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COST-EFFECTIVENESS OF THE MASS MEDIA AND HEALTH PRACTICES PROJECTS

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Responsibility for the accuracy of this work remains, of course, with the authors.

Cost-Effectiveness of the Mass Media and Health Practices Projects

EXECUTIVE SUMMARY

This summary reports the findings from a cost-effectiveness evaluation of the USAID Mass Media and Health Practices (MMHP) activity in Honduras and The Gambia. The program was an undertaking of the Ministry of Health in each country, with 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 Missions and the Ministries of Health have provided additional support and cooperation.

The purposes of the Mass Media and Health Practices Project were: to introduce home-based oral rehydration therapy (ORT) and other behaviors related to the treatment and prevention of infant diarrhea in rural areas; 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 could perform, and related nutritional and breastfeeding practices. The treatment behaviors involved mixing and administering in the home an oral rehydration solution. In The Gambia, it was made from water, sugar, and salt (W-S-S); in Honduras locally manufactured packets containing the complete World Health Organization oral rehydration solution (ORS) were used.

The Mass Media and Health Practices 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 each country to create an environment in which these methods would remain in use after the project was completed.

As one of a series of evaluation studies, we conducted a cost-effectiveness analysis for both projects. Costs of the project were derived from reports and financial statements of the Academy for Educational Development (AED) and from interviews with technical assistance personnel. Costs included not only direct project expenses such as media time and ORS packets, but also salaries of technical assistance personnel and a pro-rata share of national personnel.

The primary measure of effectiveness was the number of presumed diarrhea-associated deaths averted. This number was derived from measures of the use of ORT (based on household surveys with a two week recall) conducted by evaluators from Stanford University and on other factors.

The MMHP program in Honduras cost $4.14 per child under 5, compared to $1.56 in The Gambia. Almost half the cost in each country was for personnel. The program in Honduras achieved a 28% use rate for ORT, while 56% was attained in The Gambia. MMHP in Honduras averted 5.16 diarrhea deaths per 1000 children per year, compared to 6.94 in The Gambia. Death registrations in Honduras corroborated these findings. Thus, the cost per death averted was $224 in The Gambia, versus $802 in Honduras.

The program was three times as cost effective in The Gambia as in Honduras, because The Gambia required less technical assistance, imputed value of airtime on the radio was low, and the rate of use of ORT was high. The treatment recommendation of the home-mix of salt and sugar meant that use was not dependent on the availability of packets. Also, a "Happy Baby Lottery" proved a powerful adjunct to stimulate demand for printed materials and radio messages about ORT in The Gambia.

As to sensitivity analyses, (1) costs were projected without AED home office personnel costs to approximate the cost of a project without technical assistance, and (2) Honduras MMHP activities were extrapolated from Health Region One to a national program. These assumptions would improve the cost per death averted two- to four-fold because there was less technical assistance and, for Honduras, a larger population.

Overall, the MMHP program achieved impressive results. The cost-effectiveness of MMHP in The Gambia, and the extrapolated national program for Honduras would be among the best results known for ORT. These two initial projects were not inexpensive, but the experience in The Gambia demonstrates that subsequent programs may improve in both cost and effectiveness.

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Executive Summary: Honduras, A Report of the Major Findings

I. INTRODUCTION

Two decades ago, researchers in Bangladesh made a discovery that revolutionized the treatment of diarrhea. They found that giving a person suffering from severe diarrhea a solution to drink of water, glucose, sodium and other ingredients can avert or correct dehydration, a sometimes fatal complication of diarrhea. Following the terminology of the World Health Organization, any fluid given by mouth to prevent or correct dehydration is termed oral rehydration therapy (ORT). If the fluid conforms to WHO's recommendations, it is termed oral rehydration solution (ORS). With strong support from the U.S. Agency for International Development (USAID), WHO, UNICEF, the World Bank, and numerous other organizations, these discoveries are now being incorporated into a practice component of primary health care. The World Health Organization reported that by 1983, 38 countries were already operating programs to promote ORT, and the number was growing rapidly.

This report analyzes a project that used a particularly creative approach to promoting ORT - - public health communications. The Mass Media and Health Practices Project (MMHP) used an integrated campaign approach employing radio in conjunction with posters and instruction by health workers and community leaders to promote and teach people to treat children with diarrhea with ORT. Thus, it took ORT beyond the one-on-one treatment typical of the formal health care system to an approach that could potentially reach a wider audience at a reasonably low cost.

Cost-effectiveness analysis is a tool for allocating resources, in this case within the health sector. It seeks to estimate the health consequences of investing a given amount of money or other resources in each of a number of alternative programs. Specifically, in this report we present costs and effectiveness in ways that can be compared across the two

countries involved in the MMHP project (Honduras and The Gambia). Second, we seek to make the data as comparable as possible to those for other ORT program analyzed in a companion report (Shepard, Brenzel and Nemeth, 1985) and to reports for alternative health interventions in developing countries, such as childhood vaccinations.

Due to fundamental differences in the nature and scope of the programs, and the kinds of data available, the latter goal can probably never be completely attained, although reasonable approximations, such as those attempted here, should be able to provide useful policy guidance.

The present analysis faced the constrained of being retrospective and desk-based. The authors were not asked to undertake this cost-effectiveness analysis until after field activities were largely completed, and funds did not allow the authors to observe project activities directly. Nevertheless, a wealth of data were available through existing reports, financial and evaluation data and documents, and interviews with key project personnel from the Academy for Educational Development and Stanford University. Overall, these sources probably provided a reasonably complete picture of project activities and accomplishments.

If there is any bias in these sources, it is that foreign technical assistance may have been documented and counted <u>more</u> thoroughly in this project than in cost analyses of other projects. On the other hand, contributions of time and facilities by national officials and institutions may be understated. While the effects of these two factors on overall project costs may tend to offset each other, they would understate the share of local resources to project activities. More precise estimation of local shares will have to await future, prospective studies.

The importance of the present study lies in its being one of the few empirical analyses of both cost and health effects from actual field programs that delivered ORT to a large population. Many previous analyses have been projections for hypothetical or

proposed projects or estimates based on little data.

To make the two MMHP sites comparable with one another and with other projects, we converted all costs to 1985 U.S. dollars. We included local and foreign resources (from international organizations). We converted local costs to dollars at the official exchange rate in the month the costs were paid. The study has estimated "full costs" to the extent possible. Full costs count not only direct costs identified with the project, such as the purchase of air time on a radio station or packets of ORS, but also pro rata shares of personnel, vehicles, and equipment, whether these were paid directly by the project or borrowed from facilities, or whether used completely or only partially for project activities.

To preserve the empirical nature of this study, health effects and costs have been related to the actual time periods and populations served. The demonstration nature of the MMHP project unavoidably meant that the time period was shorter, the population was smaller, and technical assistance was greater than would be required for an on-going national activity. On the other hand, these factors also contributed to the program's success. We have adjusted in part for these artifacts of a donor-funded demonstration project by calculating average costs over the period of full field operations, and estimating effectiveness from the last year of field activities in each site. Assumptions can be introduced to extrapolate to a national program, and a few such efforts are presented in the discussion section. We have deliberately limited such efforts, however, so as not to change this analysis from an empirical study to a hypothetical model.

II. DESCRIPTION OF THE PROJECT

This analysis describes the cost-effectiveness of the Mass Media and Health Practices (MMHP) project in Honduras and The Gambia, which was designed to promote the effective use of systematic public health communications to change behaviors related to diarrheal disease control. The evaluation examines project inputs in relation to project outcomes--the presumed number of childhood deaths averted associated with diarrhea. The following sections describe the project and discuss the derivation of costs, effectiveness, and cost-effectiveness ratios for each project site.

The project sought to promote the use of ORT, continued breast feeding, and nutritional practices during diarrheal disease episodes. Behavioral changes would reduce the high infant mortality rates associated with diarrhea in these two countries. Both projects used the same public health communications model which emphasized: 1) formative research and behavioral analysis to define audiences, media messages and strategies; 2) integration of mass media, graphics, and interpersonal support; and 3) systematic monitoring to make mid-course changes in project strategies. The mass media and public health strategies in both countries were designed to strengthen health intervention efforts within the Ministries of Health.

The project was financed by the Offices of Health and Education of the Bureau for Science and Technology, United States Agency for International Development (AID). The Academy for Educational Development (AED) was contracted to assist Ministries of Health in the implementation of the MMHP Project. The Institute for Communication Research at Stanford University was contracted to evaluate the impact of the Project on the health and behavior of the population. Responsibility for the evaluation was later transferred to Stanford's Food Research Institute and its subcontractor, Applied Communication Technology.

Cost-effectiveness was determined by the authors at the Harvard School of Public Health.

Detailed descriptions of the projects and the evaluation results are included as appendices to this report. A short description of the project is given in the next section.

A. The MMHP Project in Honduras

For the past fifteen years, diarrheal disease has remained the leading cause of infant mortality in Honduras. Approximately 24% of all child deaths have been attributed to diarrhea (Ministerio de Salud Publica, 1982). Among Central American countries, Honduras has one of the highest infant mortality rates (83 deaths of infants less than one year of age per 1000 live births), and one of the lowest GNP's per capita of $660 as of 1982 (World Bank, 1984, U.S. Department of State, 1982). Estimated health expenditure per capita was $3.29 in 1977 (Gordon and Shepard, 1984).

The MMHP Project in Honduras promoted the use of pre--packaged oral rehydration salts (Litrosol) through the following channels: 1) radio broadcasts about diarrheal disease control, dehydration, and rehydration with Litrosol packets; 2) distribution of print media and educational materials; and 3) promotion of ORT through health care providers at the clinic and community level.

