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PROJECT EVALUATION

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The United States Agency for International Development
Brasilia, Brazil

The People-to-People Health Foundation
Project HOPE
Millwood, Virginia 22646

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I EXECUTIVE SUMMARY

A. Evaluation Methodology

The purpose of this evaluation was to determine the progress toward project objectives, address sustainability of the current activities by the Brazilians and make recommendations regarding future technical assistance. Stephen Plank, M.D., Dr.Ph and Joao Bosco Salomon did the initial work on-site in May, 1988. The economic component was strengthened by economists from Boston University, Thomas McGuire, PhD. and Julia Watson, M.A., after on-site work by Miss Watson in December, 1988. A revised format for the write-up was suggested by USAID/Brasilia in April, 1989.

B. Background

An inequality exists in Brazil between the developed south of the country and the underdeveloped northeast which is plagued by bacterial, viral, and parasitic diseases often complicated by a poor comprehension of hygiene and sanitation. Health care is directed at hospital-based care at the expense of public health. Patients often turn to faith healers for initial consultation and care in the community.

To address health care of the rural and periurban population, an alternative model of maternal care was established by the University of Ceara with Kellogg funding. Community maternity units were built and staffed by lay midwives. The Project HOPE activities (VIVA) added health care for children under 5 years to the same maternities in 26 communities. Community health workers were introduced and trained as members of the community health team. VIVA also utilizes the faith healers especially in the promotion of oral rehydration.

C. Project Findings

Between program years two and three, in the area served by VIVA there has been a 35.6% reduction in mortality in children under 5 years of age which surpasses the program target. However, dehydration remains high as a cause of death in infants under one year.

It is significant that the awareness and use of oral rehydration by mothers in the population targeted by VIVA has also surpassed project expectations. The use of ORS (oral rehydration solution) is nearly twice that of mothers at large in the state. However few mothers are knowledgeable about the homemade recipe for ORS. Most important is the fact that traditional healers have increasingly distributed greater amounts of ORS in comparison to the health unit which indicates an appropriate shift toward project objectives.

Efforts to increase growth monitoring in VIVA communities have resulted in a high rate of use of the growth charts (81% of children under 5 years). This is twice the level achieved by the state as a whole.

Efforts at prolonging breastfeeding have been integrated into all patient contacts both in the maternities and at home. The community health worker (CHW), traditional birth attendant (TBA) have no doubt been instrumental in achieving a 60% continuation rate at 6 months for those mothers returning to the maternity unit for checkups.

Although immunizations are not given by VIVA, educational input, referral to state or municipal health posts, and review of the immunization status of children and pregnant women are all an important component of the program. Project goals for the immunization of children have already been achieved for polio and measles, nearly reached for BCG and remain short by 10% for DPT. 72% of women were immunized with tetanus toxoid during their last pregnancy. Since it is contraindicated to give boosters to women who had been immunized during the past 5 years, VIVA did not reach its objective of immunizing 90% of pregnant women in the target population.

The information system is the least advanced component of the project. Only recently has the data processing equipment been in place. With proper instruction to the data gatherers and more prompt processing of information, better feedback can be given to the community for program guidance and evaluation. It will also allow VIVA staff to document and publicize the success of this alternative model.

Because of the anticipated decentralization of the Brazilian health care system (SUDS), the issue of sustainability centers on whether the project in its present form can be absorbed into the new system. Toward this end, VIVA is already altering itself to be more consistent with SUDS which will allow for financing of several components of the project through SUDS. The project is already planning to consolidate its activities in a small number of municipal districts (municipios) and broaden the scope of its activities to the entire population of these municipios. This approach is consistent with Brazil's decentralized plan and should, therefore, assure inclusion in the municipal health plan and budget. VIVA's future role would be to offer technical assistance such as training activities and be reimbursed for such work. Plans for phaseover of support for the community health workers and supervisors to local government have already been made by the VIVA staff.

Significant in-kind support is given the project by the project by the university (office space), the Secretary of Health (ORS, growth charts), and the community itself. 84% of the measurable expenditures at the maternity unit is financed by the Brazilians leaving only a small component for VIVA.

D. Recommendations

1. In the suggested remaining two years of the project, document program activities as a basis for replication both in and outside of Brazil.
2. Continue the program emphasis on a) the traditional healer's role in oral rehydration therapy b) consider the development of an alternative ORS recipe c) formal training to emphasize early identification of dehydration and diarrhea prevention d) studies in control communities to demonstrate project effectiveness
3. Conduct qualitative studies to identify methods used by healers to interest patients in ORS; factors related to weaning practices and the mother's understanding of growth charts.
4. Child caretakers should be mobilized and evaluated.
5. Procedures for the follow-up of children with poor weight gain should be developed for all levels of care giver.
6. Reconsideration should be given to offering immunization services to the VIVA population through the maternity units.
7. An instruction manual should be developed to train community health workers and supervisors in data collection.
8. Work with local government to include VIVA's service activities in the new decentralized plan.
9. Continue to conduct yearly household survey.

II PROJECT BACKGROUND

A. Brazilian Context

Brazil has experienced rapid economic growth throughout recent years. The benefits from this expansion have been concentrated in the southern states. By economic and mortality indices, the nine states constituting Brazil's Northeast are not much better off than Honduras, Bolivia, and Haiti.

A major problem affecting health care in the Northeast is the federal tendency to focus on curative rather than on preventive services. Much of the glamour of modern medicine is in the application of hospital based high tech interventions which can be dramatically lifesaving. In 1981 about 3000 patients were treated by hemodialysis and 900 had coronary bypass operations paid for by the National Health Service (INAMPS). The expenditures associated with these procedures exceeded the total investment in basic health services and control of transmissible diseases by more than 15%. The latter programs would have provided the greatest benefit to the 41,000,000 inhabitants of the North and Northeast. Public expenditures for health in that part of the country actually fell from the equivalent of \$815 million in 1981 to \$615 million in 1984.

In the Northeast, malnutrition is common among all age groups, beginning shortly after birth with early weaning and the introduction of contaminated mixtures in bottles. The adverse impact of diarrhea on nutritional status is aggravated by the tradition of withholding all foods until the symptoms have subsided. Too often the outcome is dehydration and death. Survivors of one episode are weakened and less able to fend off other infections. Growth and development are retarded, frequently irreversibly, by chronic malnutrition and recurrent infections. The statewide child health survey found 12.8% of children under 3 with weight-for-age below 2 SD. This value rises to 14.3 in the interior of the State. Stunting (height-for-age below -2 SD) was present in 27.6%, reaching 30.4% in the interior. On the date of the interview, mothers reported diarrhea in 12% of all children.

With poor health infrastructure and poor comprehension of hygiene and sanitation, bacterial, viral and parasitic diseases such as Chagas disease, dengue, leptospirosis, meningococcal meningitis and diarrhea are prevalent. Treated water is only used by 18% of homes in the State, falling to 1% of rural homes. No sanitary installations are present in 56% of homes in the State and in 92% of rural homes.

Measures which could protect the people from many illnesses are still neglected in favor of intensive, expensive and often inadequate curative care administered in urban hospitals.

Because of the concentration of health facilities and personnel in the urban centers and the emphasis on addressing illness only in its more severe manifestations, many in the rural areas depend on "rezadeiras", or faith-healers, for their health care. Metropolitan Fortaleza represents 32% of the population of the State but has 52% of all hospital beds, 60% of public beds and 60% of health-affiliated personnel (Estatísticas de Saude, Asistencia Medico-Sanitaria, Vol. 9, 1984, IBGE).

B. Project Description

Because of the above facts, it was recognized that another model of health care was needed for rural and peri-urban populations. The Kellogg-funded model was developed between the University of Ceara and multiple communities which had sufficient organizational skills to set up and manage their own local maternities as an alternative to receiving obstetrical care at distant urban hospitals. These communities built, equipped and staffed their own local obstetrical units. The model (PROAIS) employed lay midwives along with traditional delivery chairs and has received international attention and support.

The Project HOPE/USAID child survival project (VIVA) is based upon the same organizational structure and has had the help of the community in identifying CHWs and having them accepted as part of the community health team. Whether or not the State will have success with its attempts at replicating the VIVA model may well depend on whether the CHWs they hire are seen as members of the community team or are seen as political appointees.

With the demonstrated functional relationship between the University and communities in Ceara, Project HOPE chose to link VIVA to PROAIS. The conjoined projects stimulate the teaching and research involvement of the University. Although organizationally and financially separate within the University and within the communities, there is a functional and economical integration of VIVA with PROAIS. They share the local maternities as their base.

PROAIS focuses on maternal care while VIVA addresses children under 5 years, which is the other most vulnerable population. PROAIS' broader perspective has objectives in all areas of primary health care and is strongly committed to the training of students of the university. The strategies for carrying out the activities are similar in both PROAIS and VIVA which has been the key to the successful integration of the two programs. The

different orientation that VIVA has introduced is a more in-depth look at the evaluation of the results obtained using more specific objectives than PROAIS.

Part of the VIVA strategy to improve child health as cost-effectively as possible is to utilize lay community health workers (CHWs) for health promotion, surveillance, and early intervention. Eighty CHWs are now active in the program sites. VIVA also utilizes the faith healers who are often the first to be consulted on health problems. Approximately 120 are now participating in the promotion of oral rehydration therapy. By educating these key people on the use and utility of oral rehydration solution (ORS), it can often be incorporated into timely intervention and save lives. It also makes an ally out of a potential enemy of the program were it to be seen as supplanting his or her role.

In addition to the ORS promotion, VIVA staff are monitoring growth and development of children at the local maternities, at community gatherings or at individual homes (especially those identified as being at high risk through low birth weight or illness). CHWs promote sanitation (e.g. use of clean water and keeping pigs and chickens outside) and personal hygiene. They encourage mothers to continue breast feeding their infants while discouraging the early introduction of bottles. While providing general guidelines for mothers, the recommended foods are too often priced out of reach of these families. Referral is then made to a nutritional rehabilitation center or to a hospital if that remains the only choice.

VIVA was designed to complement the state and municipal health systems. VIVA therefore does not provide immunizations for the children or pregnant women but refers them to the government health posts.

III. PROJECT ANALYSIS

A. ORAL REHYDRATION THERAPY (ORT)

DESCRIPTION:

The objective of ORT activities in VIVA is to mobilize traditional healers (THs) to distribute free government (CEME) oral rehydration solution (ORS) packets and to promote a homemade solution. In addition to training the traditional healers in the use of ORS, basic preventive strategies (improved hygiene, infant nutrition, breastfeeding) are taught to the healers in order to reduce diarrheal infections. Instruction is also provided on the early identification and referral of high risk children to avoid deaths from dehydration. Care is taken that the introduction of ORT does not violate or alter essential elements of the traditional medical system. Community health workers' (CHWs) role is to support the TH in her ORT tasks, assuring adequate supplies, providing continuous training, conducting follow-up visits of severely dehydrated children, arranging for transfer of high risk children to referral hospitals, and collecting statistical data on the TH's ORT activities and mortality. CHWs are also trained to distribute CEME packets and to teach mothers to prepare homemade ORS.

