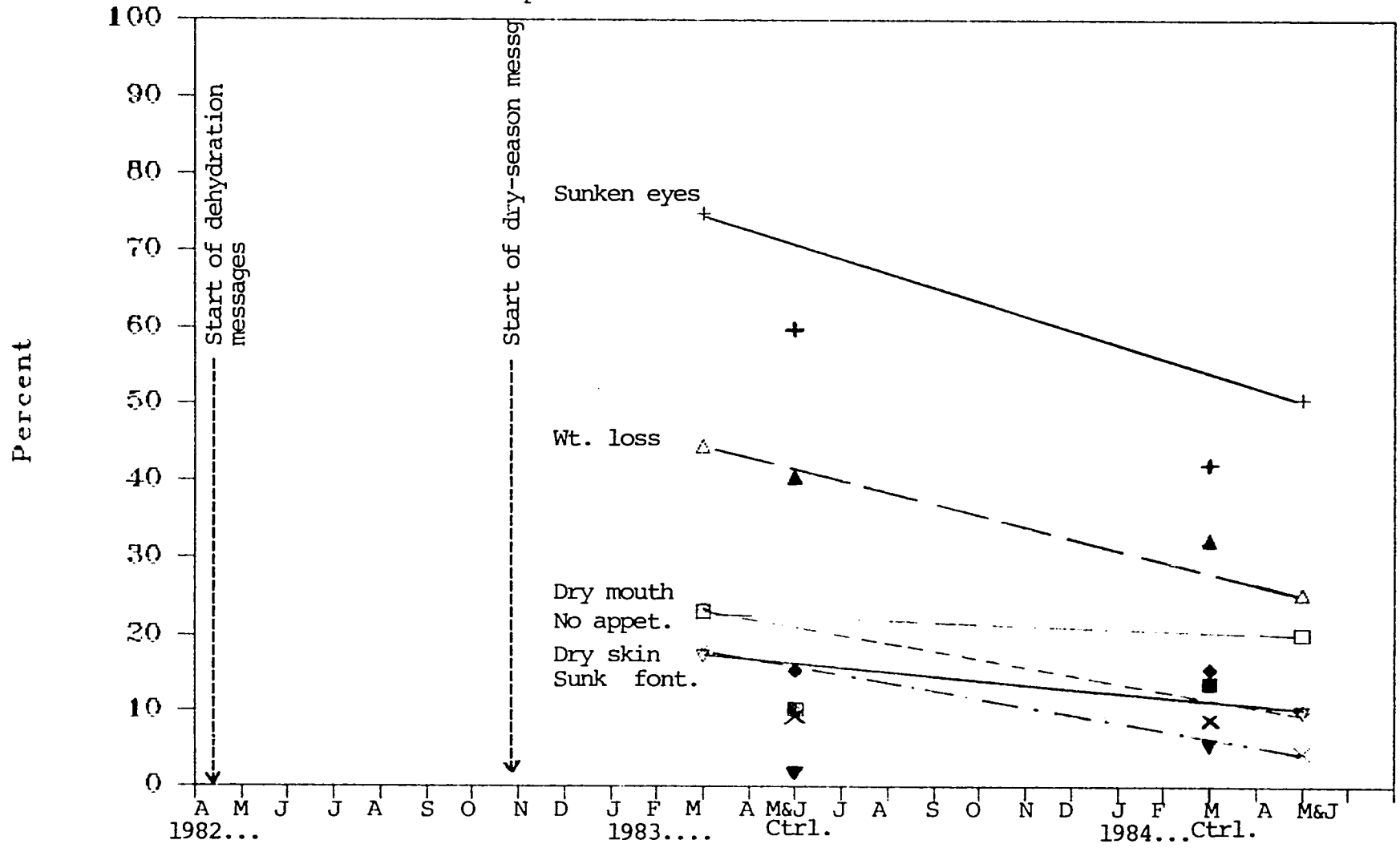
Figures II-20 and II-21 plot the change in mothers' recall of some of the correct dehydration symptoms and of signs of diarrhea incorrectly given in response to questions about dehydration (e.g., fever, vomiting) between March 1983 and May 1984. These figures show that mothers' recall of correct signs decreased while mention of other worrisome signs of diarrhea and dysentery increased slightly. The pattern was essentially the same for the control group responses. These results suggest that, as messages about dehydration began to slack off, mothers began to forget which signs were labelled as signs of dehydration. It may be that mothers saw fever, vomiting, frequent stools and inactivity as more serious signs than some of the signs of dehydration.

The three signs of dehydration stressed in the campaign, sunken eyes, weight loss, and dry skin had all decreased by May 1984. In March 1983, just at the end of the dry-season campaign, 75 percent of the mothers knew sunken eyes were a sign of dehydration and 44.5 percent knew weight loss was a sign. Dry skin was not recalled as well; only 18 percent of the mothers listed it. We cannot say for certain that the campaign was responsible for the high percentages for sunken eyes and weight loss because there is no comparable measure from before the campaign. However, the drop in knowledge when the campaign emphasis on these issues changed does suggest that the campaign had caused the earlier learning.

(ii) Recognition of the signs of dehydration

The second way of measuring knowledge about a topic is checking whether a respondent can identify it when he/she sees it. These are called recognition items, and are usually somewhat "easier" for people to answer correctly. This subsection

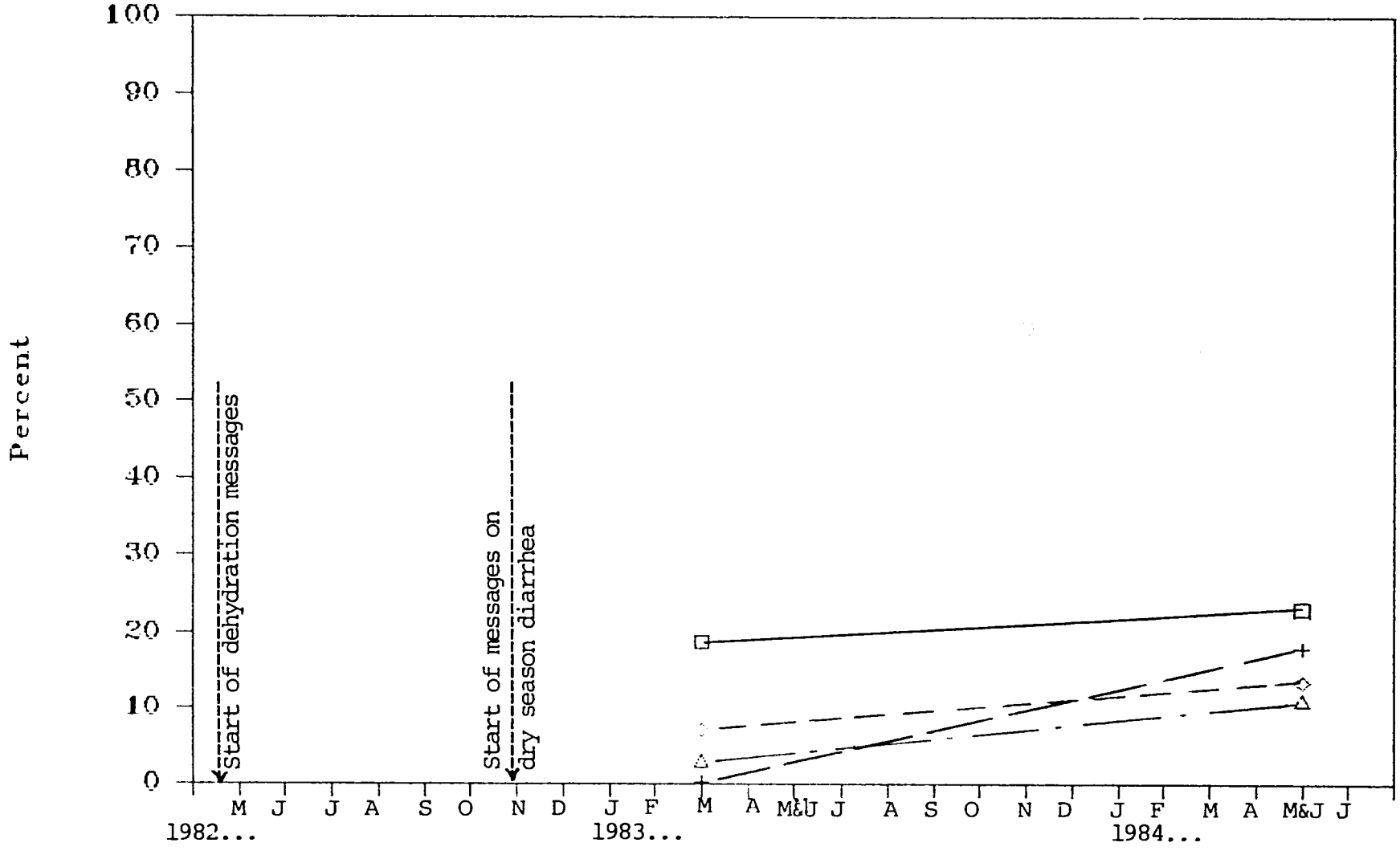
Figure II-20 Mothers' unaided recall of signs of dehydration at two points in time.



□ Dry mouth is a sign of dehy. + Sunken eyes are a sign ◇ No appetite is is a sign of dehy. △ Weight loss is a sign ✕ Dry skin is a sign of dehy. ▽ Sunken fontanel is a sign of dehy.

GRAD4,7,Ctrl:SFEV TO SFLOP

Figure II-21 Mothers' incorrect recall of signs of diarrhea when asked to list the signs of dehydration



□ Inactivity is a sign of dehydration.

+ Fever is a sign of dehy.

◇ Vomiting is a sign of dehy.

△ Frequent stools is a sign of dehy.

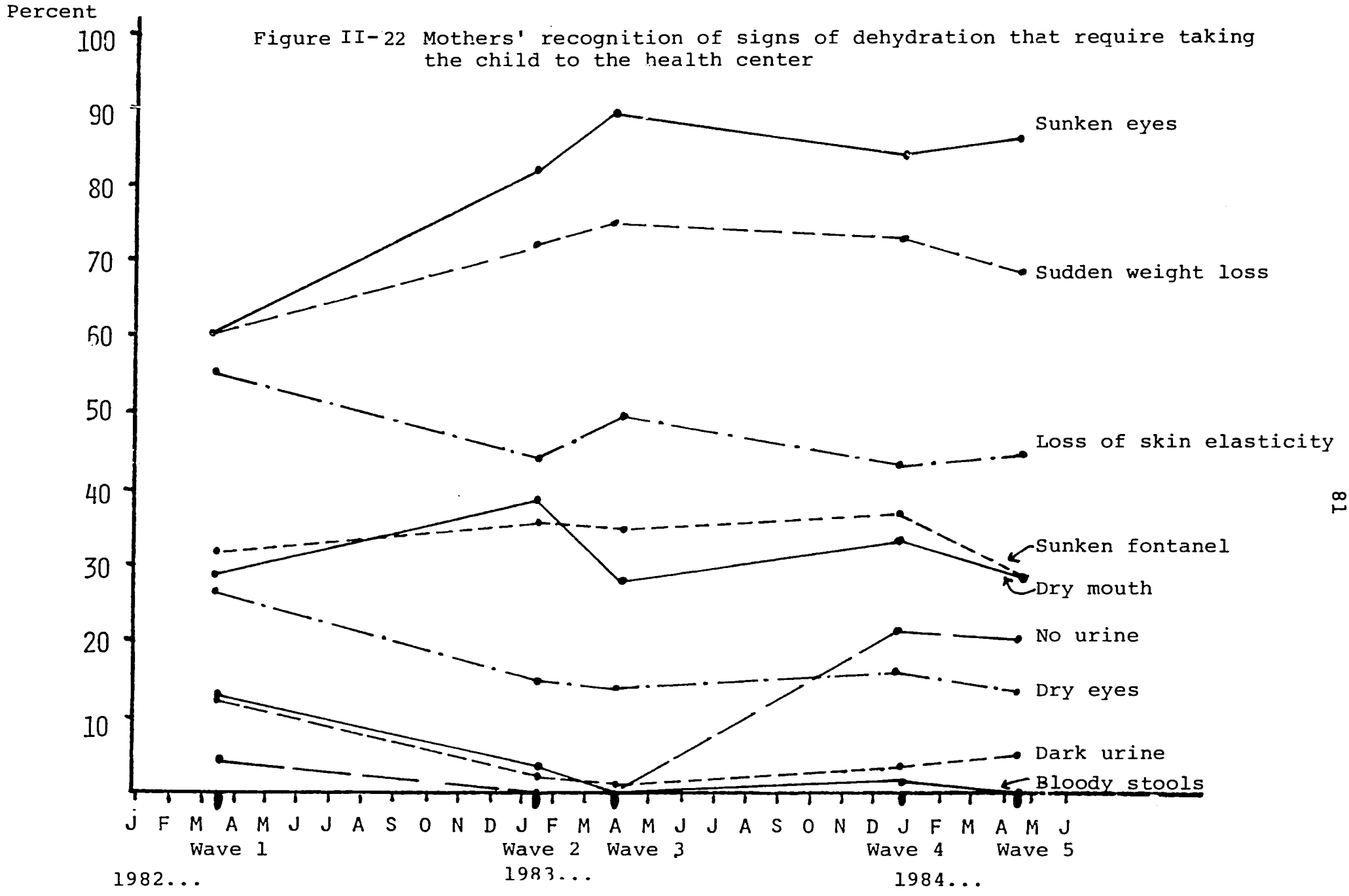
examines recognition measures of information about dehydration.

Another measure of mothers' knowledge about dehydration was a question asked in the diarrhea instrument: "What physical signs indicate that a child with diarrhea should be taken to the health center?" The mothers were then read a list of possible signs. The campaign stressed that when signs of dehydration were seen, the mother should immediately take the child to the health center. They were also told to seek help if they saw blood or mucus in the child's stool. The responses to this question can be seen in Figure II-22 and Table II-12. The responses indicate that, when given a list, mothers were much better at recognizing signs of dehydration. Sunken eyes and weight loss were recognized as danger signs by over 60 percent of the mothers throughout the campaign.

Mothers had had a relatively high level of knowledge about danger signs before the campaign: 60 percent recognized sunken eyes and weight loss as serious, and 55 percent saw inelastic skin as a serious sign. After the start of messages on dehydration and dry-season diarrhea, recognition of sunken eyes and sudden weight loss increased substantially. At the end of the dry-season messages (April 1983), 89 percent of the mothers recognized that a child with sunken eyes needs to go to the health center and 75 percent recognized the danger of sudden weight loss. After the dry-season campaign, recognition of both started to decline slightly, still remaining at a higher level after the campaign than before.

After the start of messages on dehydration (November 1982), recognition that loss of skin elasticity required visiting a health center dropped from 55 to 44 percent of the mothers. Except for a slight rise between January and April 1983, the percentages of mothers recognizing skin inelasticity as a danger sign remained at the lower level. Knowledge of the other sign of dehydration mentioned by the campaign, dry mouth, after an initial increase, also declined. The other signs of dehydration in the list given to the mothers were not mentioned in the radio broadcasts. Recognition of these signs remained approximately

Figure II-22 Mothers' recognition of signs of dehydration that require taking the child to the health center



GDIAR:BLOODY,URINE,URINDR,LOSEWT,MOUTH,EYESK,EYEDR,SNKFNT,ELASTC,OTHSIG

Table II- 12 Mothers' recognition of signs of dehydration that require taking the child to the health center

Signs	Wave 1 3&4/82	Wave 2 1&2/83	Wave 3 4/83	Wave 4 1/84	Wave 5 4&5/84
Sudden weight loss	60.3	71.4	74.8	72.1	68.9
Sunken eyes	60.3	81.4	89.2	84.2	87.8
Loss of skin elasticity	55.3	43.9	49.6	43.4	45.8
Sunken fontanel	30.9	36.5	35.4	38.5	29.9
Dry mouth	28.5	38.5	27.3	32.5	30.1
Dry eyes	26.9	14.9	13.8	16.5	14.0
Blood in stool	12.8%	3.1	0	1.1	0.6
Dark urine	12.0	2.5	1.4	3.7	5.2
No urine	4.0	0.6	0	21.4	20.0
Other	31.3	0.5	1.7	4.1	0.7
n =	750	801	785	802	825

GDIAR;BLOODY,URINE,URINDR,LOSEWT,MOUTH,EYESK,EYEDR,SNKFNT, ELASTC,OTHSIG

the same (sunken fontanel) or declined over the course of the campaign. It may be that mothers were overwhelmed with messages about diarrhea and dehydration and only learned those that were very prominent (e.g., sunken eyes and weight loss).

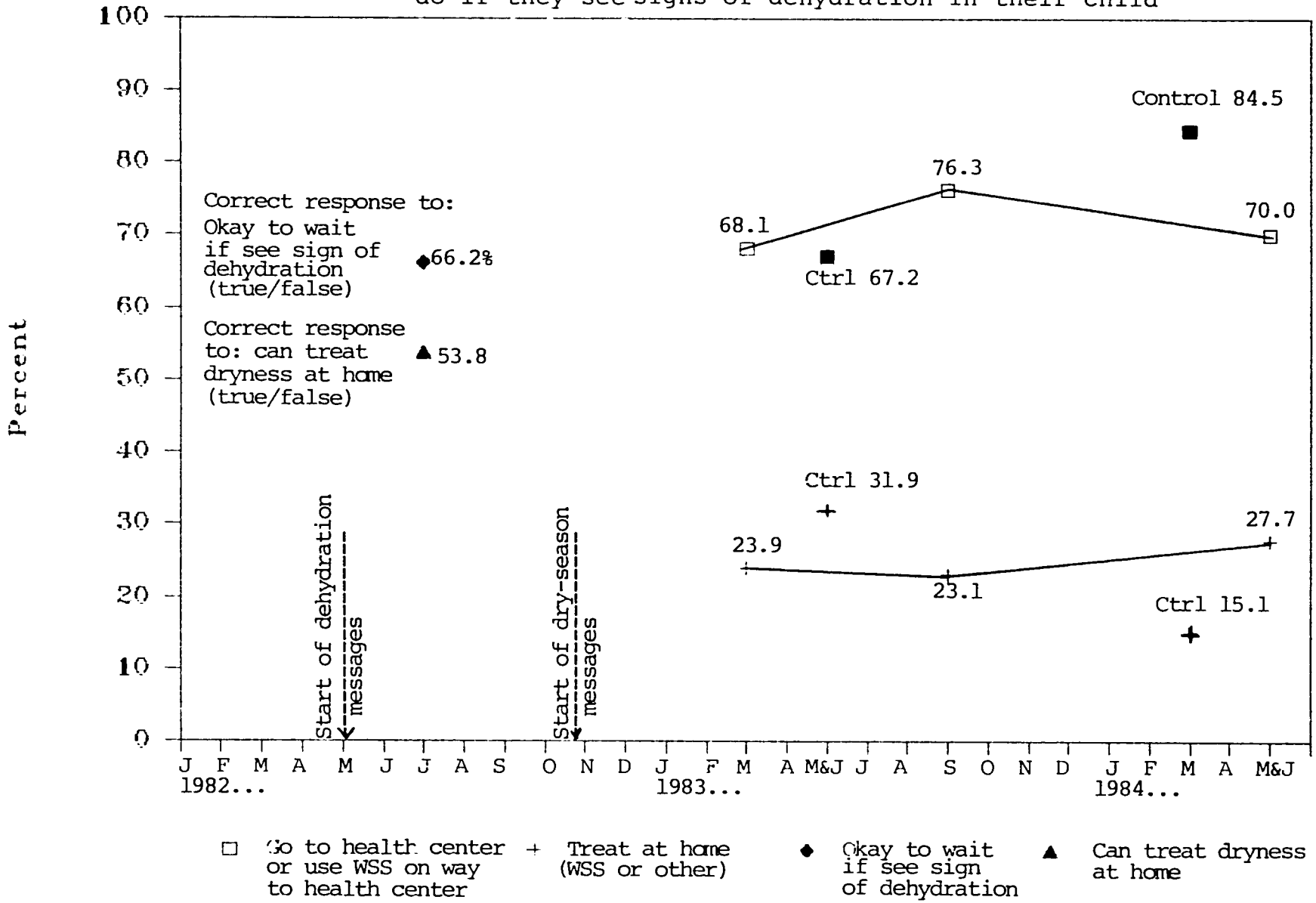
Comparison of recognition of danger signs with the unaided recall responses suggests that, at least for sunken eyes and weight loss, mothers had a useful level of knowledge. They were often not able to generate signs of dehydration from memory, but they did maintain a high level of knowledge across the two years that sunken eyes and sudden weight loss are dangerous and require clinic treatment.

(iii) Knowledge of what action to take against dehydration

Another indication of mothers' knowledge about proper treatment of dehydration during the course of the project was the response to the question: "What should a mother do right away if she sees a sign of dehydration in her child?" This question was asked of the main sample in March 1983, September and October 1983, and May and June 1984, and of the control groups. Figure II-23 and Table II-13 show the responses to this question. Figure II-23 also includes the responses to two true/false questions asked in July and August 1982 about waiting to go to the health center if signs of dehydration are seen and about treating dryness at home.

Pre-campaign figures are not available. However, the responses to the question about signs of dehydration requiring a clinic visit (discussed just before this) suggest that a high proportion of mothers knew before the campaign to take a child to the health center for dehydration. The results show that the level of knowledge about dehydration treatment had changed little by the end of the campaign.

Figure II-23 Mothers' responses to questions about what they should do if they see signs of dehydration in their child



GRAD4,5,7 Control:SIGNS

Table II-13 Mothers' responses about what they should do right away if they see signs of dehydration in their child

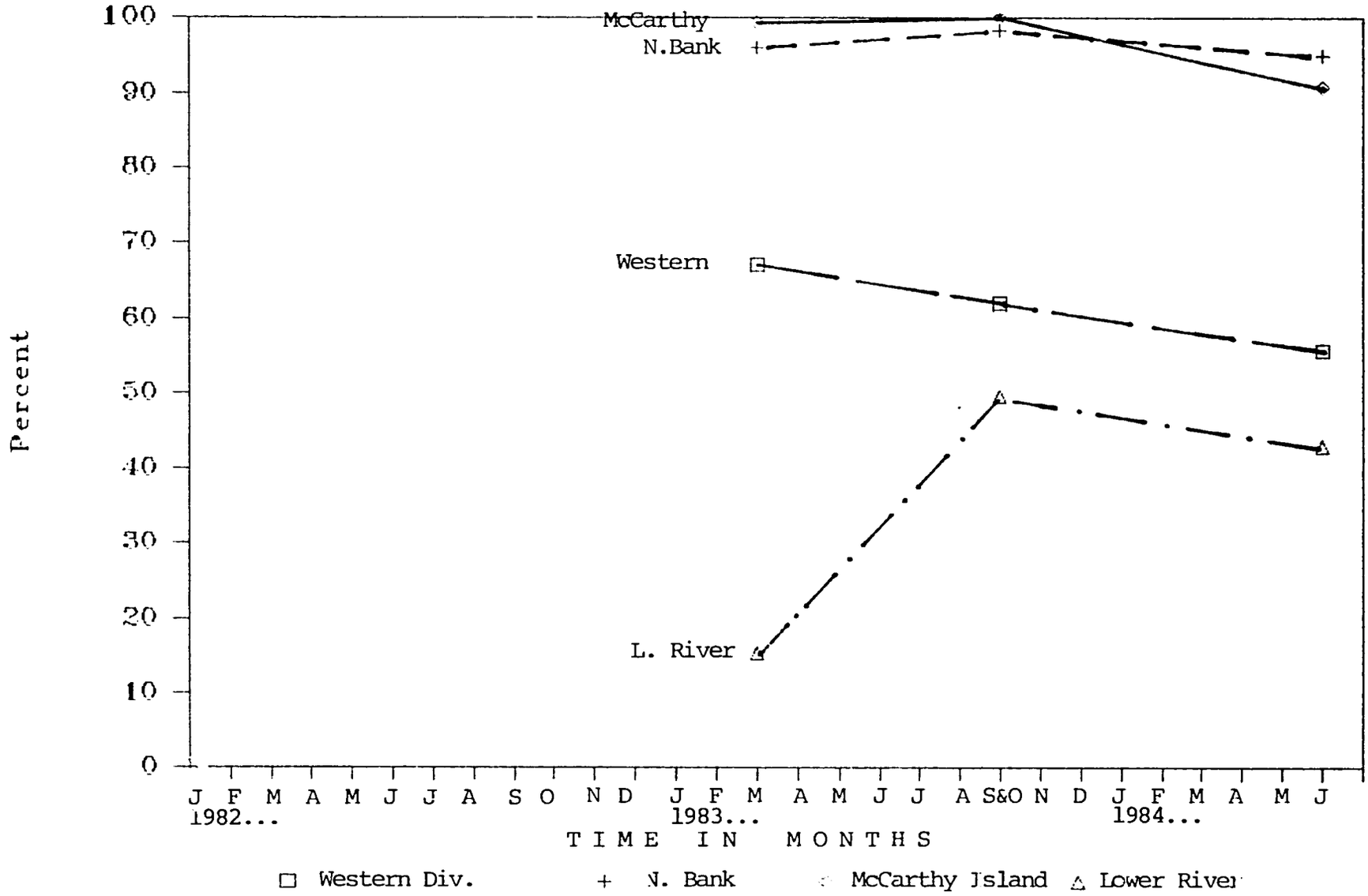
Response	March 1983	Control 5&6/83	Sept/Oct 1983	Control 3/84	May/June 1984
Go to health center*	63.0	66.8	66.9	79.6	53.5
Give WSS on way to health center*	5.1	0.4	9.4	4.9	16.5
Treat at home	8.3	4.5	16.2	7.3	8.4
Give WSS at home	15.6	27.4	8.9	7.8	19.3
Other	0.1	0	0	0	0.7
Don't know	7.9	1.3	0	0.5	1.6
n =	859	223	785	206	835

GRAD4,5,7,Control:SIGNS
* Correct responses

Between March and September 1983, knowledge that a child with dehydration should go to the health center increased from 68 percent of the mothers to 76 percent, a time when feeding messages prevailed. Correct responses to this question were examined by division (see Figure II-24). This analysis indicated that the increase in knowledge seen in September/October 1983 was primarily due to a change among women in Lower River Division. In essence, they start to catch up to the higher levels of the other divisions. Mothers in the other divisions showed either the same level of knowledge as they had in March or a slight drop. It appears that mothers in Lower River Division did not respond to dehydration messages until the second year. Mothers in North Bank and McCarthy Island divisions showed extremely high knowledge.

In summary, the mothers in the sample had a relatively high level of knowledge about danger signs and treatment of diarrhea before the campaign. The campaign's influence on knowledge was to focus mothers' attention on two symptoms, sunken eyes and

Figure II-24 Mothers' responses to the question about what they should do if they see signs of dehydration, by division



RAD4,7:SIGNS;
RAD5: TOHC,WSSHC

weight loss. Mothers learned to recognize these symptoms as two of the signs of dehydration and as indications that a child should go to the health center. Continued messages about dehydration are necessary. When broadcasts about dehydration were reduced, knowledge dropped slightly, although the levels of knowledge at the end of the campaign were still high.

b. Seasonal differences in diarrhea

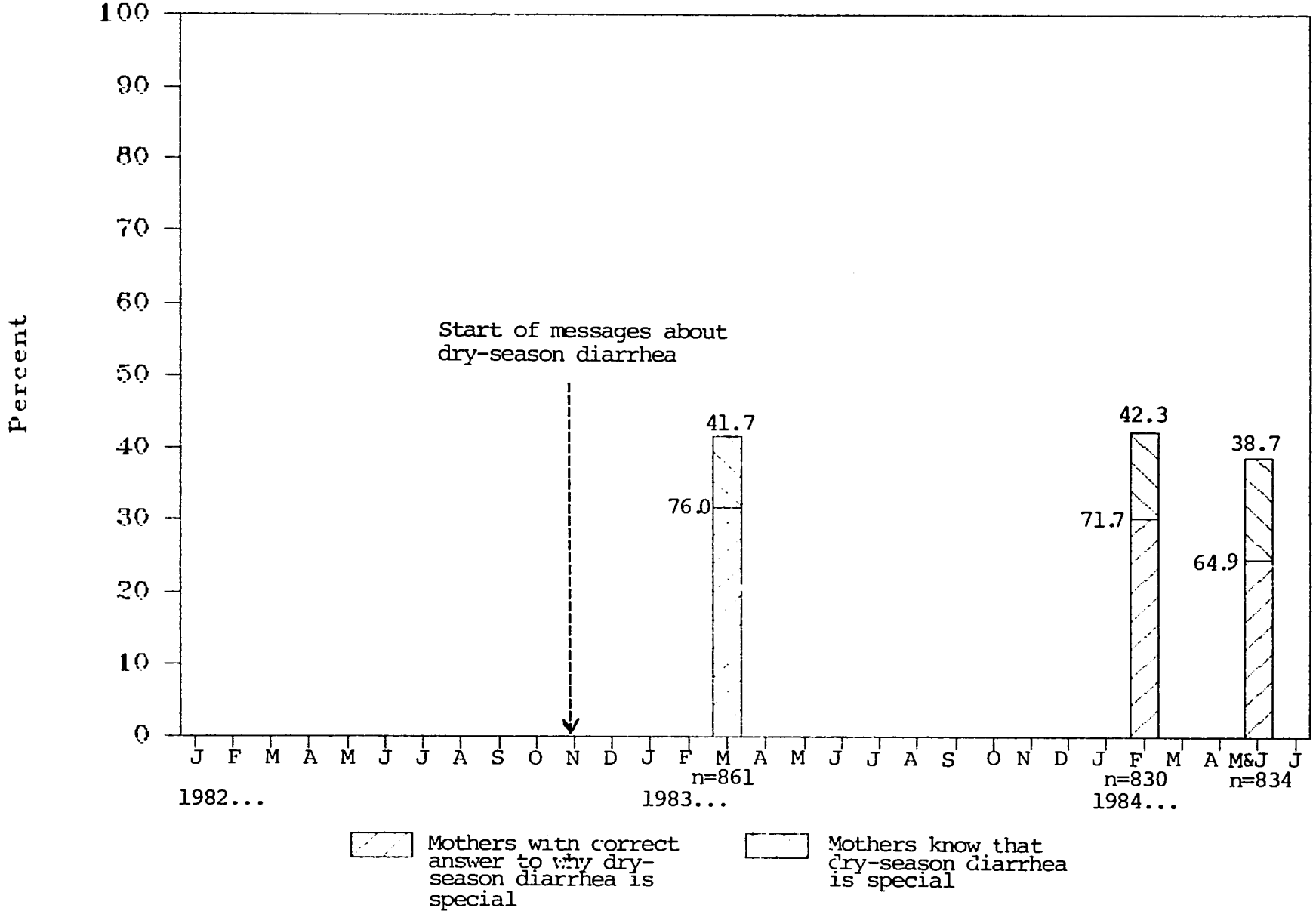
At the start of the dry season in 1983, after teaching mothers about dehydration and WSS, the campaign moved on to teaching mothers that dry-season diarrhea is different from rainy season diarrhea in that it can dehydrate a child within one to two days. Mothers were told to be aware of the possibility for rapid dehydration, to give WSS as soon as diarrhea started to prevent dehydration, to watch for signs of dehydration and to take the child to the health center if signs were seen.

After the start of the dry-season messages, mothers were asked if dry-season diarrhea is the same as rainy-season diarrhea, or special (asked in March 1983, February 1984, and May/June 1984). They were also asked in what way dry-season diarrhea is special. Figure II-25 shows the responses to these questions.

Approximately 42 percent of the sample mothers said dry-season diarrhea was special when asked at the end of the dry-season message phase. A year later, at the same time of year (dry season) the same percentage of mothers gave the correct response. Several months after this, at the start of the rainy season in 1984, the percentage of mothers with a correct response had declined very slightly.

Mothers who knew dry-season diarhea was special generally knew why. Immediately after the dry-season messages, 76 percent of mothers who said dry-season diarrhea was special could give the correct answer as to why (it dehydrates faster). This percentage declined slightly over the next year to 72 percent in February 1984 and 65 percent in May/June 1984.

Figure II- 25 Mothers' recognition that dry-season diarrhea is special, and why (because it dehydrates a child faster)



GRAD4,6,7:SEASN,DRIDI

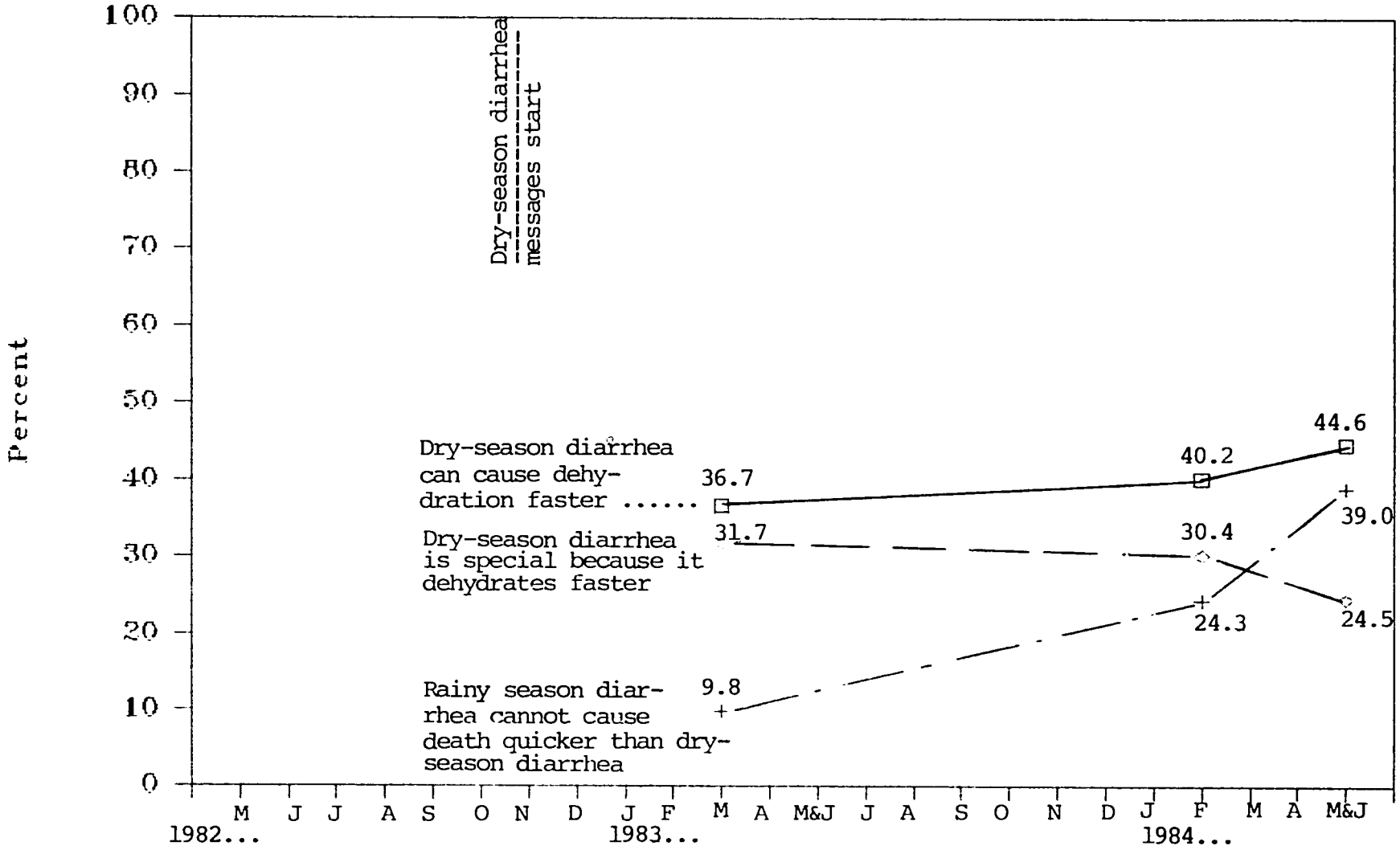
Two other questions about the difference between dry- and rainy-season diarrhea were asked: whether dry-season diarrhea can cause dehydration faster than rainy-season diarrhea (yes) and whether rainy-season diarrhea can cause death more quickly (no). The responses to these questions are in Figure II-26. The responses to the question, why is dry season diarrhea special, are also included.

Thirty-seven percent of the mothers agreed that dry-season diarrhea can cause dehydration faster when they were questioned at the end of the 1983 dry-season phase. This percentage rose slightly in the next year (to 40 percent) then more steeply three months later (to 45 percent). This pattern matches that of the question requiring recall of why dry-season diarrhea is special, except at the end. It is not clear why the mothers responses diverged at the end. One possibility is that the mothers may have been forgetting by the end. Perhaps they could not answer the open-ended question about why dry-season diarrhea is special, but were able to distinguish the correct response when given a choice.

The campaign messages that dry-season diarrhea can cause death more quickly than rainy-season diarrhea seem to have had a delayed effect. Immediately after the dry season messages, only 10 percent of the mothers disagreed when asked if rainy-season diarrhea leads to death more quickly. This rose to 24 percent of the mothers a year later (in February 1984) and to 39 percent by May and June 1984. The rise in knowledge cannot be explained in terms of the radio messages, as these increases occurred at times when the focus of the campaign had changed. It may be that health workers were telling mothers about seasonal differences.

The treatment for dry-season diarrhea was to administer WSS immediately and intensively. To measure knowledge of this treatment, mothers were asked in March 1983 and February 1984 if WSS should be given if a baby gets diarrhea in the dry season. They were also asked if WSS should be given right away or whether the mother could wait. The responses to the questions for all

Figure II- 26 Mothers' knowledge of the difference between rainy and dry-season diarrhea



GRAD4,6,7:DRIDI,DRYDH,WETDI

the mothers and for mothers by division are displayed in Figure II-27.

In March 1983, at the end of the dry-season message phase, 86 percent of the mothers knew that WSS should be given to a child with diarrhea in the dry season. Eighty-five percent of these mothers said WSS should be given right away. A year later, in February 1984, there was still a high level of knowledge about the proper treatment of dry-season diarrhea (84% of the mothers said WSS should be given and 83% of these said it should be given right away).

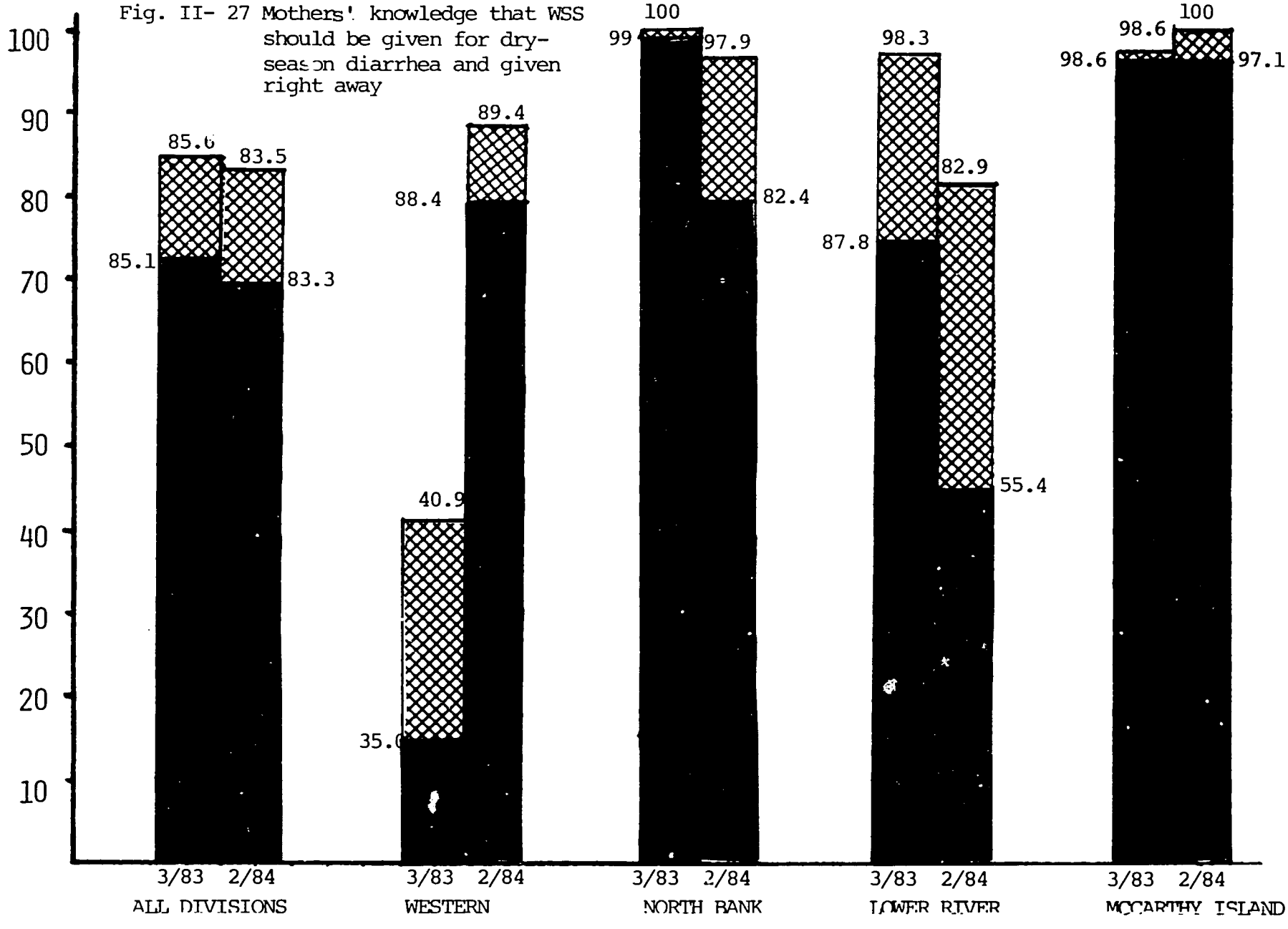
When we look at the responses for each division, we see that mothers in Western Division had a low level of knowledge about treatment of dry-season diarrhea in 1983. However, a year later, their knowledge had increased to a level similar to those of the mothers in other divisions. It is uncertain why mothers in this division showed such a large increase in knowledge by 1984, when mothers in North Bank and Lower River Divisions seemed to be forgetting (particularly that WSS should be given immediately).

Overall, the results indicate that 40 percent of the mothers in the sample knew about the difference between dry- and rainy-season diarrhea during the campaign and most of these could say why. Messages about seasonal differences in diarrhea were only broadcast at one time during the campaign (in Phase 3). It is possible that learning about this topic required longer exposure to information. Mothers showed a high level of knowledge about treatment of dry season diarrhea which was maintained over time. Over 80 percent of the mothers knew to give WSS during dry-season diarrhea.

(2) Knowledge about water-sugar-salt solution

A principle goal of the Mass Media and Health Practices Project in The Gambia was to teach mothers and caretakers about an oral rehydration solution they could mix from common ingredients found at home. The first year of the project focused

Fig. II- 27 Mothers' knowledge that WSS should be given for dry-season diarrhea and given right away



Whole Bar = Women who knew to give WSS for dry-season diarrhea
Dark section of bar = Percent of mothers who knew to give WSS right away

GRAD4,6:DRWSS,WAIT

on the water-sugar-salt (WSS) solution. Messages about WSS mixing and administration, and about the function of WSS were broadcast, health workers and local "red flag" volunteers were given special training, and a flyer detailing how to mix WSS was distributed to mothers. Messages about WSS were grouped into phases coinciding with seasonal changes in diarrheal disease:

Phase 1 (April - June 1982): radio messages focused on diagnosis of diarrhea and dehydration or "dryness" and on the relationship between dryness, diarrhea, and nutrition. Women were told that dryness can be prevented through a special "diet for dryness" (WSS, breastmilk, and solid foods). This phase also included intensive training of rural health workers in treatment of diarrhea with rehydration solutions to prepare them to be interpersonal sources of information.

Phase 2 (July - October 1982): coincided with the rainy season peak in diarrhea, characterized by long, debilitating bouts. Messages during this time introduced WSS to the women. A national rural lottery using radio, pictorial flyers and posters, and health workers was carried out to publicize WSS and to teach mothers proper mixing and administration.

Phase 3 (November 1982 - March 1983): took place during the dry season, a time of acute, rapidly dehydrating bouts of diarrhea. Messages focused on WSS mixing, immediate administration of WSS, signs of dehydration and when to go the health center.

Phase 4 (July - October 1983, rainy season): focused on feeding young children during and after diarrhea, but also included reminders about when to use WSS and about mixing. Additional training was given to health

workers about feeding and health education and reviewing WSS.

Interlude (November 1983 - January 1984): during this time planning of a mini-campaign was the primary focus of the project. No broadcast schedule was arranged with Radio Gambia, but broadcast of previous radio messages continued, although at a lower level.

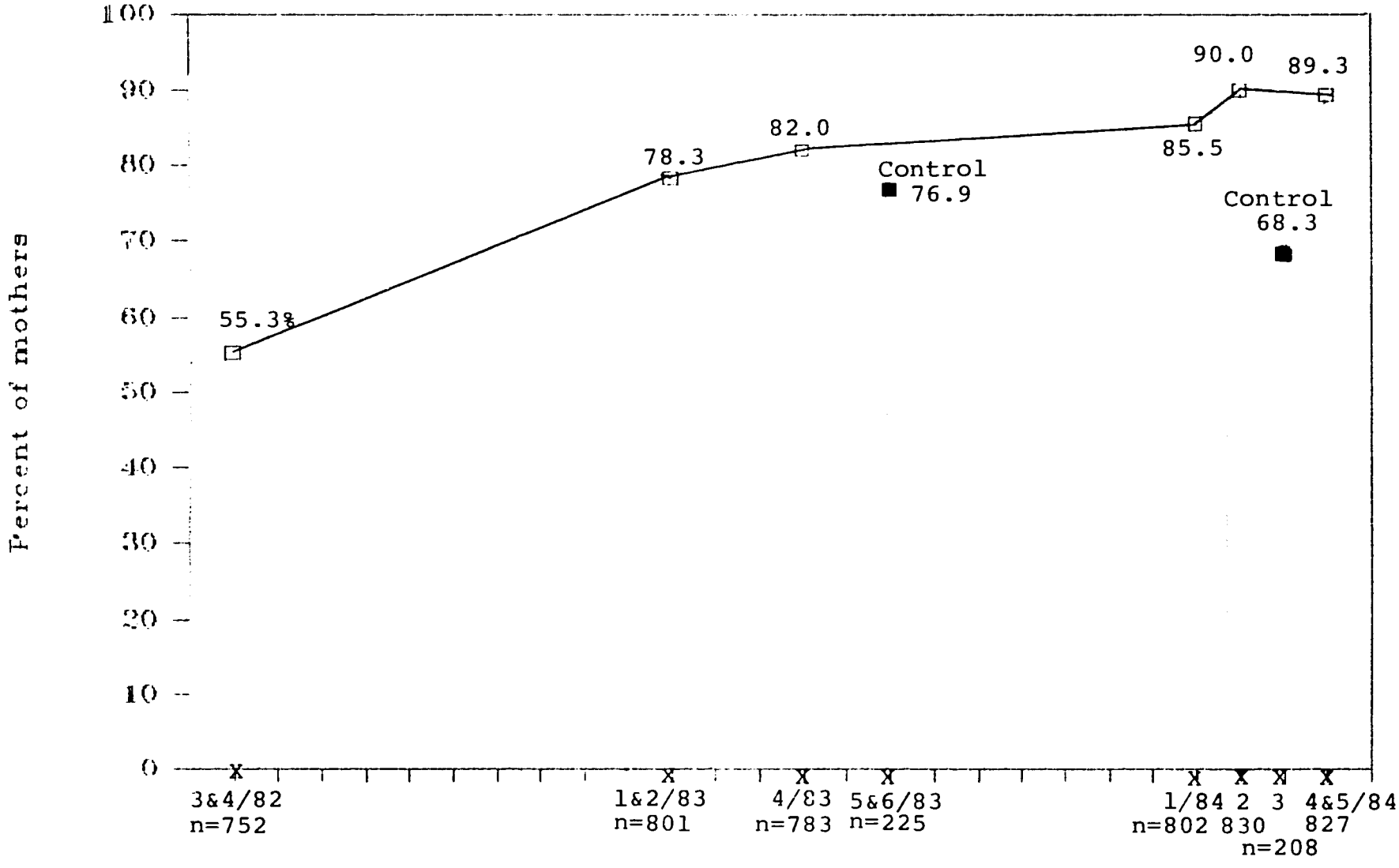
Phase 5 (February - April 1984): Mini-campaign on sanitation.

a. Awareness of the water-sugar-salt solution

Mothers were asked before the campaign and at six points during the campaign if they knew about a medicine for diarrhea made at home from water, sugar, and salt. Figure II-28 shows the responses to these questions.

During the course of the campaign, there was a steady rise in awareness of WSS. Many mothers (55.3%) knew about WSS before the campaign (March 1982) from previous health education efforts by the Gambian Medial and Health. By January 1983, after the Happy Baby Lottery and after the start of dry-season messages about WSS, the percentage of WSS-aware mothers had jumped to 78.3 percent. The increase in awareness of WSS continued to rise after these months of intensive messages about WSS, but at a slower rate. It reached a high of 89.3 percent by mid-1984. Thus for the sample group, simple awareness (that is, ever having heard of WSS) rises to an impressive level of coverage during the campaign. This does not necessarily mean that women can correctly make or administer the solution - - at the time of the first measurement, only one woman out of the entire sample knew the correct formula. In addition, some of the gain for the sample group may be the result of learning from the repeated

Figure II-28 Sample mothers' awareness of the water-sugar-salt solution over time



GDIAR :KNOWSS; Control:DIAMED

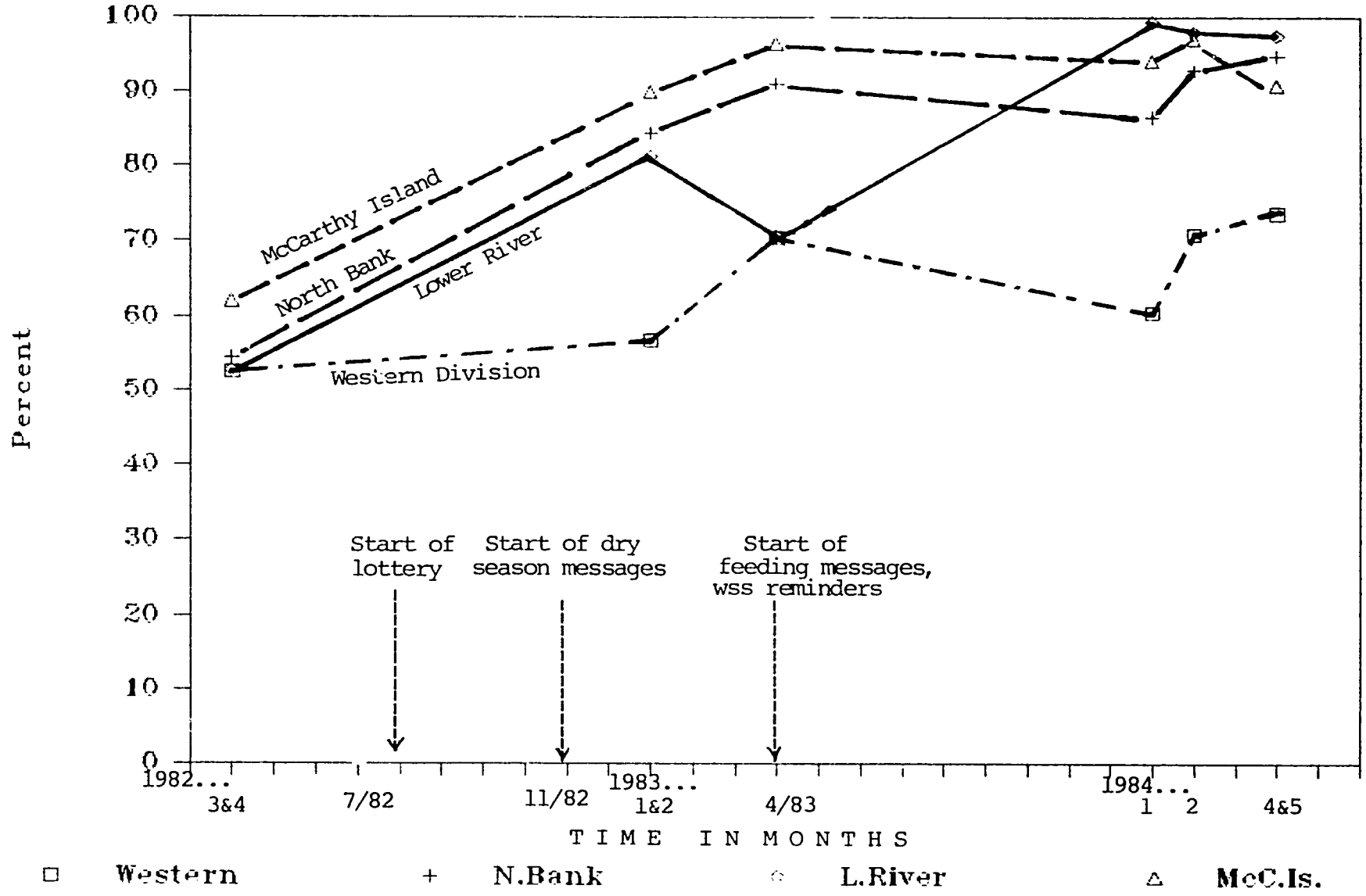
questions. Comparison with the control group figures lead one to think that the large first year gain is shared by all groups, but the more gradual second year gain, at least in part, may be due in part to learning from the interviews. The control group was the same as the sample at the midpoint, but is significantly lower than the sample at the end of two years.

Awareness of WSS over time was examined separately for each division. The results are displayed in Figure II-29 and Table II-14. Before the start of the campaign, mothers' awareness of WSS was not significantly different by division. However, once the campaign started, mothers from different divisions showed significantly different change in awareness (at $p < .0001$).

Throughout the campaign, mothers in Western Division had lower awareness of WSS than mothers from other divisions. We are not certain why this was so. When knowledge about WSS was examined by tribe, the Jolas were found to have lower levels of knowledge than mothers from other tribes. Their knowledge of WSS had increased sharply by January 1984. Several of the villages in Western Division had large numbers of Jola women. Jolas are described as having retained more of their traditional beliefs and practices than the other tribes (Elmer, 1983). Sources in The Gambia reported that Jolas have a stronger belief in the supernatural than members of other tribes.

Another possible explanation for the low awareness about WSS in Western Division was suggested by researchers at the Medical Research Council. They found that women who lived near the MRC clinic in Keneba were less likely to know about WSS than mothers who lived farther away. It is possible that mothers who live near full-time health facilities will be less motivated to learn about self-treatments because they can go to the clinic for help instead. Mothers in Western Division generally had a higher level of access to health care than mothers from the other divisions.

Figure II-29 Mothers' awareness of WSS over time, by division



GDIAR:KNOWSS; GRAD6: KNOWSGT6

Table II-14 Mothers' awareness of WSS over time by division

Division	Mar./April 1982	Jan./Feb. 1983	April 1983	January 1984	February 1984	Apr./May 1984
Western	52.6% (100/190)	56.7 (110/194)	70.5 (136/193)	60.6 (120/198)	71.0 (142/200)	73.6 (148/201)
North Bank	54.3 (100/184)	84.4 (141/167)	91.0 (192/211)	86.8 (171/197)	92.8 (192/207)	94.7 (198/209)
Lower River	52.8 (105/199)	81.3 (187/230)	70.6 (142/201)	99.5 (215/216)	98.1 (211/215)	97.6 (205/210)
McCarthy Island	62.0 (111/178)	90.0 (189/210)	96.6 (172/178)	94.2 (180/191)	97.1 (202/208)	90.8 (187/206)
Significance level of difference between divisions	N.S.	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$

GDIAR: KNOWSS; GRAD6: KNOWSGT6

b. Overall knowledge of WSS mixing and administration

The messages broadcast on the radio, given to the health workers in the training sessions, and portrayed on the flyers gave detailed instructions for the mixing and administration of the water-sugar-salt solution. Mothers were told to mix WSS in a clean basin using 3 Julpearl bottles of clean water, 8 Julpearl bottle caps of sugar, and one bottle cap of salt. Administration messages were: make a fresh batch every day; give the mixture slowly using a clean cup and spoon; give the mixture regularly even if the baby vomits (if the baby vomits, stop for awhile, then start again); give WSS as soon as the diarrhea starts; give WSS until the diarrhea stops; and give the correct amount for each age group (1 Julpearl bottle in 24 hours for a child under 6 months, 2 bottles for a child from 6 to 18 months, and 3 bottles for a child over 18 months). Summaries of the radio spots can be seen in Appendix A.

To measure knowledge about WSS, mothers were first asked if they knew about WSS. The results of this question were discussed in the previous section. Mothers who said they did not know about WSS were not asked the more specific questions about mixing and administration. WSS-aware mothers were asked a series of questions matching the messages from the radio spots. Generally, the results reported in this section will be only for WSS-aware mothers, those who were asked the specific knowledge questions. However, in some cases, it is important to look at learning for the whole sample. In these instances, we will put mothers who were not aware of WSS in the low or no knowledge category.

An overall measure of WSS knowledge was developed from the responses to five questions about WSS mixing and administration: proportions for mixing, how often to make WSS, how to give WSS, what to do if the child vomits, and when to start giving WSS. Mothers were assigned one point for each correct answer. This resulted in an index with scores from zero to five points. Although knowledge about how many days to give WSS and how much

to give children of different ages was important, the responses to these questions could not be used in the index because data were missing for the first wave.

Figure II-30 and Table II-15 give details about the knowledge index over time. The figure includes bars indicating the percent of WSS-aware mothers. The gaps between the top of the bars and 100 represent the percent of mothers in the wave who reported not knowing about WSS. As seen in the previous section, the percent of mothers who were aware of WSS increased over time. Within each bar are displayed the proportion of mothers who knew the correct answers to from one to all five of the knowledge questions.

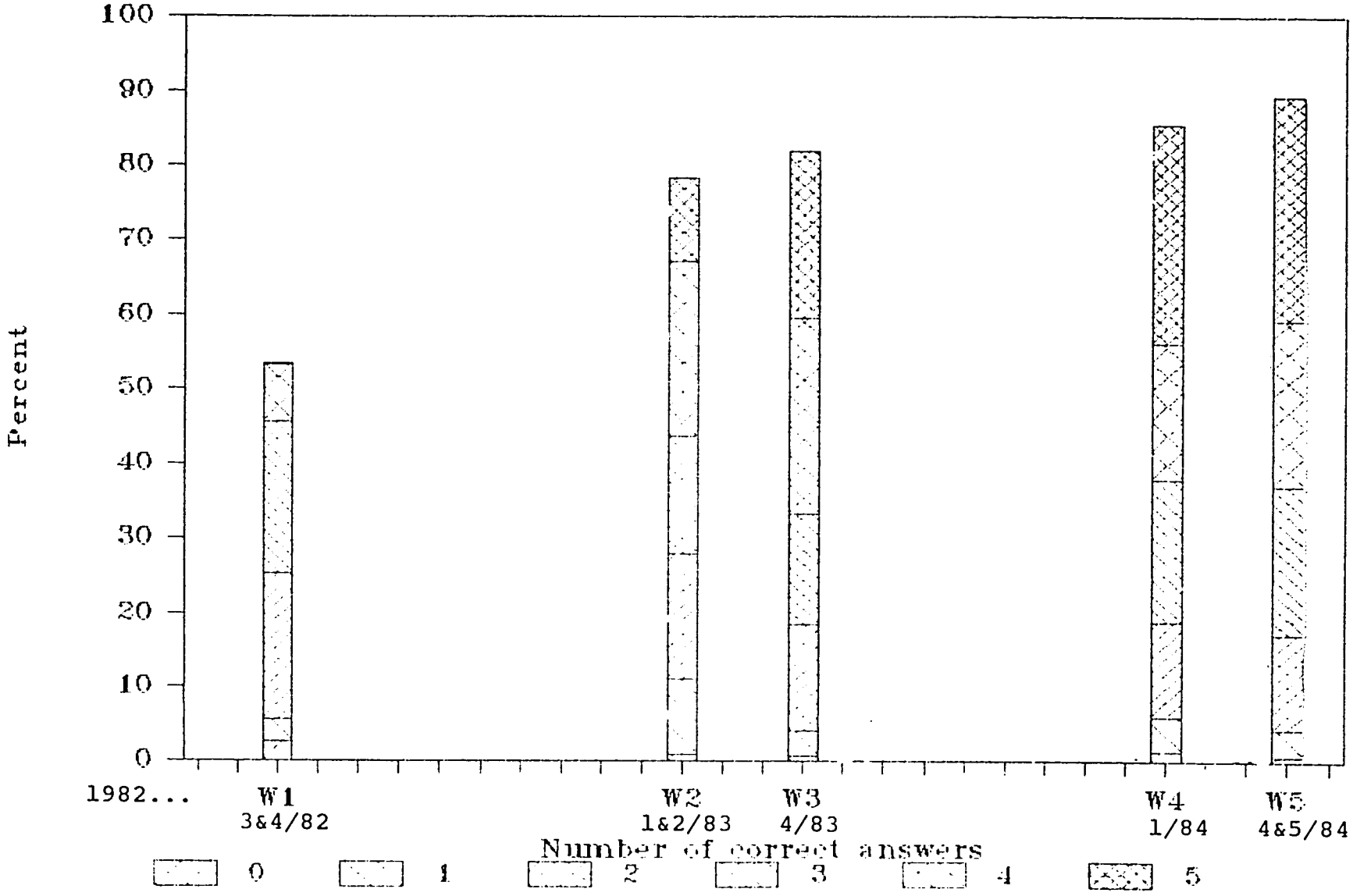
We can see that, as awareness of WSS increased, so did mothers' correct responses to more and more questions about WSS. Before the start of the campaign, mothers who knew about WSS gave an average of 2.59 correct responses. By the end of the campaign, more mothers knew about WSS and they could give an average of 3.68 correct responses.

Another way to examine the change in over knowledge is to look at the number of correct response given by mothers as compared to the total number of correct responses possible (i.e., 5 times the number of mothers questioned in the wave). The results of these calculations are presented for WSS-aware mothers and also for all mothers in Figure II-31.

This figure shows that learning about WSS climbed steadily during the first year of the campaign, when messages focused on WSS. During the second year of the campaign, when messages about WSS were still broadcast but feeding and sanitation were the focuses, increases in knowledge leveled off. Knowledge for all mothers increased more steeply at the beginning as more mothers who had not known about WSS before the campaign learned of its existence and about how to mix and administer it.

An important objective of the campaign was not only to make mothers aware of WSS and persuade them to use it, but to teach them to use WSS correctly. In order for a mother to use WSS correctly she would have to know the correct answers to all five

Figure II-30 Gain in mothers' knowledge over time: Number of correct responses by mothers who knew about WSS*



* Each bar represents the percent of mothers who knew about WSS. Each bar is divided to reflect the proportion of WSS-aware mothers who answered from 5 to none of of the WSS questions correctly.

GDIAR: KNOWSS, AMTH20,AMTSUG,AMTSLT,HOWGIV,WSSVOM,PREPWS,WHENGV

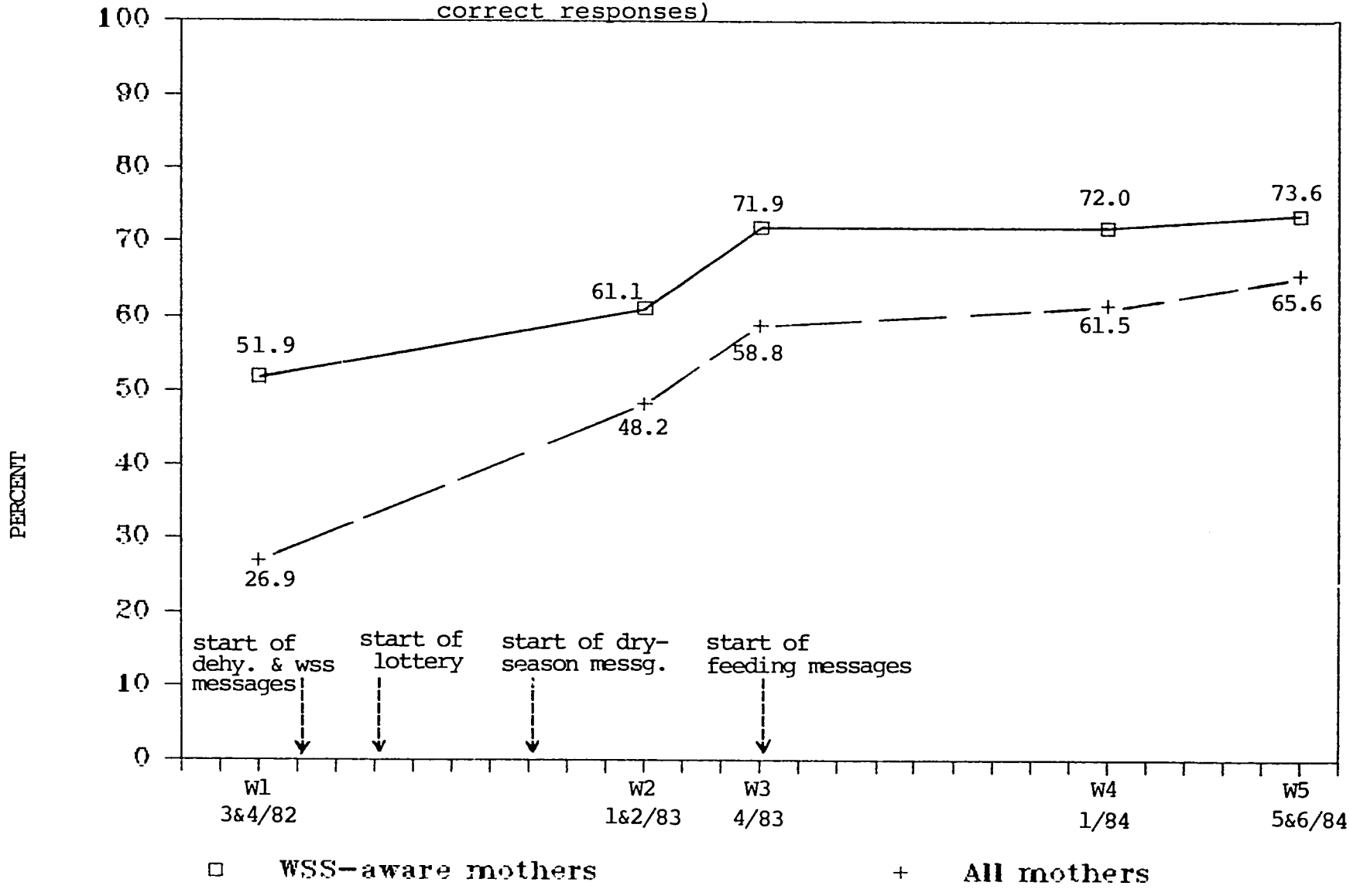
Table II-15 Number of WSS-aware mothers' correct responses to questions measuring knowledge of water-sugar-salt solution

No. of correct answers to knowledge questions	Wave 1 3&4/82 n=408	Wave 2 1&2/83 n=625	Wave 3 4/83 n=642	Wave 4 1/84 n=685	Wave 5 4&5/84 n=734
0	2.0%	1.1	0.6	1.5	0.7
1	5.9	13.0	3.9	5.4	3.8
2	38.2	21.4	17.8	15.0	14.6
3	39.0	20.0	18.2	22.3	22.3
4	14.7	30.1	31.9	21.3	24.9
5	0.2	14.4	27.6	34.5	33.7

* Questions covered: proportion for mixing WSS, how to give WSS, how often to make it, what to do if the child vomits, and when to start giving it.

GDIAR:AMTH20,AMTSUG,AMTSLT,HOWGIV,WSSVOM,PREPWS,WHENGV

Figure II-31 Change in WSS knowledge index over time (Percent of correct responses to knowledge questions out of total number of possible correct responses)



GDIAR:AMTH20,AMTSUG,AMTSLT,HOWGIV,WSSVOM,PREPWS,WHENGV

of the knowledge questions included in the index. Figure II-32 shows the change over time for the highest level of knowledge for WSS-aware mothers and all mothers.

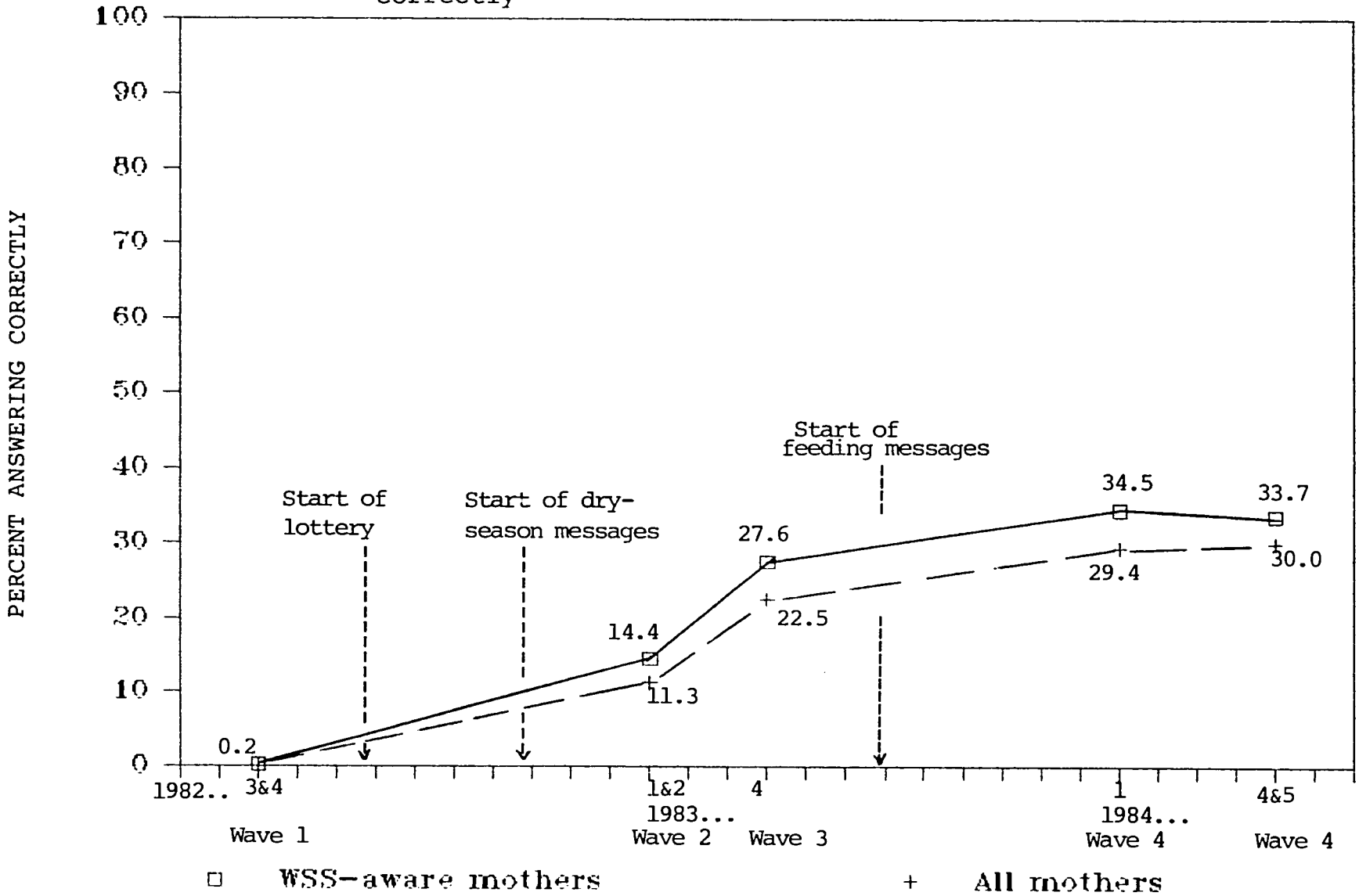
As can be seen in the figure, high knowledge about WSS climbed steadily over the course of the campaign, for both WSS-aware and all mothers, then leveled off at the end. As reported in the previous section, over half the women in the sample knew about WSS before the campaign. This figure and Table II-15 show that much of their pre-campaign knowledge was incorrect: almost none of the mothers had correct responses to all questions about mixing and administration before the campaign.

After the Happy Baby Lottery and during dry-season WSS messages, high knowledge about mixing and administration had increased to 14.4 percent among mothers who knew about WSS. A second, sharper increase in high knowledge took place during the dry-season message phase, in which correct mixing and administration were further stressed. By the end of this message phase (April 1983), almost 28 percent of mothers aware of WSS gave correct responses to all the questions. After this, during feeding and sanitation messages, high knowledge continued to increase, but at a slower rate, then leveled off by the end of the campaign. The responses when analyzed on the base of all the sample mothers are parallel, but lower because mothers who didn't know about WSS were added to the low knowledge category.

Low and high knowledge about WSS among mothers who reported knowing about WSS were examined for each division. Figure II-33 and Table II-16 show the results of this. Mothers with correct answers to none, one or two of the WSS questions were grouped into low knowledge and those with three to five correct answers were considered to have high knowledge. The high knowledge measure used previously for the whole sample (a score of 5) could not be used here because of the smaller number of cases in each group.

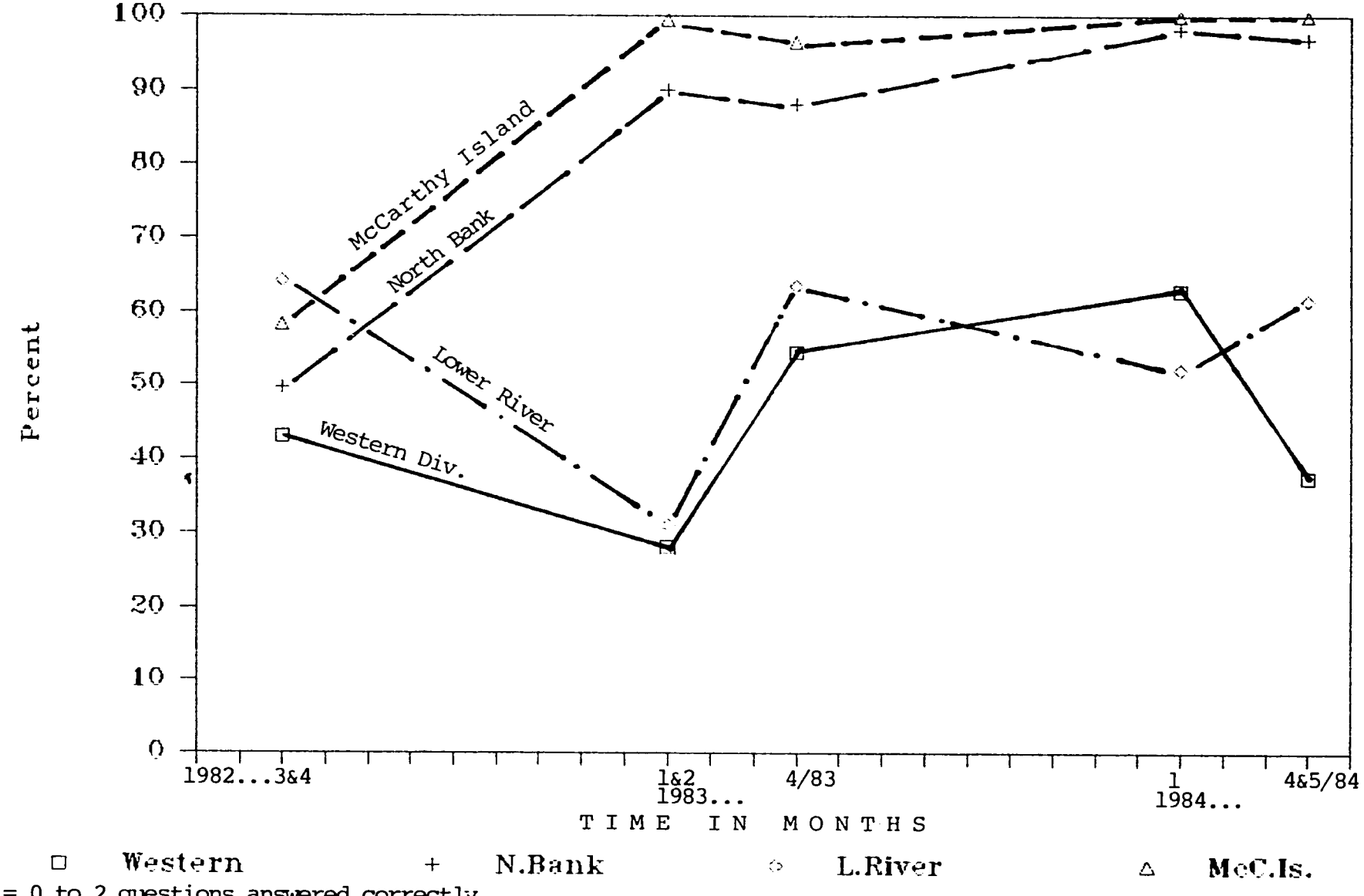
The analysis shows that for two of the divisions, learning is rapid and soon almost all the women are in the high group. However, for the other two divisions, Lower River and Western

Figure II-32 Percent of mothers answering five WSS knowledge questions correctly



Wave 1 n=408, Wave 2 n=625, Wave 3 n=642, Wave 4 n=685, Wave 5 n=734
GDIAR:AMTH20,AMTSUG,AMTSLT,HOWGIV,WSSVOM,PREWS,WHENGV

Figure II-33 High* levels of WSS knowledge among mothers who know about WSS, by division.