Health Region 1, with total population of about 400,000 persons (United Nations, 1982), was selected as the target area. Planning of field activities for implementation and evaluation efforts began in Honduras in early 1980. The first radio broadcasts under MMHP were in April 1981. This cost-effectiveness analysis considers activities through the end of 1982. The direct project activities which continued into early 1983 in Honduras were not incorporated into the analysis nor were the

subsequent phase's efforts included. The use of Mass Media has continued and expanded to other parts of the country and other health behaviors.

The Stanford University researchers conducted household surveys to measure outcomes of the public health communications efforts over 1981 and 1982. The evaluation measured the change in the knowledge of mothers with respect to ORT, the change in the amount of use of ORT, and the change in the reported childhood mortality associated with diarrhea.

Surveys were administered approximately monthly to a cohort of 750 households. These households were selected within strata of Health Region 1 by socio-economic conditions, access to health facilities, and feasibility of access, which resulted in the 20-community sample. The purpose of this sampling procedure was to draw a multi-tiered sample from a population which represented a broad range of the economic conditions found within Honduras but which was also feasible to survey repeatedly. Access to health facilities was important as they were the distribution sites for Litrosol. Packets were either obtained directly by household members at the health facilities or were distributed via community health workers.

A total of 2681 children less than five years of age were included in one or more surveys over the two-year period. These children represented 3.2 percent of the total estimated population of children of 83,716 within that age group in Region 1. Although the surveys cover many topics, the cost-effectiveness analysis relies primarily on results on incidence of diarrhea and use of ORT.

The evaluation in both countries used control groups to control for the effect of repeated surveys. They were selected in the same manner as sample populations, and received the same intervention, as they were not isolated from the radio communications and the mass media campaign. These groups received the same post-intervention evaluations as the sample populations, but not baseline or repeated measures instruments. This aspect of

the MMHP project tested whether the media campaign or the frequency of evaluation was responsible for changes in the patterns of use of ORS at home.

B. The MMHP Project in The Gambia

Although vital statistics are less reliable in The Gambia, diarrhea, malnutrition, and infectious disease are the primary causes of death for infants and children. The infant mortality rate is about 200 per 1000 live births. The Gambia is also a relatively poor country, with a GNP per capita of $330 in 1981 (U.S. Department of State, 1982b). Therefore, the potential health benefits of ORT are great in this country.

The MMHP project in Gambia differed from that in Honduras in several respects. First, the Gambian project taught the use of a home mixture of ORT known as water-sugar-salt solution (W-S-S) to prevent dehydration, rather than the use of packets. However, health workers in clinics were taught to use WHO/UNICEF formula packets to treat dehydration in children.

Second, the Gambian project used a unique strategy, the "Happy Baby Lottery" as one method for educating Gambian mothers about ORT in the face of low maternal literacy. Within the sample of mothers of young children, roughly one-third of the compounds within which the children lived had a literate member.

For entry into the lottery, flyers describing the mixing procedures of the home-made salt solution were distributed. The lottery provided opportunities for mothers to win small household items if they correctly mixed W-S-S. Thus, the lottery provided a mechanism for repeated instruction in mixing the W-S-S formula. It stimulated demand for printed materials and for listening to radio messages about ORT. The use data, described below, showed that this incentive encouraged both learning and use.

Finally, the project was conducted throughout the entire

country, rather than in one particular region. (A few remote areas up-river were eliminated from the evaluation study because of a lack of access to the national radio station, Radio Gambia.) The Gambian evaluation also measured morbidity more extensively. Thirteen field surveys were administered on a bi-monthly basis, as compared with the five morbidity and use surveys administered in Honduras. Approximately 800 households were selected in a similar manner as in the Honduras project. A total sample of 1726 children less than five years of age were included in the surveys, which comprises over one percent of the 130,840 children in that age group in the country (United Nations, 1982).

C. Assessment of Costs

The cost for each project includes direct and indirect expenses incurred planning, implementation and operation phases. AED incurred costs both at the project sites in Honduras and The Gambia and at the home office. General AED home office costs were allocated evenly between the two project sites. AED home office expenses were adjusted by deducting 25 percent of personnel costs which were considered by the Project Director to be associated with diffusion of information about project activities and methodology, rather than in-country activity. Since MMHP was a research and development project, an important goal was to share lessons learned with the international health and development communications communities. Total project costs include personnel, transportation, training, media and supplies, general expenses, management and supervision costs, and overhead, described in the following section.

(1) Project Sponsors

The costs for Honduras activities were incurred by the

various organizations that implemented the project (AED, AID, Ministry of Health, and PANI). Money spent by AED was reimbursed by AID. In addition, the Ministry of Health received other assistance from AID that may have indirectly helped defray some of the Ministry's costs.

In The Gambia, AID through AED, the Ministry of Health, and UNICEF all helped fund the MMHP Project. The Gambia contributed use of its health facilities, overhead and administrative costs, and time of workers who provided treatment at health facilities. An average of 5.3 hours per week of time on the national radio station in segments ranging from three to thirty minutes was also donated to the project.

(2) Time Period

As the MMHP activities were preceded by a year of conceptual planning and gave birth to health activities that are still continuing, the definition of the project period is necessarily somewhat arbitrary. For this analysis, we have taken it to be roughly the period of in-country technical assistance by AED under the MMHP contract. In Honduras, this period was essentially from January 1980 through December 1982. In The Gambia, the period was May 1981 through April 1984. Costs incurred prior to or following those periods of time were considered to be preparation or follow-up activities and were therefore excluded. For consistency, attitudinal and utilization data were for the same period.

(3) Categories of Costs

Personnel Costs: Personnel costs comprise salaries, consultant fees, and of all personnel fringe benefits involved both in Honduras and The Gambia, and in the U.S. Costs of AED personnel, the largest component, went for formative research,

preprogram research, pretesting of materials, monitoring surveys, and organizing distribution of materials. Personnel costs reported as home office costs were those paid by the AED's home office in the U.S. They include the persons based in the U.S. who managed and provided technical support to the MMHP sites and AED support personnel. Their Home Offices costs also include consultants, short-term expatriate and long-term technical assistance personnel. The AED maintained two long-term technical assistance persons in Honduras and one in The Gambia throughout the project. Although they were based in the field offices, their salaries and benefits were paid directly from the home office. No personnel costs were included for AID/Honduras, AID/The Gambia, AID/Washington, and UNICEF, as they primarily provided funds for certain training and media programs, and commodities. Ministry of Health costs were calculated from the proportion of time spent by Ministry personnel based on information supplied by AED field staff on project activities and their monthly salaries.

Supplies: Supplies costs of are those of oral rehydration salts (ORS) packets. In Honduras, they were locally manufactured at a cost of U.S. $0.16 per 1-liter packet. In The Gambia, they were supplied by UNICEF for use in health centers.

Transportation and Travel: This component includes internal travel within Honduras and The Gambia, international airfare, and the cost of the project vehicle. Transportation costs paid from the home office were divided equally between the two project sites. Since the useful life of the vehicle was estimated to be about the same as the project life of three years, its cost was not amortized.

Training: The MMHP project supported the direct expenses of training of health care providers at the hospital, clinic and community levels about ORT, diarrhea, child nutrition and related

activities. The training category includes the salary cost of trainees, calculated by estimating the training time for each worker and multiplying these figures by wages provided by the Ministries of Health. Salaries of trainers were included under personnel costs, since the trainers performed other project activities as well.

Media: Field office media costs include radio production and broadcasting costs and printing and design costs of graphic materials such as flipcharts, posters and flyers. Since radio stations in Honduras are commercially operated, air time had to be purchased. Media costs were calculated as a proportion of total costs using 1982 as a base and extrapolating back to 1980. Media costs for 1982 were determined by the tabulating of each individual expenditure on a line by-line basis from field ledgers of imprest funds. Media costs were found to represent four percent of total AED project costs in Honduras. As similar tabulations were not feasible for 1980 and 1981 due to constraints on time and availability of raw records, the proportion from 1982 was extrapolated back to these two years.

Gambia's only national radio station, Radio Gambia, is owned and operated by the Government and does not sell air time commercially. To estimate the value of donated air time, we derived the operating cost of Radio Gambia by dividing Radio Gambia's total expenses in 1983 (about $250,000) by its 5694 hours of program time in that year, giving a cost of $46 per hour. Thus, the value of 5.3 hours per week of donated air time was about $13,000 in 1983, and was assumed to have the same real cost in 1981 and 1982. In addition a small share of the time of Radio Gambia personnel was allocated to the project reflecting their special input in message design.

Equipment: Costs of equipment purchase, rental, and repair were calculated directly from accounting records. Purchased equipment (one vehicle and light office equipment) was treated as

having the same useful life as the field projects, three years, and was treated as an expense in the year incurred.

Management, Supervision, and Education: These costs were primarily incurred at the project site and reflect the cost of educational materials, conference fees, and the cost of supervisors at the health facilities. Educational and conference costs were calculated directly from accounting records. Supervisory costs were estimated from monthly salaries paid by the Ministry of Health and estimates by AED field staff of the proportion of time health workers spent supervising project activities. In some cases, management costs are included in personnel costs because they could not be systematically distinguished. Wherever this occurs, footnotes are used in the tables.

General Facilities: This component includes expenses relating to the maintenance and upkeep of the AED project office and miscellaneous project expenses in the home and field offices. These costs were tallied directly in 1982 and then applied on a proportional basis, to 1980 and 1981 data.