The VIVA ORT program objectives are:

- 1) To reduce by 30% the mortality associated with diarrheal diarrhea in children <5 years of age by year 3 of the project
- 2) To train 50% of mothers with children <3 years and 25% of child caretakers with siblings <3 years to correctly use ORT during diarrheal episodes
- 3) To train and mobilize 50% of THs identified at the project's initiation, in diarrheal diseases control and distribution of ORT in the context of their healing rituals

FINDINGS:

Objective 1 (Reduction of Mortality):

In areas served by VIVA there has been a 35.6% reduction in mortality in children < 5 years between program years 2 and 3, surpassing the project target of 30%. Household surveys (Appendix B, C) conducted on a randomly selected sample of project families yielded a < 5 mortality rate of 110 per 1000 live births in 1986; in 1987 the rate had fallen to 74.4%. Infant (<1 year of age) showed only a slight (3.3%) decrease from a rate of 76.5 per 1000 live births in 1986 to 69.8 in 1987.

Approximately 50% of the mortality reduction occurred in diarrheal deaths. However, in infants, diarrhea dehydration still remains by far the leading cause of death; 86.6% of <1 year deaths in 1987 were due to diarrheal dehydration. No mortality data is available to date from matched control communities where VIVA has not functioned. A statewide UNICEF Cearaense Child Health (CCH) survey (Appendix D), however, reported an infant mortality (<1 yr) rate of 106/1000 live births referent to year 1983-84. VIVA's rate of 76.6/1000 in 1986-87 and 69.8/1000 in 1987-88 represents a 32.4% and 39.2% reduction in infant mortality, respectively, which tends to confirm the prospective VIVA household survey's 35.6% reduction in mortality. Note, however, that the year of the CCH "control" survey is not the same as VIVA's which, methodologically, limits its interpretive value.

Objective 2 (Increase Mother's Awareness and Use of ORT):

The success of ORT activities can be measured by the number of mothers who know how to prepare ORS correctly and to use it during actual diarrheal episodes. Between 80-90% (depending on VIVA data used) are aware of ORS; 75% have used some type of ORT at least once; 48% utilized it in actual diarrheal episodes (occurring in the preceding 2 weeks). Only 26%, however, were able to provide the correct recipe for homemade ORS. In respect to the general use of ORS, the project target of training 50% of mothers in its correct use has been far surpassed. Adequacy in preparation of homemade ORS falls below project projections by some 24%. Child caretakers who play an important role in caring for young children in poor households where mothers must work outside the home and lack money to pay for baby sitters, have been minimally mobilized by VIVA in ORT and no data exists, to date, on their performance.

Objective 3 (Mobilization of THs and CHWs):

At the project's initiation 325 traditional healers, including folk-catholic prayers (rezadeira), Afro-Brazilian priests (Umbandistas), spiritists (espiritistas), and herbalists (raizeiro) were identified in VIVA's 26 communities. Of these, 167 THs have been mobilized in ORT. This represents 51.4% of all THs, which slightly surpasses the targeted project goal of 50%.

The level of participation of the TH in VIVA ORT activities is depicted in Table 1; the degree of healer's involvement in relationship to other ORT providers (CHWs, health post attendants) activities increased over the 3 years, but remains low. The entire program distributed a total of 63,616 liters of ORS during the 3 years; 14,334 in year 1 which increased sharply to 26,440 in years 2 and leveled off to 22,842 in Year 3.

The THs' involvement in VIVA ORT activities is measured by the percentage of ORS they distributed in comparison to other project providers. Of the total ORS distributed by VIVA, THs gave a total of 21,616 liters of ORS during the 3 years or 34% of all ORS distributed by VIVA (63,616 liters). In year 1, THs distributed only 23.4% of ORS; year 2 this increased to 40.9% and in year 3 their total participation was 32.6%. CHWs distributed 27.3% of all VIVA ORS or a total of 7,370 liters; 2,021 liters in year 1 which increased sharply to 7,626 in year 2 and to 7,723 in year 3. The largest percentage of ORS, 38.7%, was distributed by the health unit. The emphasis given on distribution through the health post in the first year (62.5% of ORS) gradually shifted to the community during years 2 and 3 as the THs and CHWs were increasingly mobilized. In year 2 the health unit distributed 37.5% of ORS and in year 3 even less, 33.6% (Table 2).

The majority of ORT activity has centered on the distribution of CEME packets of ORS; homemade mixtures have had a very low priority. Only 2.4% (1,513 liters) of ORS distributed by VIVA was based on the simple sugar, salt homemade solution; the 97.6% were CEME packets (Table 1).

Table 1

Traditional Healers' (THs) Participation in Promotion of CEME ORS packets and homemade solutions during project years 1, 2, and 3.

# liters of ORS Distributed	Project Yr			
	Yr 1	Yr 2	Yr3	Total
Total # lit. distrib/VIVA	14,334	26,440	22,842	63,616
Total# lit. distrib/THs	3,354	10,814	7,448	21,616
# packets distrib/THs	3,354	10,627	6,122	20,103
# lit. homemade ORS distrib/THs	0	187	1,326	1,513

Table 2

Percentage of ORS distributed during 3 years By THs, CHW and Health Unit

	Yr 1	Yr 2	Yr3
% ORS distrib/THs	23.4%	40.9%	32.6%
% ORS distrib/CHWs	14.1%	28.8%	33.8%
% ORS distrib/health post	62.5%	37.5%	33.6%

Data from an intensive ORT operations research in the VIVA community of Pacatuba (Nations et. al Bull PAHO 22(4), 1988) documents that the introduction of ORT by THs did not alter essential aspects of the popular healing culture; no significant ($p > .05$) change occurred in numbers of mothers who first seek THs for diarrhea, who believe in folk etiologies of diarrhea, and in the custom of feeding medicinal teas for diarrhea.

The Pacatuba ORT operations research project (Appendix E) also highlights the further impact potential of the TH-based ORT project achieved under more intensive research conditions. In 12 months, healers had highly significant impact on core diarrheal-related behaviors: correct preparation of homemade ORT (28.2%); use of homemade ORS (54.2%); correct preparation of CEME ORS packets (67%); use of antidiarrheal drugs (-20.5%); continuation of breastfeeding during diarrhea (+20.8%) among others. These impressive results demonstrate the potential the VIVA ORT model holds when fully mobilized.

Cost analysis from the Pacatuba project show the low cost for implementing homemade ORS production and promotion by THs. Average costs for making an ORT "curing room" at the THs home was US\$26.22 each; US\$43.15 was the cost to fully equip the room with ORT supplies.

CONCLUSIONS: (Documentable)

1. In areas served by VIVA there has been a 35.6% reduction in morality in children <5 years between 1986 and 1987, surpassing the project target of 30% reduction;
2. Approximately 50% of this reduction in childhood mortality occurred in diarrheal deaths;
3. Diarrheal dehydration, however, remains by far the leading cause of infant deaths; 86.6% of deaths in infants <1 year in 1987 in VIVA communities were due to diarrheal dehydration.
4. No matched, controlled comparative mortality data from communities where VIVA does not function is currently available which would statistically strengthen VIVA's mortality impact data;
5. VIVA mothers' awareness and use of ORT has surpassed project targets. Between 80-90% are aware of ORS; 75% have used some type (usually packet CEME ORS) of ORS at least once; 48% utilized it in actual diarrheal episodes.

6. Only 24% of VIVA mothers correctly prepare homemade ORS, falling below project target of 50%.
7. VIVA mothers use ORS nearly twice as often as mothers in the state at large during actual episodes of diarrhea (48.1% verses 25%); 17% of VIVA mothers used homemade ORS as compared to only 6% of Cearaense mother controls during diarrhea.
8. Child caretakers have not been sufficiently mobilized in ORT or their impact evaluated.
9. 51.4% of all THs identified are mobilized in ORT, surpassing the targeted project goal of 50%.
10. 633,616 liters of ORS were distributed during 3 years.
11. THs have distributed only 34% of all project ORT. CHWs distributed 28.8% of ORS and the health unit 38.7%. High levels of distribution through the health post shifted during the project to community-based providers.
12. 97.6% of the ORS distributed was the free government CEME packets. Simple, homemade sugar and salt solutions accounted for only 2.4% of all ORS activity.
13. Potential exists for further improvement of impact measures on diarrheal disease related behaviors.
14. Introduction of ORT when integrated into popular healing rituals by THs does not alter in any significant way core aspects of popular medicine.
15. Costs for mobilizing THs in homemade ORS are low.

CONCLUSIONS (Not Documentable):

1. The reduction of infant and childhood mortality in areas served by VIVA may be greater than 35.6% but no baseline data from Yr. 1 were collected and no data from control communities are available.
2. In areas served by VIVA there was a greater reduction in infant mortality as compared to the State of Ceara; VIVA data are referent to 1986-7 and 1987-88 household cluster surveys; CCH data is from 1984. Broader socio-economic changes transpiring during the intervening years could also be responsible for this difference.

3. Continued high diarrheal death rates in infants is partly due to faulty supply of CEME ORS packets, confusion over ORS recipes, educational/cultural barriers on mothers' part and health and professionals' (subliminal) resistance to working with the THs and ORT.
4. THs' success in promoting ORT use in VIVA is due to her skillful integration of the therapy into the accepted religious context, her personal ties with mothers, easy access, and her social position of respect in the community.
5. Mothers' low awareness and use of homemade ORS is due to the lack of program investment in basic educational and preparation materials, including salt and sugar, needed by THs to teach mothers.
6. Concentration of training of health post personnel in ORS distribution and low involvement of the TH in Year 1 (which continues to a certain extent) reflects a top-down initiation of ORT activities in 1985-86 which is not congruent with project objectives.
7. Non-participation of many THs is probably due to lack of support (e.g. in-kind, monetary) for attending training etc. by VIVA and the financial pressures of living in extreme poverty.

RECOMMENDATIONS:

1. Diarrheal diseases control activities (including ORT) should be given highest program and funding priority due to the continued high proportion of infant deaths due to dehydration.
2. A study of ORT use and mortality should be conducted in matched, controlled communities not serviced by VIVA;
3. Mobilization of THs in homemade ORS should be considered and healers be equipped with basic ORT supplies for preparation and teaching purposes;
4. A program wide training session for THs in ORT should be sponsored by VIVA (as has been done with CHWs and parteras) to mobilize further participation and new THs in ORT activities; continuous, hands-on educational training should be designed for THs with emphasis on the early identification of dehydration, administration of ORS and prevention of diarrheal diseases.

5. Incentives should be provided to THs by VIVA (as they are for parteras and CHWs) to participate in project activities;
6. An alternative homemade ORS using locally-acceptable (and available) cereals and proteins should be considered.
7. Child caretakers should be mobilized and evaluated;
8. THs who have been identified but not mobilized should be involved in ORT activities given their interest and willingness.
9. ORT delivery through health units and CHWs should be shifted even further to the THs who have first contact with diarrheal victims.
10. A qualitative evaluation of the THs' effectiveness in promoting ORT should be conducted to identify important human and communication factors utilized by healers to successfully "market" ORS to mothers.
11. Health professionals involved in the ORT intervention should be continually sensitized as to the importance of the THs' role in the community and the scientific efficacy of ORT.