*Low = 0 to 2 questions answered correctly.
High = 3 to 5 questions answered correctly.

GDIAR:AMTH20, AMTSUG, AMTSALT
HOWGIV,WSSVOM, PREPWS, WHENGV

Table II-16 High* levels of WSS knowledge among mothers who know about WSS by division

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Western Division	42.9% (42/98)	28.2 (31/110)	54.4 (74/136)	63.0 (75/119)	37.4 (55/147)
North Bank	49.5 (49/99)	90.0 (126/140)	88.0 (169/192)	98.2 (168/171)	97.0 (192/198)
Lower River	64.1 (66/103)	31.2 (58/186)	63.4 (90/142)	52.1 (112/215)	61.5 (126/205)
McCarthy Island	58.3 (63/108)	99.5 (188/189)	96.5 (166/172)	100.0 (180/180)	100.0 (184/184)
Significance level of difference between divisions:	$p < .01$	$p < .01$	$p < .0001$	$p < .01$	$p < .01$

* High knowledge = correct responses to three to five knowledge questions.
GDIAR: AMTH20, AMTSUG, AMTSLT, HOWGIV, WSSVOM, PREPWS, WHENGV

Divisions, the pattern is different and the overall levels are much lower.

The lower level of knowledge in Western Division matches the low levels of exposure to the radio messages, low awareness of the lottery, and lower clinic attendance seen in previous sections. However, the low level of knowledge in Lower River Division is more difficult to understand. It seems that, although mothers in this division reported very high exposure to the radio messages, high awareness of the lottery, and high exposure to the flyer, they learned much less about actual mixing and administration.

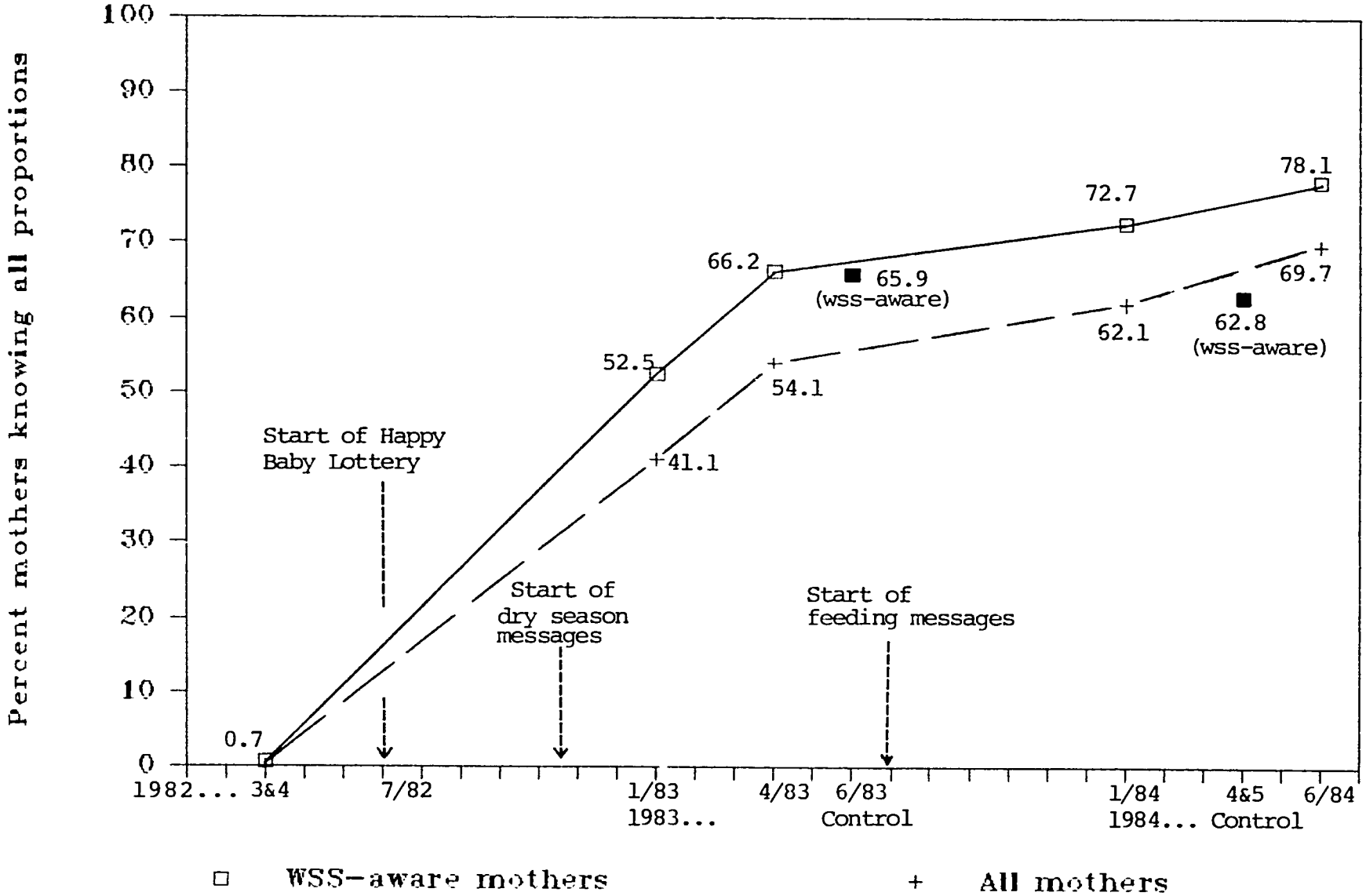
c. Knowledge of specific WSS mixing and administration instructions

(i) Correct mixing proportions

Mothers who reported knowing about WSS were asked open-ended questions about how much water, sugar, and salt are needed to make WSS five times over the course of the project. These questions were also asked of the control groups.

The AED preliminary investigation had found that, although many mothers knew about WSS before the campaign, they had no standard ways of measuring the ingredients correctly and had many different, sometimes dangerous, recipes. Figure II-34 and Table II-17 show the change in knowing correct answers to the three questions about mixing over time. These indicate that, during the message phases stressing WSS mixing and administration (Phases 2 and 3), correct knowledge of WSS mixing proportions increased steadily. One year after the start of the campaign, in April 1983, 66 percent of the mothers who knew about WSS could give correct answers to questions about the mixing proportions. This knowledge continued to increase, but at less quickly. Table II-18 shows the percentages of mothers with correct responses to each question and shows that mothers generally seem to have learned the mixing instructions as a set.

Figure II- 34 Mothers' knowledge of correct water-sugar-salt mixing over time



GDIAR:AMTH20:AMTSUG,AMTSLT;
GRAD:AMTWA,AMTSU,AMTSA

Table II-17 Number of correct responses about water-sugar-salt solution mixing given by WSS-aware mothers over time

Number of correct responses about WSS proportions	Mar/Apr 1982	Jan/Feb 1983	Apr 1983	Control (5&6/83)	Jan 1984	Control (3/84)	May/June 1984
0	89.6%	16.2	8.7	17.3	3.6	11.5	2.3
1	8.2	12.3	8.9	7.5	4.4	14.1	3.0
2	1.4	19.0	16.2	9.2	19.2	11.5	16.6
3 (All)	0.7	52.5	66.2	65.9	72.7	62.8	78.1
n =	415	625	642	173	686	156	735

GDIAR: AMTH20, AMTSUG, AMTSLT; GRAD and Control: AMTWA< AMTSU, AMTSA;
S. Spain: SWATER, SSUGAR, SSALT

Table II-18 Percent of WSS-aware mothers with correct knowledge about volume of water, sugar, and salt to use in making the water-sugar-salt solution.

	Mar/Apr. 1982	Jan/Feb. 1983	Apr. 1983	Control (5&6/83)	Jan. 1984	Control (3/84)	Apr/May 1984
Water (3 Julpearl bottles or equivalent)	8.2%	66.9	77.3	71.7	90.2	80.8	94.1
Sugar (8 bottle-caps or equivalent)	1.4	67.8	79.1	74.0	85.9	72.9	89.7
Salt (1 bottlecap or equivalent)	3.6	73.1	83.5	78.0	85.0	70.5	86.7
n =	416	625	642	173	686	156	735

Variables: GDIAR: AMTH20, AMTSUG, AMTSLT
GRAD: AMTWA, AMTSU, AMTSA; S. Spain: SWATER, SSUGAR, SSALT

The responses from the first control group suggest that the steep initial gain in knowledge of proportions was a real gain in knowledge. Sixty-six percent of the WSS-aware mothers in the main sample had correct knowledge in April 1983, as did 66 percent of the WSS-aware mothers in the control group, measured in May and June 1983. However, the second control group measure has not risen, and may mean that some of the later knowledge gains among sample mothers result from familiarity with the questions. Seventy-three percent of the WSS-aware mothers in January 1984 and 78 percent in April/May 1984 had correct mixing knowledge as compared to 63 percent of the WSS-aware mothers in the control group (measured in March 1984).

Knowledge about WSS proportions increased in a similar pattern when all mothers in the sample were considered. By January 1983, 41 percent of all the sample mothers knew correct WSS proportions. These percentages continued to increase until the last measurement. By June 1984, almost 70 percent of the mothers knew correct mixing.

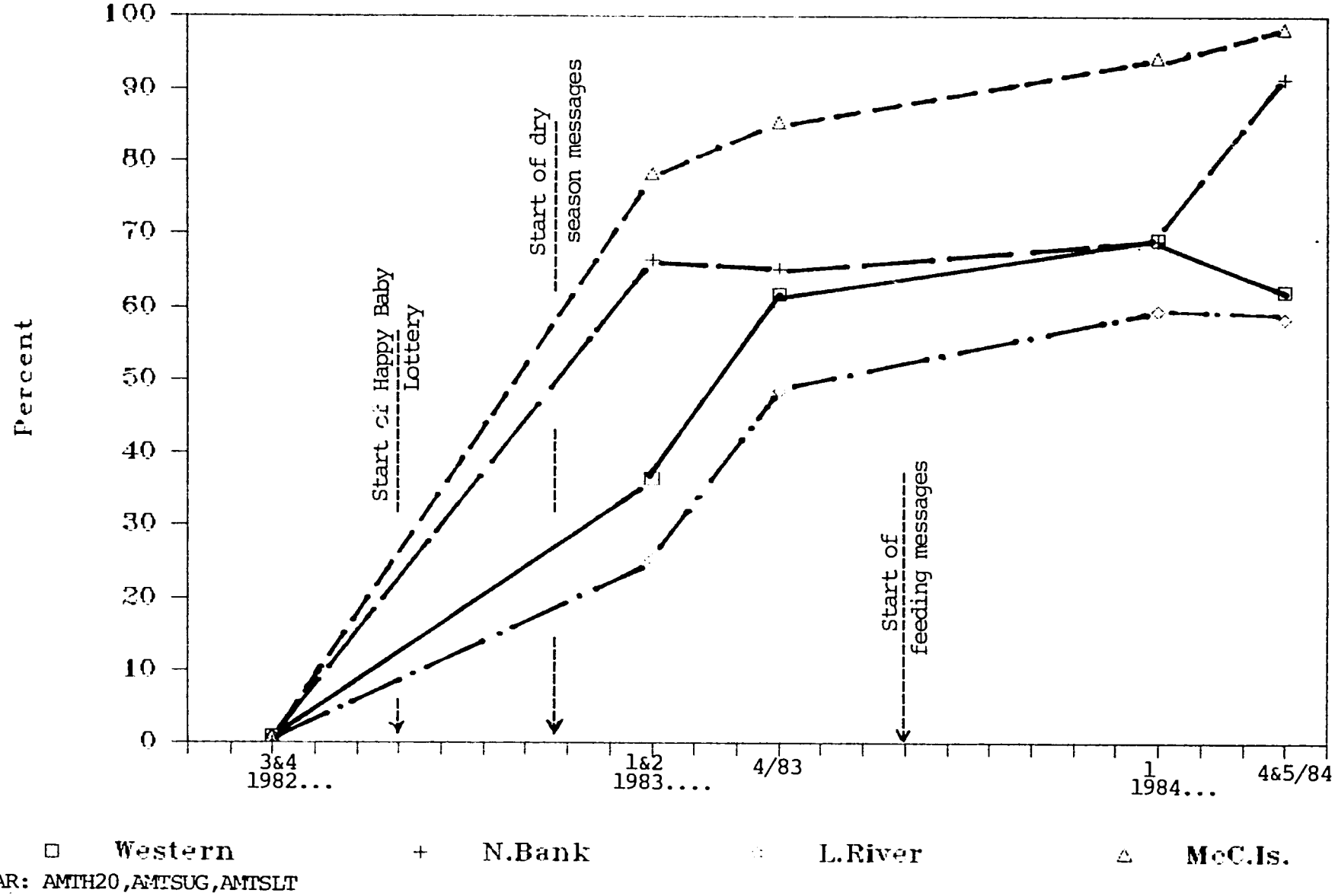
Within each division, learning of the correct mixing proportions followed approximately the same pattern, with a steep rise in correct knowledge among mothers who knew about WSS between Waves 1 and 3, during the periods when messages about WSS were being disseminated more intensively (see Figure II-35 and Table II-19).

Again, there were considerable differences between divisions, but this time the patterns are similar. Mothers in Lower River and Western division tended to have lower knowledge over all. They learned about WSS mixing later than mothers in the other two divisions and during the dry-season messages rathe than during the lottery. This finding was not expected for Lower River Division mothers, who reported high exposure to the lottery and the mixing flyer.

(ii) Correct administration

Mothers in the main sample and in the control sample were asked a series of questions about how WSS should be administered

Figure II-35 Knowledge of correct water-sugar-salt mixing proportions among WSS-aware mothers, by division



GDIAR: AMTH20,AMTSUG,AMTSLT

Table II-19 Knowledge of correct water-sugar-salt mixing proportions among WSS-aware mothers, by division

Division	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Western	1.0% (1/100)	36.4 (40/110)	61.8 (84/136)	69.2 (83/120)	62.2 (92/148)
North Bank	0.0 (0/100)	66.4 (93/140)	65.1 (125/192)	69.0 (118/171)	91.4 (181/198)
Lower River	1.0 (1/104)	25.3 (42/186)	48.6 (69/142)	59.5 (128/215)	58.5 (120/205)
McCarthy Island	0.9 (1/111)	78.3 (148/189)	85.5 (147/172)	94.4 (170/180)	98.4 (181/184)

GDIAR: AMTH20, AMTSUG, AMTSLT

to a child: when WSS should first be given, how it should be administered, how many days WSS should be given, what to do if the child vomits, how often WSS should be made, and how much should be given to children of different ages. Because of earlier efforts by the Gambian health department, mothers who knew about WSS before the campaign already knew some correct administration practices - - to give WSS at the first sign of diarrhea, and to give WSS with a cup and spoon.

Mothers' correct responses about when to first give WSS to a child (at the first sign of diarrhea) were high at the start of the project and changed very little during the message phases stressing WSS instructions (see Table II-20). There was a slight rise in correct knowledge after the Happy Baby Lottery, but it was not significant ($p < 0.3$). When feeding messages started and WSS messages were reduced, mothers' correct knowledge began to decrease, suggesting a forgetting effect.

The campaign promoted that WSS be given from a cup, using a spoon. Mothers were asked how one should give WSS to a child, and the answers were coded as cup, spoon, bottle, other, and don't know. Table II-21 shows the distribution of their responses over time. The correct answers, cup and spoon, taken together account for an average of 82.9 percent of the mothers responses.

Bottle, as a response, rises from 2.9 percent at the beginning to 13.5 percent at the end with a higher peak in the middle. However, the referent for "bottle" may have shifted during the intervention. At the earliest measure, the mothers probably assume that "bottle" refers to a baby bottle and nipple used to administer the solution. The radio messages made frequent mention of Julpearl bottles as measures for mixing, and for determining how much solution should be given to a child of a given age. They may be using "bottle" after the radio spots to refer to a Julpearl bottle, rather than a baby bottle. If "bottle" is treated as a possible appropriate response under these assumptions, the average across all waves for plausible, if incorrect, responses about how WSS is given to a child, is 96

Table II-20 WSS-aware mothers' responses to question about when to first give water-sugar-salt solution to a child

	Wave 1 3&4/82 n=409	Wave 2 1&2/83 n=626	Wave 3 4/83 n=642	Control 1 6&7/83 n=173	Wave 4 1/84 n=685	Control 2 3/84 n=156	Wave 5 4&5/84 n=735
At the first sign of diarrhea*	84.8%	87.7	87.2	93.6	72.8	88.5	73.3
After one day	9.3	7.3	7.0	0.6	9.3	8.3	18.6
After two days	2.4	3.2	3.7	1.2	13.3	0.6	7.3
After three days	1.0	0.6	0.3	0.0	3.8	0.0	0.5
Other	1.0	0.0	0.0	0.0	0.3	1.3	0.0
Don't know	1.5	1.1	1.7	4.6	0.4	1.3	1.0

* Correct response
GDIAR, Control: WHENGV

Table II-21 WSS-aware mothers' responses to question about how WSS is given to a child

	Wave 1 3&4/82	Wave 2 1/83	Wave 3 4/83	Wave 4 1/84	Wave 5 4&5/84
Bottle	2.9%	13.1	25.2	10.8	13.5
Cup*	16.2	41.3	45.8	26.4	47.7
Spoon*	77.5	31.5	27.3	62.2	38.3
Other	1.4	13.0	0.9	0.0	0.3
Don't know	1.9	1.1	0.8	0.6	0.1
	n=415	n=625	n=642	n=686	n=733

* Correct responses. Mothers were told to give WSS from a cup, using a spoon.
GDIAR:HOWGIV

percent. If bottle is treated as incorrect, the average is, as stated, above 82.9 percent. Either analysis reflects a high level of correct responses about how to administer WSS.

The campaign promoted that WSS be given until the diarrhea stops. WSS-aware mothers' responses about how many days WSS should be dropped steadily throughout the second year of the campaign (see Table II-22). We cannot correctly judge how much learning took place during the lottery and dry-season message phases because the instruction to give WSS until the diarrhea stops was a new idea introduced in the campaign. Thus, mothers couldn't give this as an answer in the first diarrhea interview wave. However, we will make the assumption here that correct knowledge was zero. This suggests that during the first phases of the campaign, mothers learned how long to give WSS. By January and February 1983, 71 percent of the mothers could give the correct response. However, after this, correct knowledge fell rapidly, and many mothers began to say that WSS should be given for one, two, or three days. It may be that, by the end of the campaign, mothers were beginning to confuse this knowledge with dry-season messages exhorting women to give WSS for three days, then take the child to the health center. Either response would probably have been clinically appropriate.

Nearly one-half of WSS-aware mothers (47.7%) knew the correct responses to a question about what to do if the child vomits the WSS (wait and try again in a little while) before the start of the campaign (see Table II-23). After the lottery, in January 1983, correct knowledge had increased to 63 percent of the mothers and continued to increase at the same rate until the start of the feeding messages, when knowledge of this item leveled off.

Learning that WSS should be made every day rose to a level of about 60 percent and stayed there (see Table II-24). There was no change in the percentage of WSS-aware mothers giving the correct response between March 1982 and January 1983, but the responses did shift markedly after that. During this time, there was an increase in the proportion of mothers who said

Table II-22 WSS-aware mothers' responses to question about how many days the child should be given water-sugar-salt solution (WSS)

Number of days	Wave 1 3&4/82	Wave 2 1/83	Wave 3 4/83	Wave 4 1/84	Wave 5 4&5/84
1	8.7%	10.1	20.2	15.3	17.6
2	16.5	9.4	9.8	13.0	13.1
3	21.8	5.9	7.0	23.6	21.7
4	5.8	2.7	3.7	7.1	8.4
More than 4	45.3	0.0	0.0	3.1	0.1
Until diarrhea stops*	**	71.4	58.6	37.0	39.0
Don't know	1.9	0.5	0.6	0.9	0.1
	n=413	n=625	n=642	n=686	n=734

* Correct response
** This response was not listed on the questionnaire. Because the idea of giving WSS until the diarrhea stops was introduced by the campaign, we can assume the percentage for this response to be zero.
GDIAR:DAYSGV

Table II-23 WSS-aware mothers' responses to question about what they should do if the child vomits when given water-sugar-salt solution (WSS)

	Wave 1 3&4/82	Wave 2 1/83	Wave 3 4/83	Wave 4 1/84	Wave 5 4&5/84
Stop giving WSS	15.7%	13.8	18.1	16.3	16.2
Wait and try later*	47.7	62.7	69.2	66.8	68.8
Force the child to take WSS	20.3	7.4	11.7	14.7	14.2
Other	15.3	15.7	0.5	1.5	0.7
Don't know	1.0	0.5	0.6	0.6	0.1
	n=413	n=625	n=642	n=686	n=734

* Correct response
GDIAR:WSSVOM

Table II- 24 WSS-aware mothers' response to question about how often water-sugar-salt solution should be made

Response	Wave 1 3&4/82	Wave 2 1/83	Wave 3 4/83	Wave 4 1/84	Wave 5 4&5/84
More than once a day	9.7%	39.8	19.8	23.0	22.6
Every day*	32.2	32.5	64.0	58.9	61.6
Every two days	3.9	1.1	7.5	10.2	12.5
When first batch is used up	46.5	25.9	7.9	7.4	3.0
Other	4.8	-	-	-	-
Don't know	2.9	0.6	0.8	0.4	0.3
	n=413	n=625	n=642	n=686	n=734

* Correct response
GDIAR:PREPWS

WSS should be made more than once a day. This may be a case of information overload during the lottery phase. At the end of the dry-season messages, which focused on WSS mixing, administration and use for dehydration, without all the extra information and excitement of the lottery, there was a steep rise in mothers giving the correct response (64 percent of mothers). This leveled off for the rest of the campaign.

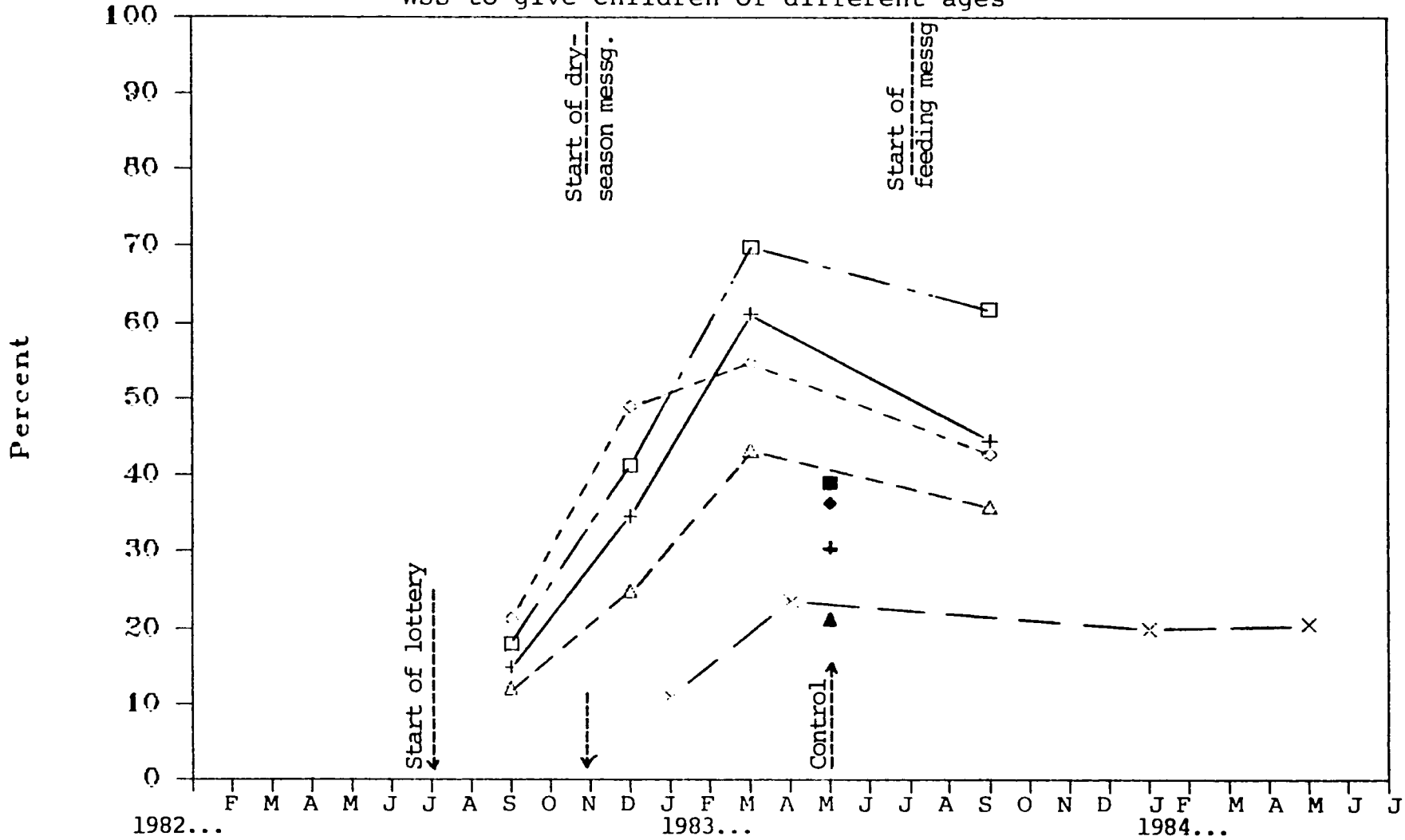
The final aspect of WSS administration that was taught was how much to give children of different ages. The campaign gave complex instructions which may have overwhelmed the audience considering the low level of schooling and possible poor number skills among Gambian women. Mothers were told to give children under six months of age one Julpearl bottle of WSS a day, to give children 6-18 months old two Julpearl bottles, and children over 18 months three bottles. These instructions may have been particularly problematic because many mothers do not know the age of their child.

Mothers were asked open-ended questions about the volume of WSS to give in several different survey instruments. A question about how much WSS to give a child 6-18 months was administered to WSS-aware mothers four times in the diarrhea instrument. Women were also asked these questions in questionnaires about the radio spots, administered in September and October 1982, December 1982, and March 1983 and in an interview for a separate study in September and October 1983.

As can be seen in Figure II-36 knowledge about the correct volume of WSS to give increased during the lottery and the dry-season messages, then began to fall when the focus of the campaign changed. The pattern is essentially the same for the radio spot and diarrhea questionnaires (see Table II-25).

The radio spot responses indicate a very high level of learning during the first year of the messages and then a moderate deline. The final levels were two to five times as high as the initial levels (see also Table II-26). By March 1983, 43 percent of all mothers gave correct answers to all the volume questions. The responses from the control group are lower than

Figure II- 36 Mothers' correct responses to questions about volume of WSS to give children of different ages



□ Under 6 mo. + 6-18 months ◇ Over 18 months △ All 3 volumes correct ✕ Correct amount for child 6-18 mo. from DIARRHEA questionnaire

GRAD2,3,4,ctrl:
I24A,IN24B,IN24C
McDivitt:KAMT1,KAMT2,KAMT3

Table II-25 Mothers' responses to question about how much water-sugar-salt solution should be given to a child between six and 18 months of age*

Amount	Wave 1 3&4/82 n=414	Wave 2 1&2/83 n=625	Wave 3 4/83 n=642	Wave 4 1/84 n=686	Wave 5 4&5/84 n=734
One liter	2.9	12.3	9.5	12.0	19.1
One cup	10.9	20.5	39.3	39.3	22.6
As much as child can drink	34.1	41.0	22.3	28.9	36.0
Two Julpearl bottles**	***	11.0	23.5	20.0	20.7
Other	43.7	2.4	0.2	2.3	0.4
Don't know	8.5	12.8	5.3	6.6	1.2

* Includes only mothers who reported knowing about WSS
** Correct response
*** Before the campaign, Julpearl bottles had not been recommended to measure WSS for children of different ages. The question used in this wave asked about how much should be given to any child. Although they are not strictly comparable to the later figures, the responses to this question were provided to give an indication of the range of responses given by the mother before the campaign.

GDIAR:WSSVOL

Table II-26 Mothers' correct responses to questions about the volume of WSS to give children of different ages

Correct knowledge of volume of WSS to give a child of:	Sept./Oct. 1982	Dec. 1982	March 1983	Control 5&6.83	Sept/Oct. 1983
Under 6 months old	18.1%	41.4	69.8	39.0	61.9
6 to 18 months old	14.8	34.6	61.1	30.5	44.5
18 months or older	21.2	48.8	54.7	36.3	42.8
n =	819	971	860	223	677*
All three correct	12.0	24.9	43.2	21.1	35.9

* The results of this interview are not strictly comparable to the others because of differences in the sample - only mothers with children under five years old at the time of the interview were questioned.

Radio Spots 2, 3, 4, and Control: IN24A, IN24B, IN24C
McDivitt: KAMT1, KAMT2, KAMT3

the sample, but still roughly twice as high as the sample initial levels. There does seem to have been a campaign effect on mothers' learning about amounts of WSS to give children of different ages. Knowledge increased during message phases with frequent information about WSS and started to drop when WSS messages decreased.

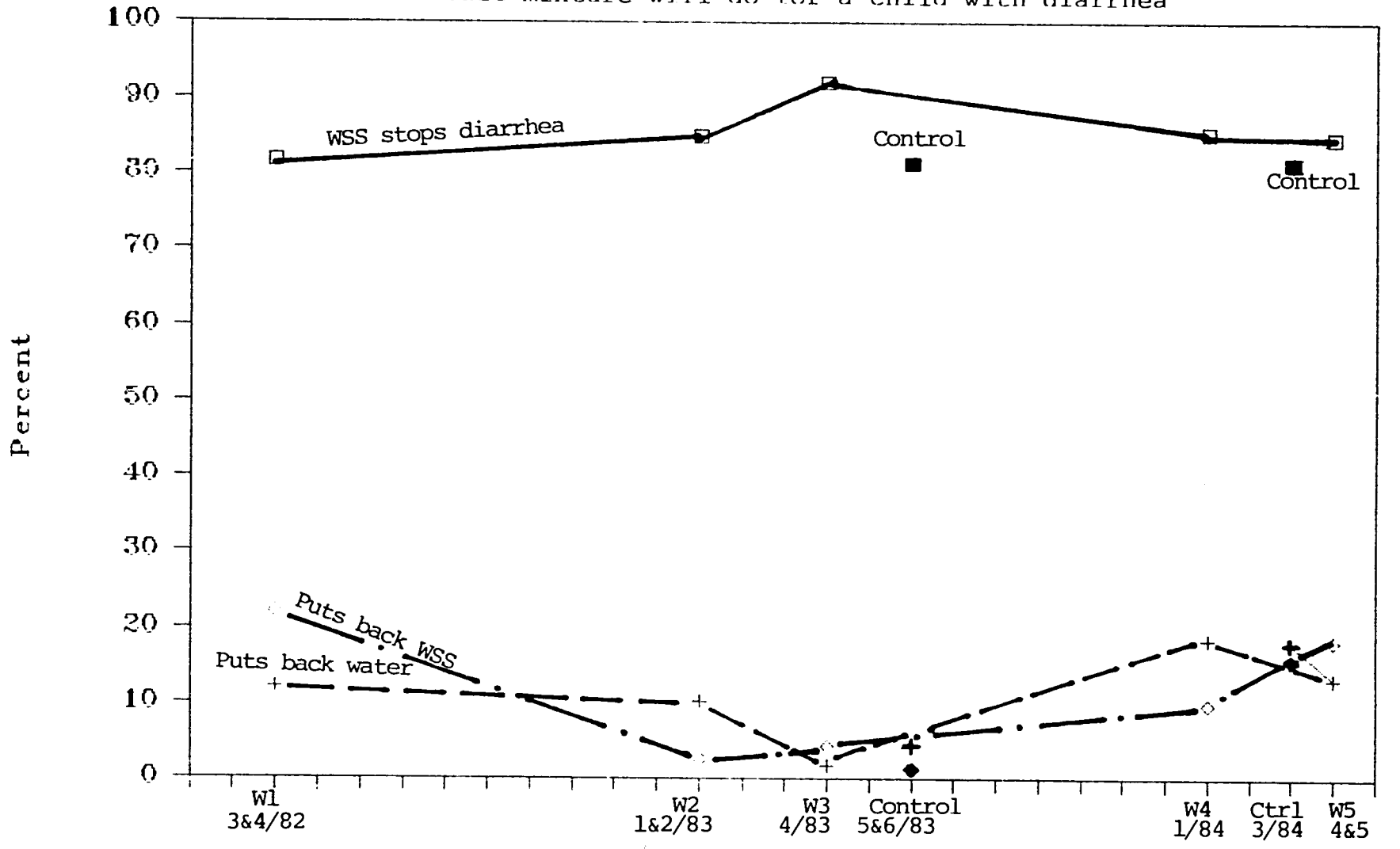
d. Knowledge about the function of WSS

From the start of the campaign, messages had stressed that WSS prevents dryness by putting back water and that it does not stop diarrhea as most mothers expected and wanted. Sample mothers were asked two different questions about their views of the role of WSS. In the diarrhea questionnaire waves, they were asked what they expected WSS to do for a child with diarrhea. In three radio-spot interviews, they were given a choice, does WSS stop diarrhea or prevent dryness?

As can be seen in Figure II-37 and Table II-27, when asked what WSS does, the majority of mothers who were aware of WSS, responded that it stopped diarrhea. This changed little over the course of the campaign except for a small, but significant ($p < .001$) rise during dry-season messages, which paradoxically focused on treatment of dehydration and the role of WSS in preventing it. Corresponding with the rise in mothers saying WSS stops diarrhea is a decrease in their reporting that it either puts back water or puts back water, sugar, and salt. Later, after the phases stressing dehydration were over, more mothers reported that WSS put back water or WSS. However, there was very little change in the continued view that it stops diarrhea.

We don't know why more mothers said WSS stops diarrhea after the dry-season messages, which specifically told them that it puts back water and doesn't stop diarrhea. In a second question, when mothers were given a choice between whether WSS stops diarrhea or prevents dryness, there was a steep drop in mothers' reporting that WSS stops diarrhea between December 1982 and March 1983, the time when dry-season messages were being disseminated.

Figure II-37 WSS-aware mothers' expectations of what the water-sugar-salt mixture will do for a child with diarrhea



□ Stops diar. + Puts back water ◇ Puts back WSS

GDIAR: STOPDI, RETH20, RETWSS

Table II-2 7 WSS-aware mothers' expectations of what WSS will do, over time

What W-S-S does:	Wave 1 3&4/82 (n-414)	Wave 2 1&2/83 (n=625)	Wave 3 4/83 (n=640)	Control 1 6&7/83 (n=223)	Wave 4 1/84 (n=686)	Control 2 3/84 (n=166)	Wave 5 4&5/84 (n=735)
Stops diarrhea	80.0%	85.6	87.2	81.2	85.4	81.3	84.6
Cleans the stomach	24.2	6.1	0.6	0	7.3	2.4	3.7
Puts back water	12.1	10.9	5.9	4.5	18.5	18.1	13.1
Puts back water, sugar, salts	23.9	7.8	6.6	1.3	9.8	15.7	18.2
Other	11.1	0.5	0.3	1.3	2.8	1.8	0.3

GDIAR:Control:STOPDI,RETH20,RETWSS,CLEANS

See Figure II-38 and Table II-28 for details. However, the responses of the control group do not show the same change.

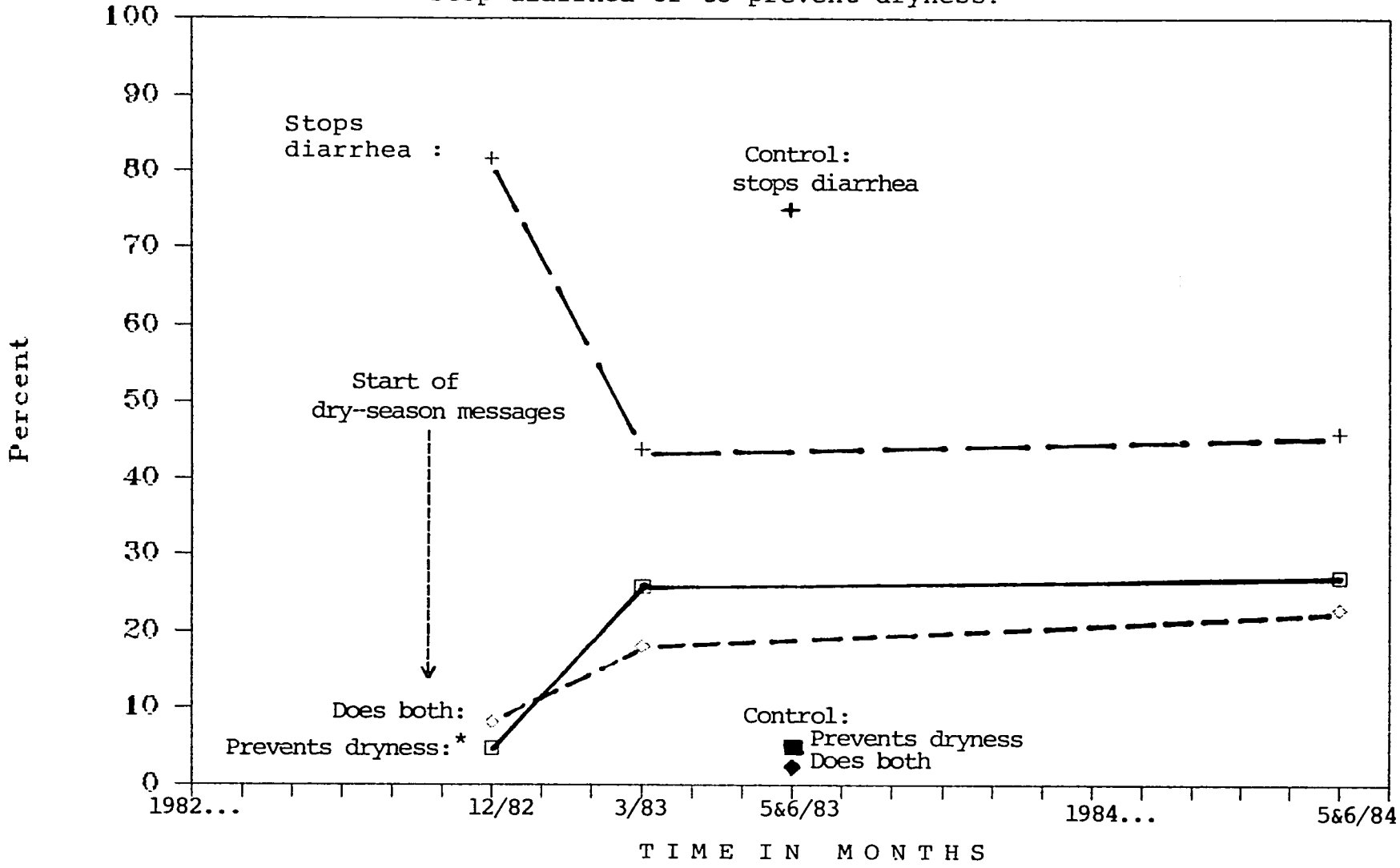
Overall, the data indicate that the campaign had little effect on mothers' views that WSS stops diarrhea. It may be that the first question measured a strongly held belief that medicines for diarrhea stop diarrhea. Mothers may have refused to believe that such a widely-publicized solution did not, in fact, stop the diarrhea, or they may never have gotten a sufficiently clear notion of the distinction between diarrhea and dehydration. It is also possible that, when they tried WSS, the diarrhea was nearly over and stopped of its own accord. The mean length of diarrhea bouts among the children in the sample was three to four days. In most cases, diarrhea would end within several days of beginning WSS, even if the mother started administering it at the start of diarrhea. This even experience with WSS might appear to confirm mothers' erroneous expectations.

e. Health worker knowledge about WSS and treatments for dehydration

An important part of the campaign was face-to-face education of the mothers by the health workers in their villages or clinics. Health worker training sessions occurred during April-June 1982 and July-August 1983. The workshops trained community health workers, health inspectors, dress-dispensers, nurse midwives, leprosy inspectors and Peace Corps health volunteers. These health workers were then expected to train other staff members in their villages and to teach village volunteers to be Red Flag volunteers. The 1982 workshops concentrated on dehydration and WSS; the 1983 workshops focused on feeding, but also included reviews of WSS.

Three samples of approximately twenty health workers or volunteers, designated "experts," were interviewed during the course of the project. The samples included community health nurses, Peace Corps volunteers, health inspectors, midwives, dresser-dispensers, nurses, village health workers, traditional

Figure II-38 Mothers' responses to question "Is WSS meant to stop diarrhea or to prevent dryness?"



GRAD3,4,7,Ctrl.
*Prevents dryness is the correct response.

Table II-28 Mothers' responses to question "Is WSS meant to stop diarrhea or to prevent dryness?"

WSS:	December 1982	March 1983	Control 5&6/83	May/June 1984
Prevents dryness*	4.8%	25.9	5.0	27.2
Stops diarrhea	81.7	43.9	75.1	46.0
Does both	8.2	18.1	2.3	22.9
Other	0.0	0.6	0.0	0.8
Don't know	5.3	11.5	17.6	3.0
n =	871	861	221	834

* Correct response

Radio Spots 3, 4, 7, Control

birth attendants, and Red Flag volunteers. All four divisions were covered, although equal numbers from each division were not interviewed. One sample was interviewed in May 1982, at the start of the radio broadcasts, another in January and February 1983, and the third in January 1984. The interviews included questions about WSS mixing and treatment of mild, moderate, and severe dehydration.

In May 1982, almost all the health "experts" knew about WSS (18/20 people). By January 1983, all the experts interviewed knew about WSS, as did those interviewed in January 1984. The health experts learned about WSS mixing proportions quickly. Correct knowledge of how to mix WSS increased dramatically after the start of the campaign. The campaign efforts involved direct training, printed manuals, as well as radio exposure. In May 1982, 10 out of 18 experts (55 percent) knew all the correct mixing amounts; in January 1983, 18 out of 20 (90 percent) knew all three, and in January 1984, all twenty-one experts knew the correct amounts.

Knowledge about when a child should be taken to the health center, rather than treated at home was learned more slowly. In the first year of the campaign, half the health experts could give a correct answer (11 out of 20 in May 1982, 10 out of 20 in January/February 1983). By January 1984, over three-quarters of the experts (17 out of 21) knew when to take a child to the health center.

Approximately half of the experts interviewed at each time had received training in the three treatment phases for dehydration. Table II-29 shows their responses to questions about dehydration. Knowledge about dehydration signs and their treatment varied widely. Overall, the experts seemed to know about what treatments to give for different types of dehydration better than they knew the signs of each type of dehydration.

Care must be taken in generalizing from these results as the samples were not chosen randomly. These results do suggest that health workers and volunteers were able to provide help to mothers in mixing WSS properly. Health experts seem to have

better learned the information that was given both in training sessions and in the broadcasts (i.e., WSS awareness and mixing and signs indicating that a child should be taken to the health

Table II-29 Knowledge of treatment for dehydration among health experts who had received training about dehydration

	May 1982	Jan/Feb 1983	Jan. 1984
Number trained:	10 of 20	12 of 20	13 of 21
Mild dehydration:			
Knows signs	8 (80%)	11 (92%)	5 (38%)
Knows treatment	8 (80%)	12 (100%)	10 (77%)
Moderate dehydration:			
Knows signs	7 (70%)	12 (100%)	10 (77%)
Knows treatment	8 (80%)	1 (8%)	12 (92%)
Severe dehydration:			
Knows signs	6 (60%)	1 (8%)	12 (92%)
Knows treatment	7 (70%)	6 (50%)	8 (67%)

GXPERTS:MILDDY to SEVTRT

center. This suggests that the broadcasts were important for health workers and Red Flag volunteers as well as for the general population. Health workers may also benefit from repeated messages to teach new information and reinforce existing knowledge.

f. Summary

During the campaign, awareness of and specific knowledge about WSS increased steadily during the first year, when radio messages focused on WSS. Increases in knowledge about WSS leveled off in the second year, when messages focused on feeding and sanitation.

The largest increase in knowledge was for the mixing proportions to make WSS. At the start of the campaign, only one

mother knew how to mix WSS correctly. By the end, 70 percent of the mothers and all of the health workers knew the correct proportions.

In general, improvements are noted in responses to questions about detailed administration instructions. Instructions concerning when to start treatment, how to administer WSS, for how long to give it, how often to remake it, how much to give to children of different ages, and what to do if the child vomits were covered. The patterns vary, but many peak and then decline slightly. The variable patterns may have to do with interactions betwseen messages. Overall, mothers needed time and continued reinforcement to learn about WSS administration.

The campaign seems to have had no effect in convincing mothers that WSS does not stop diarrhea. This may be because mothers refused to believe that a medicine recommended for diarrhea wouldn't stop it or because diarrhea tends to stop after two or three days anyway.

Health personnel also learned from the campaign. They too seemed to have benefited from radio broadcasts. Learning of the material covered in both the training and the broadcasts was higher than learning about material covered only in the manual and workshops.

(3) Knowledge about feeding during and after diarrhea

During the rainy season in The Gambia, diarrhea interacts with poor nutrition, leading to weakness and possible death. Focus-group interviews done by AED before the campaign found that most mothers said a child with diarrhea should continue to be breastfed and also to receive other foods during diarrhea. However, some mothers reported that breastfeeding can cause diarrhea, which suggested that they would discontinue breastfeeding in these cases. When asked about what mothers should feed a child with diarrhea, mothers most frequently mentioned coos pap,

a watery millet porridge, that is bland and low in nutrition.

The first year of the campaign promoted a "diet for dryness", focusing on WSS, but also including messages about continued breastfeeding and giving solid foods during diarrhea to build up the child's strength. Mothers were also told to give fluids, such as teas and juices. See Appendix A for summaries of the radio scripts used.

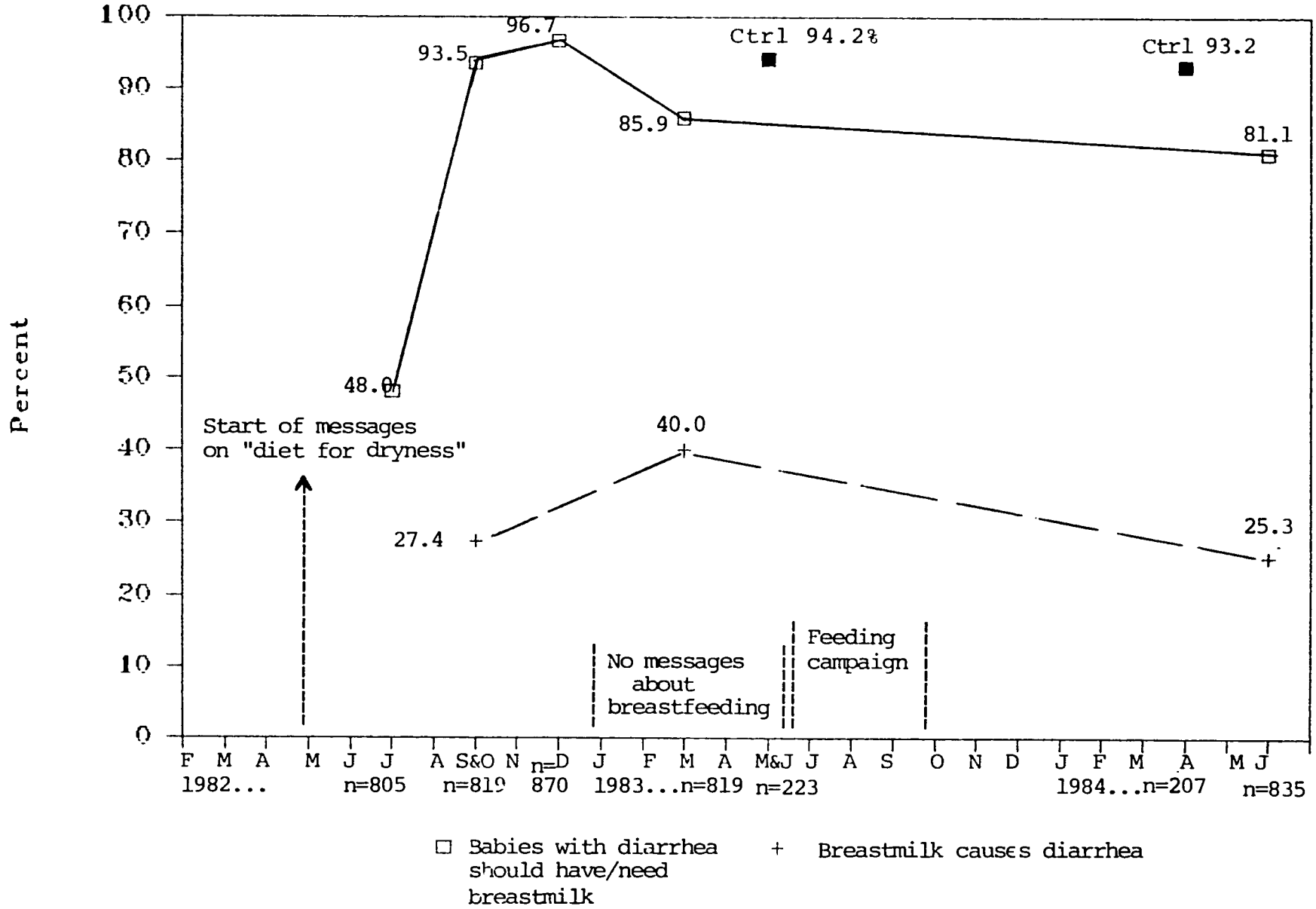
In 1983, after noting low behavioral responses to feeding messages, AED reformulated the messages. In the feeding messages starting in July 1983, the focus was on coaxing children to eat something during diarrhea (when they have little appetite) and on feeding them solid and high-protein foods after diarrhea to restore their weight and power. Nutritious local foods were recommended, as were energy-rich foods (e.g., milk, sugar, peanuts) that could be added to paps and other meals to add "power". A pictorial flyer was designed showing a mother giving her baby solid foods, listing local high-energy foods and showing pictures of power foods. Fifty thousand copies of this flyer were distributed. In addition, a second series of training session was held in July and August for 95 rural health staff (health inspectors, community health nurses and nursing students, primary health care trainees, and leprosy inspectors). The training sessions introduced the feeding messages, demonstrated how to use the feeding flyer to teach mothers, reviewed the overall campaign and problems seen by health workers and gave training in health education.

a. Continued breastfeeding during diarrhea

Mothers in the sample were asked five times a true/false question about babies needing breastmilk during diarrhea. They were also asked if it were true that breastmilk causes diarrhea. The responses to these questions are in Figure II-39.

Mothers' knowledge about breastfeeding showed a steep rise after the first months of broadcasting and, although it declined somewhat, still remained at a high level. The "diet for dryness"

Figure II-39 Mothers' knowledge that a child should continue to be breastfed during diarrhea



GRAD1-4,7,Control:BRST,CAUS

messages of the campaign started in May 1982. In July 1982, 48 percent of the mothers reported that it was true that babies with diarrhea should have breastmilk. By September and October, correct responses had jumped to 93.5 percent of the mothers. During the first five months of 1983, when no messages about breastfeeding were broadcast, the percentage of women giving correct responses dropped slightly. By the end of the campaign, 81 percent of the mothers reported that babies with diarrhea need breastmilk. Examination of breastfeeding knowledge by division showed a similar pattern for all divisions, although knowledge was consistently lower among mothers in Western Division.

In Figure II-39 we can also see that at least 25 percent of the mothers said that breastmilk causes diarrhea, when asked at three different times during the campaign. Thus, some of the mothers who said babies should have breastmilk during diarrhea had the conflicting belief that breastmilk causes diarrhea. The relationship between saying that breastmilk causes diarrhea and that a child with diarrhea needs breastmilk was examined at each time. In July 1982, the two were not significantly related; mothers agreed that a child needed breastmilk when he had diarrhea regardless of whether they also said breastmilk causes diarrhea. The measures were significantly related at the other two times (at $p < .0001$). Mothers who believed breastmilk causes diarrhea were less likely to say a child with diarrhea needs breastmilk. In March 1983, 91 percent of the mothers who said breastmilk doesn't cause diarrhea agreed that babies with diarrhea need breastmilk, compared to 78 percent of those who said that breastmilk <u>does</u> cause diarrhea. A year later, the figures were 87 percent and 63 percent, respectively.

We still see a large percentage of mothers giving conflicting responses to these two questions. A possible explanation of why mothers will answer yes to both questions is that some mothers in The Gambia believe that, under certain circumstances, breastmilk can cause diarrhea. In informal interviews with village mothers about causation, the women mentioned that when a woman works too hard in the fields, her breastmilk can go sour

and make the child ill. We would assume that, in these cases, she would stop breastfeeding, but otherwise would be amenable to continuing breastfeeding.

Overall, we see that mothers did learn about continued breastfeeding during diarrhea. After radio messages were reduced there was some forgetting, but knowledge remained high.

b. Giving liquids during diarrhea

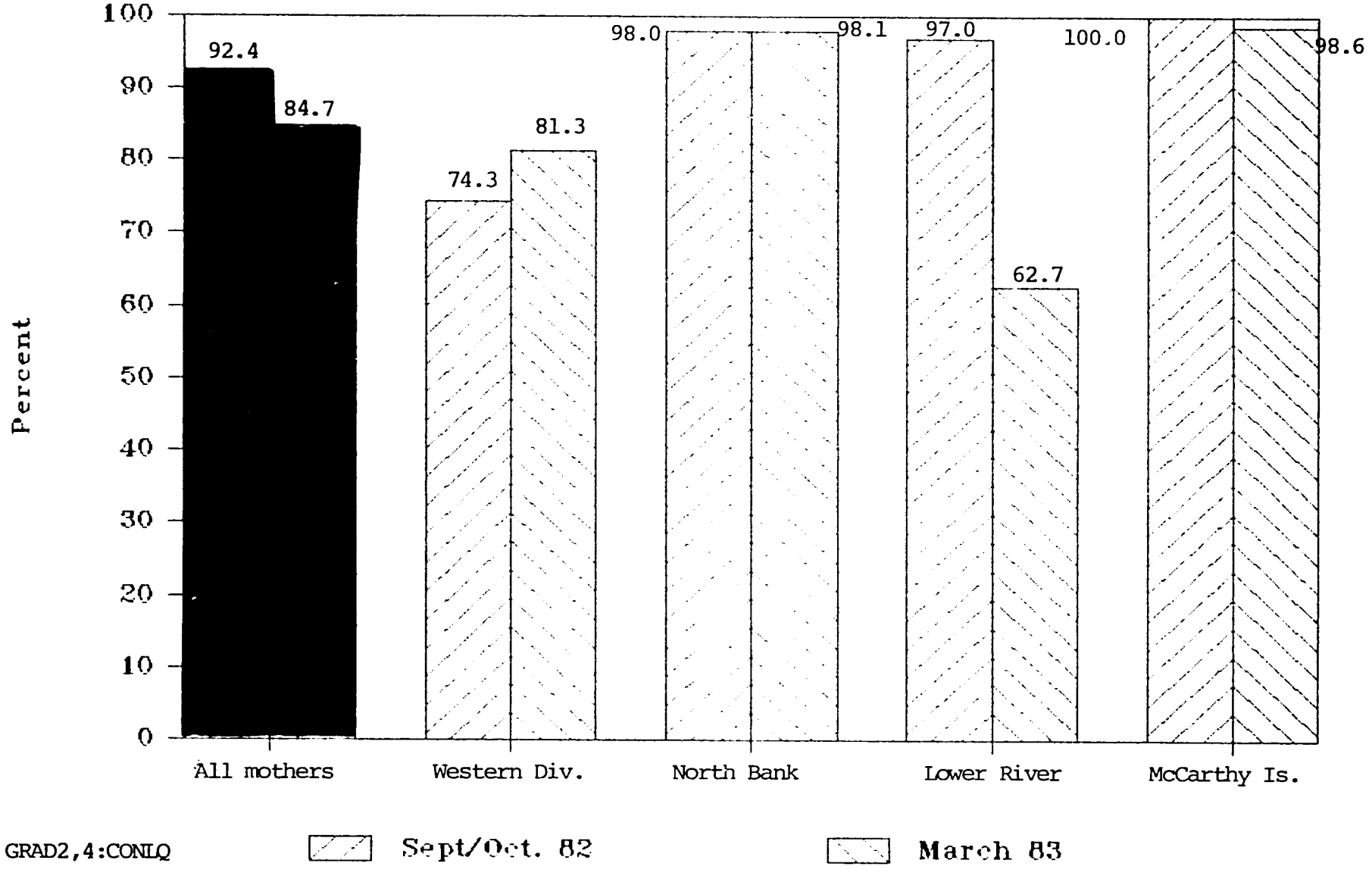
Messages about giving liquids, such as teas and juices, were broadcast from July through September 1982. Mothers were asked questions about giving liquids to children with diarrhea in September/October 1982, and in March 1983. Figure II-40 shows the mothers' responses. The mothers were asked: "A baby who is old enough to be drinking traditional teas and fruit juices should continue to have them when he has diarrhea. True or false?"

Knowledge about giving liquids during diarrhea was high after the start of the campaign. We can't say that this high level of knowledge was due to the effects of the campaign because we have no measure from before the broadcasts. Overall, it looks as if correct knowledge about giving liquids fell after the messages stopped. However, when we examine the pattern for each division, it is clear that this drop reflects a sharp decrease only for mothers in Lower River Division. Mothers in the other three divisions maintained the initial level of knowledge or increased slightly. We don't know why knowledge decreased only for women in one division.

c. Giving solids during and after diarrhea

During the first year of the campaign, Gambian mothers were urged to give their children adult, solid foods during and after diarrhea. To measure their knowledge in these areas, the mothers in the sample were asked if it were true or false that solids are not good for a baby with diarrhea, or that as soon as the baby is

Figure II-40 Mothers' knowledge that children with diarrhea need liquids



GRAD2,4:CONLQ

able he needs solid food to help get his strength back. The responses to these questions can be seen in Figure II-41.

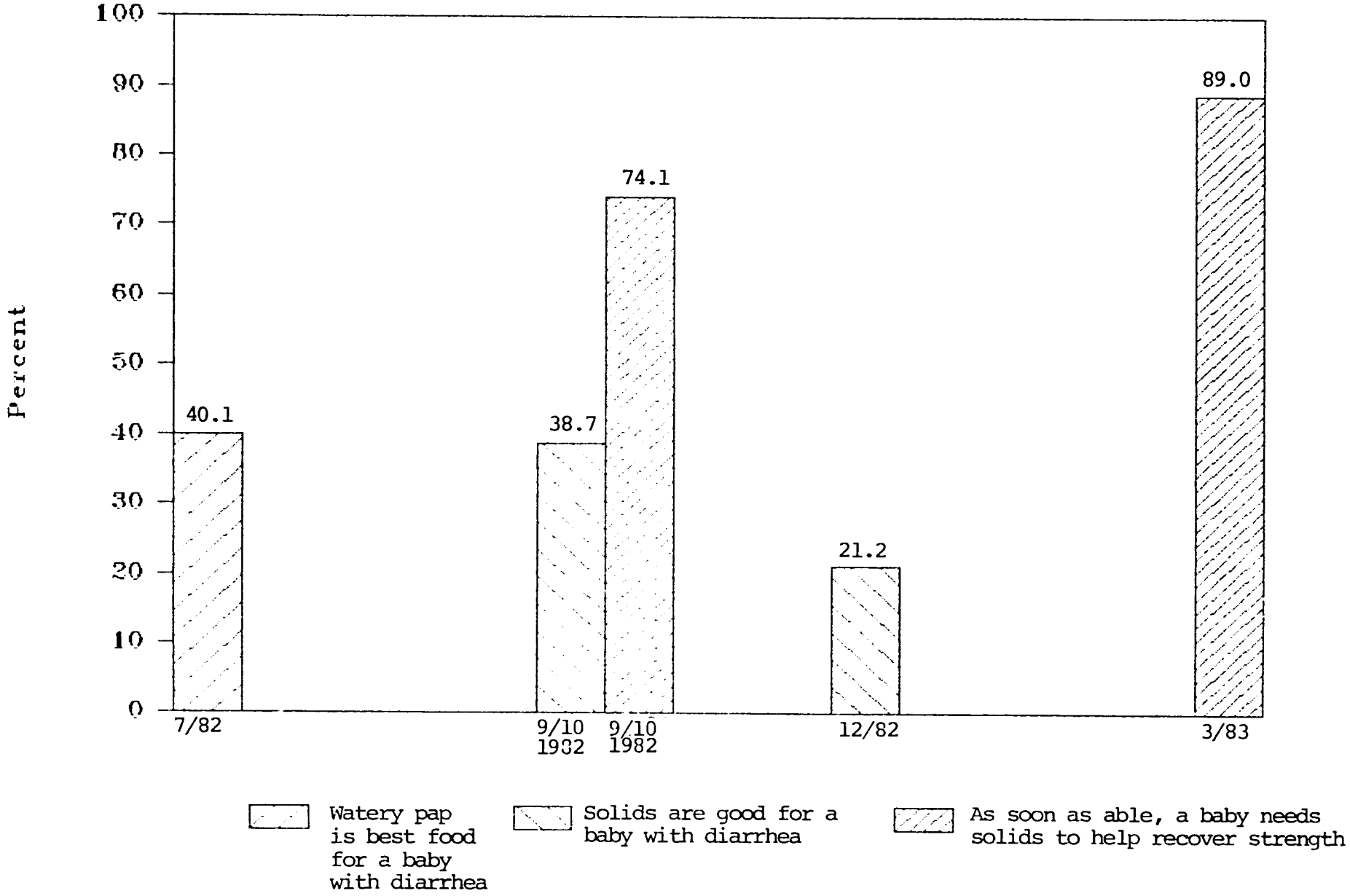
In September and October 1982, only 39 percent of the mothers disagreed that solid foods were not good for a baby with diarrhea. By December, this percentage had dropped to 21 percent. It seems that the campaign was not successful in persuading mothers to change their idea that paps are the best foods for sick children and that solid foods are not good.

The figure shows that, at the same time, mothers were learning that solid foods should be given as soon as the child is able. Seventy-four percent of the sample mothers agreed with this in September/October 1982 and 89 percent agreed in March 1983. This pattern was similar in all four divisions.

The second-year feeding messages, starting in July 1983, focused on feeding after diarrhea. Mothers were asked about feeding practices recommended in the new campaign in September and October 1983 and in February 1984. First, mothers were asked to list what foods a child should be given when he is recovering from diarrhea. These responses were grouped according to whether the mother mentioned power foods, other solids, or no solids. The second question asked the mothers which foods give more power, solids or paps? Responses to questions about feeding after diarrhea are in Figure II-42. This figure also includes the figures from the question asked in the first year about solid foods after diarrhea.

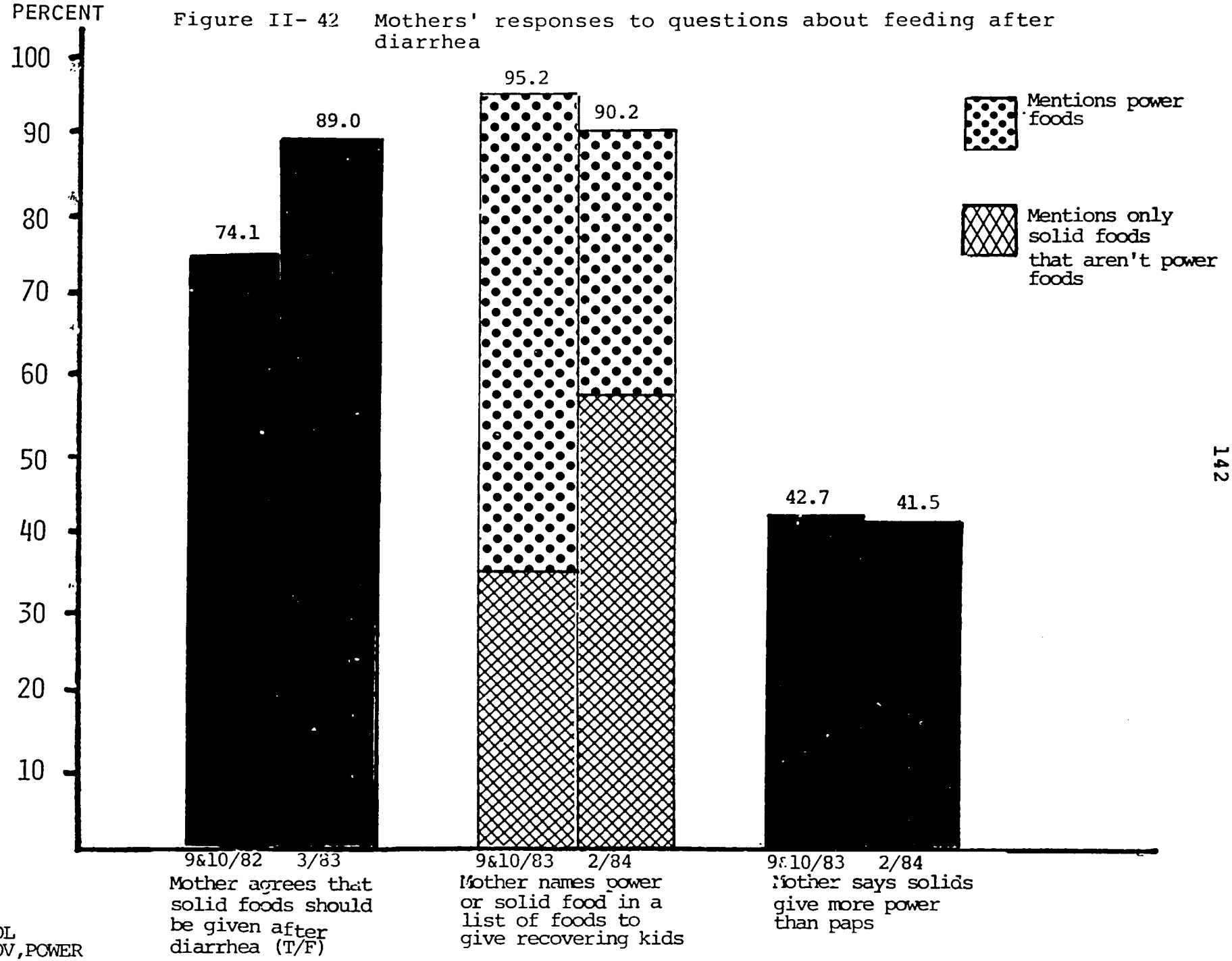
The responses show that the proportion of mothers who knew to give a child solids after diarrhea increased over the course of the project. Agreement that solid foods should be given after diarrhea to restore strength increased during the first year from 74 percent of the mothers to 89 percent. After the start of the special feeding campaign in September and October 1983, 95 percent of the mothers correctly answered a more difficult question about feeding. This question required them to name foods good to give after diarrhea, rather than just agreeing or disagreeing with a statement. After the feeding campaign had ended, mothers knowledge declined slightly, but still remained at

Figure II- 41 Mothers' knowledge about feeding during the first year of the campaign



GRAD1:PAP; GRAD2:NOSOL
GRAD2:[illegible]NDSOL

Figure II- 42 Mothers' responses to questions about feeding after diarrhea



GRAD3,4:NDSOL
GRAD5,6:RECOV,POWER

a high level (90 percent).

Particularly good foods to give after diarrhea (power foods) were recalled by 35 percent of the mothers at the end of the feeding messages (see Figure II-42). Recall of power foods continued to rise, even after messages about feeding had decreased. This may be due to a delayed learning effect.

One of the messages broadcast throughout the campaign and stressed in the special feeding campaign was that solid foods give the child more power and strength than watery paps. If mothers wanted to give paps, they were told to fortify them with power foods, such as sugar, milk, or ground peanuts.

This message was not accepted by a large proportion of the mothers. Despite their high recall of solid or power foods as good to give after diarrhea, a majority of the mothers (approximately 60 percent) believed that paps give more power. There was no change in the percentages between October 1983 and February 1984. This suggests that the value of giving pap for illness is a strongly rooted belief.

We noted large differences between divisions in the levels of knowledge about feeding after diarrhea and in the patterns of change. More analysis is required before these results can be explained and presented. Differences in food availability and farming practices have been seen between divisions. The feeding campaign occurred during the time of low food availability (the "hungry season") and in a year when the crops were bad. We do not yet have a clear understanding of the possible effects the drought and division differences may have had on feeding knowledge.

In summary, during the campaign, large increases in correct knowledge were seen for breastfeeding during diarrhea and feeding solid foods after diarrhea. The high levels of knowledge were maintained after radio messages decreased.

The campaign was not successful in teaching mothers that solids should be given <u>during</u> diarrhea (a finding that led to a change in the campaign messages). A majority of mothers also did not learn that solid foods given more power than paps.

These two beliefs seem related and may be part of mothers' beliefs about the treatment of sick children.

(4) The 1984 Mini-campaign: knowledge and practice

The final phase of the Mass Media and Health Practices Project was a mini-campaign conducted from February through April, 1984, with the evaluation of the campaign conducted in May through June. The major goals of the mini-campaign were:

1. To provide in-service training experience in the project's educational methodology for members of The Gambia's Health Education Unit (HEU) and to more firmly institutionalize that methodology.

2. To promote several personal and community behaviors that had been otherwise difficult to achieve in the course of the regular campaign.

Several specific objectives of the mini-campaign were unique to this phase of the project. These objectives were to increase public awareness of the existence and responsibilities of Village Development Committees (VDCs) and to promote measures to reduce the contamination of well-water (such as building walls, concrete aprons, and fences around wells). Other goals of the mini-campaign were formulated to complement and reinforce earlier phases of the project. This second set of goals focused on mothers' beliefs about germs and the promotion of regular handwashing to reduce disease transmission.

Phase I (February to March) of the mini-campaign emphasized the responsibilities of VDCs in the management and coordination of local aspects of the primary health care system. An important role of the VDCs was to mobilize community members to improve and maintain sanitation around community wells. This phase used radio programs (during the hour-long "Bantaba" magazine program),

developed in consultation with the Rural Broadcasting Section of Radio Gambia, to disseminate VDC and well-protection messages.

Phase II of the mini-campaign (March to April) emphasized well-protection messages and introduced information about germ theory in the context of how wells can become contaminated. Phase II messages were disseminated by radio, on the "Tesito" or selfhelp program, and were also taught at regional training sessions for Community Health Nurses in the month of March. Nurses were expected to relay these messages and instructional materials to other community health workers in their areas.

Phase III of the mini-campaign (April) focused on handwashing messages and germ theory, with an emphasis on the importance of promptly cleaning up infant feces from one's compound and washing hands with soap and water particularly after handling feces. Radio broadcasts on the woman's shows, "Musoltaa" and "Jotayi Jigainyi", covered these topics and were supplemented by posters illustrating appropriate times for washing hands (after using the latrine, after cleaning up feces from the compound, after cleaning up after a baby who has defecated, and before eating or preparing food). Posters were distributed to community health workers and members of VDCs.

a. Exposure to campaign messages

Exposure to the broadcast campaign messages was slightly less than expected. The "Bantaba" radio program which carried VDC messages was the most widely received with 31 percent of mothers in the sample (n=837) saying that they had heard the program every week and an addition nine percent saying that they heard the program at least every other week. The "Tesito" radio program which emphasized well-protection information was heard every week by 19 percent of mothers and by an additional 12 percent every other week. The "Musoltaa" program, which broadcast messages on handwashing and germ theory in Mandinka, was heard by 15 percent of mothers every week and by another eight percent every other week. Eight percent of the mothers heard the

"Jotayi Jigainyi" program, the Wolof version of "Musoltaa," every week with an additional six percent hearing the program every other week.

Mothers were asked what they had learned from the radio about health in the last three months. Table II-30 shows the percentage of mothers who said they learned particular campaign messages from the radio. Handwashing was mentioned by about 30 percent of mothers as learned from the radio, while 17 percent and 9 percent of mothers mentioned learning about VDC responsibilities and well-protection, respectively, from the radio.

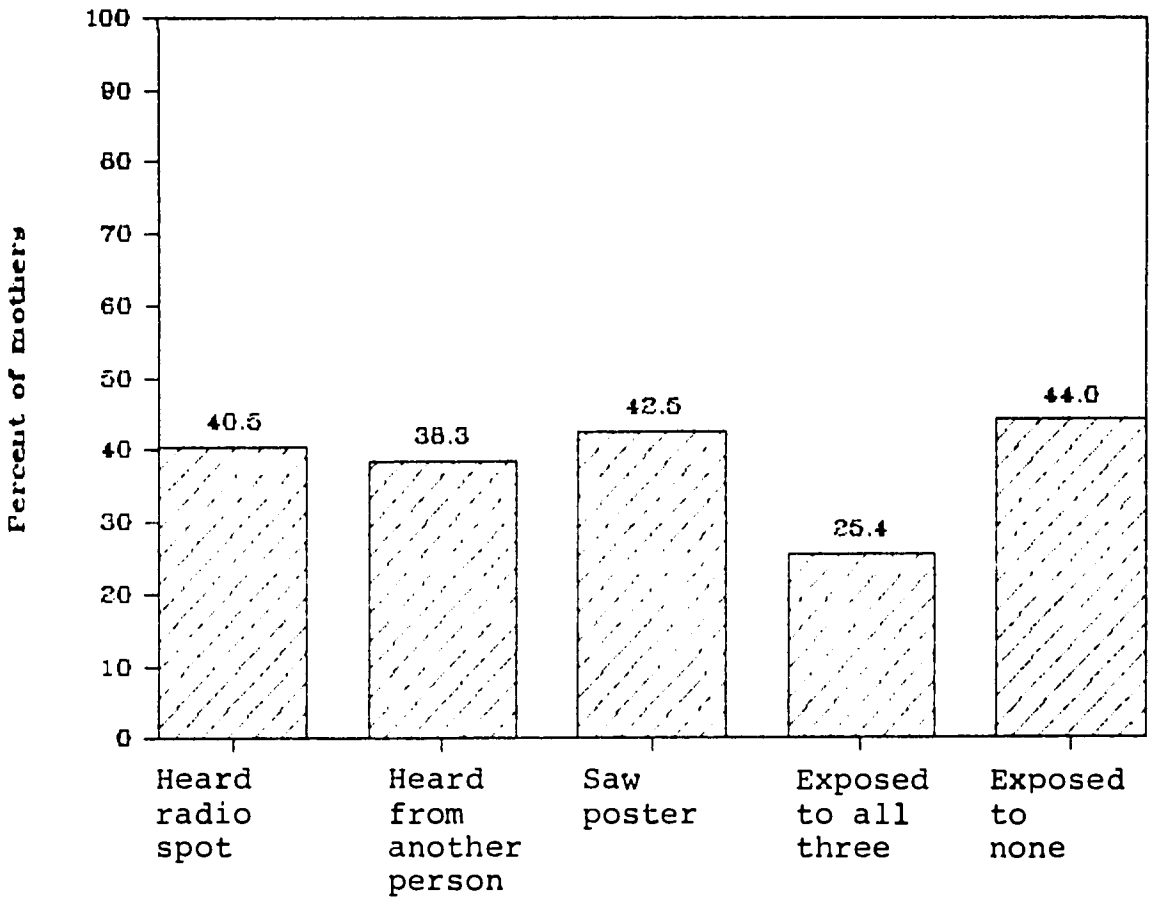
Table II-30 Exposure to the mini-campaign

Topic	Percent of mothers who mentioned learning topic from radio	Number mentioning the topic
Well protection	8.6%	72
Handwashing	29.4	246
VDC responsibilities	17.0	142

n=837, Variable source=LNPROGT7, LNWSHGT7, LNVDCGT7

Mothers were asked more specific questions about their exposure to the different components of the handwashing campaign: if they had heard radio announcements, if someone had talked to them about handwashing, and if they had seen the poster. Figure II-43 shows their responses to these questions. Forty-four percent of the mothers had no exposure to the handwashing campaign. Exposure to the individual components of the campaign was spread about equally across the three channels: 41 percent of the mothers had heard radio announcements, 38 percent had been informed by another person (village health worker, VDC health promotor, or community health nurse), and 43 percent reported having seen the poster (at the clinic, at another woman's home, or shown by a health worker or VDC worker). Approximately one-quarter of the women had been exposed to all

Figure II-43 Sources of exposure to the handwashing campaign



N=837;
GRAD7: HRWSHGT7,TKWSHGT7,POSTRGT7

three channels.