Overhead Costs: Overhead costs are a pro-rata share of expenses for maintaining the AED's home office, such as rent, utilities, and insurance. This indirect cost was calculated as a percent of total direct costs, using the same principles and rates that final audits established for the AED as a whole. Overhead was about a quarter of total direct costs. Exact rates were 26.1 percent in 1980, 25.8 percent in 1981; and 25.4 percent in 1982. Table 1 shows costs by source and year for each site in current U.S. dollars. The project in the Gambia was about 40 percent less expensive because the project could build on methods learned in Honduras, and required less field research and fewer staff members, among other reasons. Table 2 shows that total field office costs in Honduras in current U.S. dollars (that is, dollars of the year in which costs were incurred)

Table 1: Program Costs for Honduras and The Gambia by Institution Disbursing Funds (in Current U.S. Dollars)

Institution	Honduras			Gambia		
	1980	1981	1982	1981	1982	1983
AED[a]						
Home Office	$140,880	$174,805	$156,233	$117,216	$115,121	$119,265
Field	39,130	58,259	63,114	12,021	33,256	40,863
U.S.AID[b]	-	30,000	32,000			
UNICEF[c]				1,539	1,281	1,632
Ministry of Health, other Government[d]	13,098	27,798	18,198	12,294	24,122	18,425
PANI	-	22,500	22,500			
TOTAL	$192,842	$313,362	$292,045	$143,070	$173,789	$180,185

[a] Source: Academy for Educational Development (AED) accounting records.

[b] Direct payments of certain media expenses by AID/Washington and AID/Honduras.

[c] Value of donated packets, excluding inventory in central pharmaceutical warehouse.

[d] Includes Radio Gambia personnel for message preparation and value of donated air time ($10,602 in 1981, $11,751 in 1982 and $13,000 in 1983).

Table 2: Program Cost by Component for AED (in Current U.S. Dollars)[a]

	Honduras						The Gambia					
	1980		1981		1982		1981		1982		1983	
	Home[b]	Field[c]	Home	Field	Home	Field	Home	Field	Home	Field	Home	Field
Personnel[d]	$86,784	$14,080	$105,860	$28,160	$102,780	$32,474	$59,926	$ 1,798	$ 68,659	$ 7,379	$ 64,833	$11,262
Transportation[e]	14,127	14,331	15,381	8,662	6,957	3,330	15,381	3,972	7,038	11,703	11,086	14,705
Media	4,403	8,808	6,435	17,616	7,015	17,586	9,612	35	6,846	3,191	7,586	3,608
Equipment[f]	367	-	-	733	-	1,976	2,344	65	2,302	1,233	2,246	1,608
General Facilities	6,195	1,544	11,279	3,088	7,644	1,946	5,913	6,151	6,907	4,118	10,887	6,302
Management, Training, Supervision	-	-	-	-	-	5,799	-	-	-	5,642	-	3,378
Overhead[g]	29,104	-	35,850	-	31,837	-	24,040	-	23,318	-	24,257	-
TOTAL	$140,880	$39,130	$174,805	$58,259	$156,233	$63,114	$117,216	$12,021	$115,121	$33,265	$120,897	$40,863

a Source: AED accounting records
b Home office costs
c Field site costs
d Includes salaries, benefits, and consultants fees
e Includes airfare and internal travel expenses
f Denotes equipment rental and repair
g Indirect cost calculated from a percent of total direct costs; allocation scheme furnished by AED.

increased from $39,130 in 1980 to $63,114 in 1982. Home office costs for AED for Honduras were three to four times higher than field costs and ranged from $140,880 to $148,589 in 1982.

International versus Local Funding: Table 3 separates the cost of the Honduras project in current U.S. dollars between international donors such as AID/Washington and USAID/Honduras, and local sources such as the Ministry of Public Health, and PANI. This table demonstrates that a significant proportion of media, training, and ORT supply costs were covered by Honduran sources. The Ministry of Public Health also provided some funds for broadcasting of radio messages, printing of graphics, and salary support for the training and supervision of health workers. PANI (a semi-autonomous pharmaceutical company that produces drugs for the Ministry of Health) produced 150,000 packets of Litrosol at approximately $0.15 U.S. per packet in each of the years 1981 and 1982.

Indigenous sources of funding accounted for at least 6 percent of total project costs in 1980, 14 percent in 1981 and 13 percent in 1982. Due to data limitations, personnel costs may be undercounted. Use of local facilities represents an additional in-kind contribution.

Table 4 separates international and local funding for The Gambia. In The Gambia project, supplies include pre-packaged oral rehydration salts which were provided by UNICEF as a back-up to the use of W-S-S solution in the home. The project also furnished some broadcasting equipment to Radio Gambia in appreciation for its collaboration, which are also included. General facility costs also include overhead costs calculated for AED home office costs. Between 1981 and 1982, the percent of direct costs allocated to overhead was the same for The Gambia as Honduras. In 1983, overhead was 25.1 percent of total direct home office costs.

Table 3: Total Project Costs for Honduras by Component and Type of Institution (in Current U.S. Dollars)

Component	1980 H[a]	1980 I[b]	1981 H	1981 I	1982 H	1982 I
Personnel	$3,098	$100,864	$ 4,298	$134,020	$ 6,698	$135,254
Supplies[c]	-	-	22,500	30,000	22,500	-
Transportation	-	28,458	-	24,043	-	10,207
Training[d]	-	-	1,500	-	1,500	1,348
Media	10,000	13,211	22,000	24,051	10,000	56,603
General Facilities[e]	-	36,844	-	50,217	-	41,427
Equipment	-	367	-	733	-	1,976
Management,[f] Supervision, Education	-	-	-	-	-	4,452
TOTAL	$13,098	$179,744	$50,298	$263,064	$40,698	$251,347
Annual Total	$192,842		$313,362		$292,045	

[a] Costs incurred within Honduran organizations (MOH and PANI).

[b] Costs incurred within international organizations (AED,AID).

[c] Supplies include Litrosol packets.

[d] Estimated from salary schedules for trainers and proportion of time for training activities.

[e] Includes overhead costs recorded in Table 2.

[f] Management costs are sometimes included in personnel costs.

Table 4: Total Project Costs for The Gambia by Component and Type of Institution (in Current U.S. Dollars)

	1981		1982		1983	
	G[a]	I[b]	G	I	G	I
Personnel	$1,692	$61,724	$ 5,535	$76,038	$3,207	$76,095
Supplies[c]	-	1,539	-	1,281	-	1,632
Transportation	-	19,353	-	18,741	-	25,791
Training[d]	-	-	6,835	-	2,218	-
Media	10,602	9,647	11,751	10,098	13,000	14,497
General Facilities[e]	-	36,104	-	34,332	-	38,145
Equipment	-	2,409	-	3,535	-	3,854
Management,[f] Supervision, Education	-	-	-	5,642	-	1,748
TOTAL	$12,294	$130,776	$24,121	$149,667	$18,425	$161,762
ANNUAL TOTAL	$143,070		$173,788		$180,187	

[a] Costs incurred within Gambian organizations (MOH and Radio Gambia).

[b] Costs incurred within international organizations (AED, UNICEF).

[c] Supplies include UNICEF packets.

[d] Estimated from salary schedules for trainers, the number of people trained, and the amount of time (hours, weeks) for training.

[e] Includes overhead costs recorded in Table 2.

[f] Management costs are sometimes reflected in personnel costs.

Cost Projections to 1985 Dollars: To provide summary cost figures, each year's cost in constant 1985 U.S. dollars was future-valued using inflation factors for the United States. These factors were derived from annual consumer price indices. For the period for which consumer price indices were not available at the time of analysis (1983 to 1985) the average inflation rate from the last 5 years was used to project costs to 1985. Appendix Tables A1 and A2 illustrate the methodology used to derive U.S. inflation factors and provide similar factors for Honduras and The Gambia as a comparison.

Table 5 reports total cost in 1985 dollars for each year of the Honduras project by source of funding. The average cost per year was $346,603, calculated by taking the total cost ($1,039,809) and dividing by the number of years (3) in the project. These figures are relatively high because the development costs of using mass media in general, and the formative research for developing messages, are allocated over the limited actual population and duration of the project.

Total cost for The Gambian site is projected in Table 6. The Gambian project cost per year of $189,693, calculated as for the Honduras project, is approximately 40 percent below that of the Honduran project. Gambia's lower costs may be due to several factors. First, the cost of ORT supplies was much greater in Honduras than in The Gambia. This was primarily due to the fact that the latter project stressed the use of a home mixture and only used packets for severe cases of dehydration. Second, personnel costs were much higher for Honduras because of larger numbers, higher wage scales, and varied expertise of the people involved. Third, the cost of radio broadcasting was substantially reduced in The Gambia because of government ownership of the station house. The Honduras project relied heavily on commercial radio stations.

Finally, the two cost figures might illustrate a "learning curve" for the MMHP Project. The higher cost of the Honduras project may reflect inefficiencies associated with implementing a

Table 5: Honduras Program Costs by Institution Disbursing Funds (in Current and Constant 1985 Dollars)

Contributor	1980	1981	1982	TOTAL
1. AED Home Office				
Current Cost[a]	$140,880	$174,805	$156,233	
Inflation Factor[b]	1.43	1.30	1.22	
1985 Dollars	201,458	227,246	190,604	619,308
2. AED Field				
Current Cost	39,130	58,259	63,114	
Inflation Factor	1.43	1.30	1.22	
1985 Dollars	55,956	75,737	76,999	208,692
3. U.S. AID				
Current Cost	-	30,000	32,000	
Inflation Factor	-	1.30	1.22	
1985 Dollars	-	39,000	39,040	78,040
4. Honduras MOH				
Current Cost	13,098	27,798	18,198	
Inflation Factor	1.43	1.30	1.22	
1985 Dollars	18,730	36,137	22,202	77,069
5. PANI				
Current Cost	-	22,500	22,500	
Inflation Factor	-	1.30	1.22	
1985 Dollars	-	29,250	27,450	56,700
TOTAL	$276,144	$407,370	$356,295	$1,039,809

[a] From Table 2. In current dollars for year incurred.

[b] From Appendix Table A2.