B. GROWTH MONITORING

DESCRIPTION:

Growth monitoring activities include the monthly weighing of children under three years who live in poor areas of the participating communities. These activities are conducted in the community setting by community health workers with occasional supervision and support by project supervisors. The traditional birth attendants provide the same follow-up service for children up to one year in the maternity units. However the drop out rates are high. The instruments employed in the monitoring are growth charts provided by the State Secretary of Health, portable scales and other materials which were developed as appropriate technologies by the VIVA project.

FINDINGS: (50% of children <3 years will be participating in growth monitoring sessions by the end of the project)

As there was a lack of definition of high risk communities and information by age groups, quantitative evaluation of progress toward specific objectives was impossible. However from data

collected in the recent household survey (Appendix B), mothers in the project reported that 81% of their children under 5 years had growth charts while 65% had been weighed in the preceding three months. This reflects VIVA's success in weighing infants and children at the maternity units, in community sessions, and in the homes. The growth and development charts are commendably designed and easily interpreted and comprehended by the mothers. It was not clear what measures are taken to follow up children found to be off their growth curves. In comparison to the VIVA household survey, data provided by the statewide survey in the same period (see Appendix D) showed that 67% of children under three years had growth cards while only 30% had been weighed in the previous three month period. This varied from 44% in Fortaleza to 25% in the interior of the State.

CONCLUSIONS:

VIVA has achieved reasonably good rates of coverage for growth monitoring activities which are more than twice those achieved by the State as a whole. The efficacy of these activities has not been measured.

RECOMMENDATIONS:

Having documented the prevalence of growth monitoring, the project should define qualitative aspects of these activities. Such studies could analyze factors related to participation, understanding of the growth chart by the mother and the development of clear procedures for the follow-up of children with poor weight gain. These procedures would include all levels of care-giver.

C. BREASTFEEDING

DESCRIPTION:

Educational efforts to promote breastfeeding are integrated into all activities of the traditional birth attendant including prenatal care, delivery with early breastfeeding and rooming in and postnatal follow-up of mother and child. Community health workers make a specific home visit shortly after the birth for this purpose and promote the continuation of breastfeeding in other patient contacts including the growth monitoring sessions and care for diarrhea.

FINDINGS: (75% of women delivering at unit maternities in target area will be breastfeeding at 4 months post-delivery)

Among women returning to the maternity units for their own or a child's six month check-up, 60% were still breastfeeding compared to an estimated 38% in the general population. Whether this is

due to the VIVA project or to self-selection factors cannot be determined. The women who come for return visits are less likely to be employed outside the home. Women who cease breastfeeding may feel guilty and not return for follow-up care.

CONCLUSIONS:

VIVA's objective of having 75% of all mothers who deliver at the units still breastfeeding at four months is regarded as unrealistically optimistic. In addition to employment, there is a tradition in this population of early weaning and the early introduction of bottles which even predates commercial formulas. The VIVA/PROAIS staff are working to encourage breastfeeding but the present data is inadequate to measure impact. An effect is suggested (protective effect from conception with breastfeeding) by there being fewer pregnant women in the 1987 household survey although the use of contraception by percentage and method has not changed since the 1986 survey.

RECOMMENDATIONS:

Low breastfeeding rates are a major contributing factor to the elevated rates of morbidity and mortality in infants of this region. Although the pro-breastfeeding message of VIVA has reached mothers who return for follow-up care, community-wide data show less success. This objective of the VIVA project may best be met by conducting a study of the weaning practices in the project sites to seek a greater understanding of why mothers stop breastfeeding. Following this study, current strategies could be re-evaluated.

D. IMMUNIZATIONS

DESCRIPTION:

All communities where VIVA is carried out have an immunization service affiliated with a state or municipal health post. VIVA therefore adopted the strategy of promoting usage of these services by its target population. VIVA provides educational input to the project team and reviews the immunization status of pregnant women and children in the project areas.

FINDINGS: (of children 12 months of age at the project's end, 80% will have received Polio 3, DPT 3 and measles vaccine; 75% BCG; 90% of women will be vaccinated with tetanus toxoid during their pregnancy)

Tetanus toxoid has been received by 72% of women. This refers to immunization with the most recent pregnancy and excludes those already adequately immunized. The objective of immunizing 90% of pregnant women in the target population delivering in the last 6 months of the project is seen as unrealistic since boosters at greater than five year intervals is medically contraindicated.

According to the 1987 household survey, 73% of women delivering within the previous year reported having had one or more tetanus shots during their last pregnancy. This is substantially higher than among those interviewed in the BENFAM survey in the Northeast a year earlier and represents excellent coverage. However it should be emphasized that the VIVA/PROAIS role is that of promoting immunization not applying them.

Project goals for child immunizations have already been reached for polio and measles; nearly reached for BCG; and are short by 10% for DPT. From the 1987 household survey data among children 12-23 months of age, 96% reported having a vaccine card while 84% had them available to verify coverage. Of these, 88% had received three or more doses of polio (74% of the total population), 80% had received three or more doses of DPT (55% of the total), 80% one or more doses of measles vaccine (68% of the total) and 85% had received BCG (71% of the total). Comparable rates of childhood coverage for the State as a whole are 14-25% lower according to the Ceara Child Health Survey (Appendix D). Only DPT coverage is appreciably below the target levels set for the project's end. In view of the deficiencies of the governmental system responsible for immunizations, these achievements are quite impressive. Polio protection should have risen further due to Ministry of Health campaigns in May, 1988 but DPT may fall further behind due to its lower priority and higher cost. These are factors beyond VIVA's control.

CONCLUSION:

Although coverage rates are better than those for the State, it is expected that project input has had an impact in the project areas. However this is difficult to document.

RECOMMENDATIONS:

VIVA should consider directly offering immunization services to the population through the maternity units. The availability of tetanus vaccine at the same location where prenatal care is provided could improve coverage. Similarly, the availability of childhood vaccines could improve participation in visits for well-child care.

E. INFORMATION MANAGEMENT

DESCRIPTION:

A system of monthly reporting of local project activities by each program site has been implanted. Data are collected from locally used registers and transcribed to a report form. This data is entered into a microcomputer which produces monthly, activity-specific reports. In addition, a house-based cluster survey has been carried out in both 1986 and 1987. These surveys provide

community-based prevalence and coverage rates as well as other epidemiologic data.

FINDINGS:

The need for accurate data on what was being done (activities) and what was being accomplished (health statistics) was recognized from the start but hindered initially by the lack of requisite data processing hardware and software. A major step forward was realized when these were acquired. Now that they are functioning, the information system should fulfill its promise of prompt feedback for program guidance and evaluation. It is unfortunate that the community health workers and some of the supervisors do not understand the need for accurate data collection and recording. It is viewed as a chore which interferes with their service commitment to the community.

Although some of the errors in the data shown in the monthly ledgers could be corrected, many were incorrectly submitted from the field too long ago to permit easy correction. Most of the errors stem from insufficient training. The Brazilian staff are overloaded with competing demands for time and energy. On top of their roles as supervisors, these team members find themselves responsible for data collection and analysis for which they were not adequately trained. As a result, the quality of data submitted is less than optimum. The unfortunate consequence of the high error rates is a loss of confidence in the monthly records as an evaluation tool for several important questions. Those rates and the impossible data frequently shown, suggest that no one had yet used the information system as intended.

CONCLUSIONS:

It is our overall impression that the system of monthly reports is still in a fairly early development stage and that the necessary time has not been given to getting the bugs out. Even then, however, the result will only be a recompilation of data unless a more sophisticated analyst and computer programs are employed. The community-based surveys have produced very helpful data to evaluate the program and its progress. It is unfortunate that it was not possible to execute a baseline survey before implementation of project activities had begun.

RECOMMENDATIONS:

Accurate documentation of project achievements will do more than anything to secure institutionalization and replication of this innovative health care model. Mechanisms to assure correct data

reporting in monthly reports are necessary.

Development of an instruction manual and training of community health workers and supervisors is essential. The training in the importance of data collection should result in a reduction in the amount of incorrectly reported data.

The community workers should also have feedback from the information system to let them know outcomes and allow them to utilize the data in readjusting strategies.

The annual community-based household surveys should continue. This will allow for a continued assessment of the impact of VIVA program activities.

IV ECONOMIC ANALYSIS

A. Review of Project Expenditures

Table 3 presents the original budget for this grant, including breakdown by line items. Table 4 presents the expenditures to date by source, whether from AID funds or Project HOPE matching contributions.

TABLE 3

PROJECT BUDGET BY ITEM

	AID	HOPE	TOTAL
PERSONNEL/FRINGE	696,978	174,244	871,222
CONSULTANTS	0	46,250	46,250
TRAVEL/TRANSPORT	61,154	15,289	76,443
TRAINING	9,400	2,350	11,750
EQUIPMENT/SUPPLIES	110,050	111,559	221,609
OTHER DIRECT COSTS	45,340	11,335	56,675
OVERHEAD	157,078	29,270	196,348
EVALUATION	20,000	0	20,000
TOTAL	1,100,000	400,297	1,500,297

TABLE 4

	AID	HOPE	TOTAL
PERSONNEL/FRINGE	424,136	83,101	507,237
CONSULTANTS	26,795	0	26,795
TRAVEL/TRANSPORT	38,866	5,346	44,212
TRAINING	4,569	2,390	6,959
EQUIPMENT/SUPPLIES	50,762	507,726	558,488
OTHER DIRECT COSTS	142,177	27,390	169,567
INDIRECT EXPENSES	233,810	24,481	258,291
EVALUATION	2,710	1,788	4,498
TOTAL	871,248	704,799	1,576,047

USAID funds were underspent in all three years of the project. In total almost \$175,000 was left unspent at the end of the three-year period. These remaining funds have been allocated to an extension period of 18 months, together with \$170,000 of new AID funds and \$47,000 of matching funds from Project HOPE.

Table 5 shows the difference between budgeted and actual expenditures each year.

TABLE 5 BUDGETED AND ACTUAL ANNUAL EXPENDITURES BY SOURCE

	YEAR 1	YEAR 2	YEAR 3	TOTAL
AID				
BUDGET	268,571	393,502	437,927	1,100,000
ACTUAL	191,892	319,359	414,362	925,613
HOPE				
BUDGET	101,843	142,349	156,105	400,297
ACTUAL	2,390	488,741	159,303	650,434
TOTAL				
BUDGET	370,414	535,851	594,032	1,500,297
ACTUAL	194,282	808,100	573,665	1,576,047

Many factors have contributed to the underspending of AID funds. In Year 1 the initiation of the project was delayed for three months due to negotiations between UFC and Project HOPE. The original proposal had been extensively discussed with Dr. Galba Araujo, the founder of PROAIS. Before it could be implemented, however, Dr. Araujo died, and the participation of UFC therefore had to be re-negotiated. This meant that spending out of both AID and HOPE funds at the beginning of the first year was significantly lower than it otherwise would have been.

In Year 2 spending on personnel from AID funds was much lower than had been projected and spending from Project HOPE funds was higher. The original plan was for a second expatriate pediatrician to enter the project beginning in Year 2, but Project HOPE chose to substitute this position for that of a medical anthropologist. Because the change was not approved until Year 3, the salary of the anthropologist was considered a Project HOPE contribution and not an AID contribution in Year 2.