The radio messages on handwashing seem to have generated discussion about handwashing among women in the village or compound. Of the mothers who heard the handwashing spots, 60 percent reported talking to others about the spots. The people with whom the mothers talked were most frequently older women in the village or compound, their mothers, or a co-wife. Mothers rarely talked to their husbands, VDCs, or health workers about these messages.

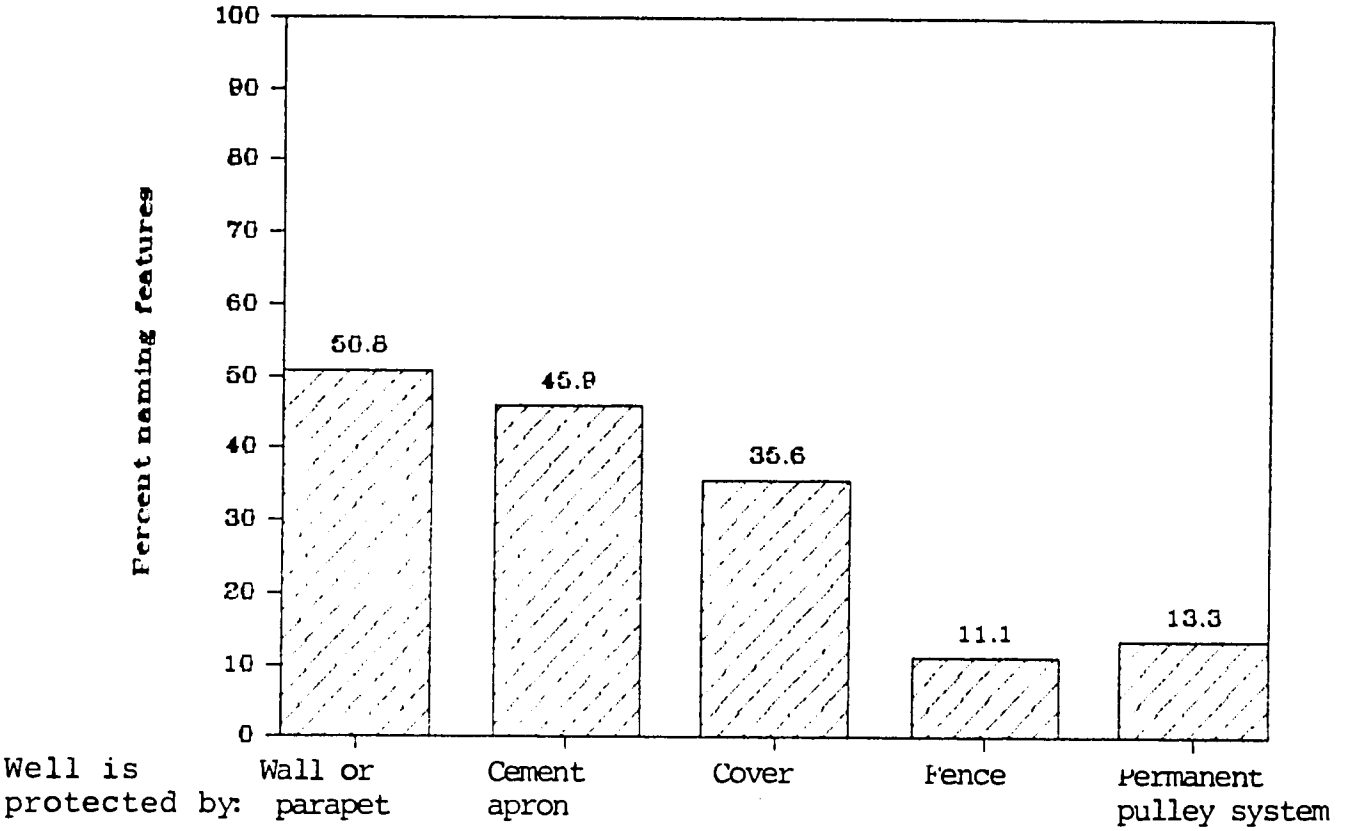
b. Learning from the mini-campaign

One of the objectives of the mini-campaign was that 25 percent of mothers be able to name three of the five promoted features of a well-protected well - - a wall around the well, a cement apron, a cover, a fence around the well area, and a permanent pail or pulley system (see Figure II-44). The three most mentioned features of a protected well were reported by an average of 44 percent of the mothers in the sample. Over half said that a well-protected well should be surrounded by a wall or parapet, 46 percent mentioned a cement apron around the well, and more than one-third said that a protected well should have a cover.

Mothers were also asked about the condition of the well they currently used. According to the women in the study communities, the majority of wells already had most of the features being promoted. Fifty-nine percent said that the well they used had a cement apron around it and over 52 percent said their well had a fence around it. In 64 percent of the cases, however, women brought their own buckets to the well because there was no permanent bucket and pulley system available as promoted by the campaign.

The major messages in the well-protection campaign were to protect the well, to keep animals away from the well, and to do laundry away from the well where runoff won't contaminate the drinking water. When knowledge of the campaign was measured by

Figure II- 44 Percent of mothers naming well protection feature after the mini-campaign



N=837, Variables=WLWALGT7,APRONGT7, COVERGT7, FECEGT7, PULLYGT7

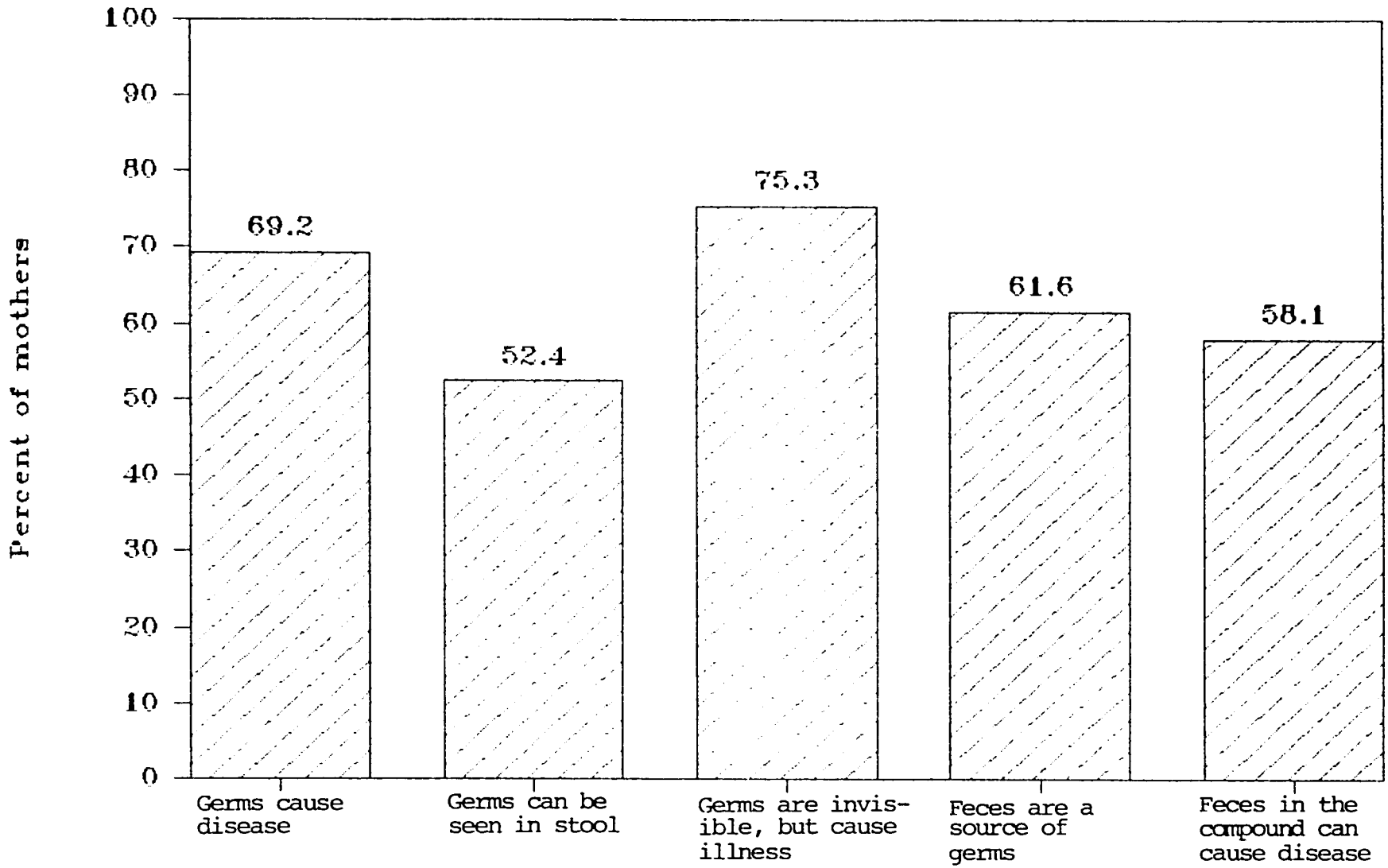
asking mothers about their preferences, we received the following responses. Most women expressed a preference for wells with a surrounding wall (89%) as opposed to no wall; they also preferred that animals be kept away from wells (81%) as opposed to being allowed near the wells, and they preferred that clothes not be laundered near wells (88%) as opposed to near the wells where runoff could contaminate the drinking water supply.

Another objective of the mini-campaign was that mothers recognize germs as causative agents of disease even though they are invisible. Figure II-45 summarizes mothers' beliefs about germs which were specifically targeted by the campaign. By the end of the campaign (June 1984) well over the target of 25% of mothers believed that germs cause disease (69%), that germs can not actually be seen in the stools of their babies (52%), and that germs cause illness even though they are invisible to the eye (75%). In addition, 62 percent of mothers recognized feces as a common source of germs and 58 percent believed that feces in the compound can cause disease.

Another objective of the mini-campaign was for mothers to know that handwashing is important at particular times in order to reduce disease transmission. Figure II-46 summarizes mothers' knowledge about the promoted times for handwashing: before preparing or eating food (mentioned by 59%), after using the latrine (57%), after cleaning up a baby who had defecated (51%), and after cleaning up feces from the compound (24%). The importance of cleaning oneself after removal of feces from the compound appears to be a difficult point to get across.

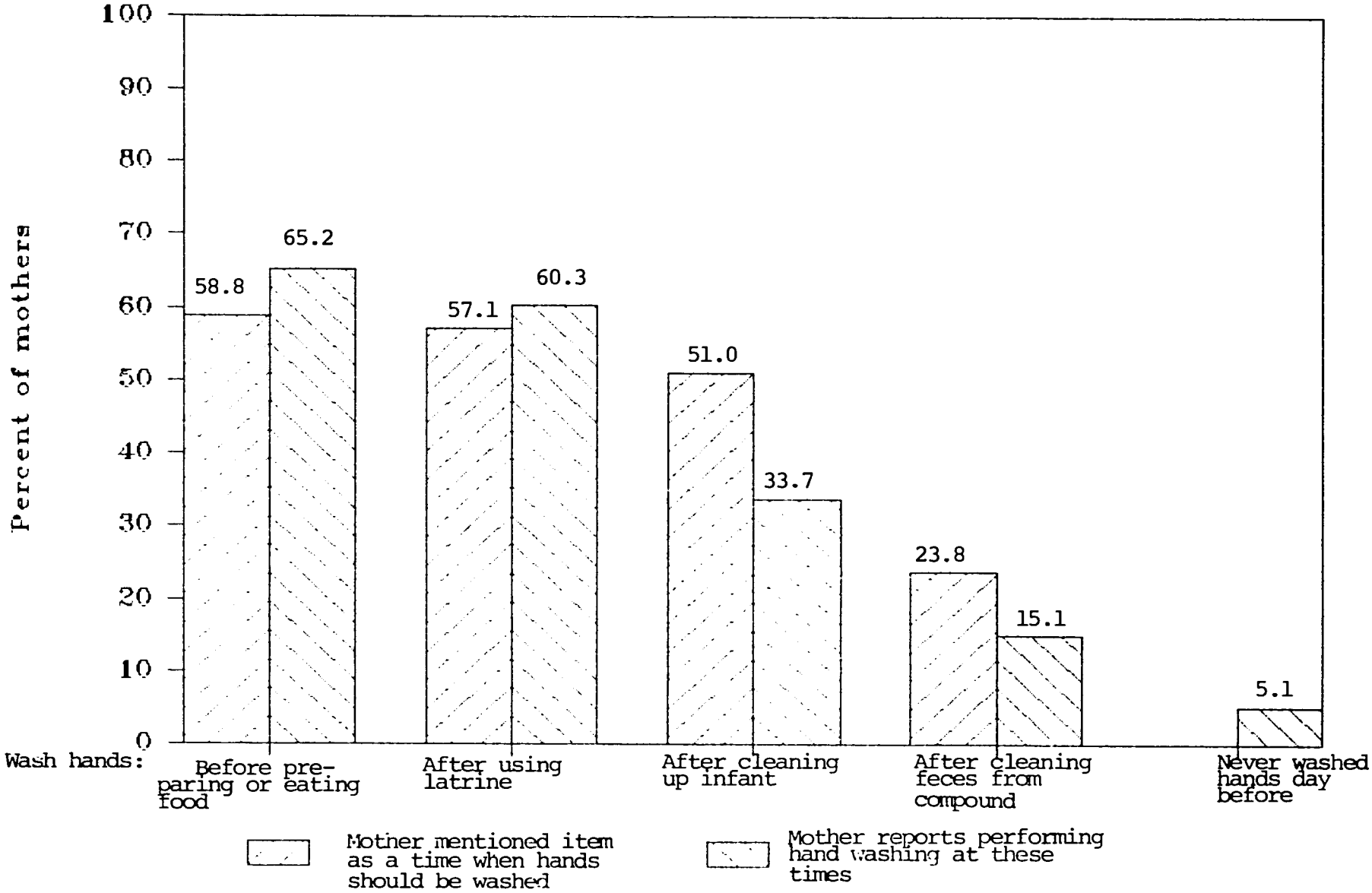
More mothers were aware of the appropriate times for handwashing than actually performed the promoted behavior. Figure II-46 also shows the prevalence of handwashing following the mini-campaign. Nearly 69% of the mothers were able to show that they had soap in the home at the time of the interview. When asked about their handwashing behavior the day before, 65 percent said they had washed their hands before handling food, 60 percent after using the latrine, and 34 percent after cleaning up their infants. Despite the fact that more than four-fifths of

Figure II-45 Learning from the mini-campaign: Germ Theory- -
Percent of correct responses in May/July 1984



n=837
GERMSGT7,GSEENGT7,INVISGT7,FECSRGT7,FECESGT7

Figure II- 4b Knowledge and practice of handwashing recommendations after the mini-campaign



GRAD7:USEWCGT,CLFECGT,DIAPRGT,FDHNDGT,HANDLGT,LATRIGT,CLBABGT,CLASHTGT,NOWSHGT

all mothers agreed with a statement in the interview that one should wash after cleaning up feces from the compound, and approximately one-quarter of the mothers could name it as a promoted handwashing time, only 15 percent said they actually had washed their hands after cleaning up feces from the compound the day before.

(5) Change in sanitation beliefs and practices over time

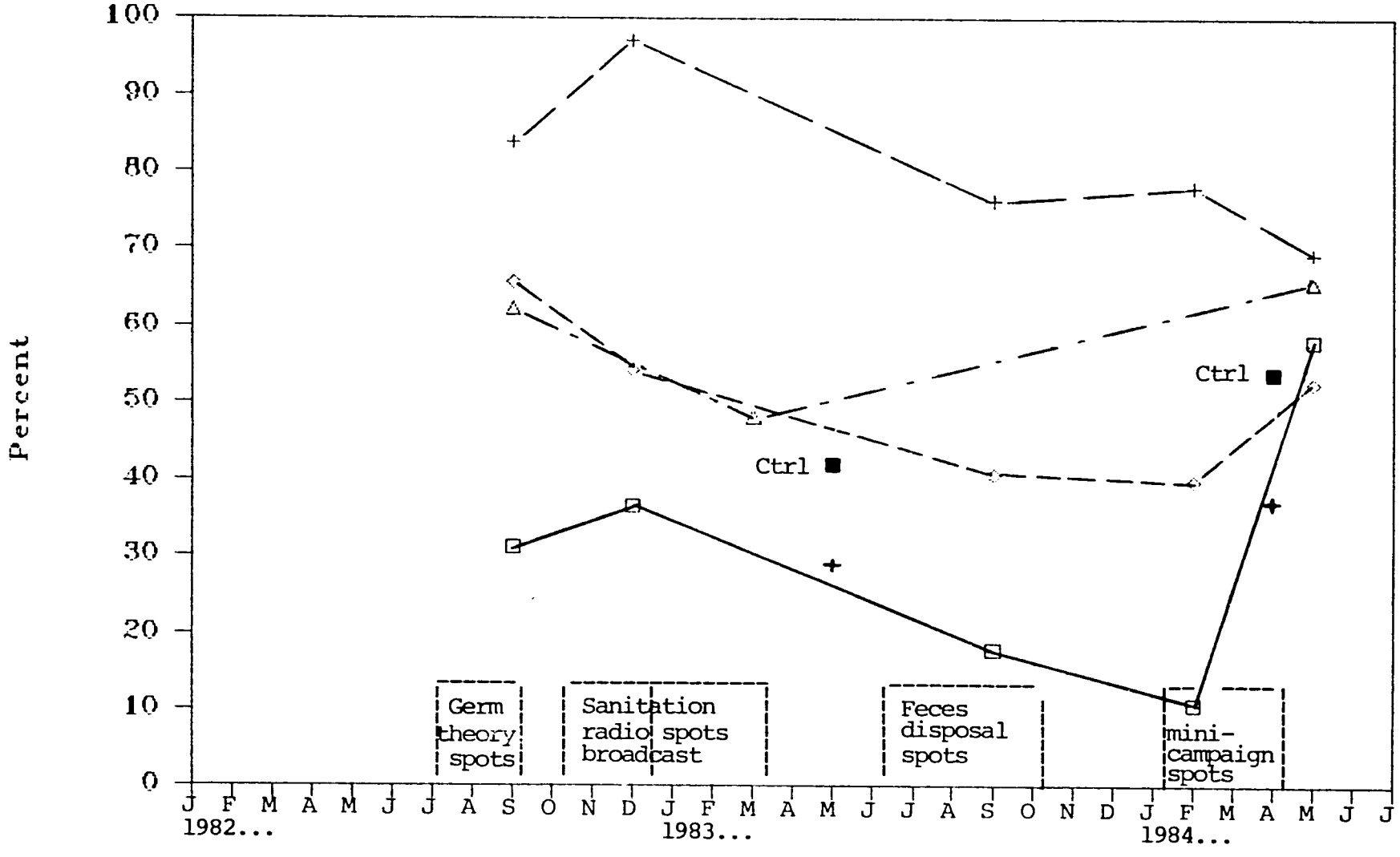
The mini-campaign was a short effort focusing on sanitation and prevention measures. A lower level of dissemination of sanitation information had occurred throughout the two years of the project. The messages covered germ theory, waste disposal, and personal hygiene.

a. Mothers' beliefs about germs

The majority of mothers understood that germs can cause disease, but they were not sure what germs are. In the early phases of the project, the percentage of mothers understanding that germs cause diarrhea increased from 83.8 percent in September/October 1982 to 97.3 percent in December 1982 (Table II-31 and Figure II-47). After that the percentage declined gradually to a low of 69.2 percent in June 1984. Radio spots varied in their emphasis of specific germ theory and sanitation information which may account for the decline. Radio spots in October through December emphasized germs as causative agents of disease. This idea was not promoted again until the mini-campaign and then only for one month in April 1984. This single month of messages does not seem to have been enough to raise mothers' understanding of germs as causative agents to their previous high level.

The belief that feces in the compound can cause diarrhea increased from 31 percent in September/October of 1982 to 36.4 percent in December of that year - - a period when radio messages

Figure II-47 Percent of correct beliefs about germs, over time



N: W2=819;W3=871;W4=861;
W5=785;W6=830;W7=837;C1=226;C2=208
GERMSGT,GERMSGOGERMSGP,GSEENGT,
FECESGT,FECESGO,FECESGP,CAUSDGT

□ Feces cause diarrhea

+ Germs cause diarrhea

◇ Germs cannot be seen in baby's stool

△ Breastmilk does not cause diarrhea

stressed the idea that diarrhea spreads if infant feces are left in the compound - - then declined to 10.7 percent in February of

Table II-31 Mothers' beliefs about germs and cleanliness over time

Belief	Sept/Oct 1982	Dec. 1982	Sept/Oct 1983	Feb. 1984	May-Jul. 1984
Germs cause diarrhea	83.8%	97.2	76.1	77.8	69.2
Feces in compound cause diarrhea	31.3	36.4	17.8	10.8	57.9
One should clean hands after cleaning up feces	89.9	83.9	-	-	82.9
Should clean compound every week	52.9	83.0	-	-	-
Mother cleans feces from compound at least daily	-	-	92.9	95.1	-
Best way to clean up feces is to bury it	85.0	86.1	34.1	15.9	-
It's okay to throw feces over compound wall	65.3	76.8	56.3	80.7	-
Flies carry disease	43.7	43.7	49.7	44.2	-
Mothers cannot see germs	65.6	54.2	40.6	39.8	52.4
n =	819	871	785	830	837

Variable source: GERMSGT, FECESGT, WASHGT, ONCWKGT, ONCWKGT5, ONCWKGT6, BURYGT, THROWGT, FLIESGT, GSEENGT

1984, just before the mini-campaign began. By June 1984, after the mini-campaign, the belief that feces in the compound cause diarrhea had risen dramatically to 57.9 percent. A similar pattern can be seen in the belief that germs cannot really be seen in a child's stools and the understanding that breastmilk is not responsible for diarrhea. In both cases, the percentage of

mothers holding correct beliefs declined from an initial high of over 60 percent, then rose again following the mini-campaign (see Figure II-47). Similar messages concerning the causes of diarrhea specifically and of disease in general may have caused some confusion. The earlier message that germs cause diarrhea may have been overshadowed by the later emphasis (particularly in the mini-campaign) on feces and dirty hands as causes of diarrhea.

b. Waste disposal

The sanitary disposal of infant feces continued to be a problem throughout the campaign. The percentage of mothers who believed that it was acceptable to dispose of feces by throwing it over the compound wall increased from 65.3 percent in September/October 1982 to 76.8 in December 1982, although the vast majority agreed with the statement that burying feces is the best way to dispose of it. There is some logic to this since the campaign strongly emphasized the disposal of feces as a way to prevent diarrhea. In the same time period, the percentage of mothers who believed that feces should be cleaned from the compound at least once a week rose from 52.9 percent to 83 percent.

By September/October 1983, 92.9 percent of mothers in the sample said that they cleaned feces at least once a day with 78 percent claiming that they cleaned up immediately after a child defecated in the compound. In February 1984, 95.1 percent said they cleaned up feces at least once a day, with 70.8 percent saying they cleaned up each time a child defecated in the compound. However, while the frequency of cleaning the compound was quite high, the preferred method of disposal continued to be by throwing feces out of the compound. In September/October 1983, 56.3 percent of the mothers said one should dispose of feces by throwing it over the compound wall and 34.1 percent said it should be buried. Four months later, in February 1984, 80.7 percent of mothers said one should dispose of feces by throwing

it over the wall and only 15.9 percent said that feces should be buried. Mothers may have been confused by radio messages which advised them to dispose of feces by throwing it into pit latrines or burying it.

c. Personal hygiene

Personal hygiene is one area in which practice clearly lagged behind knowledge and attitudes. Hygiene was not stressed in the campaign until the second year except that mothers were advised to wash their hands after cleaning up infant feces. Handwashing at other appropriate times was not targeted until the mini-campaign in March and April of 1984. Mothers were apparently well aware that one should wash after cleaning up feces from the compound. A consistent 83 to 90 percent of all mothers across the entire time span of the campaign agreed that handwashing after cleaning the compound was necessary (Table II-29), but handwashing behavior declined in the last year of the campaign. In September/October 1983, 56.8 percent of the mothers said they do wash their hands after cleaning feces from the compound, while four months later in February 1984, only 44.8 percent said they did. In June of 1984 only 15.1 percent said they had washed their hands after cleaning up the compound the day before.

Severe water shortages may account for some of the lag between attitudes about handwashing and actual behavior, but mothers claimed to wash their hands more regularly at times other than after cleaning up infant feces. In June of 1984, 65 percent of mothers said they had washed before handling food yesterday, 60.3 percent said they had washed after using the latrine yesterday, and 33.7 percent said they had washed after cleaning up their babies yesterday (see Figure II-47 in the previous section).

While beliefs and attitudes about sanitation, germ theory, and personal hygiene were somewhat improved by the campaign, and

particularly by the mini-campaign in 1984, people continued to practice inappropriate methods of feces disposal and cleanliness associated with feces disposal.

(6) Relationship between exposure and knowledge about WSS

In previous sections, we have seen that knowledge about a campaign topic tended to increase during the times radio messages focused on this topic and then decrease or level off when the messages decreased or concentrated on new topics. This suggests a relationship between exposure to the campaign and knowledge. A study was done in September 1983 that examined the relationship between exposure to the radio and knowledge about WSS. This study also looked at the influence of interpersonal sources of information: the health workers, the Red Flag volunteers, and other mothers in the compound.

a. Description of the research

The study examined the relationship between exposure to Radio Gambia and knowledge about WSS after removing the influence other factors might have on the relationship. These factors were: division differences, exposure to health workers, exposure to a Red Flag volunteer, compound literacy, mothers' experience with outside ideas, level of development in the village, and social support for using WSS. The research then examined the interactive effect of radio and the other factors on knowledge of WSS. For example, the interaction between radio exposure and contact with a health worker was examined as it related to knowledge about WSS.

The variables used in the analyses were measured in a survey included in the September/October interview sweep or had been measured in previous interviews. The special survey was given only to the subset of sample women who had a child five years or

under at the time of the interview. Six-hundred and seventy-seven mothers were included in these analyses. The frequencies for each of the variables used are described below and summarized in Table II-32.

Exposure to Radio Gambia was measured by asking the mothers how often they listened to Radio Gambia. The responses were grouped into two categories: low radio exposure (mother never listened or listened once a week or less) and high exposure (mother listened daily or several times a week). Sixty-three percent of the mothers were in the high exposure category and 37 percent had low radio exposure.

Knowledge of WSS was also a two-value measure: no knowledge and some knowledge. Mothers were considered to have no knowledge about WSS if they said they didn't know about WSS or if they could answer none of the questions about WSS mixing and administration correctly. Mothers who correctly answered at least one question about WSS were put into the category of some knowledge. Eighty-six percent of the mothers had some knowledge about WSS and 14 percent had none.

Contact with a health worker was examined by asking the mothers if they had visited any of the people who work in the clinic about the health of their children and, if so, how many times since the start of Ramadan (a religious holiday beginning approximately three months before the interviews). Eighty percent of the mothers had seen a health worker in the last three months and twenty percent had not.

The mothers were also asked if they knew of a Red Flag volunteer and if they had visited her. Forty-five percent of the mothers reported having visited a Red Flag volunteer. The other 55 percent of the mothers either did not know of a Red Flag compound or had not been to see the volunteer.

Social support in the compound measured the percentage of other sample mothers in the compound who reported using WSS for the last case of diarrhea they had treated. An example of how social support was calculated is: if, in a three-mother compound, mother #2 had used WSS but mother #3 had not, mother #1 would be

assigned 0.5 on the social support measure (half the other sample women in her compound had used WSS). This measure could only be

Table II-32 Summary of the distributions of the variables used in the analyses

	FREQUENCY CATEGORY			N of
	Low	Medium	High	cases
Radio exposure	36.5	--	63.3	674
Knowledge of WSS	14.2	--	85.8	677
Health worker contact	20.2	--	79.8	674
Contact with Red Flag volunteer	55.0	--	45.0	677
Social support	26.3	21.8	51.9	417*
Compound literacy	63.0	--	37.0	494**
Outside experience	32.1	51.5	16.4	576**
Village development	10.9	48.2	40.9	677

* Number of cases is low because only mothers in compounds with another mother in the sample could be measured.
** A large number of cases are missing because the variables came from earlier interview sweeps. The same mothers were not always available to be interviewed in every sweep.

calculated for mothers who lived in compounds where there was at least one other woman in the sample. Two hundred and forty mothers were listed as missing cases for this variable.

Fifty-two percent of the mothers from compounds with two or more sample mothers had high social support (all the other sample mothers in the compound reported using WSS). Twenty-two percent of the mothers were in the medium social support category (some other mothers used WSS) and 26 percent had low social support for WSS use (no other mothers reported use of WSS).

The compound literacy measure was the same as that described in the access section of this report. Thirty-seven percent of the mothers for whom literacy test results were available lived in a compound where at least one member could read. Sixty-three percent had no literate compound member.

Mothers' experience with ideas from outside the village or culture was a compound-level measure composed of maximum years of education attained by a member of the compound, whether there was a latrine in the compound, and whether a member of the compound had been to the West. Thirty-two percent of the mothers had low outside experience (answered "yes" to none or one of the three questions), 52 percent had moderate outside experience (answered "yes" to two of the questions) and 16 percent had high outside experience (answered "yes" to all three questions).

Level of village development was based on whether the village had a health center or a health post, a government school, any foreign aid projects, or was located on a main road. Eleven percent of the mothers lived in a village with a low level of development (no school, no health post, no foreign projects, and not on a main road). Forty-eight percent of the mothers lived in a village with one or two of these signs of development and 41 percent lived in villages with a high level of development (three or four of the indicators of development).

The method of analysis used was step-wise discriminant analysis, using radio exposure and the other factors to discriminate between mothers with no knowledge of WSS and mothers with some knowledge. The analyses were done in steps: first, the

influence of division differences was removed; then that of other factors that might be the actual explanation for the relationship was removed; then radio exposure was examined to see if, over and above the influence of other explanatory variables, radio exposure was still significantly related to knowledge. The final step was to examine the interactive effect of radio exposure and the other variables on knowledge.

b. Results

In September and October, 1983, approximately one and a half years after the start of the campaign, mothers with high exposure to the radio were more likely to know something about WSS than mothers with low radio exposure (see Figure II-48). This relationship was significant at $p < .0001$. When other explanations for the relationship were controlled, radio exposure was still found to make a significant contribution to discriminating between no knowledge and some knowledge ($p < .001$).

The interaction analyses identified three significant interactions: between radio exposure and health worker contact, between radio exposure and contact with a Red Flag worker, and between radio and social support. In all three cases, it was found that radio exposure was important primarily for mothers who had no interpersonal sources of information. This will be described in more detail below.

The interaction between radio exposure and health worker contact was significantly related to WSS knowledge at $p < .0001$. See Figure II-49 for a graphic representation of the relationship. Overall, mothers who had visited a health worker in the last three months were more likely to know something about WSS than mothers with no health worker contact. Mothers who also had high radio exposure were even more likely to know about WSS: 84 percent of the mothers with low radio exposure knew about WSS as compared to 92 percent with high radio exposure.

However, for low health worker-contact mothers, radio listening made a big difference. Only 50 percent of the mothers

Figure II- 48 Percent of mothers with some knowledge about WSS by radio exposure

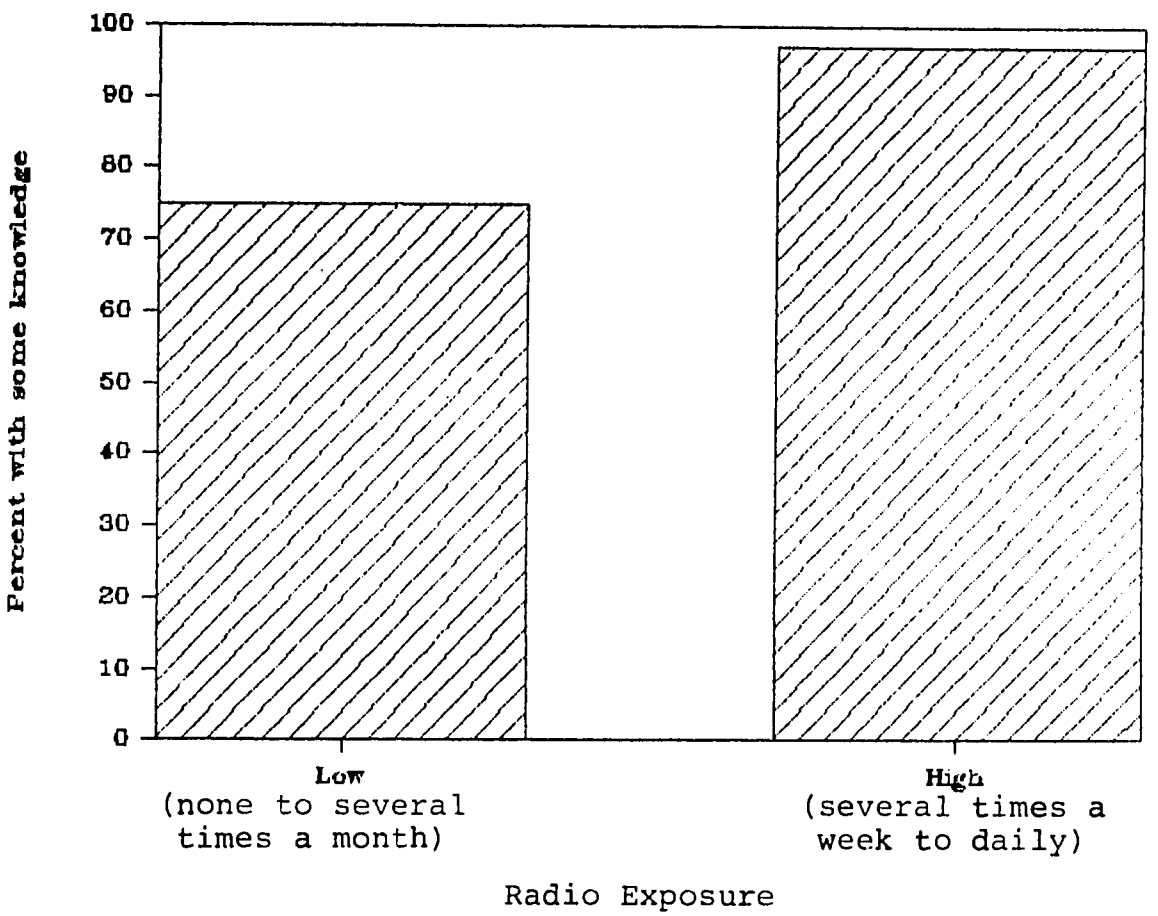
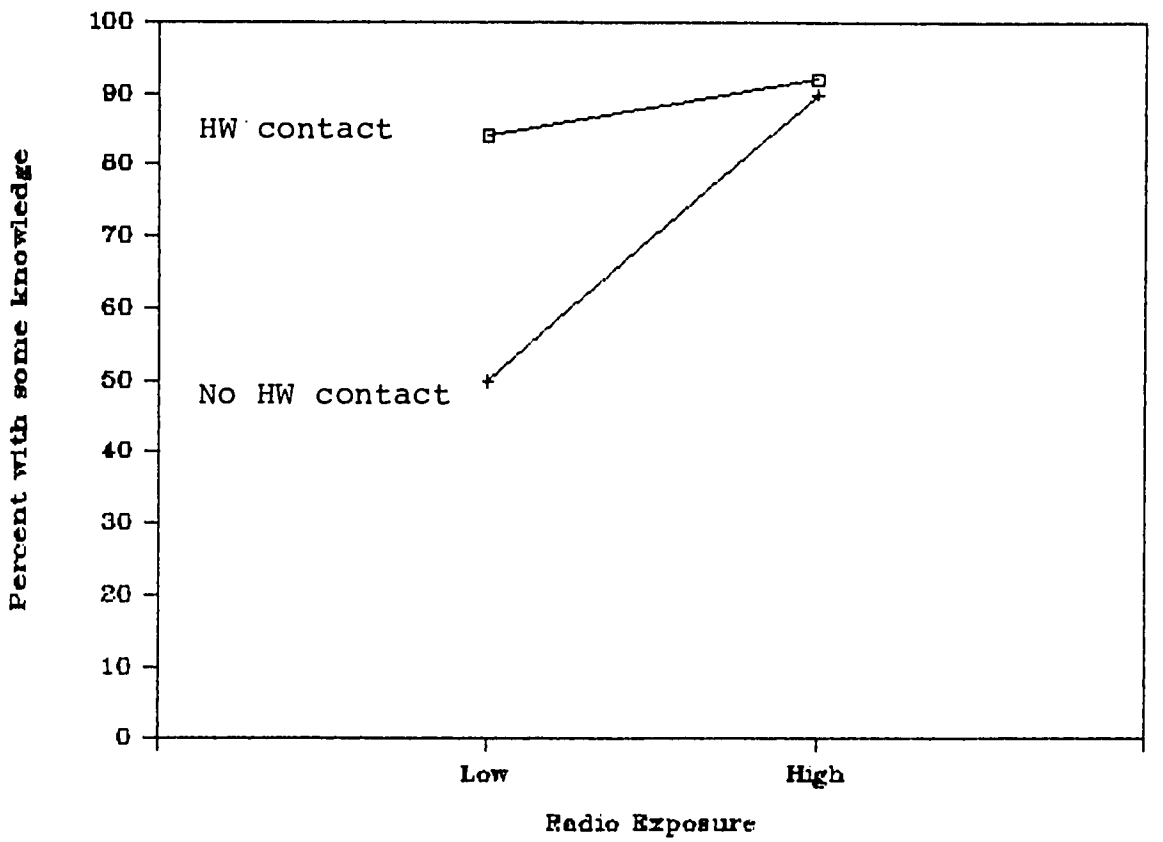


Figure II- 49 Relationship between knowledge about WSS and the interaction between radio exposure and health-worker contact



who had both low health worker contact and low radio exposure knew something about WSS. Ninety percent of those with high radio exposure knew about WSS.

The same type of interaction was seen between radio exposure and contact with a Red Flag volunteer (see Figure II-50). The interaction effect was significant at $p < .01$. Almost all mothers who had visited a Red Flag volunteer knew something about WSS. Radio exposure made little difference because there was little room for change. For mothers who had not visited a Red Flag volunteer, radio exposure did make a difference. Sixty-one percent of the mothers with no contact and low radio exposure knew something about WSS, as compared to 87 percent of the mothers who had no Red Flag contact but high radio exposure.

The interactive relationship of radio exposure and social support with WSS knowledge can be seen in Figure II-51. This relationship was significant at $p < .02$. Essentially, mothers who lived in a compound where another mother used WSS, were more likely to know something about WSS than mothers in compounds where no one else used WSS. High radio exposure increased mothers' likelihood of knowing about WSS slightly. As seen in the two previous relationships, radio exposure made a difference primarily for mothers with no social support: 59 percent of those with low radio exposure knew the minimum about WSS as compared to 87 percent of mothers with high radio exposure.

c. Summary and discussion

The main findings of this study were that, in September 1983, among mothers who currently had a child under five years old or less:

> Mothers with high radio exposure were significantly more likely to know something about WSS than mothers with low radio exposure, even after controlling for other possible explanations;
>
> Mothers with interpersonal sources of information (health worker, Red Flag volunteer, or other mothers in the compound) were more likely to know about WSS

Figure II- 50 Relationship between knowledge about WSS and the interaction between radio exposure and contact with a Red Flag volunteer

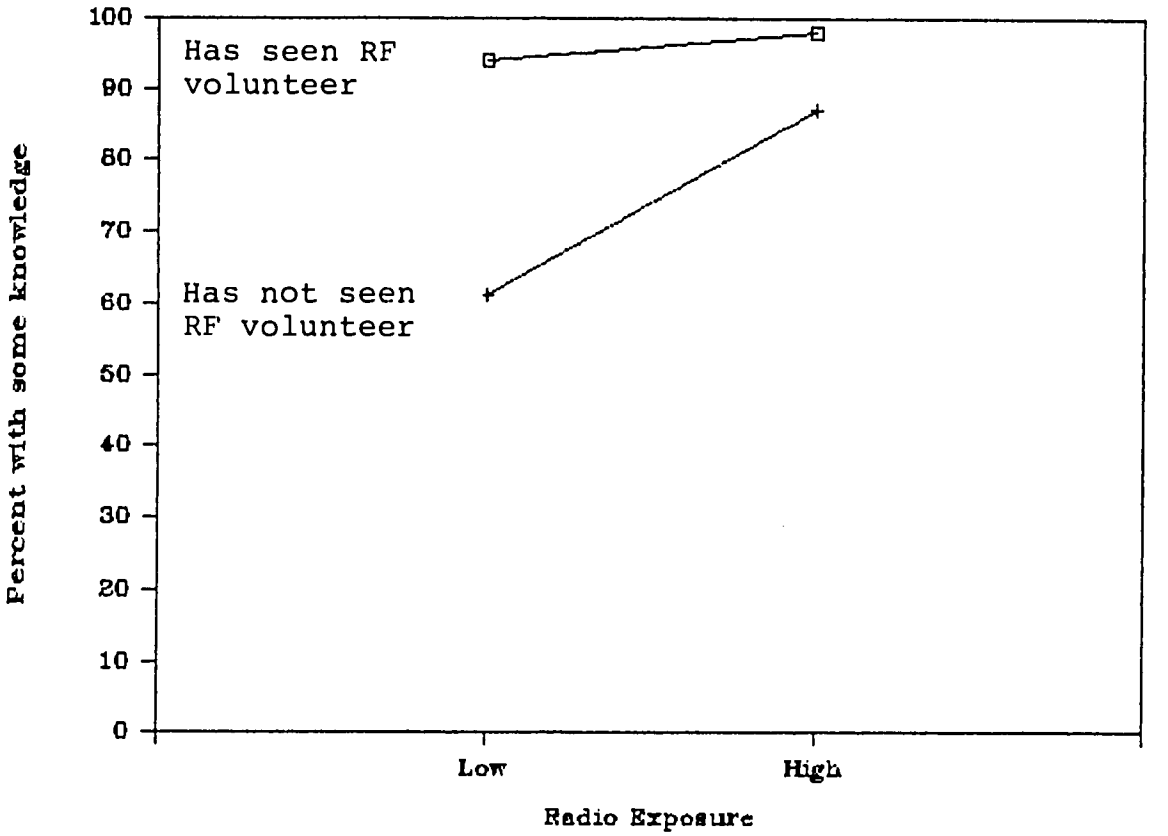
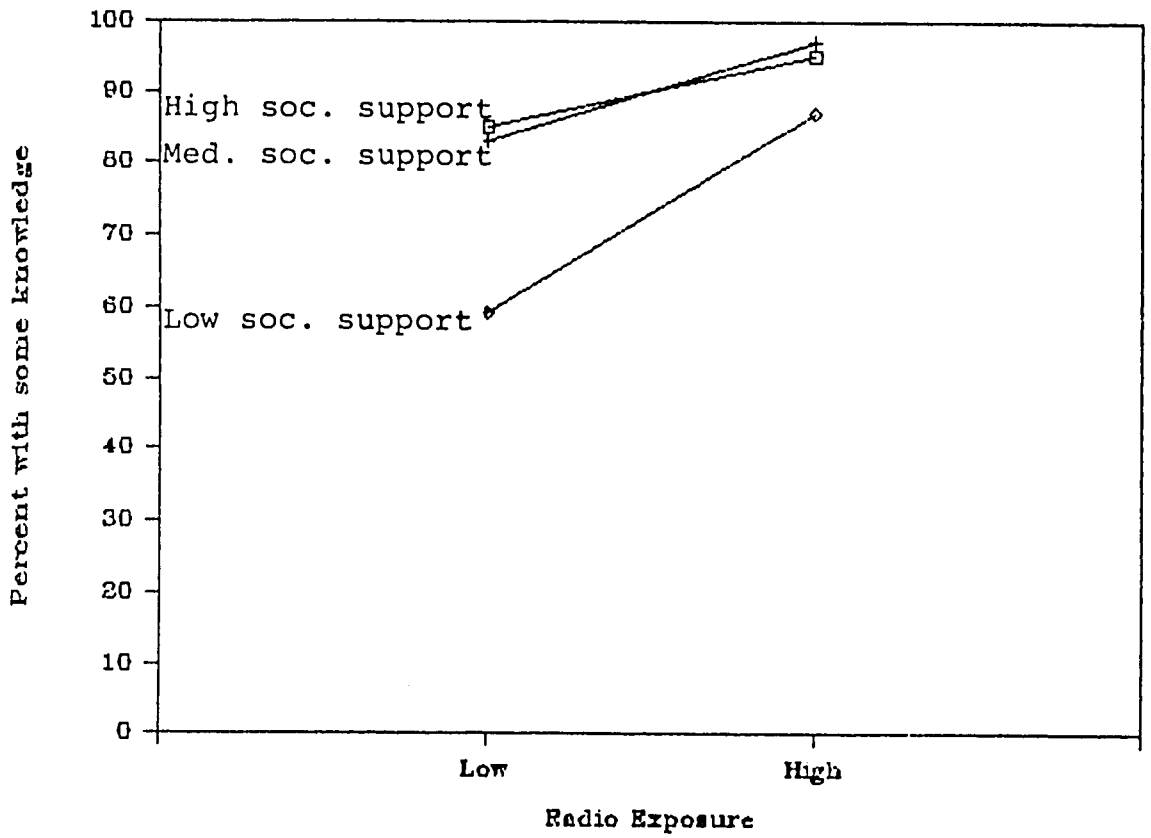


Figure II- 51 Relationship between knowledge about WSS and the interaction between radio exposure and social support



than mothers without such contact; but

For mothers with low interpersonal contact, frequent listening to the radio could teach them about WSS.

The finding that radio exposure had a significant association with knowledge over and above the influence of division differences, compound literacy (which also may be a measure of social status), outside experience, village development, and contact with interpersonal sources is important. Other studies of nonformal education programs in rural areas of developing countries have shown that people who are already better off (those with greater status, education, wealth) tend to profit more from these programs. The finding here suggests that all Gambian mothers had a chance to learn from the campaign. Radio messages seem to have cut across boundaries of status, education, and compound or village development in providing knowledge about WSS.

A second major point is that radio seemed to cut across boundaries of access to information, reaching mothers who did not have contact with health personnel. Health workers in developing countries tend to reach only part of the population. In this study, it was found that radio instruction could fill this gap and teach mothers who didn't have other access to information.

The findings indicate that use of multiple channels of information is important. It was expected that the channels used would reinforce each other. There is slight evidence of this - - mothers with high radio exposure and also contact with an interpersonal source of information were more likely to know about WSS than women with only one source, but only slightly more likely. It may be that the different channels reinforced each other early in the campaign but that by the time this survey was done, this pattern was no longer evident.

Instead, by September 1983, radio was acting as a substitute source of knowledge for mothers who had low interpersonal contact. Radio seems to have been important in reaching a

segment of the population who weren't receiving WSS information from other sources and in helping close a gap in health knowledge.

(7) Summary of learning from campaign messages

The campaign in The Gambia had four major subject areas: the water-sugar-salt solution, dehydration, feeding, and sanitation. The campaign's effects on learning were highest for WSS, the subject that received the most attention in the broadcasts and perhaps also from health workers. Awareness of WSS increased from 55 percent of the mothers before the campaign to 89 percent of the mothers by the end of the campaign. Correct WSS mixing was learned by a large percentage of the mothers. Mothers also learned about WSS administration, but learning was slower and not as high as for mixing.

Knowledge that breastfeeding should continue during diarrhea and that solid foods should be given after diarrhea increased during the campaign. There was also an increase in recognition that sunken eyes and weight loss indicated the need for clinic treatment. Knowledge about signs and treatment of dehydration had been relatively high before the campaign.

Mothers also showed high learning about sanitation. Gains were made in knowledge about germ theory, cleaning the compound of feces, and handwashing.

A pattern that was seen across all topics was forgetting of some of the information. During the time that a topic was being covered intensively by the campaign, we generally saw rises in knowledge. When the campaign shifted its focus to another topic, even if messages on the first topics continued at a lower level, mothers' knowledge about the latter tended to drop. This indicates that the mothers needed continued high levels of messages to maintain knowledge.

A study of the relationship between compaign exposure and knowledge about WSS indicated that mothers with high radio

exposure were significantly more likely to know something about WSS than mothers with low exposure even after controlling for other possible explanations. The results also showed that mothers with exposure to interpersonal sources of information (health worker, Red Flag volunteer, or other mothers in the compound) were more likely to know something about WSS than mothers without such contact. For mothers with low interpersonal contact, radio exposure was important in teaching them about WSS.

In this chapter, we found that, overall, mothers had high access and exposure to the campaign and high knowledge of the campaign messages. The study described in the previous paragraph provides evidence that exposure and knowledge were positively linked. In Chapter III we move to the next step in the process model, change in behavior.

Chapter III

BEHAVIORAL EFFECTS

In this chapter, we move on to the next stage in the process model, that of examining behavioral outcomes. In the following pages we will discuss whether mothers in our sample altered their actions to conform with behavior advocated by the campaign. First, child-feeding behaviors, particularly feeding during diarrhea, will be examined to see if changes occurred among mothers in the sample. Second, selection of treatments for diarrhea will be discussed. Lastly, we will look at the interaction between cognition of advocated behaviors and the actual behavior of mothers.

The two questionnaires which measured these items were morbidity and nutrition. The latter was administered to the sample four times, and the women were instructed to answer the questions regarding feeding and childcare for their youngest child not currently breastfed. The morbidity questionnaire was administered 13 times, and women responded for each child under five years old at the time of the interview. This made it possible to look at mothers' behaviors for children of different ages.

Estimating the age of the children in the sample was done in the following way. When children had health cards/growth charts, preference was given to that recorded age. For the rest of the sample, mother's recalled age for their children was used. Since the recalled ages tended to cluster at the half-year, we have categorized ages used in analyses of diarrhea incidence and child health status (see next section), not by cutting at the halfyear, but by including three months before and three months after the half-year. Thus, children between three

and nine months were considered together as about six months. Table III-1 shows the number of children in the morbidity instruments from each age group. For the behaviors in this section, these categories were collapsed into four groups: 0 to 1 year, 1 to 2 years, 2 to 3 years, and over 3 years. (Table III-2)

The behaviors were also analyzed by division. Table III-3 shows the distribution of sample children by division, and the interviewer responsible for data collection in that division. Due to pregnancy leave, a temporary interviewer worked in the North Bank during waves seven to nine. The North Bank interviewer worked in the Western Division during waves eight to nine. Among the control group, fewer children were measured in the Lower River division than in other divisions. In addition, no age was recorded for the 33 children in Lower River Division, so Lower River is not represented in behavior analyses by age for the control population.

Some analyses were performed for the subset of the sample ill with diarrhea in the two weeks prior to the morbidity interview. Pre-tests determined that memories of past events were often vague; thus mothers who were reporting responses to a case of diarrhea from more than a few weeks ago might unintentionally distort their reports. In addition, women who had not had occasion to treat diarrhea anew since the last interview would be reporting about the same bout more than once, which could mask effects of intervening campaign messages. Pertinent analyses, therefore, are presented for both the entire sample of children and the subset experiencing diarrhea recently.

A. Changes in Child Feeding Behavior

Breastfeeding of infants during diarrhea and other feeding practices for ill children were strongly encouraged by the campaign. As background, however, it is necessary to understand feeding practices in general in The Gambia, and recognize that

Table III-1 Number of children in each age group and each wave in morbidity instrument

Age Category (years)	Age Range (months)	Morbidity Waves W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	N
0.33	0-2.9	45	24	19	28	37	33	7	10	1	33	13	1	19	270
0.50	3-8.9	102	110	102	79	76	64	74	74	42	65	65	60	39	952
1.0	9-14.9	88	97	99	96	97	114	81	72	64	79	53	55	72	1067
1.5	15-20.9	82	86	93	93	87	97	104	100	99	64	90	79	55	1129
2.0	21-29.9	124	88	91	72	76	86	92	87	90	88	83	72	75	1124
2.5	27-32.9	96	102	106	109	88	86	79	76	81	82	104	88	81	1178
3.0	33-38.9	102	91	102	98	89	108	105	104	73	70	79	90	81	1192
3.5	39-44.9	84	79	79	93	84	97	93	102	100	86	74	65	71	1107
4.0	45-50.9	113	69	90	78	76	87	91	75	84	76	102	86	70	1097
4.5	51-56.9	57	71	82	86	75	81	71	77	59	76	83	84	91	993
5.0	57-72.0	94	43	60	83	89	132	162	161	166	146	175	152	168	1631
N	0-72	987	860	923	914	874	985	959	938	859	865	921	832	822	

Note: MORB:AGEGPGQ

Table III- 2 Number of children in each collapsed age group by wave in the morbidity instrument

Age	Morbidity waves 1	2	3	4	5	6	7	8	Control(a)	9	10	11	12	13
1 (0 - 14.99 mos)	226	231	220	203	210	211	162	156	48	107	177	131	166	130
2 (15-26.99 mos)	203	174	184	164	163	183	196	187	29	189	152	173	151	130
3 (27-38.99 mos)	195	193	208	207	177	194	184	180	37	154	152	183	178	161
4 (39-72 months)	330	262	311	340	324	397	417	415	59	409	384	434	388	401
Totals	954	860	923	914	874	985	959	938	173	859	865	921	833	822

AGEC

a) 77 (32.5%) of the women did not know their children's ages.

Table III-3 Number of children in each division and interviewer identification number in morbidity instrument

# of children and interviewer in each div.	Morbidity waves 1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
1. Western division	258 2	210 2	235 2	269 2	217 2	259 2	289 2	261 2,3	59 3	212 3	230 2	282 2	243 2	249 2
2. North Bank	261 3	228 3	241 3	243 3	241 3	257 3	243 9	302 9	87 9	243 9	246 3	282 3	253 3	260 3
3. Lower River	247 8	216 8	249 8	200 8	213 8	250 8	219 8	200 8	33 8	211 8	203 8	206 8	172 8	224 8,9
4. McCarthy Island	238 4	231 4	235 4	244 4	241 4	275 4	276 4	258 4	71 4	285 4	257 4,8	290 4	301 4	240 4
Totals	1004	885	960	956	912	1041	1027	1021	250	951	936	1060	969	973

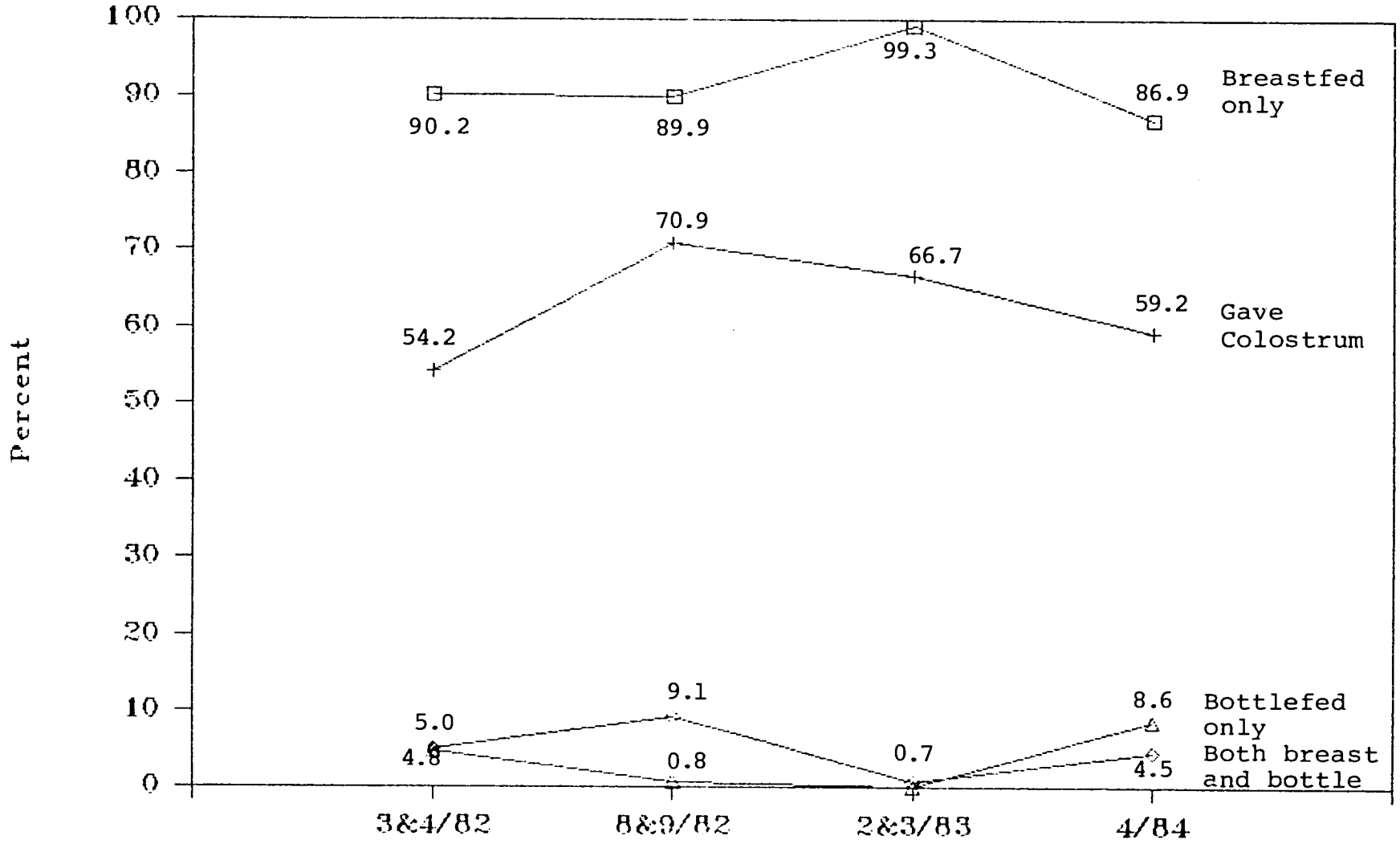
practices may fluctuate or change completely over time. Reasons for changes may include seasonal food availability, the worsening economic condition which limited disposable income, drought-related shortages, and educational factors such as the growing numbers of primary health care workers conducting home visits and Radio Gambia's non-formal educational programs. The evaluation team administered a nutrition questionnaire over three successive dry seasons and once during the rainy season to examine relevant child feeding practices.

Most mothers in our sample breastfed their infants. Figure III-1 shows that the percentage of mothers reporting that they breastfed their youngest child during the first months of its life gained about eight percent during the campaign - - up to a high of 99.3 percent in February 1983 and dropped back to 86.9 percent in 1984. The percentage of mothers bottlefeeding their infants remained under ten percent all during the campaign. Additionally, by April 1984 a majority of mothers (59.2%) claimed that they were giving their infants colostrum or first milk, rather than discarding it. The women who bottlefed or gave both breast and bottle in 1982 were mostly from the Western Division. During the 1984 drought, women in Lower River Division accounted for nearly all bottle feeding; 41% of LRD women bottle fed alone or with breastfeeding.

Breastfeeding on demand remained popular over the campaign; the dry season percentages went from 86.8 percent in 1982 to 97.7 percent in 1983 to 90.2 percent in 1984. The proportion of mothers who reported breastfeeding their infants from the first day rose from 20.3 percent to 34.9 percent over the first year, and went down to 26.0 percent in 1984. It might be best to interpret part of this fluctuation as reflecting knowledge change or intent by the mother to give the correct answer, rather than behavior change, because many mothers would not have had a new baby and hence not have had the opportunity to change their behavior in areas such as giving colostrum or breastfeeding on the first day.

On the other hand, the drought conditions during 1984 may

Figure III-1 Breast and bottle-feeding of youngest child in the first months of life, March 1982 to April 1984



n's for breastfed only: 655, 605, 746, 658, respectively; for gave colostrum: 379, 436, 497, 420, respectively; for breast and bottle : 35, 7, 0, 34

Note: HOWFEDGI, DISCGI

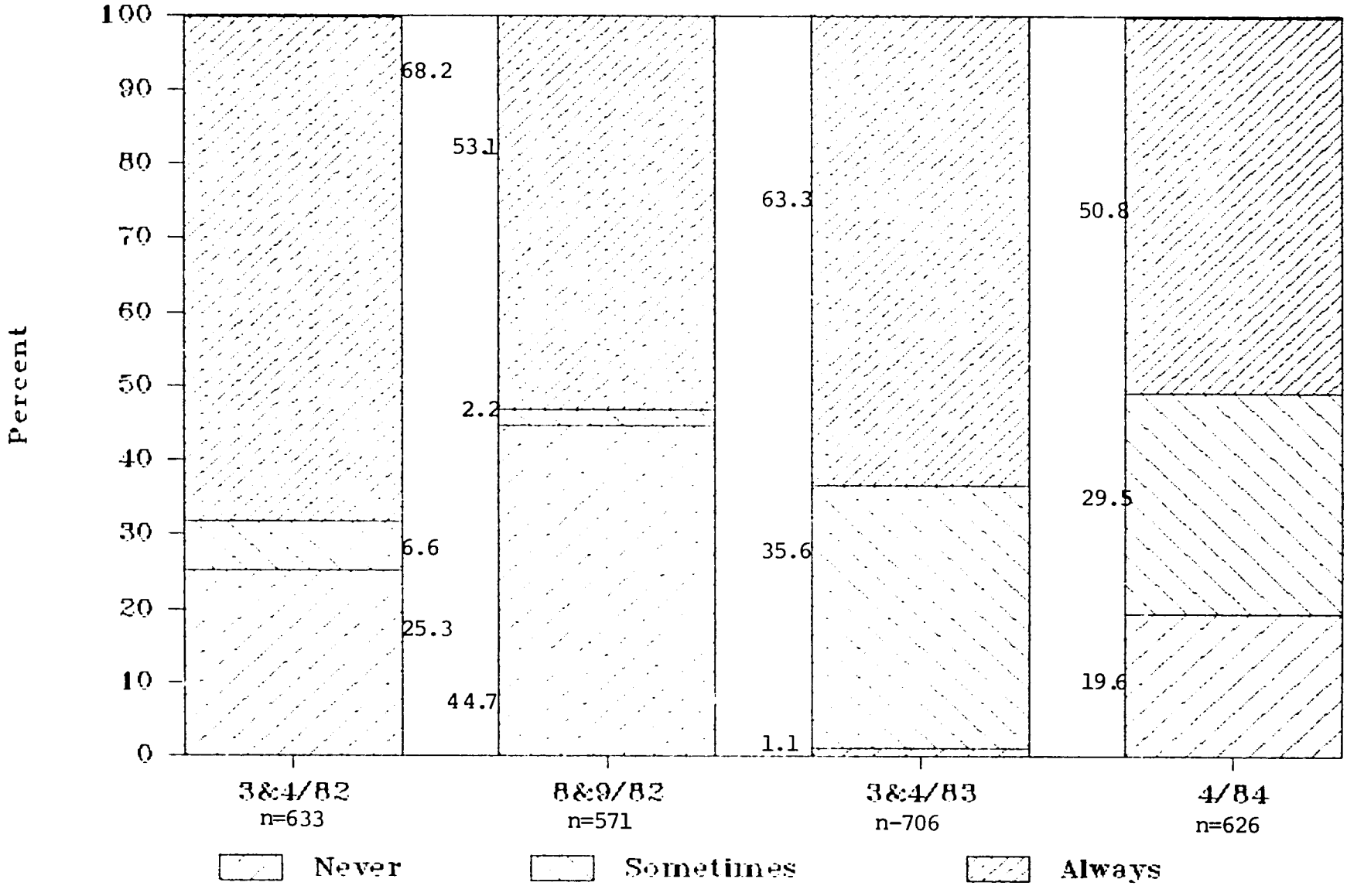
have reduced women's nutritional status which may have affected breastfeeding capabilities. Still other women did more traveling than normal in 1984 in efforts to secure some income in trade to compensate for poor crop yields in the 1983 drought. Weaning age, as well as not breastfeeding at all, could be affected by these two drought-related factors.

Weaning in rural Gambia began when a child was between three and five months of age. Breastfeeding continued for most children, however, until they were between 18 to 24 months of age. Ages of beginning and completing weaning varied from wave to wave, perhaps in response to economic and climatic conditions. The mean ages in months for starting and completing weaning were: 4.4 to 21.7 months in March/April of 1982; 4.7 to 18.2 months in August/September of 1982; 3.5 to 22.8 months in February/March of 1983; and 3.1 to 19.2 months in April of 1984. Many mothers breastfed their children at least 24 months (75% Wave 1, 67% Wave 2, 81% Wave 3, 53% Wave 4). Extended breastfeeding dropped slightly during the rainy season at Wave 2 and during the drought at Wave 4, while the age of beginning weaning rose during the rains in 1982 and dropped during the drought. Different weaning behaviors during the drought may be one root of the decreased health status of the sample in 1984 (see Health Status chapter).

Most rural Gambia women farm; in fact, they are responsible for the subsistence crops their families consume. When they go to their fields, they may take their young child with them and breastfeed there. Alternatively, they may prepare foods in the morning for the child, who is left with a caretaker in the compound while the mother works in her fields.

The percentages of mothers in our sample taking their child with them to the fields varied by season of the year. Figure III-2 shows the percentage of mothers who took their youngest child to the fields. Children were less likely to accompany their mothers to the fields in August/September than in the spring. Most mothers breastfed their child if they took them along to the fields in spring (93.1% in 1982, 99.4% in 1983,

Figure III- 2 Mothers who take youngest child to the fields with them when they go to work



TAKKGI:Excludes zeros and don't knows

92.5% in 1984) and slightly fewer over the heavy work season in August/September 1982 (84.8%, see Figure III-3).

The young children left behind in the village were usually fed some sort of soft pap made from coos, rice, or occasionally corn (see Table III-4). Coos pap is a watery porridge made of millet. Rice pap seems to have been preferred over coos when it was available (there was a rice shortage in 1984).

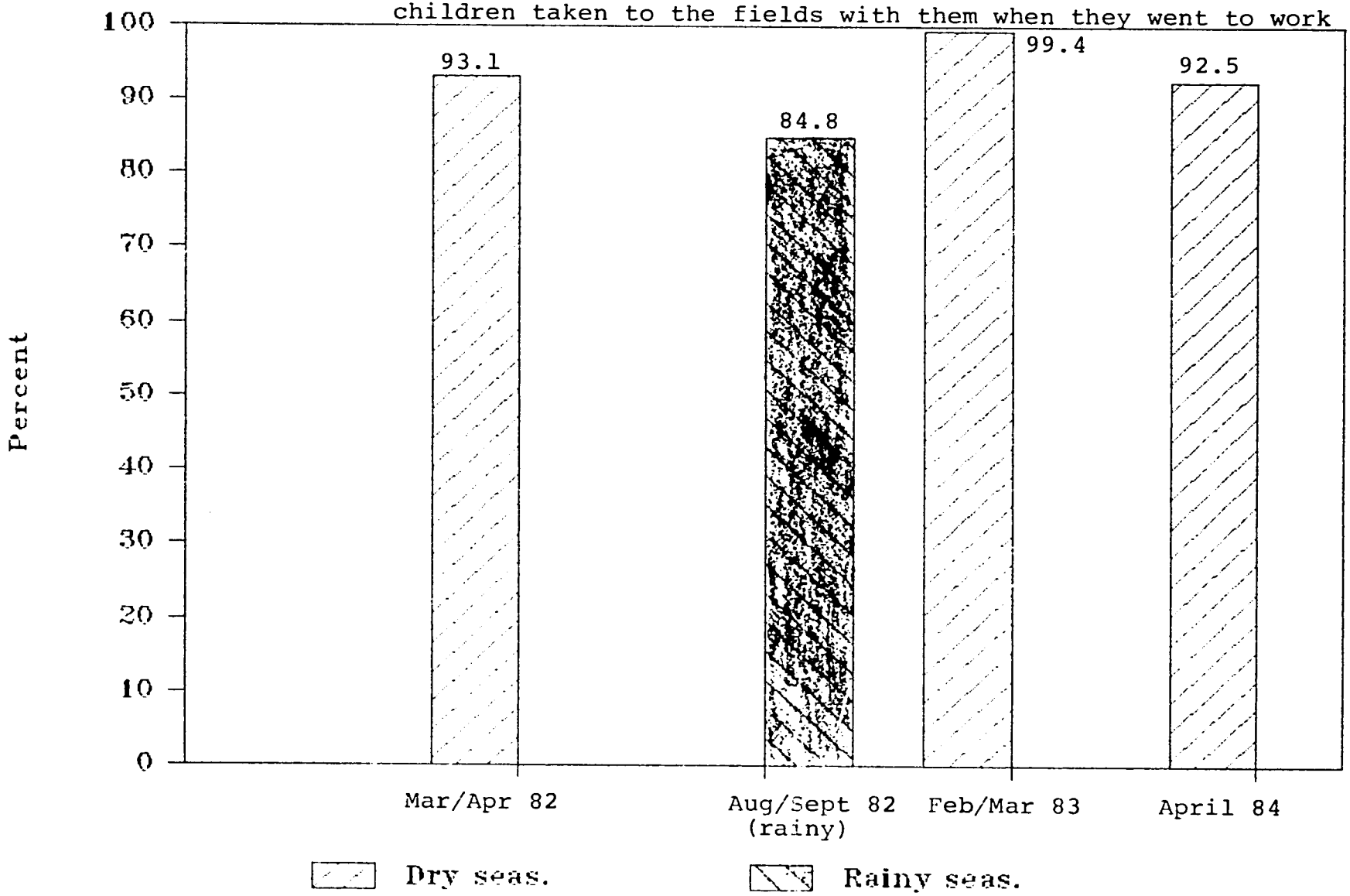
The sample children were cared for by older female relatives, or a female non-relative, or another child, when not by their mothers. Table III-5 shows the caretaker of the young child remaining behind in the village. Younger caretakers were used more often during the busy rainy season.

Table III-4 What the youngest child eats if it remains in the village while mother goes to work in the fields

Foods:	Mar/Apr. 1982	Aug./Sept. 1982	April 1983	April 1984
Coos pap	68.3%	52.0	26.3	81.4
Rice pap	9.1	41.6	69.1	11.1
Corn pap	3.8	2.1	3.9	7.1
Other	18.8	4.3	0.8	0.3
Total percent eating pap when left:	81.3	95.7	99.2	99.7
n =	208	281	259	323

A few questions were asked about the mother's diet, such as how often during the previous week they had eaten any fish, meat, eggs, or groundnuts, all protein sources. Mothers were also asked if they had eaten any fruit the day before. As Figure III-4 shows, seasonal variation is evident. Fish, groundnut, and fruit consumption dropped during the rainy season. Between March 1982 and April 1984, dry season consumption of fish and ground-

Figure III- 3 Seasonal differences in mothers who breastfed their children taken to the fields with them when they went to work



INFLDGI, INFLGI2-4
n's = 478, 374, 702, 505, respectively

nuts rose. Egg consumption, while always low, was even less after March 1982, probably due to a worsening economic situation (eggs are valuable in the marketplace). Table III-6, showing the mean number of times these protein sources were consumed in a week, also testifies to the paucity of Gambian women's diets.

Table III-5 Caretaker of child remaining in the village when child's mother goes to work in the fields

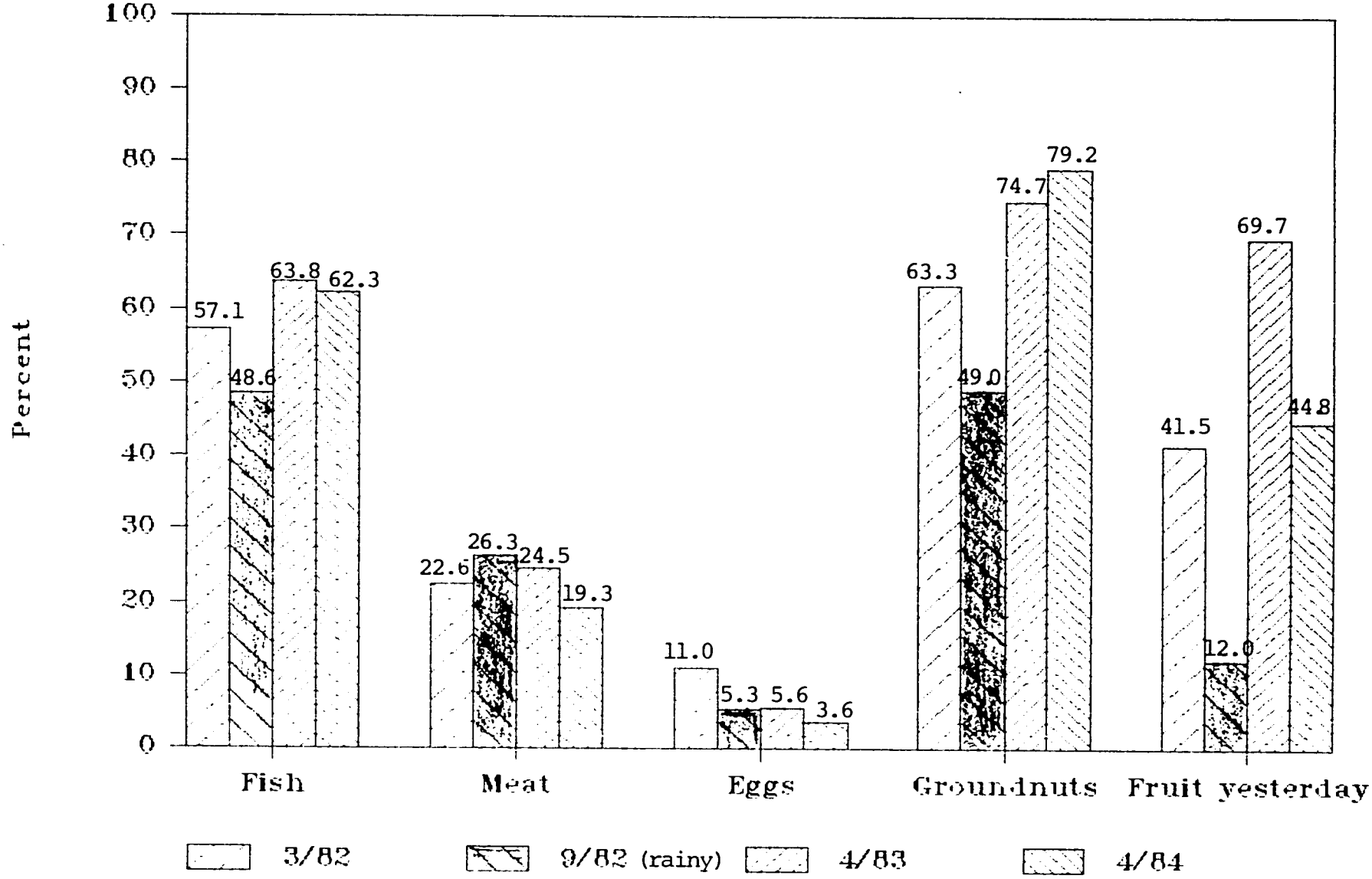
	Mar./Apr. 1982	Aug./Sept. 1982	April 1983	April 1983
Another child takes care of younger child	28.9%	58.6	2.3	24.5
Older woman, relative, or non-relative takes care of child	61.9	40.7	96.2	75.5
n =	208	281	259	323

Table III-6 Mother's diet: Number of times food eaten in the last week

	Season: DRY March '82	RAINY Sept. 82	DRY April 83	DRY/DROUGHT April 84
Fish	5.7 (670)	3.9 (770)	6.4 (727)	5.6 (802)
Meat	2.4 (698)	2.6 (533)	2.6 (632)	2.2 (757)
Eggs	1.4 (675)	0.7 (512)	0.8 (512)	0.5 (740)
Groundnuts	5.9 (697)	5.1 (621)	10.3 (581)	7.9 (611)

GNUT:FISHGI, MEATGI, EGGSGI, GDNUTGI

Figure III- 4 Mothers' diet. foods eaten more than three times in the past week



N's: for fish: 670, 771, 727, 802; for meat: 698, 533, 632, 757; for eggs: 675, 512, 523, 740;
for groundnuts: 697, 621, 581, 611; for ate fruit yesterday: 754, 527, 755, 844
FISHGI, MEATGI, EGGSGI, GNUTGI, FRUITCI

During the rainy season, which was when women are working the hardest in their fields, the average woman consumed fish four times, meat three times, eggs once, and groundnut meals five times over the course of a week in 1982. Because of the social value of rich diets, these self-reported figures are probably inflated. Furthermore, reporting the number of times a food was eaten does not reflect the size of portions consumed. In The Gambia, people eat out of common bowls, and one dried fish or a few pieces of meat may be shared by all family members. In addition, women and children eat last in many tribes and so may not receive their share of the protein.