Table 6: The Gambia Program Costs by Institution Disbursing Funds (in Current and Constant Dollars)

Contributor	1981	1982	1983	TOTAL
1. AED Home Office				
Current Costs[a]	$117,216	$115,121	$119,265	
Inflation Factor[b]	1.30	1.22	1.18	
1985 Dollars	152,381	140,448	140,733	$433,562
2. AED Field				
Current Costs[a]	12,021	33,265	40,863	
Inflation Factor[b]	1.30	1.22	1.18	
1985 Dollars	15,627	40,583	48,218	104,428
3. UNICEF				
Current Cost[a]	1,539	1,281	1,632	
Inflation Factor[b]	1.30	1.22	1.18	
1985 Dollars	2,001	1,563	1,926	5,490
4. MOH				
Current Cost[a]	1,365	11,530	5,064	
Inflation Factor[b]	1.30	1.22	1.18	
1985 Dollars	1,775	14,067	5,976	21,818
5. RADIO GAMBIA[c]				
Current Cost[a]	10,929	12,592	13,361	
Inflation Factor[b]	1.30	1.22	1.18	
1985 Dollars	14,207	15,362	15,766	45,335
TOTAL, 1985 Dollars	$185,991	$212,023	$212,619	$610,633

[a] From Table 1. In current dollars for year incurred.

[b] From Appendix A.1. Because of varying exchange rates, costs were converted to current dollars in year incurred, and then the U.S. inflation factor was applied.

c Includes donated air time shown in Table 1.

new type of demonstration project. The lessons learned from the Honduras experience were applied in The Gambia, resulting in a more tightly organized and efficient field operation.

Table 7 reports the breakdown of costs by year. Although no broadcasting occurred in the first year of field activities in each site, costs were almost as high in the first year as in subsequent years, and considerable personnel, travel, and other resources were required to plan the project. The cost methodology of averaging costs for the three years in effect treats the first year like subsequent years of operation.

Table 8 reports average annual costs by category of expenditure. Personnel is by far the largest component, representing almost half the costs in each site. Media costs, including the implicit cost of Radio Gambia, amount to only 14 to 17 percent of total costs. Supplies are a larger component in Honduras due to reliance on ORS packets. And transportation costs are a greater share for The Gambia, primarily due to the higher cost of air travel from the United States for technical assistance personnel.

Table 7: Costs of Project in Honduras and The Gambia by Year (in Constant 1985 Dollars)

Year	Honduras[a]	Gambia[b]
1980	$276,144	-
1981	$407,370	$185,991
1982	$356,295	$212,022
1983	-	$212,618
TOTAL COST	$1,039,809	$610,633
Average[c] Cost Per Year	$346,603	$203,544

[a] From Table 4.

[b] From Table 6.

[c] Average cost per year calculated by dividing the total 1985 dollar cost by the number of years of the project (3).

Table 8: Average Annual Cost of Projects in Honduras and the Gambia by Category of Expenditure (in constant 1985 Dollars)

Category	Honduras		Gambia	
	Amount	Percent	Amount	Percent
Personnel	$167,220	48	$91,845	45
Supplies	31,900	9	1,830	1
Transportation	28,167	8	26,152	13
Training	1,808	1	3,652	2
Media	58,105	17	28,475	14
General Facilities	56,170	16	44,610	22
Equipment	1,296	0	3,997	2
Management, Supervision, Education	1,810	1	2,982	1
TOTAL	$346,476	100	$203,543	100

III. ASSESSMENT OF EFFECTIVENESS

For the purpose of this analysis, effectiveness is measured as the number of presumed deaths averted through the use of ORT, as shown in Table 9. An indirect measure of effectiveness was used because attempts to collect direct field data on deaths within these populations met with resistance from the local population and were very incomplete. Other measures of effectiveness could be the number of cases of diarrhea treated (an output measure) or an improvement in nutritional status, as measured through nutritional scores. However, as ORT prevents death due to diarrhea, the most relevant indicator of effectiveness is deaths averted.

Presumed deaths averted were estimated from data on use and morbidity, making assumptions about the case-fatality rate and efficacy of ORT, as described below. Limited data on diarrhea--associated deaths were also available from death registrations in selected counties in Honduras. Despite problems with these data, they tend to support the findings on presumed deaths averted, as indicated below.

A. Population of Target Areas

(1) Honduras

The population of children less than five years was estimated from 1978 census figures, assuming a constant geometric population growth rate of 3.5% per year in the region derived from historical data (United Nations, 1982). The age structure of Region 1 was thought to mirror that of the entire Honduran

Table 9: Number of Childhood Deaths Registered in Study Area in Honduras

Time Period	Total	Non-Diarrhea	Diarrhea
	All children aged 0-59 months:		
Before[a]	206	124	82
After[b]	172	130	42
% Change	-17	+5	-49
	Children aged 0-11 months:		
Before	118	71	47
After	105	81	24
% Change	-11	+14	-49
	Children aged 12-59 months:		
Before	88	53	35
After	67	49	18
% Change	-24	-8	-49

a Two years prior to the start of the program
b Two years following the start of the program

population. Therefore, it was assumed that 19.3 percent of the population of that region would be below age five, totalling 83,716 (Gordon and Shepard, 1984). This estimate does not consider patterns of rural to urban migration or the effect of the civil wars in El Salvador and Nicaragua on the population composition of this region, however. Household surveys revealed a very mobile population, though the effect of mobility on population size was difficult to measure and not incorporated into the analysis.

Also, not all newborns were successfully enumerated and incorporated into the sample population over time. As a result, the sample slightly over-represented older children. This process may have slightly underestimated incidence, in that the youngest age groups manifested higher rates of diarrheal disease than older children. There should be no bias for the most important variable, however, use of ORT.

(2) Gambia

The population of children less than five of 130,840 within the country was derived from estimates of a recent (1983) census and estimates of the age structure of the population. The proportion of children less than five was thought to be 20.2 percent of the total population in 1981 (Billewizc, et. al. 19-81).

B. Incidence of Diarrhea.

(1) Honduras

The annual incidence of diarrhea episodes in the study population was calculated from a two-week recall period.

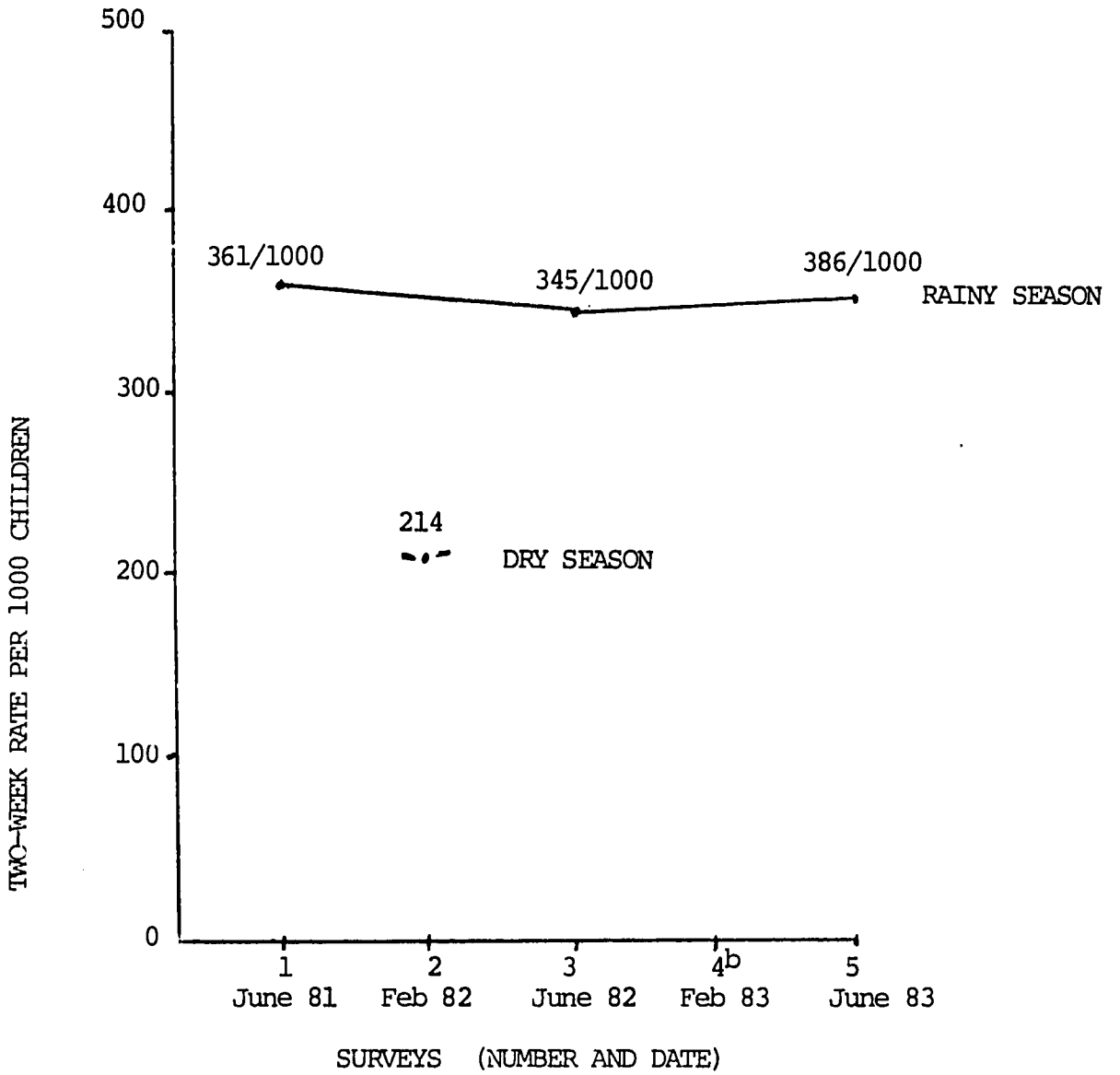
It was felt that this time period minimized the amount of memory loss about diarrhea incidence within the household but generated an adequate number of cases for statistical stability. One day prevalence (presence of diarrhea on the day of the interview) may be more accurate, but demands a much larger sample since it is a rare event.