In all three years there have been cost savings resulting from the coupling of the VIVA project with PROAIS. The ability to share infrastructure such as secretarial staff, supervisory staff, transportation and training costs has made some elements of VIVA's costs much lower than they would have been if the project had been running independently. This is a further reason why spending out of AID funds has been lower than expected.

Throughout the project the economic environment in Brazil has made it particularly difficult to match the dollar value of spending by the VIVA project in Fortaleza to the dollar amounts specified in the original budget. Major problems have been introduced by

rapidly increasing inflation rates and the corresponding rapid depreciation of the Brazilian currency relative to the dollar. The falling value of the cruzado in international markets can be taken to reflect very accurately its falling domestic value. A more direct indicator of the rate of inflation is the changing value of the OTN, a government security whose value is indexed to the rate of inflation. In order to try to stabilize the economy, a major governmental package which included freezes of wages, prices and exchange rates was imposed beginning in March, 1986. Market pressures, brought on by shortages of numerous products and other distortions, led to the eventual failure of this package. Two subsequent packages were similarly ill-fated, not succeeding in breaking the inflationary spiral.

In the final months of the period under analysis here, inflation has run between 25 and 30 percent per month. With prices in cruzados rising so rapidly, it becomes difficult to judge how fast a sum of money budgeted in dollars is being spent and easy inadvertently to underspend. Underspending by the VIVA project may have resulted partly from a misconception on the part of those in charge of expenditure about the rate at which they were actually spending. The fact that the monthly financial reports have to be submitted in dollars provides a regular check on how much is being spent in dollar terms, but there is a time lag before this information becomes available. During the lag, prices continue to rise, so that on a day to day level the budgeting problem remains.

High inflation rates also expose VIVA to the risk of losing purchasing power over time. In order to help avoid this risk, Project HOPE wires funds in dollars to its office in Fortaleza each month, based on expenditures reported in the monthly financial reports sent to HOPE Center. This limits the loss of buying power of project funds, but with such high inflation rates significant losses still occur, particularly when money is spent at the beginning of a month and new funds do not arrive to cover the expenditure until a month later. Project HOPE plans to take immediate action to correct this problem.

Table 5 also appears to show overspending of Project HOPE funds in Years 2 and 3. Part of this is simply delayed expenditure from the beginning of the project, such as spending on the vehicles which could not be bought until Year 3. In addition, it should be noted that the expenditure figures include the value of in-kind contributions, such as donations of vaccines, which were not necessarily included in the original budget and which do not necessarily represent project-related expenses. These contributions have certainly been valuable and should not be ignored.

B. Brazilian Contributions to VIVA

Various counterpart institutions contribute to VIVA's activities, either in cash or in kind, at both the central level and the local level.

Project HOPE's major counterpart institution, the UFC, provides office space for the Project HOPE office, including an administrative office, a meeting room, half of a computer room and an office for the program's anthropologist. Including electricity and general maintenance, this represents a contribution of approximately \$20,000 per year.

The contribution of PROAIS should be recognized, although PROAIS also represents a project with external funding (in this case from the Kellogg Foundation directly to the university). Many support people, such as the PROAIS secretaries, drivers, faculty advisers and selected supervisors have been supported by PROAIS while serving both projects. Transportation provided by PROAIS has been particularly important to VIVA. For several reasons, primarily associated with the scarcity of new cars for sale during the Cruzado Plan, cars were not purchased by VIVA until the beginning of Year 3. Until that time, VIVA depended largely on PROAIS vehicles for the transport of supervisors to project sites. The salaries of many supervisors have been divided between the two projects, but it is felt that the time devoted to the activities of each project is proportional to the amount paid by each, so this does not represent any contribution to VIVA by PROAIS.

The Secretary of Health has made important contributions, especially of ORS packets (20,000 - 25,000 per year) and growth monitoring charts (approximately 6,000 per year). In addition, several local supervisors of project activities are employees of the Secretary of Health, receiving only small gratifications from PROAIS/VIVA for their participation. The same is true for several municipal governments in relation to other PROAIS/VIVA supervisors. Municipal governments also collaborate in the transportation of some supervisors to their units, and in the referral of emergency cases to hospital care.

At the local level, contributions from local sources far outweigh the support provided through Project HOPE. It is difficult to establish which contributions are attributable to VIVA's child survival activities and which to PROAIS' maternity services, since VIVA activities depend for the most part on the existence of the maternity unit to facilitate their execution. Consequently, the financing of the unit as a whole will be examined. Each local maternity unit is usually administered by a community association and so is in effect a private sector philanthropic health facility. The unit receives financial support from its association and in most cases also from the municipal government. The associations in turn receive most of their income from the

state offices of INAMPS, the health division of the Ministry of Social Security, with which they have formal agreements. Other sources of smaller amounts of income include monthly contributions from members of the association and user fees (neither of these was a source of any significant amount of revenue at either of the two units visited for the purposes of this evaluation). For periodic needs (e.g. purchase of a car for transportation of referral cases, or construction of a new facility) specific fund-raising efforts may be undertaken, as well as solicitations to appropriate institutions.

The salaries of local staff are paid primarily by the local municipal government (prefeitura) or, in some cases, by the association with its revenue from INAMPS. One exception is the salaries of the community health workers, which are paid entirely by VIVA. PROAIS also complements the salaries of those TBA's who earn especially low wages. Forms and minimal medical supplies are provided by the two projects. Aside from salaries, income from INAMPS is mainly used to pay for food, other supplies and transportation. The physical structure which houses the maternity unit is commonly owned by the association or rented by the municipal government.

For the purposes of this evaluation, income and expenditure data were collected from two units, Conjunto Palmeiras and Jubaia, for the first six months of 1988. This data shows the contributions from Brazilian sources received by each unit during that period, but it includes contributions to PROAIS activities as well as those of VIVA. Ideally, the total contributions to each unit should be separated into those attributable to PROAIS activities and those attributable to VIVA. There is so much overlapping between the two projects, however, that it is difficult to divide the contributions between their respective activities in any non-arbitrary way, so the income of each unit as a whole will be examined here.

Funding for the Jubaia unit comes from various different Brazilian sources. The municipal government (prefeitura) pays salaries to a supervisor, four TBAs, a CHW, a cook, an administrator, a doctor, a dentist and a mini-post attendant. It also pays the unit's electricity bills, makes a contribution towards transportation costs and provides some supplies, such as vaccines. The unit receives a monthly sum of money from INAMPS, which it uses to supplement the salary of the administrator and to pay for food and other supplies. In addition, a small amount of money and food is donated each month by the members of the local community. VIVA's contribution to the funding of this unit consists of gratifications which it pays to supplement the salaries of the supervisor and each of the CHWs. A detailed summary of the income and expenditure of the unit for one month of 1988 is given in Table 6.

The unit's total measurable expenditure in May 1988 was \$1,081.74, of which \$174.79 was funded by VIVA. This means that approximately 84% of the expenditure which can be measured given the data available was financed by Brazilians. If the payments by the prefeitura for the doctor, the dentist and electricity could be included in this calculation, the percentage of expenditure contributed by Brazilians would be larger.

Table 6

Spending at the Jubaia unit in May 1988

Spending funded from Brazilian sources:

Groceries	\$369.48	(INAMPS)
Administrator	\$ 32.37	"
Medical supplies	\$ 41.18	"
Other supplies	\$ 64.68	"
Transport	\$ 90.64	(INAMPS and Prefeitura)
Four TBAs	\$112.70	(Prefeitura)
Administrator	\$ 28.18	"
Supervisor	\$102.93	"
Two CHWs	\$ 22.54	"
Cook	\$ 19.72	"
Mini-post attendant	\$ 22.53	"
Supervisor	\$123.00	(VIVA)
Two CHWs	\$ 51.79	"
Total	\$1,081.74	

Other costs whose size is not known were:

Electricity	(Prefeitura)
Doctor	"
Dentist	"

No rent is paid on the building which houses the unit, since it is owned by the community.

Total income from INAMPS for the month was \$686.26. The Prefeitura's contribution towards transportation costs was \$64.74

C. Sustainability

Considering the increasing cost of living in Brazil, the high rate of inflation, and the progressive cutbacks in government expenditures for local programs, it would be unrealistic to hope that the government would assume full responsibility of VIVA activities in the foreseeable future. VIVA is seen as essentially a community program, managed by a private, non-profit organization but with significant financial contributions from the municipal government, the State of Ceara, the Federal University of Ceara, the Ministry of Health and the Social Security System. The recurrent costs to the Brazilians of existing activities will impact greatly on the issue of sustainability.

There are two questions to be answered about the recurrent costs to Brazilians of existing activities. One concerns the level of recurrent costs in total and the other the level of the recurrent costs which are currently being borne by Brazilians. Once these two levels of costs are known, the difference between them can be used as a measure of the shortfall which would result if funding for recurrent costs from foreign sources were to be withdrawn. On the basis of this figure an attempt can be made to judge whether or not the recurrent costs of existing activities could be met from Brazilian sources alone.

The recurrent costs of VIVA's activities are the operating cost elements of total costs. They are the costs which have to be paid repeatedly in order for project activities to continue. Thus the cost of constructing a building (for example an extension on to a maternity unit) is not part of recurrent costs. In the case of VIVA's activities, the most important recurrent costs are salaries, transportation, equipment and supplies. Some of these costs are incurred at the level of individual units and others at the central level in Fortaleza.

The monthly expenditures of individual units can be used to examine the level of recurrent costs. As mentioned previously, these expenditures include the costs of PROAIS activities as well as those of VIVA. Again, the total costs of each unit should ideally be divided between the two projects, but it is even more difficult to do this in a reasonable way with expenditures than with income.

Some of the money spent from the Project HOPE office should be included in recurrent costs and some need not be. Some are necessary costs of administration, which should be incurred even if Project HOPE pulled out. Other things, such as evaluation, consultants, etc. are not recurrent costs. Then there are things which one would like to have included in recurrent costs, because they ought to be paid for regularly, such as record-keeping (not just financial, but also of patients treated, etc.), but which

aren't essential to the provision of existing services at their current levels.

It is hoped that the services which are currently being provided by the VIVA program will be sustainable by Brazilians without any external funding from USAID or Project HOPE. The program's sustainability will depend on many factors, including the sustainability of PROAIS's activities (since the two projects share many facilities) and the availability of funds from Brazilian sources to replace the contributions of the foreign agencies. In the present Brazilian context it is almost impossible to estimate the probability of obtaining additional funding from government sources. The whole health care system is due to undergo a major reform, which will radically change the environment within which VIVA operates and which introduces considerable new uncertainty about the future of the project's activities. The relevant question is no longer whether the activities are sustainable with the project in its present form, but whether they will be sustainable within the new system of health care provision and financing which emerges from the reform.

The proposed new health system is known as SUDS (Unified, Decentralized Health System). After the changes planned in this health reform, all health resources within a municipio would be administered by a single municipal management. All health facilities would be represented at this level through a municipal-level inter-institutional commission. A single health budget would be developed at the municipal level, based on the needs of the population, the health resources available, and the capacity further to develop the health sector to meet health needs. Funds to finance the budget would come from social security contributions and social and municipal tax revenue. Although the health system would be managed within the public sector, some services would be provided by the private sector under formal agreements or contracts, with preference being given to non-profit institutions.