There is also evidence of seasonality in the amount and kinds of foods that children ate. Mothers were asked to name all the foods they could remember their youngest, non-breastfed child eating in the last week, and how many times they ate that item. Appendix D shows that during the "hungry season", as expected, children ate fewer portions and less variety of foods. Observations made by Peace Corps Volunteers support this; meals take place around a communal bowl, children are expected to scoop up what they can, and mothers are not necessarily likely to notice the volume of food eaten by the child.

Handling of leftovers is another feeding practice which could be dealt with in an educational campaign, although it was not a topic of this campaign. Leftovers can be a source of contamination and cause diarrhea if not stored or reheated properly for a child's consumption. Table III-7 illustrates what was done with leftovers by sample mothers. The number of women keeping leftovers for later meals fluctuated between 60 and 90 percent. Disturbingly, fewer mothers over time reheated the foods before serving, especially women in Lower River and McCarthy Island divisions. However, nearly all women (98.1%) in May 1982 said they kept stored food covered. Barrell and Rowland's (1979) findings indicate that the risk of contamination of infants' foods is much more severe during the rainy

season than during the rest of the year, and increases over time after preparation.

Table III-7 Women who kept and reheated leftovers, by division

	March 1982	Sept. 1982	April 1983	April 1984
Percent of women who kept leftovers for later meals, all divisions:	68.6% (724)	59.2 (830)	88.9 (751)	79.4 (757)
Among women serving leftovers, percent who reheat them:				
All divisions	62.8 (505)	39.8 (487)	21.4 (668)	35.9 (596)
Western division	82.9 (105)	72.4 (123)	55.5 (153)	49.1 (114)
North Bank	69.8 (149)	66.4 (113)	8.9 (153)	1.5 (67)
Lower River	30.2 (159)	70.4 (135)	0 (202)	0 (172)
McCarthy Island	72.6 (124)	42.5 (146)	47.3 (131)	0 (250)

GNUT: FDLEFGI, SERVGI
Excludes zeros and don't knows.

B. Feeding during Diarrhea

A major thrust of the campaign dealt with promoting a better diet for children during and after diarrhea. In July 1982 the radio broadcasts discussed a "diet for dryness" or dehydration, which included continued breastfeeding, lots of liquids (like tea or WSS), avoidance of watery paps, and giving solid foods during and after diarrhea. A different campaign, starting

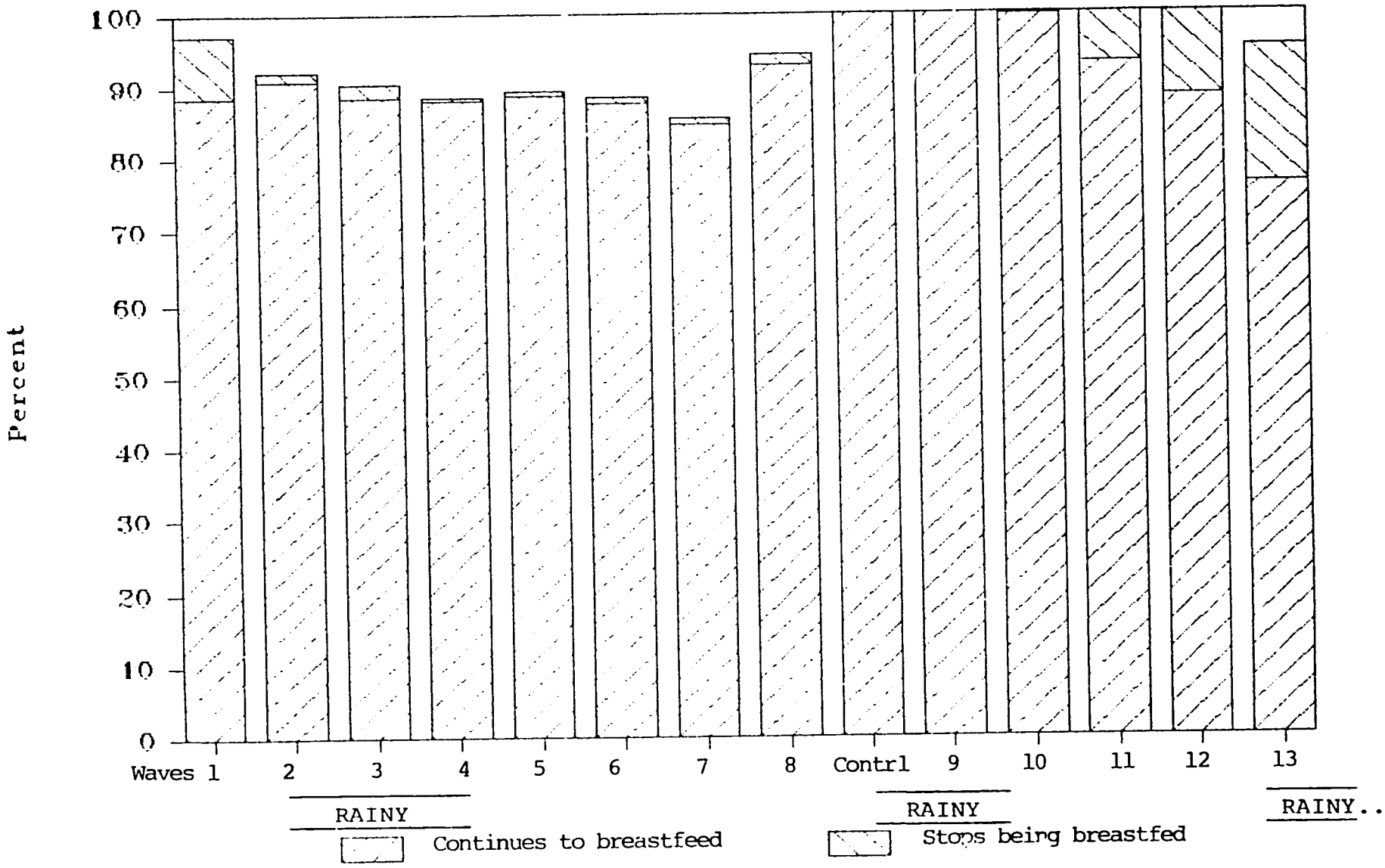
in July 1983, focused on foods for recovering children. Special foods like rice and groundnut porridge and "power foods" like fish and meat were taught explicitly. In addition, the campaign promoted adding milk, sugar, or oil to paps for recovering children. Posters illustrating a proper diet for children ill with diarrhea were distributed between July and October 1983 to health centers and village meeting places. It is unclear how often feeding messages were broadcast after October. It seems likely that Radio Gambia reran some messages between October and the mini-campaign in April 1984, and that health workers continued to teach feeding practices until they, too, became involved in the mini-campaign.

(1) Breastfeeding during diarrhea

Figure III-5 and Table III-8 demonstrate that breastfeeding did continue when infants were ill. The percentage of children whose mothers said they stopped breastfeeding during diarrhea dropped from 8.8 percent before the campaign to between zero and two percent during the 1983 rainy season. However, more children stopped breastfeeding during diarrhea in 1984. This pattern holds for the subset of the sample ill in the last two weeks (Table III-9). Breaking down the sample by district (Table III-10) shows that the children who stopped breastfeeding during diarrhea in 1984 lived in Western Division and Lower River Division. In June and July 1984, 21.7 percent of the children in Western Division and 58.7 percent of children in Lower River stopped breastfeeding.

An analysis by age groups shows that younger children were more likely to be breastfed during diarrhea than older ones (Table III-11). However, the high rates of response by mothers of older children suggests that women responded to the morbidity questionnaire item on breastfeeding in general, rather than for that particular child. Looking only at children aged two years and younger, 12.3 percent of the children measured in June 1984

Figure III- 5 Percentage of children breastfed and not breastfed during a bout of dia-rhea



MORB:DIBRSGQ

Table III-8 Child feeding during diarrhea, The Gambia

	W1 3/82	W2 6/82	W3 7&8/82	W4 9/82	W5 11/82	W6 12/82	W7 3/83	W8 4/83	Cont. 5/83	W9 7/83	W10 10/83	W11 2/84	W12 4/84	W13 7/84
Breastfeeding:														
Continues	88.3	90.9	88.4	88.1	88.7	87.6	84.7	92.9	100.0	100.0	99.9	93.1	88.4	76.3
Stops	8.8	1.1	1.9	0.4	0.6	0.8	0.8	1.6	0	0	0	6.9	11.6	19.0
Other feeding:														
Stops	31.5	10.5	15.4	16.5	16.7	18.0	27.3	9.9	8.0	2.1	3.5	1.0	3.4	14.6
Same diet or more liquids	58.9	84.7	82.0	82.9	81.9	79.6	56.0	61.3	55.2	92.4	96.6	97.8	80.0	85.1
Given solids	13.6	19.3	21.3	30.9	24.9	29.6	49.5	37.6	57.2	33.2	54.9	41.9	44.6	52.2
Given special food after diarrhea	55.0	67.0	69.9	66.5	54.5	65.8	91.0	83.4	67.2	73.8	60.5	69.7	63.6	73.7
Mother considers some foods taboo	27.1	21.7	24.5	25.7	22.5	25.3	28.0	33.5	36.8	34.2	26.0	22.4	16.0	30.1
N	971	885	960	956	912	1041	1027	1021	250	951	936	1060	969	972

Note: MORB: DIBRSGQ, DIFEDGQ, DIETGQ, CHNGEGQ, (SAMEGQ), TABOOGQ, SPECLGQ, TYPFDGQ

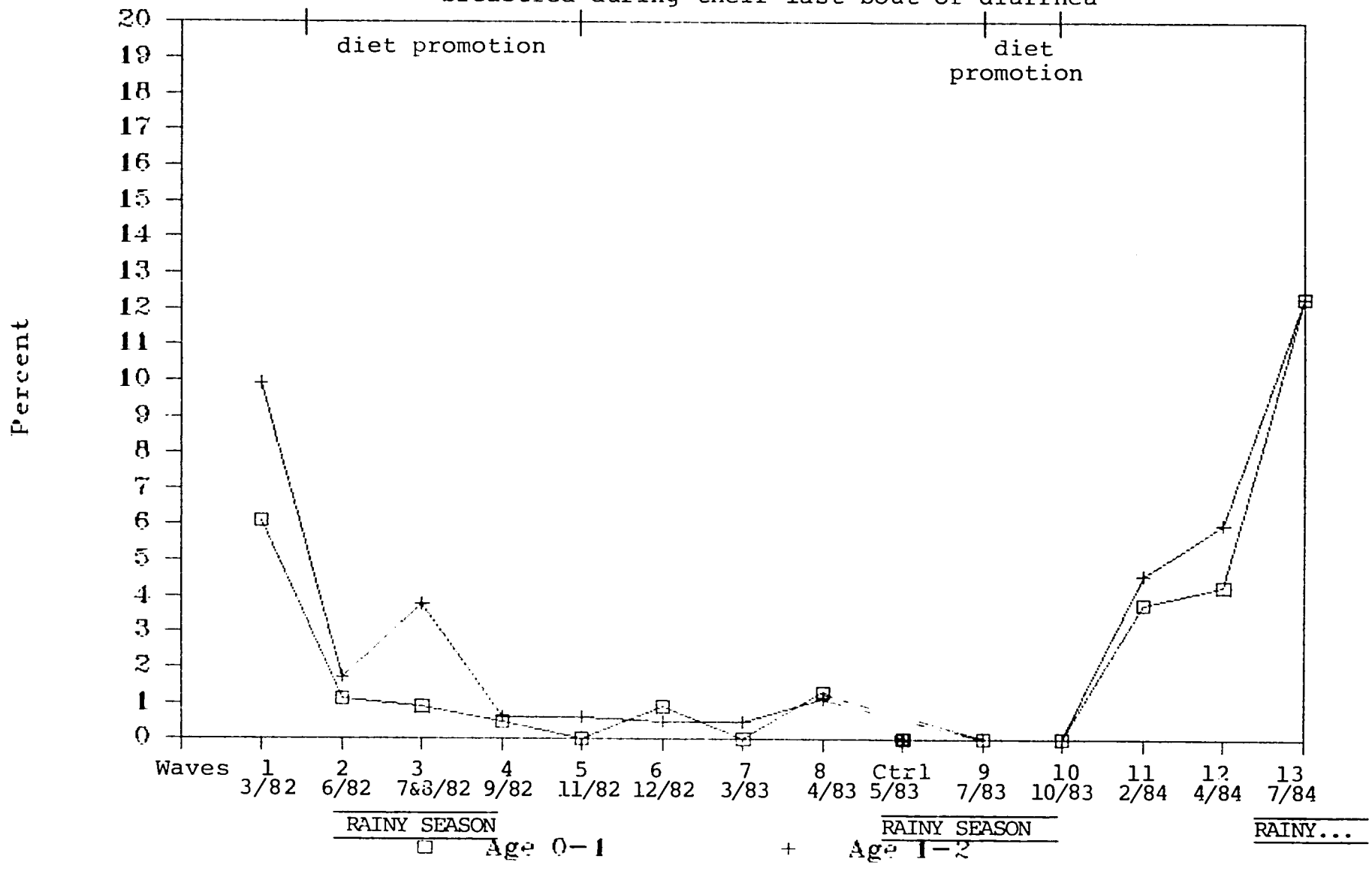
were not breastfed during their last bout of diarrhea (Figure III-6). It is unclear why this upswing in stopping breastfeeding occurred over the course of 1984; however, it parallels information in the previous section on lower breastfeeding rates in general during the 1984 drought. Thus, it may be associated with reduced health status and increased dry season workload during the drought, or may be related to the shift in the campaign to sanitation issues during the mini-campaign.

(2) Continued feeding during diarrhea

In addition to messages about breastfeeding, the campaign promoted continued feeding during and after diarrhea and giving the child lots of liquids to replace lost fluids. Figure III-7 compares children not fed solid foods or liquids besides breastmilk with children given the same diet or more liquids, and children fed solid food. During the 1982 rainy season diet promotion, the women seemed to be responding to messages about continuing feeding and giving more liquids. The number of children not fed during diarrheal bouts dropped from 32 percent to between 10 and 17 percent, while the number of children given the same diet or more liquids rose from an initial 59 percent to 82 to 85 percent.

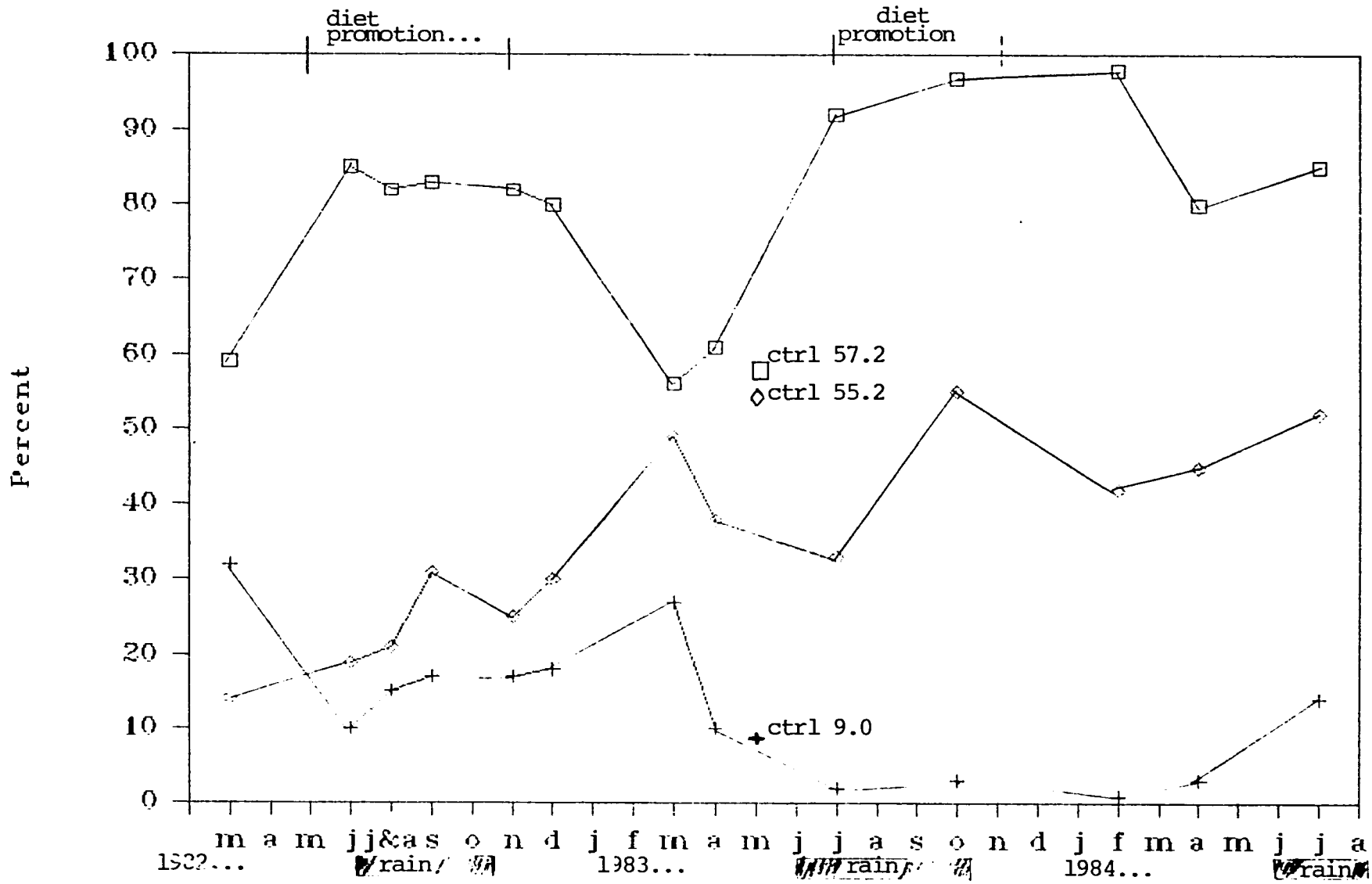
When the campaign ceased its diet emphasis from October to July, 1983, women seemed to resume their past behaviors; 56 percent of the children were fed the same diet or more liquids in March 1983 and 27 percent of the children were not fed. Then with the resumption of diet messages, nearly all women (92-98%) responded by saying they continued to feed their children. These levels dropped somewhat after the messages ended in the dry season, 1983-84, but the levels did not drop as much as they had after the first year. Thus, at the beginning of the rains in 1984, 85 percent of the children were given the same diet or more liquids, and 14 percent were not fed at all during diarrhea bouts.

Figure III-6 Percentage of children under two years old who were not breastfed during their last bout of diarrhea



MORB: DIBRSGQ

Figure III- 7 Feeding during diarrhea, aside from breastfeeding



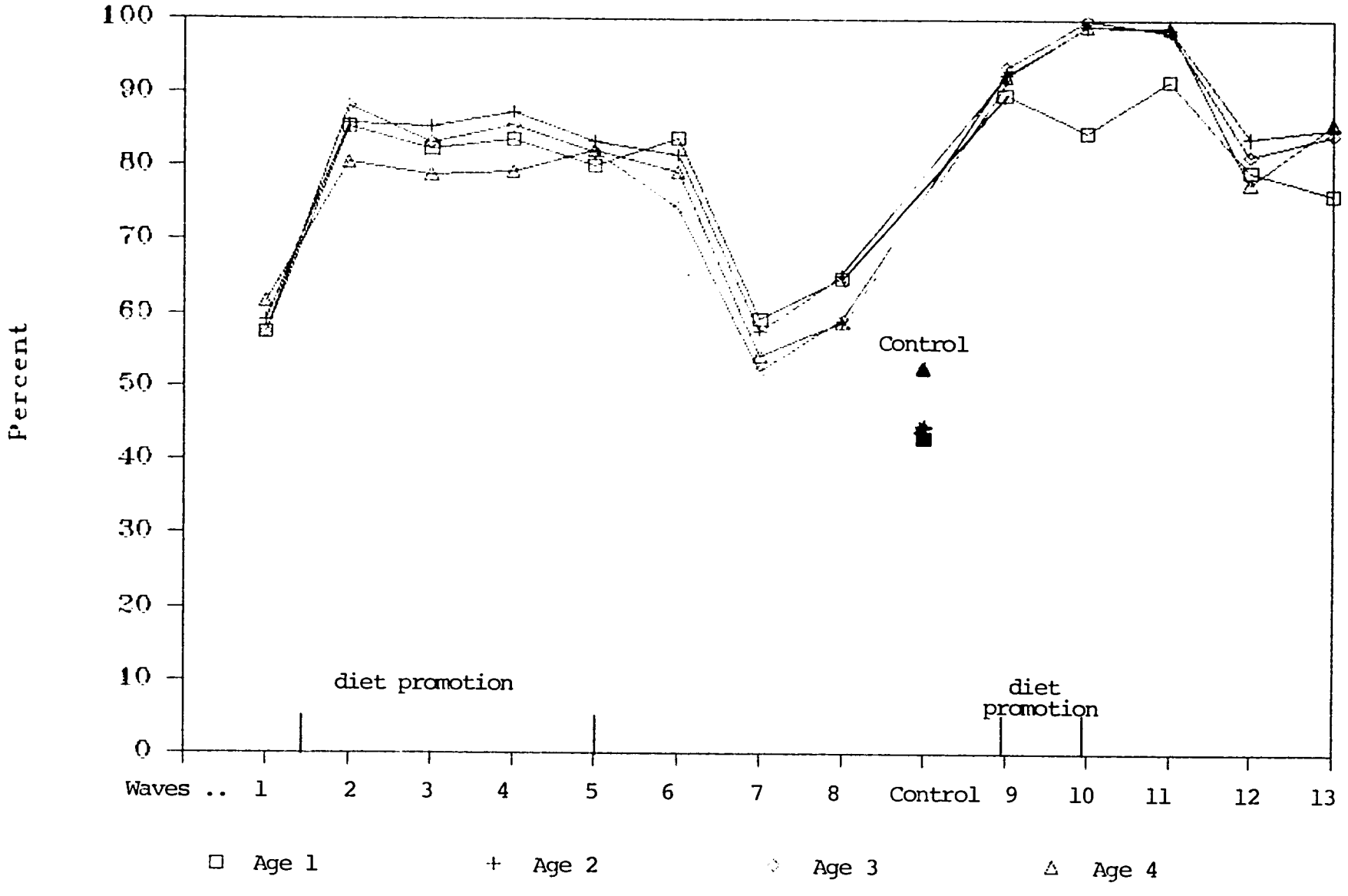
n's = W1= 971; W2= 885, W3= 960, W4= 956, W5= 912, W6= 1041; W7= 1027, W8=1021
W9=951, Ctrl=250, W10=936, W11=1060, W12=969, W13=972
CHNGEGQ,TYPFDGQ, DIFEDGQ; MORB

This general pattern for the same diet of a gain during the first diet promotion followed by a drop, then a higher gain during the second year's promotion followed by less of a drop is consistent across age groups (Table III-11 and Figure III-8). By the end of the evaluation, 14.3 percent of children aged 2-3 years and 12.7 percent of the children over 3 years were not fed at all, compared to initial rates of 32.1 and 29.1 percent, respectively (Figure III-9).

Analysis by division (Table III-10) shows considerable variation. Western Division, apparently, did not respond to these feeding messages until the second year, while Lower River and McCarthy Island responded immediately and maintained low levels of stopping feeding. Curiously, both Lower River and McCarthy Island rates of children not fed during diarrhea rose during the last wave of data collection. The control villages in each division responded similarly to the closest data collection points, which suggests that the samples in each division were not sensitized to feeding messages by the evaluation. However, the systematic division differences may be due to interviewer bias. Certainly, the flux in North Bank Division between March and May 1983, is attributable to the temporary interviewer in that district.

Other evidence points toward a forgetting effect once feeding messages ceased. One question on the Radio Spots instruments No. 5 and 6 confirms that after the feeding campaign, slightly fewer women than during the 1983 rainy season were giving the same diet or increased amounts of food to recovering children, but that the overall levels were high. Figure III-10 shows that the percentage of women during the 1983 rainy season and the 1984 dry season who fed their children less than normal after the diarrhea stopped increased from 16.4 percent to 22.8 percent. In addition, 13.7 percent fewer women increased the amount of foods given recovering children. The percentage of women giving the same diet or more foods dropped slightly between September and February, from 83.6 percent to 77.3 percent. The figures correspond roughly to morbidity waves 10 (Oct. 1983) and

Figure III- 8 Percentage of children given the same diet or more liquids, by age



Note: SAMEGQ;MORB

Table III-9 Child feeding during diarrhea for children ill in the last two weeks

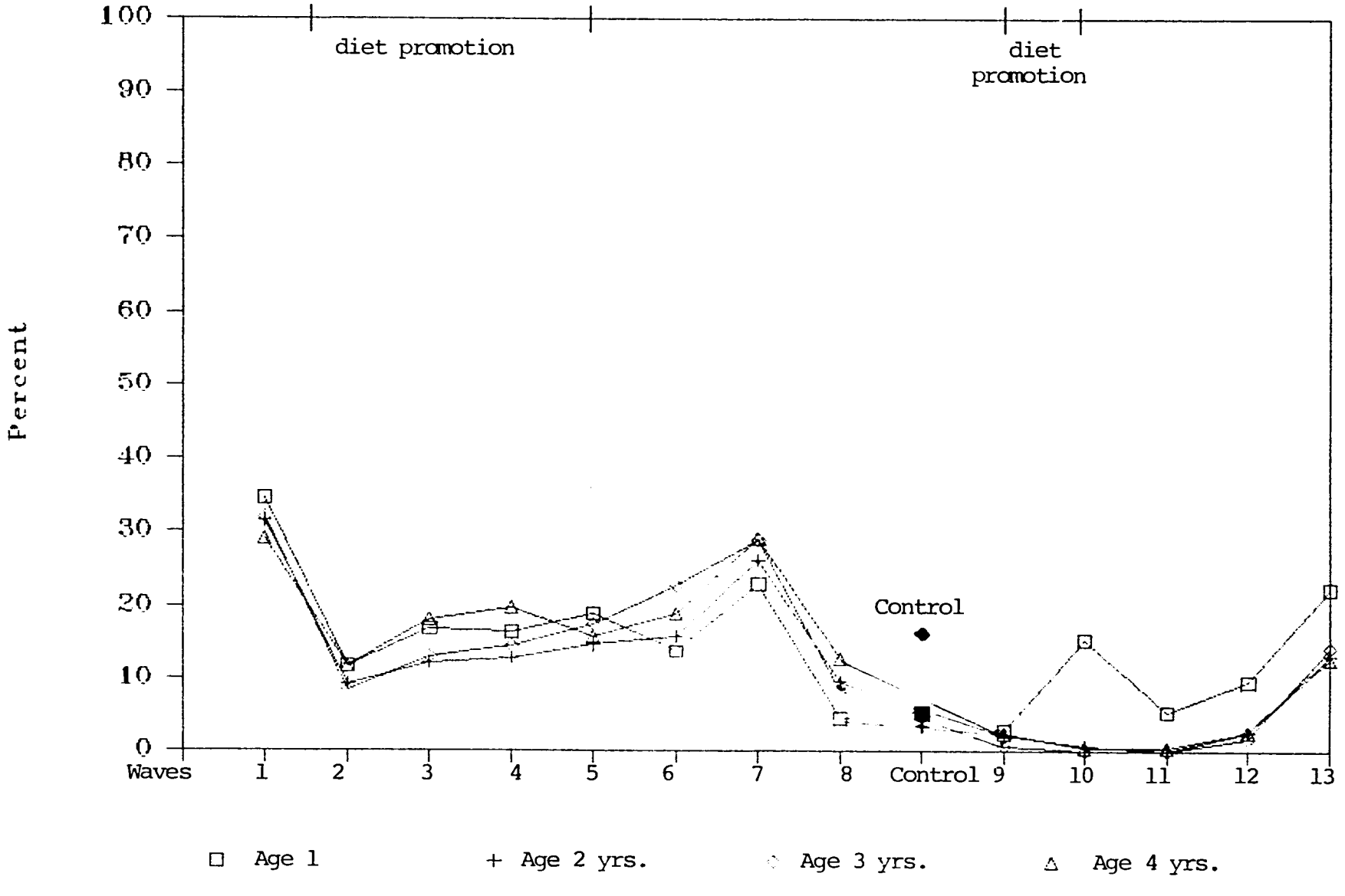
	Morbidity waves													
	1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
Breastfeeding:														
Continues	79.3	92.6	94.4	91.9	87.0	91.7	86.2	[illegible].8	100	100	100	94.8	94.6	76.2
Stops (1)	14.0	2.6	0.6	1.2	0.9	0.0	0.8	7.2	0	0	0	5.2	5.4	19.8
Stops other feeding	47.7	81.7	88.9	85.9	79.6	79.6	46.2	46.8	52.8	90.3	94.2	93.6	87.4	79.1
Given solids	24.5	22.3	14.9	19.8	18.5	26.9	60.0	43.2	52.4	39.6	60.1	42.4	64.9	51.7
n =	196	230	323	248	108	108	130	111	42	227	138	172	111	172

Note: IF HADDIGQ, DIBRSGQ, DIFEDGQ (SAMEGQ), FDTYPGQ
(1) The response "doesn't breastfeed" is not shown.

Table III- 10 Feeding during diarrhea, by division

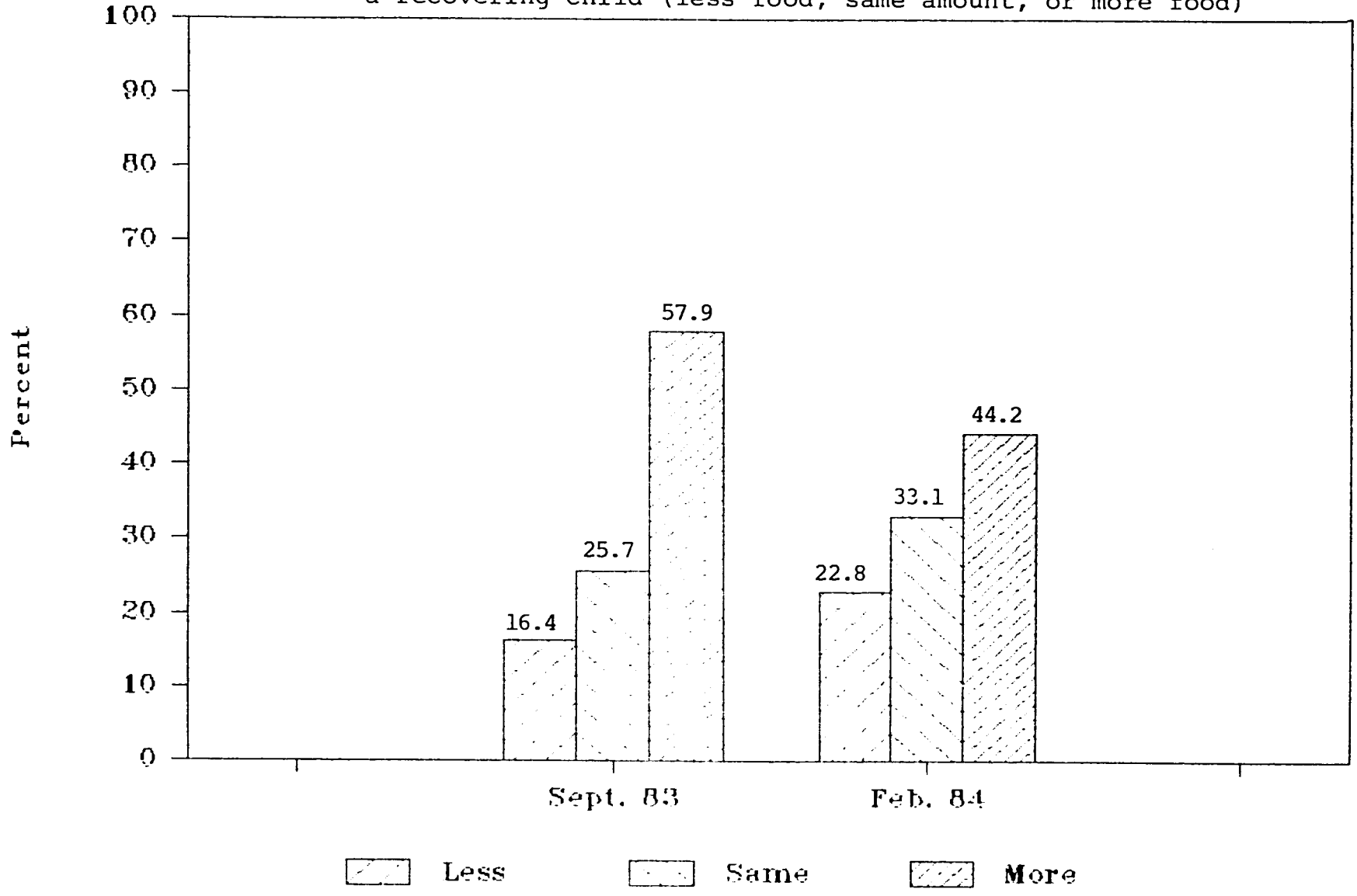
	Morbidity Waves													
	1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
Stops breast:														
Western Division	7.5	3.3	6.8	1.5	2.3	3.1	1.0	5.0	0.0	0.0	0.0	25.9	46.1	21.7
North Bank	8.7	1.3	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Lower River	10.6	0.0	1.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	58.7
McCarthy Island	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stops other foods:														
Western Division	27.3	31.4	53.2	44.6	33.6	54.8	56.8	29.1	24.4	9.4	0.4	0.0	7.0	0.4
North Bank	29.1	10.5	9.5	16.1	32.8	17.5	46.5	7.3	3.4	0.0	11.4	3.6	4.7	2.7
Lower River	32.1	0.0	0.0	0.0	0.0	0.0	0.5	0.0	6.1	0.0	0.5	0.0	0.0	38.6
McCarthy Island	38.8	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	16.7
Same diet or more liquids:														
Western Division	57.7	54.8	36.6	54.3	60.4	35.9	31.5	65.1	74.6	90.1	99.6	100.0	25.1	99.2
North Bank	66.1	82.9	90.0	83.5	67.2	82.1	2.9	0.0	1.1	79.4	88.6	96.5	95.3	96.9
Lower River	56.8	100.0	100.0	100.0	100.0	100.0	91.8	100.0	90.9	99.5	99.5	93.7	100.0	59.2
McCarthy Island	54.9	99.6	100.0	100.0	100.0	100.0	100.0	99.2	88.7	100.0	99.2	100.0	100.0	81.7
Gives solid foods:														
Western Division	14.0	22.4	46.8	78.0	70.1	86.5	75.8	56.7	3.4	10.4	74.4	74.5	77.8	38.2
North Bank	12.6	39.2	8.8	7.0	12.5	12.1	75.7	67.6	79.3	71.2	71.5	22.3	36.8	66.6
Lower River	11.3	1.4	13.7	8.5	8.0	6.4	23.7	6.5	12.1	51.7	72.9	65.5	84.3	69.2
McCarthy Island	16.7	13.9	16.6	22.1	11.6	13.5	19.2	7.4	95.8	4.2	7.4	12.4	1.7	37.5
n =	971	885	960	956	911	1040	1027	1021	250	951	936	1060	969	973

Figure III-9 Percentage of children who weren't fed during their last bout of diarrhea, by age



MORB:DIFEDGQ

Figure III-10 Mothers' reports on the amount of foods she gives to a recovering child (less food, same amount, or more food)



N's = Sept 83=689, Feb. 84=813
EXTRAGT5,6

12 (April 1984) measures of 96.6 and 80.0 percent of the children, respectively. While the figures are not directly comparable because the question wording was altered on the radio spots instruments, and the level of analysis (child vs. mother) was different, the same trends are depicted.

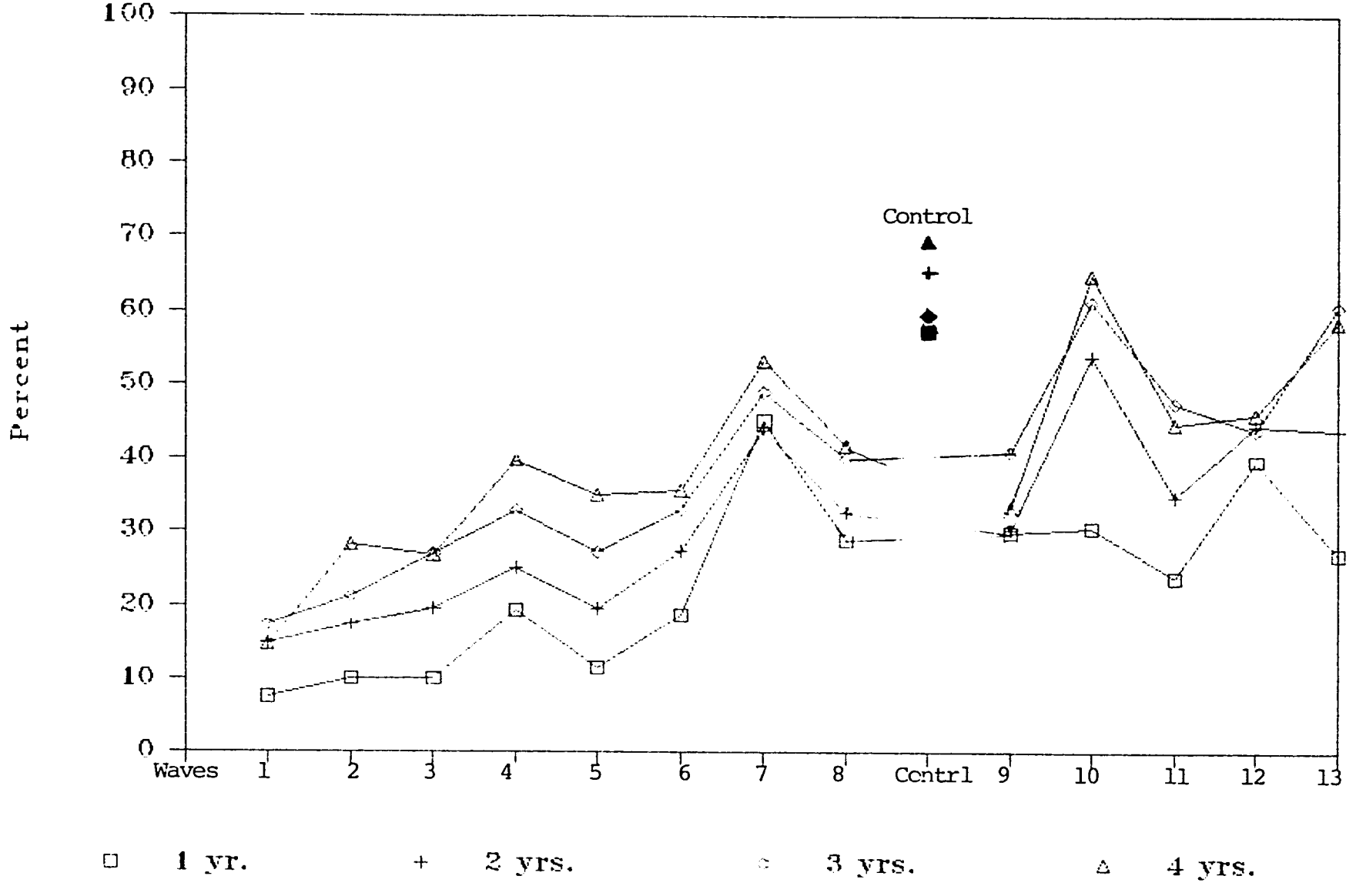
(3) Giving solid foods and taboo foods

Messages during the second rainy season particularly emphasized giving solid foods to recovering children, after comparatively few mothers seemed to learn this important dietary behavior during the first promotion phases. Figure III-7 (presented earlier) shows a rise from 13.6 percent to 30.9 percent over the first rainy season, a substantial rise to 49.5 percent when there was no emphasis on feeding in March 1983, followed by a drop and then second rise by the end of the promotion in 1983. Unlike other feeding issues, the feeding of solids during diarrhea did not recede substantially by the last wave of data collection in June 1984, perhaps due to the heavy coverage this particular message received during 1983.

Older children were more likely to be fed solid foods when recovering from diarrhea and the trend improved over time for all age groups (Figure III-11). The campaign emphasized solids for children old enough to eat them, but may have been too vague about the proper age to begin solid foods. By June 1984, 43.8 percent of the children between 1 and 2 years old, compared to 58-60 percent of the older children were given solids when recovering.

Within each division there was much fluctuation over time (Table III-10). All divisions except Western Division show a rise in feeding solids during March 1983 - - Western Division levels were high (86.5%) before that date. McCarthy Island had the lowest rates throughout most of the evaluation, averaging around 15 percent, but inexplicably reported 95.8 percent of the children in the control sample were given solids during their

Figure III-11 Percentage of children given solid foods after their last bout of diarrhea, by age



MORB: TYPFDGQ

Table III-11 Feeding during diarrhea by age groups (collapsed)

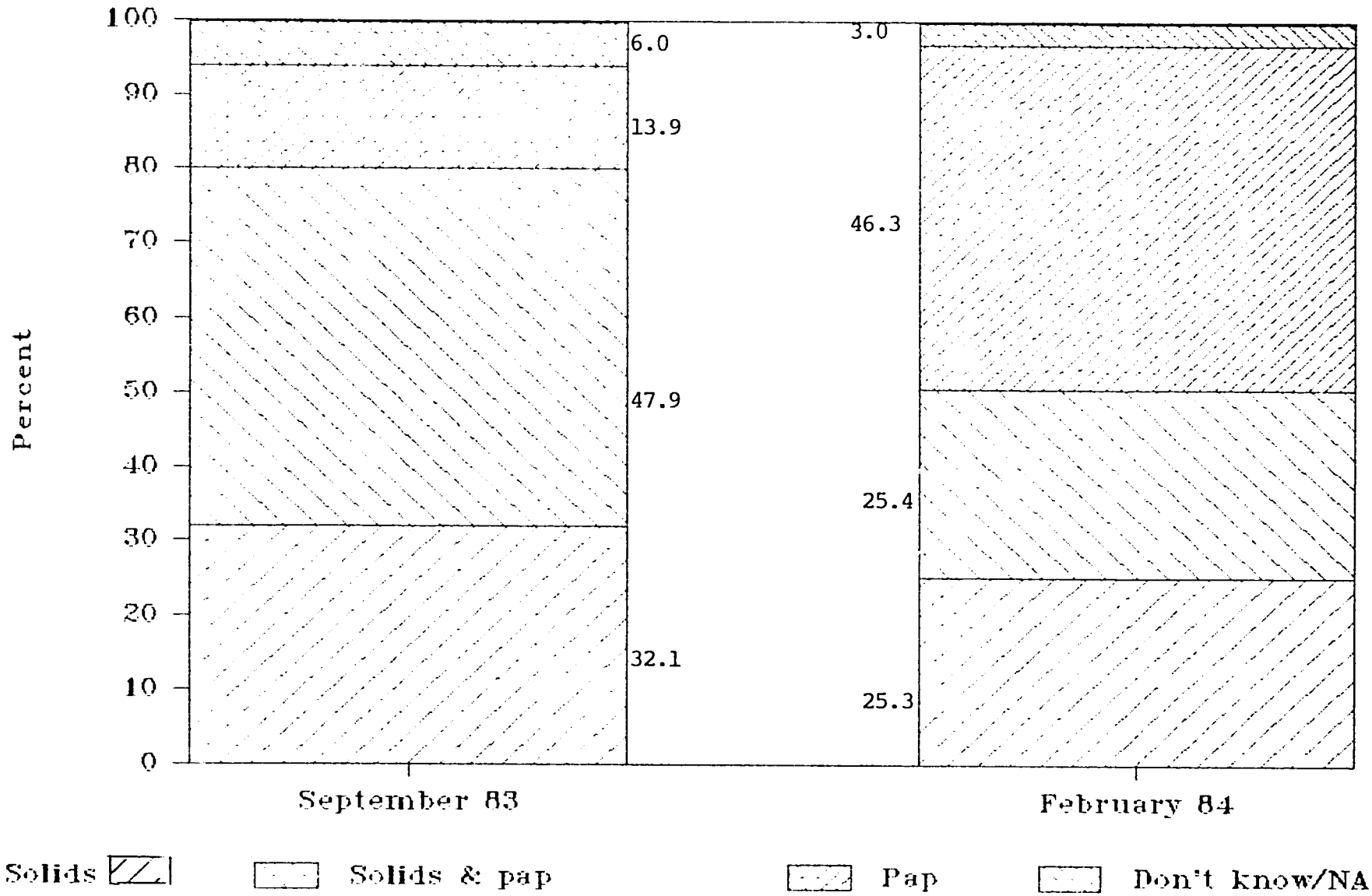
Item	Morbidity waves 1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
Stops breast:														
Age 1	6.1	1.1	0.9	0.5	0	0.9	0	1.3	0	0	0	3.8	4.3	12.3
Age 2	9.9	1.7	3.8	0.6	0.6	0.5	0.5	1.1	0	0	0	4.6	6.0	12.3
Age 3	10.9	0.5	1.4	0	0	1.5	1.1	2.2	0	0	0	7.1	11.8	21.7
Age 4	9.1	1.1	1.9	0.3	1.2	0.5	1.2	1.9	0	0	0.3	7.4	15.5	24.2
Stops other foods:														
Age 1	34.5	11.7	16.8	16.3	19.0	13.7	22.8	4.5	5.3	2.9	15.3	5.3	9.5	22.3
Age 2	31.5	9.2	12.0	12.8	14.7	15.8	26.0	9.6	3.4	2.1	0.7	0	2.6	13.1
Age 3	32.1	8.3	13.0	14.5	17.5	22.7	28.8	8.3	16.2	0.6	0	0	1.7	14.3
Age 4	29.1	11.8	18.0	19.7	15.7	18.9	29.0	12.8	5.1	2.4	0.5	0.5	2.6	12.7
Same diet or more liquids:														
Age 1	57.5	85.3	82.3	83.7	80.0	83.9	59.3	64.7	42.9	89.7	84.7	91.6	79.3	76.2
Age 2	59.1	85.6	85.3	87.2	83.4	81.4	57.7	65.2	44.8	92.6	99.3	98.8	84.1	85.4
Age 3	57.4	88.1	83.2	85.5	81.9	74.2	52.2	59.4	45.9	93.5	100.0	98.4	81.5	84.5
Age 4	61.5	80.5	78.8	79.1	82.1	79.1	54.2	58.8	52.5	92.2	99.2	99.1	77.6	86.0
Gives solids:														
Age 1	7.4	10.0	10.0	19.2	11.5	18.6	45.1	28.8	57.1	29.9	30.5	23.7	39.7	26.9
Age 2	14.8	17.3	19.6	25.0	19.6	27.3	43.9	32.6	65.5	30.2	53.9	34.7	44.4	43.8
Age 3	17.3	21.2	26.9	32.9	27.1	33.0	48.9	40.0	59.5	40.9	61.2	47.5	43.8	60.5
Age 4	14.7	28.2	26.8	39.7	34.9	35.5	53.2	41.7	69.5	33.3	64.8	44.7	45.9	58.5
n =	954	860	923	914	874	985	959	938	173	859	865	921	833	822

last bout. This is most probably due to an interviewer's error. In North Bank, the tremendous rise at Wave 7, when the temporary interviewer took over, remained constant at Wave 10 when the permanent interviewer returned, but dropped inexplicably again for two waves.

These strange fluctuations suggest that this question was difficult for the fieldworkers to handle consistently. It is doubtful that campaign influences would cause such dramatic behavior fluctuations within short periods of time. Thus, the data should be understood as a general trend toward increasing rates of giving solid foods to recovering children, with lower rates among the disease-vulnerable age group of 1-2 years, and lower rates in McCarthy Island Division. By June 1984, an average of 49.3 percent of children ill in the last two weeks still were not given solid foods following their diarrhea.

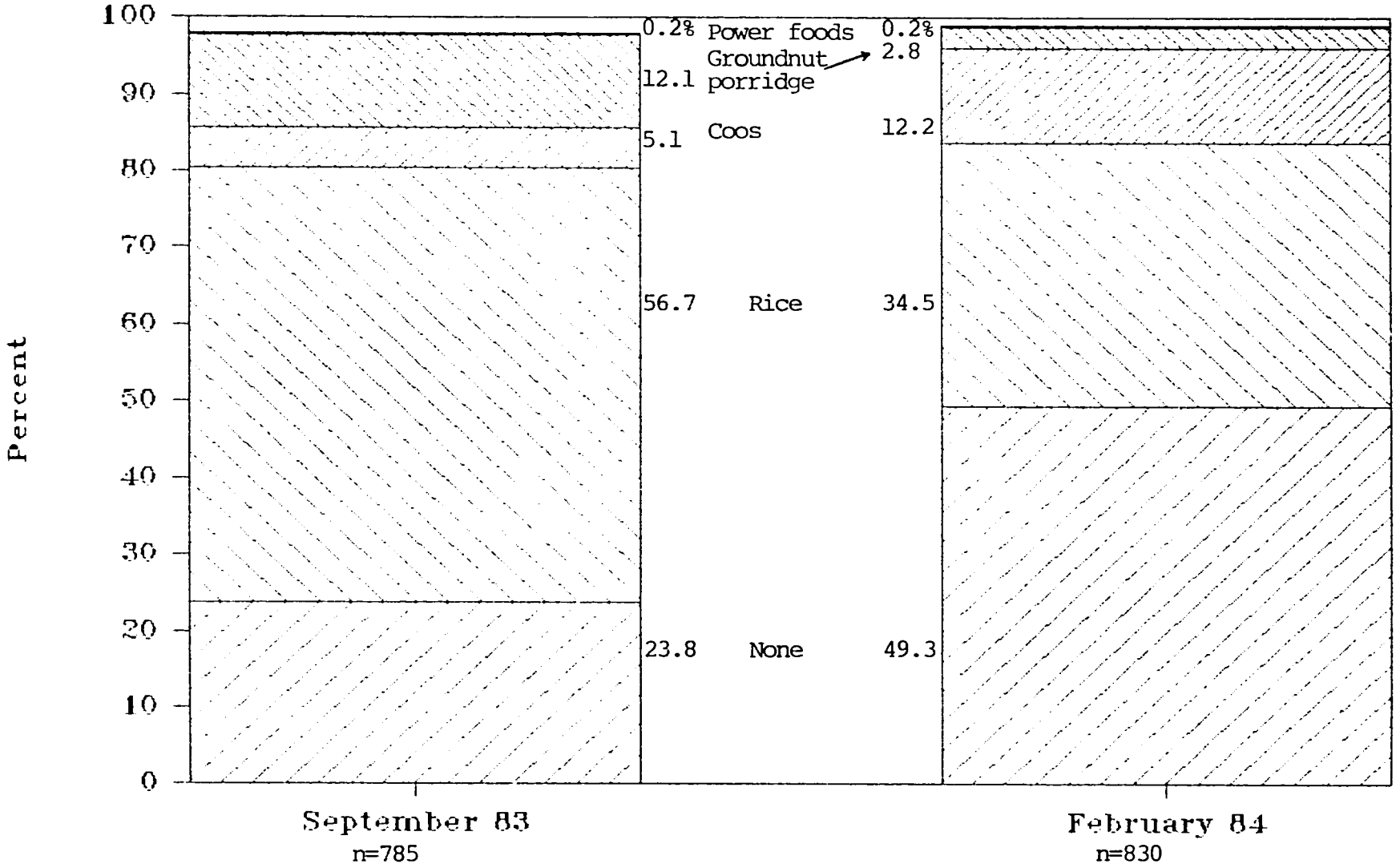
Several questions on the Radio Spots instruments No. 5 and 6 confirmed that a quarter to one-half of the women did not give solid foods to their children during diarrhea in the second year of the campaign (see Figure III-12). During the 1983 rainy season, 72.8 percent of the women gave either solids alone or solids and pap together to their ill children. Only 13.2 percent reportedly gave paps alone to their children. By the following February, 50.8 percent of the women said they gave solids and 46.3 percent gave only paps. Some of the deterioration here may be due to food shortages during the drought, in addition to the decrease in frequency of feeding messages. Looking at the composition of solid foods given ill children, rice and groundnut porridge, two foods in short supply by February 1984, dropped in consumption while coos increased (Figure III-13). "Power foods" like fish and meat were rarely mentioned at either time by the women. About half of the women said they added one of the foods recommended by the campaign to their children's paps (Figure III-14).

Figure III-12 Percent of mothers giving solids or paps to children during diarrheal bouts



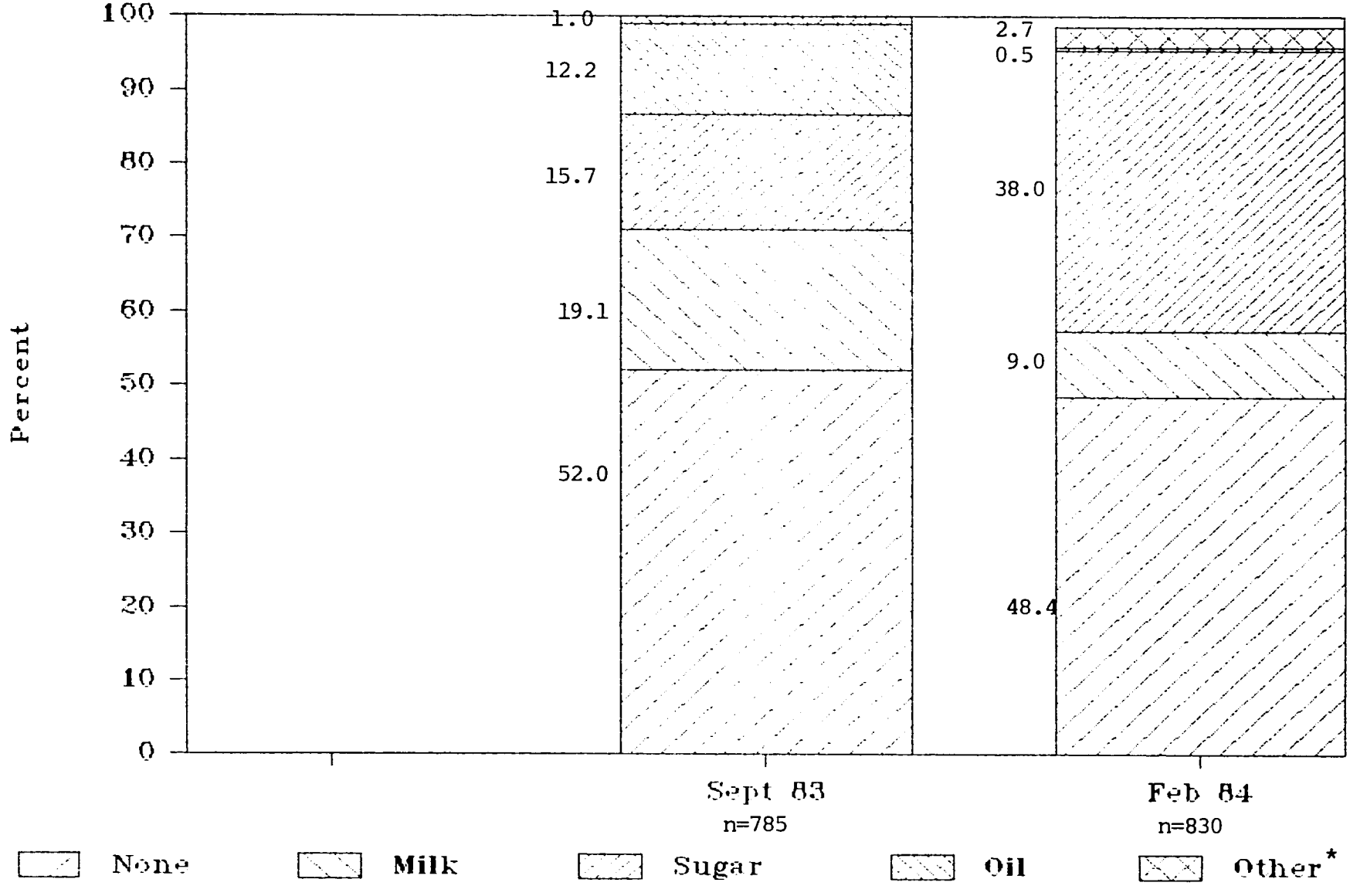
GRAD:TYPFDGT,GVSOLGT,YSPAPGT

Figure III-13 Types of solids which mothers reported feeding to sick children



GRAD:TYPFDGT,GVSOLGT,YSPAPGT

Figure III-14 Types of food added to pap, which mothers reported feeding to sick children



* Other foods include: egg, groundnut paste, fish, baobab fruit

GRAD:TYPFDGT,GVSOLGT,YSPAPGT

(4) Taboo foods

A quarter to a third of the women consistently considered some foods taboo during diarrhea. The evaluation interviewer asked the mothers open-ended questions about foods that were considered taboo for a sick child, and whether the mother gave a recovering child any special foods (see Appendix D). The mothers told them that rice, sour milk, millet, coos pap, leftovers (mentioned after June 1982), groundnuts and groundnut porridge, and cow's milk were all taboo for children with diarrhea. As for foods given to a recovering child, only a small percentage of mothers mentioned breastmilk as being beneficial, and even fewer mentioned cow's milk. By April 1983, the most common answers to the special foods question were that rice, groundnut porridge, coos pap, meat, fish, and millet were all foods that strengthened the child. There is no ready explanation for the apparent contradiction between the list of taboo foods and the list of special foods. Other foods mentioned less often included eggs, bananas, and coos coos. Casual observations made by Peace Corps Volunteers in several divisions of The Gambia indicate that health workers promoted eggs as a beneficial food; however, eggs are too expensive for most rural women and thus, few women claimed that they give their children eggs.

(5) Size and frequency of feeding

One final diet issue was covered in Radio Spots instruments Nos. 5 and 6 which was not addressed in the morbidity questionnaire. Mothers were asked whether they gave their children small, frequent feedings even before the diarrhea stopped (as the rainy season 1983 messages suggested) or whether they gave large amounts of food to their children once or twice a day. While the number of women giving frequent feedings increased between September 1983 and February 1984, the absolute levels remained low. Only 15.2 percent in 1983 and 28.0 percent in February 1984

said they fed small portions frequently. This message was not mentioned on many of the spots, and probably was not repeated often enough for mothers to learn.

(6) Conclusions

In summary, the women seemed to respond to those feeding messages which the campaign emphasized the most, but showed signs of forgetting or ceasing behaviors when the messages stopped. After the second round of feeding messages, there was less forgetting. This may be due to more effective message construction or the fact that the second year was building on the first year's base.

Nearly all mothers continued to breastfeed their children during diarrhea once the campaign began. During the 1984 drought, Western and Lower River Division women were more likely to stop breastfeeding ill children. Aside from breastfeeding, mothers learned to keep feeding other foods to ill children who were old enough. After the campaign emphasized feeding during the second rainy season, few children were not fed anything at all, but only half received solid foods. Campaign messages perhaps should have been more specific about the proper age to give children solid foods. Of those children eating paps, half again had sugar, milk or some other supplement added to the pap.

Two additional points which were not covered extensively by the campaign were not learned well. One-third of the mothers continued to report that some foods were taboo during diarrhea, and few women learned to feed small, frequent portions to their children.

C. Treatments for Diarrhea

When a rural Gambian mother discovers her child has diarrhea, she has several treatment alternatives. She may take her child to a local healer, such as a herbalist or Islamic marabout, if she feels that the illness is curable by traditional means; but observations by Peace Corps volunteers and others suggest that diarrheal disease is usually not seen as curable by these methods. The mother may also seek help from a health center, dispensary, or clinic. If she wishes to treat the bout herself, she may give teas, pharmaceutical drugs, purges, or the campaign prescribed water-sugar-salt solution (WSS).

One of the objectives of the campaign - - to introduce the WSS treatment - - would have multiple consequences if it were successful. At one level, a successful introduction would lead to an increase in the proportion of mothers who treated at home when their children fell ill with diarrhea. At another level, it would replace other treatments for women who treat cases themselves. Thus a drop in the proportion of mothers seeking care in the health centers should be construed as an indicator of success for the program. A finding of displacement of other home treatments by WSS would also indicate success. We therefore conducted an analysis of the treatment choices mothers made.

(1) Analyzed for all episodes

During the course of the campaign, there was a dramatic shift in favor of home treatments, especially WSS. At the start of the campaign, 80.6 percent of the children were taken to a health center, and only 16.6 percent were treated at home (Table III-12). By the end of the campaign, the percent going to the health center had taken a somewhat uneven downward path to 24.2 percent or roughly a third of its earlier levels. The percent treating at home rose to 82.9 percent, or more than five times

Table III-12 Treatments given to children for their last bout of diarrhea

Treatment	Morbidity Waves 1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
Went to health center	80.6%	83.1	78.0	82.0	78.3	59.8	45.8	53.7	53.2	54.2	68.8	59.3	59.2	24.2
Went to local healer	4.3	0.7	0.2	0	0.1	0.3	0.6	0.4	0.8	1.0	2.6	1.9	2.6	5.0
Treated at home	16.6	21.8	31.2	31.3	31.7	53.9	62.2	53.3	58.8	58.2	42.4	60.0	52.5	82.9
Gave WSS	3.6	15.5	22.2	25.5	26.2	48.1	59.1	51.2	54.4	56.6	35.5	53.2	49.4	69.9
Gave tea	9.6	5.7	7.0	5.6	4.3	5.4	3.2	2.2	3.2	2.0	6.6	10.2	3.4	22.8
n =	1004	885	960	956	912	1041	1027	1021	249	951	936	1060	969	970

MORB: SELFGQ,HEALRGQ,CENTRGQ,TROTHGQ

its earlier level. The size of the change during the final sweep was unexpected but was consistent with the overall trend of the data. Several factors in addition to the campaign may have contributed to the magnitude of the change in the final interval, including economic factors for the Ministry of Health that severely curtailed their ability to provide services, and the arrival of the long awaited rains which had the twin impact of making travel more difficult and making mothers very busy with agricultural tasks. The percent of all episodes that received WSS treatment rose from almost none (3.6 percent of cases) at the beginning to more than two-thirds (69.9 percent of cases) at the end. This value refers to the last bout a child suffered and so represents an estimate of the coverage of diarrhea episodes with oral rehydration therapy. The final period's percentage was substantially higher than the preceding waves, but is still consistent with the trend, as the average coverage in the sample over the second half of the study was over 50 percent. Part of the rise in the final period may reflect a lack of alternatives, but it was building upon a very high base.

Other possible treatment sources, such as local healers, were reported only rarely. Less than five percent of the children were taken to local healers initially; this figure dropped to nearly nothing during the campaign and rose again only at the last data collection point in June-July 1984.

The second indicator of impact was the displacement of alternative home treatments by WSS. This analysis was conducted for episodes in which mothers chose to treat the case themselves, rather than for all episodes. Among self-treaters, WSS was preferred from the time of the Happy Baby lottery onward (see Table III-13). Of those children treated at home, most were given WSS. Tea dropped quickly and remained a distant second choice, while drugs, purges, and tea made from chalk washed from a slate on which a saying from the Koran had been written were hardly used at all. The rapidity of which this happened is striking. From the earliest point at which information about how to mix and administer WSS was available, mothers virtually

Table III-13 Choice of treatments given to children at home*

Treatment	Morbidity Waves 1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
Given WSS	21.7	71.0	71.2	81.6	82.7	89.3	95.0	96.1	92.5	97.3	83.6	88.7	94.1	84.3
Given tea	57.8	25.9	22.4	18.1	13.5	10.0	5.2	4.0	5.4	3.4	15.6	17.0	6.5	28.3
Given pharmaceutical drugs	9.0	1.6	5.7	2.0	2.4	1.1	0.2	0.2	3.4	0	2.3	0.6	2.0	2.3
Given Koran water	2.4	0.5	0	0	0	0.4	0	0	0	0	0	0.2	3.1	6.2
Given purge	2.4	0.5	0	0	0	0	0	0.4	0	0	0	0	9.4	1.2
n =	166	193	299	299	289	561	639	544	147	553	397	636	509	780

MORB; TEAGQ, WSSGQ, PURGEGQ, KORANGQ, PHARMGQ
* Percent children treated by their mothers, not total.

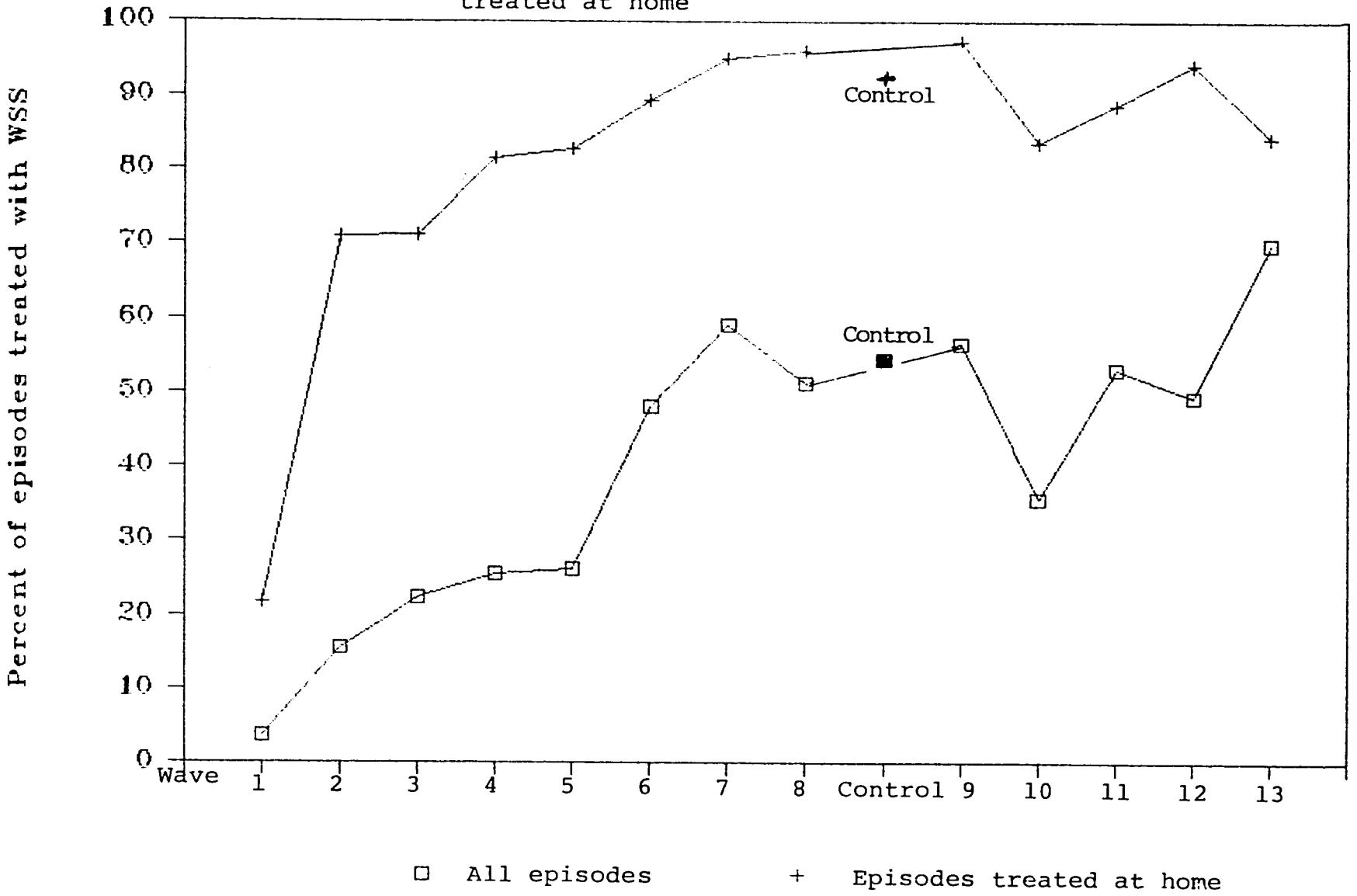
abandoned other ways of treating the case. The proportion of home-treated cases that received WSS treatment jumped from around twenty percent in the first measurements to the high eighty and ninety percent ranges. Because the proportion of cases treated at home also rose during this time, the impact on coverage of all cases was even more strongly affected. Figure III-15 shows the coverage over time of all episodes and of home treated episodes.

(2) Analyzed for episodes occurring in the previous two weeks

We have repeated the analysis for only those children sick with diarrhea within the last two weeks prior to the interview. There are two main reasons for the analysis of this subset of recent cases. Evidence from other contexts indicates that recall of prior events loses accuracy quite quickly and the event fades into the past. We have chosen to limit this analysis to a two-week recall because earlier studies at the Institute for Nutrition for Central America and Panama (INCAP) have demonstrated deterioration of accuracy in periods greater than two weeks. Thus we feel that the most accurate estimates of behavior are those based on the shortest recall period. Shorter recall periods reduce the number of cases in the sample and therefore reduce the accuracy of the estimates; there is a balance to be struck between short recall periods and numbers of cases, and we feel that two weeks is an optimal period.

A second reason for limiting the recall period is that it eliminates the risk of possible double counting of cases under the "last bout" approach. If a child has not had diarrhea since the last questionnaire, the mother will repeat the information she gave in the previous cycle. This introduces a descriptive bias to make the aggregate behavior appear more like the behavior of mothers when "seldom-sick" children become ill. Age and other characteristics of the child are correlated with the probability of becoming ill, so one type of bias may be introduced from over

Figure III-15 Episodes treated with water-sugar-salt solution, shown as a proportion of total episodes and of episodes treated at home



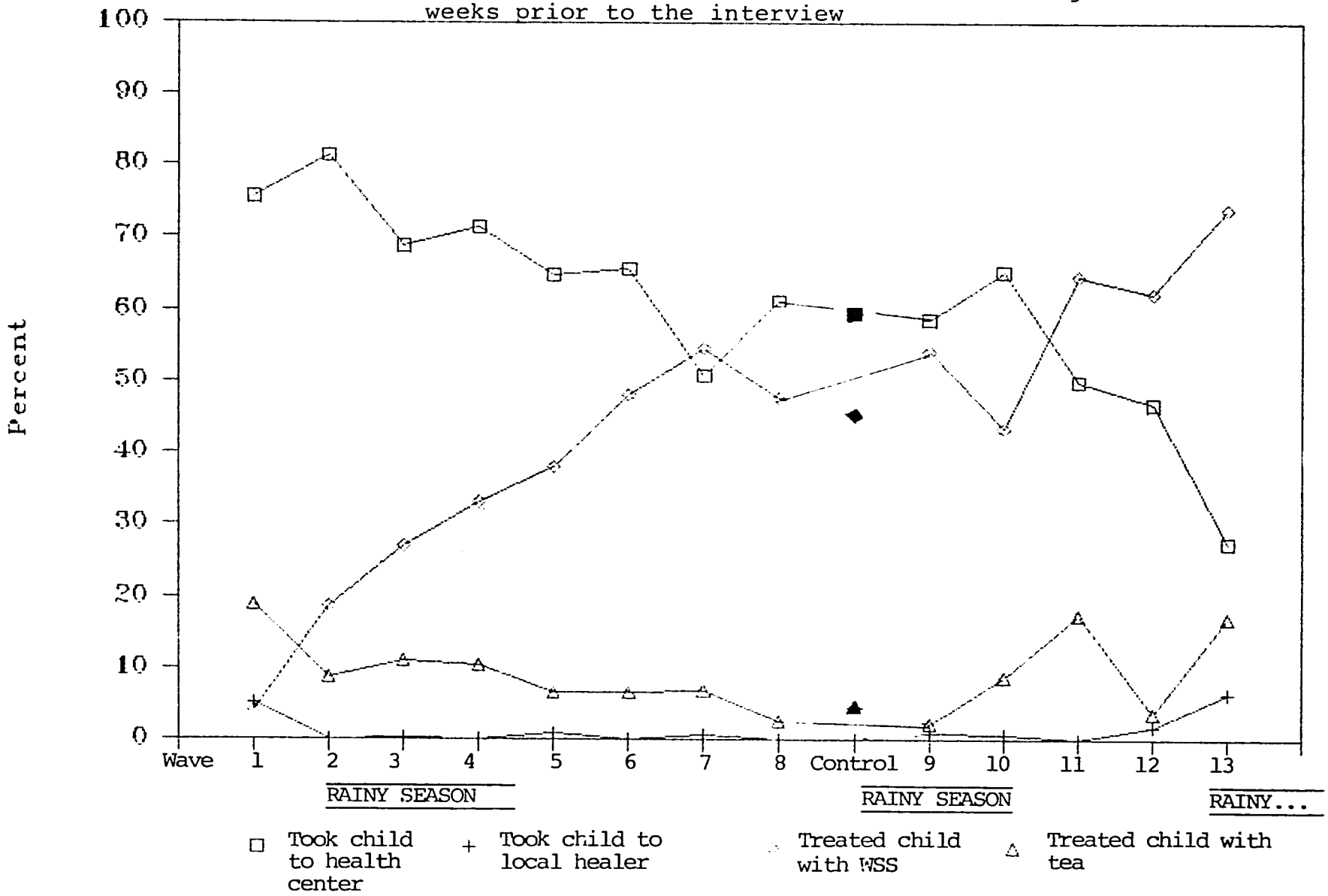
MORB:SELFSQ,WSSGQ

counting of "seldom-sick" children. Additionally, mothers may behave differently, either because of characteristics of the child (they may treat older children differently) or because of specific concerns when a usually hardy child does become sick. For these reasons, we have repeated the previous analysis on the subset of episodes that occurred in the two weeks prior to the interview. This eliminates any potential double-counting and it increases the probability of accurate recall. The results of that analysis, presented below, are very similar to those of the preceding analysis.