Calculations from the survey data considered the seasonal patterns of diarrhea incidence in Honduras. Figure 1 shows incidence is higher in the rainy season than in the dry season. Therefore, incidence rates for these two seasons were averaged to reflect the overall rate over a year. The overall incidence rate was estimated to be 275 episodes per 1000 children within a two-week period. This rate translates into 5.5 episodes of diarrhea per child per year or a total of 460,000 episodes of diarrhea within the study population. Although this figure seems relatively high, several other studies have calculated high incidence rates for Latin America, especially within younger age groups (Snyder and Merson, 1982). Moreover, frequent surveillance tends to result in higher reported rates.

In Honduras, the last two evaluation waves (4 and 5) presented a potential problem for data analysis of incidence. Survey forms which were turned in for analysis were only for households in which an episode of diarrhea was reported for one of the recall periods. As a result, denominators may have been underestimated and incidence would be overstated, particularly in Wave 4 (the low diarrhea season). Therefore, Wave 4 was not included in a formal analysis of incidence.

Duration of diarrhea episodes is a factor used to calculate annual incidence. From survey data, the average duration per episode was 5.1 days. In Indonesia, where similar cost-effectiveness calculations were performed, average duration of episodes was found to be 3.5 days (Lerman, Shepard, and Cash, 1984). This shorter duration would result in a slightly higher extrapolation to annual incidence.

Figure 1: Seasonality of diarrheal episodes[a] in children less than five in the study area in Honduras.



Notes:

a Incidence calculated for a two-week recall period in the surveys

b In Wave 4, a data collection error occurred that made it impossible to calculate a denominator

(2) Gambia

Incidence rates for diarrhea episodes were also based on a two-week recall period. The analysis also considered the effect of seasonal variations on annual rate calculations. Figure 2 illustrates the striking seasonal variation in incidence, with the highest rates occurring during the rainy season. An average rate of 172 per 1000 children was calculated from waves 6 and 9. These waves were chosen because they captured the seasonal variation over a period of six months. These waves also coincided with the attainment of a steady state of use of ORT within the study population.

C. Use of ORT

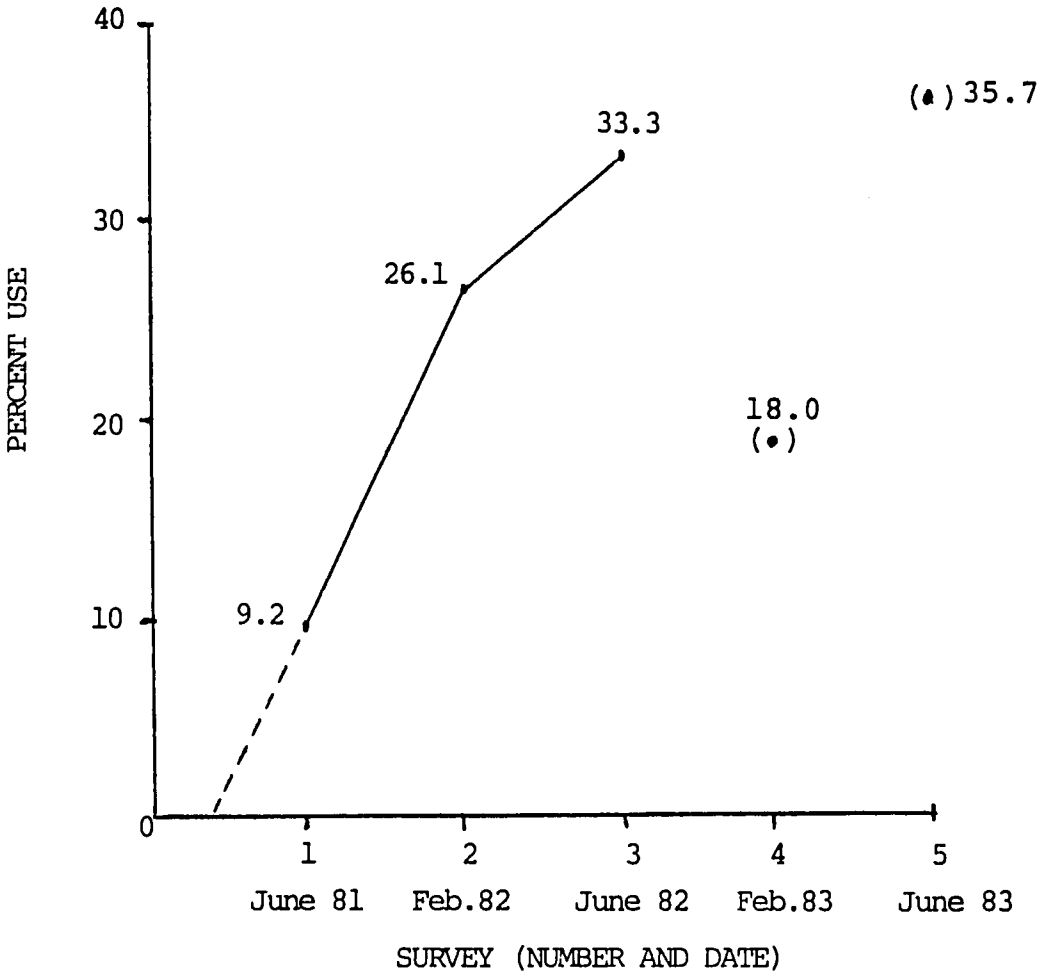
(1) Use of Litrosol in Honduras

Figure 3 demonstrates a rise in the percentage of total diarrhea episodes treated with Litrosol in the study population. The proportion used for the calculation of effectiveness was the average from waves 2 through 5, or 28 percent. Data on use in the last two waves should not be affected by excluding children with no diarrhea. Since the rise in ORT coincided with the MMHP campaign, it is likely that the campaign deserves the credit. Conceivably, rises in income or improved access to health care could also have contributed, but effective changes from these variables would be small over three years.

(2) Gambia

Figure 4 shows that the proportion of mothers who treat diarrhea at home reaches a peak during wave 6 (88%). Notice also

Figure 2: Proportion of total diarrhea episodes treated with Litrosol in the study population (Honduras)