It is certain that the proposed changes will be made. The state INAMPS offices have already been absorbed within the state Secretary of Health and inter-institutional commissions have been formed at the federal, state, regional and municipal levels for joint planning. What is not yet clear is how long it will take to complete the changes. Some conservative estimates say that it will take three years to implement the new system throughout the state of Ceara. The process of decentralization has in fact already begun, with the division of the city of Fortaleza into 8 health districts. The decentralization should extend into the interior of the state beginning in early 1989.

Prospects for the sustainability of VIVA's activities clearly depend on whether or not the program is incorporated into the

SUDS as part of the new health care system. It seems that the best way for the project to maximize its chances of survival without external involvement is to take advantage of the reorganization and make a permanent place for itself in the new system. Realizing this, both VIVA and PROAIS are altering their programs to make them consistent with the SUDS, as well as to seek the maximum of financial support from the SUDS for their contribution to health care in the state.

Incorporation into the SUDS is most viable in those areas related to the direct care of patients. During the three-year period currently under analysis, the programs have worked from a relatively large number of individual units, most of which are linked much more closely to the central level of the program in Fortaleza than to any municipal health administration. Plans are already underway, however, to consolidate the activities of PROAIS and VIVA in a smaller number of municipios but at the same time to broaden the scope of their activities to cover the entire population of each of these municipios. Both the units and the direction of the program would thus have closer links to the municipal government, consistent with the SUDS. Within this context, the current health units would be included in the municipal health plan and budget, and would receive supervision from the municipio for its health care services.

The role of VIVA/PROAIS in such a system would change to one of technical support in the development of primary health care for women and children, in the areas of Child Survival and Safe Motherhood, but with the municipal governments as important new counterpart institutions. Ideally the relationship of VIVA/PROAIS to the SUDS would be defined in a formal agreement or contract, in which the programs would be reimbursed for services rendered to the SUDS. At the moment, an impediment to this is the fact that the programs do not exist as legal entities capable of entering into such formal relationships.

If we now review the different levels of the VIVA/PROAIS program as it currently exists in the light of this future, we can make an initial assessment of the prospects for sustainability within the SUDS. At the local level, most activities are currently self-sustaining, due to the support from INAMPS and the municipal government. The VIVA project is currently supporting only the CHWs, while PROAIS is providing some complementary salary support for TBAs as well as some medical supplies for the units. Under the SUDS, all these expenses should be included in a municipal health budget. The other, more immediate prospect for reducing VIVA spending on CHWs is a statewide CHW program currently being implanted by the State Secretary of Health. At the moment, this program has been implanted in nearly half of the municipios of the interior of the state, but has not yet included those municipios where the program is active. Understandings have been reached with the co-ordination of the statewide program to ensure

that, having demonstrated their competence, the CHWs affiliated with the VIVA program will be included.

The supervisory level of the project, which currently accounts for a considerable proportion of its expenses in terms of salaries and transportation, would likewise be eliminated within the future context of the program. Local health professionals would assume routine supervision of the current program's units, with transportation being the responsibility of the municipal government.

The central level of the program would therefore give up its role of administering the direct provision of services. It would presumably assume a role of providing technical assistance to the units and municipios which participate in the future phase of the project, as well as to the SUDS as a whole, based on understandings reached with the municipal governments, the community organizations directing the maternities and the co-ordination of the SUDS. The new roles assumed by the central level would be defined in relation to understandings that it reached with the institutions that support it. It is assumed that support from USAID would then be used for research and training in the fields in which the program has accumulated considerable expertise, i.e. Child Survival and Safe Motherhood. The geographic area where the units are located would be used for the execution of such work. Support from the Kellogg Foundation would be directed at supporting the implantation of the SUDS, especially in rural areas, and using these sites for educational purposes involving the diverse segments of the university as well as local personnel.

It is clearly possible, at least in theory, to find a way of incorporating each level of the program into the SUDS. While this means that there is a possibility that the program's activities would continue to be financed even in the absence of USAID and Project HOPE, it does not necessarily mean that they would continue to be carried out with the same efficiency and effectiveness. Adequate funding is a necessary but not a sufficient condition for providing high quality health care services.

There is something intangible but crucially important about the VIVA project, which has enabled it to be so successful so far and which may be very important to the issue of sustainability. All the people involved in running the program are extremely committed to making it run well. The attitude of VIVA employees is completely different from that of many of those doing similar work in the public health system, though their wages are just as inadequate. Working for PROAIS/VIVA gives employees a certain status, because the programs are held in such high esteem. (The symbols of the project probably also play an important part in this. The emblems on the sides of the vehicles, on the

protective clothing worn by unit staff, on the top of the stationery, etc.) The public health sector is plagued by strikes, and often it is impossible to obtain care from public facilities. PROAIS/VIVA facilities, on the other hand, are staffed 24 hours a day and people often go to them with medical problems which have nothing to do with maternal or child health, knowing that they will receive help. In some communities people with health problems which require hospital treatment go to PROAIS/VIVA units simply because they know that some means will be found of transporting them to the city. The units are seen as reliably giving good quality, free care to anyone in need.

Prospects for sustainability will be much improved by VIVA's continuing involvement in aspects of the project's work other than the direct provision of services. If the programs were run entirely without outside support, it is difficult to imagine them running as well as they do now. Having foreign involvement, expertise, equipment, and money all contribute to the respect they currently receive and to their employees' motivation. The individuals who were involved in running the programs' activities in the future might be expected to make a very significant difference, even to the quality of services provided at the local level. It is particularly difficult to imagine the project in anything like its present form if Project HOPE was not currently involved.

It will be very important that jobs in the state CHW program are given to qualified people who are committed to ensuring that it succeeds (that is to say, people like the VIVA CHWs). The alternative possibility is that the jobs will be used as political appointments, in which case the state's use of CHWs is unlikely to be anywhere near as successful as VIVA's.

Is this a good time to be asking about sustainability? There is such a lot of uncertainty surrounding health care in Brazil now and in the near future that it is very difficult to say anything about the prospects for any particular element of the system. Perhaps the best thing to do now is to see that the program continues to provide its services in the transition period between the new and the old health systems and then to reassess the situation in the light of the developments which actually take place under the SUDS. It may be that the program's benefits would not continue if outside support were withdrawn at this point, but that they would become a casualty of the reorganization. In the long run and in a more stable environment, on the other hand, the program's activities might prove to be relatively easily sustainable. If the program's activities are not incorporated into the SUDS, this does not necessarily mean that they are not sustainable in the long run. Maybe HOPE/AID should concentrate on keeping the services running through the changes.

D. Integration

In the urban area, there is a reasonable integration of VIVA/PROAIS with other health institutions, although some of the services for which the local units refer patients to governmental clinics (e.g. immunizations) are not dependably provided. In the Conjunto Palmeiras (and perhaps elsewhere as well) there is a nutritional rehabilitation unit financed by Swiss philanthropy with which there are mutual referrals.

VIVA/PROAIS is also collaborating with the state's Viva Crianca program which is coordinated by the Secretary of Social Services with the co-operation of those of Health, Education, and Planning, and the active involvement of UNICEF. Professional interchange and care not to duplicate activities are central to the collaboration.

E. Cost per Beneficiary of Project Activities

An ideal calculation of the cost per beneficiary of project activities would measure the cost of providing each different kind of service to each patient served. That is, it would determine how much was spent in total over a given period of time on a service such as growth monitoring and then divide this figure by the number of children whose growth was monitored during that period. Not only would this be interesting information in itself, but it might make it possible to compare the cost of providing Child Survival services through VIVA to the cost of providing them at other facilities, such as government health posts. There are several difficulties involved in making such calculations, however. The denominator can only be measured properly if accurate records have been kept by those who provide services of how many patients actually received each service. Moreover, in a setting such as that within which the VIVA project operates, where various different services are being provided, it becomes very difficult to establish how much of the total costs of the project's activities should be attributed to each service provided.

The problem of correctly attributing costs is amplified in the case of VIVA for two reasons. At the level of the individual units from which services are provided, the total costs of running each unit must be divided between VIVA activities and PROAIS activities before any attempt can be made to divide VIVA's total costs among its different activities. And at the central level of the project in Fortaleza the project-wide costs of administration, training, etc. must be attributed among different services provided at different units, which is even more difficult.

The data collected from the Conjunto Palmeiras and Jubaia units for this evaluation includes some information about the total number of contacts made at each unit for different services in Year 3 of the VIVA project. (This information is presented in Appendix F.) Unfortunately, the records of the number of individual patients treated are very incomplete. This makes it impossible to measure the actual number of beneficiaries of either unit accurately. The best that can be done is to obtain an approximate number of potential beneficiaries for each unit by estimating the size of the target population (children under five years old and their mothers), based on census data and a household survey carried out by VIVA.

Unit-level expenditure data was collected from both units for the first six months of 1988, but it was decided not to attempt to divide the expenditure between VIVA and PROAIS activities, nor among the different activities of the two projects. As was mentioned earlier, there is so much overlapping in both cases that any division of expenditure would inevitably be arbitrary. Given the limitations of the available unit-level data, all that can be calculated with a reasonable degree of accuracy is the unit-level cost for each person who might have benefited from one or more of the activities of VIVA or PROAIS.

Regarding unit-level costs, it is also necessary to include in the calculation the central-level costs of running VIVA's activities. A measure of the central-level cost per beneficiary is required, and in order to calculate this accurately, total costs need to be correctly attributed to individual units. Because different units vary significantly in size and in the extent of their activities, it would be inaccurate simply to divide total central-level spending by the number of units. Again, the best that can be done is to calculate the total target population of all the PROAIS/VIVA units taken together and then to divide central expenditure by this number to get a measure of central-level cost per potential beneficiary. The total population in the target area for each project site is taken from census data. It is also known from the census that children under five years of age constitute 15% of the total population. The proportion of mothers of children under five is taken to be 10.03%, a figure which comes from the VIVA project's annual survey. The relevant figures are presented in Appendix F.

An estimate of the total cost of project activities per potential beneficiary is obtained by adding together the unit-level cost (which includes the cost of providing PROAIS as well as VIVA activities) and the central-level cost (which includes only VIVA). The resulting figure will probably underestimate the cost

per actual beneficiary of VIVA/PROAIS, since not all of those in the target population actually take advantage of the program's services. This effect will be partially offset by the fact that some beneficiaries receive more than one service and so should be counted as benefiting more than once. The figure will certainly overestimate the cost per actual beneficiary of VIVA's activities, since it also includes a large part of PROAIS's costs.

V. SUGGESTED RESEARCH

Emphasis should be placed on field projects for epidemiological studies. Internal migrations, personnel changes, and even changes in administration prevent strict clinical studies.

On the other hand, epidemiologic studies are deficient in Brazil as well as operational research. Some suggestions are the following:

1. Women's Health
 - . evaluate nutritional status during pregnancy
 - . evaluate gestational anemia
 - . determine causes of maternal mortality
 - . evaluate chronic and degenerative diseases affecting rural women
 - . evaluate operational systems for family planning
2. Neonatal Health
 - . evaluate fetal risks and appropriate interventions
3. Investigate factors affection child growth and development in rural areas
4. Investigate protein/calorie under-nutrition
5. Investigate specific deficiencies eg iron and Vitamin A

VI. RECOMMENDATIONS

Experience has shown that at least 5 years are required before a demonstration project can have proved itself sufficiently to be absorbed by public agencies. The VIVA project has to be so transformed at some date or it will remain a limited, paternalistic experiment doing little to ameliorate poverty and misery for the population intended to be served.