Figure III-16 and Table III-14 compare giving WSS or tea, and going to a health center or local healer for episodes occurring in the last two weeks. Some women chose more than one type of treatment. The control villages figures match evaluation villages estimates, suggesting that the mothers were not sensitized to treatment messages by the evaluation team. As more women adopted WSS, fewer went to the health center for diarrhea. WSS use rose steeply during and just after the Happy Baby lottery, fluctuated around 50 percent during 1983, and rose again in 1984 to a high of 73.8 percent of the bouts treated with WSS.

Health center use showed the opposite trend - - declining to 46.8 percent in April 1984 and a low of 27.3 percent in June-July 1984. With the swift drop in health center use at the last data collection point came an increased use of tea. The increase in home treatments during the beginning of 1984 may be related to a convergence of external factors: the heavy work season beginning, Ramadan fasting during June which reduced energy levels and free time, and an acute gas shortage which limited taxi/bus availability. It must be remembered that few women lived in a town with its own health center, and during gas shortages most women would be forced to walk with a child on their back for many miles. (On the other hand, when clinics are nearby and time is not in short supply, it can be pleasant to meet other women in line at the clinic.)

Figure III-16 Treatments for children with diarrhea during the two weeks prior to the interview



MORB:CENTRGQ,HEALRGQ,WSSGQ,TEAGQ,PHARMGQ,IF HADDIGQ

Table III- 14 Treatment for children with diarrhea during two weeks prior to the interview

Treatment	Morbidity Waves 1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
Went to health center	75.5%	81.3	68.7	71.4	64.8	65.7	50.8	61.3	59.5	58.6	65.2	50.0	46.8	27.3
Went to local healer	5.1	0	0.3	0	0.9	0	0.8	0	0	0.9	0.7	0	1.8	6.4
Gave WSS	4.1	18.7	26.9	33.1	38.0	48.1	54.6	47.7	45.2	54.2	43.5	64.5	62.2	73.8
Gave tea	18.9	8.7	11.1	10.5	6.5	6.5	6.9	2.7	4.8	2.2	8.7	17.4	3.6	16.9
Gave pharmacy drug	2.6	0.4	4.6	1.6	1.9	0	0	0.9	2.4	0	3.6	0.6	2.7	2.3
n =	196	230	323	248	108	108	130	111	42	227	138	172	111	172

MORB:CENTRGQ,HEALRGQ,WSSGQ,TEAGQ,PHARMGQ, IF HADDIGQ

(3) Analyzed by age of child

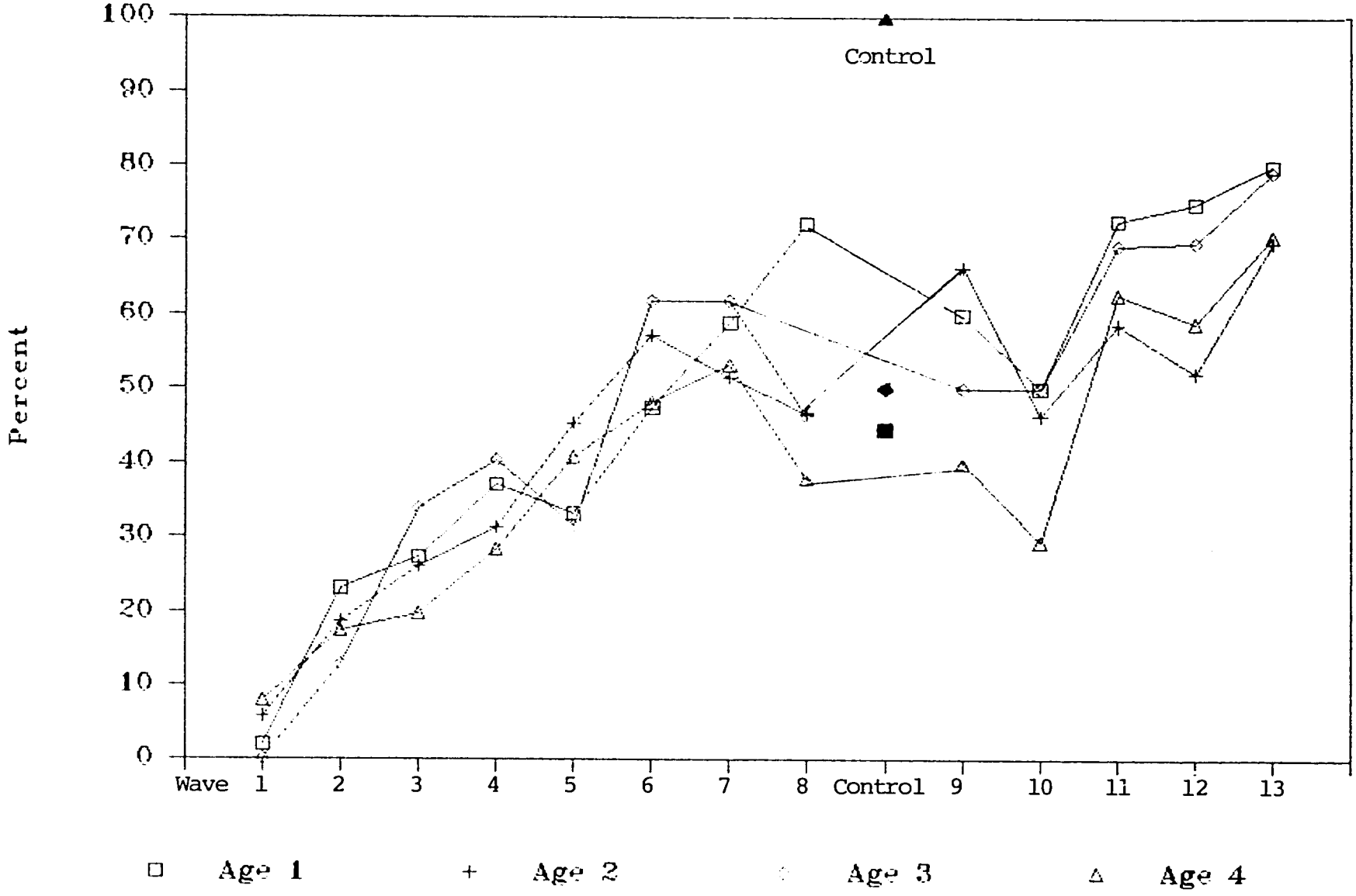
The Ministry of Health policy was to promote treatment of all cases of early childhood diarrhea with WSS. This policy was consistent with World Health Organization guidelines, which encourage unselective early treatment of all episodes in order to prevent dehydration from developing, and to reduce the uncertainty and possible errors resulting from putting decision-making responsibilities on the mothers.

We have analyzed the treatment rates by the age of the child, collapsing age into years and looking only at cases occurring in the two weeks prior to the interview. The results of this analysis are presented in Figure III-17 and Table III-15. There was no consistent difference among age groups in the proportion of episodes treated. Thus, it appears that mothers were following the Ministry guidelines. In some ways this is a surprising finding, since mothers were aware that younger children were at greater risk from diarrhea, and in other contexts mothers were often quite selective about where they invested their energies.

(4) Analyzed by administrative division

In contrast, analysis by division of the country revealed somewhat greater differences (Table III-16 and Figure III-18). McCarthy Island division was seemingly slow to start using WSS, but it remained the preferred treatment after December 1982. It should be noted that the apparent elevation of McCarthy Island above the rest of the divisions in this second half of the campaign was based on a very small number of cases (eight or fewer cases per wave from Waves 5-8, for example). It is possible that the estimates are not reliable for McCarthy Island for these periods because of the small numbers. In Lower River division, use fluctuated between 25 and 45 percent until the

Figure III- 17 Children treated with water-sugar-salt solution for diarrhea cases within the last two weeks, by age group (collapsed)



MORB:WSSGQ by ACECGQ IF HADDIGQ

Table III-15 Children treated with WSS for diarrhea cases within the last two weeks, by age group (collapsed)

Age of child	Morbidity Waves 1	2	3	4	5	6	7	8	Ctrl	9	10	11	12	13
1	2.0% (49)	23.2 (82)	27.3 (99)	37.0 (73)	33.3 (36)	47.5 (40)	58.8 (34)	72.2 (18)	44.4 (9)	60.0 (35)	50.0 (38)	72.7 (33)	75.0 (24)	80.0 (30)
2	5.8 (52)	18.6 (59)	26.2 (84)	31.3 (48)	45.2 (31)	57.1 (14)	51.4 (35)	46.7 (30)	50.0 (8)	66.2 (65)	46.4 (28)	58.7 (46)	52.2 (23)	69.7 (33)
3	0 (42)	12.8 (47)	33.9 (62)	40.4 (52)	31.6 (19)	61.9 (21)	61.9 (21)	46.2 (26)	50.0 (6)	50.0 (36)	50.0 (30)	69.2 (26)	69.6 (23)	79.2 (24)
4	8.0 (50)	17.5 (40)	19.7 (66)	28.3 (60)	40.9 (22)	48.0 (25)	53.1 (32)	37.9 (29)	100.0 (4)	40.0 (70)	29.4 (34)	62.7 (51)	58.8 (34)	70.5 (61)

MORB: WSSGQ BY AGECGQ2 IF HADDIGQ

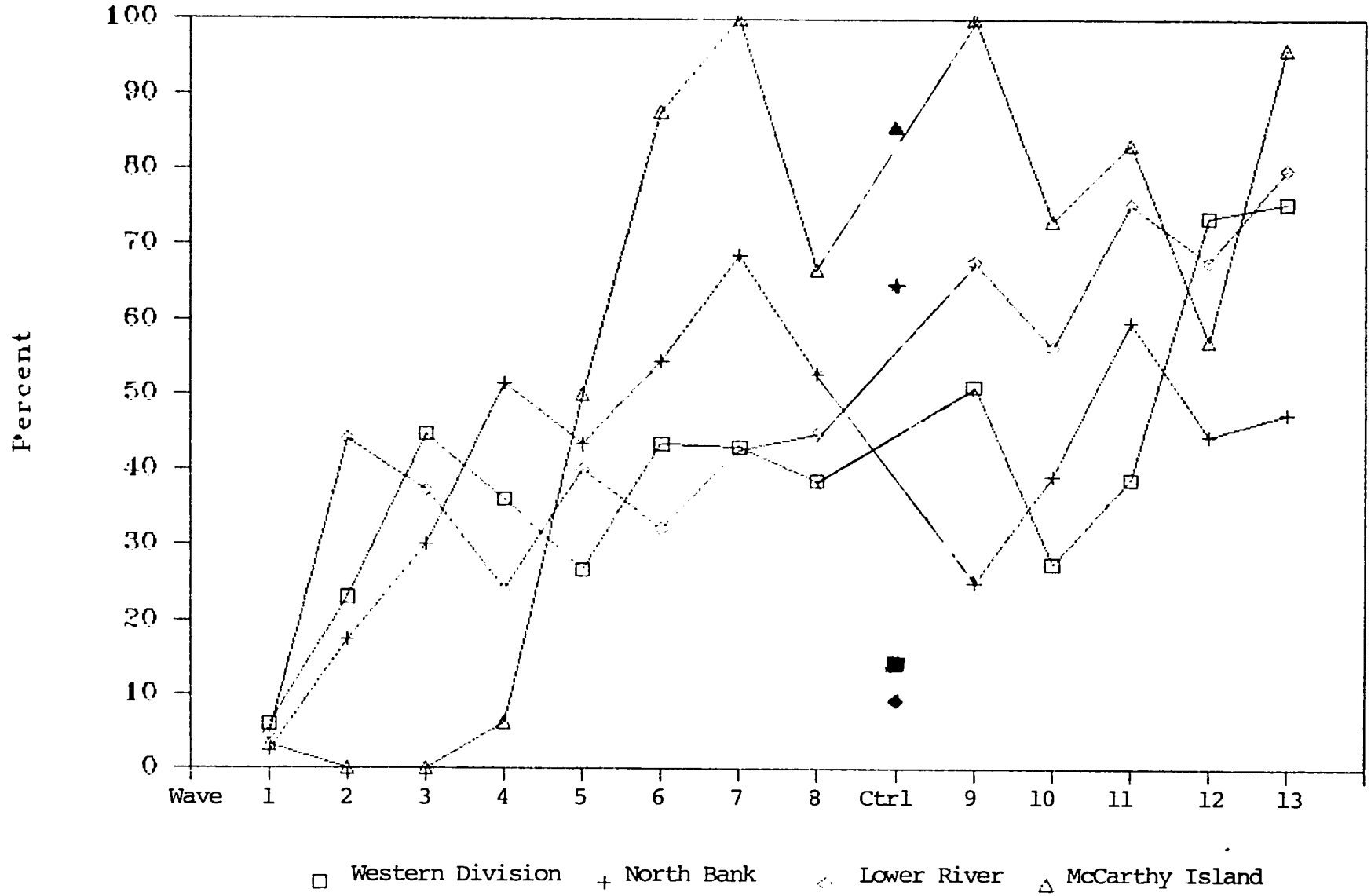
Table III-16 Treatment for children within each division for diarrhea cases within the last two weeks

	Morbidity Waves													
	1	2	3	4	5	6	7	8	Ctrl*	9	10	11	12	13
Went to health center:														
Western	72.0	71.4	44.7	58.0	63.3	47.8	45.7	80.8	100.0	85.7	67.5	61.3	21.1	32.7
North Bank	71.4	95.4	8[illegible].1	87.1	78.3	87.0	56.9	66.0	58.8	92.2	98.0	94.2	100.0	39.5
Lower River	85.7	38.2	44.6	65.2	46.7	64.5	52.5	37.9	32.0	32.3	28.1	20.8	30.5	21.7
McCarthy Is.*	74.2	96.3	100.0	87.5	50.0	0	0	33.3	0	0	26.7	16.7	42.7	11.5
Went to local healer:														
Western	10.0	0	0	0	0	0	0	0	0	2.0	0	0	10.5	0
North Bank	2.4	0	0	1.2	0	0	2.0	0	0	0	0	0	0	2.6
Lower River	0	0	0	0	3.3	0	0	0	0	1.0	0	0	0	15.0
McCarthy Is.*	6.5	0	0	0	0	0	0	0	0	0	6.7	0	0	3.9
Gave WSS:														
Western	6.0	23.2	44.7	36.0	26.7	43.5	42.9	38.7	14.3	51.0	27.5	38.7	73.7	75.5
North Bank	2.9	17.4	30.1	51.4	43.5	54.4	68.6	52.8	64.7	25.0	39.2	59.6	44.4	47.4
Lower River	4.8	44.1	37.3	24.1	40.0	32.3	42.5	44.8	9.1	67.7	56.3	75.3	67.8	80.0
McCarthy Is.*	3.2	0	0	6.3	50.0	87.5	100.0	66.7	85.7	100.0	73.3	83.3	57.1	96.2
Gave tea:														
Western	18.0	1.8	21.3	12.0	6.7	4.4	14.3	3.9	28.7	0.2	10.0	9.7	0	14.3
North Bank	11.9	22.1	20.5	17.1	8.7	8.7	3.9	1.9	0	0	13.7	26.9	11.1	39.5
Lower River	26.2	0	8.2	7.1	3.3	3.2	5.0	3.5	0	0	3.1	16.9	1.7	31.0
McCarthy Is.*	19.4	0	0	0	0	12.5	0	0	0	0	0	0	0	0
Total number of children ill:														
Western	50	56	47	50	30	23	35	26	7	49	40	31	19	49
North Bank	42	86	83	70	46	46	51	53	17	64	51	52	27	38
Lower River	42	34	110	112	30	31	40	29	11	99	32	77	59	58
McCarthy Is.	62	54	83	16	2	8	4	3	7	15	15	12	7	26

Note: MORB: CENTRGQ,HEALRGQ,WSSGQ,TEAGQ,IF HADDIGQ

* The number of cases in these categories are low, therefore percentages may fluctuate more dramatically.

Figure III-18 Children treated with WSS within each division for diarrhea cases within the last two weeks



MORB:CENTRGQ,HEALRGQ,WSSGQ,TEAGQ,IF HADDIGQ

second rainy season messages in 1983 and subsequently climbed slowly to around 75 percent. In the North Bank division, use of WSS increased during the lottery and post-lottery promotions, dropped off slightly, and rose again in 1984 to around 45 percent, perhaps due to community organizing activities at that time. Western Division, with its relatively easier access to health care facilities via taxis had lower rates of WSS use until the last two measurements, which showed a jump to 75 percent. All divisions showed some use of local healers, although nowhere was it the norm. Only on the North Bank was use of teas almost as popular as WSS by 1984.

(5) Summary

Thus, over the course of the campaign, mothers shifted from relying on the health center to using the water-sugar-salt solution at home as the preferred method of treatment for their sick children of all ages. The campaign successfully promoted the use of the WSS solution, such that at the beginning of the rains in 1984, 73.8 percent of all diarrheal cases were treated with WSS at home.

D. Relationship between WSS Knowledge and Practice

Prior to the start of the campaign the implementation team learned that some children were already being treated with WSS. This is because the Ministry of Health had encouraged home treatment with different versions of WSS prior to this campaign. The previous WSS efforts had not been intensive or sustained, nor had they promoted a common mixing technique. Judging from the entry-level knowledge of mothers in our sample, the previous efforts had also not had a lasting impact. Because of confusion among the different formulas promoted in the past and forgetting

of part of the information, some of the few mothers who were already using WSS at the start of the campaign were using incorrect mixing proportions, which could prove to be ineffective or even possibly harmful to a small child. The implementation team decided to make the mixing formula recipe an important part of the campaign, training health workers, distributing the mixing flyer in 1982, running the Happy Baby Lottery emphasizing mixing knowledge, and broadcasting mixing messages throughout the campaign.

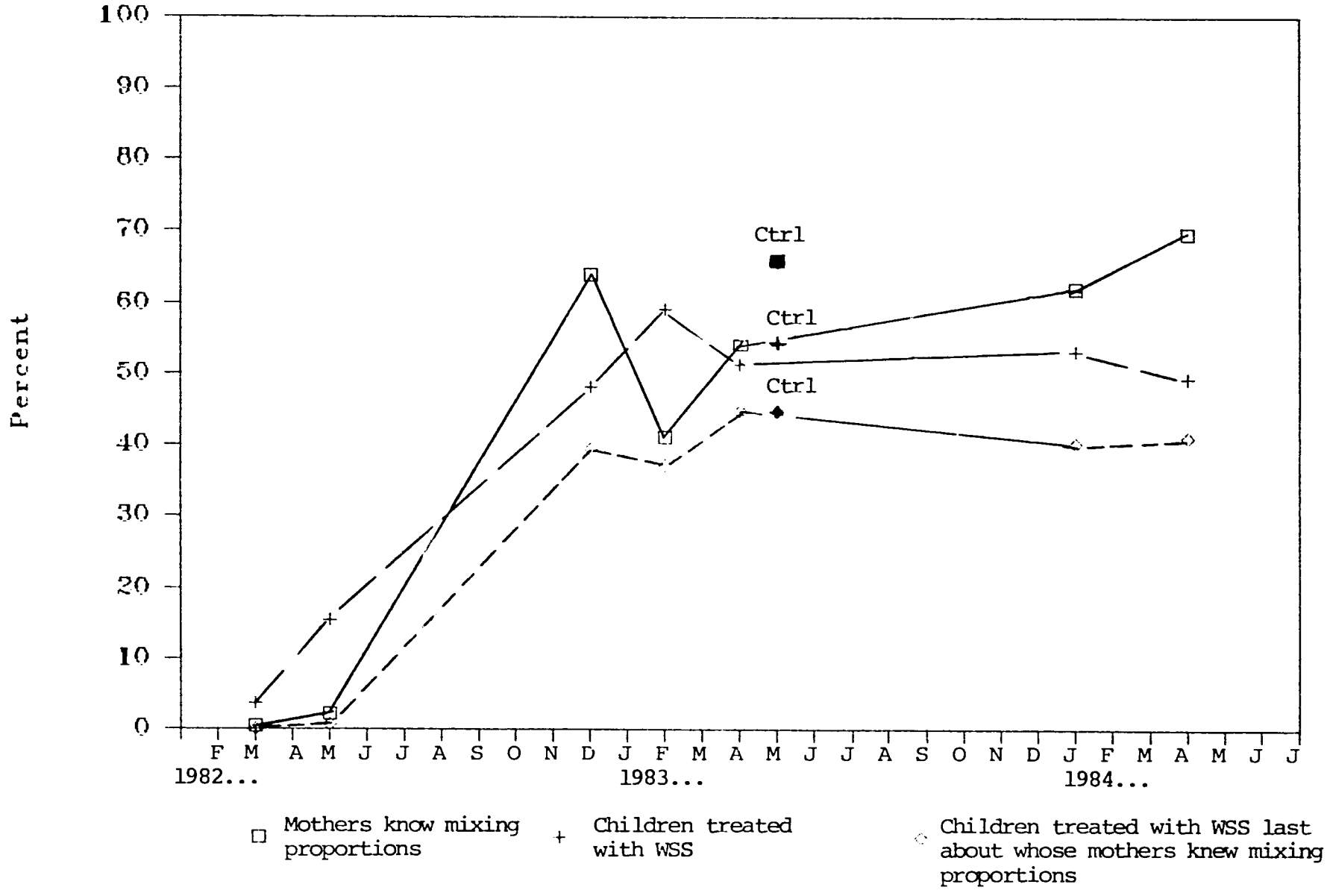
(1) Knowledge of mixing formula

The concentration on mixing knowledge proved to be an effective strategy. The evaluation used a strict criterion for knowledge of the WSS mixing formula - - mothers had to correctly name the exact amount of all the ingredients to be counted as knowing the formula. Table III-17 and Figure III-19 show the percentages of women in the sample who knew the correct formula for WSS. At the beginning of the campaign, while 3.6 percent of all the children had been treated with WSS, only 0.2 percent of the women knew how to mix it properly. None of the women who knew the formula used it with their children. By December 1982, after the end of the lottery, where knowledge of the correct proportions of formula ingredients was a requirement for lottery entry, 63.9 percent of the women knew the correct formula, 48.1 percent of the children had been treated with WSS for their last bout of diarrhea, and 38.7 percent of all cases in the last two weeks had been given WSS by women who knew the correct mixing formula. Knowledge levels dropped slightly after December 1982, and then rose such that by 1984, 46 to 50 percent of diarrhea cases in the two weeks prior to the interview were treated with WSS by a mother who could repeat the formula correctly. Also shown in Figure III- 19 are the percentages from the control

Table III-17 Knowledge of mixing proportions and practice of WSS

Item	March 1982	May 1982	Dec. 1982	Feb. 1983	April 1983	Control (5/83)	Jan. 1983	April 1983
Mothers who know WSS mixing proportions	0.4% (794)	2.1 (809)	63.9 (871)	41.1 (799)	54.1 (785)	65.9 (713)	62.1 (803)	69.7 (824)
Children treated with WSS	3.6 (1004)	15.5 (885)	48.1 (1041)	59.1 (1027)	51.2 (1027)	54.4 (250)	53.2 (1060)	49.4 (969)
Children treated with WSS their last bout whose mothers know mixing proportions	0 (1000)	0.6 (792)	39.4 (1035)	37.1 (980)	44.8 (938)	44.8 (250)	40.3 (1016)	41.0 (926)
Cases of diarrhea in last two weeks treated with WSS by women who know mixing proportions	0 (194)	0.5 (211)	38.7 (106)	28.5 (123)	34.2 (111)	35.7 (42)	46.9 (160)	49.5 (103)

Figure III-19 Knowledge of mixing proportions and practice of WSS



villages in May 1983. These communities had similar rates as the evaluation cohort, thus strengthening the confidence in the validity of the results.

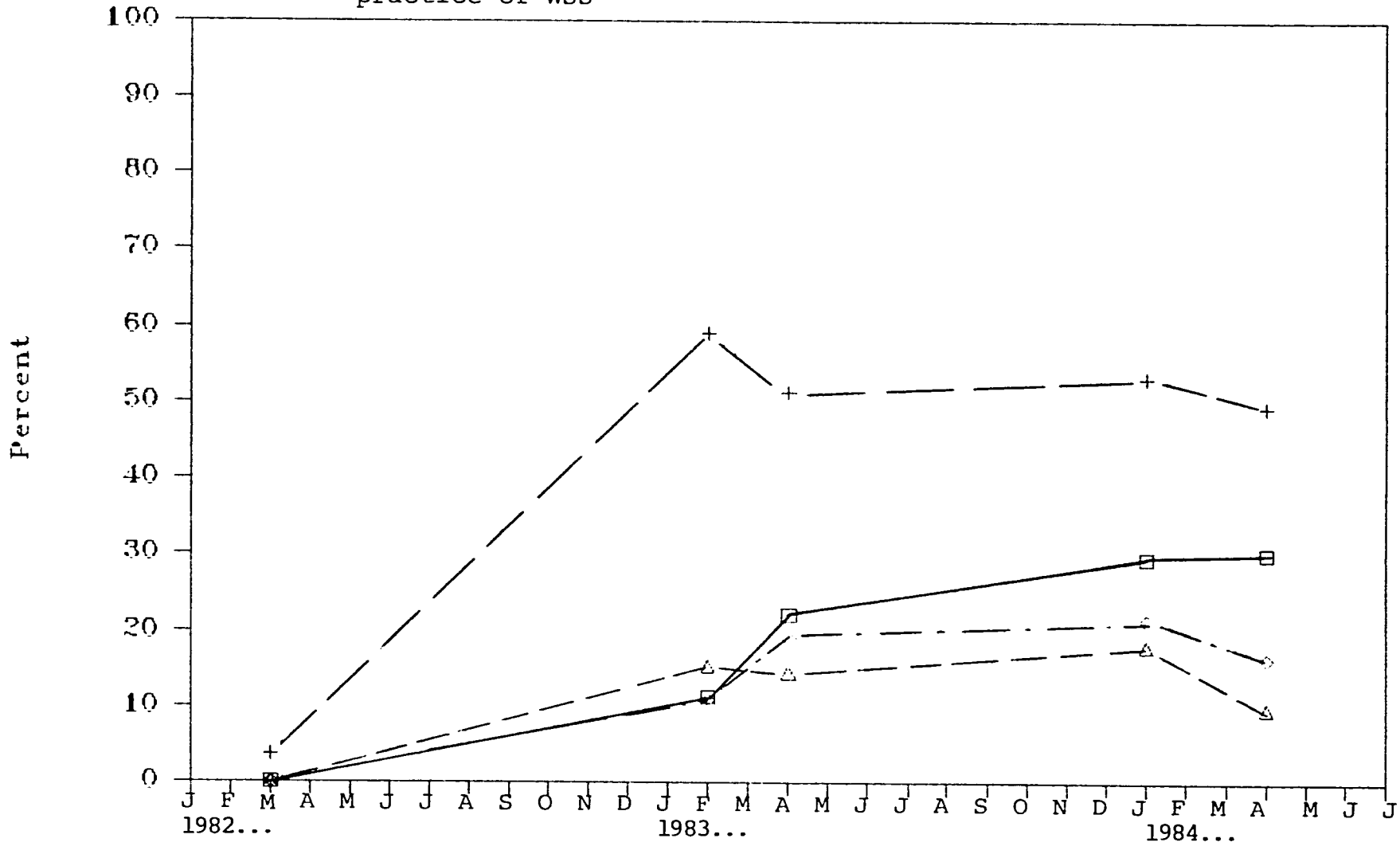
(2) Knowledge of WSS administration protocol

In addition to the formula proportions, the campaign taught other less critical points about the administration of WSS. Using an equally strict criterion as was used for mixing knowledge meant that mothers must have beem able to recite all the administration content, such as amounts to give, frequency of mixing new batches, etc. This is the criterion that was used, but it might have been an overly strict one in that this information was not fully as crucial to effective and safe treatment as were the mixing proportions. Nonetheless, over a quarter of the women eventually learned all five of the administration points. Figure III-20 and Table III-18 compares the percentage of women who knew all five administration issues with children receiving WSS. None of the diarrhea cases in the baseline were treated correctly with WSS. In February 1983, 15.4 percent of diarrhea cases in the last two weeks were given WSS by mothers who knew all the points about WSS administration. That figure rose slightly to 18.1 percent in January 1984, but fell by half in April 1984. Thus, teaching the rest of the WSS administration points proved more difficult than teaching the WSS formula. By April 1984, about 40 percent of recent diarrhea bouts were given WSS by mothers who did not know all the administration points.

(3) Knowledge and practice by division

Knowledge and practice was higher in some divisions than in others. Table III-19 shows that McCarthy Island division learned the mixing formula and used it for 73.8 percent of the cases in December 1983. McCarthy Island division also showed the

Figure III- 20 Knowledge among mothers of WSS administration procedures and practice of WSS



Percent of mothers who know WSS administration

+ Percent of children treated with WSS last bout

Percent of children treated with WSS last bout whose mothers know WSS administration

△ Percent of cases of diarrhea in last two weeks treated with WSS by women who know WSS administration

Table III-18 Knowledge of WSS administration procedures and practice of WSS

Item	March '82	Feb. '83	April '83	Jan. '84	April '84
Mothers who know WSS administration	0.1% (787)	11.3 (799)	22.1 (785)	29.4 (802)	30.0 (823)
Children treated with WSS last bout	3.6 (1004)	59.1 (1027)	51.2 (1021)	53.2 (1060)	49.4 (969)
Children treated with WSS last bout whose mothers know WSS administration	0 (1000)	10.9 (980)	19.1 (1018)	21.5 (1016)	16.3 (926)
Cases of diarrhea in last two weeks treated with WSS by women who know WSS administration	0 (1000)	15.4 (123)	14.4 (111)	18.1 (160)	9.7 (103)

Table III-19 Knowledge and practice of WSS, by division

	Mar.'82	May '82	Dec.'82	Feb.'83	Apr.'83	Jan.'84	Apr.'84
Know mixing proportions:							
Western Division	0 (256)	1.0 (191)	36.0 (258)	19.6 (280)	23.4 (261)	28.8 (277)	49.9 (242)
North Bank	0 (260)	1.4 (217)	39.3 (247)	35.6 (230)	36.8 (302)	40.4 (267)	35.3 (252)
Lower River	0 (247)	0 (193)	7.2 (249)	11.4 (201)	14.5 (220)	36.5 (189)	39.2 (153)
McCarthy Island	0 (237)	0 (191)	73.8 (271)	75.8 (269)	85.9 (255)	53.7 (283)	41.2 (279)
Know all WSS administra-procedures							
Western	0 (256)	-	-	0.4 (280)	1.2 (261)	0 (277)	0.4 (242)
North Bank	0 (260)	-	-	26.5 (230)	14.2 (302)	27.3 (267)	17.9 (252)
Lower River	0 (247)	-	-	0 (201)	4.5 (200)	1.6 (189)	3.3 (153)
McCarthy Island	0 (237)	-	-	16.7 (269)	54.5 (255)	50.2 (283)	35.8 (279)

highest rates of knowledge of all administration points and WSS practice. North Bank rates remained steady after the lottery, with 17.9 percent of all sample children being treated with WSS for their last bout of diarrhea by mothers who knew all administration points. Both Western division and Lower River division showed slower rates of mixing knowledge and practice, and few cases treated by mothers who knew all administration points. The pattern of substantial differences between divisions, and within divisions over time, was observed repeatedly during the evaluation. Where situation-specific information is known it has been presented, but comprehensive explanations are lacking. We hope to pursue additional investigation of divisional differences in future analyses.

(4) Summary

Thus, two years after the campaign began, roughly two-thirds of the mothers knew the WSS formula, but only a third knew all five points of WSS administration. About half to three-quarters of the children in the sample were treated with WSS when they had diarrhea. Nearly all of those children were treated by mothers who knew how to correctly mix the formula, but only about a fifth of their mothers knew the rest of the administration procedures, including making fresh solutions every 24 hours and how to deal with a child vomiting the solution. These represent impressive gains in formula learning and treatment behavior change, but point to parts of the complicated administration procedure which were less successfully learned.

E. Observational Study

(1) Introduction

Most of the research surrounding the Mass Media and Health Practices Intervention in The Gambia relies very heavily on the self-reports by mothers about what they have learned and what they do differently. Self-report in these contexts is often influenced by a variety of distorting factors - - mothers forget some of the things they did, they may distort their recollection or reports toward more socially desirable responses, they may selectively recall only some types of events, or they may even learn from the questions a fieldworker asks. All these factors introduce error into the measurement of the true levels of knowledge and behavior. The real threat comes from the fact that the error is not random, but systematic in some unknown way, either up or down.

In order to develop an indication of whether mothers' behaviors might be different from their own reports of those behaviors, we undertook an observational study of mothers who were currently taking care of a child with diarrhea.

(2) Design of the study

The study consisted of direct observation by a fieldworker of the mother's and child's behavior while the child was ill. The design of the study was influenced by several constraints. One is the necessity of having willing respondents who would permit a sustained intrusion into their home by a stranger who simply sat there and watched and occasionally made notations on a clipboard. This necessity limited the amount of time that could be spent in any given household, since the intrusiveness can become quite burdensome in a fairly short period, particularly if the burden of caring for a sick child is added to all the usual

responsibilities. We resolved this problem by limiting the amount of time that would be spent with any family to three hours.

A second constraint was the logistical difficulty of finding diarrhea cases at an early stage. Normal sampling techniques are not much use when one is looking for a relatively infrequent event, because they are cost-inefficient ways to find cases. The statistical objective of representativeness may be impossibly expensive to meet, and may not be that important for these purposes in any case. We met this constraint by adopting a strategy of case-finding, in which fieldworkers entered a community, put out the word that they were looking for young children with cases of diarrhea, and canvassed mothers of such children until they found one with a sick child. The fieldworkers then sought their agreement to come into the house and to sit and observe what happened for the next three hours.

The constraints and the resolutions to them introduce several potential biases that should be kept in mind in interpreting the findings of the study. First, it makes it almost impossible to catch cases right at the very onset of diarrhea, because a case will necessarily have existed for some time before it comes to our attention. Second, the fact that cases are in progress when we observe them means that we will see disproportionately few end-of-case behaviors. Thus the cases that are detected and observed are most likely to represent "middle-of-the-episode" behaviors, after the onset (which can be the period of most violent illness) and before the case subsides completely. Third, this measurement technique is highly reactive, that is, it is very likely to influence the behavior it is intended to measure. Mothers may respond in different ways, with some refraining from treatment behaviors for fear of doing it wrong in front of the observer, while others do everything they can think of in order to please the observer. We have no way of telling how any given mother might be influenced.

Nonetheless, an observational study provides a perspective and a validity check that is not available through any other

means. One can assume that a mother who is already treating a case with WSS when the fieldworker arrives represents uninfluenced behavior. Even if mothers are performing in order to please the fieldworker, one can still judge whether their behaviors are the correct ones. One can argue that one should interpret a mother's behavior under observation as an indicator of her highest level of ability. However, it still gives useful information about her ability levels, even if it does not precisely reflect her practices when she is not under observation.

Accordingly, the evaluation carried out some direct observations of children who were sick with diarrhea, to see if mothers' behavior conformed to their self-reported behavior. During August 1983, during the peak of the rainy season when diarrhea is at its most prevalent, interviewers sought out actual cases of diarrhea among the children of our sample's women. They observed thirty-nine children for three hours each.

After locating a current case of diarrhea and securing permission to observe the child, fieldworkers asked one question: how many days has this case of diarrhea lasted? Otherwise, all information gathered in this exercise is based on fieldworker observation, rather than on mothers' self-reports. The three-hour observation period was divided into thirty-minute segments, with the fieldworker going through a checklist of possible observations six times over the three hours, and noting which of the behaviors had been observed during that period.

The analyses that follow are based on their recorded observations. The analysis is sometimes based on the proportion of mothers or cases doing a certain thing, and sometimes on the number of possible times a variable or a group of variables might have been observed. The two bases represent different perspectives on what happened, with "mothers" or "cases" giving population proportions and "possible events" giving relative frequency of occurrence. The base for each analysis is noted in the text accompanying the analysis.

(3) Behaviors observed during the study

a. Caretaking

One of the issues for planners of interventions is who actually is taking care of the sick child. This is the individual who must be trained to notice important symptoms and respond to them, even if that response is calling in a more senior person for decisions or actions. In order to answer this question, we observed who, if anyone, was attending to the child's needs during each time period.

The children were watched by someone virtually all the time. On the average, 1.05 people took care of the child during each half-hour. In practice, this meant that someone checked up on the child every half hour, and in some periods more than one person took responsibility.

Mothers played by far the strongest role in caretaking. Of all the observed caretaking events, mothers accounted for 61.4 percent. Second and third in rank of caretaking were older female relatives at 21.9 percent, and sisters of the sick child at 9.8 percent. Caretaking is an almost exclusively feminine role. Of all the observed events, males accounted for only 1.0 percent. This was a case in which the father took responsibility for the child for an hour; brothers were never observed to take care of the sick child.

The clear implication for message designers is that they must target their messages to the mothers and older women if they are discussing things pertaining to the care of the sick child.

Specific caretaking behaviors like feeding and treatment are discussed in subsequent sections. One set of caretaking behaviors not covered elsewhere is washing the child. Three-quarters of the children (74.4%) were washed at least once during the three hours, and 41 percent were washed with soap. Washing occurred in 21.8 percent of the time periods, and each child was cleaned an average of 1.3 times. Use of soap, however, was much

less common. Children were washed with soap in only 10.2 percent of the observation periods, for an average of 0.6 times per child. Thus soap was used in less than half of the cleaning events.

b. Child's activity level

Several different measures were kept of whether the child was active during the time period. These children were obviously affected by their illness. Nearly half the children (43.6%) were never judged active, whereas only 2.6 percent were never seen to take a rest. Children were active in 15.0 percent of the time periods, and they rested in 61.1% of them. (These numbers need not add to 100 percent; children could both rest and be active in the same half hour period, and a child who was not resting but was not physically active would not be coded in either category.)

Half the children (48.7%) were judged inactive or listless at some point. Children were put in this category in 23.9 percent of the time periods, or 1.4 times apiece. This measure was made in the context of assessing how sick a child seemed, and might best be thought of as "apathetic". Six of the thirty-nine children (15.4%) were categorized this way in all time periods. Children also cried frequently. Of all the children, 92.3 percent cried at least once during the three hours, and they cried in 27.7 percent of the time periods. On the average, each child cried 1.7 times.

c. Feeding behaviors

The campaign messages promoted continuation of breastfeeding and the giving of other foods during episodes of diarrhea. These children were fairly well fed. They ate something in one-quarter of all the possible time periods (25.2%), with breastfeeding being the largest single activity at 41.8 percent of the feeding events. Giving of paps (36.2%) and solid foods (22.0%) account for the remainder of the feeding events. In general, the paps

and solid foods were not prepared fresh by the mothers. Only 30.0 percent of paps were made during the same time period as they were consumed, and only 17.9 percent of the solid foods were prepared fresh. Other studies have documented rapid bacterial growth in paps and solid foods when they are stored in the heat and humidity of The Gambia's rainy months.

One can also ask how many children ever got the different types of food. Pap is the most commonly given food, with 34 of 39 children receiving it, followed by breastfeeding (29) and solid foods (25). But those who received breastmilk were fed most often (2.6 times in three hours), followed by pap (1.9 times), and solid foods (1.0 times). For breastfeeding, fieldworkers recorded whether the child or the mother initiated the event. The children initiated breastfeeding about twice as often as the mothers.

d. Characteristics of the episodes

At the beginning of the study, fieldworkers asked mothers how many days the child had been sick with diarrhea. These children had already been sick for an average 3.3 days according to the mothers. The distribution of duration of illness is shown in Table III-20.

As can be seen from the table, the median length of episodes was between two and three days, and one of the cases had already been going on for 10 days. This evidence confirms our earlier expectation that we would not see many cases at the very beginning of an episode - - only 17.9 percent of the sample was in their first day of the bout.

The children defecated a total of 79 times during the observation periods, for an average of just over two movements in three hours for each child. The range on number of stools per child is 1 to 3; that is, every child defecated at least once, and no child had more than three stools during the three hours of observation. About a quarter of these stools (27.8%) contained mucus, but only 3.8 percent had blood in them.

Table III-20 Reported duration of episode at the start of the observational period

	Number of days with diarrhea									
	1	2	3	4	5	6	7	8	9	10
Number of children	7	10	6	7	4	0	4	0	0	1
Percent of sample	17.9	25.6	15.4	17.9	10.3	0	10.3	0	0	2.6
Cumulative percent of sample	17.9	43.6	59.0	76.9	87.2	87.2	97.4	97.4	97.4	100

DAYSDIGY

Vomiting was frequent among these children. The average child vomited 1.5 times in three hours, and only 20.5 percent of the children never vomited. In nearly two-thirds (62.1%) of the occurrences of vomiting, fieldworkers described it as forceful.

Children were rated for a number of signs of dehydration during each time period. The signs included: reduced urine output, dark urine, dry mouth, sunken eyes, sunken fontanel, lost appetite, dry eyes, and dry skin. The ratings show a remarkably high level of signs of dehydration, as judged by the fieldworker. Children exhibit an average of 2.0 signs each time period. 20.5 percent of the sample never show any signs, but the median number per child is between six and seven, and the maximum is 44 signs (out of a possible 48). Table III-21 shows the distribution of the observed signs of dehydration.

Thus, the children in the observational study as a whole are sick with fairly serious cases of diarrhea. The cases have been going on for some time, and they are showing preliminary signs of dehydration.

e. WSS treatment behaviors

Treatment of the diarrheal episodes with water-sugar-salt solution was the central focus of the intervention. Hence the key dependent variable for the evaluation is how many of the children were treated with WSS, and how accurately that treatment was mixed and administered. In these regards, the sample for the observational study did very well.

Of the 39 children in the study, 26 (or 67%) were treated with WSS. This percentage is quite consistent with mothers' reported treatment levels in the survey study. During the same period, in the six months surrounding the period of the observational studies, reported levels of treatment for cases occurring in the two weeks prior to the interview ranged from 44 to 65 percent of cases. We have already noted that the observational procedure is highly reactive and might lead women to change their behavior because of the presence of the observer. Given the

Table III-21 Observed signs of dehydration

Signs of dehydration	Number of times observed	Percent of children ever showing this sign	Percent of all observed signs	Percent of possible time periods
Reduced amount of urine	10	15.4%	2.2%	4.3%
Dark urine	27	20.5	5.8	11.5
Dry mouth	71	35.9	15.3	30.3
Sunken eyes	147	69.2	31.7	62.8
Sunken fontanel	55	25.6	11.8	23.5
Lost appetite	64	43.6	13.8	27.4
Dry eyes	48	20.5	10.3	20.5
Dry skin	42	17.9	9.1	17.9

AMTURN1,COLURIN1,DRYMOUTH,SUNKEYES,SUNKFONT,LOSTAPPE,DRYEYES,DRYSKIN

similarity of these measures with the self-report, reactivity may not have been much more of a problem in this study than in the survey.

Eleven of the children were already being treated with WSS when the fieldworker arrived at the house, and treatment was begun on the other 15 recipients during the observation period. If these eleven are assumed to provide a lower bound estimate for the true, uninfluenced level of treatment, one is still seeing a minimum of 28 percent of cases being treated. All of these cases are still current, so this number will underestimate the true lower-bound, because cases still have the opportunity to begin treatment. If one assumes that at least some of the cases that began treatment after the arrival of the fieldworker would have begun it in any case, then the true coverage level is at least a third of all episodes, and probably substantially higher. This is essentially a confirmation of the basic validity of the self-report data.

Fifteen mothers initiated treatment after the arrival of the fieldworker. In those cases, the fieldworker had the opportunity to observe the mother preparing as well as administering WSS. Observers noted five items related to correct mixing of the solution: (1) how much water was used, (2) how much sugar was used, (3) how much salt was used, (4) whether the bottle caps used to measure the sugar and salt were heaping or leveled, and (5) whether the solution was mixed in a bowl.

In the fifteen mixings observed in the study, all of the mothers received a perfect score on mixing - - they performed correctly on all five criteria. This is impressive information and it lends very strong support to the interpretation that the campaign has successfully taught the complex behavior of mixing of WSS to an extremely high criterion.

Administration of the WSS was done primarily from a cup (83.3 percent of administered doses); the rest was given with a spoon. No bottles were used for administration in this sample during the observation period.

The findings on the preparation and administration of WSS

are very encouraging. They conclusively show that mothers know how to mix the solution, and that the percent of episodes being treated is high, perhaps fully as high as the self-reported figures indicate.

f. Other treatment behaviors

The fieldworkers noted the use of other measures for the treatment of diarrhea. The findings are shown in Table III-22 (WSS figures added for comparison). Though WSS solution seems to be the treatment of choice among home-based diarrhea treatments, the use of traditional teas and of pills and liquids from the clinic or pharmacy remains high among the cases. WSS is given more than twice as often as the next highest treatment, and it is given to the most children. However, the use of other home treatments at the same time as WSS is much higher than mothers have reported in the survey.

g. Relationship among observed variables

In analyzing the wide range of information contained in the observational study, several index variables have been created to permit the investigation of relationships among the variables. These indices are: a severity index, combining everything from the diarrhea symptoms and the signs of dehydration; an index of feeding behaviors, combining breastfeeding, pap, and solid foods; an index of other treatments besides WSS, including herbal teas, Koran water, purges, pills, liquid medicines, traditional medicines, and other medicines; and an index of mixing behaviors, covering the correct ingredients and quantities, and mixing practices. The mixing index, in fact, becomes a surrogate measure for whether the mother began treatment during the observation period, because all mothers who were observed mixing the formula got perfect scores on the mixing questions.

These indices were then correlated with the variable measuring the number of time periods in which WSS administration

Table III-22 Diarrhea treatments observed

Treatment	Number of times given	Number of children treated
Herbal tea	21	15
Koran water	4	4
Purge	1	1
Pills	18	17
Liquid medicine	11	8
Traditional medicine	6	7
Other medicine	7	7
WSS solution	51	26

was observed. Table III-23 shows the correlation matrix and significance values among these variables.

Severity of the case is strongly and significantly related to feeding, mixing, and administration of WSS. This is a very encouraging finding, since it implies that the mothers are detecting and responding more strongly to those cases that are at greatest risk. Severity is less strongly related to whether other treatments are given, and does not quite reach statistical significance. This is interesting by itself, because other treatments is not significantly related to any of the other variables.

One would expect the opposite - - that mothers who were concerned about a severe case and were changing their feeding behaviors and giving WSS would be more likely to do other things as well. However, the correlations are low and not significant. In the case of administration, the correlation is actually negative. If this were significant, it would suggest that mothers who gave other treatments were less likely to give WSS, but a conclusion of "no relationship" must be drawn from these data.

Feeding, in addition to being significantly related to WSS use, is significantly related to mixing behaviors. This may not be surprising if one recalls that the lack of variability on the mixing behaviors index transforms it into a measure of whether a woman began administration of WSS during the observation period (and hence makes it a component of the Administration of WSS Index).

Thus the main finding here is that severity of the case is a strong predictor of whether mothers will feed the child and treat it with WSS. In both cases, the more serious the case, the more likely the child will be to receive food and WSS.

Table III-23 Pearson correlations among measures of behavior during the observational study

	Feeding Index	Other Treatments Index	Mixing Behaviors Index	Admin. of WSS
SEVERITY INDEX	.3858 p=.008	.2552 p=.058	.3698 p=.010	.4050 p=.005
FEEDING INDEX		.1191 p=.235	.5994 p=.000	.4971 p=.001
OTHER TREATMENTS			.0599 p=.359	-.1037 p=.265
MIXING BEHAVIORS				.3267 p=.021

Source variables:
Severity index: STOOLS,BLOOD,MUCUS,VOMIT,FORCE,AMTURN1,COLURIN1, DRYMOUTH,SUNKEYES,SUNKFONT,LOSTAPPE,DRYEYES,DRYSKIN
Feeding index: BRSTFED,EATSPAP,FRESHPAP,EATSOLID,FRSHFOOD
Other treatments: HERBTEA,KORANWTR,PURGE,PILLS,LIQMED,TRADMDCN, OTHRMDCN
Mixing Behaviors: THREEBTL,SUGAR,SALT,CAPFULS,MIXBOWL
Admin. of WSS: WSSUSED

(4) Conclusions

This observational study has provided an excellent opportunity to check the validity of self-reported behavior and to enrich our understanding of how the process of responding to an episode of diarrheal disease actually works.

It has demonstrated that a third of mothers of sick children are already administering WSS when the fieldworker arrives, and that another third initiate treatment during the observational period. These levels are consistent with and validate the self-report data on percentage of cases being treated. The women know the WSS formula perfectly and mix it accurately. They are more likely to treat more serious cases, which represents a deviation from the official Ministry instructions to treat all cases, but is probably a very rational decision from the perspective of the mothers.

CHAPTER IV

HEALTH STATUS EFFECTS

A. Variation in Diarrheal Disease over Time

The Medical Research Council team in The Gambia has provided detailed data on the growth, nutrition, and health of children. One of the striking aspects of these data is the seasonal variation they reveal. The peak of diarrheal disease incidence occurs during the rainy season which lasts from June to October. The infectious agents during the rainy season are likely to be bacterial although giardiasis also plays an important role. A smaller peak in incidence occurs in the dry season, with cases more likely being caused by rotavirus. Episodes occurring during the rainy season are likely to be of longer duration while those in the dry season tend to be shorter and more severe. For this reason, children are at a greater risk of severe dehydration and death in the dry season (Rowland, 1983).

Bacteriological studies show that children come into contact with bacterial agents of diarrheal diseases (among other pathways) through the use of contaminated water in the preparation of foods. Water sources are most polluted during the rainy season and not surprisingly, the contamination in weaning foods is greatest at this time (Rowland, Barrell, and Whitehead, 1978). The rainy season is the time of greatest food scarcity but also the time when demands for agriculture are at their peak. Mothers spend much of the day away from home in the fields and infants are often left under the care of someone else. Studies show that birth weights are less during the rainy season and that the milk

output of mothers is decreased (Roberts et al, 1982). The rainy season is therefore a time when the nutritional status of children rapidly deteriorates.

(1) Seasonal variation in prevalence

Data from our study corroborate the findings of the MRC unit. Mothers were interviewed using the morbidity instrument on 13 different occasions between March 1982 and June-July, 1984, providing data for two years. The information obtained includes whether the mother's preschool children were ill with diarrhea on the day of the interview and in the previous two weeks, and the characteristics of the episode for each ill child. (The sources of curative care sought, and treatments prescribed were described in Sections IIIC and IIID).

Table IV-1 and Figure IV-1 show the marked seasonal variation in diarrhea prevalence in the last two weeks and on the day of the interview for all children. The peak of 34 percent occurred during the 1982 rainy season and prevalence for the previous two weeks remained consistently low at between 10 and 13 percent during the subsequent dry season. Diarrheal incidence rose again during the 1983 rains, but was lower than during the previous rainy season by ten percent, probably due to decreased rainfall during the 1983-84 drought. Diarrhea prevalence for the subsequent dry season was slightly higher than the year before, although still lower than rainy season incidence for cases ill in the last two weeks. Prevalence was beginning to rise again at the last data point in July 1984, as the rains were beginning.

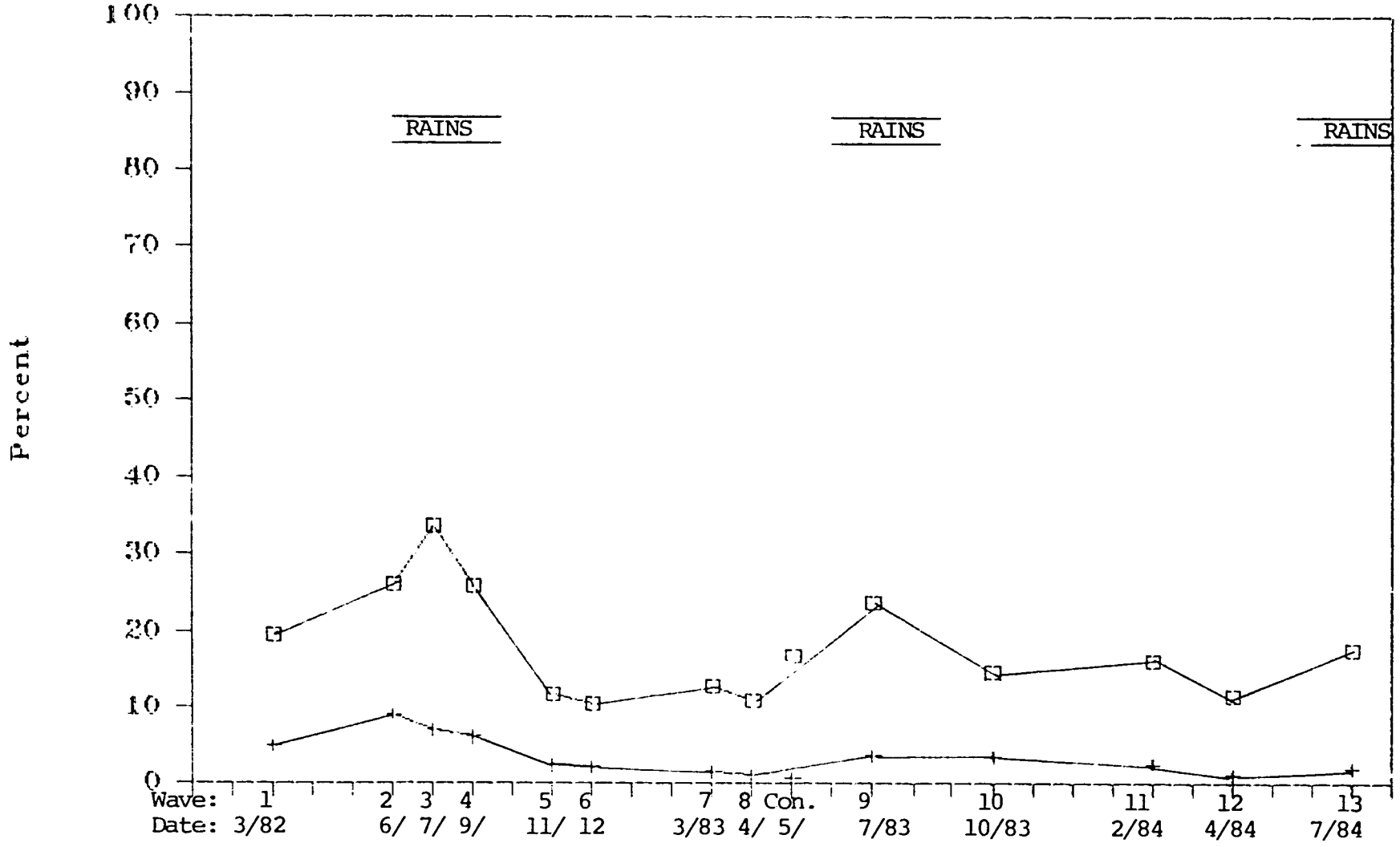
Point prevalence, or cases of diarrhea on the day of the interview, also reflects seasonal variation. As with cases of diarrhea within the previous two weeks, point prevalence over the two years under study was highest during the 1982 rains, with nine percent of the children having diarrhea on the day of the interview in June 1982. Rates decreased to between 1.2 and 2.4 percent in the subsequent dry season, increased to only 3.7 percent during the very light 1983 rains, and fell afterwards

Table IV-1 Prevalence of diarrhea: percentage of all children ill with diarrhea during the previous two weeks and on day of interview, over time

	MORBIDITY WAVES													
	3/82	6/82	7/82	9/82	11/82	12/82	3/83	4/83	5/83*	7/83	10/83	2/84	4/84	7/84
Percent of children having diarrhea in previous two weeks	19.5	26.0	33.7	25.9	11.9	10.4	12.7	10.9	16.8	23.8	14.7	16.2	11.5	17.7
Percent of children with diarrhea on day of interview	5.0	9.0	7.1	6.2	2.4	2.1	1.6	1.2	0.8	3.7	3.5	2.3	1.2	2.0
n =	1004	885	960	956	912	1041	1027	1021	250	951	936	1060	968	972

MORB
* Control group

Figure IV-1 Prevalence of diarrhea: percentage of all children ill with diarrhea during the previous two weeks and on day of interview, over time



□ Children with diarrhea in in the last two weeks

+ Children with diarrhea on day of interview

back to between 1.2 and 2.3 percent.

Two time points bear further explanation. October, which is usually considered part of the rainy season, experienced less rain in 1983 and so is considered part of the dry season in the graphs. The point prevalence figures at that time were similar to the rainy season measure from July of that year, while the rate of diarrhea incidence in the last two weeks was much lower than the July rate, and much more in line with the 1984 dry season measures. In addition, the initial data collection at March 1982 showed higher dry season point prevalence and prevalence in the last two weeks than during the later dry seasons, reflecting yearly variation. MRC data also shows considerable variation by year for similar seasons (Rowland, 1983).

Thus, our data show higher rates of diarrhea during the rains than during the dry season. Over the two years of our study, incidence was highest during the 1982 rains, and lower during the 1983 rains, when rainfall was unusually low. The rainy and dry season peaks in 1982 conform with previous research in The Gambia on diarrhea incidence, varying slightly from year to year.

(2) Seasonal variation in severity

The mean duration of episodes in Gambian children older than six months is four days according to MRC estimates (Rowland, 1983). In our sample, the mean duration ranged from 3.9 to 4.4 days during the rainy seasons, to 3.1 through 3.9 days during the dry seasons, for all cases of diarrhea in the last two weeks (see Table IV-2). Because many of the episodes of diarrhea were still in progress on the day of the interview, our duration data are not a true estimate of the average duration of episodes. However, the data do provide a relative indicator of the duration of cases at different times of the year. In Figure IV-2 we plotted the percentage of cases with more than four days of diarrhea in the past two weeks. There were more cases of diarrhea over four days long in the rainy seasons than in the dry

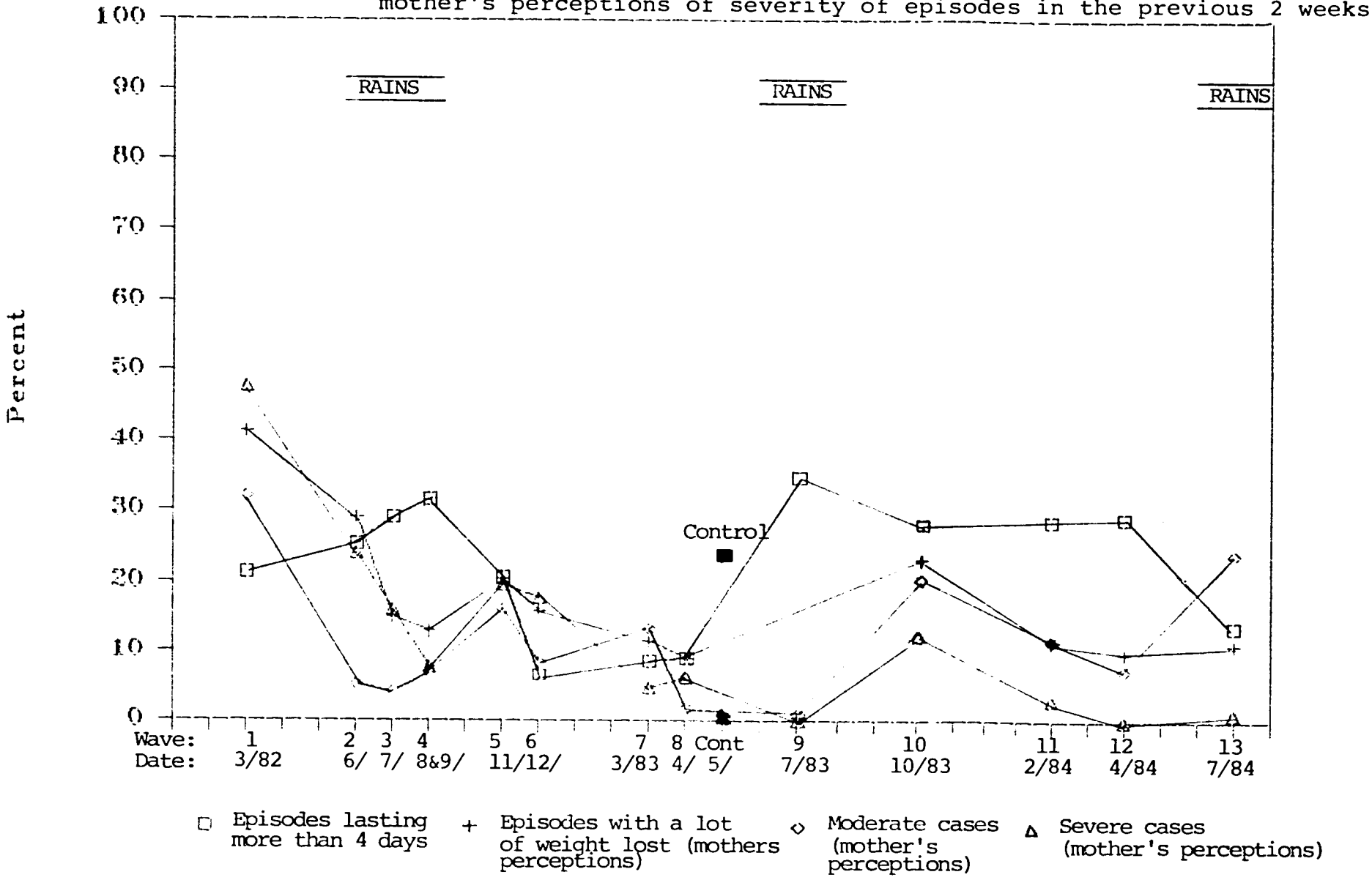
Table IV-2 : Measures of diarrhea severity: Length of episodes, weight loss, and mother's perception of severity for cases in the previous two weeks

	MORB WAVES													
	1	2	3	4	5	6	7	8	Cont. 9		10	11	12	13
	Mar	Jun	Jul	Sep	Nov	Dec	Mar	Apr	May	Jul	Oct	Feb	Apr	Jul
Mean duration of episode, in days	3.9	4.0	4.4	4.0	3.6	3.1	3.1	3.3	3.6	3.9	3.6	3.5	3.9	3.3
% of episodes lasting more than 4 days	21.1	25.2	29.0	31.6	20.6	6.5	8.5	9.0	23.8	34.8	28.1	28.6	29.1	13.6
% of episodes with a lot of weight lost	41.3	29.1	14.9	12.9	20.4	15.7	11.5	9.0	.8	.4	23.2	11.6	9.9	11.1
% of moderate cases (mother's perception)	32.0	5.2	4.0	6.9	15.9	8.3	13.2	1.8	.8	.9	20.3	11.6	7.3	24.0
% of severe cases (mother's perception)	47.7	24.0	15.9	7.7	19.6	17.6	4.7	6.3	.4	.0	12.3	2.9	0	1.2
N	196	230	323	248	108	108	130	111	41	227	138	171	110	172

MORB:DAYSDGQ,LOSTGQ,DITYPGQ

DAYSDGQ,LOSTGQ,DITYPGQ

Figure IV-2 Measures of severity: length of episodes, weight loss, and mother's perceptions of severity of episodes in the previous 2 weeks



MORB:DAYSDGQ,LOSTGQ,DITYPGQ

seasons, except for the last data point, which is anomalously low for a rainy season measure. The other rainy season data indicate between 25 and 35 percent of cases in the last two weeks as longer than four days in duration. The 1982-83 dry season is much below March 1982 and 1983-84 dry season estimates, again, pointing to yearly variation.

Mothers of children ill with diarrhea in the past two weeks were asked if they thought the case was mild, moderate, or severe and were also asked to report whether the child lost a lot of weight. In Figure IV-2 we have plotted the percent of cases reported by mothers to have moderate diarrhea, severe diarrhea and a lot of weight lost.

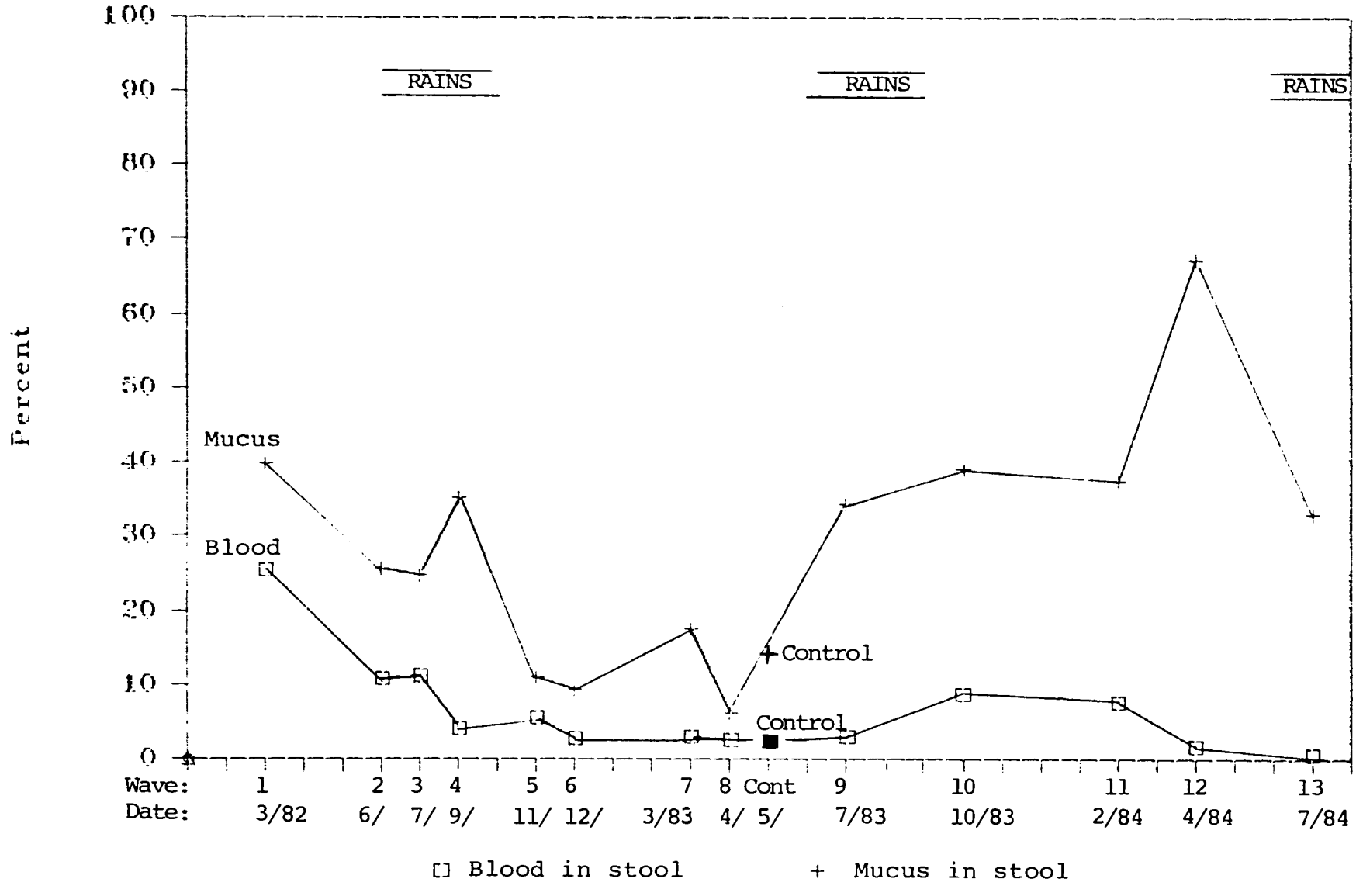
With the onset of the campaign, these three indicators of mothers' perceptions of severity declined. The number of cases losing a lot of weight dropped from a high of 41.3 percent in March 1982 to 29.1 percent by June of that year, and continued to drop further during the rainy season, which was a period of heavy campaign promotions. Rates of perceived severe weight loss rose slightly in March 1983, then dropped again through the heavy feeding/WSS message promotion in 1983. October 1983 shows an odd peak of 23.2 percent, after which the rates of perceived severe weight loss dropped again. In October, the implementation team turned their efforts towards planning the mini-campaign, while health workers were probably concentrating more on the meningitis inoculation campaign; less public attention was focused on diarrhea management. Thus, the rates of perceived severe weight loss for children ill in the last two weeks declined over the course of the campaign, and was lowest during periods of heavy promotion. The fluctuations do not coincide with variation by season or by duration of episodes.

In a similar manner, the percentage of moderate and severe cases perceived by mothers for episodes in the last two weeks prior to the interview reflect more campaign effects than seasonal ones. The high measures in March 1982 were not repeated once the campaign was underway. Perceptions of severity rose again, but not to the pre-campaign level, during the dry-season

diarrhea promotion, which emphasized the danger of dehydration deaths for small children. These messages may have been repeated after the feeding campaign wound down in October 1983, when perceptions of severity rose slightly again. In February 1984, severe cases dropped to next to nothing, while moderate cases fell, but increased during the July 1984 rains. Thus, the most striking feature was the steady decline overall in mothers' impressions of severity, especially during heavy rainy season promotions. Perceptions of severity were slightly higher during dry season messages about the danger of diarrhea deaths.

Mothers were asked about the presence of blood and mucus in the stools, telltale signs of bacterial diarrhea. Figure IV-3 and Table IV-3 show the lowest levels of mucus in children's stools among diarrhea cases in the two weeks prior to the interview during the 1982-83 dry season. Rates are higher during the rains in 1982, 1983, and 1984, but two of the dry seasons also show high rates of mucus in the stools - - March 1982 and all measures in 1983-84 dry season, especially the April 1984 data point. Blood levels were highest in March 1982, reporting a quarter of the cases with blood in stools. Rainy season levels were higher in 1982 than dry season rates, but the rise in blood levels in 1983 occurred after the rainy season measure in July, with higher rates in October 1983 and February 1984, and a subsequent decline by April and July 1984. Thus, aside from the first data point, the first year shows the expected relation between seasonality and two indicators of bacterial diarrhea, the presence of blood and mucus in stools - - namely, that there is more bacterial diarrhea during the rainy season. However, the second year does not show the expected dry season drop in bacterial indicators, perhaps due to conditions caused by the drought. The first data point, from the 1982 dry season, matched the October 1983 and February 1984 levels for mucus in the stools, but was anomalously high in cases with blood in their stools. Control community levels in May 1983 matched sample communities during the same period, indicating that there was not an interview reaction at that time.

Figure IV-3 Measures of bacterial diarrhea: presence of blood and mucus in stools for cases ill in the last two weeks



MORB:BLOOD,MUCUS

Table IV-3 Measures of bacterial diarrhea: presence of blood and mucus in stools for cases ill in the last two weeks

	MORBIDITY WAVES													
	3/82	6/82	7/82	9/82	11/82	12/82	3/83	4/83	5/83*	7/83	10/83	2/84	4/84	7/84
Percent of cases in last two weeks with blood in stools	25.5	10.9	22.3	4.0	5.6	2.8	3.1	2.7	2.4	3.1	8.8	7.6	1.8	0.6
Percent of cases in last two weeks with mucus in stools	39.8	25.7	24.8	35.1	11.1	9.3	17.7	6.3	14.3	34.4	39.1	37.4	67.3	33.1
n =	196	230	323	248	108	108	130	111	42	227	138	171	110	172

MORB
* Control group

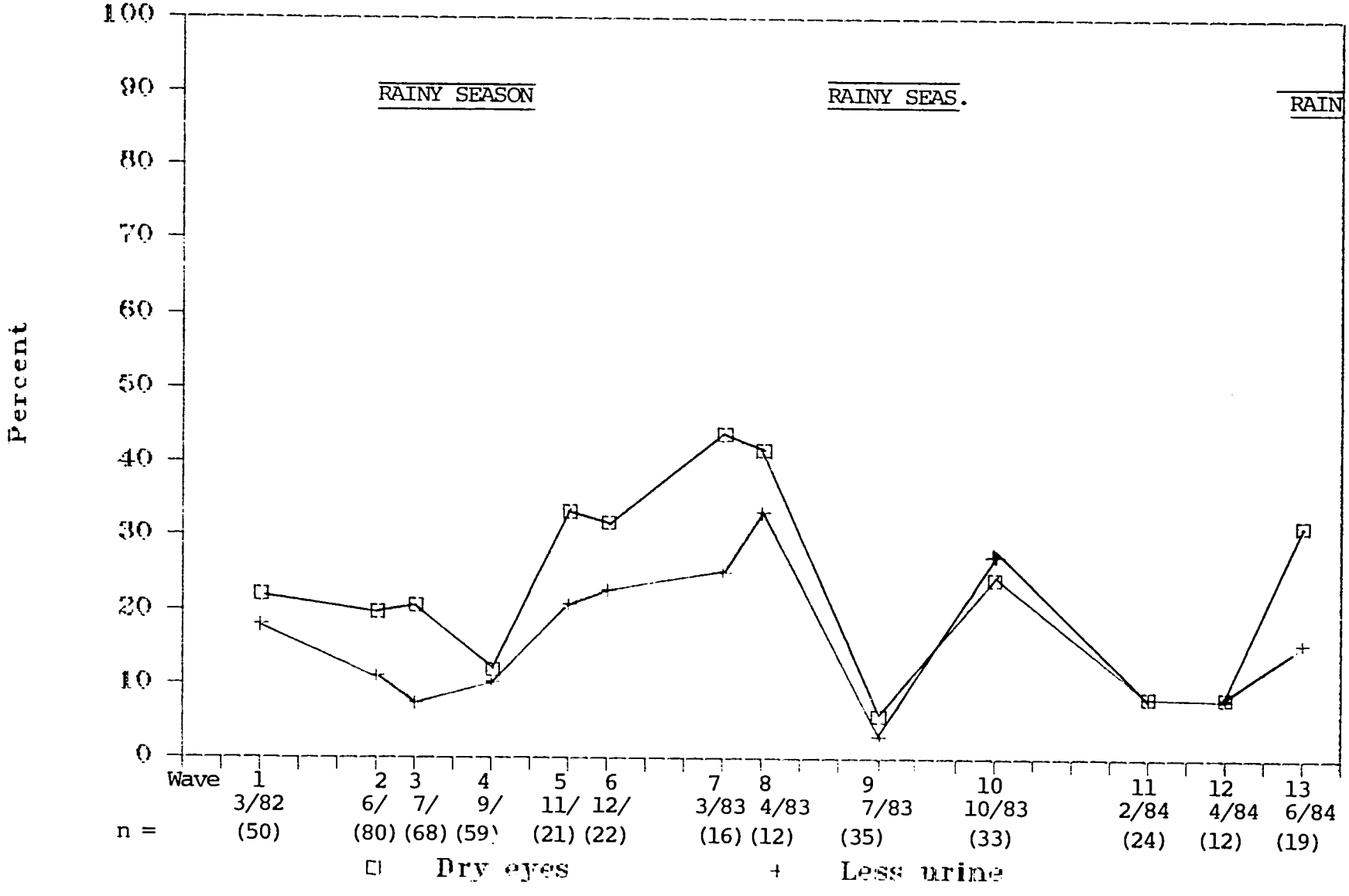
(3) Variation in dehydration indicators

Data for two indicators of dehydration are plotted in Figure IV-4: percent of children urinating less and percent of children with dry eyes. In both instances the data refer to only those cases with diarrhea on the day of the interview. The data on the extent of urination was provided by the mother while the degree of dryness in the eyes was determined by the fieldworker. It is clear that the indicators show greater dehydration during the dry season than in the rainy season (as expected from the MRC data). The steady rise in the dehydration indicators during the dry season may represent the rising prominence of rotavirus and the declining role of bacterial agents of diarrhea. During the 1983 rainy and dry season, however, there seems to have been less dehydration than from the previous year. The July 1983 levels of both dry eyes and less urine are lower than July 1982 levels. October 1983 looks fairly comparable to the previous November, but the February and April 1984 rates are much lower than March and April 1983 levels of these two dehydration indicators. The low rates in 1984 are surprising, due to the drought in The Gambia; by this time in 1984, many wells were dry, while many of those left were low and presumably more contaminated, and food and petrol shortages were more pronounced. During the 1984 drought, however, episodes lasted longer, fewer children showed signs of dehydration, and levels of mucus in the stools were high.