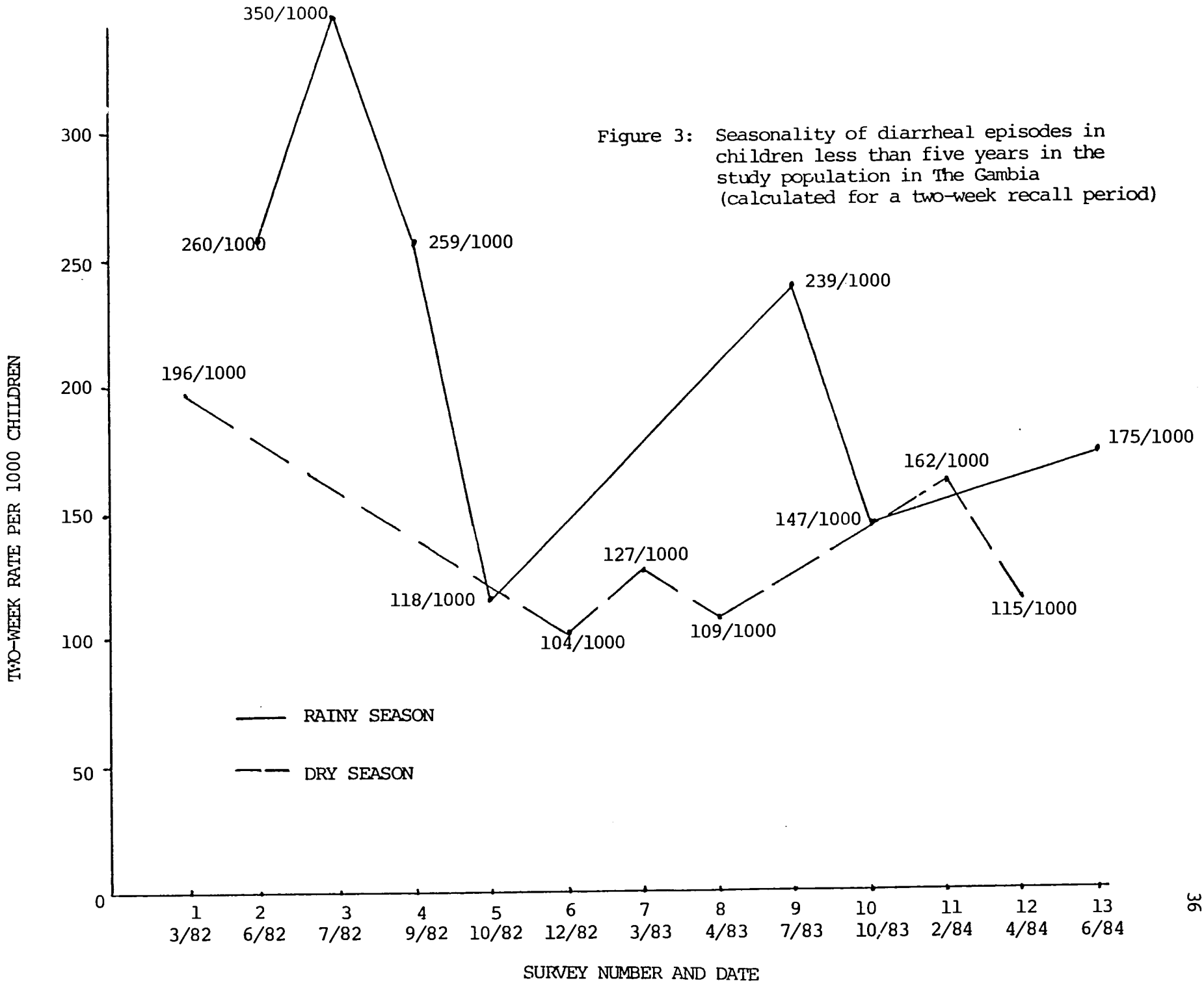
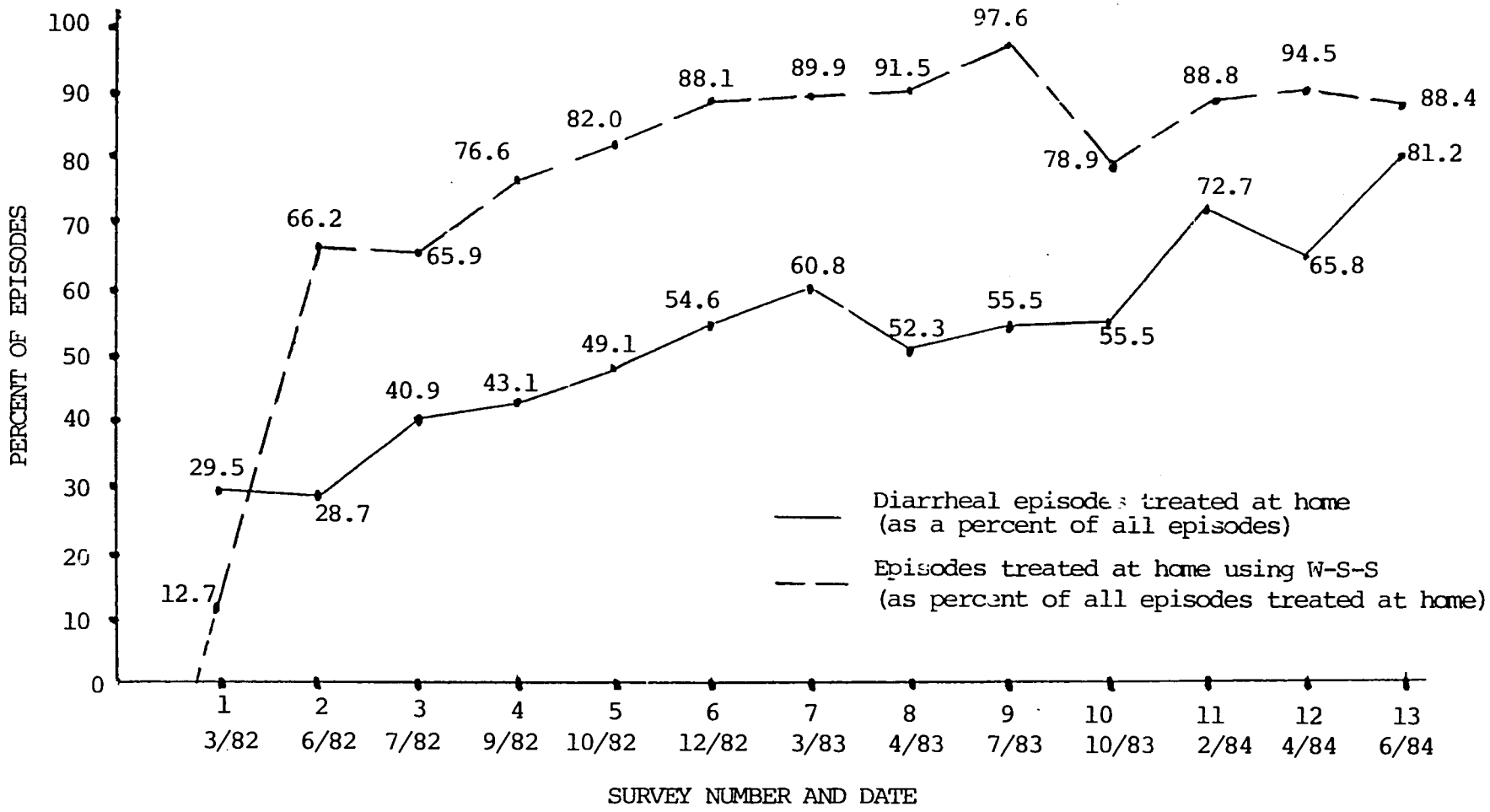


Figure 3: Seasonality of diarrheal episodes in children less than five years in the study population in The Gambia (calculated for a two-week recall period)

Figure 4: Percent of total diarrheal episodes treated at home and percent of home treatment using W-S-S in the study population in The Gambia

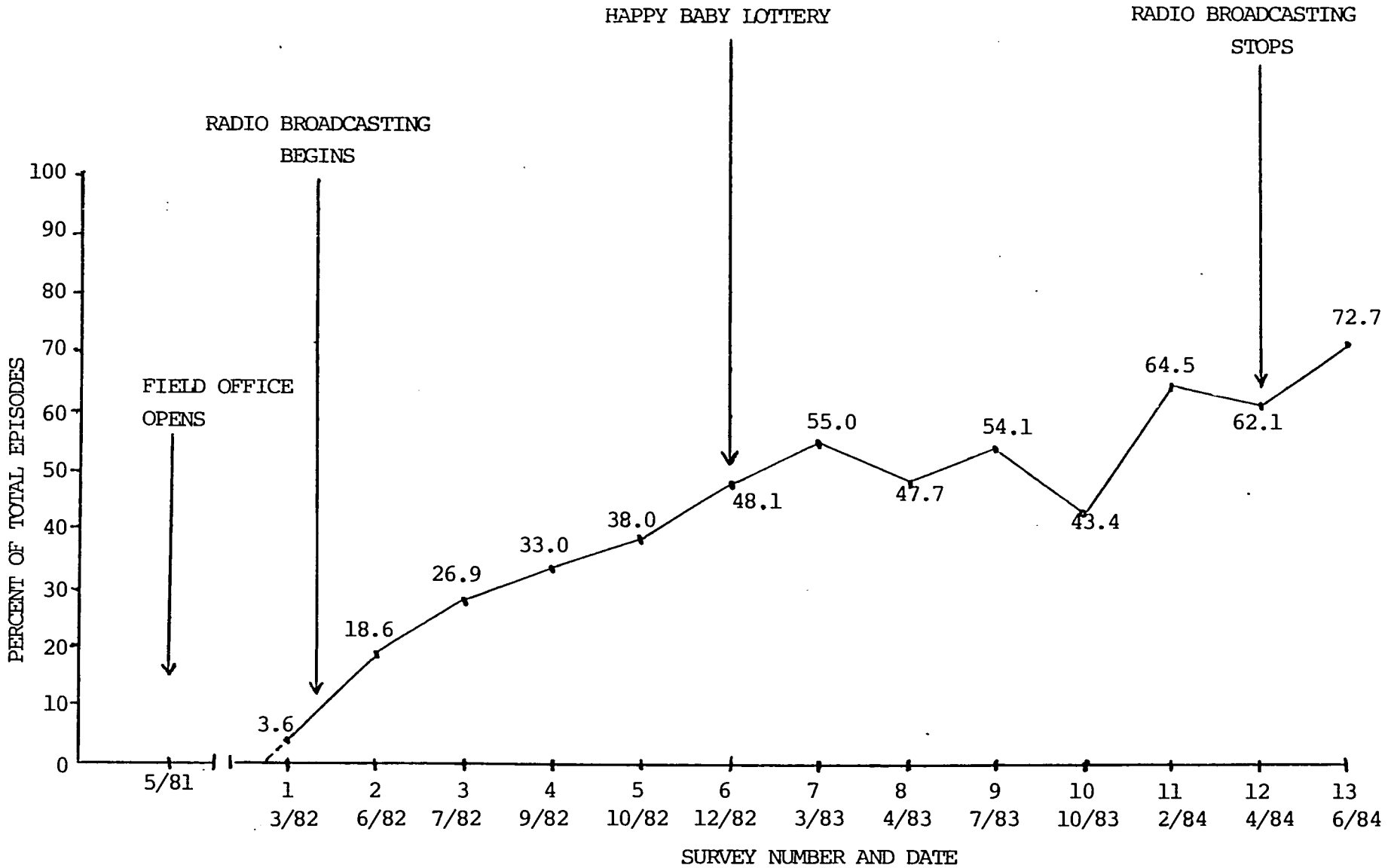


that the proportion of mothers who treat at home climbed steadily to 81% of mothers surveyed. Use of W-S-S as a proportion of total cases of diarrhea was derived by multiplying the proportions shown in Figure 4 by data from two survey items: (1) the proportion of mothers who treat at home; and (2) of those mothers, the proportion of who used W-S-S. This method of analysis neglects the use of ORS outside of the home (at a health facility, for example) and may underestimate use. However, because the focus of the campaign was home treatment, this proportion of users provides an adequate basis for determining effectiveness. The overall proportion of use (0.56) was calculated by averaging the use rate shown in Figure 5.

The disparity of a factor of two between the high rate of use in The Gambia (56 percent) and that of Honduras (28 percent) might be due to several factors. First, one possibility is that use of W-S-S in the Gambia may be over-reported because frequent administration of surveys could potentially have promoted use in a way that would not be representative. The evaluation study included a special control group that was surveyed only once to control for this possibility, and showed it was not important. The rate of use of ORT in the control group in The Gambia surveyed in March 1983, for example, was 54 percent. The rate for the study cohort for the immediately preceding and following waves (51.2% at wave 8 and 56.6% at wave 9) also averaged 54 percent.