1. Activities should be documented in the suggested remaining two (2) years of the project as a basis for replication of this alternative model in other rural/urban poor communities both in and beyond Brazil.
2. Diarrheal disease control activities should be given program priority. Consideration should be given to the role of homemade ORS.
3. An alternative homemade ORS using locally acceptable cereals and proteins should be developed and introduced to enhance acceptance by mothers.
4. A formal and hands-on training should be designed for THs and new THs to emphasize the early identification of dehydration, administration of ORS and prevention of diarrheal disease. ORT delivery through health units and CHWs should be shifted even further to these THs.
5. The effect of ORT use in the target communities should be compared with matched, controlled communities not served by VIVA.
6. The traditional healer's effectiveness in promoting ORT should be reviewed to identify important human and communication factors utilized by healers to successfully "market" ORS to mothers.
7. Child caretakers should be mobilized and evaluated.
8. Health professionals involved in the ORT intervention should be continually sensitized as to the importance of the traditional healer's role in the community and the scientific efficacy of ORT.
9. Procedures for follow-up of children with poor weight gain should be developed for all levels of care givers.
10. Reconsideration should be given to offering immunization services to the VIVA population through the maternity units.

11. Development of an instruction manual and training of community health workers and supervisors in collection of data on activities and health statistics
12. Achieve sustainability of project activities by continuing to link the VIVA model to the new decentralized health system in Brazil (SUDS)
13. Yearly household surveys should be continued.
14. Studies should be considered on various MCH topics. Suggested areas include a definition of the qualitative aspects of growth monitoring activities (analysis of factors related to participation and understanding of the growth chart), weaning practices in project sites, anemia.

APPENDIX A

SCOPE OF WORK

Consultant - Child Survival Specialist

Evaluation of VIVA, Child Survival Program of Project HOPE-Brazil

Project HOPE was awarded a Child Survival Grant by USAID to be executed in the state of Ceara in Brazil's Northeast. Project HOPE's counterpart institution is the Federal University of Ceara (UFC), located in the capital city, Fortaleza. More specifically, VIVA is being carried out through PROAIS, a primary health care program of the UFC, which uses small, community-based maternities as its primary health care unit. Most services are provided at these units by trained traditional birth attendants (TBAs), auxiliaries, and community health workers, with weekly supervision being provided by nurses and/or physicians.

For the external evaluation of VIVA, a child survival specialist will be one of the two consultants to carry out this evaluation. The general responsibility of this consultant will be to evaluate the progress of the project activities in ORT, growth monitoring, promotion of breastfeeding, and promotion of immunizations, and to provide recommendations for improving the quality of program activities. Broad questions that should be addressed in the evaluation are listed below.

1. How well are the following activities being carried out at the community level, both in qualitative and quantitative terms?
 - ORT
 - Growth monitoring
 - Promotion of breastfeeding
 - Promotion of immunizations
2. Evaluate the supervisors, CHWs, TBAs and traditional healers in regard to the following:
 - functional knowledge for the execution of program activities
 - utilization of times
 - additional training needs.
3. How well is the Management Information System developed and functioning?
4. Evaluate the coverage being attained by VIVA.
5. How appropriate is the PROAIS/VIVA model for providing primary health care in Brazil's Northeast compared to the traditional physician-based model? For periurban areas? For rural areas?

6. Should VIVA be working with other problems related to child survival, e.g. Vitamin A deficiency?
7. Provide recommendations for research that can be carried out within the context of this program.

It is planned that the initial two weeks of the evaluation will be spent in data collection and analysis. This will involve interviews with project staff, visits to program sites, review of program records, and interviews with state health authorities. The third week will be spent in preparing the evaluation report and discussing the findings with local program staff and USAID-Brazil.

The individual who will carry out this evaluation should have the following qualifications:

1. Be recognized as an authority in child survival activities.
2. Be fluent enough in Portuguese to be able to communicate with non-English speaking project staff or alternatively in Spanish.

SCOPE OF WORK

Consultant in Health Economics and Administration
Evaluation of VIVA, child survival project of Project HOPE-Brazil

Following discussions with USAID in Fortaleza in July, 1987, it was decided that a health economist should be one of the members of the evaluating team, due especially to the importance being attributed to the issue of recurrent costs and the sustainability of current program activities. Listed below, by general topic, are questions that should be examined by this evaluator.

1. What is the likelihood that sustainability of project activities can be achieved by the end of the project, and what progress has been made in reaching that goal? For the local delivery of services? For the supervision of local services? For the provision of program supplies?
2. How well has PROAIS/VIVA been able to integrate with local health-related institutions? What are the obstacles?
3. What cost/benefit analysis can be done regarding project activities from existing sources of data? What would be recommendations for an in-depth cost/benefit analysis of program activities?
4. Provide recommendations for strengthening the project's ability to deal with economic/administrative issues.
5. Provide suggestions for research that could be carried out within the framework of the project.
6. Based on current levels of project expenditures, should the duration of VIVA be extended? If so, for what period?

The individual participating in this evaluation should have the following qualifications:

1. Be a recognized authority as a health economist in the context of primary health care in the developing world.
2. Have experience at examining the question of sustainability of primary health care activities, from the project-level perspective;
3. Be fluent enough in Portuguese to communicate with non-English speaking program team members and health authorities or, if not possible, in Spanish.

APPENDIX B

VIVA/PROAIS ANNUAL HOUSEHOLD SURVEY, 1987

VIVA is a child survival project being carried out by Project HOPE in the Northeast of Brazil in collaboration with the Federal University of Ceara (UFC), and with support from the Agency for International Development. Located in the state of Ceara with headquarters in the capital of Fortaleza, this project is being executed within PROAIS, the primary health care program of the UFC. Operating in 29 locations, 24 of them in rural areas within 150 km of Fortaleza, the program uses small, TBA-staffed maternities as its basic health unit.

VIVA, which began its field operations in 1986, was designed to develop the GOBI strategies within PROAIS. The essential strategy is to utilize a community health worker to promote and/or execute the basic activities which include growth monitoring, oral rehydration therapy (ORT), breastfeeding, and immunizations. The community maternity unit, where the TBAs provide prenatal, delivery and post-natal care, complements the other promotional work carried out by the CHW.

To evaluate the results of this project, yearly surveys have been planned to determine at the community level the status of the population in relation to project objectives and the activities associated with each objective. The first survey was carried out in September of 1986. The current report provides the results of the second survey, carried out in December, 1987. From the experience of the first survey, a number of improvements were made, including separate questionnaires for the mother and for each child, and additional information was obtained.

METHODS

A cluster survey methodology was adopted for the survey. Due to differences between the program sites in Fortaleza and the Interior, the clusters were chosen in 2 stages. Based on the urban populations of the program sites, 20 clusters of 20 homes with children under 5 were randomly selected for the Interior, and 10 clusters of 25 homes for program sites within Fortaleza.

A questionnaire was developed by project staff. A manual was also prepared for orientation in the application of the questionnaire. Program supervisors were trained in the application of the questionnaire. They, in turn, trained the CHWs in the communities included in the sample. Following the initial training, CHWs applied several questionnaires which were subsequently reviewed by the supervisor. Once approved, the CHWs then proceeded with the application of the questionnaires.

The starting point for each cluster was randomly selected. In rural program sites, the first house was selected from maps prepared by SUCAM, the endemic disease control agency of the federal government. In Fortaleza, where such maps do not specify houses, residential blocks were chosen first with, one side of the block then being randomly selected. The interviewers then proceeded in a predetermined direction visiting other houses until the correct number of houses of children under 5 were identified. Interviewers were oriented to return to a house at a later time when no one was present at the time of the first visit.

Once completed, the questionnaires were reviewed and coded by the supervisor. They were then returned to project headquarters where they were entered into the program microcomputer and analyzed using dBASE software.

RESULTS

Among the 24 rural program sites, the 20 clusters fell in 15 sites. In Fortaleza the 10 clusters included 4 of the 5 program sites. From the 650 homes included in the sample, 653 questionnaires were obtained from mothers of children under 5 and 977 from children under 5. Based on the percentage of the total population represented by children under 5, it is calculated that the general population represented by this sample is 6470. Mothers Thirty-five percent of mothers reported being illiterate. Eighteen percent reported that they had received no schooling and an additional 45% reported 4 years or less of formal education. The source of water, which was intended as a general socioeconomic indicator, was piped-in in only 35% of homes. The mean number of children born to these mothers was 4.1. Eleven percent had more than 8 children. Eighteen percent of children born to these mothers had died. Among mothers of children under 2 years, 22% reported that it was common for them to be away from the home. Among all mothers, 1.7% left their children in the care of someone under 12 years of age while away from home.

A third of these mothers had delivered a total of 218 live births in the preceding 12 month period, including one set of twins. There were 6 stillbirths reported. Based on the estimate of the general population, this represents a crude birth rate of 34. Of delivering mothers, 18% were over 35 years of age, and 6% were under 18. Among the 80% of mothers delivering in the previous 12 months who had previous children, dates were obtained on 88% permitting the calculation of birth intervals which were below 24 months for 38%.

Among mothers delivering in the previous 12 months, 12% reported receiving no prenatal care while 53% made 5 or more visits. Seventy percent reported receiving tetanus toxoid during

the pregnancy. Forty-two percent of these mothers delivered at the PROAIS maternity, 2% at regional hospitals tied to the program and an additional 10% were referred from the unit to the university maternity. Nine percent of these mothers delivered at home. The remaining 37% delivered at other hospitals not part of the program. Of the 623 mothers under 45 years of age, 88% did not want to become pregnant at the time of the interview, 4% wanted to become pregnant, and 8% were pregnant already. Of those not wanting to become pregnant, the pill was the most common method, used by 32%. Tubal ligations were the second most common method, adopted by 19%. No method was being utilized by 28%.

Children

A total of 16 child deaths were reported by mothers during the preceding 12 month period. Of these, 15 were among children under 1 year of age. Diarrhea was given as the cause of death in 11 of the 16 cases. The infant mortality rate is 70/1000 live births, and 74/1000 among children under 5 (based on the 218 reported live births but excluding 3 live births for which mortality data was omitted from the questionnaire).

Breastfeeding was initiated immediately after delivery among 65% of deliveries in the previous 12 month period. Five percent of these mothers reported never breastfeeding. Diet histories among children under 2 years of age using life table analysis showed that 91%, 78%, 72% and 54% were still breastfeeding at 1, 2, 3, and 4 months respectively. On the other hand, bottle feedings were being given to 47%, 58%, 71%, and 79% of children at 1, 2, 3, and 4 months, respectively. Two thirds of the children were reported to be enrolled in at least one food distribution program. Eighty-one percent of all children reported having a Road-to-Health chart, which was shown to the interviewer for 70% of the children. Among those with the chart available for inspection, 57% had been weighed in the previous 3 month period with the result registered on the chart. Ninety-three percent reported having an immunization card, which was shown to the interviewer for 79% of all children. The coverage of children from 12-23 months of age based on card-confirmed doses was 74% for polio, 55% for DPT, 68% for measles, and 71% for BCG. When asked whether the child had participated in the 2 polio vaccine campaign days in the previous 6 months, 77% participated both times, 13% only once and 7% on neither occasion.