(4) Discussion

Overall, the data show the expected season fluctuations in the prevalence of diarrheal disease. The similarity to trends found by the British Medical Research Council in The Gambia tend to support the reliability of our findings. We found higher rates of diarrheal disease and longer-lasting episodes during the

Figure IV-4 Measures of dehydration for cases of diarrhea on the day of the interview



MORB:AMURNGQ,NORMGQ

Table IV-4 Measures of dehydration: Children with dry eyes and urinating less for cases of diarrhea on the day of interview

	1982	RAINY SEASON					1983		RAINS		1984		RAINS
	Mar.	June	July	Sept	Nov.	Dec.	Mar	Apr	July	Oct.	Feb	Apr	June
Percent of cases with dry eyes	22.0 (11)	20.0 (16)	20.6 (14)	11.9 (7)	33.3 (7)	31.8 (7)	43.8 (7)	41.7 (5)	5.7 (2)	24.2 (8)	8.3 (2)	8.3 (1)	31.6 (6)
Percent of cases urinating less	18.0 (9)	11.3 (9)	7.4 (5)	10.2 (6)	23.8 (5)	22.7 (5)	25.0 (4)	33.3 (4)	2,9 (1)	27.3 (9)	8.3 (2)	8.3 (1)	15.8 (3)
n =	50	80	68	59	21	22	16	12	35	33	24	12	19

MORB:AMURNGQ,NORMGQ

rainy seasons than during the dry seasons. The rainy season peak in 1983 is less than the year before, however. This is probably due to diminished rains during the beginning of the drought, since MRC research has pointed to a strong relationship between rainfall levels and diarrhea incidence during rainy seasons. MRC also cautions that there may be considerable variation across communities and years (Rowland, 1983).

Feachem et al (1983) would not expect an ORT campaign to lead to lower diarrheal prevalence because the transmission of disease causing pathogens is not likely to be interrupted. It might be possible, however, that an ORT camaign would shorten the duration of a case. Thus, we feel that the observed changes in prevalence are more likely the result of annual and seasonal factors, not a result of the intervention. Because we have only two years of data, it is problematic to interpret trends which feature such great seasonal and yearly fluctuation.

Mothers' estimations of the severity of episodes in the last two weeks seems to have varied more with the campaign than by other factors such as season or reported duration of diarrhea episodes. Fewer cases of severe weight loss during diarrhea were reported as the campaign progressed. Reports of moderate and severe cases dropped dramatically after the campaign began, and rose to some degree during dry season messages about the dangers of dehydration. Thus, the campaign seems to have influenced how severe women perceived specific bouts of diarrhea to be - - fewer cases were described as moderate or severe or causing the child to lose a lot of weight. Seasonal variation in the danger of diarrhea, as promoted by the campaign, seemed to be particularly recognized when the messages were broadcast. When the campaign was not emphasizing dry season diarrhea (during parts of the dry seasons of 1983 and 1984), perceptions of the severity of cases by mothers were low.

Rowland, Barrell, and Whitehead's differentiation between bacterial diarrhea during the rainy season and rotavirus diarrhea during the dry season is only partially supported by our data. The first year shows the expected trends, apart from the first

data point, but the second year does not. Blood and mucus in stools, two indicators of bacterial diarrhea, remained high during the 1983-84 dry season, contrary to expectations. Two measures of dehydration, which MRC research relates to rotavirus diarrhea peaking normally during the dry season, were found to be low in February and April 1984, and high as the rains began in 1984.

The incidence of dehydrating diarrhea in The Gambia is too low for us to be able to attribute any change to the campaign for our sample of roughly 1000 children at a given point in time. As we have seen, point prevalence of diarrhea during the two years under study remained below ten percent, and usually below five percent. Of these cases, usually less than 30 percent show any sign of dehydration. In numbers, this means that only between one and 16 children from our sample (0.1% to 1.6%) show a sign of dehydrating diarrhea at a given point in time. These figures are too low to create significant variation.

B. Age Differences in the Prevalence and Characteristics of Diarrhea

(1) Age differences in prevalence

The prevalence of diarrhea is highest during the period of weaning in most studies in developing countries. Diarrhea becomes less frequent after weaning is completed and is rare in older, school-age children. As discussed in Chapter III, weaning in The Gambia begins when a child is between 3 and 5 months, on the average, and continues until the child is between 17 and 24 months, but may go on until age 3 years. During the rainy season, weaning seemed to begin and end slightly earlier. Thus, to understand diarrhea prevalence, it is important to consider age differences.

The mean age of sample children in each morbidity wave is presented in Table IV-5. Despite the inclusion of newborns, the sample aged slightly over the course of the evaluation, from a low mean age of 28.8 to a high of 37.9 months. We therefore analyzed the data at separate time points, as well as pooled together, to check for age differences in prevalence over time.

A simple test of the effects of age on diarrhea prevalence is to compare the mean age of children who had diarrhea in the last two weeks prior to the interview to the mean age of children not ill. The results, presented in Table IV-6, show that children ill with diarrhea were significantly younger than children not ill. In March 1982, for example, the mean age of ill children was 27.7 months, compared to 31.8 months for children without diarrhea. By the final wave in July 1984, the mean ages were 33.9 and 38.8, respectively, showing the slight aging of the sample but still depicting a significant difference between those children ill and those not. The differences in the means were significant at at least $p < .05$ for each wave of data collection.

Since the relationship between age and prevalence is not linear, we categorized children into age groups so that we could examine age and prevalence in more detail. Using the age categories introduced in Chapter III, Table IV-7 and Figure IV-5 show the percentage of children in an age group who were ill with diarrhea in the previous two weeks, pooling data collection waves by season. As anticipated, weaning-age children showed higher rates of diarrhea than both newborns and older children. Six-month olds to one and half year olds showed the highest rainy-season rates, 34.5 to 39.0 percent ill in the last two weeks. Children four months old and younger were slightly less vulnerable during the rains than weanlings, but still more at risk than children three years and older. Rainy season diarrhea rates declined steadily after one and a half years, and stabilized at three years of age around 15 to 20 percent. During the dry season, infants showed the same diarrhea rates as children over three years, at about ten percent. Dry season

Table IV-5 Mean age of children in the Morbidity instruments, The Gambia

	W1 3/82	W2 6/82	W3 7&8/82	W4 9/82	W5 11/82	W6 12/82	W7 3/83	W8 4/83	Cont. 5/83	W9 7/83	W10 10/83	W11 2/84	W12 4/84	W13 7/84
Mean	30.9	28.8	30.5	32.2	31.6	33.3	35.5	35.7	29.3	37.2	35.1	37.4	37.5	37.9
Standard Deviation	17.9	16.9	17.3	17.9	18.4	18.7	18.7	18.7	18.5	18.2	19.8	19.3	18.7	19.4
Minimum	0	0	0.1	0.1	0.3	0.6	0.9	1.1	1.0	2.8	0.3	0.6	2.0	0
Maximum	67.1	67.4	71.0	70.3	71.8	70.6	71.9	71.6	72.0	72.0	71.9	72.0	72.0	71.9
N	987	860	923	914	874	985	959	938	174	859	865	921	833	823

Note: MORB:AGEGQ

Table IV-6 Mean ages of children with and without diarrhea within last two weeks

	W1 3/82	W2 6/82	W3 7&8/82	W4 9/82	W5 11/82	W6 12/82	W7 3/83	W8 4/83	Cont. 5/83	W9 7/83	W10 10/83	W11 2/84	W12 4/84	W13 7/84
Mean Age - had diarrhea:														
Mean	27.7	23.6	25.2	27.2	25.1	26.3	27.3	31.1	23.4	31.9	28.3	30.9	31.1	33.9
S.D.	16.6	15.3	16.1	16.6	15.5	17.4	17.7	16.4	14.1	17.6	17.7	18.7	18.0	33.9
Mean Age - did not have diarrhea:														
Mean	31.8	30.7	33.2	34.0	32.6	34.1	36.7	36.3	30.6	38.8	36.3	38.7	38.4	38.8
S.D.	18.1	17.0	17.3	18.1	18.6	18.6	18.5	18.9	18.9	18.1	19.9	19.1	18.6	19.2
T-value of difference between group means (a)	-3.0*	-5.9***	-7.0***	-5.3***	-4.6***	-4.2***	-5.4***	-3.0**	-2.3*	-4.9***	-4.6***	-4.8***	-3.9***	-2.7**
N	986	860	923	914	874	985	959	938	173	859	865	919	832	822

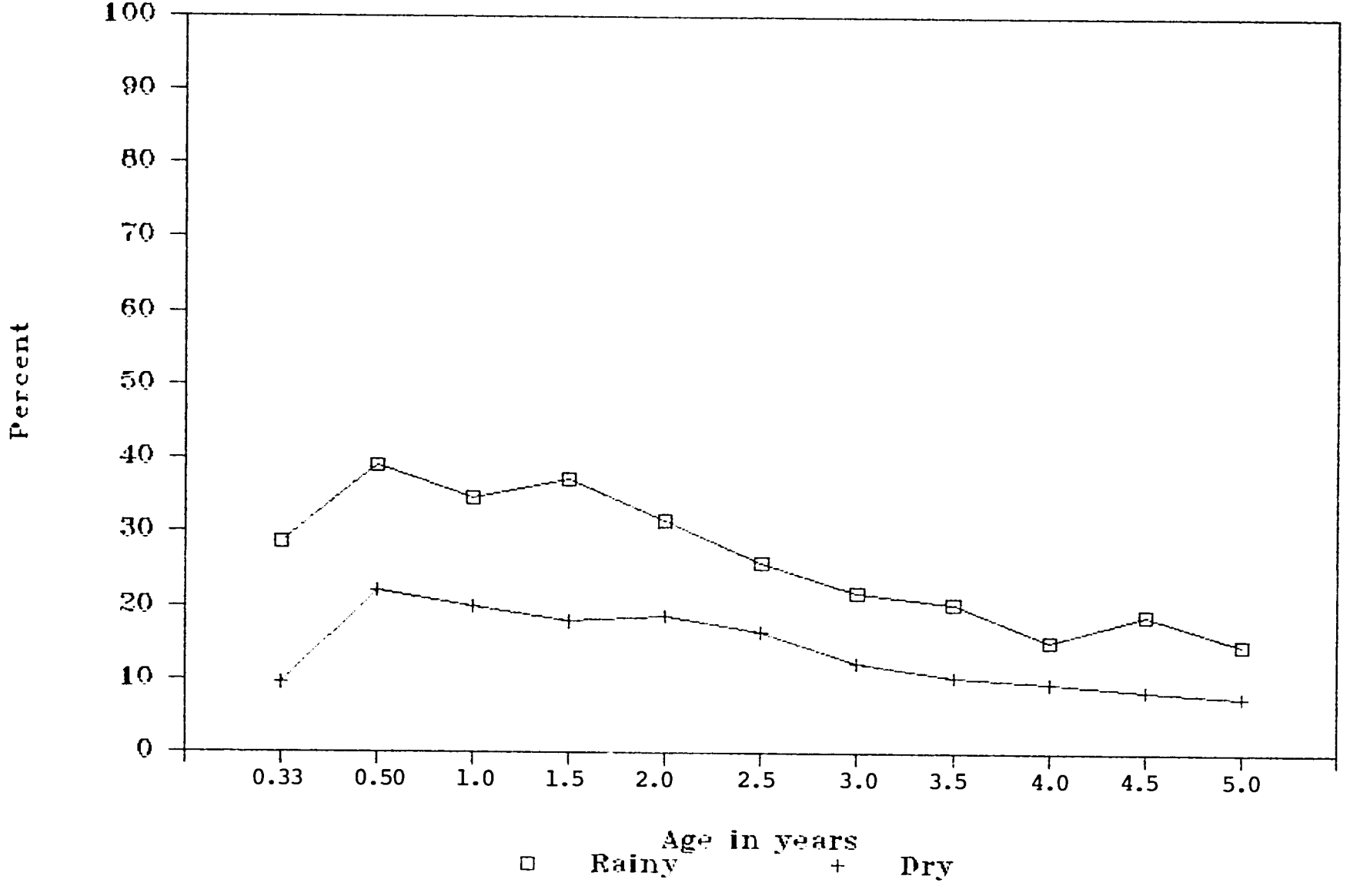
Note: MORB:HADDIGQ, AGEGQ

(a) T-value represents separate variance estimate
* Significant at the .05 level
** Significant at the .01 level
*** Significant at the .001 level

Table IV-7 Percent of children with diarrhea, by age and season

Age	Rainy Season %	Rainy Season N	Dry Season %	Dry Season N	'82-83 Dry Season %	'82-83 Dry Season N	'83-84 Dry Season %	'83-84 Dry Season N
0.33	28.6	91	9.5	179	9.2	87	4.3	47
0.50	39.0	372	22.1	580	18.1	288	26.3	190
1.00	34.5	428	19.9	639	18.7	364	23.0	187
1.50	37.1	426	18.1	703	15.2	388	20.6	233
2.00	31.5	416	18.6	708	15.0	341	20.2	243
2.50	25.9	479	16.5	699	12.2	329	16.8	274
3.00	21.8	445	12.4	747	11.6	406	13.8	239
3.50	20.4	422	10.4	685	8.0	376	11.1	225
4.00	15.3	391	9.5	706	7.3	329	12.1	264
4.50	18.8	389	8.4	604	6.9	304	9.1	243
5.00	14.8	520	7.6	1111	6.1	544	9.5	473

Figure IV-5 Percent of children with diarrhea in the last two weeks, by age and season (pooled across waves)



Note: Rainy season includes Waves 2,3,4,9, and 13
Dry season includes Waves 1, 5-8, and 10-12
MORB:HADDIGQ,AGEGPGQ

diarrhea rates for weanlings declined slowly from 22.1 percent for six-month olds, to 16.5 percent for 2 and half year olds. Thus, the dry season diarrhea rate among weanlings was similar to rainy season rates for children over three. Infants four months and under showed high rates in the rainy season compared with older children, but the same low rates in the dry season.

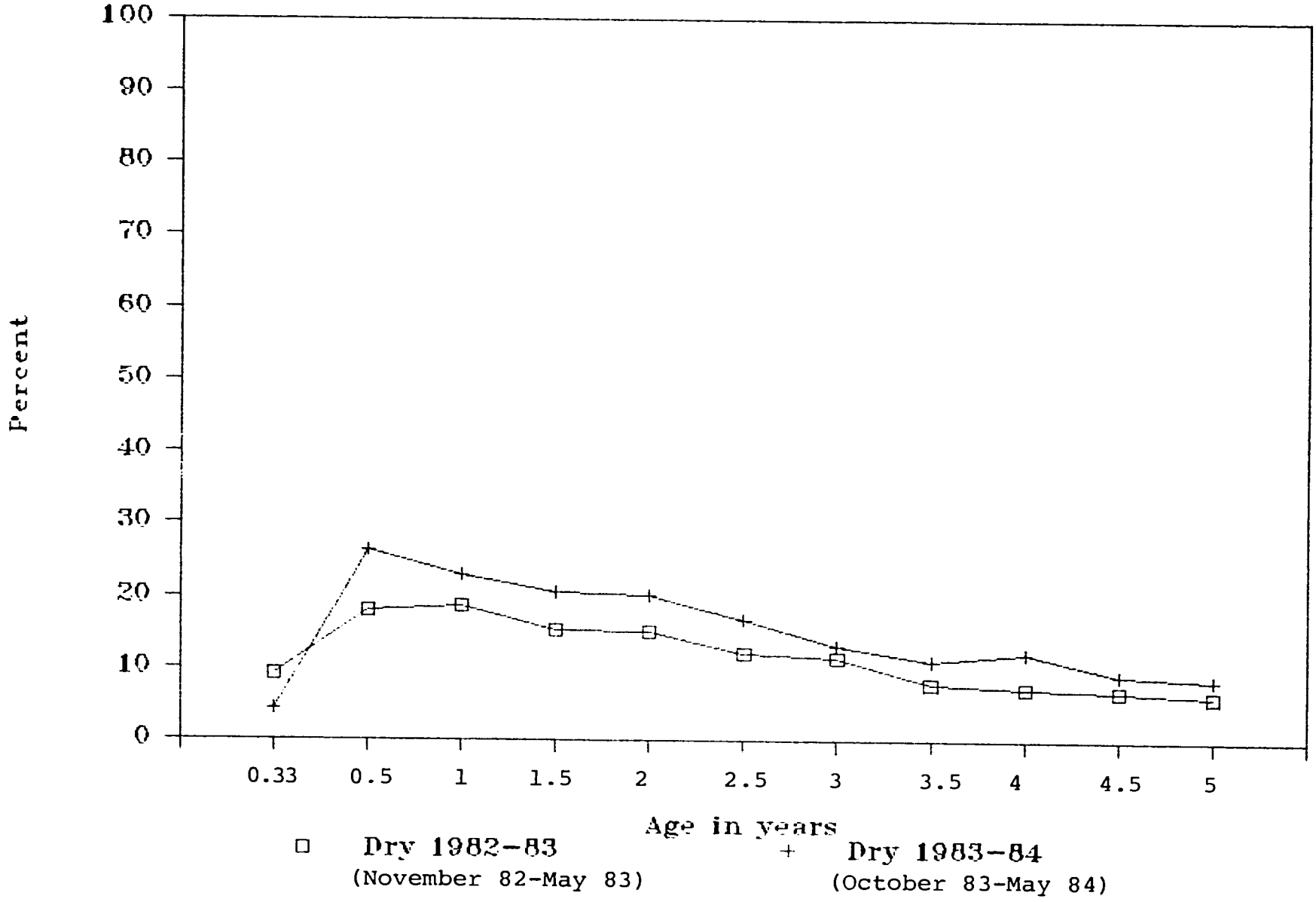
To look at differences in years, we compared dry season measures from 1982-83 to 1983-84. Figure IV-6 and Table IV-7 show the same pattern: low dry season rates for infants, high rates for six month olds and a steady decline afterwards. However, diarrhea rates in 1983-84 were higher for all ages except infants under four months than the rates one year earlier. Among six month olds, 26.3 percent suffered dry-season diarrhea in the droughts of 1983-84, compared with 18.1 percent in 1982-83. After the age of two, the differences between the years are less, averaging only about three percent.

It is curious that dry-season diarrhea among infants was so low in 1983-84, below even that of older children. It may be because women began weaning slightly later than normal during the drought, such that very few children under four months were exposed to pathogens in weaning foods.

The Medical Research Council (MRC) studies suggest a dry season peak in diarrhea rates around December, mostly involving children between one and one and a half years of age. To look for this tendency, we computed the percent of children in each age group with diarrhea for each wave of data collection. Table IV-8 shows that in December 1982, one year olds showed slightly higher diarrhea rates (22.8%). However, other ages showed higher diarrhea rates at other dry season points: in November 1983 for two year olds (23.7%), six month olds (28.4%) and one a half year olds (22.1%) in March 1983, six month olds in October 1983 (27.7%) and February 1984 (32.3%), and one and a half to two year olds in February 1984 (26.7 and 26.5%, respectively).

Because the number of children in each age category per wave was low, we collapsed the data into four age groups: (1) 0-14 months; (2) 16 to 26 months; (3) 27 to 38 months; and (4) over 39

Figure IV-6 Percent of children during two dry seasons with diarrhea in the last two weeks, by age



MORB:HADDIGQ,AGEGPGQ

Table IV-8 Percent of children in age group who had diarrhea within the last two weeks

Age (years)	W1 3/82	W2 6/82	W3 7&8/82	W4 9/82	W5 11/82	W6 12/82	W7 3/83	W8 4/83	W9 7/83	W10 10/83	W11 2/84	W12 4/84	W13 7/84
0.33	15.6a	16.7	47.4	21.4	13.5	9.1	0	0	0	6.1	0	0	36.8
0.50	25.5	39.1	50.0	35.4	15.8	17.2	28.4	10.8	38.1	27.7	32.3	18.3	17.9
1.00	18.2	36.1	39.4	40.6	19.6	22.8	16.0	13.9	29.7	22.8	22.6	23.6	22.2
1.50	24.4	39.5	43.0	30.4	14.9	8.2	22.1	15.0	37.4	18.8	26.7	15.2	34.5
2.00	25.8	28.4	48.4	27.8	23.7	7.0	13.0	17.2	31.1	18.2	26.5	15.3	18.7
2.50	30.2	29.4	33.0	28.4	8.0	10.5	16.5	14.5	25.9	19.5	16.3	14.8	8.6
3.00	12.7	18.7	26.5	21.4	13.5	11.1	7.6	14.4	20.5	20.0	11.4	11.1	21.0
3.50	20.2	16.5	25.3	25.8	9.5	5.2	9.7	7.8	16.0	10.5	12.2	9.2	18.3
4.00	9.7	14.5	17.8	10.3	6.6	9.2	6.6	6.7	22.6	10.5	11.8	14.0	10.0
4.50	19.3	12.7	20.7	24.4	9.3	8.6	4.2	5.2	15.3	10.5	13.3	3.6	18.7
5.00	11.7	18.6	21.7	8.4	2.2	3.8	8.6	7.5	15.7	6.2	10.9	7.9	13.7
Total % with diarrhea	19.6	26.5	33.7	25.5	12.4	10.2	12.7	11.0	24.0	15.0	16.9	12.4	17.9
Total N	987	860	923	914	874	985	959	938	859	865	921	832	822
Chi square	27.7**	43.2***	52.7***	41.0***	28.8**	33.8***	40.8***	16.4	31.3***	30.8***	36.5***	19.8*	26.3**

(a) Percent in table means, for example, that 15.6% of the children age four months had diarrhea at time of measurement Wave 1, and 84.4% did not have diarrhea.

* Significance at .05 level, ** significance at the 0.01 level, *** significance at the .001 level

Note: MORB:HADDIGQ, AGEGQ

months of age. (The rationale behind the age categories is explained in Chapter III). The collapsed age groups also make it easier to depict trends graphically. Table IV-9 shows the distribution of prevalence when the age groups are collapsed in this fashion.

Figure IV-7 and Table IV-7 show that each year, all age groups experienced more diarrhea in the rainy season than in the dry season. In addition, dry season rates in December 1982 and February 1983 were high among children under two years old.

Comparing similar months in different years, we can see that rises in diarrhea prevalence were not consistent across age groups. March 1983 rates were lower than March 1982 rates among children two years and older; they were the same for the 0 to one year group. High rates for two year olds in March 1982 were seen again in February 1984, while the 1983 rates for all children were very close to the March 1984 rates. These similarities help establish the reliability of the data: expected trends in high vulnerability for weanlings are apparent, while other age groups show more stability across years. Thus, March 1982 was a time of high diarrhea rates in all age groups, but the rates were not unreasonably high. Children two and older showed less diarrhea one year later, and by April 1983 the youngest group's rates declined as well. In February 1984, all children two and under showed dry season rates which dropped only slightly for infants by April 1984. In May 1983, for the control villages, rates for children three and older were similar to April in the sample, rates for infants were up, and rates for two year olds were very high at 27.6 percent. Since all the measures were reasonable, we can assume that there were no effects of repeated measurement for the sample. It also shows the rates climbing just before the rains, which is consistent with MRC findings. In another dry season comparison, November 1983 rates were similar to October 1984, except for the three year olds. Among this group, the rates went up to match the other groups, namely, around 19 percent.

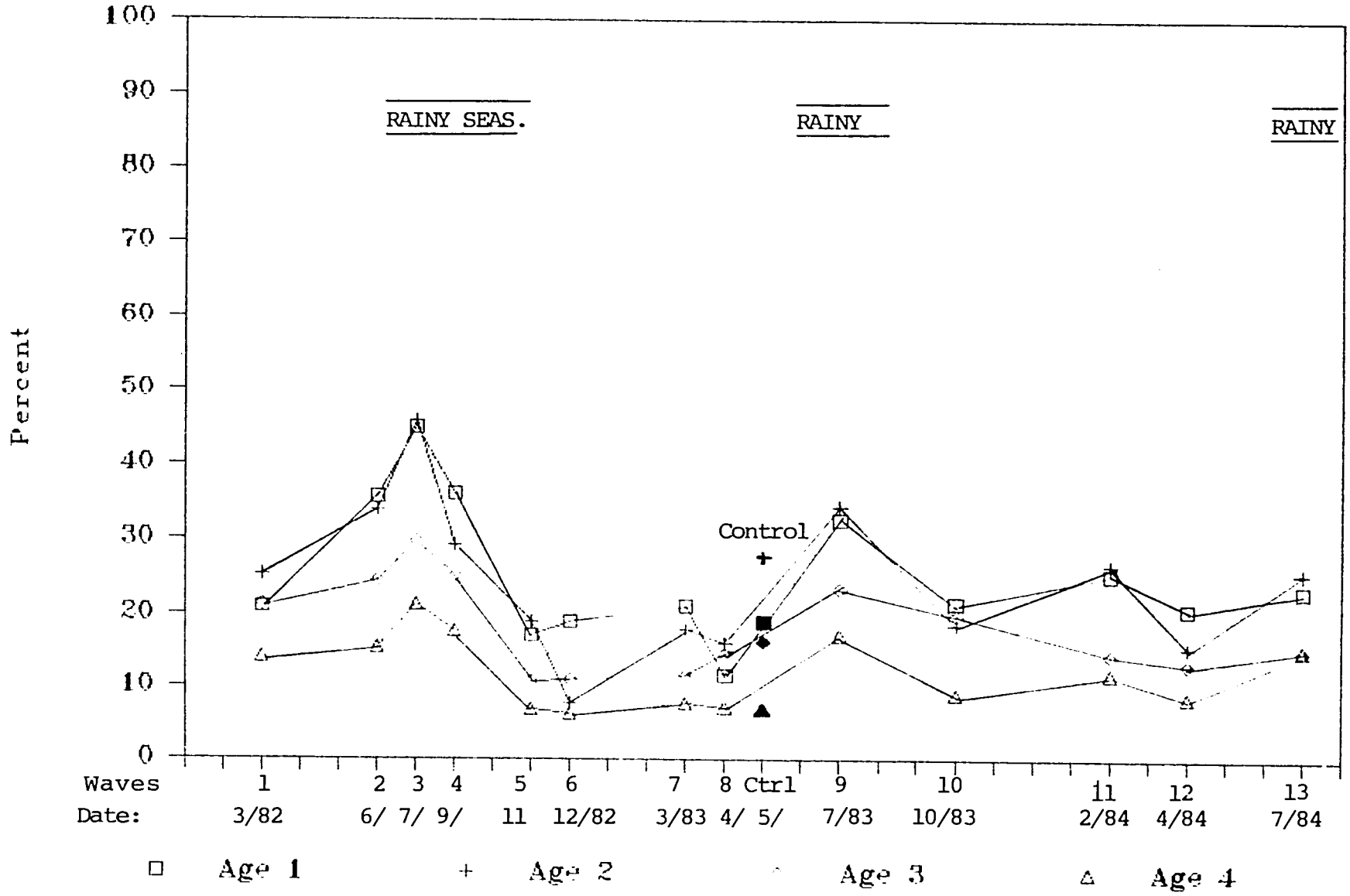
Together, these data suggest that children age two can

Table IV-9 Percent of children in age group (collapsed) who had diarrhea within the last two weeks

Age (years)	W1 3/82	W2 6/82	W3 7&8/82	W4 9/82	W5 11/82	W6 12/82	W7 3/83	W8 4/83	Cont. 5/83	W9 7/83	W10 10/83	W11 2/84	W12 4/84	W13 7/84
1	20.9	35.5	45.0	36.0	17.1	19.0	21.0	11.5	18.8	32.7	21.5	25.2	20.7	23.1
2	25.2	33.9	45.7	29.3	19.0	7.7	17.9	16.0	27.6	34.4	18.4	26.6	15.2	25.4
3	21.2	24.4	29.8	25.1	10.7	10.8	11.4	14.4	16.2	23.4	19.7	14.2	12.9	14.8
4	14.4	15.3	21.2	17.6	6.8	6.3	7.7	7.0	6.8	17.1	8.9	11.8	8.5	15.0
Total	19.6	26.5	33.7	25.5	12.4	10.2	12.7	11.0	15.6	24.0	15.0	16.9	12.4	17.9
N	987	860	923	914	874	985	959	938	173	859	865	921	832	822

Note: MORB

Figure IV-7 Percent of children in age group (collapsed) who had diarrhea within the last two weeks



experience high rates of dry season diarrhea, but in slightly fewer months than children one year old and younger. In consecutive months, rates for one year olds stayed high more often, while rates for two year olds declined. In peak months of dry season diarrhea, three year olds were as likely as younger children to be ill, but children four and older rarely showed high rates in the dry season.

During the rains in the summer, diarrhea rates increased for all children, but the increase was greater for children two and under. MRC data puts the peak of prevalence in August; our July-August 1982 measure, of 45 percent for young children and between 20 and 30 percent for older children, were the highest rates we recorded. During the light rains in 1983, our one rainy season measurement period in July shows rates similar to rates at the beginning of the rains in 1982. Unfortunately, we don't have data from August 1983, to see how the light rains affected what should have been the worst month for diarrhea. The one rainy season measure in 1984 at the end of the evaluation, was collected between early June and mid-July, and shows high rates for children two and under, but not as high as the previous two years.

(2) Characteristics of cases by age

We have seen how prevalence varies by age - - weaning-age children show higher rates than children aged three and older. However, there are fewer age differences in the characteristics of those episodes. Table IV-10 presents how many cases per season and age group showed signs of dry eyes, less urine, bloody stools, or mucus in their stools. Rainy season data is pooled across years, because there were not enough measurement periods during the short 1983 rains or at the end of the evaluation in 1984. Dry season data is shown pooled across years and also for 1982-83 alone and 1983-84 alone, since there were four and three measurement waves, respectively, during those dry season.

Table IV-10 Percent of cases of diarrhea which show presence of bacteria and dehydration, by age group (collapsed) and season

Variable	Age	Rainy Seasons %	Rainy Seasons N	Dry Seasons %	Dry Seasons N	'82-83 Dry Season %	'82-83 Dry Season N	'83-84 Dry Season %	'83-84 Dry Season N
Dry eyes on day of interview (observed by fieldworker)	1	13.8	80	21.5	65	33.3	27	8.7	23
	2	17.7	68	30.0	60	39.1	23	22.2	18
	3	21.5	56	48.0	25	50.0	6	58.4	12
	4	14.6	41	27.3	33	35.7	14	36.4	11
Percent cases with less urine on day of interview (mother assessed)	1	7.5	80	20.0	65	22.2	27	17.3	23
	2	8.8	68	21.7	60	26.1	23	22.2	18
	3	10.7	56	20.0	25	33.3	6	8.3	12
	4	7.3	41	21.2	33	28.5	14	18.2	11
Percent of cases with bloody stools in last two weeks	1	6.0	319	6.6	273	3.9	128	4.2	95
	2	9.3	289	13.8	231	3.6	110	14.5	69
	3	6.3	221	8.2	208	5.7	87	5.1	79
	4	6.6	286	10.0	261	2.2	92	7.6	119
Percent of cases with mucus in stool in last two weeks	1	36.1	319	33.1	272	15.6	128	54.7	95
	2	24.6	289	31.6	231	7.3	110	66.7	69
	3	32.1	221	32.2	208	11.0	82	53.2	79
	4	30.1	289	39.5	261	16.3	92	54.6	119

The two indicators of dehydration, measured only for cases with diarrhea on the day of the interview, showed higher dry season than rainy season rates. Between 13 and 21 percent of the cases had dry eyes during the rains, compared with 21 to 48 percent during the dry season. Mothers' assessment of cases with less urine rose from around eight percent during the rains to 20 percent of cases in the dry season. Age differences in cases with dry eyes are plotted in Figure IV-8. There is little interaction between dry eyes and age during the rainy season, with children two and three years old showing only slightly higher rates than older and younger children. During both dry seasons, three year olds with diarrhea showed more of this dehydration sign, although fewer children three years had diarrhea on the day of interview. Children three and older showed similar dry eyes rates in the two years under study, with slightly higher rates in the 1983-84 drought. However, this graph also shows that younger children experienced dry eyes less frequently when they had diarrhea in 1983-84, despite drought conditions. For young children, dry season 1983-84 percentages of cases with dry eyes were close to rates during the rainy season. Mothers' assessments of whether their child urinated less were lower during the second dry season, but were much less for older children (Figure IV-9). Rainy season rates of less urine were consistently low across ages.

Thus, mothers' reports regarding less urine for sick children conflicts slightly with fieldworkers' observations of dry eyes. In the former, all sick children fared better with respect to dehydration in the second year, more noticeably children three years and older. But the data on dry eyes indicate that the older children were actually slightly worse off, and only children two years old and under fared better in 1983-84. Given these conflicts, it would be impossible to attribute differences in dry season dehydration rates to the introduction of WSS by the campaign. However, both indicators suggest that younger children may be more susceptible to dehydration, once ill. The chance of showing a sign of dehydration was

Figure IV-8 Percent of diarrhea cases on day of interview where field-worker observed dry eyes, by age and season

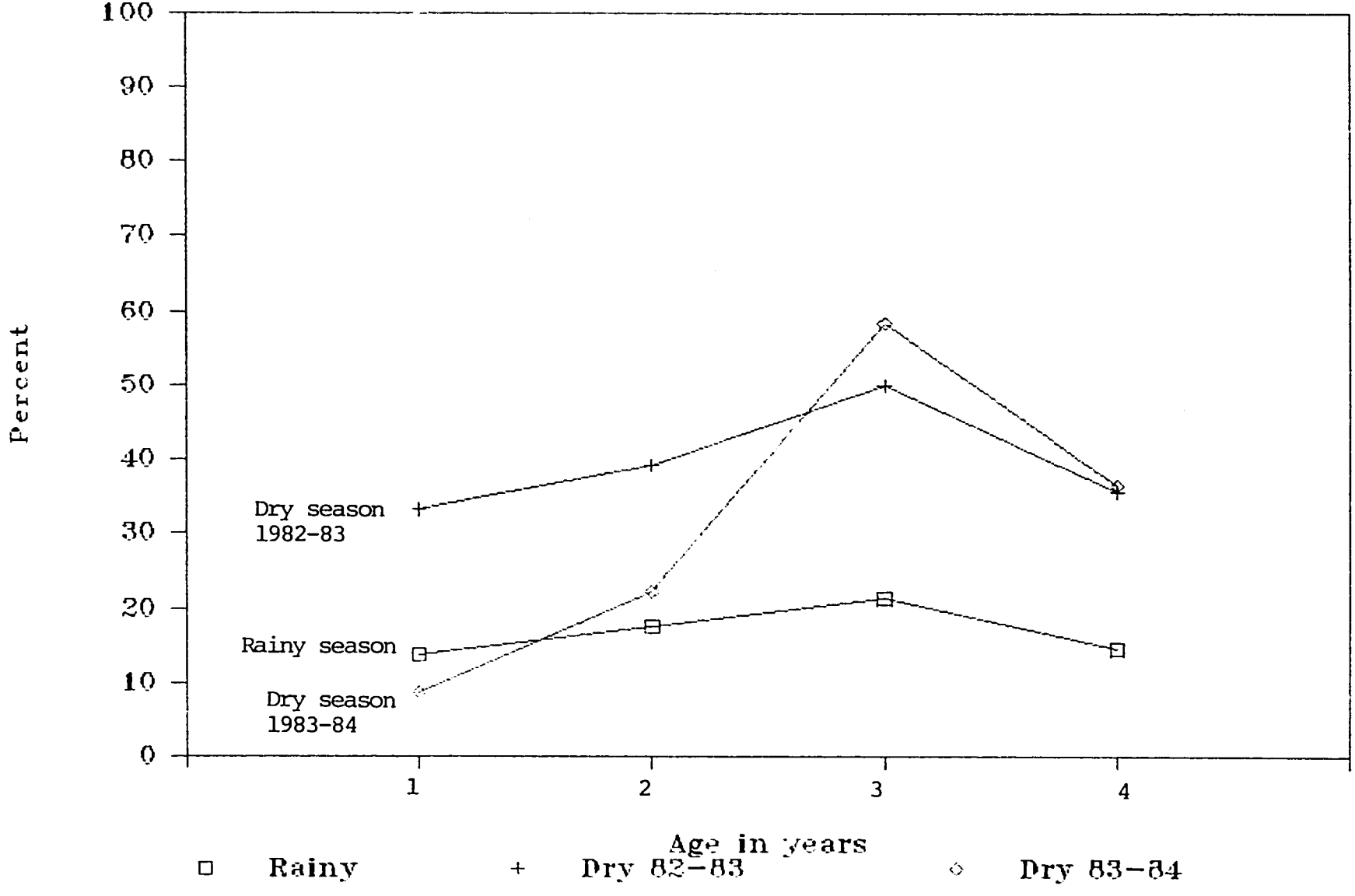
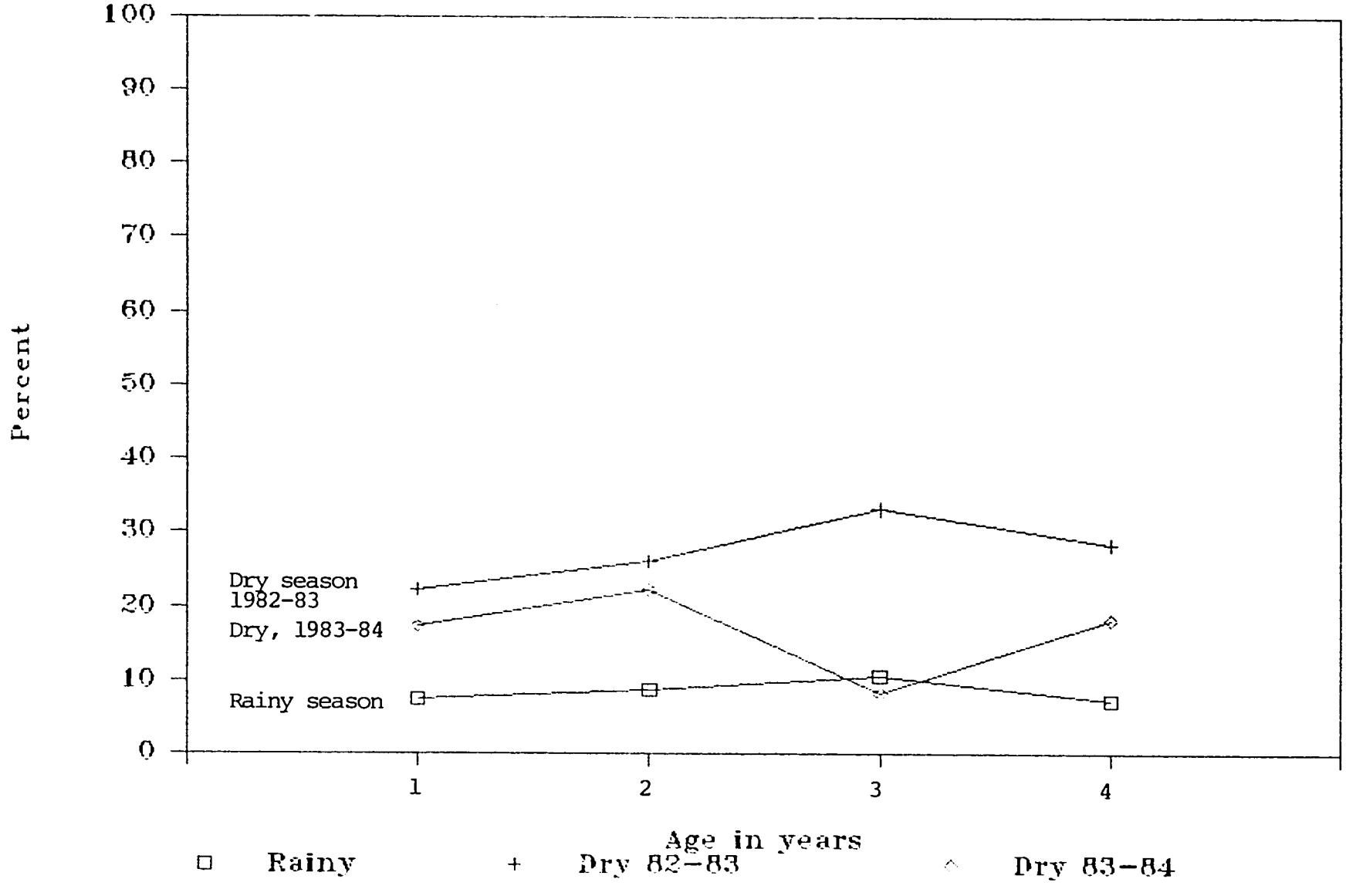


Figure IV-9 Percent of diarrhea cases on day of interview where mother reports that child urinated less, by age and season



the same for all ages during the rains, and perhaps higher for older children than younger ones during the dry season.

The number of cases with blood in stools, according to mothers' reports, was low, ranging from six to nine percent during the rains to six to 14 percent during the dry seasons (see Table IV-10). Dry season rates in 1982-83 were low (2-6%) for all children. In 1983-84, though, rates were higher for two year olds: from 3.6 percent in 1982-83 to 14.5 percent in 1983-84. The rate for children four years old and up also was higher in the second year.

The other indicator of bacterial diarrhea, mucus in stools, showed only slight variation by age but more differences between years. As Figure IV-10 shows, rainy season rates of mucus were higher than rates in the 1982-83 dry season, as expected by MRC reports. For both periods, rates for two year olds were slightly less than the other age groups. But dry season 1983-84 rates were abnormally high, ranging from 54 to 67 percent, with two year olds showing the highest rates. Figure IV-11 and Table IV-11 depict the same information broken down by wave. They show lowest rainy season rates in 1982 for children four and older. In October 1983, mucus levels were high for all except the oldest children, but by the April 1984 peak, all ages were high. There was also some variation by age in July 1983, when the youngest children experienced much higher levels of mucus in their stools than the other three age groups. Levels of blood in stools, given in Table IV-11, were very low while mucus levels were abnormally high in April 1984 for all ages. The high dry season mucus levels might be an indication of widespread infections caused by decreased nutrition levels and worsening water quality during the drought.

(3) Summary

Weaning age children were more vulnerable to diarrhea episodes than both older and younger children. The prevalence

Figure IV-10 Percent of diarrhea cases in two weeks prior to interview with mucus in stools, by age and season

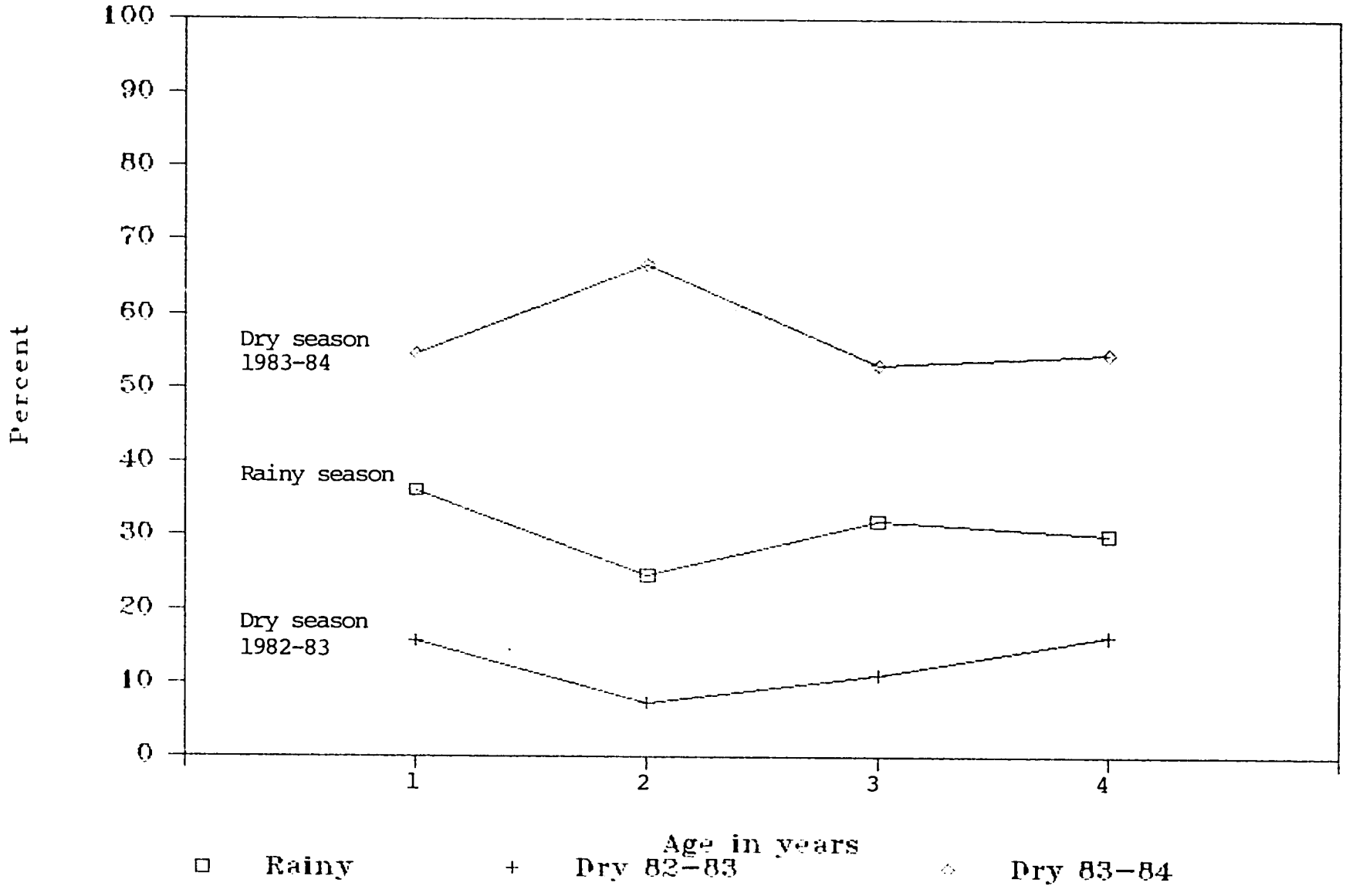
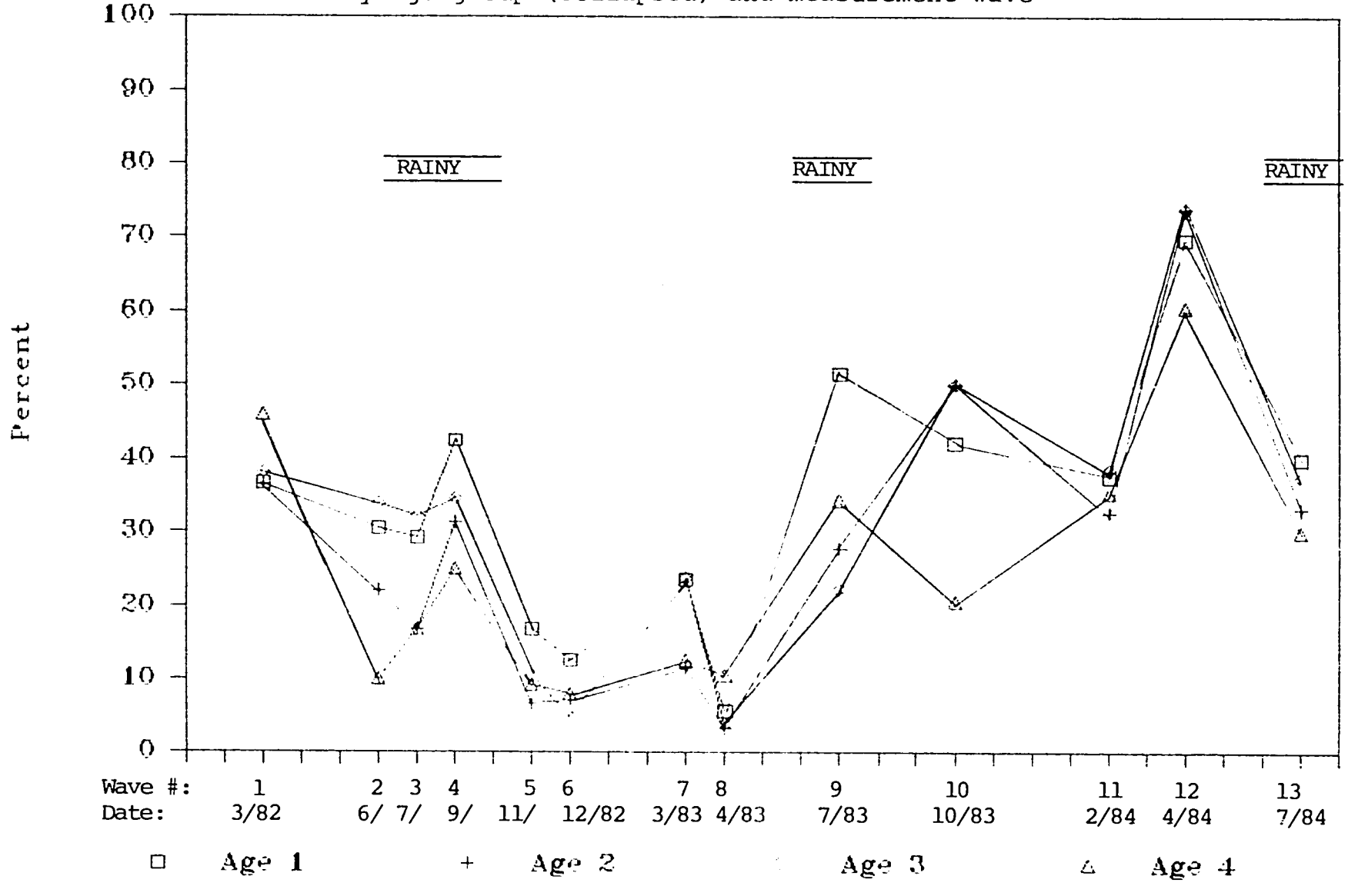


Figure IV-11 Percent of cases in the last two weeks showing mucus in stools, by age group (collapsed) and measurement wave



MORB

Table IV-11 Diarrhea severity indicators for cases in last two weeks by age groups (collapsed)

Percent of cases with:	Age	W1 3/82	W2 6/82	W3 7&8/82	W4 9/82	W5 11/82	W6 12/82	W7 3/83	W8 4/83	W9 7/83 RAINY	W10 10/83	W11 2/84	W12 4/84	W13 7/84 RAINY
			|RAINY SEASON|										
Bloody stools	1	18.4	7.3	11.1	1.4	5.6	2.5	5.9	0.0	2.9	5.9	6.3	0.0	0.0
	2	34.6	15.3	13.1	6.3	3.2	7.1	2.9	3.3	4.6	17.9	10.9	0.0	3.0
	3	19.0	10.6	11.3	3.8	15.8	4.8	4.8	0.0	0.0	6.7	7.7	0.0	0.0
	4	30.0	12.5	10.6	6.7	0.0	0.0	0.0	6.9	4.3	8.8	7.8	6.1	0.0
Mucus in stools	1	36.7	30.5	29.3	42.5	16.7	12.5	23.5	5.6	51.4	42.1	37.5	69.6	40.0
	2	36.5	22.0	16.7	31.3	6.5	7.1	11.4	3.3	27.7	50.0	32.6	73.9	33.3
	3	38.1	34.0	32.3	34.6	10.5	4.8	23.8	3.8	22.2	50.0	38.5	73.9	37.5
	4	46.0	10.0	16.7	25.0	9.1	8.0	12.5	10.5	34.3	20.6	35.3	60.6	30.0

MORB:HADBQ2,MUCUSGQ

rates for children six months old were the highest, at 39 percent during the rainy seasons and 22 percent during the dry seasons. During the drought, dry season diarrhea rates were higher, especially among weaning-age children, than for the previous year. Infants four months old and under experienced less diarrhea during 1983-84 than during 1982-83, perhaps due to women delaying the onset of weaning slightly during the drought. Dry season peaks occurred for all weaning-age children, not just those between one and one and a half years as MRC data suggests, and the peaks were spread out over the dry season.

On the other hand, measures of severity show fewer clean-cut patterns by age, indicating that once children are ill, the characteristics of their bouts are similar no matter their age. Levels of mucus and blood in childrens' stools varied by season, rather than by age. Two indicators of dehydration, dry eyes and less than normal amounts of urine, differed in their relationship to age and year, making it impossible to attribute any changes to the campaign.

C. Child Mortality and Mother's Pregnancy History

(1) Community mortality

Past research has shown that oral rehydration is an effective treatment in reducing mortality due to dehydrating diarrheas, but only of limited use in the treatment of chronic or dysenteric diarrheas (Feacham, 1983). As we saw in Section A of this chapter, most of the diarrhea in The Gambia occurs during the rainy season, and seems to be caused by bacteria. MRC research describes this rainy season diarrhea as chronic, caused by water-borne vectors, and <u>not</u> leading to severe dehydration. Thus, we can only expect limited reduction in diarrhea-related mortality rates during the rainy season due to campaign interventions. Dry-season diarrhea is different, however, for it <u>is</u> of

the dehydrating variety, such that one could expect an impact on mortality rates through the use of ORT. However, this type of diarrhea is less common in The Gambia as Section A has shown.

Still, the evaluation team attempted to measure changes in mortality by monitoring all child deaths in our 20 sample villages during the two years of study. On four separate occasions, fieldworkers attempted to collect community-wide mortality data for the prior six months by interviewing sample mothers, village officials, traditional birth attendants, and village health workers. Upon discovering a death, a follow-up interview was done with the mother of the deceased, to record cause and date of death, age, and treatments sought for the child before death.

Unfortunately, we found that Gambian mothers were unwilling to discuss their children's deaths with outside researchers, even though our fieldworkers were Gambian women who were currently living in one of the sample villages. Our figures under-identified child deaths in these communities by an estimated factor of four. According to Gambian officials of the Primary Health Care system, even Village Health Workers, who are from the village they work in, can identify only one-third of child deaths. We thought we might get better data from the four villages where our Gambian fieldworkers resided, but our experience was as unsuccessful as that of the Village Health Workers. In addition, mothers' attributions of cause of death were unreliable. Many mothers in our surveys identified spiritual agents such as God, Satan or witches as the cause of death; for those children, we cannot tell whether diarrhea was in evidence or not before the child died. Thus, we learned that we could not rely on mothers' recall to adequately record child deaths community-wide in sample villages over two years. To get a better record, we would have needed other data collection techniques and a much larger sample. Because our figures are too unreliable, they will not be presented.

Using MRC estimates of child mortality in The Gambia, we would have needed to closely monitor about 20,000 children under

five years old to find 100 deaths attributable to dehydrating diarrhea. The figures estimating this are as follows: of each 1000 children under five, 250 will die before their fifth birthday, or 50 will die each year. Of these 50, 20 will die from diarrheal diseases; and of these 20, 15 will die from chronic rainy season diarrhea-malnutrition-infection and five will die from acute dehydrating diarrhea. So, to identify and diagnose five dehydrating diarrhea deaths, a sample of 1000 is needed. To find 100 dehydration deaths, we would have needed enough resources to monitor 20,000 children under five.

Thus, by monitoring child deaths in The Gambia in 20 sample villages, it was not possible to look for an impact on child mortality attributable to the campaign. We did not have adequate resources to increase the sample size to the point where we might have found enough deaths due to diarrhea of any type. In addition, because deaths from dehydrating diarrhea represent a small proportion of diarrheal deaths in The Gambia, it would have been even more costly to detect campaign effects on mortality from dehydrating diarrhea. Furthermore, Gambian women are reluctant to discuss child deaths, leading to gross under-estimates of community-wide child mortality rates and unreliable data on causes of death when one relies on mothers' reports.

(2) Pregnancy history

In another instrument, the pregnancy history questionnaire, we collected enough information to give an estimate of the infant mortality rate and pregnancy outcomes in rural Gambia. Because this information was collected only once, we cannot use it to look for campaign effects on infant mortality. However, it provides a useful description of the high number of pregnancies Gambian women experience and the high death rate of their children.

In August and September 1982, the evaluation team conducted interviews with women in the sample to learn the outcomes of each

of their pregnancies. Specifically, the question asked whether the pregnancy had ended in a miscarriage, a stillbirth, a child who was born alive but had since died, or whether the child was born alive and was still alive.

In this sample of 834 women, there were 3681 reported pregnancies, an average of 4.7 per woman (see Table IV-12). Only 53 women, or 6.4 percent of the sample, had never been pregnant. Seventy percent of the remembered pregnancies ended in the birth of a child who was still living, while 6.2 percent of the pregnancies did not result in a live birth. There were 875 children (23.8%) who had been born alive, but had since died.

Table IV-13 and Figure IV-12 show the causes of death mentioned by the mother. The most frequently mentioned causes were fever, kris, or jarala, in the mother's terminology. The actual medical diagnoses for these diseases are probably malaria, cerebral malaria, or meningitis. Diarrhea, with 23.2 percent, ranked as the second most common cause of death among children. Traditional causes, such as Satan, God or witches accounted for another 14 percent of the responses by the mothers.

Thus, three-quarters of the children born alive were still alive. Among women who had begun childbearing, they had an average of 4.7 pregnancies and 4.5 children born alive. Women attributed nearly one quarter of their children's deaths to diarrhea, so we may conclude that they recognize the danger of diarrheal diseases.

These birth and death rates reflect a bias in the age distribution of sample women, and therefore cannot be taken as true estimates of parity or mortality. Younger women will have lower pregnancy rates, and their infants would not have been exposed to pathogens for as long as older children. In addition, these data suffer from recall problems such as those discussed in the previous section, and probably reflect an under-reporting of child deaths. However, we have higher confidence in sample women's abilities to recall pregnancies and willingness to discuss them than in non-sample women's willingness to discuss their children's deaths directly. Since child-bearing is a very

Table IV-12 Pregnancy outcomes among women in the sample

Outcome		Percentage of Pregnancies
Child still alive		70.0%
Child born alive, but now is dead		23.8
Child born dead		4.2
Miscarriage		2.0
Total number of pregnancies	3681	
Total number of women	834	
Number of women with at least one pregnancy	771	

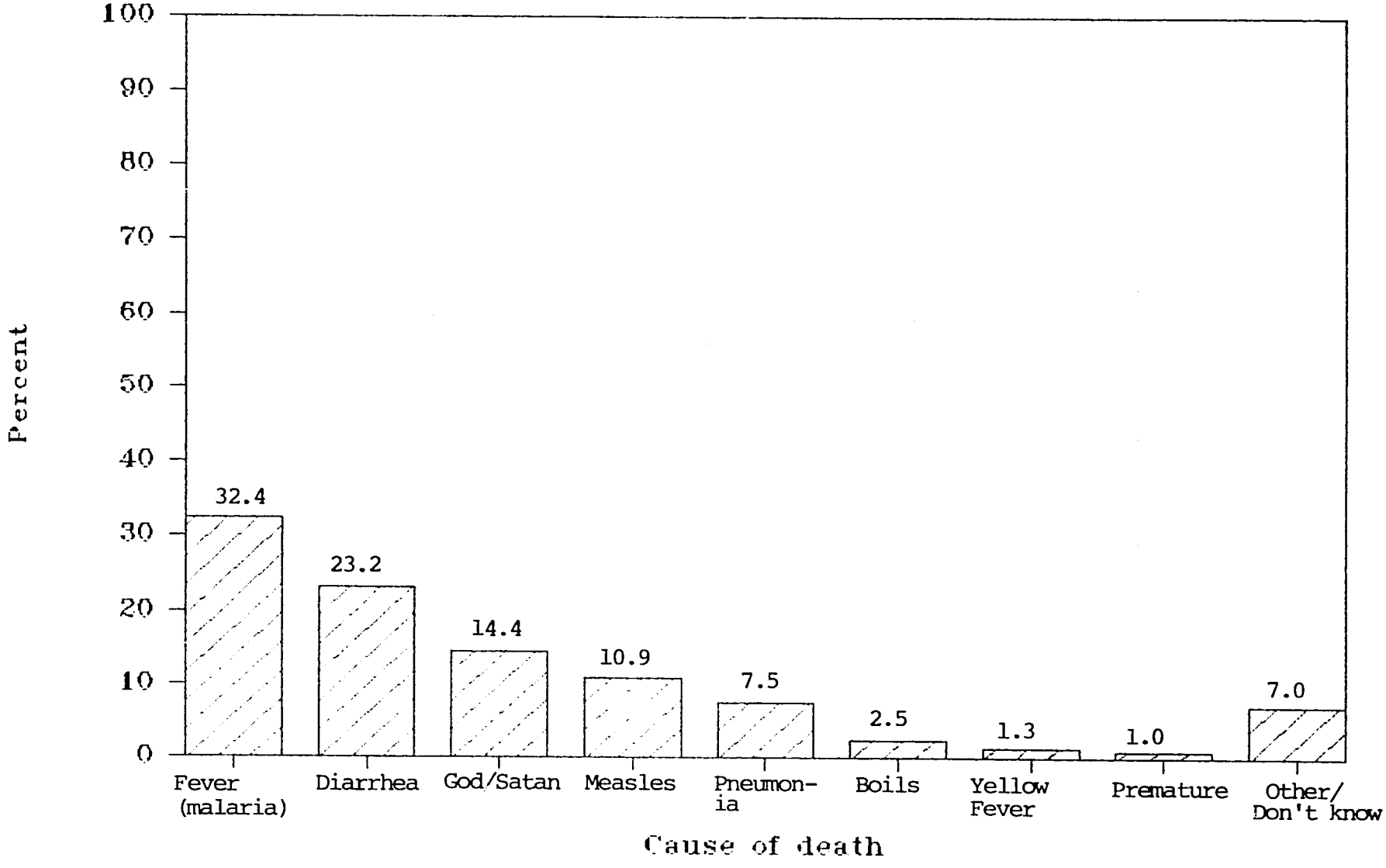
GPREG:Aug/Sept 1982

Table IV-13 Cause of death of children who had been born alive by women in sample

Cause	Percentage
Fever/kris/jarala (malaria)	32.4%
Diarrhea	23.2
God/Satan/witches	14.4
Measles	10.9
Pneumonia	7.5
Boils	2.5
Yellow fever	1.3
Premature	1.0
Other/don't know	7.0

GPREG:Aug/Sept 1982
N=875

Figure IV-12 Cause of death of children who had been born alive to women in sample



n=875
GPREG,8&9/82

important event in a young woman's life, pregnancy recall by young women should be high. Among older women, however, early pregnancies, particularly unsuccessful ones, may be readily forgotten. Our data, then, is probably more reliable for younger women, and under-estimates overall rates. Therefore, to compute infant mortality rates, we chose a procedure which takes the mother's age into account.

(3) Estimating infant mortality from pregnancy histories

Table IV-14 shows the number of children surviving for women in different age ranges. It includes all women who knew their age, at least roughly, and had had at least one child as recorded in the pregnancy history questionnaire (the few women over 49 were excluded because there were not enough in each age category).

Applying a technique developed by Griffith Feeney (1976) we have computed child mortality rates by mother's age. His method allows for changing mortality rates over time, using pregnancy history information. The model assumes (1) a declining mortality rate over time, (2) no differential mortality by the age of the mother, and (3) a known lifetable. The model and necessary tables are in Appendix E.

Table IV-15 shows the results of each step of computations. The mean number of children born to women age 15-19 is 1.5, indicating that women begin motherhood relatively young. In the oldest category shown, women aged 45 to 49, the mean number of children born is 6.3, which is probably an underestimate. The proportion of deceased children for each group is computed by subtracting the number of children surviving from the number born, and dividing by the number born. We obtained estimates between 0.239 and 0.371. The mean age of the mother at childbirth is computed from the differences between the mean number of children born in two adjacent categories. The difference between the first two groups is 0.517. This value corresponds to +2 in

Table IV- 14 Child survivorship by age of mother

Age group	No. of women	Number of children Born	Surviving
15-19	92	140	88
20-24	128	377	279
25-29	217	871	663
30-34	134	693	503
35-39	92	516	357
40-44	68	360	258
45-49	18	114	73
	749	3071	2221

Note: Number surviving includes all children still alive at time of data collection, not just children surviving beyond a given age.
GPREG,GENUM.Aug/Sept 1982

Table IV- 15 Estimation of child mortality rates from child survivorship data by age of mother

Mother's age group	Mean Number of children born	Mean Age at child-bearing	Proportion of deceased children	Infant mortality rate	Years prior to census
15-19	1.522	22	.371	-	-
20-24	2.945	21	.260	158.9	4.8
25-29	4.014	-	.239	143.9	7.4
30-34	5.172	-	.274	156.3	10.2
35-39	5.609	-	.308	168.4	13.2
40-44	5.294	-	.283	138.2	16.7
45-49	6.333	-	.360	156.2	20.2
Population mean =		21.5		153.7	12.1

GPREG:Aug/Sept 1982, using Feeney (1976)

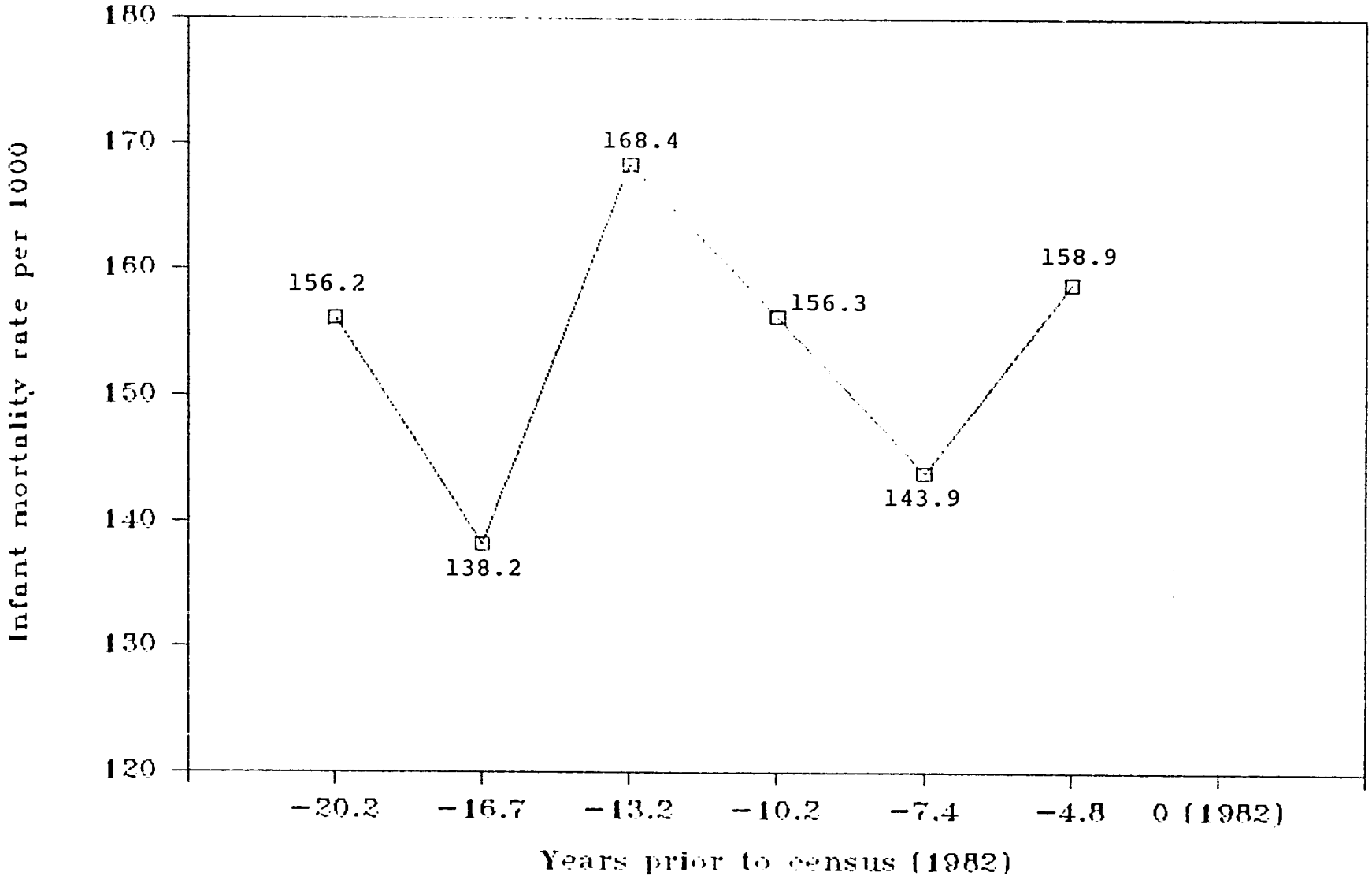
reference table number 1 in Appendix E, so we added 2 to the mean age of the groups, 20, and ended up with a mean childbearing age of 22. Applying the same technique to age groups 20 to 24 and 25 to 29 yields 25 minus 4, or 21. Further estimates fall out of range of the table, and are not needed. The overall mean, then, is 21.5 years at childbirth.

The infant mortality rate and number of years prior to census were computed from the formulas in Table 2 of Appendix E. The plotted estimates, shown in Figure IV-13, do not follow the assumption of a declining mortality rate. The lower rates prior to 1969 may be more a product of poor memories than lower mortality; so by ignoring the two earliest measures, a slight decline is observable between 1969 and 1974, but the rates went up again in 1977. The average rate was 153.7 deaths per 1000 children born for 12.1 years prior to 1982, or 1970. This figure is less than MRC estimates. The difference in infant mortality rates may be due to sample composition, our sample containing a wider range of villages and therefore presumably making our sample more accurate. Alternatively, to the extent that women under-report dead children, our estimates are less reliable. In any case, our estimates, ranging between 143 and 168 in recent years, confirm that infant mortality in rural Gambia is very high compared to other nations in the world. These figures are similar to infant mortality estimates in other poor sub-Saharan African nations (World Bank, 1982).

(4) Summary

In general, we found it was impossible to collect community mortality data from our sample villages with accuracy. Even if we had been successful, the rate of dehydrating diarrhea is too low in The Gambia for us to have been able to attribute any changes in mortality patterns to the campaign. However, by applying a technique using pregnancy history data, we were able to estimate the infant mortality rate between 1969 and 1982 as

Figure IV-13 Estimated infant mortality rates



Computed from GPREG,August/September 1982, using Feeney (1976)

ranging from 143 to 168 deaths per 1000 children born. Although these estimates might reflect an under-reporting of deaths, they still rank among the worst national estimates in Africa. The mean number of children born to older women was 6.3, and again, the true figure is probably larger. Thus, our conservative estimates still depict very high numbers of children born to rural Gambian women, and correspondingly high risk of infant mortality for those children. In 1982, mothers attributed nearly one-quarter of all child deaths to diarrhea, thus indicating that diarrheal deaths were recognizable and salient to sample mothers as the campaign got underway.

D. Anthropometric characteristics of children from The Gambia

The chief objective of this section is to assess the nature and magnitude of changes in anthropometric variables which may have occurred throughout the study period. A secondary objective is to describe the anthropometric characteristics of children from our study sites relative to those of well nourished children.

(1) Methods

Data are available for four surveys or waves. These surveys were carried out as follows:

Wave 1 June 1982	Early rainy season
Wave 2 October 1982	Beginning of dry season
Wave 3 October/November 1983	Beginning of dry season
Wave 4 July 1984	Early rainy season

Since season is generally recognized as an important determinant of infection and malnutrition, waves 1 and waves 4, because they were carried out during the early rainy season, form a logical pair. Similarly, waves 2 and 3 were carried out during the beginning of the dry season and are also a useful pair to

contrast.

As is well known, mothers in The Gambia are not generally concerned with remembering the ages of their children. As a result, we were only able to obtain information on 80 to 90% of the children for whom we have anthropometric information.

The anthropometric variables selected for analyses include: length, weight, arm length, head circumference, arm length, triceps skinfold and subscapular skinfold. Each value was in most instances the average of two independent measurements. Length was measured to the nearest millimeter with a wooden board and weight was measured to within 0.1 kg using a portable beam balance scale. Arm length was measured with a tape from the tip of the acromion to the end of the third digit. Arm circumference was measured with a tape at the mid-point of the arm. Lange calipers were used to measure skinfold thicknesses to the nearest millimeter at the midpoint in the arm over the triceps muscle and at the back over the scapular bone. Standard measurement techniques were followed in all cases.

Subroutines available from the Centers for Disease Control (CDC) were used to generate standard deviations or z-scores for weight, height and weight for height.[1] These calculations use data from the National Center for Health Statistics (NCHS) as the reference values (Hamill et al, 1979). Arm muscle and fat area were calculated as given in Frisancho (1981) and these values were compared to the NCHS distribution.

Outliers were excluded from the analyses if the calculated age was negative (measurement data earlier than the stated birthdate) or greater than 72 months. Cases with z-scores greater than -6.0 and less than 4.0 were deleted. These limits excluded less than one percent of cases.

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[1] One centimeter was subtracted from all length values of Gambian children older than 24 months to correct for the fact that after this age the NCHS data are height, not length measurements. The dimensions are of course greater for "supine" length than for "standing" height due principally to compression of the vertebrae when standing. The systematic differences are usually found to hover around one centimeter.

Age groups were defined so as to bracket half or full year mid-points with the exception of the first age group which included 0 to 3 months. This age group had few cases and hence data for this group were omitted in all figures but were included in all tables. The age groups were identified in tables by their ranges and in the figures by their mid-points:

Ranges (months)	Mid-point (months)
3.00 - 8.99	6
9.00 - 14.99	12
15.00 - 20.99	18
21.00 - 26.99	24
27.00 - 32.99	30
33.00 - 38.99	36
39.00 - 44.99	42
45.00 - 50.99	48
51.00 - 56.99	54
57.00 - 72.00	60 (plotted as 60 months but may be higher)

The average age of the samples of children measured increased from the first to the fourth wave. Thus, the average age of the children measured in Wave 1 was 28.1 months (n = 835) while the average age was 31.1 months for Wave 2 (n = 885), 35.9 months for Wave 3 (n = 910) and 40.0 months for Wave 4 (n = 864). For these reasons, extreme caution should be exercised when comparing sample means. In order to correct for the "aging" factor, two simple strategies were followed, often in combination: a) stratification by age and b) standardization by age (e.g. use of z-score values which are age and sex specific).

Both figures and tables of the results are generally provided for each of the results discussed in the following sections. To improve readability, we have included only the figures with the text. All the tables have been put at the end of this section.

(2) Changes in indicators of stunting and wasting.

The two most informative anthropometric variables are height and weight which provide data about stunting (as indicated by height z-scores) and wasting (as indicated by weight for height z-scores). Stunting indicators measure the cumulative history of retardation and indicate only that problems existed in the past whereas wasting indicators measure the existence of problems at the time of measurement. Weight z-scores are a mixed indicator combining information about stunting and wasting.

Tables IV-16, IV-17, and IV-18 (at the end of this section) present mean z-scores respectively for height, weight and weight for height by categories of age, sex and wave. Figure IV-14 presents the data for boys for Waves 1 and 4, the surveys carried out during the early rainy season and a similar approach is followed in Figure IV-15 for girls. These graphs indicate that Gambian children are considerably shorter, about a standard deviation less, when compared to the reference values. Values appear to become increasingly negative during infancy with more or less a stable pattern from the second year onwards. The data for boys (Figure IV-14) suggest some improvement in height values in the first three years of life but this is not seen in the case of girls (Figure IV-15).

The data for weight for height z-scores are given in Figure IV-16 for both boys and girls. Values are higher for the first age group, 6 months, but basically similar thereafter. Overall, Gambian children are thinner than U.S. children, particularly in Wave 4. The significant findings of Figure IV-16 are the large and consistent differences between Waves 4 and 1, namely that boys and girls were markedly thinner in Wave 4 in all age groups.