Second, perhaps the adoption of Litrosol in Honduras is hindered by a greater number of competing forms of treatment than in The Gambia. Honduras has a much more developed commercial and governmental health infrastructure which might be used more heavily for treatment of diarrhea than in The Gambia, where access to health care providers is a major problem. W-S-S might be one of the few accessible treatments available to mothers in the Gambia. Finally, Gambian society might be more influenced by the campaign in an environment in which there is so little competing media promotion.

Figure 5: Percent of total diarrheal episodes in the study population treated at home with W-S-S (The Gambia)



D. Case-Fatality Rate

(1) Honduras

This analysis relies primarily on presumed deaths averted based on the WHO estimate of the case-fatality rate for diarrhea of 0.5 percent. According to the expert we consulted (Myron Levine, M.D. of the University of Maryland), this rate seems appropriate for Honduras.

(2) Gambia

The case-fatality rate of 0.5 percent was also used as the baseline for calculating effectiveness of the project in The Gambia. Mortality data collected in field proved unreliable.

E. Efficacy of ORT

This analysis in both countries relied on a WHO estimate of efficacy of ORT in the field of 67 percent. This estimate is based on a weighting of the effectiveness or oral therapy depending on the severity of the disease. Mild and chronic cases of diarrhea do not benefit from the effects of oral therapy as much as cases of acute, severely dehydrating diarrhea. While the efficacy of W-S-S in The Gambia may not be as high as that for complete formula packets, mothers were encouraged to use health centers, where packets were available, for serious cases. The number of presumed deaths averted in The Gambia (908) should be considered a maximum value on the basis of the uncertainty of the efficacy of W-S-S in the field.

F. Effectiveness

Table 8 summarized the derivation of the effectiveness measures. A total of 432 presumed diarrheal deaths were averted per year in the Honduras study population as a result of the use of ORT in that area. This figure also translates into 5.16 presumed diarrhea deaths averted per 1000 children per year. These figures are highly favorable in comparison with other projects. In The Gambia, the number of presumed deaths averted within the target area population per year is 908 and the number of presumed deaths averted per year per 1000 children less than five years of age is 6.94.

G. Direct Count of Deaths Averted

As a comparison, Table 9 reports available data on the number of deaths registered in the study area of Honduras (part of Health Region 1) before and after the MMHP program. The data were obtained from official county records by Stanford researchers. The data reveal a 49 percent decrease in the number of deaths involved in diarrhea in any way, both in infants under one and in children aged one through four years after the start of the MMHP program. Changes in numbers of non-diarrhea deaths are small and inconsistent, as would be expected, as the MMHP program was directly primarily at diarrhea.

Difficulties in ascertaining the size of the population covered makes the absolute numbers hard to interpret. The percentage changes are meaningful, however, if three assumptions are made: that (1) the size of the population, (2) the completeness of reporting, and (3) the criteria for cause of death did not change substantially over this period. While these assumptions cannot be verified directly, the factors would tend to have offsetting effects if the assumptions did not hold. Population

change due to natural growth and immigration from Nicaragua, and more complete reporting would tend to raise the number of reported diarrhea deaths after the program, while the campaign might make parents embarrassed about attributing a child's death to diarrhea and reduce the number of such deaths reported.

The observed reduction in diarrhea-associated deaths is consistent with a 73 percent rate of effective use of ORT. That is, 73 percent times the 67 percent efficacy rate of ORT estimated by WHO gives the observed 49 percent reduction. While the 73 percent use rate is almost three times the overall use rate found in surveys in Honduras, it is plausible that treatment rates were this high for the most severe cases for which ORT was most critical. The Stanford surveys included a number of questions to ascertain the severity of an episode of diarrhea, and the researchers found that more severe cases were more likely to receive ORT.

IV. ASSESSMENT OF COST-EFFECTIVENESS

The cost-effectiveness ratios of the two projects are compared in Table 10. Overall, the Gambia project is more cost-effective, at a cost of $224 per death averted. The cost per presumed diarrheal death averted in Honduras is $802, which is still within the range of figures for other ORT projects in developing countries.

Both sites demonstrate that the use of the media, integrated with training and interpersonal communication, is a cost-effective means of promoting ORT. For The Gambia project, the rate of use of W-S-S correlated well with the intensity of the mass media campaign. Figure 5 demonstrates that the rising intensity of media efforts, specifically the "Happy Baby Lottery" and radio broadcasting, led to increasing shares of mothers treating diarrhea at home with W-S-S. The rate of use begins to

Table 10: **Comparison of Project Effectiveness in Honduras and The Gambia**[a]

Measurement	Honduras	Gambia		
Population of children less than 5 years in target area	83,716	130,840		
Incidence of diarrhea within a two-week period	275/1000	172/1000		
Diarrhea episodes per child per year	5.5	3.7		
Aggregate annual diarrhea episodes in target area	460,438	484,108		
Proportion of episodes receiving treatment with ORT	0.28	0.56[b]	.40	.20
Aggregate annual diarrhea episodes receiving ORT in target area	128,923	271,100	193,600	145,200
Case-fatality rate	0.005	0.005		
Efficacy of ORT	0.67	0.67		
Annual number of presumed diarrheal deaths without ORT	645	1,356		
Annual number of presumed diarrhea deaths averted in target area	432	908	40% 649	30% 487
Number of presumed diarrhea deaths averted per 1000 children less than 5 per year	5.16	6.94	55 110	74 148

[a] See text for description of analysis.
[b] See Figures 4 and 5, and the text for discussion of determination of use.

plateau after the steep gains at the time of the lottery.

Costs have been calculated based on the efforts of AED and AID in the field. These figures would tend to over-estimate the true cost to the country Ministries of Health of running an ongoing diarrheal disease control program. The next step in the analysis would be to replace United States personnel costs with indigenous salaries, and to estimate the cost of internal travel and overhead based on comparable costs within the two countries. The total cost for this project, based on Ministry of Health infrastructure and capabilities would be more useful for a cost-effectiveness analysis which compares alternative programs for making resource allocation decisions.

The Ministry of Health currently operates a national public health communications program with some assistance from U.S. AID, but data on neither the costs nor effectiveness were available. To illustrate the probable magnitudes for a program beyond the research and development phase, we hypothesize that the Ministry of Health in Honduras were to allocate the same level of resources to their program for the control of diarrheal diseases through the use of public health communications ($346,603 per year) as was spent previously. These funds would pay for reaching an estimated population of 733,400 children less than five years of age for roughly U.S. $0.47 per child. Because we do not know the exact relationship between MMHP Project inputs and outcomes, we are unable to predict the numbers of presumed deaths averted per year for this scenario. The effectiveness of such a Ministry of Health program would undoubtedly decrease, however, as the level of resources spent per child decreases to a tenth of those of the original project. The cost-effectiveness ratio for the project would be expected to increase.

An alternative assumption can be made about extending the results of the MMHP Project to a nationwide program. If the results of the MMHP Project reflected maximum efficiency and effectiveness in the control of diarrheal diseases, the Ministry of Health in Honduras should allocate the same amount of re-

sources per child as in the MMHP Project ($4.14). A nationwide mass media campaign designed to change behaviors associated with the control of diarrheal diseases would require approximately $3.0 million. The cost-effectiveness ratio for such an undertaking would remain at $802.

Bringing national or regional rates of use of ORT from low pre-program levels up to 28 to 56 percent by the second year in each country is an impressive achievement. In The Gambia, this was achieved at a modest cost of $1.56 per child, and the cost in Honduras could drop to as low as $0.47 per child.

V. CONCLUSIONS

These findings suggest that the MMHP activities in The Gambia were considerably more cost-effective than those in Honduras (Table 11).

The MMHP program in both The Gambia and Honduras was remarkably successful. In the space of only three years of implementation, it brought the rate of use of ORT from essentially zero in both countries to around 30 percent in Honduras and around 50 percent in The Gambia. These are remarkable rates of adoption of a new technology in a short period.

Among the possible reasons for the different in level of effect are the facts that The Gambia may have been a more accepting culture, in the sense that it was less commercialized, and there were fewer advertisements and messages on the radio. Also, there were fewer barriers to adopting the home mixture recommended in The Gambia compared to the packets advocated in Honduras. A mother in Honduras who wished to use ORT not only must have understood and followed all the behavioral recommendations of the MMHP program, but also she must have access to packets of ORT at the time her child is sick. The ingredients of salt and sugar needed in The Gambia were common household items.

Table 11: Comparison of the Cost-Effectiveness of Mass Media Project Activities in Honduras and The Gambia[a]

Measurement	Honduras	Gambia
Average cost per year (in 1985 dollars)	$ 346,603	$ 203,544
Number of diarrhea episodes treated in target area per year	128,923	271,100
Cost per episode treated	$2.69	$0.75
Number of children in target area less than 5 years	83,716	130,840
Cost per child in target area	$4.14	$1.56
Number of presumed diarrhea deaths averted in target population per year	432	908
Cost per presumed diarrhea death averted (cost-effectiveness ratio)	$802	$224

[a] Data from previous table or derived by division.

Technical assistance was a prominent component of the MMHP program. In an attempt to determine what the potential of this approach might be if it were completely locally run, all personnel costs paid from AED's home office were deleted, and average costs were recalculated. This sensitivity analysis lowered the average annual cost in 1985 dollars to $217,440 for Honduras and $124,154 for The Gambia. These are reductions of 37 and 39 percent, respectively. The personnel shares were reduced to 18 and 10 percent, respectively. The cost per child is reduced to $2.60 in Honduras and $0.95 in The Gambia.