Nineteen percent of children were reported to have had diarrhea in the previous 2 week period, of which 15% were considered light cases (3-5 stools per day), and 4% were considered severe (6 or more stools per day). Of these cases, 48% had received ORS, 23% using the government packets (CEME), 17% using a homemade solution, and 8% using a commercial

preparation. One third had spent some period without being fed, 6% having been fasted for a week or more. A traditional healer was consulted by 42% of the cases. Half of all cases received some form of medication for the diarrhea. Ninety percent of mothers reported knowing of ORS, while 74% reported having used it at some time. The CEME ORS had been used by 64% of all mothers, the homemade ORS by 26% and a commercial ORS by 44%. Of all mothers, 42% indicated that they knew how to prepare a homemade ORS, whereas 26% were able to provide a correct formula. The formula most frequently described was that promoted by VIVA/PROAIS which uses a bottle cap to measure sugar and salt. Of those able to correctly provide a formula, 50% had been taught by a CHW. When CHWs or traditional healers were cited as the person who had instructed the mother in the preparation of homemade ORS, 94% of mothers provided a correct formula.

APPENDIX C

VIVA/PROAIS HOUSEHOLD SURVEY, 1986

VIVA is a child survival project being carried out by Project HOPE in the Northeast of Brazil in collaboration with the Federal University of Ceara (UFC), and with the support of the Agency for International Development (AID). Located in the state of Ceara with headquarters in the capital of Fortaleza, this project is being executed within PROAIS, the primary health care program of the UFC, founded by Dr. Galba Araujo. Operating in 32 locations, 27 of them in rural areas within 100 km of Fortaleza, the program uses small, TBA-staffed maternities as its basic health unit.

VIVA, which began its field operations in 1986, was designed to develop the GOBI strategies within PROAIS. The essential strategy is to utilize a community health worker to promote and/or to execute the basic activities which include oral rehydration therapy, growth monitoring, breastfeeding, and immunizations. The community maternity unit, with the TBAs providing prenatal, delivery, and post-natal care, complements the promotional aspects of VIVA.

To evaluate the results of this project, yearly surveys have been planned to determine at the community level the status of the population in relation to project objectives and the associated activities. The first survey was carried out in September of 1986, and thus may reflect the initiation of certain activities, rather than a true time-zero.

METHODS

A cluster survey methodology was adopted based on the Manual for the Planning and Evaluation of National Diarrhoeal Diseases Control Programmes (WHO). Due to the distinct differences between the 5 communities served by the project in Fortaleza, and the others in the surrounding rural areas, clusters were selected in a two stage process. Nineteen clusters of 20 homes of children under 5 were selected for the rural areas, and 5 clusters of 50 homes within Fortaleza.

A questionnaire was developed by project staff and field tested by medical students under the supervision of a project physician in an urban setting. Following the resultant modifications, it was distributed to field sites.

The questionnaire was applied by community health workers or work-study students of the project following a training by the project supervisor of the given community. For each cluster a house was randomly selected using a map of the community obtained from SUCAM, the national endemic disease control program. The interviewer followed a sequence of homes in a predetermined direction, filling out a questionnaire at each home which had at least one child under 5. Once the questionnaires were completed, they were reviewed by the project supervisor before being returned to the project office.

The results were subsequently coded, transcribed and entered into the Project HOPE microcomputer where they were first reviewed using dBASEIII and later tabulated using Statgraphics.

RESULTS

Of the 630 questionnaires applied, seven were excluded for mistakenly including a child of 5 years in a family with no younger children. Of the resulting 623, 247 (40%) of the questionnaires were obtained from communities within Fortaleza, approximating the 44% of the target population residing within the capital.

The mean age of the mothers was 29.7 with a median value of 28. The distribution of their ages is shown in Table 1. These mothers reported a total of 2614 live births (4.2/mother) of whom 2128 (81.4%) were living. Of these, 941 children were children under 5 years of age. In the previous 12 month period 206 live births were reported. The age distribution of these mothers is also shown in Table 1.

TABLE 1. AGE DISTRIBUTION OF ALL AND NEW MOTHERS

AGE	ALL MOTHERS		NEW MOTHERS	
	NO.	%	NO.	%
15 - 19	48	8	21	10
20 - 24	155	25	71	34
25 - 29	137	22	44	21
30 - 34	99	16	28	14
35 - 39	107	17	27	13
40 - 44	47	8	10	5
45 - 49	16	3	5	2
> 49	14	2		
Unknown	2	0		

There were 25 child deaths reported in the previous 12 month period of which 17 were under a year of age. This translates to an infant mortality rate of 81 and an under 5 mortality rate of 120 per 1000 live births (State of the World's Children, 1987, UNICEF). Among the alleged causes of death diarrhea accounted for 56%, as shown in Table 2.

TABLE 2. CHILD DEATHS BY AGE AND CAUSE

CAUSE	<1	1-4	TOTAL
Diarrhea	10	4	14
Perinatal	3	-	3
Pneumonia	-	2	2
Sarampo	-	1	1
Unclear	4	1	5
TOTAL	17	8	25

ORAL REHYDRATION THERAPY

When questioned if they were familiar with ORS, 83% of

mothers answered affirmatively. Seventy-five percent responded that they had used ORS, 56% being government-produced packets (CEME) and 19% other, presumably commercial, preparation. Of the 941 children under 5, 66% were reported to have already utilized ORS.

Diarrhea was present in 194 (31%) of the households during the two week period prior to the survey, of which 120 were considered mild and 74 severe. ORS was being used in 86 (44%) of those cases, with a slightly higher rate, 53%, among those with severe diarrhea compared to those with mild diarrhea, 39%.

IMMUNIZATIONS

Immunization data was provided on 784 children (84%), the remaining either not having an immunization record, or not having one available for verification by the interviewer. Of those over one year, 76% had received 3 doses or more of DPT, 86% had received 3 or more doses of antipolio, and 81% had received measles vaccine. In regard to BCG, 70% had been vaccinated. On the other hand, of those over one year, 6% had received no DPT, while less than 1% had not received a dose of anti-polio. Among children of one year of age, 52.6% had completed the basic series of immunizations, while 55.8% of children 1-4 had done so.

Of the two days in which anti-polio had been distributed as part of a national campaign, 76% of respondents indicated that they had participated both days, 15% indicated participation on one of the 2 days, and 9% reported not participating.

When asked how many doses of tetanus toxoid they had received for the prevention of neonatal tetanus, 37% related having received a full schedule of 3 or more doses, whereas 25% reported having received 2 doses, 16% one dose, and 23% no doses. When asked again in relation to her last pregnancy, 68% responded that they had received at least one dose.

NUTRITION

Mothers were asked to state how long their last child was breastfed, at what age artificial milk feedings were introduced, and at what age other foods were begun. The results are shown in Figure 1 for children born within the 2 preceding years. The prevalence of breastfeeding at 1, 3, 6 and 12 months was 90%, 58%, 38%, and 24%. The prevalence of artificial milk feedings (commonly in mixture with a starch powder) at 1, 3, 6 and 12 months was 58%, 81%, 92% and 97%. The prevalence of feeding with other foods at these same intervals was 3%, 44%, 82% and 99%.

The youngest child was participating in a governmental food distribution program (Programa de Suplementacao Alimentar - PSA) in 47% of families. A Road-to-Health card had been distributed to 39% of the youngest children, of which the majority (58%) had been distributed through VIVA/PROAIS, as well as 31% by the LBA (Legiao Brasileira de Assistencia). Of those children with Road-

to-Health cards, 70% had been weighed in the preceding 3 month period.

An inquiry on the source of water used in the household revealed that approximately half received treated water, as shown in Table 3.

TABLE 3. HOUSEHOLD WATER SOURCE

Treated	320 (52%)	
In home		218 (35%)
Community source		102 (17%)
Untreated	300 (48%)	
Well		262 (42%)
Stream, etc.		36 (6%)
Other		2 (<1%)

PRENATAL AND DELIVERY CARE

In reference to the mother's last pregnancy, 39% reported 6 or more prenatal visits, while 16% denied having received prenatal care. Table 4 shows the distribution of the number of prenatal visits attended.

TABLE 4. NO. PRENATAL VISITS IN LAST PREGNANCY

<u>No. Visits</u>	<u>No. (%)</u>
0	98 (16)
1 - 2	55 (9)
3 - 5	170 (28)
> 5	243 (39)

Table 5 shows the location where those mothers who delivered in the last 12 months had the delivery. The regional hospitals and the Maternidade Escola Assis Chateaubriand (MEAC) are reference hospitals for PROAIS. Thus 53% of deliveries occurred in PROAIS associated units. It was not ascertained how many of the home deliveries were carried out by PROAIS trained TBAs, but presumably in the majority of cases.

TABLE 5. PLACE OF LAST DELIVERY

Local PROAIS Maternity	92 (45%)
MEAC	15 (7%)
Regional Hospital	3 (1%)
Other Hospital	63 (31%)
Home	29 (14%)
Other	4 (2%)

FAMILY PLANNING

When asked if they wished to become pregnant at the time, 86% of women under 45 responded negatively, while another 7% were pregnant. Table 6 shows the methods being used by those not wishing to become pregnant. No method was being used by 26%.

TABLE 6. CONTRACEPTIVE METHODS OF WOMEN <45 NOT WISHING TO BE PREGNANT

<u>Method</u>		
Pill	210	(42%)
Tubal ligation	84	(17%)
Rhythm	33	(7%)
Breastfeeding	13	(3%)
Condom	12	(2%)
Injections	7	(1%)
IUD	3	(1%)
Unreliable methods	10	(2%)
None	131	(26%)
No response	3	(1%)

DISCUSSION

This population-based survey is the first of its kind carried out by PROAIS, the primary health care program of the Federal University of Ceara through which Project HOPE is executing the VIVA child survival initiative, and as such represents a landmark. The survey was exclusively done by program staff with many of the questionnaires applied by community health workers. The population from which the sample was drawn is that residing within the city limits of the locations where PROAIS/VIVA has primary health care units. Extrapolating from the number of children under 5 included, the sample reached represents a general population of _____, thereby representing approximately 1/xxx of the target population.

During analysis of the results, several limitations of the survey became apparent. The information referrent to women's health is limited by having only collected data on the mother of children in the household, rather than all women in the reproductive age range. In the elaboration of the questionnaire, twins and stillbirths were not included when asking about births in the previous 12 month period. By utilizing a single questionnaire to register information on the various persons of interest denominators are not always clear for calculating rates. For example, households with diarrhea in the last two weeks was determined rather than children under 5 with diarrhea. The pre-coded answers did not include "Don't remember" as an option. Certain questions were considered unclear, such as "At what age did he start to take other foods?", without establishing what the mother considered "other foods." In general, however, the information gathered was quite useful and considered satisfactory.

The ages of mothers shows a wide distribution reflecting both the early onset and late termination of motherhood for many.