Data on stunting and wasting are often presented in terms of binary classifications and the values most often used are greater or lower than 90% height for age for stunting (0 = 90% or more, 1 = 89.9 or less) and 80% weight for height (0 = 80% or more, 1 = 79.9 or less). Stunting is generally much more common than

Figure IV-14 Mean Height Z-Scores for Males in Waves 1 and 4

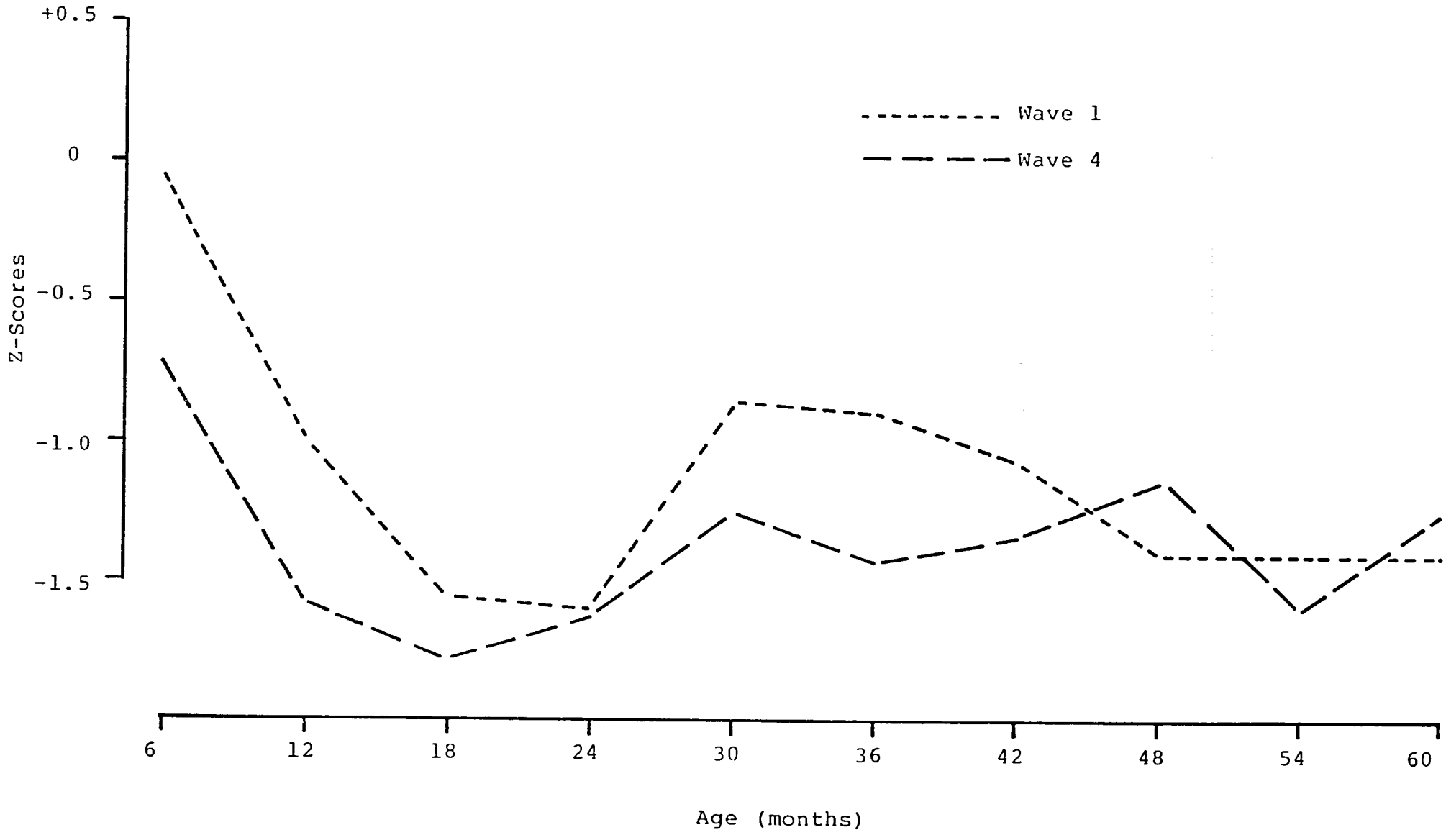


Figure IV-15 Mean Height Z-Scores for Females in Waves 1 and 4

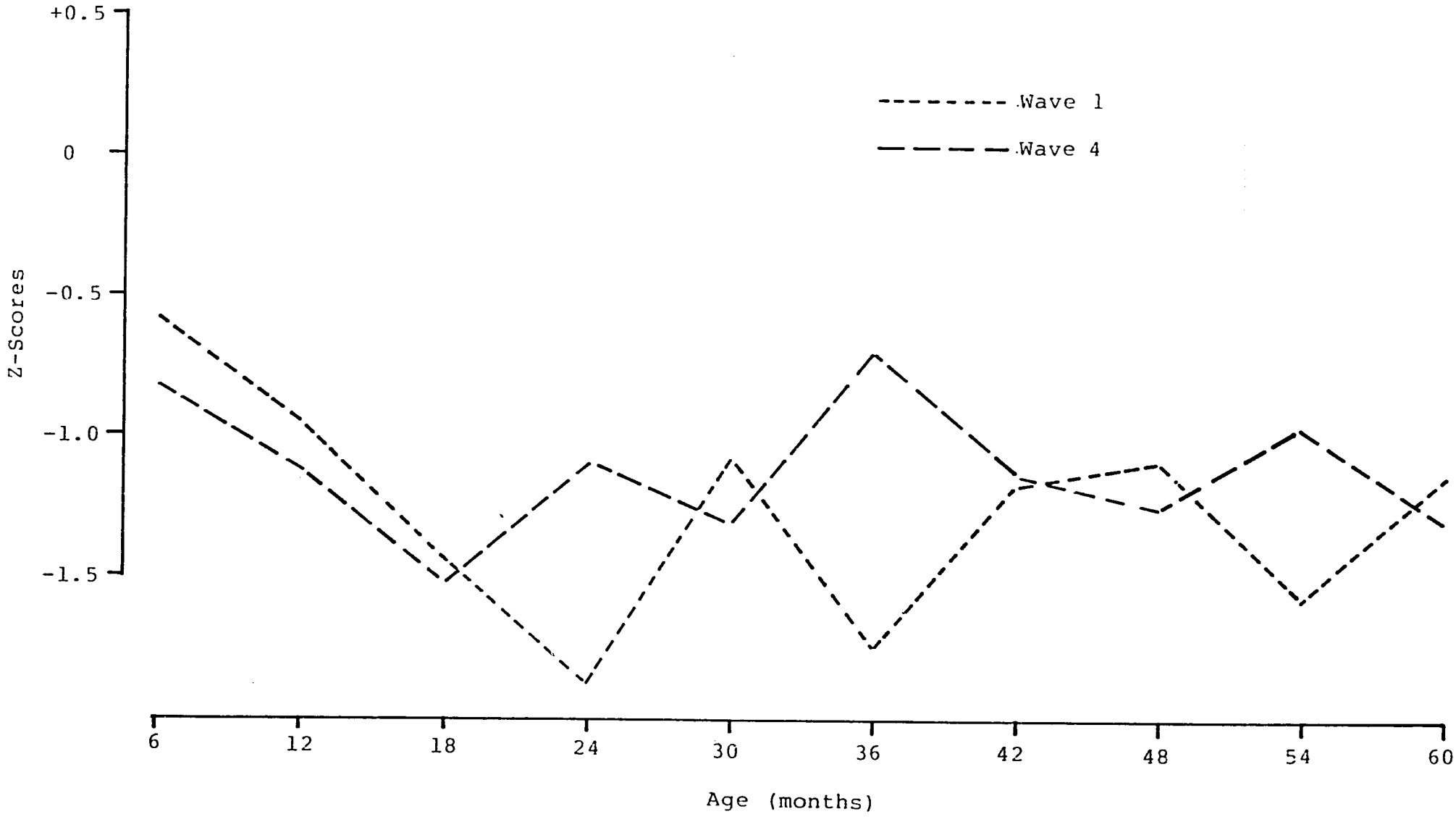
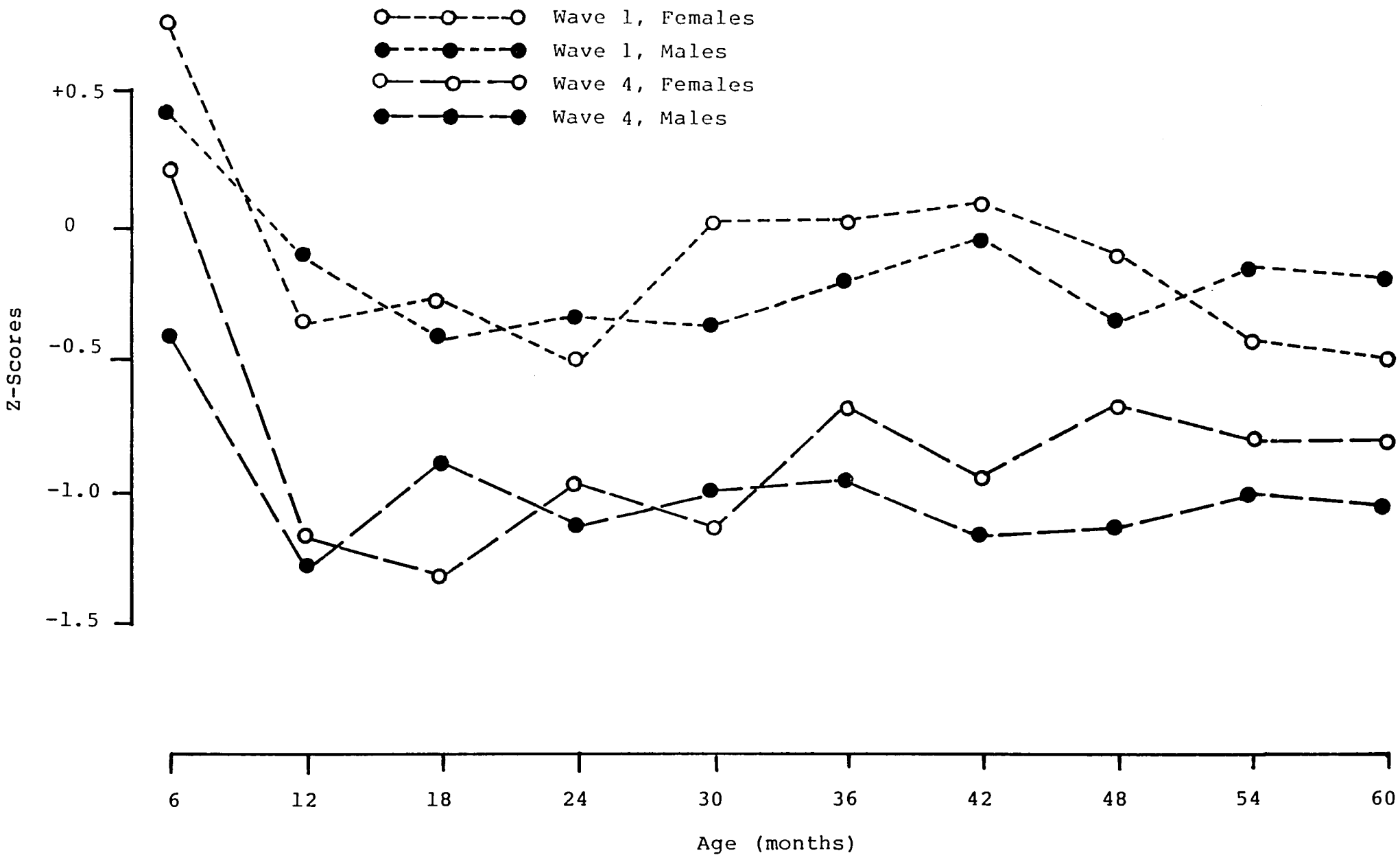


Figure IV-16 Mean Z-Scores for Weight for Height in Waves 1 and 4



wasting. Figure IV-17 presents the data for stunting by wave but separately for boys and girls. The ages have been pooled to reduce the number of groups and increase the sample sizes. The prevalence of stunting is around 16-18% and there are no striking differences associated with either sex or wave. Figure IV-18, on the other hand, indicates that a marked increase in the prevalence of wasting took place in the study population, from less than 4% in Wave 1 to 13-14% in Wave 4. These changes are, if true, indicative of an alarming, deteriorating nutritional situation in the population.

(3) Changes in other anthropometric variables.

The value of having a battery of anthropometric information is that one can seek corroboration from anthropometric variables which measure similar or related concepts. Tables IV-19 through IV-24 present the basic information.

Arm length is a measure of linear growth and as such is another indicator of stunting. Figures IV-19 and IV-20 and Table IV-22 show the data for arm length for boys and girls respectively. These data appear to suggest an improvement in linear growth in the first 3 or 4 age groups (first 2.0 to 2.5 years) and corroborate the trends seen for height for males. Head circumference is a measure also related to length, particularly during the first two years of life. The data for head circumference (Table IV-23) contradict those for height and arm length and suggest in fact that values declined from Wave 1 to Wave 4 as was noted earlier for weight for height.

The data for arm circumference and triceps and subscapular skinfolds are very useful for investigating whether a decrease in weight for height seems plausible and whether the drop was in terms of muscle, fat or both. The arm circumference data for all waves are shown in Table IV-19 and for Waves 1 and 4 in Figure IV-21 (males) and Figure IV-22 (female). Arm circumference is a

Figure IV-17 - Prevalence of Stunting by Wave and Sex

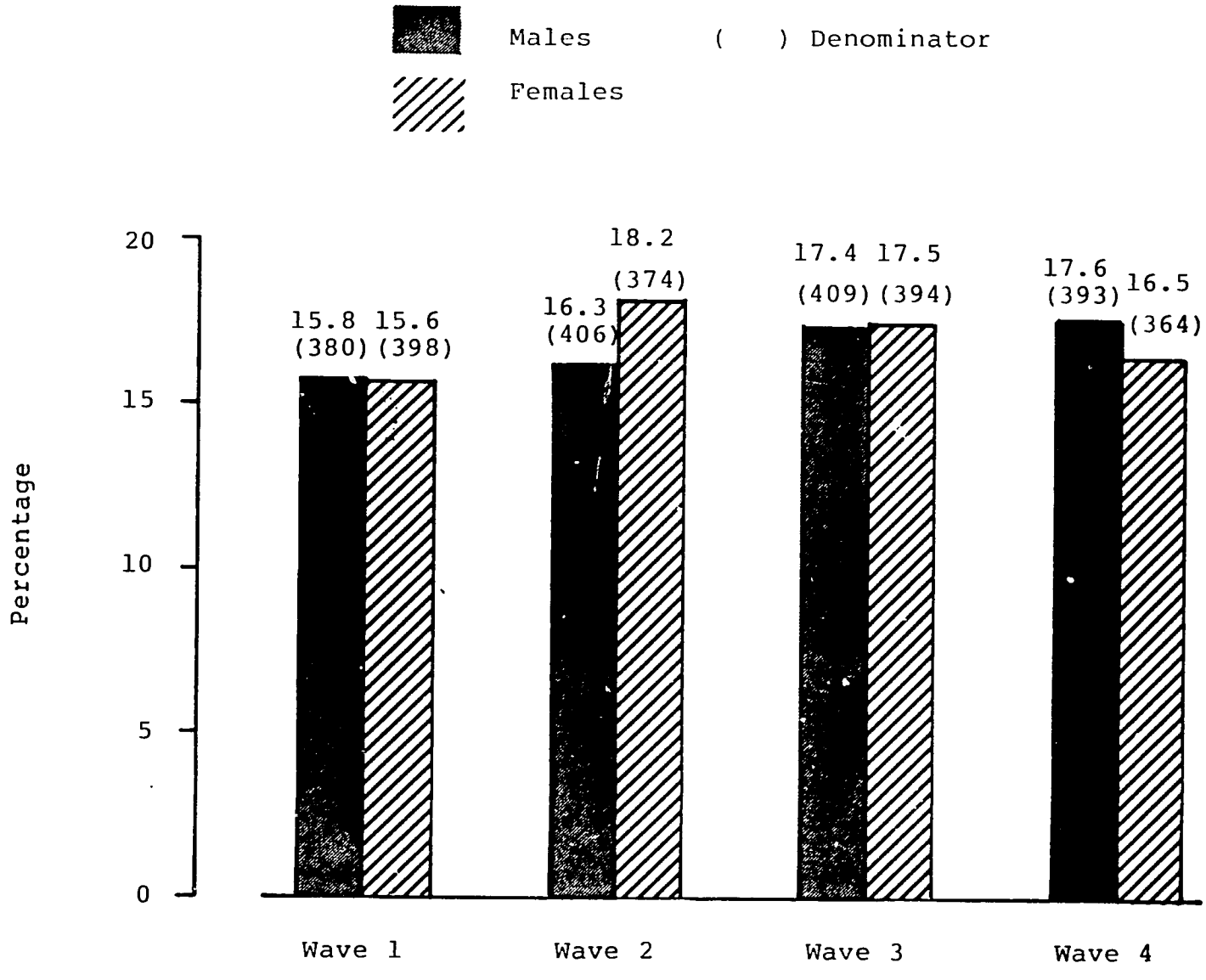


Figure IV-18 - Prevalence of Wasting by Wave and Sex

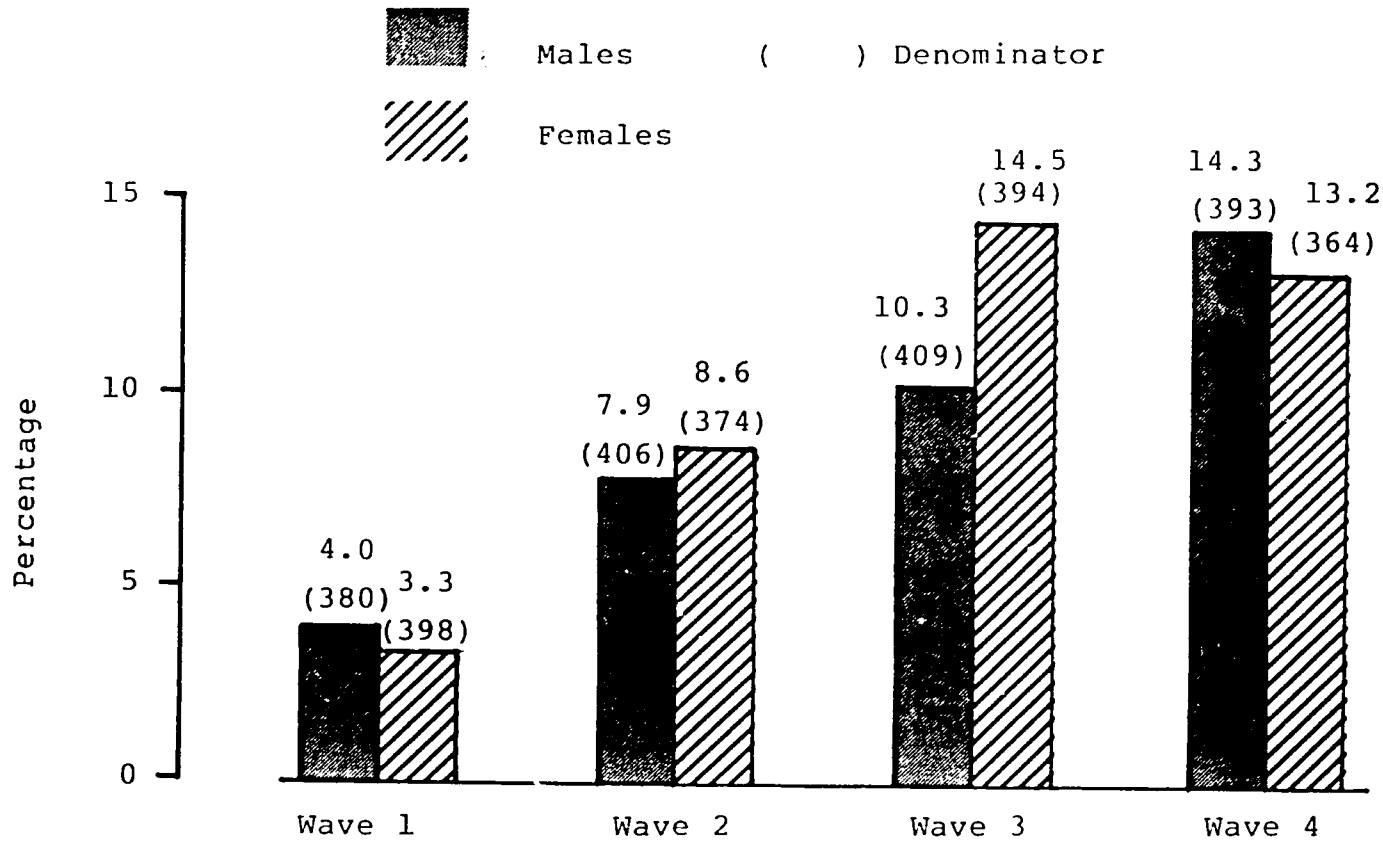


Figure IV-19 Mean Arm Length (cm) in Waves 1 and 4: Males

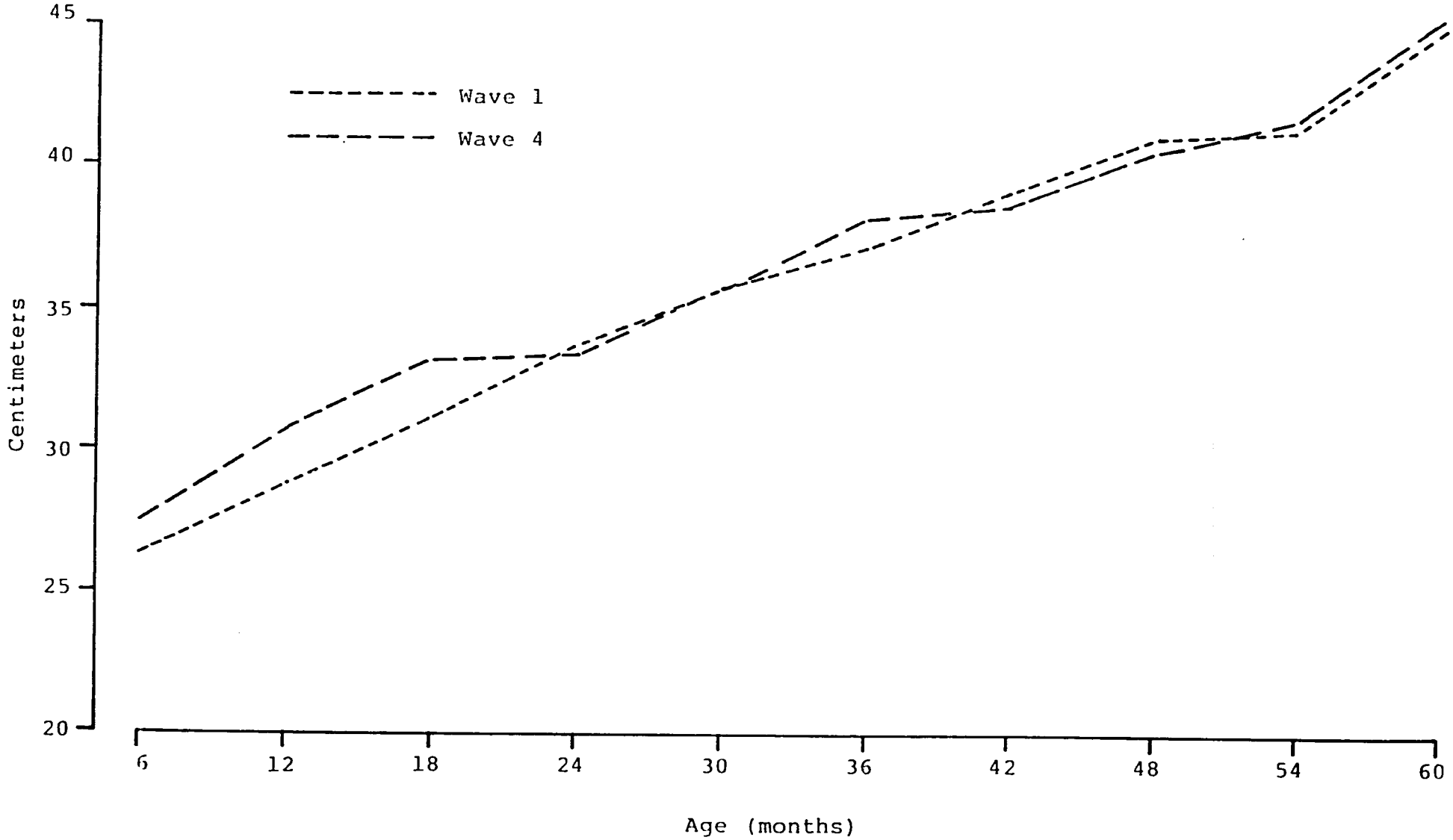


Figure IV-20 - Mean Arm Length (cm) in Waves 1 and 4: Females

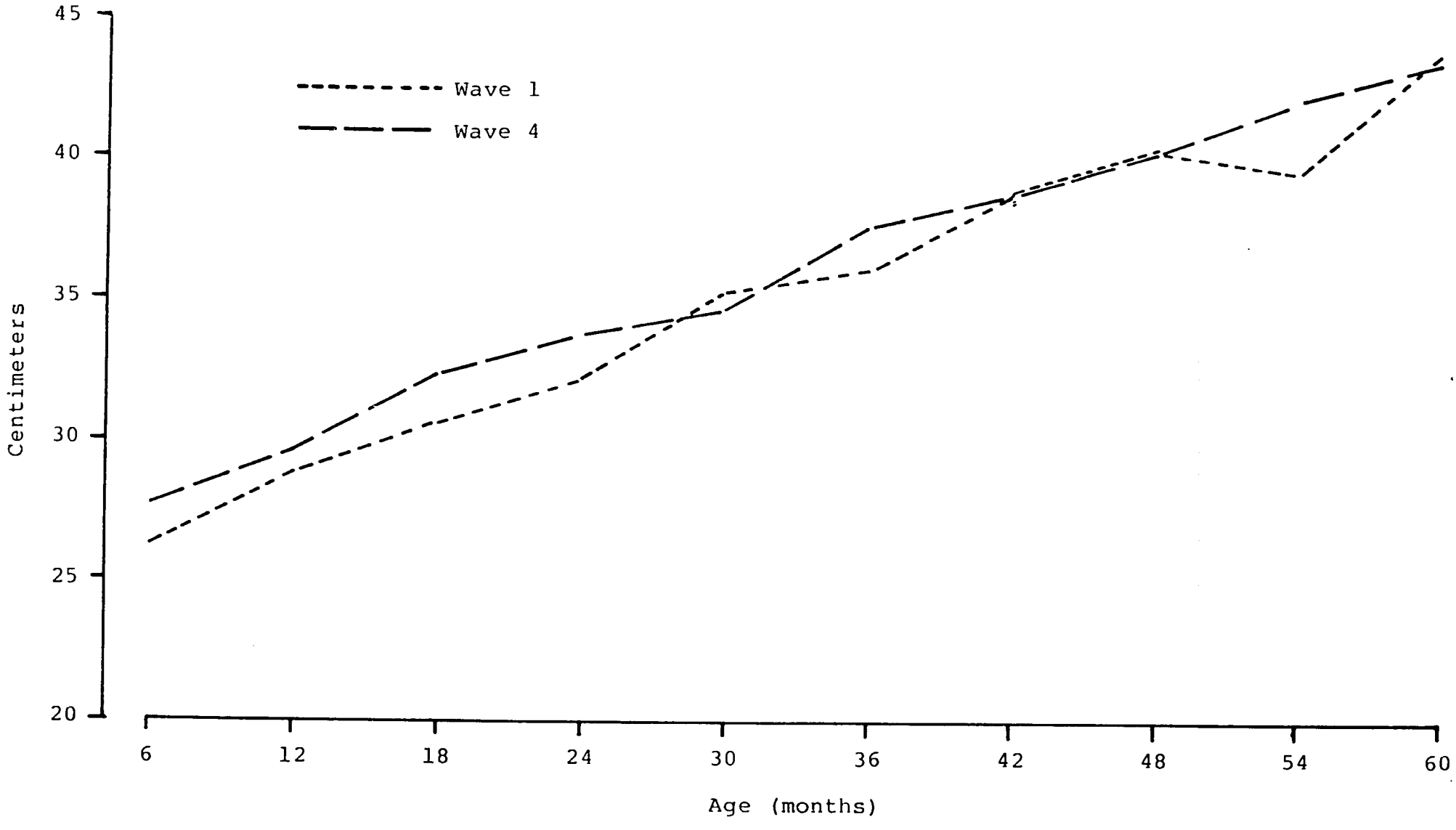


Figure IV-21- Boys' Arm Circumference Means for Waves 1 and 4.
NCHS 50th and 5th Percentiles Plotted for Reference

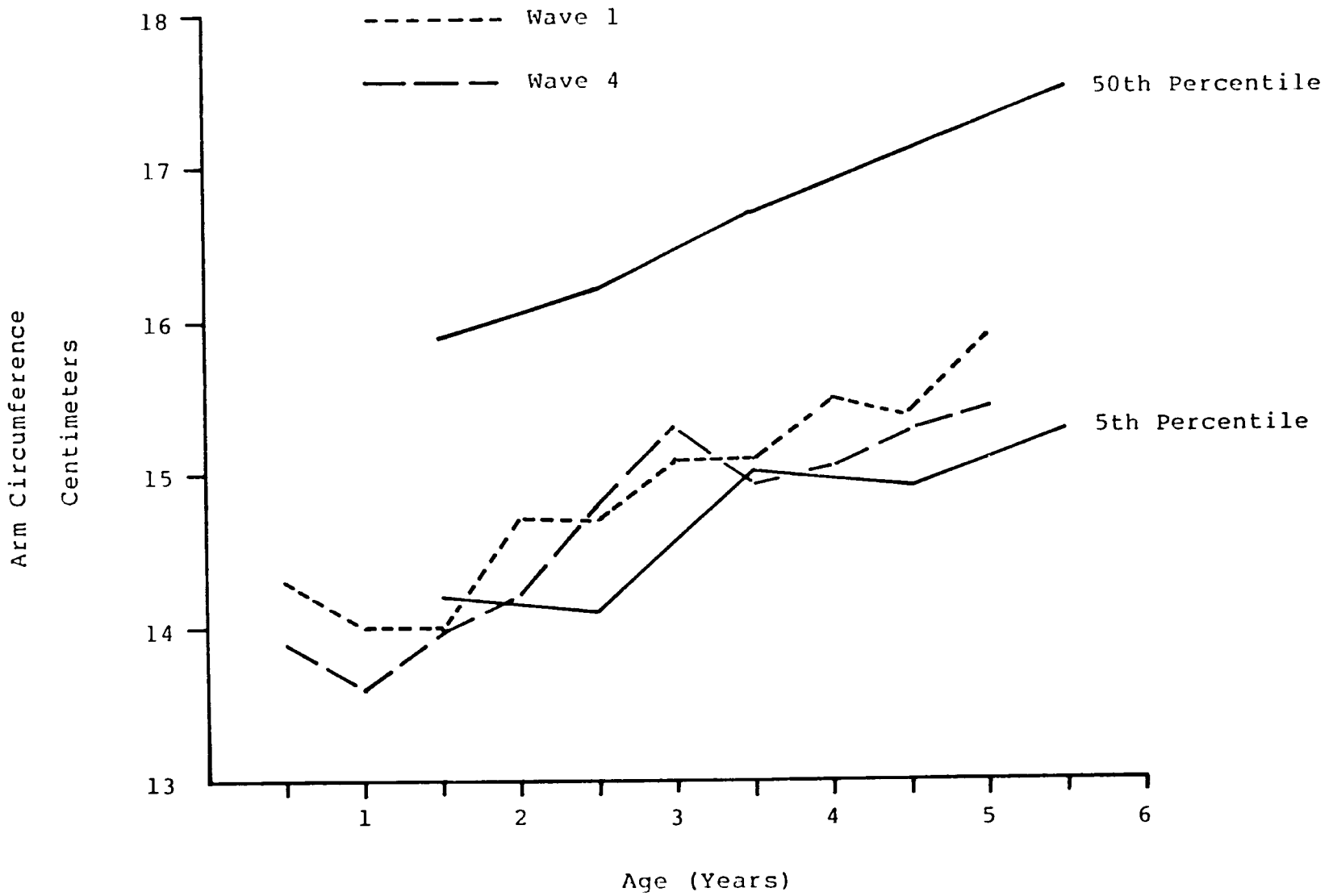
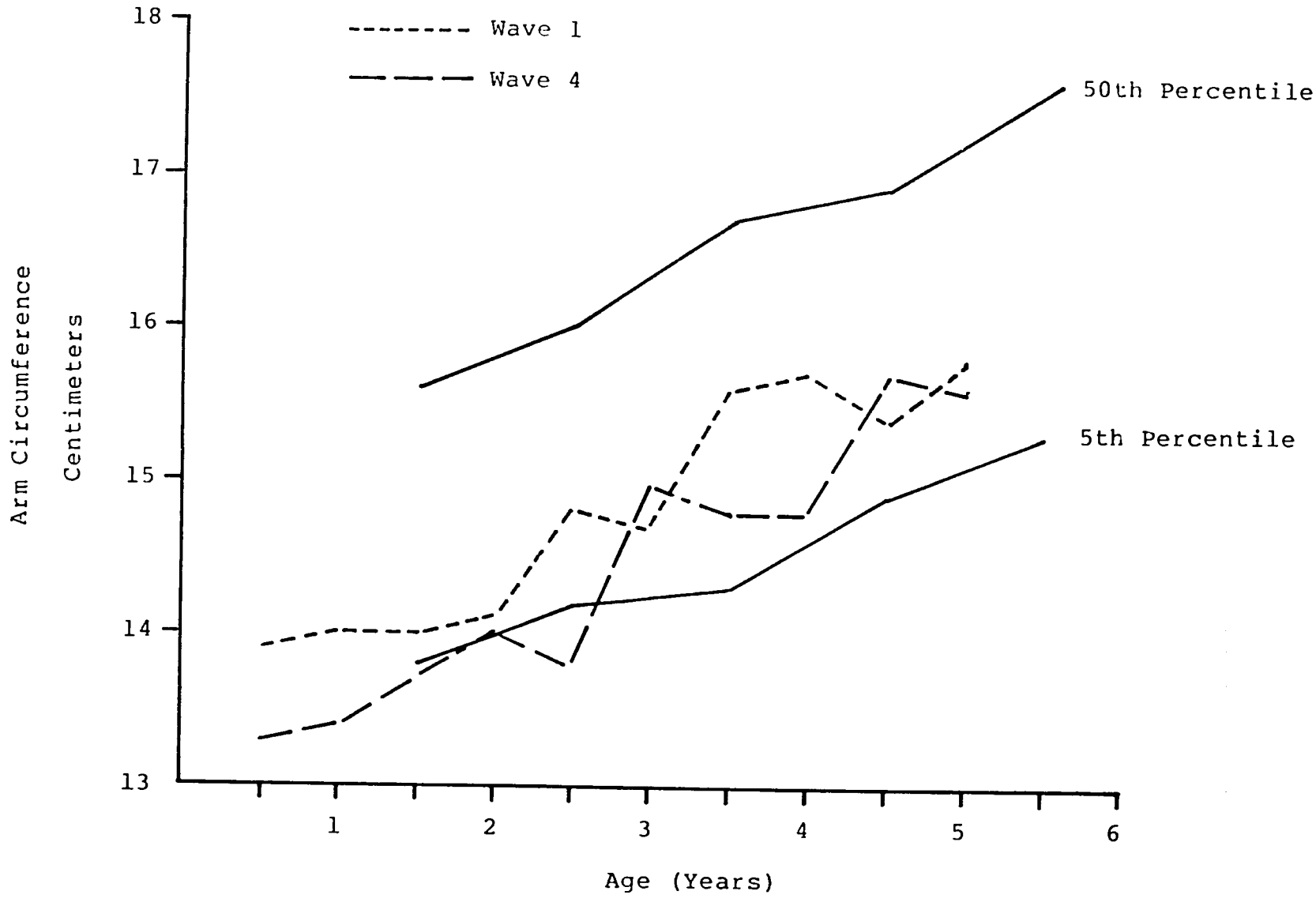


Figure IV-22 - Girls' Arm Circumference Means for Waves 1 and 4.
NCHS 50th and 5th Percentiles Plotted for Reference



variable closely related to weight and reflects muscle and fat stores. Figures IV-21 and IV-22 show that Gambian children have mean arm circumference values that hover around the 5th percentile of the NCHS population. The figures also show that values increase with age in both the reference data and the local population. It is a fallacy therefore to speak of arm circumference as an "age independent" measure. Figures IV-21 and IV-22 show a tendency, clearer for girls than for boys, for values to lower in Wave 4 than in Wave 1.

The skinfold data are presented in Table IV-20 (triceps), Table IV-21 (subscapular) and Table IV-24 (sum of triceps and subscapular). Inspection of these data leave no doubt that there was a significant decrease in fatness over the course of the study. This observation is clearly illustrated in Figure IV-23 (boys) and Figure 24 (girls) for the triceps skinfold. At all ages and for both boys and girls, the sample measured in Wave 4 had smaller triceps skinfolds than the sample measured in Wave 1.

By considering the arm to be a cylinder for which we have measurements for the circumference and for the layer of fat around it (i.e. triceps skinfold), we can then estimate the cross-sectional area made up by muscle (and bone) and fat. These data are shown in Tables IV-25 and IV-26. The data for Waves 1 and 4 are drawn in Figures IV-25 and IV-26 for arm muscle area and in Figures IV-27 and IV-28 for arm fat area. The data for arm muscle area do not reveal systematic differences associated with wave (Figures IV-25 and 26) while those for fat area (Figures IV-27 and 28) show consistent differences at all ages and for boys and girls.

(4) Changes in the same individuals.

It could very well be that the changes in the level of fatness which are evident in the preceding tables and figures are due to changes in the composition of the sample. That is, perhaps different types of children, say of poorer families, were measured in later waves and this is the reason for the apparent

Figure IV- 23 - Boys' Triceps Skinfold Means for Waves 1 and 4.
NCHS 50th and 5th Percentiles Plotted for Reference

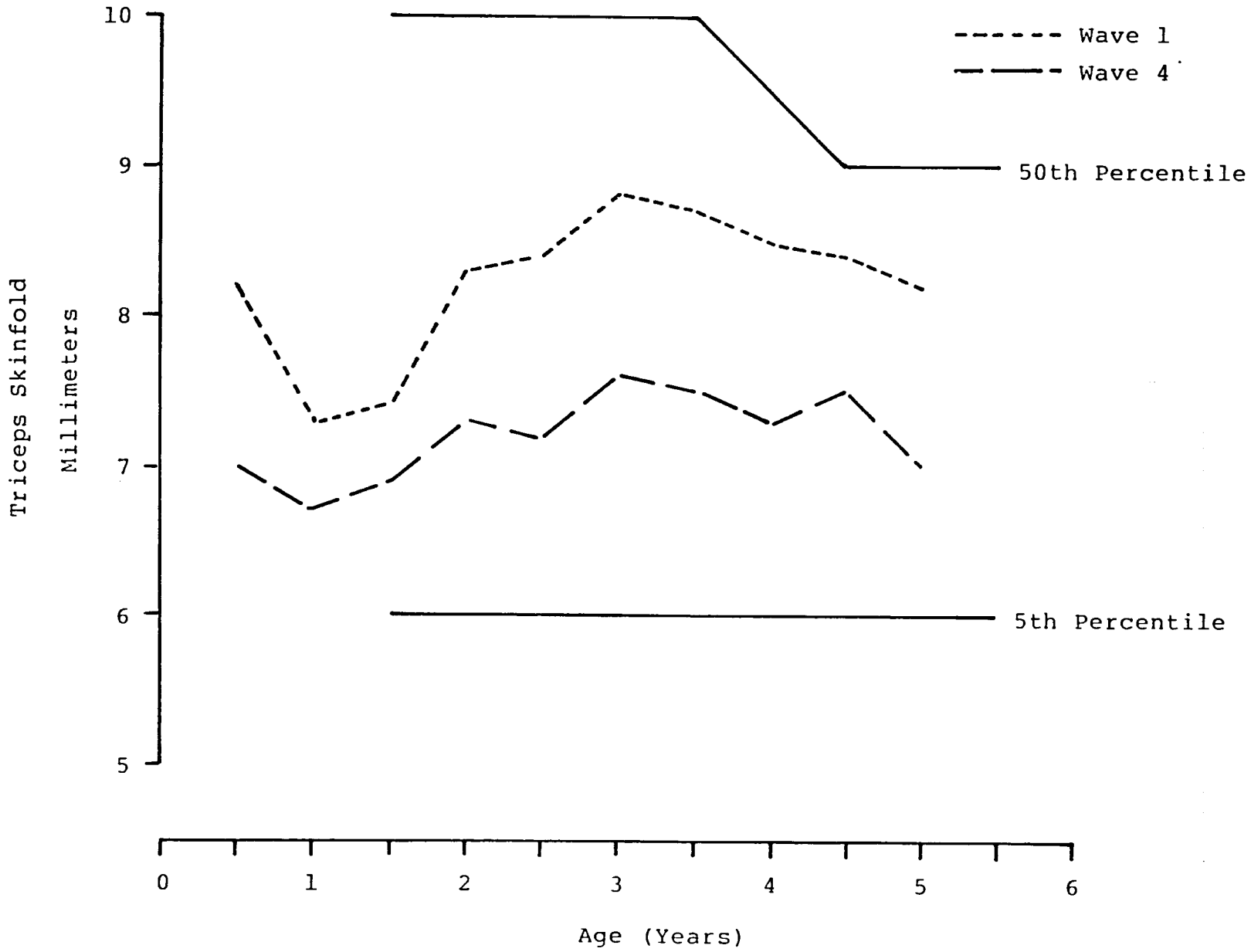


Figure IV- 24- Girls' Triceps Skinfold Means for Waves 1 and 4 .

NCHS 50th and 5th Percentiles Plotted for Reference

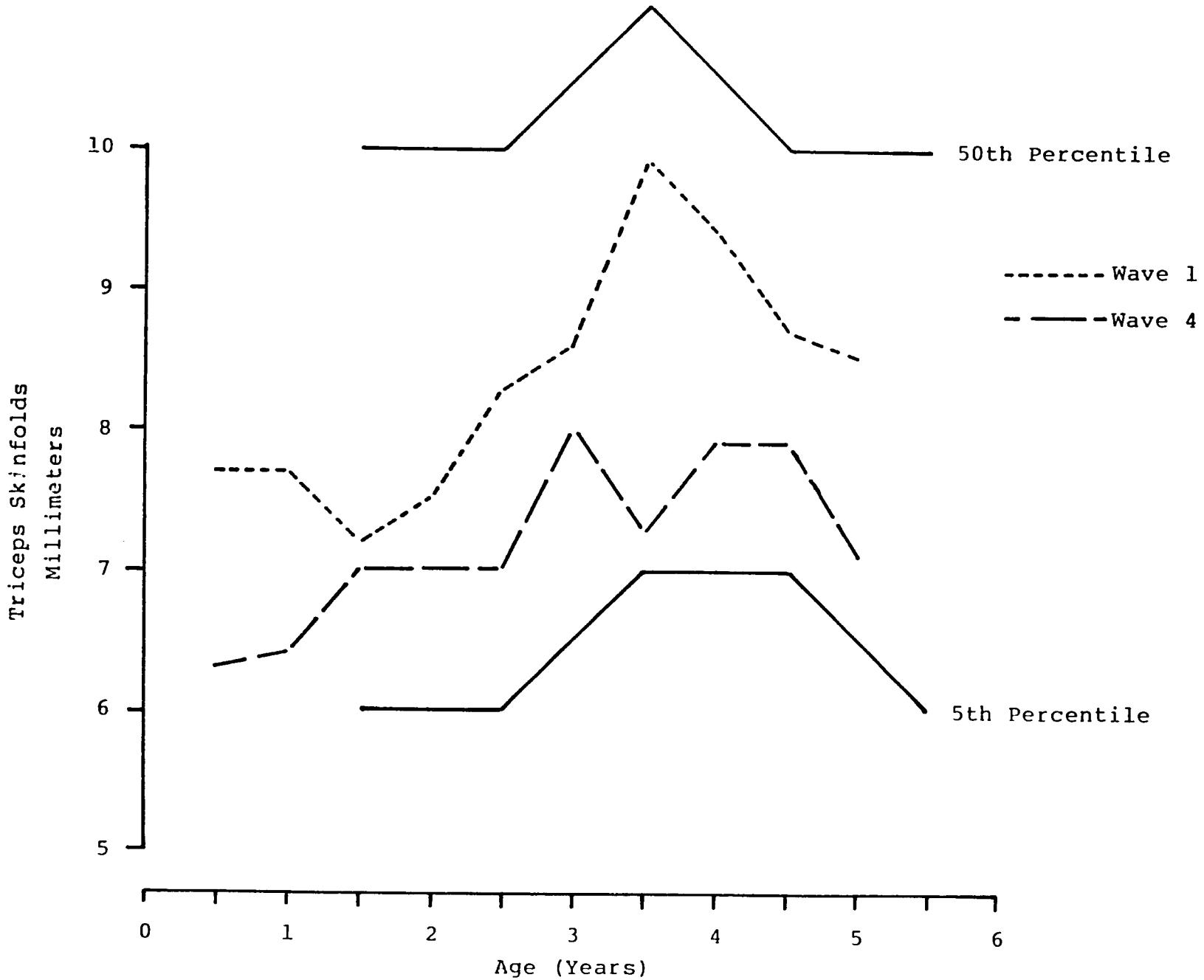


Figure IV-25 - Arm Muscle Area (cm^2) for Males.
NCHS 50th and 5th Percentiles Plotted for Reference

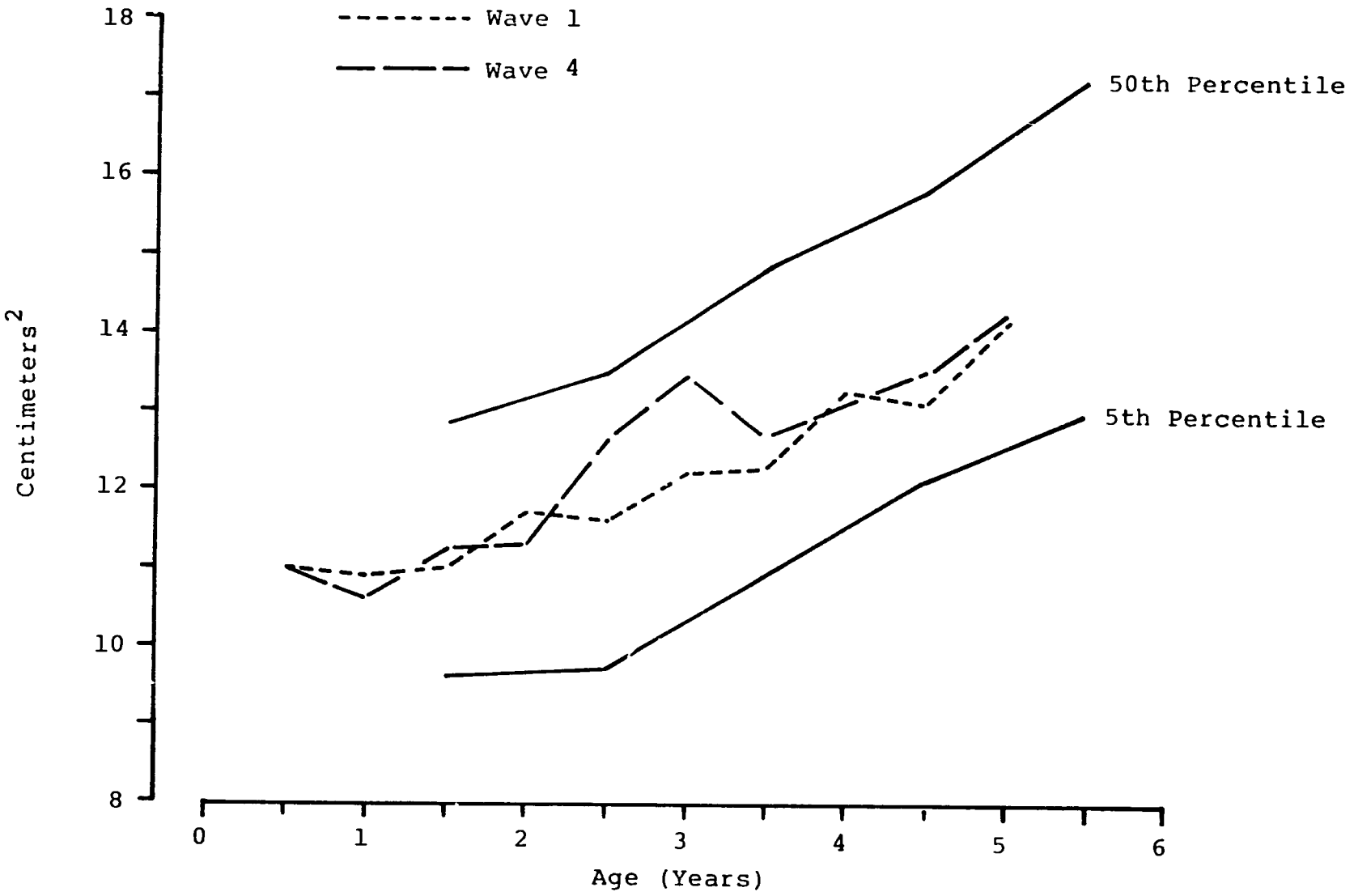


Figure IV-26 - Arm Muscle Area (cm^2) for Females.

NCHS 50th and 5th Percentiles Plotted for Reference

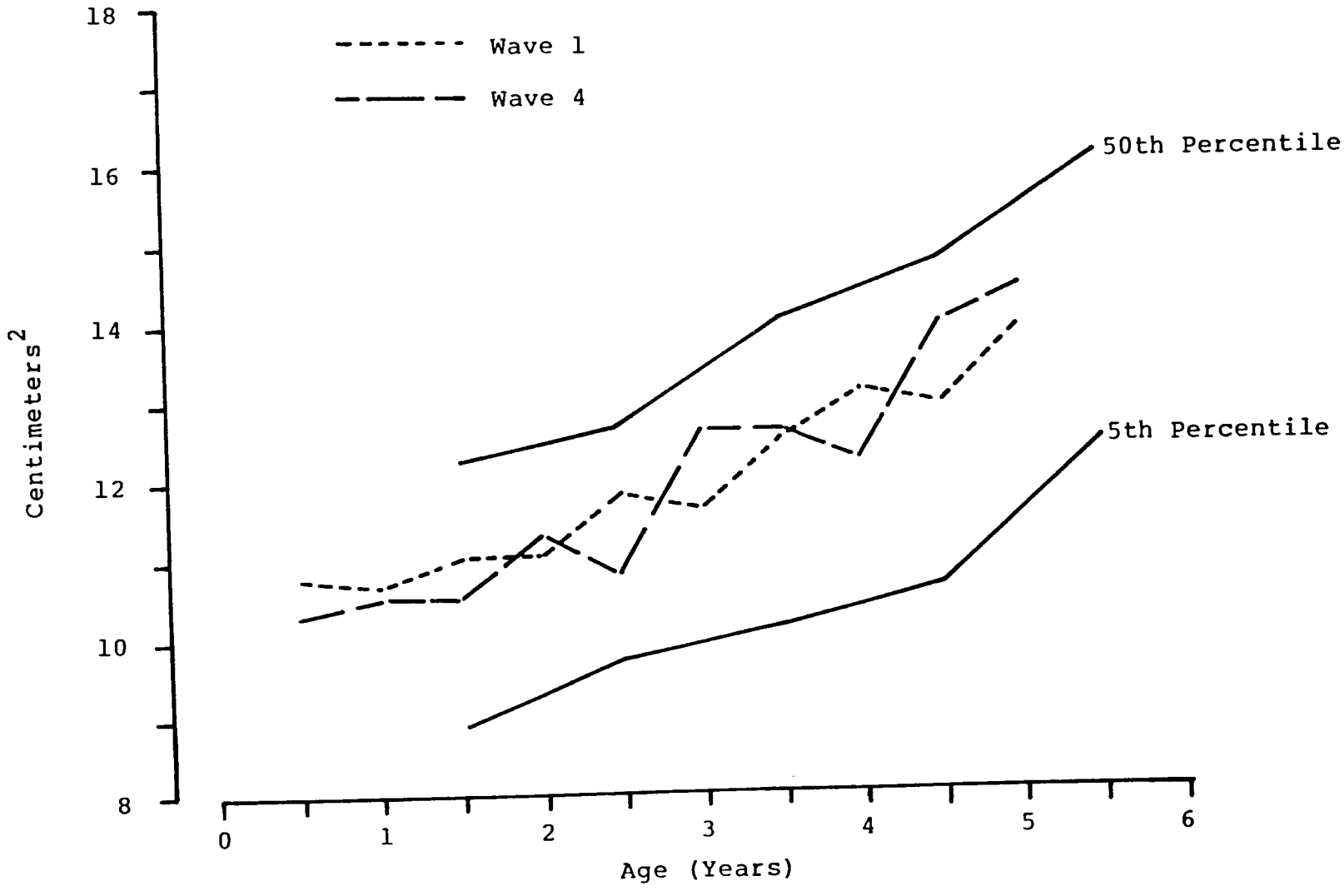


Figure IV- 27 - Arm Fat Area (cm^2) for Males in Waves 1 and 4.

NCHS 50th and 5th Percentiles Plotted for Reference

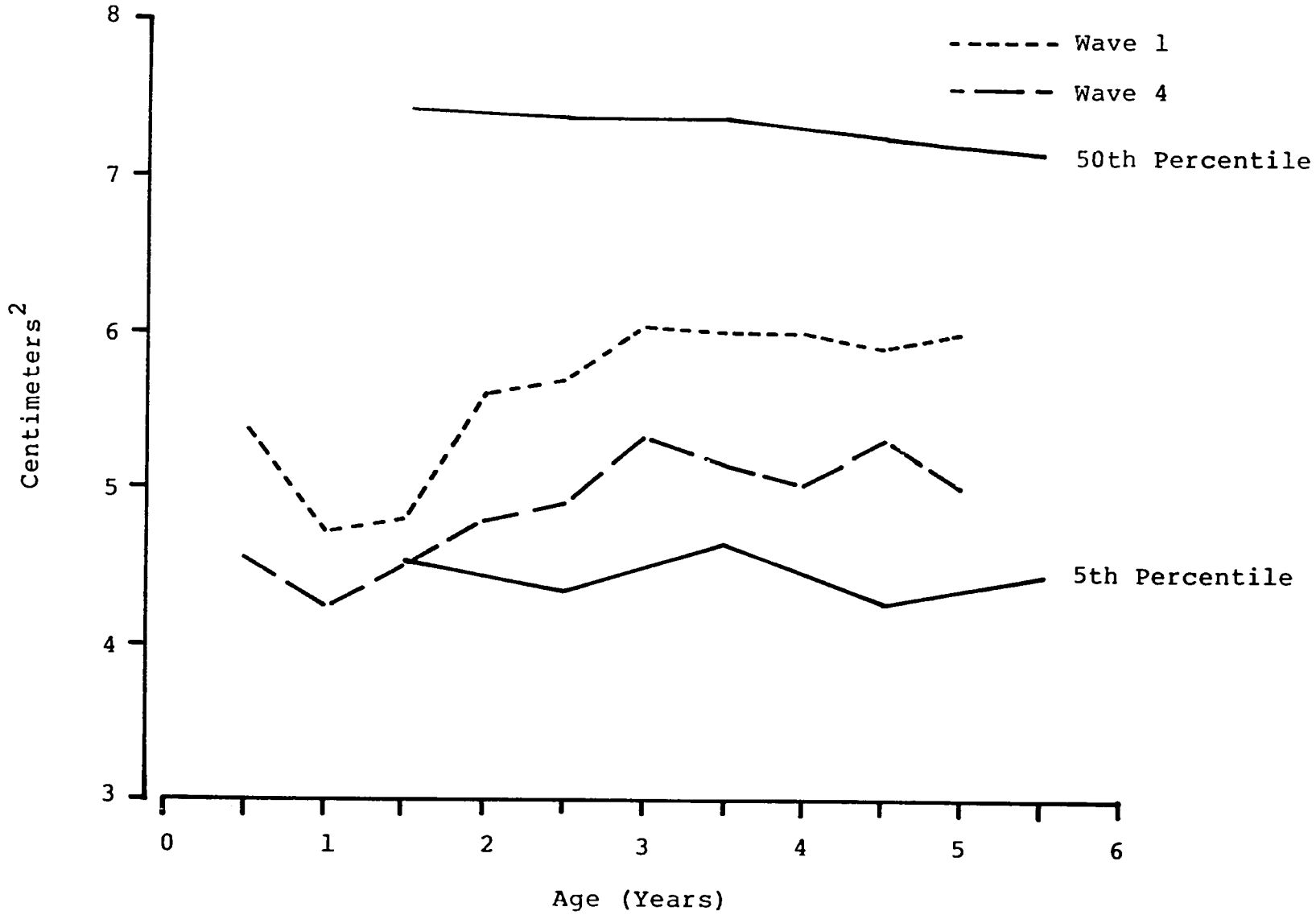
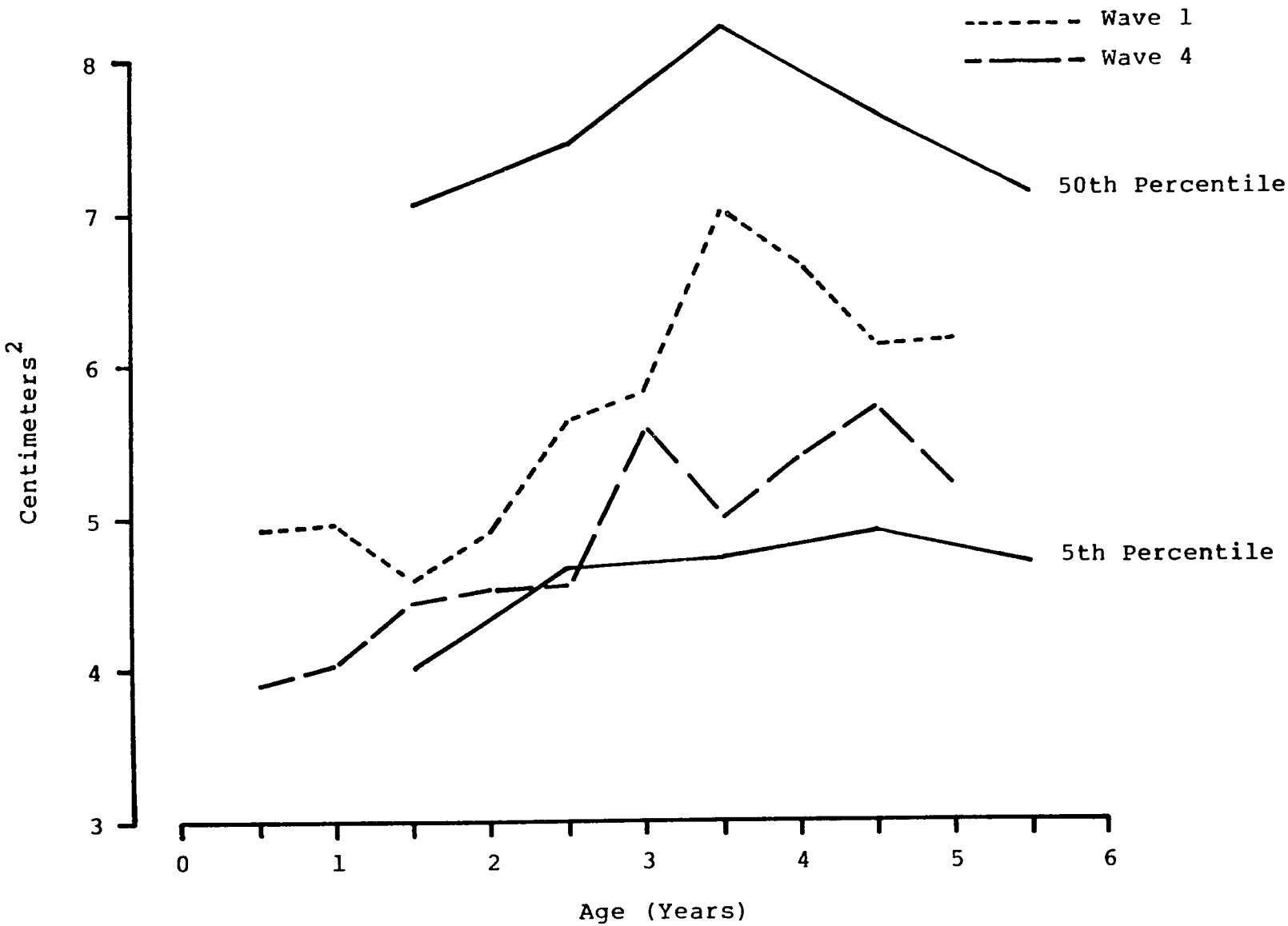


Figure IV-28 - Arm Fat Area (cm^2) for Females in Waves 1 and 4.

NCHS 50th and 5th Percentiles Plotted for Reference



decrease in fatness. One way to test this hypothesis is by focusing on those individuals for whom we have data for Waves 1 and 4 and Waves 2 and 3. Since an individual obviously ages from one wave to the next, careful attention must be paid to whether the variables examined are age dependent or not. For measures like arm length or even arm circumferences we would expect positive changes over the two year period separating waves 1 and 2. With this consideration in mind, the following variables were chosen for analyses: height for age and weight for height z-scores, triceps and subscapular skinfolds, and arm fat area. All of these measures are fairly independent of age as shown earlier. However, as an additional safeguard, the differences between waves were adjusted by analyses of covariance by age at the beginning of the period and by differences in the time span between measurements. These adjustments had only minor effects on the results which are shown in Table IV-27. There are no clear changes with respect to height z-scores, the measure of stunting. For all other measures (i.e. weight for height z-scores, triceps and subscapular skinfolds and for arm fat area), there are strong indications of lower values in Wave 4 when compared to Wave 1 and in Wave 3 when compared to Wave 2. As would be expected, changes between Waves 1 and 4 were much greater than those taking place between Waves 2 and 3.

(5) Discussion

The anthropometric study was carried out to see if we could detect any anthropometric impact from the campaign. However, a drought in 1983 and worsening economic conditions also occurred at the same time as the project, overwhelming any effects adoption of the campaign recommendations may have had. The most consistent finding in this section is that children became considerably skinnier, most likely because of losses in fat, throughout the course of the study. Because the children were lean to begin with and because the prevalence of wasting, a

condition known to be associated with a diminished ability to resist infections, became high, these changes cannot be said to be beneficial.

The hypothesis that the changes observed were due to sample selection bias was discarded by analyses that focused on the same subjects.

Another possibility is that the findings reflect a change in measurement technique over time. This does not appear to be the case because the findings are very consistent across different measures. For example, we observed reductions in weight for height as well as in skinfolds and arm fat area.

The most reasonable explanation is that the changes observed are real and that in fact the children in the study villages became increasingly leaner and more wasted as time went on. The explanation appears to be the worsening drought which Gambia experienced throughout the study period. Droughts affect agricultural yields, incomes, and diets, and have been documented to adversely and severely affect nutritional status and to result in a marked increase in wasting.

The findings are not as expected and point out problems in detecting changes in anthropometric variables. We are not prepared to attribute the changes observed, and quite rightly so, to the ORT intervention because it simply would not make sense. Anthropometric indicators are very sensitive to external factors such as droughts and the fact that one occurred presents itself as a more likely explanation.

Future analyses need to focus on anthropometric changes as a function of WSS use in order to test the hypothesis that the effects of the drought were ameliorated by the intervention. Thus, it is possible that the population as a whole became wasted but that those using WSS did not become leaner or changed to a lesser extent than those not using WSS.

Table IV-16 - Z-Scores for Height for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0-2.99 (1.5)	x	-.17	-.07	-.71	-.10	.15	-.09	.77	-.30
	S.D.	.97	1.33	1.36	1.36	1.05	1.12	2.17	1.44
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	-.72	-.35	-.25	-.04	-.58	-.60	-.42	-.83
	S.D.	1.05	1.48	1.09	1.74	1.22	1.05	1.42	1.47
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	-1.56	-1.06	-1.45	-.98	-.95	-.98	-.82	-1.13
	S.D	1.09	1.69	1.54	1.71	1.17	1.53	1.47	1.39
	n	52	50	37	29	39	41	38	37
15-20.99 (18)	x	-1.78	-1.72	-1.40	-1.54	-1.44	-1.35	-1.89	-1.52
	S.D.	1.41	1.25	1.72	1.47	1.53	1.78	1.31	1.48
	n	40	47	31	27	45	32	27	22
21-26.99 (24)	x	-1.62	-1.70	-1.31	-1.60	-1.87	-1.66	-1.40	-1.10
	S.D.	1.51	1.26	1.80	2.06	1.30	1.38	1.72	1.58
	n	41	35	44	32	39	34	40	35
27-32.99 (30)	x	-1.35	-1.05	-1.34	-.86	-1.06	1.00	-.41	-1.30
	S.D.	1.50	1.70	1.37	1.63	1.42	1.88	1.95	1.41
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	-1.42	-1.09	-1.51	-.80	-1.75	-1.16	-1.19	-.70
	S.D.	1.51	1.60	1.36	1.48	1.32	1.67	1.16	1.51
	n	37	38	26	40	44	46	39	29
39-44.99 (42)	x	-1.34	-1.48	-1.23	-1.06	-1.16	-1.61	-1.58	-1.14
	S.D.	1.33	1.71	1.23	1.51	1.22	1.63	1.71	1.53
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	-1.13	-1.12	-1.25	-1.41	-1.09	-.45	-1.49	-1.25
	S.D.	.92	1.59	1.21	1.12	1.33	1.33	1.36	1.89
	n	32	34	39	29	34	36	34	27
51-56.99 (54)	x	-1.61	-1.28	-1.63	-1.39	-1.56	-1.58	-1.64	-.96
	S.D.	1.38	1.43	1.30	1.53	1.55	1.62	1.46	1.48
	n	26	33	32	35	36	35	33	37
57-high (60)	x	-1.25	-.97	-1.36	-1.39	-1.14	-1.21	-1.15	-1.29
	S.D.	1.35	1.16	1.30	1.44	1.57	1.92	1.26	1.46
	n	16	40	73	103	16	35	78	85
TOTAL	x	-1.35	-1.16	-1.28	-1.16	-1.22	-1.11	-1.14	-1.14
	S.D.	1.33	1.54	1.42	1.58	1.41	1.62	1.56	1.51
	n	380	406	409	393	398	374	394	364

Table IV-17 - Z-Scores for Weight for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	.28	.62	.09	-.12	1.28	1.13	.14	.33
	S.D.	1.02	1.03	1.27	1.05	1.29	1.97	1.28	1.01
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	-.16	.11	-.46	-.38	.13	-.48	-.37	-.54
	S.D.	1.10	1.75	.10	1.10	1.26	1.85	1.23	.93
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	-1.16	-1.22	-1.76	-1.74	-1.04	-.52	-1.72	-1.80
	S.D	1.16	1.27	1.37	1.49	1.16	1.42	1.21	1.16
	n	52	50	37	29	39	41	38	37
15-20.99 (18)	x	-1.33	-1.74	-1.79	-1.56	-1.04	-1.67	-2.03	-1.86
	S.D.	1.38	1.02	1.23	1.25	1.25	1.19	1.06	1.06
	n	40	47	31	27	45	32	27	22
21-26.99 (24)	x	-1.29	-1.29	-1.58	-1.81	-1.45	-1.58	-1.82	-1.40
	S.D.	1.25	1.50	.95	1.01	1.28	1.43	1.25	1.29
	n	41	35	44	32	39	34	40	35
27-32.99 (30)	x	-1.17	-1.19	-1.46	-1.43	-.71	-1.29	-1.73	-1.86
	S.D.	1.21	1.15	1.10	1.27	1.23	1.51	1.18	1.42
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	-1.03	-1.01	-1.55	-1.27	-1.10	-1.22	-1.81	-1.12
	S.D.	.96	1.13	1.26	1.10	1.13	1.20	1.16	1.37
	n	37	38	26	40	44	46	39	29
39-44.99 (42)	x	-.84	-1.39	-1.46	-1.57	-.73	-1.32	-1.56	-1.52
	S.D.	1.12	1.10	.96	.82	.99	1.39	1.19	1.26
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	-.99	-.75	-1.47	-1.67	-.83	-.77	-1.37	-1.32
	S.D.	.68	1.34	1.30	1.14	.99	1.22	.86	1.31
	n	32	34	39	29	34	36	34	27
51-56.99 (54)	x	-1.12	-1.03	-1.69	-1.57	-1.29	-.96	-1.51	-1.23
	S.D.	.92	1.15	.80	1.02	1.05	1.19	1.00	1.14
	n	26	33	32	35	36	35	33	37
57-high (60)	x	-.93	-1.09	-1.44	-1.61	-1.06	-1.18	-1.30	-1.33
	S.D.	1.07	1.16	1.16	1.18	1.17	1.43	1.26	1.17
	n	16	40	73	103	16	35	78	85
TOTAL	x	-.97	-1.04	-1.43	-1.49	-.82	-1.00	-1.46	-1.40
	S.D.	1.17	1.35	1.19	1.19	1.28	1.51	1.24	1.27
	n	380	406	409	393	398	374	394	364

Table IV-18- Z-Scores for Weight for Height for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	.57	.84	.78	-.04	1.26	1.11	-.69	.63
	S.D.	1.44	1.60	1.09	1.46	1.36	1.70	1.63	.61
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	.43	.37	-.43	-.44	.75	-.04	-.02	.22
	S.D.	1.14	1.59	1.10	1.44	1.31	1.61	1.43	1.32
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	-.11	-.54	-.93	-1.28	-.36	.36	-1.38	-1.18
	S.D.	1.54	1.57	1.30	1.35	1.43	1.32	1.30	1.40
	n	52	50	37	29	39	41	38	37
15-20.99 (18)	x	-.44	-.99	-1.28	-.88	-.27	-1.15	-1.27	-1.32
	S.D.	1.28	1.37	1.08	1.72	1.31	1.43	1.16	1.43
	n	40	47	31	27	45	32	27	22
21-26.99 (24)	x	-.35	-.33	-.96	-1.13	-.52	-.84	-1.27	-.97
	S.D.	1.26	1.42	1.09	1.39	1.19	1.69	1.06	1.37
	n	41	35	44	32	39	34	40	35
27-32.99 (30)	x	-.38	-.62	-.75	-1.00	.00	-.71	-1.54	-1.23
	S.D.	.99	1.45	1.14	1.20	1.12	1.33	1.62	1.21
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	-.23	-.42	-.84	-.96	.02	-.54	-1.25	-.68
	S.D.	1.28	1.09	1.26	1.13	.97	1.05	1.12	1.54
	n	37	38	26	40	44	46	39	29
39-44.99 (42)	x	-.05	-.68	-.94	-1.19	.08	-.36	-.69	-.95
	S.D.	.94	1.17	1.12	.99	1.04	1.39	.85	1.25
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	-.37	-.13	-.98	-1.13	-.12	-.52	-.54	-.68
	S.D.	.80	1.22	1.48	1.48	.78	1.38	.76	.92
	n	32	34	39	29	34	36	34	27
51-56.99 (54)	x	-.19	-.33	-.97	-1.02	-0.45	-.02	-.66	-.82
	S.D	.92	1.32	.98	.89	1.09	1.04	.90	1.12
	n	26	33	32	35	36	35	33	37
57-high (60)	x	-.21	-.65	-.84	-1.06	-.51	-.68	-.89	-.81
	S.D.	.72	1.30	1.10	1.24	.91	1.36	1.27	1.22
	n	16	40	73	103	16	35	78	85
TOTAL	x	-.16	-.43	-.84	-1.02	-.05	-.38	-.94	-.86
	S.D.	1.19	1.41	1.20	1.28	1.22	1.45	1.25	1.30
	n	380	406	409	393	398	374	394	364

Table IV-19- Arm Circumference (cm) for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	13.4	12.4	12.2	12.7	13.0	11.1	12.6	14.4
	S.D.	1.2	1.0	1.5	1.4	1.6	1.1	0.8	4.3
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	14.3	13.7	14.0	13.9	13.9	13.5	13.1	13.3
	S.D.	1.2	1.7	1.0	1.2	1.8	5.3	1.3	9.1
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	14.0	14.2	14.4	13.6	14.0	13.5	13.5	13.4
	S.D	1.2	3.4	2.8	1.3	1.3	2.2	1.2	1.2
	n	51	50	37	29	39	41	38	37
15-20.99 (18)	x	14.0	13.7	14.0	14.0	14.0	13.4	13.4	13.7
	S.D.	1.4	9.5	1.4	1.2	9.6	1.5	1.2	1.1
	n	40	47	30	27	45	32	27	22
21-26.99 (24)	x	14.7	13.6	14.4	14.2	14.1	13.1	13.6	14.0
	S.D.	1.1	1.1	1.2	1.1	1.0	1.5	1.4	1.5
	n	39	35	44	32	39	34	40	35
27-32.99 (30)	x	14.7	16.1	14.7	14.8	14.8	14.3	14.8	13.8
	S.D.	1.3	6.9	1.7	1.1	1.2	1.8	1.3	1.4
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	15.1	15.1	14.9	15.3	14.7	15.1	14.2	15.1
	S.D.	1.3	1.7	1.2	1.5	1.3	3.4	1.4	1.4
	n	37	38	26	39	44	46	39	29
39-44.99 (42)	x	15.1	14.6	15.1	15.0	15.6	14.9	14.8	14.8
	S.D.	1.5	1.5	1.2	1.2	1.3	1.6	1.1	1.4
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	15.5	15.3	15.3	15.1	15.7	16.6	15.4	14.8
	S.D.	1.1	1.5	1.2	1.1	1.3	4.8	1.0	1.2
	n	32	33	39	29	34	36	34	27
51-56.99 (54)	x	15.4	15.7	15.0	15.3	15.4	15.9	15.1	15.7
	S.D	0.9	3.4	1.3	1.2	1.2	5.2	1.3	1.1
	n	26	33	32	34	36	35	33	37
57-high (60)	x	15.9	16.9	15.5	15.5	15.8	15.6	15.8	15.6
	S.D.	1.0	7.1	1.2	1.2	1.3	1.5	1.3	1.3
	n	16	40	73	102	16	35	78	84
TOTAL	x	14.7	14.8	14.7	14.8	14.6	14.5	14.5	14.7
	S.D.	1.3	3.8	1.6	1.4	1.5	3.4	1.6	1.6
	n	377	405	408	390	398	374	394	363

Table IV- 20- Triceps (mm) for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	8.4	5.9	6.3	7.4	8.8	6.2	5.3	8.0
	S.D.	1.5	1.4	1.3	1.2	2.6	1.6	1.8	2.7
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	8.2	7.3	7.2	7.0	7.7	6.4	7.0	6.3
	S.D.	1.8	2.3	1.5	2.1	2.0	1.7	1.7	1.8
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	7.3	6.6	6.4	6.7	7.7	6.5	6.3	6.4
	S.D	2.1	2.2	1.6	1.3	1.8	2.1	1.5	1.5
	n	52	50	37	29	39	41	38	37
15-20.99 (18)	x	7.4	6.4	6.1	6.9	7.2	6.2	6.1	7.0
	S.D.	1.9	1.3	1.4	1.9	1.5	1.5	1.4	2.1
	n	40	47	31	27	45	32	27	22
21-26.99 (24)	x	8.3	6.1	6.3	7.3	7.5	6.5	6.4	7.0
	S.D.	1.9	1.7	1.7	1.9	1.5	1.9	1.6	1.7
	n	41	35	44	32	39	34	40	35
27-32.99 (30)	x	8.4	7.4	6.9	7.2	8.3	7.5	7.1	7.0
	S.D.	2.3	1.9	2.0	2.0	1.9	2.4	2.1	1.9
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	8.8	8.1	7.4	7.6	8.6	7.5	6.9	8.0
	S.D.	2.1	2.1	1.8	1.5	2.5	2.0	1.7	1.3
	n	37	38	26	40	44	46	39	29
39-44.99 (42)	x	8.7	7.5	7.0	7.5	9.9	8.8	7.8	7.3
	S.D.	1.9	2.1	1.6	1.7	3.5	2.8	1.6	1.9
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	8.5	7.7	7.4	7.3	9.4	8.3	7.9	7.9
	S.D.	1.7	2.3	1.5	2.0	1.9	2.0	1.8	1.7
	n	32	34	39	29	34	36	34	27
51-56.99 (54)	x	8.4	7.4	6.6	7.5	8.7	8.0	7.6	7.9
	S.D.	2.4	1.7	1.7	1.6	1.9	2.2	1.8	2.1
	n	26	33	32	35	36	35	33	37
57-high (60)	x	8.2	7.0	6.4	7.0	8.5	7.9	7.3	7.1
	S.D.	1.5	2.1	1.4	2.1	1.6	2.0	1.8	1.7
	n	16	40	73	103	16	35	78	85
TOTAL	x	8.2	7.1	6.7	7.2	8.3	7.3	7.0	7.2
	S.D.	2.0	2.0	1.7	1.8	2.2	2.2	1.8	1.8
	n	380	406	409	393	398	374	394	364