In an attempt to place these findings in perspective, the costs and effectiveness have been compared with those identified for a number of other ORT projects in a companion report (Shepard, Brenzel, and Nemeth, 1985). Insofar as possible, all used the same methodology. The results in Table 12 show that the MMHP projects, particularly in The Gambia, are among the more cost-effective projects. Table 12 summarizes the data, with programs ranked from best to worst in terms of cost per death averted. Program 1 was a rehydration program for diarrhea described by Oberle et al (1980). The study analyzes inpatient hospital rehydration for diarrhea (using both intravenous therapy and ORT) from Matlab hospital in Bangladesh, where much of the original development of ORT took place. At least 35 percent of the patients had confirmed cholera. Deaths averted were projected based on the patient's degree of dehydration on admission, estimated from his weight gain while in the hospital. From their data, we calculated the entries in Table 12. While the findings make it the most cost-effective program considered, it is not a community-based program and hence is not strictly comparable to the others in the table. Also, the results would undoubtedly be considerably less cost-effective in an area with less cholera.

The sites in Indonesia - Sukawati (2), Damaraja (4), Bandung (6), and Campurdarat (7) - - are four sub-districts on Indonesia's most developed and densely populated islands, Java

Table 12: Comparative Cost-effectiveness of ORT Projects[a] based on Diarrhea-Associated Deaths

No.	Project or site	Country	Cost per child per year (1985 $)	Deaths averted per 1000 children	CE Cost per death averted
1	Matlab Hospital	Bangladesh	0.50	4.04	$124
2	Sukawati	Indonesia	1.14	6.97	$163
3	Mass Media[b]	Honduras	0.47	2.77	$170
4	Darmaraja	Indonesia	1.50	8.46	$177
5	Mass Media	The Gambia	1.56	6.94	$224
6	Bandung	Indonesia	0.92	3.25	$283
7	Campurdarat	Indonesia	1.38	4.73	$291
8	Salt/Sugar Home	Egypt	4.76	8.20	$580
9	Oralyte Home	Egypt	4.99	7.80	$639
10	Mass Media[c]	Honduras	4.14	5.16	$802
11	Salt/Sugar Pre.	Egypt	9.99	7.00	$1427
12	Oralyte Comm.	Egypt	5.56	2.00	$2780
13	Con 2-Awareness	Egypt	4.24	0.40	$10600

a Projects are ordered from most to least cost-effective (i.e., in increasing order of cost per death averted.

b Illustrative calculation for an ongoing program: assumes that the same level of costs for the research and development program in one region could support a national effort, but that the effectiveness (level of use) would only be half as high.

c Actual results attained with three years in the field in the research and developmental program.

and Bali. Indonesia has had ORT activity since the late 1970's, and all of these sub-districts except Bandung were selected because they were expected to have some of the country's best functioning ORT activities. Thus, they are more representative of the potential of ORT programs than of the current overall status of the Indonesia program.

These sites are interesting, however, in that they are entirely staffed and managed by national officials and virtually all nationally financed. The "program" consisted of provision of and/or instruction in ORT by staff of a health center in the sub-district or by volunteer community field workers, supervised by the health center physician. Household surveys revealed rates of use of ORT that ranged from 32 percent of childhood diarrhea episodes in Bandung to 88 percent in Sukawati. The programs in Sukawati (#2) and Damaraja (#4) were the most cost-effective of all the actual community ORT programs we have studied.

The Indonesian programs still leave room for improvement, however; tetracycline was more widely used than the indications would suggest, and rates of ORT use are undoubtedly lower in most other sub-districts. Volume of ORT may also have been insufficient. Indeed, there would be the potential for mass media to strengthen the Indonesian program, and such efforts are already under discussion. Nevertheless, the resulting cost-effectiveness ratios for these four sub-districts, which range from $163 to $238 per diarrhea death averaged, illustrate the potential of a mature well-functioning ORT program.

The programs in Egypt were part of an experiment in 1980 by the Project for Strengthening Rural Health Delivery (SRHD), described by Mobarak, et al (1980). Under a formal experiment for one diarrhea season, villages were assigned to one of four different experimental approaches, or to control areas of usual care. Three of the approaches (#'s 8, 9, and 11) involved intensive schedules of home visits by a nurse to promote the use of home mixtures of salt and sugar, Oralyte (the local name for ORS packets), or simply packaged bags of salt and sugar. The

deaths averted were based on direct counts of deaths in experimental and control villages.

These approaches all cost more per child per year than the MMHP approaches in both sites, though several of the approaches (#'s 8, 9, and 10) were slightly more effective in terms of deaths averted per 1000 children per year. Data on rates of use of ORT were not available. It is not surprising that home visits could be more successful in averting deaths than a mass media approach, but few places have the personnel, money, and vehicles to sustain home visiting. Staffing in the areas receiving approach II was equivalent to one paid health worker for every 42 children. Even in the SRHD project in Egypt, frequent household visits did not continue after this experiment had been completed.

Thus, the projected health accomplishments of the MMHP programs are almost as good as those of the best ORT programs for which we could obtain data, and the MMHP costs are within the range of other good ORT programs.

To appreciate magnitude of the MMHP accomplishment, it is interesting to speculate on the impact of applying such a program to all children under five in developing countries. It is estimated that 5,000,000 children die annually from problems involving diarrhea. According to our calculations of presumed deaths averted, the MMHP program averted 19 percent of diarrhea-associated deaths in Honduras and 38 percent in The Gambia. These numbers were obtained by multiplying the use rate of ORT (28 and 56 percent, respectively) times the reduction in the case fatality rate for diarrhea from ORT (67%). Applying the percentage saving derived from Honduras and The Gambia worldwide would imply a saving of 900,000 to 1,900,000 children each year.

Finally, it is instructive to compare the cost-effectiveness of the MMHP program with an analysis of another major child health intervention, the Expanded Program for Immunization (EPI). Shepard, Sanoh, and Coffi (1985) analyzed the cost-effectiveness of the measles component of the EPI program in the Ivory Coast as of 1979. The cost per measles death averted was $779

when inflated to 1985 prices, according to the price index in this report (the 1979 figure was $479). Thus, the cost-effectiveness in the Gambia is better than that calculated for the Measles component of the EPI program and similar to that for the MMHP program in Honduras.

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APPENDICES

Table A2: Inflation Factors Used to Project Costs to 1985 Prices[a]

Year Cost Incurred	Honduras	Gambia	United States
1980	1.65[b]	NA	1.43
1981	1.50	1.43	1.30
1982	1.36	1.29	1.22
1983	NA	1.17	1.18
1985	1.00	1.00	1.00

[a] Source: International Monetary Fund, International Financial Statistics, vols. 34 and 37.

[b] Figures derived from consumer price index: see Table A-1 for derivation.

Table A1: Consumer Price Indexes, Expressed with 1975 as a Base

Year	Honduras	Gambia	United States
1975	100.00	100.00	100.00
1976	104.90	117.10	105.80
1977	113.60	131.60	112.70
1978	120.60	143.20	121.20
1979	131.40	151.90	134.90
1980	156.90[b]	162.10[b]	153.10[b]
1981	172.90[b]	171.99[b]	169.02[b]
1982	190.16[b]	190.63[b]	179.28[b]
1983	208.21[b]	210.89[b]	185.10[b]
1984	232.24[c]	227.87[c]	201.46[c]
1985	258.94[c]	246.21[c]	219.26[c]

[a] Source: International Monetary Fund, International Financial Statistics, Vols. 34, 37.

[b] Converted from CPI reported in 1980 dollars.

[c] Calculated from the average compound inflation rate for the last 5 years with data:

$$(1983\ CPI/1978\ CPI - 1)^{1/5}$$

Sample calculation for Honduras: entering 208.21 for 1983 and 120.60 for 1978 gives 0.115 or 11.5%. Thus:

$$1984\ CPI = (1983\ CPI)\ (1.115) = 232.24$$
$$1985\ CPI = (1984\ CPI)\ (1.115) = 258.94.$$

The inflation factor for a particular year is the ratio of the 1985 CPI over the CPI for that year. For 1980 in Honduras:

$$\frac{(258.94)}{(156.90)} = 1.65$$

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

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

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

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

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

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

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

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

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

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

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

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

Litrosol use was measured both as a percentage of mothers who had ever tried it and as a percentage of episodes being treated. Within six months of the start of broadcasting, over a third of the mothers (36.7%) said they had tried Litrosol. This percentage rose to 62.4 percent by the end of the intensive campaign. This is a very high level of trial usage by any standards. When calculated as a percentage of episodes occurring in the two weeks prior to the interview (the most reliable reporting period used) the proportion of episodes treated rose from none before the start of the project to a maximum of 35.7 percent, with an average of roughly 20 percent of episodes over the final 18 months of the campaign. For cases recalled from the last six months, mothers reported much higher usage rates, averaging 45 percent of episodes over the final 18 months of the campaign. The most likely interpretation of this discrepancy was that mothers tended to forget milder cases and hence unconsciously selected the more severe episodes in recalling past behavior.

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

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

Use of other medicines concurrently with Litrosol was common - - an average of 43 percent of Litrosol-treated cases were also reported to be treated with other medicines. About 20 percent of

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

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

An observational study was conducted for a small number of mothers to measure treatment behaviors directly. The mothers were selected when they brought their children to clinics complaining of diarrhea and observed afterwards in their homes. A total of 50 percent of these cases were treated with Litrosol, either before coming to the clinic or during the observation period at home. Mothers who did treat during the observation period gave Litrosol at a rate that would, if sustained, result in the consumption of a liter in 10 to 15 hours. Mothers were tested on their mixing skills after the observation period and performed quite well. The average mixing volume was 926 cubic centimeters, with a standard deviation of 218. Only one mother in five had a bottle of exactly a liter volume. They used all the salts (94%) and surprisingly, used boiled water (97%) even though the instructions did not require it. Thus, mothers were observed to mix accurately and to administer in amounts that would be clinically effective, if they gave Litrosol at all.

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

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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.

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

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

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

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

EXECUTIVE SUMMARY

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

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

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

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

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

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

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

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

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

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.

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

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

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

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

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

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

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