Table IV- 21 - Subscapular (mm) for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	6.9	5.4	5.8	6.8	6.6	5.5	5.2	6.6
	S.D.	1.4	1.1	1.5	1.6	1.6	2.1	2.2	2.3
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	6.7	5.8	6.4	6.1	6.4	5.4	5.7	6.1
	S.D.	1.5	1.7	1.5	1.8	1.3	1.5	1.4	1.2
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	5.9	5.5	5.9	5.7	6.1	5.5	5.8	5.1
	S.D.	1.5	1.9	1.8	1.3	1.6	1.7	1.4	1.6
	n	52	50	37	29	39	41	38	37
15-20.99 (18)	x	5.7	5.4	5.5	5.7	5.8	5.6	5.9	5.7
	S.D.	1.2	1.1	1.2	1.8	1.0	1.8	1.9	1.6
	n	40	47	31	27	45	32	27	22
21-26.99 (24)	x	6.3	5.2	5.9	5.7	5.9	4.9	5.5	5.6
	S.D.	1.8	1.3	1.5	1.5	1.4	1.4	1.6	1.4
	n	41	35	44	32	39	34	40	35
27-32.99 (30)	x	6.0	5.9	6.2	5.7	6.2	6.0	6.3	5.9
	S.D.	2.1	1.8	1.9	1.7	1.2	2.1	1.0	1.7
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	6.6	6.5	5.8	6.2	6.8	6.1	5.5	6.6
	S.D.	1.5	1.7	1.0	1.6	2.0	2.1	1.1	1.8
	n	37	38	26	40	44	46	39	29
39-44.99 (42)	x	6.4	5.9	6.3	6.3	7.6	6.8	6.4	5.9
	S.D.	1.5	2.1	1.4	2.2	2.1	2.2	1.6	1.3
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	6.0	6.0	6.0	5.7	7.0	6.4	7.0	5.8
	S.D.	1.4	1.6	1.5	1.6	1.7	1.9	1.8	1.3
	n	32	34	39	29	34	36	34	27
51-56.99 (54)	x	6.6	6.0	5.5	6.1	5.9	5.8	6.2	6.9
	S.D.	2.3	1.9	1.3	1.2	1.3	1.4	1.3	1.9
	n	26	33	32	35	36	35	33	37
57-high (60)	x	5.7	5.9	5.5	5.7	5.9	6.1	6.1	6.2
	S.D.	1.1	2.1	1.1	1.4	1.3	1.7	1.3	1.7
	n	16	40	72	103	16	35	78	85
TOTAL	x	6.2	5.8	5.9	5.9	6.4	5.8	6.0	6.0
	S.D.	1.6	1.7	1.5	1.6	1.6	1.8	1.5	1.7
	n	380	406	408	393	398	374	394	364

Table IV-22 -Arm Length (cm) for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	24.4	23.2	22.5	23.3	23.6	22.1	21.7	21.5
	S.D.	1.5	2.4	3.7	2.1	2.2	1.6	4.6	4.7
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	26.3	27.1	26.9	27.5	26.3	26.5	26.7	27.6
	S.D.	2.2	3.3	3.1	2.3	2.1	2.5	2.2	2.8
	n	51	37	26	18	50	34	33	14
9-14.99 (12)	x	28.8	29.7	29.8	30.8	28.8	28.8	29.8	29.6
	S.D.	3.1	3.6	3.5	4.3	2.3	3.0	2.7	2.9
	n	52	50	37	29	39	41	38	37
15-20.99 (18)	x	31.1	31.6	32.9	33.1	30.5	29.9	31.4	32.3
	S.D.	3.5	3.3	5.1	2.9	3.0	4.5	2.4	2.9
	n	40	47	31	27	44	32	27	22
21-26.99 (24)	x	33.8	34.1	33.2	33.4	32.2	31.9	33.7	33.6
	S.D.	2.9	2.7	2.6	3.5	3.1	4.4	2.5	2.8
	n	41	35	44	32	39	34	40	34
27-32.99 (30)	x	35.8	35.2	35.3	35.7	35.4	34.0	35.1	34.7
	S.D.	2.6	4.1	2.8	5.0	2.5	4.3	3.3	3.5
	n	44	42	44	40	51	36	31	36
33-38.99 (36)	x	37.3	37.5	37.6	37.3	36.0	37.0	37.0	37.5
	S.D.	2.7	4.8	2.5	4.3	3.4	3.9	3.6	3.8
	n	37	38	26	40	44	46	39	29
39-44.99 (42)	x	39.2	38.8	38.8	38.8	38.6	37.6	37.7	38.9
	S.D.	4.0	4.6	3.6	3.5	2.8	4.1	2.8	3.9
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	41.1	41.5	40.8	40.6	40.1	39.1	40.2	40.3
	S.D.	2.6	3.7	3.7	4.6	3.0	6.5	2.8	3.8
	n	32	34	39	29	34	35	34	27
51-56.99 (54)	x	41.5	40.5	41.2	41.8	39.5	40.1	41.4	42.2
	S.D.	3.4	6.8	4.1	6.1	4.8	6.0	2.8	5.2
	n	26	33	32	35	36	35	33	37
57-high (60)	x	45.0	44.6	45.3	45.1	43.8	42.2	44.1	43.5
	S.D.	3.4	6.7	4.2	5.7	3.1	7.4	4.0	6.5
	n	16	40	73	103	16	35	78	83
TOTAL	x	34.4	35.4	36.7	38.1	33.9	34.2	36.3	37.2
	S.D.	6.3	7.1	7.0	7.4	6.0	7.2	6.7	7.1
	n	380	405	409	392	397	373	394	361

Table IV- 23 - Head Circumference (cm) for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	40.8	37.9	37.9	39.3	39.2	36.6	37.2	38.6
	S.D.	3.5	3.2	5.2	1.9	1.6	1.9	2.8	1.7
	n	6	10	13	8	9	14	9	7
3-8.99 (6)	x	42.4	42.9	43.1	42.6	41.4	40.5	41.5	41.7
	S.D.	4.9	2.4	2.0	3.3	3.1	4.6	1.8	4.0
	n	50	37	26	19	50	33	33	14
9-14.99 (12)	x	45.5	44.3	45.3	44.7	44.5	43.7	44.5	43.6
	S.D.	1.4	4.3	1.6	2.8	2.4	2.9	1.3	2.8
	n	52	50	37	28	39	41	38	37
15-20.99 (18)	x	46.7	46.1	46.2	46.2	45.7	44.6	44.9	44.9
	S.D.	1.4	2.1	2.2	2.4	2.2	3.6	4.4	2.6
	n	40	47	31	27	45	32	27	22
21-26.99 (24)	x	47.7	47.4	47.4	46.6	46.7	45.0	46.3	45.1
	S.D.	1.8	1.3	1.9	3.4	1.8	3.6	1.6	2.8
	n	40	35	44	31	39	34	40	34
27-32.99 (30)	x	48.1	47.1	48.0	47.0	47.4	46.7	47.0	46.8
	S.D.	1.2	5.6	1.4	2.7	1.3	3.2	2.6	1.6
	n	44	42	44	40	51	36	31	36
33-38.99 (36)	x	48.6	48.2	48.7	48.0	47.8	47.6	47.2	47.2
	S.D.	2.2	4.2	1.4	2.6	1.8	1.5	2.1	2.6
	n	37	38	26	40	44	45	39	28
39-44.99 (42)	x	49.1	48.6	49.1	48.7	48.3	48.1	48.2	48.0
	S.D.	1.3	2.5	1.9	2.4	1.3	1.8	1.4	1.6
	n	35	39	44	31	34	30	32	35
45-50.99 (48)	x	49.3	49.1	49.4	49.8	48.9	47.4	48.2	48.5
	S.D.	1.4	2.6	1.5	1.8	1.4	4.8	1.5	2.2
	n	32	34	39	29	34	36	34	27
51-56.99 (54)	x	50.0	48.9	49.7	49.3	48.6	48.5	48.8	47.9
	S.D.	1.6	3.5	1.3	1.9	1.6	1.3	1.5	3.1
	n	26	33	32	35	36	35	33	37
57-high (60)	x	50.0	49.8	49.7	49.7	49.3	48.8	49.5	48.6
	S.D.	1.6	2.5	3.5	2.6	1.6	2.3	1.5	4.3
	n	16	40	73	102	16	35	78	84
TOTAL	x	47.1	46.9	47.6	47.8	46.3	45.8	46.7	46.7
	S.D.	3.4	4.2	3.5	3.5	3.2	4.3	3.4	3.8
	n	378	405	409	390	397	371	394	361

Table IV- 24- Sum of Skinfolds (mm) for Male and Female

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	15.3	11.2	12.1	14.1	15.4	11.7	10.5	14.6
	S.D.	2.5	2.2	2.7	2.7	3.7	3.3	4.0	4.6
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	15.0	13.0	13.6	13.1	14.1	11.7	12.6	12.4
	S.D.	3.0	3.8	2.7	3.6	3.0	2.9	3.0	2.6
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	13.3	12.1	12.3	12.4	13.8	12.0	12.1	11.5
	S.D.	3.0	4.0	2.9	2.2	3.0	3.5	2.4	3.0
	n	52	50	37	29	39	41	38	37
15-20.99 (18)	x	13.1	11.7	11.5	12.6	13.0	11.8	12.1	12.8
	S.D.	2.9	2.1	2.4	3.4	2.3	2.9	2.8	3.4
	n	40	47	31	27	45	32	27	22
21-26.99 (24)	x	14.6	11.3	12.2	13.0	13.4	11.4	11.8	12.5
	S.D.	3.3	2.8	2.7	2.9	2.6	3.1	3.1	2.8
	n	41	35	44	32	39	34	40	35
27-32.99 (30)	x	14.5	13.4	13.1	12.9	14.5	13.6	13.4	12.9
	S.D.	4.2	3.4	3.3	3.3	2.8	4.2	2.5	3.3
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	15.5	14.6	13.3	13.9	15.4	13.6	12.4	14.6
	S.D.	3.1	3.3	2.5	2.5	4.2	3.8	2.5	2.8
	n	37	38	26	40	44	46	39	29
39-44.99 (42)	x	15.1	13.4	13.4	13.8	17.4	15.6	14.2	13.3
	S.D.	3.1	3.9	2.3	3.4	5.0	4.6	2.6	2.8
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	14.5	13.7	13.4	13.0	16.4	14.7	14.9	13.7
	S.D.	2.7	3.7	2.5	3.3	3.2	3.8	3.2	2.8
	n	32	34	39	29	34	36	34	27
51-56.99 (54)	x	15.0	13.5	12.1	13.7	14.6	13.8	13.8	14.8
	S.D.	4.4	3.3	2.7	2.5	2.6	3.4	2.7	3.5
	n	26	33	32	35	36	35	33	37
57-high (60)	x	13.9	12.9	11.8	12.7	14.4	14.0	13.3	13.3
	S.D.	2.4	3.9	2.1	3.1	2.7	3.6	2.7	2.7
	n	16	40	72	103	16	35	78	85
TOTAL	x	14.4	12.9	12.6	13.1	14.7	13.2	13.0	13.3
	S.D.	3.3	3.5	2.7	3.0	3.4	3.8	2.9	3.1
	n	380	406	408	393	398	374	394	364

Table IV- 25 - Arm Muscle Area (mm2) for Males and Females

Age		Males				Females			
(Months)	Values	Wave 1	Wave 2	Wave 3	Wave 4	Wave 1	Wave 2	Wave 3	Wave 4
0.-2.99	x	933	897	837	871	858	672	947	1255
(1.5)	S.D.	250	161	209	181	243	116	148	1096
	n	6	10	13	8	10	14	9	7
3-8.99	x	1104	1050	1105	1101	1077	1260	969	1033
(6)	S.D.	199	252	194	195	381	1933	206	150
	n	51	37	26	19	50	34	33	14
9-14.99	x	1093	1257	1272	1061	1072	1081	1072	1045
(12)	S.D.	211	1109	762	225	220	420	183	189
	n	51	50	37	29	39	41	38	37
15-20.99	x	1102	1088	1186	1119	1097	1060	1058	1050
(18)	S.D.	207	163	250	169	163	275	182	150
	n	40	47	30	27	45	32	27	22
21-26.99	x	1170	1090	1239	1129	1105	975	1084	1132
(24)	S.D.	192	173	235	167	157	207	183	285
	n	39	35	44	32	39	34	40	35
27-32.99	x	1157	1874	1273	1257	1184	1144	1257	1077
(30)	S.D.	182	3059	327	210	207	313	223	177
	n	44	43	44	40	51	36	31	36
33-38.99	x	1219	1265	1259	1339	1161	1379	1163	1261
(36)	S.D.	242	326	212	318	177	1215	222	257
	n	37	38	26	39	44	46	39	29
39-44.99	x	1231	1206	1338	1274	1250	1188	1224	1258
(42)	S.D.	278	277	257	205	199	236	196	281
	n	35	39	44	31	34	31	32	35
45-50.99	x	1325	1330	1358	1309	1313	1725	1337	1218
(48)	S.D.	173	256	248	207	274	1896	207	222
	n	32	33	39	29	34	36	34	27
51-56.99	x	1306	1505	1330	1350	1287	1619	1307	1395
(54)	S.D.	190	1097	220	252	224	2127	261	245
	n	26	33	32	34	36	35	33	37
57-high	x	1406	2102	1453	1415	1392	1370	1471	1437
(60)	S.D.	179	3072	220	234	255	270	260	272
	n	16	40	73	102	16	35	78	84
TOTAL	x	1181	1366	1289	1270	1166	1262	1218	1237
	S.D.	227	1510	346	261	256	1172	272	313
	n	377	405	408	390	398	374	394	363

Table IV- 26 - Arm Fat Area (mm2) for Males and Females

Age (Months)	Values	Males Wave 1	Males Wave 2	Males Wave 3	Males Wave 4	Females Wave 1	Females Wave 2	Females Wave 3	Females Wave 4
0.-2.99 (1.5)	x	504	336	358	431	514	318	312	520
	S.D.	87	84	116	108	165	105	108	215
	n	6	10	13	8	10	14	9	7
3-8.99 (6)	x	539	461	464	454	493	408	421	390
	S.D.	133	178	104	145	154	218	127	117
	n	51	37	26	19	50	34	33	14
9-14.99 (12)	x	471	437	430	423	495	416	398	403
	S.D.	130	188	144	104	128	188	115	120
	n	51	50	37	29	39	41	38	37
15-20.99 (18)	x	479	405	395	450	460	387	387	445
	S.D.	147	91	107	144	106	111	110	151
	n	40	47	30	27	45	32	27	22
21-26.99 (24)	x	558	387	423	481	489	401	408	454
	S.D.	140	117	124	139	116	151	138	123
	n	39	35	44	32	39	34	40	35
27-32.99 (30)	x	569	562	471	490	561	501	487	455
	S.D.	183	334	155	144	141	188	158	154
	n	44	43	44	40	51	36	31	36
33-38.99 (36)	x	606	560	511	534	581	519	455	558
	S.D.	157	167	145	116	198	156	134	126
	n	37	38	26	39	44	46	39	29
39-44.99 (42)	x	599	509	493	517	700	602	531	501
	S.D.	161	157	116	139	263	227	127	137
	n	35	39	44	31	34	31	32	35
45-50.99 (48)	x	604	548	523	511	668	643	562	536
	S.D.	151	194	126	150	146	296	130	135
	n	32	33	39	29	34	36	34	27
51-56.99 (54)	x	593	543	463	533	614	607	529	572
	S.D.	169	190	143	128	145	368	143	156
	n	26	33	32	34	36	35	33	37
57-high (60)	x	601	574	465	503	620	571	534	519
	S.D.	132	379	117	154	142	173	148	140
	n	16	40	73	102	16	35	78	84
TOTAL	x	552	492	461	494	557	498	474	493
	S.D.	156	225	133	142	174	233	149	148
	n	377	405	408	390	398	374	394	363

Table IV-27 - Intra-individual Changes in Anthropometric Indicators by Sex: Similar Seasons Compared, Adjusted by Initial Age and Time Between Measurements

		Rainy Season, 82-84 (Wave 1 to 4 Changes)		Dry Season, 82-83 (Wave 2 to 3 Changes)	
Variable	Values	Boys n = 254	Girls n = 234	Boys n = 326	Girls n = 294
Height z-score	x	-0.21	0.00	-0.27	-0.19
	(S.E.)	(0.13)	(0.13)	(.11)	(0.11)
	p	N.S.	N.S.	.014	N.S.
Weight for height z-score	x	-0.71	-0.77	-0.17	-0.34
	(S.E.)	(0.10)	(0.11)	(0.15)	(0.16)
	p	<0.10	<.001	N.S.	.035
Triceps skinfold (mm)	x	-0.90	-0.61	-0.44	-0.20
	(S.E.)	(0.16)	(0.17)	(0.14)	(0.15)
	p	<.001	<.001	.0018	N.S.
Sub-scapular skinfold (mm)	x	-0.37	-0.11	-0.01	0.18
	(S.E.)	(0.13)	(0.14)	(0.10)	(0.11)
	p	.006	N.S.	N.S.	N.S.
Arm fat area (cm^2)	x	-0.36	-0.17	-0.32	-0.12
	(S.E.)	(0.12)	(0.12)	(0.12)	(0.13)
	p	.002	N.S.	.009	N.S.

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APPENDIX A

Radio Spots Used in Campaign

Phase 1	April - June 1982
Phase 2	July - October 1982
Phase 3	November 1982 - March 1983
Phase 4	April - October 1983
break....	
Phase 5	February - April 1984

PHASE 1 SPOTS - May to June 1982

Spot #1 : NEWS ITEM

1) Introduction of Ministry of Health campaign against dryness;
2) Dryness is a condition that accompanies diarrhea, but it is much more dangerous;
3) The symptoms of dryness are - - loss of weight, sunken eyes, dry skin and weakness;
4) There is a special diet that will prevent dryness. It consists of breastmilk, adult food instead of watery pap, sugar and salt solution;
5) You can learn how to mix and administer this sugar and salt solution;
6) Radio Gambia is pledged to assist the Ministry of Health in this campaign to overcome the dangers of dryness in infants.
7) You will hear frequent messages and programs about infant diarrhea and dryness;
8) Let us work together to rid our nation of the danger of dryness.

Spot #2 : DRYNESS MEANS DANGER

1) Dryness means danger! (repeated) If your baby suffers from dryness, he could die!
2) It is our duty to care for them - we must be alert for signs that mean danger;
3) What are the signs of dryness danger? - baby will be listless, lose weight, he will have dry skin, dark eyes, sunken eyes.
4) You must do something right away;
5) Diet is the answer to dryness - it may not stop the diarrhea,but it can prevent dryness.

PHASE 1 Spots (continued)

Spot #3 : SONG (IN MANDINKA) - "DRYNESS IS DANGER"

1) Mothers and parents, if your children have diarrhoea, do you know what is the medicine? Let me tell you:
2) One bottle julpearl filled with water 3 times, put in basin, one cover of the bottle filled with salt and put in water, eight times of it with sugar and put in the water. Nothing more than eight times.
3) Give it to your child
4) Give rice-groundnut porridge - it is good medicine, too - the doctors told me this.
5) Breastfeed your children - it is true it is medicine for your children
6) Diarrhoea is the cause of death and it kills many children
7) Take good care of your children.

(Song also sung in Wolof)

Spot #4: FATOU-MARIAM DIALOGUE

1) M: We are not the only community with sick and dry children this time of year.
   F: There is a high prevalence of diarrhea this year. The important signs of dangerous diarrhea are: sunken eyes, weight loss and loss of appetite. Don't underestimate dangers of diarrhea;
2) M: Can you tell me how to prevent this? Our traditional healers are helpful;
   F: Yes, but if your child has these signs, he must be taken to the health center, and there is a special diet for children; These things are important: sugar and salt solution, continuation of breastfeeding, and solid adult foods such as rice, millet and findi.
3) M: This is new knowledge because our traditional diet for the sickness is different;
   F: Yes, paps aren't as good as adult foods. When diarrhea stops, give child extra adult foods for two days - this gives power.

Spot #5: MINIPROGRAM 1

1) Subject of this program is dryness - a condition that accompanies diarrhea and is particularly dangerous to young children
2) The Ministry of Health is currently focusing on this problem. It wants everyone to know the dangers of dryness, the symptoms of dryness, and the diet that can prevent dryness in infants;
3) We visited a clinic to find out about the problems of dryness;
4) A mother became concerned when her baby showed symptoms - sunken eyes and weight loss. At the health center, baby received instant help;
5) (Interview with nurse) and (interview with health worker)
6) Let's summarize what we learned today: babies with dryness have these symptoms - loss of weight and appetite, sunken eyes, listlessness. A diet for dryness is breastmilk, adult solid foods, and a sugar-salt solution. If you think your baby has these symptoms, take him to the clinic right away.

Phase 1 Spots

Spot #6: MINIPROGRAM 2 - TRUE/FALSE

1) Quiz to let people find out how much they know about childhood diarrhea and dryness;
2) Infant diarrhea is never dangerous?- that is false (gives symptoms)
3) Babies with diarrhea should be given breastmilk? - true
4) Dryness is a condition that can result from infant diarrhea? - true. If you see symptoms of dryness, get medical help right away.
5) Watery pap is best food for a baby with diarrhea? False (gives correct foods);
6) It is safe to wait 2 or 3 days after seeing first signs of dryness before taking baby to clinic? - false (take action right away)
7) Sunken eyes and weight loss are symptoms of dryness?- true
8) Baby with dryness needs a lot of liquids to drink?- true
9) Adult food should never be given to baby with diarrhea? - false
10) Sugar and salt solution is most effective treatment against diarrhea? - true
11) Baby with dryness can be treated at home? - false
12) (added section) What is meaning of the red flags our health workers are distributing? - They are an important symbol of the campaign against diarrhea and dehydration. These people are specially trained to know how to treat these problems.

Spot #7: MINIPROGRAM - DRAMA

1) Drama about mother worried about baby with diarrhea (symptoms)
2) Take child to health center right away.
3) (dialogue with nurse at health center) - Mother did right thing to bring child in fast- gives him sugar and salt solution
4) Mother and baby return home - baby is much better. (discussion about what nurse said to do)
5) Announcer - keep listening and you will learn how to help your children when they are sick.

Spot #8: INTERVIEW BETWEEN S. FYE AND DR. CONTEH

1) (dialogue between the two about dangers of diarrhea) Diarrhea is most harmful to children. There are two types of diarrhea: one can kill child quickly, the other cannot kill a child quickly, but will really disturb the child's health.
2) If child has been well-fed all along and happens to get diarrhea, it cannot kill him because he's a healthy child. But if child has not been well fed and has had diarrhea on and off, it can kill him.
3) Signs of diarrhea - sunken eyes, weakness, skin sticks to bones. Give sugar and salt solution, breastfeed the child, give solid foods - feed him bit by bit. Give him what ever he wants to eat while he is getting better.
4) (gives correct proportions of water-sugar-salt solution) Give it slowly to child. Capfuls should be level ones
5) If child drinks all the WSS, a fresh one should be mixed. Make a fresh one the next day. If child is older, give WSS four times a day. If child is getting well, take him back to clinic for reassessment.

Phase 1 Spots

Spot #9: INTERVIEW WITH IMAM

1) Tell us what the Holy Koran says about the duty of parents for the health of their children;
2) People should be clean before doing anything. Koran says parents should take good care of their children.
3) Cleanliness brings good health.
4) Mothers should breastfeed their children, and do not feed them dirty food, or they will get diarrhea. They should tive their children sugar and salt solution, and good solid foods.
5) Announcer: Our health workers also are spreading this important message to villages. Look for the red flag when your child has diarrhea.

PHASE 2 SPOTS - July to October 1982

July 12 to August 2 Spots

Spot #10: RED FLAG SPOT NO. 1

1) Health workers in village throughout the country are working hard to teach mothers to look after their babies with diarrhea.
2) A red flag will fly in the compound of the person in the village who has been specially trained to teach mothers about the diet that stops dryness.
3) Dryness can kill babies, but if we know the diet for dryness, they will not die;
4) Symptoms of dryness: loss of weight, dry skin, sunken eyes
5) Diet that stops dryness is: breastmilk, and fluids, the special sugar and salt mixture (gives correct proportions), solid food to build up his strength
6) Go to the person with the red flag if yourchild has diarrhea.

Spot #11: RED FLAG SPOT NO. 2: STORY TELLER

1) Story teller tells story of woman with sick child, who recognized symptoms of diarrhoea and dryness.
2) Woman could not remember the diet to stop dryness, but remembered seeing the red flag in her village. Knows what the red flag stands for (specially trained person who knows the diet)
3) Goes to red flag volunteer, learns the diet for dryness (gives proportions of water-sugar and salt), and baby was saved.

Spot #12: RED FLAG SPOT NO. 3: MARIAM AND FATOU

1) (Dialogue between the two women about the red flag) Mariam wants to know what it means. Fatou replies that the person living there has had special training, to know how to look after babies with diarrhea.
2) Fatou says that the red flag person can tell mothers how to make the special sugar and salt mixture that can stop dryness.

Spot #13: RED FLAG: POEM

1) Red flag poem - it is flag of help, person is trained to give help, trained to make the salt and sugar mixture that can save your baby's life.
2) Remember red flag of help. A baby with diarrhea needs the diet that stops dryness (gives diet), (gives water-sugar-salt proportions)

Spot #14: DRAMA WITH FATOU, DEMBA, AND ADAM: DIET FOR DRYNESS

1) Demba tells Fatou not to listen to radio, that older women of village have been looking after children for a long time
2) Fatou says radio tells us better ways of doing things to keep our children healthy.
3) Adam points out to Demba that Fatou child is ill. Adam thinks child is suffering from dryness. Demba tells Fatou not to give child breastmilk, but Adam says breastmilk is good for the child. It is part of diet for dryness.
4) Adam says to take child to clinic, and tells Demba to listen to the radio to learn the diet for dryness.
5) Fatou learns how to mix the sugar and salt solution while at the clinic (gives proportions). Adam and Fatou talk about what health worker said to give to sick baby (solid foods to regain strength, keep baby on breastmilk, give one bottle of sugar-salt mixture every 24 hours)

Spot #15: THE DIET THAT STOPS DRYNESS: Spot 1

1) Dialogue between a Specialist and a mother about dryness.
2) Symptoms of dryness
3) Continue with breastmilk - it is the best food for baby
4) Make sure breasts are clean before feeding
5) Give baby additional liquids if he is thirsty - teas and juices
6) Items needed to make the sugar-salt mixture - bowl, julpearl bottles - gives proportions.
7) If baby on solid foods, give them to him to regain his strength.
8) These are the things in the diet that stops dryness.

Spot #16: THE DIET THAT STOPS DRYNESS, Spot 2

1) (Dialogue between a specialist and a mother)
2) Gives symptoms of dryness; although baby won't be very hungry, give him solid foods if he was eating them before.
3) Good foods are: boiled rice, groundnut porridge, cheereh, oil, beans and fish if possible
4) If baby not old enough for these, give breastmilk to make him strong

Spot #17: DIET THAT STOPS DRYNESS, SPOT 3

1) (Dialogue between specialist and a mother)
2) Same messages as Spot 2, but more emphasis on mixing proportions of WSS solution.
3) Specialist says health worker can tell you how much mixture baby will need, depending on baby's age and weight.

Spot #18: DIET FOR DRYNESS: MINIPROGRAM No. 2

1) You've probably heard the messages about dangers of dryness
2) Here are two experts demonstrating the correct way to mix the sugar and salt solution (experts go through dialogue about mixing)
3) (Experts talk about solid foods, and breastmilk and juices)
4) (recorded in actual village, with questions from audience)

PHASE 2 SPOTS : AUGUST 3 to SEPTEMBER

(Red Flag Spots 1,2, and 3 from July-August broadcast during this phase.)

Spot #19: ADMINISTRATION: MINIPROGRAM NO. 1

1) We're listening to someone taking an important test - a health worker trainee. Let us see how he does.
2) How do we mix sugar and salt solution? Everything must be clean and (gives proportions of WSS).
3) How much mixture should a child have? Depends on age of child. Child under six months - we measure out one Julpearl bottle to be given in 24 hours. Child between 6 and 18 months, give 2 Julpearl bottles every 24 hours. If child older than 18 months, all mixture (3 bottles) should be given in 24 hours.
4) What are the five things to remember about giving the WSS mixture? Make fresh batch every day, give mixture slowly with clean cup and spoon, give mixture regularly, even if baby vomits it up. If that happens, wait awhile and start again slowly, give other parts of the diet for dryness, give right amount.
5) What kind of good food should baby have? Whatever foods he's used to - gives examples.
6) Give extra food for same number of days child was sick, so he can regain strength.
7) Give baby teas and fruit juices mixed with sugar and water, but breastmilk and WSS are even better.

Spot #20: FECES SPOT NO. 1

1) Disease is likely to come in places that are dirty. If we want to keep disease away, we must keep dirt away.
2) A particular kind of disease is infant diarrhoea. His stools will contain part of the diarrhoea disease. If another child touches those loose stools, he may pick up the disease too and get sick.
3) As good mothers know, we should all keep our compounds clean of feces all the time. Every time a baby has a loose stool, we should clean it up immediately, and cover or bury it.
4) Get into the habit of keep compounds clean; perhaps appoint one person to be responsible for cleaning feces from compound.

Spot #21: ADMINISTRATION SPOT NO. 2

1) Here we are at a village where a health worker is showing mothers how to make WSS. (Health worker points out key points briefly about the diet for dryness)

Phase 2 (part 2) continued

Spot #22: ADMINISTRATION SPOT NO. 3

1) (Dialogue between Fatou and Mariam)
2) Mariam says she wants to keep salt in her compound in case her children get diarrhea. Says she learned this from Awa, the red flag person in her village.
3) Mariam says Awa knows about the WSS mixture.
4) Fatou gives amounts children in each age group need of WSS mixture.
5) Mariam asks - if child is under 6 months, do I just make up mixture with one bottle of water.
6) Fatou says no!, always make the WSS mixture with 3 bottles (and gives rest of proportions)
7) Fatou says give mixture slowly from a spoon throughout day and night. Leftover mixture can be added to family's food.
8) Mariam says that fresh batch should be made every day.

Spot #23: ADMINISTRATION SPOT NO. 4

1) Announcer talks about diet for dryness - components, and
2) tells listeners how to give the WSS properly (the five things to remember), and
3) gives amounts for administration to kids of certain ages.

Spot #24: ADMINISTRATION: MINIPROGRAM NO. 2

1) Announcer is talking to guest from Medical and Health Dept.
2) Guest talks about WSS (gives proportions) it is important they be exact, says how much to give, and that mother shouldn't give up too easily if child doesn't want to drink it.
3) Guest talks about amounts of WSS to give to kids of different ages. Also discusses other important things: mixture must be made fresh and unused portion should not be given next day, but can be mixed in with the family's meal.
4) Guest discusses child's need for extra food to regain strength, what those good foods are, how many days to give extra foods (for same number of days child had diarrhea). Discusses the five things to remember. (see Spot #19)

Spot #25: FECES SPOT NO. 2 WITH FEMALE ANNOUNCER

1) Announcer - want to talk about cleanliness in the compound.
2) It is a busy time of year, and we may not always have time to do all the things we need to do. In the rainy season, there is one important job that shouldn't be neglected - watery stools should be taken out of the compound whenever they happen.
3) Watery stools contain part of the diarrhoea disease, and if left in compound, another child may touch it, and will get the disease and become sick. Diarrhoea is not always dangerous, but it can lead to dryness, and dryness can kill babies.
4) If you are in habit of catching baby's stool in a pot, remember to empty pot into latrine or pit right away. If you can't, cover it so children won't accidentally touch it, and no flies can land on it. Flies carry disease from one child to another.

Phase 2 Spots (continued)

PHASE 2 - AUGUST 23 to OCTOBER 23

Spot #26: HAPPY BABY LOTTERY SPOT 1 (prepublicity announcement)

1) Here's wonderful news. The medical and health department is having a lottery.
2) Its called the HAPPY BABY LOTTERY and is a lottery for mothers only. Next week Radio Gambia will give all the details.
3) So, mothers, remember to listen to Radio Gambia next week. Perhaps you can be a winner of a grand prize in the HAPPY BABY LOTTERY.

Spot #27: HAPPY BABY LOTTERY SPOT 2

1) Mothers, get your free mixing picture from your health center, or from the red flag compound.
2) Listen to the Radio Gambia programmes which will teach you how to use the mixing picture to make the sugar and salt mixture that can save babies from dryness that comes with diarrhea.
3) You could win a grand prize - a radio or cassette player. The lottery begins on September 9, so don't waste time.

Spot #28: HAPPY BABY LOTTERY: FULL ANNOUNCEMENT

1) The medical and health department is running a special HAPPY BABY LOTTERY. This is open to mothers who know how to make the sugar and salt mixture that saves babies from dryness.
2) If you want to win, you must know how to mix the WSS properly and you must have a copy of the mixing picture.
3) Can get mixing picture from health center or red flag compound.
4) Here's how the lottery will work (gives details on how lottery participants will be chosen)

Spot #29: HAPPY BABY LOTTERY: #2

1) Mothers, do you have your free copy of the mixing picture yet?
2) Here's how to use the mixing picture to make the sugar and salt solution correctly. Clean mixing bowl to start with,
3) RED picture - add 3 Julpearl bottles clean water
4) YELLOW picture - add one level Julpearl cap of salt
5) BLUE picture - add 8 level Julpearl caps of sugar
6) Other side - how to level the caps, stir it
7) Here are the five important points to remember in giving WSS (see #19)

Spot #30: HAPPY BABY LOTTERY SPOT NO. 3

1) Mothers, listen to Jaata Kendihya at 8:30 pm on Thursday and Saturday night. You'll hear the names of the twenty villages that will be visited by judges next week.
2) Remember, if your village is chosen, you must have a mixing picture and you must take it with you on judging day. You can get one from health center or red flag compound.
3) So, get your mixing picture, learn to mix the WSS solution and listen to the program to hear the names of the villages.

Spot #31: HAPPY BABY LOTTERY - JAATA KENDIHYA DRAWING

1) Jaata K. program - here are the names of the villages chosen to be visited by the Happy Baby Lottery judges next week.
2) Here is what you need to do if you village is chosen (same as earlier messages)
3) Mother will have to be able to show judge how well she can mix WSS, the 5 key points about how to give the mixture, and if she can do this, she'll win a prize immediately, and her name will go into a special drawing for the grand prizes.
3) If your village is not chosen, do not throw away the mixing picture.

Spot #32: HAPPY BABY LOTTERY: #4 - Public Notice

1) Here's today's special news about the Happy Baby Lottery. This week the judges will be at the following villages..._____
2) Mothers, remember, if you want to be in the Happy Baby Lottery, you must be there on judging day;
3) You must have your copy of the mixing picture with you
4) And you must know how to make and give the sugar and salt mixture that can save babies from the dryness that comes with diarrhoea.

Spot #33: HAPPY BABY LOTTERY, SPOT 5

1) Here's special news about the Happy Baby Lottery
2) Next Saturday (Oct. 9) is the big night. That's when we'll find out who won the grand prizes of radios and cassette players.
3) Be sure you're listening to Radio Gambia next Monday night at 8 pm.

Spot #34: HAPPY BABY LOTTERY- GRAND PRIZE NIGHT

1) Tonight is the night we will announce the Grand Prize winners and Village winners in the exciting Happy Baby Lottery.
2) (Speech by honored guest...)
3) Mr. Minister reads names of mothers who have won radios. (10 women)
4) Reads names of women who have won cassette players (5)
5) Announcer: Mothers it is important for you to keep your Mixing Picture. Later this month we will be bring you programs [illegible] which will tell you why to keep it.
6) Mr. Minister reads names of villages who have won 50 kg of sugar and 100 kg bag of rice.
7) Information given on how to claim lottery prizes

Spot #35: HAPPY BABY LOTTERY Spot 6

1) Announcer: Ministery of Health has announced the grand prize winners and village winners. (Gives names)
2) Tells how to claim prizes.

Spot #36: POST LOTTERY SPOT 1

1) (Dialogue between Fatou and Mariam about Happy Baby Lottery)
2) F: I've been listening to the Happy Baby Lottery, even though I did not win a prize.

Phase 2 (part 3) continued

Spot #36 continued

3) M: Fatou, you would have won if a judge had come to the village, you know all about the sugar and salt mixture that can save babies from diarrhoea, and you also know all the five points about giving the mixture correctly. Its a pity that not everyone won a prize.
4) F: Well everyone does win a prize, because the real prize comes from having amixing picture and knowing how to mix the WSS so that you'll always know how to help your baby get better if he gets diarrhoea.
5) M: It is true that it certainly brings peace of mind to parents when children are healthy.
6) F: God has given us our children as a special gift, the best way to thank God is keep our children happy and healthy. So, now, Mariam , do you think you won a prize in the Lottery?
7) M: Yes I did. I learned that one of the best ways to keep my babies healthy is to remember the Diet thatstops Dryness - breastmilk, solid foods - for babies who are old enought for it, and the special sugar and salt mixture, which is made with 3 Julpearl bottles of water, 1 level Julpearl cap of salt and 8 level Julpearl caps of sugar.

Spot #37: POST LOTTERY SPOT No. 2

1) Announcer: Here's an announcement for all of you who have kept your Mixing Picture. Today the Minister of Health will talk to you about this subject.
2) Min: Have you thought about what a wonderful prize it is to have happy healthy babies? The slogan that opens all these special programs about infant diarrhoea tells us that "the health of the child is the peace of mind of the parents". That is the special prize that we all receive if we keep the mixing picture in a place where we can always see it and use it.
3) If all parents in our country knew about the diet that stops dryness and how to make WSS and remembered to keep their compounds free of feces at all times, it is possible that we could get rid of infant diarrhea in our country.
4) So, by keeping the mixing picture and knowing how to use it, we all win two special prizes. We learn how to keep our babies healthy, and we help our whole nation.

Spot #38: POST LOTTERY SPOT NO. 3

1) Specialist and mother are talking.
2) Spec: This is Mrs. _____, and I want to ask you some questions about the lottery. Did you win a prize?
3) Mother: no, I didn't win a radio or even a bar of soap or a cup.
4) Spec. Are you disapppointed? Mother: No, I'm happy for all the mothers that did win, and I'm happy for what I learned
5) Spec: What did you learn?
6) Mother: I learned how to make the special sugar and salt mixture that can stop dryness that comes with diarrhoea. You take a clean mixing bowl. Put into it 3 Julpearl bottles of clean water, add 1 Julpearl cap of salt, levelled, and 8 Julpearl caps of sugar, levelled. Mix it all until it is dissolved.
6) Is there anything else you learned? Yes, I learned the 5 important points about how to give the WSS mixture. They are: (1) make a fresh

Spot 38 continued

batch every day; (2) give the mixture slow using a clean cup and spoon; (3) give mixture regularly, even if baby vomits it up. Stop for awhile, and then try again, slowly; (4) give the other parts of the diet that stops dryness - breastmilk, solid foods if baby is old enough for it (5) give the right amounts: a baby under 6 mo. should have one Julpearl bottle taken from the mixture within each 24 hour period, a baby 6 to 18 months should have 2 julpearl bottles every 24 hours, a baby over 18 months should have 3 Julpearl bottles or all the mixture in 24 hours.

PHASE 3 SPOTS - NOVEMBER 1982 to DECEMBER '82 (PART I) Dry Season

Also broadcast at this time: Feces Spot #3, Admin Spots 2,3,4(#21,22,23 Post lottery #2(#37), Dryness/danger Spot 4

Spot 39: DRY SEASON SPOT 1: MEDICAL AND HEALTH DEPT. SPOKESMAN

1) Ann: This is Mr. Dibba from the Medical and Health dept. with another important message from our campaign to protect our children from diarrhea and dehydration.
2) Dibba: We've brought you programs in the past months telling you how to best care for your baby when he has diarrhoea by giving him the WSS solution, breastmilk, and solid foods like boiled rice and rice and groundnut porridge. Today I want to tell you why its important at this time of year to remember how to mix and give the WSS solution.
3) During the next few months our babies can get sick with a very dangerous kind of diarrhoea. This type of diarrhoea causes the baby to pass many watery stools in a short time, 1 or 2 days and can quickly make him dehydrated. If not treated quickly, a dehydrated baby can die.
4) Remember the signs of dehydration: 1) dark, sunken eyes 2) dry mouth, 3) loose, dry skin 4) weight loss; and 5) a very weak condition (can't hold head up).
5) If your baby gets diarrhoea during the next few months, do the following: mix the WSS solution immediately and begin giving it to your baby immediately. (Gives proportions - see Spot #38) (Gives correct amounts for age - see Spot #38).
6) Watch your baby closely for signs of dehydration, especially dark, sunken eyes and dry skin and mouth. If you see these signs, take your baby to the health center as quickly as possible so he can get special treatment. Did you get all that? If you have trouble remember, go the your nearest health worker or Red Flag Volunteer.

Spot #40: FECES CAMPAIGN MINIPROGRAM 1

1) This is a quiz program during which you can find out how much you about the problem of diarrhoea in children.
2) Infant diarrhoea is caused by hot, rainy weather. False: diarrhoea is caused by tiny germs that get into baby's stomach.
3) Some of the diarrhoea germs are pass out of baby's body when he passes a watery stool. True: Diarrhoea is the body's way of getting rid of germs.
4) Diarrhoea germs that are passed in a watery stool are not dangerous to other people. False: Germs are very dangerous to

Spot 40 continued

other children. This is how the disease is passed to another child.

5) Flies can carry the germs from one child to another. True - flies don't cause diarrhea, but they can pick up the germs from the watery stool and they can carry the germs to another child.
6) There is nothing we can do to prevent the diarrhoea germs in watery stools from being passed from one child to another. False - if we can stop children from touching the watery stools and if we can keep flies away from them, we can do a lot. The important thing is to clear the feces from the compound as soon as it happens.
7) Feces should be taken right away from the compound and put into a latrine or a pit, and then covered with straw or earth. True - it is not enough to just take the feces outside the compound and throw them on the ground. Feces should always be covered.
8) This quiz reminds us how important it is to clear up infant feces as soon as it happens. This way we can all prevent the spread of infant diarrhea , because diarrhoea can lead to dryness, which can kill children.

Spot #41: FECES SPOT NO. 4

1) Dialogue between Fatou and Mariam about feces in compound
2) M: My little Awa has diarrhea, but she is not too sick. She is very thirsty and not very hungry, but wants to play with the other children.
3) F: Look, Awa has just had a very loose stool. The other children are playing right there. One of them might accidentally put his fingers in that stool.
4) M: Well, there is nothing I can do about it. I can't stop the loose stools.
5) F: But you should clean it up and take it out of the compound and cover it right away. Leaving the stool lying around might make one of the other children sick, if they touch it. I will clean it.
6) F. If a baby has diarrhea, part of the disease is carried out of the body in the watery stool.
   M. So another child could get disease if he touched the stool.
7) F: Yes, if flies settle on feces and touch our uncovered foods, then the foods become contaminated. If we eat it, we become sick with diarrhea. That is why it is important to keep the compound clear of feces all the time, not only when our children have diarrhea.

Spot #42: DRY SEASON MINIPROGRAM No. 1 - Jaata Kendeya

1) Tonight we will honor Red Flag Volunteers. They have been specially trained by health workers to know how to properly treat a baby with diarrhea. They fly a red flag in their compound to show other people where to come for advice about diarrhea.
2) By teaching mothers how to mix and give the WSS solution, the volunteers are protecting our babies from diarrhoea and dehydration.
3) (excerpts of interviews with red flag volunteers)
4) (speech by Min. of Health expressing appreciation to Volunteers with warnings about dry season diarrhea - same signs of dehy as in spot #39, mixing proportions, and age amounts to give, same as #39)

Spot #43: FECES SPOT NO. 2

1) Ann: I invite you to listen to the words of Imam _____
2) Imam: According to the Koran, we should be clean before doing anything. Cleanliness is best.
3) Ann: Keeping clean helps us keep free of disease. Let us remind ourselves to keep our compounds free of infant feces. They are one of the main causes of spreading diarrhoea from one child to another. Germs can be easily picked up by one child who touches the watery stool of a sick child. It is our duty - not just the mother's - to be sure that feces are removed from compuond and buried immediately. Listen to what Imam ____ says about cleanliness and disease.
4) Imam: Cleanliness brings good health and builds a good relationship between a person and God.

Spot #44: FECES SPOT no. 5

1) Specialist and mother are talking about controlling diarrhea.
2) This is a time of year when diarrhea can be a continuing problem for young children
3) Mother: What is the cause of diarrhea in young children?
4) Spec: Diarrhoea is caused by germs - very tiny living things.
5) Mother: How does a baby get these germs?
6) Spec: Germs are carried out of sick baby's body in watery stools. If another baby touches this stool, then germs will get onto his hands. If he puts hands into his mouth or onto food, the germs will get into his body, and he will get diarrhea.
7) Is that the only way a baby can get diarrhea? A mother can accidentally give gemms to baby. If she touches watery stool, and then touches her breast, baby may pick up germs. Mothers should always wash hands with soap after cleaning feces.
8) How do we stop diarrhoea from spreading? Keep compound clear of feces at all times. Clean up feces and put in latrine or bury it.

Spot #45: DRY SEASON MINI No. 2

1) Interview with Dr. Conteh. Is there anything special about diarrhoea that occurs in dry season?
2) Yes,(describes acute dry season diarrhoea, which leads to rapid dehydration and death in an infant)
3) Can you tell us what signs of dehy are?
4) Conteh: 1) Eyes become dark and sunken, 2) child is very thirsty and mouth is dry, 3) skin is dry and becomes loose, inelastic 4) child loses weight 5) child is very weak, "floppy", can't hold head up.
5) What should parents do? The WSS solution should be mixed and given when ever a baby has diar. BUt once a child shows signs of dehydration, the WSS is not enough. Child should be taken to health center right away. Mother should keep giving WSS until they reach the center.
6) Announcer gives correct proportions of WSS mixture.
7) Conteh tells how much of it to give depending on age: at least 1 bott of solution daily, kid under 6 mo; at least 2 bottles for 6-18 months, at least 3 bottles for child over 18 months.
8) Solution needs to be mixed fresh each day. Leftover can be added to families cooking.
9) How many days to give WSS? For as long as the diarrhea lasts, but if diarrhea lasts longer than 3 days, mother should take baby to

PHASE #3(part 1) continued

SPOT 45 continued
health center.

Spot #46: FECES CAMPAIGN, MINIPROGRAM 2

1) Here is a doctor to help us understand children's diarrhea.
2) What is diarrhoea? (answer by expert)
3) Doctor gives info. (not included in written message) on germs, prevention of spread of diarrhea.

PHASE 3 SPOTS, PART 2, JANUARY TO MARCH 1983

(Also broadcast: Dry season spot 1,3; Feces Spots 2,4, dry season miniprogram 1,2)

Spot #47: DRY SEASON SPOT 2

1) Fatou and Mariam. Fatou has heard program talking to her (a red flag volunteer and others) F: The radio was saying some thing new about protecting our babies from diarrhoea and dehydration.
2) In the dry season, our babies can get sick with a dangerous kind of diarrhea. It makes baby pass many watery stools in 1 or 2 days, and can quickly dehydrate him.
3) Mariam asks what to do. F: you should give WSS immediately (gives proportions as in earlier messages, gives amount for child ages). And there is the important point about recognizing the signs of dehydration: dark, sunken eyes, dry skin and mouth and noticeable weight loss. If you see these, take baby to health center as quickly as possible.

Spot #48: DRY SEASON PROGRAMME, FECES SPOT 6

1) Today we will look at other possible causes of diarrhea.
2) Housefly can be a threat to health. If we leave food uncovered and a fly lands on it, then the food is contaminated.
3) If we eat the food or give it to our children, then we will suffer from diarrhea.
4) Flies are not only source of contamination - mothers should wash their hands with soap after cleaning a child's feces. Anyone else cleaning should, too.
5) Ensure that food is not going to be contaminated by covering all foods in house to protect them from flies. Clean all feces in compound - bury or throw into pit latrines. Wash our hands with soap and clean water after cleaning up feces.

Spot #49: DRY SEASON MINIPROGRAM 3 - Jaata Kendeya

1) Mr. Dibba is going to answer questions posed by parents about how to take better care of their children.
2) Diarrhea is dangerous. BUt mothers can effectively treat it at home with WSS. Doctors all over world have found this to be an effective treatment. Red Flag volunteers help us by teaching mothers right in villages about how to mix WSS.
3) We think a good start has been made on the campaign against diar. and dehydration.
4) Question: mother has treated child with WSS, but diarrhea has

Spot 49 continued

not stopped. What to do? WSS doesn't necessarily make diarrhea stop right away. Purpose of WSS is to prevent child from getting dehydrated. You shouldn't worry if your child continues to have loose stools while receiving WSS. Diarrhoea will usually stop after one or two days. If it goes for three days, take baby to health center

5) Baby should go to health center if he is vomiting, has fever, cough, blood in stool or any of signs of dehydration. (signs of dehy - same as spot 39, and 45).
6) Do not mix only one Julpearl of bottle with 1 cap of salt and 8 caps of sugar for a child under 6 months. Must always use 3 Julpearl bottles of water, no matter what age. (gives age amounts of WSS)
7) Make WSS fresh each day. Leftover can go into family cooking.
8) Baby not only can get diarrhea from touching another child's feces who has diarrhea, but also from contaminated food, from flies that land on food, and from a mother who has not washed hands after cleaning feces from compound.
9) Clean compound promptly, always wash hands with soap and water after touching feces and before preparing food.
10) Role of men in taking care of babies. All fathers should recognize signs of dehydration, and encourage their wives to take child to health center when ill. Learn how to mix WSS.

PHASE 4 SPOTS - JULY TO OCTOBER 1983

(Also: Feces Spots 4,6; Administration 1,4; Rainy Season spot 6)

Spot #50: POWER FOODS

1) (sound of crying child) Announcer: Have you heard that sound. Mother is worried because her has diarrhoea and has lost his appetite
2) You should give him breastmilk and coax him to rice and groundnut porridge or coos porridge with sugar and milk.
3) As soon as the diarrhoea is better, give him solids foods that will give him power. These are _____ (foreign words for food)
4) Next time your baby has diarrhea, give him breastmilk and try to give him rice and groundnut prrridge or coos porridge that is not watery. Once his appetite returns, give him solid foods, which will give him weight and power.

Spot #51: POWER FOODS

1) When your child is recovering from diarrhea, give him solid foods to give him power. Try to feed him when he loses his appetite. Give him breastmilk, and foods like rice and groundnut porridge adding some sugar or milk.
2) When his appetite returns, give him solid foods like _____ These will help him regain weight and strength.
3) If he is still on the breast, continue to breastfeed him.
4) It is your duty as a parent to feed your child when he has diarrhea and even after the diarrhoea has ended.

Phase 4 spots (continued)

Spot #52: SOLID FOODS - EXPERT

1) This report is about child care, when child has diarrhea.
2) Child has to eat even if he is sick. If a child is sick and doesn't feel like eating, try to get him to eat as he should.
3) For him to eat porridge we have to put in sugar or milk if available. Breastmilk should be given continuously to child.
4) If diarrhea stops and appetite is restored, we should try to give him solid foods. There are different kinds from which to choose. (lists foods - other languages).
5) These solid foods help restore health of the child and his strength more than watery paps. They will restore power to child.

Spot #53: RAINY SEASON SPOT #4: EXPLANATION OF FEEDING FLYER

1) Have you heard of the free picture you can get from your local health center? It shows you some important information about the care of your child.
2) This year the Dept is giving you a picture that shows how to properly feed a child who has been sick with diarrhoea.
3) We are going to go over the picture.
4) The front side shows a mother feeding her baby. It shows the kinds of food you should feed when he is recovering from diarrhoea. They are solid foods like: (list of four in two languages)
5) We know sick child loses appetite and doesn't want to eat. He grows weak and thin. It is even more important then to give foods like _____ when child is recovering and appetite has returned. These foods give a baby much more power than paps, and will return him to a happy healthy state.
6) Other side of picture shows 6 foods which are especially high in power. They are fish, oil (palm and groundnut), and groundnuts. At bottom are milk, sugar and eggs.
7) Remember, these are especially good to add to your child's food at any time, because they contain a lot of power and will make him strong and healthy.

Spot #54 : TAKING CHILD FOR HELP (SPOT) RAINY SEASON 7

1) If your child is suffering from diarrhea, and there is no improvement by the third day, take him immediately to health center.
2) Diarrhea is very dangerous to a child. The dryness that goes with diarrhea can even kill achild. Do you remember signs? They are sunken eyes, loss of weight, dry and loose skin, loss of appetite, dry lips and thirst. If you see those signs, rush child to health center.
3) If you give WSS and there is no improvement by third day, you must seek help at the health center. We know that WSS along cannot treat child who has become dry.
4) Summary of above three items... ...

Spot #55: SPOT ON RAINY SEASON CHILD CARE 8

1) This is time of year when children get sick with diarrhea more often. This is serious, because in many villages, food is scarce, and many sick children aren't getting enough to eat.
2) Many of our children become dehydrated and malnourished during this season, and some die. We must make a special effort to take special care of our sick children at this time.
3) We are appealing to everyone, especially grandmothers, older children and fathers - - to help mothers take care of babies when they are sick.
4) A baby with diarrhea needs to be given WSS to prevent dehydration and he needs power foods when he is recovering to give strength.
5) Taking care of our children is an important responsibility we must all share - especially at this time of year.

Spot #56: SCRIPT FOR A RADIO SPOT PROMOTING SOLID FOODS

1) Mothers, when your baby is recovering from diarrhoea, give him power foods. Foods like (_____),
2) They contain much more power than watery paps and are what doctors recommend for a baby who has lost weight and power from diarrhea.
3) Next time baby has diarrhea, feed him small amounts of food while he's sick and continue to breastfeed him, too
4) When he's getting well, give him power foods.

Spot #57: SOLID FOODS SLOGAN

1) In Mandinka, Wolof, English:
2) When your baby is recovering from diarrhea, give him solid foods that will give him POWER POWER POWER (echo)

Spot #58: FECES SLOGAN (in Mandinka and Wolof)

MINICAMPAIGN SPOTS - FEBRUARY to APRIL 1984

(see also Field Notes #10 from Academy for Educational Development, February 1984)

Specific campaign messages are as follows:

Village Development Campaign

- The VDC is the entry point to the village. All visitors should pass through it.
- The VDC's responsibilities include organizing remuneration for the VHW and TBA; managing the VHW's drug supply; mobilizing the community to undertake projects promotive to health, such as water and environmental sanitation, vegetable gardening, etc.

MINICAMPAIGN MESSAGES -

Village development committees (continued)

- One of the VDC's most important specific responsibilities is inspection and maintenance of well-protected community wells. All VDC members should know the features of a properly protected well.

- VDC's should meet regularly to exchange ideas and plan ahead. Records of all activities should be kept.

Well Protection

- Wells should be protected against all possible sources of contamination because water is a good medium of disease germ growth and transmission.

- Wells should have the following protective features: a well or parapet at least 3' tall; a sloping cemented apron at least 4-6' in diameter around the well; a cover preferably made of flattened metal or other durable materials; an animal-proof fence around the well made from some locally available material; a permanent pc ' on a pulley system or Y-shaped pole for raising water.

- Laundry, washing of utensils, and watering of animals should be done outside the well's fenced area.

- VDC members should keep close watch on community wells to make sure they are kept well-protected.

Washing Hands with Soap / Germ Theory

- You should wash your hands with soap and water at the following four important times: after using the latrine; after cleaning up faeces from the compound; after cleaning up a child who has defecated; before eating or preparing food.

- Germs ("seeds of disease") are tiny creatures which are not visible to us but which can make us sick.

- Germs usually enter our bodies in the food we eat or water we drink or through the bite of an insect like a mosquito.

- Faeces contain many germs which can make us sick. They can enter our bodies if our hands come into contact with faeces and then touch our food, water, or mouth, or if flies sit on faeces and then come in contact with our food.

- Washing hands with water alone cannot wash away germs. Soap is necessary.

Appendix B

"Stratification Variables"

Health Care Level

- Hospital
- Health Center
- Dispensary
- Sub-Dispensary
- Maternal-Child Health Team Visits
- Peace Corps Volunteer
- Village Health Worker
- Nothing

Tribe

- Mandinka
- Wolof
- Fula
- Jola
- Sarahule
- Other
- Mixed

Language of Preference

- Wolof
- Mandinka

Radio Reception

- Banjul transmitter
- Basse transmitter

Location

- North Bank
- South Bank

Administrative Division

- North Bank Div.
- McCarthy Island Div.
- Upper River Div.
- Lower River Div.
- Western Div.
- City of Banjul

Livelihood

- Groundnuts
- Rice
- Millet
- Cotton
- Retail Services
- Vegetables
- Cassava
- Livestock (and Cattle Herding)
- Fishing

Community Services

- Paved Road
- Bus Service
- Taxi Service
- Telephone
- Telegraph
- Electricity
- Water Taps
- Wharf Town
- Ferry
- Primary School
- Secondary School
- Weekly Markets
- Daily Market
- Shops in Houses
- Rainy Season Access
- Post Office

Population

Appendix C

Description of the Sample in The Gambia

(A) Villages in the sample

There were twenty villages in the evaluation's sample. They were located in four divisions (a division is equivalent to a state in the U.S.); the Western Division, the North Bank Division, the Lower River Division, and the McCarthy Island Division. Much of the information here is also presented in the summary table in Chapter I.

THE WESTERN DIVISION

The five Western Division villages are located at or near the Atlantic coastline. They are perhaps the most diverse of the four divisional clusters. None of the villages has electricity or telephones.

Gunjur is a relatively large town of 732 compounds. The men fish in the ocean and operate fish-smoking houses on the beach. Groundnuts flourish here, as do citrus fruits and vegetables. Rice is grown in marshy depressions along the streams. Gunjur has a health center staffed fulltime, several primary schools, and a secondary technical school. Three other villages have Catholic mission schools.

At another Western Division village, Kachuma, the Manjago people work as palm wine tappers. Manjagos are atypical in The Gambia because they are Catholics from Guinea-Bissau and also because they live in isolated homes rather than in village clusters. Their Christianity allows them to be the only people raising pigs in mostly Muslim Gambia. However, their religion does not prevent them from practicing traditional African and/or modern Muslim polygamy.

Most people in the Western Division are Mandinkas and Jolas. Jolas come from the Casamance, an area of Senegal south of The Gambia. Jolas may be Christians as well, influenced by the French. They tend to be more cosmopolitan than villagers in

the other sample communities; some Jolas commute from Gunjur to white-collar jobs in Banjul.

THE NORTH BANK DIVISION

The North Bank is considerably drier than areas sough of the river. Fulas, Serere, Wolofs, and Mandinkas all live in the North Bank Division. Generally, Wolofs are absent from most of rural Gambia, except for two or three enclaves to the north of the river.

Groundnuts are the primary crop in the North Bank Division. Some women from the villages of Kuntair and Kerewan trek five kilometers daily to cultivate swamp rice plantings along the river. Traditional Fula leaders maintain sizable cattle herds in this division.

Kuntair has a clinic served by a trekking team from Essau. Kuntair and Jissa have primary schools. Kerewan has a fulltime health center, a primary and secondary technical school. Kerewan is located on the river and is a post for the ferry.

THE LOWER RIVER DIVISION

In the Lower River Division, three of our sample villages are mainly Mandinka, one is Fula, and one is Serahule. The Mandinka villages sit between the river and the south bank. Mandinkas cultivate large quantities of rice along with groundnuts. The other two villages, to the north of the road on higher ground, substitute millet cultivation for rice, and also grow groundnuts.

One Lower River Division village, Bureng, has a clinic that is served from Mansakonko. Two villages, Bureng and Baso Kunda, have primary schools.

THE MCCARTHY ISLAND DIVISION

The five village of the McCarthy Island Division are the most remote in our sample. Mandinkas are the primary group in these villages, although one is Serahule and others have many Fula, Wolof, and Jahanka people.

The Bansang hospital is a notable feature of the McCarthy Island Division. This facility is staffed by a medical team from the Peoples' Republic of China. It is the only hospital in The Gambia other than the Royal Victoria Hospital in Banjul. Bansang, located about 300 kilometers inland, also has a fulltime health center. It is the only village in our sample with electric power.

B. Socio-economic indicators among the sample population

This section summarizes data collected on socio-economic status of the people in our sample. We administered the questionnaire in May 1982 with a view toward discovering socio-economic differences among sample members.

Respondents showed considerable stability. Eighty-two percent have lived in their present house for more than four years; only 7 percent had moved in the year before. The vast majority of people live in homes owned by their family. Only one person out of 809 claimed to live in a rented house. Three people said they were "borrowing" the house. Thus, the sample reflects the Gambia village culture, where inhabitants are allocated land on which to build, and where people build homes for their own use.

(1) Compounds and Houses

Rural Gambians live in compounds within their villages. Compounds are essentially single-family dwellings, but rural Gambians don't conform to the Western practice of a nuclear family. Extended families live together in so-called single family compounds. Compound population can rise to well over 100 people. In some cases, different families share the same compound.

Houses usually have earthen floors (94%), with mud (29%) or mud-brick walls (60%). Three-quarters of the homes have corrugated tin roofs. The remainder have thatch.

The number of rooms per family varies with family size. More than half of the families in our sample have only one (35%) or two (20%) rooms. Thirty-seven percent do not have separate living and sleeping quarters.

Beds are a major item of furniture among people in our sample, but 12% possessed only one bed per family, and 59% of families had three or fewer beds.

We asked our Gambian interviewers to evaluate the condition of the respondent's house by comparing it with surrounding homes. The interviewers apparently were generous in their evaluations. They rated 48 percent of the homes as "average" and four percent as "poor", but the remainder were judged as being in "very good" condition. This was a non-standardized subjective measure, not a comparison against an absolute standard. Because compounds were randomly sampled within villages, it is quite unlikely that the housing quality is systematically different from that in the rest of the community.

(2) Sanitary and Cooking Facilities

Almost three out of four compounds in our sample have latrines. The data from the hygiene questionnaire indicated that 80 percent of adults in our sample used latrines for feces disposal.

All respondents in the sample cook over an open fire.

Almost all respondents said they store their food in a covered container. Refrigerators are used only by one percent of the sample.

Twenty-two percent of the respondents burn their garbage, and another

32 percent dump it in the fields. A surprising 43 percent claim that garbage is set out for public pick-up.

Electricity is available only in the village of Bansang. Only 32 women (4%) in our sample light their homes with electricity. Kerosene lamps are used by 78 percent of the sample. Some people (15%) use only candles.

Seventy-eight percent of the women in our sample own irons, of which the overwhelming majority (93%) use charcoal to heat them.

Seventy-three percent of the women in our sample, during the baseline survey, said they have a working radio in their compound, but later measures show a slightly lower percentage (about 60%) is actually able to show the interviewer a radio that actually works.

(3) Cash and Income

The sale of farm and garden produce are the two principal sources of family income among our respondents. In most cases women are responsible for rice cultivation, a subsistence crop. Men take care of the groundnuts, a cash crop. The money earned from the groundnut crop goes to the man. Among the Serahule people, however, women grow and sell the cash crops. In some areas in the west of the country, women sell vegetables from their gardens for cash also.

The number of animals owned is an index of wealth. Within breeds of animals, prices vary. Table I-4 shows the average prices for domestic animals in The Gambia at the time the measures were taken. Table I-5 lists the percentage of compounds in our sample owning particular domestic animals.

We used the prices of domestic animals to compute a measure of wealth for each family in our sample. Taking the sample as a

Table I.3: Crops under cultivation by members of sample (N-809)

Crop Name	Percentage
Groundnuts	78.6
Rice	67.1
Coos (millet)	56.9
Vegetables	30.0
Sorghum	7.9
Cotton	0.2
Others	2.2
None	3.5

Table I.4 : Average prices of domestic animals (in dalasis)

Animal	Price
Horses	600
Oxen	500
Cows	300
Pigs	90
Donkeys	70
Sheep	50
Goats	25
Chickens	3

Note: GSES

Table I.5 : Percentage of compounds in sample owning domestic animals

Animal	Percentage
Chickens	76
Goats	54
Sheep	53
Donkeys	44
Cows	35
Horses	13
Oxen	8
Pigs	2

Note: GSES, N=809

whole, 25 percent of the mothers are in families owning 110 dalasis or less of domestic animals. Another 25 percent of the women live in families with 111 to 495 dalasis worth of domestic animals. The family of another quarter of the women own up to 1815 dalasis worth of animals. The remaining quarter of women are in families owning animals worth 1816 to 42,122 dalasis. At the time this survey was made, a dalasi was worth about U.S. $0.46.

(4) Medical services costs

The socioeconomic status questionnaire also included questions about costs for obtaining medical services.

Most women in the sample incur no out-of-pocket costs when they take their children to the health clinic. More than four out of five women (85%) walk to the clinic, so no money is needed for transportation. However, there is an opportunity cost for the woman's time. Thirty percent of the women who knew the distance had trips of ninety minutes or longer. Roughly half the women (48%) had trips of a half hour or less. However, the health centers to which they walk are often not staffed; many are sub-dispensaries that are only staffed one day every two weeks. Hence the actual access to care, particularly for emergencies, is much lower.

Medicine is free in 95% of the cases. Consultation is free as well.

About one women out of seven said food for the journey cost money.

E. Water and sanitation

Virtually all (99%) of the village women in our sample draw their water from a well. Most of these obtain water from public wells (71.0%), another 26 percent have wells in their own compounds and another 3 percent draw water from wells in other compounds. Unfortunately, the well water is often not reliable.

The village women in our sample claim that three out of five wells go dry sometimes and 23 percent go dry every day. Among the women whose wells do run dry, three quarters of them report having no other source of water.

Most of the women in the sample store water in an earthenware jar. Seventy-three percent always filter the well water through a clean cloth, while 17 percent do this sometimes. Filtering is done in order to remove visible particles from the water. Insect larvae are referred to as "children of the water" and an attempt is always made to filter these out as well. However, ten percent of the women in the sample do not filter their water at all.

A cup is usually used (in about 87% of the cases) to dip water from the jar. Ten to twelve percent of the women use their hands for dipping water from the jar. This may be a particular source of contamination of the compound's water supply. Eighty-five percent of the women say that they cover the jar to keep the water clean, but this means that another 15 percent of the storage jars are not covered and are thus open to contamination by flies and dirt.

(1) Personal hygiene

Five out of six women in the sample say that they always use soap for their own personal hygiene, and all the others claim that they use soap at least sometimes. Clothes are washed with soap less than are the people in our sample; 42 percent of the women always use soap to launder their clothes, the remainder use it sometimes.

Teeth are cleaned regularly (87%) and chewing sticks are the preferred implement of 98% of the sample. Toothpaste is used only by two percent of the women.

(2) Waste disposal

Seventy-seven percent of the women live in compounds that have a latrine. The remainder have no systematic means of sanitation. Most compounds have an enclosed area for bathing and on one side of this area is a section for urinating, paved with flat stones for the user to stand on. Most children (91%) use this section during the day for urination, while seven percent use the bush. At night 70 percent of the children use this enclosed area for urination and 25 percent use a potty of some kind indoors. Most adults (83% in the day, 87% at night) use the bathing area for urination. Fewer than ten percent use a latrine for urination day or night, and the remainder use the bush. Therefore, while latrines are present in three-quarters of the compounds in our sample, they are not used for urination by a large portion of the adults and children in our sample.

Latrines are used for defecation by adults in our sample, but are not used by children. Fewer than one percent of the children defecate in a latrine during the day; five precent use the latrine for defecation at night. Instead, children use the compound both during the day (88%) and night (67%). Potty use rises from less than two percent during the day to 23 percent during the night. Among adults, latrine use for defecation is high - - 82 percent use it during the day, and 85 percent at night. The remainder use the bush. It is worth noting that a higher percentage of mothers reports using latrines for defecation than reports having a latrine in their compound. While there may be some public latrines and some women may use their neighbors' latrines, it seems likely that at least a few of the women are overestimating their behavior. However, it does seem that if a latrine is available on the compound, adults will use it to defecate.

APPENDIX D

TYPES OF FOODS CONSUMED IN THE PAST WEEK BY A WOMAN'S YOUNGEST NON-BREASTFED CHILD: TOTAL NUMBERS OF CHILDREN AND TOTAL NUMBERS OF TIMES EATEN, BY SEASONS

FOOD	MARCH 1982 (DRY) #KIDS	MARCH 1982 (DRY) TIMES	AUG-SEPT 1982 (RAINS) #KIDS	AUG-SEPT 1982 (RAINS) TIMES	APRIL 1983 (DRY) #KIDS	APRIL 1983 (DRY) TIMES	APRIL 1984 (DRY) #KIDS	APRIL 1984 (DRY) TIMES
RICE PAP	107	769	10	119	57	561	11	105
COOS PAP	430	3259	467	5129	420	5072	303	2870
CORN PAP	10	49	6	63	3	35	2	21
RICE	468	3992	472	4808	536	6674	439	4647
COOS	222	1157	166	1399	164	1327	237	1841
FISH	315	2257	103	788	214	1678	130	917
MEAT	198	630	31	89	57	206	46	175
CHICKEN	4	17	1	3	2	3	11	25
OKRA	5	54	0	0	5	24	1	3
BISAP	8	56	6	40	23	124	1	2
COCONUT	15	105	0	0	0	0	0	0
BEANS	7	33	1	7	0	0	0	0
PUMPKIN	4	25	0	0	0	0	1	3
GROUNDNUT PORRIDGE	122	373	124	921	260	2239	171	1214
SWEET POTATOS	21	100	3	6	5	33	2	6
GROUNDNUT PASTE	24	135	6	34	20	128	2	13
BITTER TOMATOS	2	16	0	0	1	2	2	12
CORN	4	28	0	0	0	0	0	0
PALM OIL	31	153	0	0	10	57	5	30
GROUNDNUT OIL	68	631	3	11	11	82	4	20
VEGETABLE OIL	4	16	0	0	0	0	0	0
FISH OIL	4	80	0	0	0	0	0	0
EGGS	100	275	16	52	41	198	21	82
CHEESE	1	2	0	0	0	0	0	0
COWS MILK	195	1067	146	1127	103	822	36	262
GOATS MILK	5	27	0	0	0	0	0	0
PANCAKES	143	636	1	4	16	68	17	84
AVOCADOS	0	0	0	0	0	0	0	0
EGGPLANT	4	29	1	14	2	10	0	0
ORANGES	123	919	9	27	19	297	5	46
GRAPEFRUIT	9	58	0	0	1	2	1	3
MANIOC-CASSAVA	19	96	0	0	0	0	0	0
MANGO	13	116	2	10	111	897	14	100
HONEY	4	14	0	0	1	7	0	0
LIMES	0	0	0	0	0	0	0	0
TOMATOS	7	54	0	0	0	0	0	0
CARROTS	4	26	0	0	2	16	0	0
SOUP	36	385	0	0	0	0	1	2
SOFT DRINKS	9	33	1	4	0	0	0	0
BANANA	37	242	6	41	26	61	7	32
CANDY	1	7	0	0	1	7	0	0
CAKE	12	85	15	62	4	9	2	21
ICE CREAM	0	0	0	0	0	0	0	0
GUAVA	2	6	0	0	1	7	0	0
CABBAGE	0	0	0	0	1	3	0	0
ONIONS	3	30	0	0	0	0	0	0
JUICE	4	26	1	2	1	7	0	0
PAPAYA	20	88	2	8	7	24	2	9
LETTUCE	1	3	0	0	1	3	0	0
POWDERED MILK	8	81	5	71	10	171	1	5
BREAD	26	113	1	14	0	0	0	0
CANNED MILK	3	7	0	0	0	0	0	0
PALM WINE	2	17	0	0	0	0	0	0
BAOBAB	3	21	0	0	0	0	0	0
SORGHUM	11	69	0	0	0	0	0	0
POTATOES	3	5	0	0	0	0	0	0
HOT WATER AND SUGA	2	2	0	0	0	0	0	0
TEA	2	2	1	3	0	0	0	0
BUTTER	3	12	0	0	0	0	0	0
FINDI	3	10	0	0	0	0	0	0
WHEAT	2	14	0	0	0	0	0	0
BISCUITS	6	29	0	0	0	0	0	0
GROUNDNUTS	2	10	0	0	0	0	0	0
GREEN LEAVES	1	3	0	0	0	0	0	0
CUSTARD	1	13	0	0	0	0	0	0
NYELLUNG	14	84	0	0	0	0	0	0
GROUNDNUT SEEDS	1	1	0	0	0	0	0	0
CERELAC	1	7	0	0	0	0	0	0
OGGI	1	7	0	0	0	0	0	0
SOUR MILK	0	0	0	0	2	10	0	0
TOTAL # CHILDREN	637		651		670		520	

NOTE: COMPILED USING G#GFOODSAS PROGRAMS.
*WAVE 4 EXCLUDES DIVISION 3, DUE TO FIELDWORKER ERRORS.

APPENDIX E

Estimation of Child Mortality Rates

The procedure by Griffith Feeney (1976), assumes (1) the mortality rate is declining, (2) there is no differential mortality by the age of the mother, and (3) the lifetable is a known, one parameter model family. The formula is:

$$Q = 1- , C \quad P (w,r)$$

where Q is the proportion of deceased children born to women in the age group; C is the proportion of a group of children born in the jth year prior to the census, P (w,r) is the proportion of children born during the jth year prior to census who would survive, w is the infant mortality rate at time of census, and r is the constant rate of decline in the years prior to the census. Since C can be estimated from the mean child-bearing age (M), the formula may be written:

$$Q = 1 - \quad , C \quad (M) \quad p \quad (w,r)$$

Tables 1 and 2 provide the necessary information to compute the mean age at childbearing infant mortality, and the years prior to census.

Table 1: Estimation of the mean age at childbearing from mean parity ratios for successive five-year age groups

1000 x Mean parity for women aged x-5 to x / Mean parity for women aged x to x+5	Displacement of mean age at child-bearing from x
063-110	+10
111-167	+ 9
168-230	+ 8
231-293	+ 7
294-353	+ 6
354-409	+ 5
410-461	+ 4
462-508	+ 3
509-562	+ 2
563-593	+ 1
594-630	0
631-665	- 1
666-697	- 2
698-728	- 3

Table 2 Estimation of infant mortality rates from proportions of deceased children among children born to women in five-year age groups, given the mean age at child-bearing

Age group	Infant mortality rate	Years prior to census
20-24	(-44.7+30.5M)Q - 2.6	11.8 -0.325M-0.17Q
25-39	(294+14.9M)Q - 2.9	16.5 -0.424M+0.16Q
30-34	(357+10.4M)Q - 2.8	20.6 -0.494M+0.77Q
35-39	(362+ 9.77M)Q -7.8	24.9 -0.556M+0.80Q
40-44	(282+11.0M)Q - 8.5	30.1 -0.633M+0.87Q
45-49	(216+11.1M)Q - 7.5	33.4 -0.641M+1.590

Note: the proportion of deceased children is representated by Q, the mean age of childbearing by M.
Note: Tables are adapted from Griffith Feeney (1976) "Estimating Infant Mortality Rates from Child Survivorship Data by Age of Mother," Asian and Pacific Census Newsletter, Vol. 3(2), November, 1976.