Nearly a fifth of births in the previous year were to women over 35 years of age. While 86% of women under 45 indicated that they did not wish to be pregnant at the time, and that 28% of them were using no method to avoid pregnancy, the importance of a stronger family planning component is clear.

Infant mortality rates were calculated in 1984 by the Brazilian Census Institute (IBGE) in a national household survey (PNAD) and showed rates of 113.2 for Ceara and 94.4 for Greater Fortaleza. A study published by the Ministry of Health shows that infant mortality had risen successively in the 2 years from 1982 to 1984, from 93 to 116, an increase of 25%. In this context a rate of 81 for the PROAIS/VIVA target area in 1986 can be considered slightly better. Given that PROAIS/VIVA work with a poor and therefore high risk population one might expect rates otherwise to be higher. Among the causes of child mortality, diarrhea is singly the most important, with a specific mortality rate of nearly 50 for those under one year, and accounting for 56% of all child deaths. The infant mortality rate due to perinatal causes is only 14, which most likely reflects the exemplary perinatal care offered by PROAIS through the TBAs and community maternity units it has developed.

Mothers in this survey were familiar with ORS, with three-fourths reporting previous use of it in two-thirds of their children under 5. In the 2 week period preceding the survey, use of ORS ranged from 53% in significant cases of diarrhea to 39% in minor cases. Although many are using ORS, the diarrhea mortality rate is excessively high to accept these rates. Greater use should be sought as well as guarantees that the use is effective.

One child in six did not have a vaccine card or could not locate it. The immunization status of this group is unknown. Among those with a card, approximately one half had completed the basic series. Although polio coverage is adequate (less than one percent had never received a dose) due to the national polio campaign days held twice yearly since 1980, coverage with the other immunizations, which depends on the effective provision of routine immunization services, is inadequate. The PROAIS/VIVA strategy to promote the population to seek the vaccinations which are provided by the local health authorities needs to link more closely with the institutions actually providing these vaccines.

The feeding history of children under 2 years of age documents the recognized pattern of Brazil and the Northeast, which is early introduction of bottle-feedings, generally a powdered milk mixed with a starch, followed by early weaning from the breast. In our population, bottle-feedings were introduced by the first month in 58%, while only 38% had not been weaned by 6 months of age. If, however, one compares these rates to those from a 1980 survey of Rio Grande do Norte, a neighboring state, breastfeeding prevalence at one, six and twelve months is 30% - 100% higher. Subsequent surveys of this same population will be necessary to understand trends of which we are in the midst.

At the outset of VIVA growth monitoring was underway within food supplementation programs only. The official health services only launched a major growth monitoring initiative in 1987.

PROAIS/VIVA distributes Road to Health charts to all children born in the participating community maternities, as well as to all children participating in community-based growth monitoring sessions. Although 47% of households reported that their youngest child was enrolled in a food supplementation program, only 39% had a chart. Of those with a chart 58% had received the chart from PROAIS/VIVA, and 70% had been weighed with the result recorded in the previous 3 month period. These figures portray the beginning of growth monitoring activities in this area and in which PROAIS/VIVA is taking the initiative.

Of every three women who delivered in the previous 12 month period, 2 were attended directly or indirectly by PROAIS. The 14% delivering at home were presumably attended by a TBA who has received training from PROAIS. The community maternities were utilized by 45%. Affiliated hospitals were sought by another 8%, although it is not clear how many were referred to these units and how many independently sought them out. Two thirds of those delivering in the past 12 months had made 3 or more prenatal visits, while nearly 40% had made 6 or more. Outreach efforts need to be better developed to reach the 16% who did not receive prenatal care, those who initiate it late, as well as to guarantee the return of those who do not complete it.

Although it would have been ideal to have carried out the first such survey prior to initiating the child survival activities, our program was not adequately structured to allow this. Nevertheless, annual surveys are now planned and will allow for the further tracking of the indicators chosen.

APPENDIX D

DIAGNOSIS OF THE HEALTH OF THE CHILDREN OF CEARA STATE

Cross-sectional Study of a Representative

Sample of 8,000 Families

Study carried out with the collaboration of the following entities:

Fundação Cearense de Pesquisa
Fundo das Nações Unidas para a Infância (UNICEF)
Instituto de Planejamento do Ceará (IPLANCE)
Secretaria da Saúde do Estado do Ceará
Projeto HOPE

The present report was elaborated by

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UNICEF Consultants

August 1988

INTRODUCTION AND METHODOLOGY

There is a lack of reliable data about the health situation of the children of Ceará. For example, the infant mortality rate and prevalence of malnutrition are not adequately known. With the objective of obtaining a diagnosis of the health situation of the children of the state and to provide information for the implantation of an ample program for improvement of the present conditions, an extensive study was carried out at the end of 1987, which will be described in this document.

The sampling method selected 31 municipalities, chosen randomly, of diverse regions of the state (see Map). In each municipality, 10 census sectors were randomly chosen (100 in the case of Fortaleza), and 20 houses were visited in each one of these sectors, amounting to a total of 8000 homes. All of the 4,513 children under 3 years old and the 10,868 women from 15 to 49 years old living in these homes were included in this study sample, representing one of the largest studies of child health ever realized in this country. It is also one of the few Brazilian studies in this area that utilized a representative sample, that permits generalizations from the results to all the children and women in the state.

During the interviews, a great amount of data about fertility, child mortality, morbidity and health services utilization was collected, and, for children, heights and weights were measured. Eighteen interviewers participated in this study (nurses and nutritionists) and the field work was carried out from October to December 1987. The main results are presented here.

PRINCIPAL RESULTS

FIGURES:

1. INFANT MORTALITY

The infant mortality rate indicates the proportion of children that die before reaching one year. Figure 1 shows that, in the State of Ceará, 106 of each 1000 children didn't survive to their first birthday. This proportion was 92 per 1000 in the Metropolitan Region of Fortaleza and 112 per 1000 in the Interior. These indices are very elevated, much superior to the indices observed for Brazil as a whole, which is close to 70 per 1000. The main causes of infant death detected in this study were diarrhea, perinatal problems and respiratory infections.

OBS: Due to the statistical method utilized, these data are approximate estimates, and refer to the period 1983-84.

2. MALNUTRITION - STATURE DEFICIT

The stature of a child reveals his nutritional past, as infectious and nutritional problems result in low stature. Figure 2 shows the prevalence of chronic malnutrition, moderate and severe forms, that affects about 20% of the children in the Metropolitan Region and 30% in the Interior. These children present an elevated risk of morbidity and subsequent death.

OBS: The definition utilized here was stature less than 2 standard deviations from the NCHS median.

3. MALNUTRITION - WEIGHT DEFICIT

The weight of a child reveals chronic malnutrition as well as current malnutrition, caused by a recent loss of weight. Figure 3 shows that approximately 9% of the children in the Metropolitan Region and 14% in the Interior are affected by this form of malnutrition.

4. MALNUTRITION ACCORDING TO FAMILIAR INCOME

The insertion of the family within the broader social structure determines, in a large way, the nutritional state of their children. Figure 4 shows important differentials in the frequency of malnutrition in different income groups. The children of the families with less buying power should receive priority from health programs.

5. DIARRHEA FREQUENCY

Figure 5 shows that 12% of the children presented diarrhea on the day of the interview. Other information in the same study revealed that diarrhea is the main cause of death in minors under 5 years in the State of Ceará.

6. DIARRHEA TREATMENT WITH ORAL REHYDRATION

ORS, if adequately used in diarrheal episodes, can avoid serious dehydration and save many lives. It is described as the greatest

medical discovery of the current century. Unfortunately, only 30% of the children from the Metropolitan Region and 20% of those in the Interior that presented diarrhea at the time of the study were receiving ORS (Figure 6). The majority of these utilized packaged ORS (given in health posts or bought in pharmacies), while 6% of the total were utilizing a sugar-salt solution made at home.

7. VACCINE COVERAGE - STATE

Figure 7 shows that, based on the information given by the mothers, only half of the children from 12 to 23 months of age had received the complete vaccination schedule recommended for the first year of life. If we look only at the vaccination cards this proportion falls to 40%. The lowest coverage is with DPT and the highest is anti-polio, although it reaches only 73% of the children according to the mothers, and less than 60% from vaccine card data.

8. VACCINE COVERAGE - METROPOLITAN REGION AND INTERIOR

Figure 8 shows that the vaccine coverage - based on the mothers information - is superior in the Metropolitan Region in relation to the Interior of the State. The main difference is found with BCG vaccination, that is administered following birth which doesn't reach children born at home.

9. PLACE OF DELIVERY

While in the Metropolitan Region, almost 90% of the deliveries are in hospitals, this proportion is only 56% in the Interior, where almost 40% of the deliveries occur at home (Figure 9). Small community maternities ("casas de parto") are the site of 5% of the births in the State.

10. INCIDENCE OF CAESAREANS

Caesarean deliveries represent 10.4% of the total, varying from 19.0% in the capital to 7.3% in the Interior. It is known that the risk of a caesarian delivery, to the mother as well as the child, is much higher than a normal delivery. Despite this, as shown in Figure 10, caesareans are preferred for women with high income and their doctors, while among the poorest women - those with more necessity for caesareans due to their greater gestational risks - there is a low incidence.

11. USE OF THE GROWTH CHART

Figure 11 indicates the percentage of children that, according to mothers' information, have a growth chart. Although many of the children have them, only a minority (less than 10%) had a weight recorded on the chart in the prior three month period.

12. BREAST-FEEDING

Figure 12 shows the percentage of children breast-fed according to age. Close to 10% of the children are never nursed, while the median duration of breast-feeding is close to 3.5 months in the Metropolitan Region and 4.5 months in the Interior. This situation is far from ideal, which should be to maintain children

nursing until 6 months of life, and if possible until 12 months.

13. FREQUENCY OF ILLETERACY AMONG PARENTS

Close to 25% of the fathers and mothers of the children studied in the Metropolitan Region were illiterate. This percentage is much more elevated in the Interior, being close to 60% for the fathers and 50% for the mothers (Figure 13). This data is relevant for choosing channels of communication on health programs, because they show the necessity of utilizing the spoken word (including radio and TV) and the community channels.

CONCLUSIONS AND RECOMMENDATIONS

The infant mortality rate and prevalence of malnutrition are extremely high. Their reduction depends in great part on the process of development and on the reduction of social inequalities in the State. However, there are some measures that can be adopted in the short term that can contribute to the improvement of these health indicators. These include:

a) Promotion of Breastfeeding: The mean duration of breastfeeding in the State is very short, and efforts must be made to increase it.

b) Increased Vaccine Coverage: Half of the children in the State are not adequately vaccinated; greater effort should be developed in this area.

c) Care at the Time of Delivery: Almost half of the deliveries in the interior of the state are in the home; efforts for training midwives and the establishment of "casas de parto" must be amplified, since perinatal problems are one of the main causes of infant death.

d) ORS Use: Diarrhea is the main cause of infant mortality, and less than one third of children with diarrhea receive ORS, a simple therapy that can save many lives; a greater promotion of ORS is essential.

e) Growth Monitoring: Although many children have the growth chart, it has not been adequately used. Efforts for the prevention of malnutrition include regular weighing of the child, and this periodic contact with health services can also permit the promotion of other measures mentioned here.

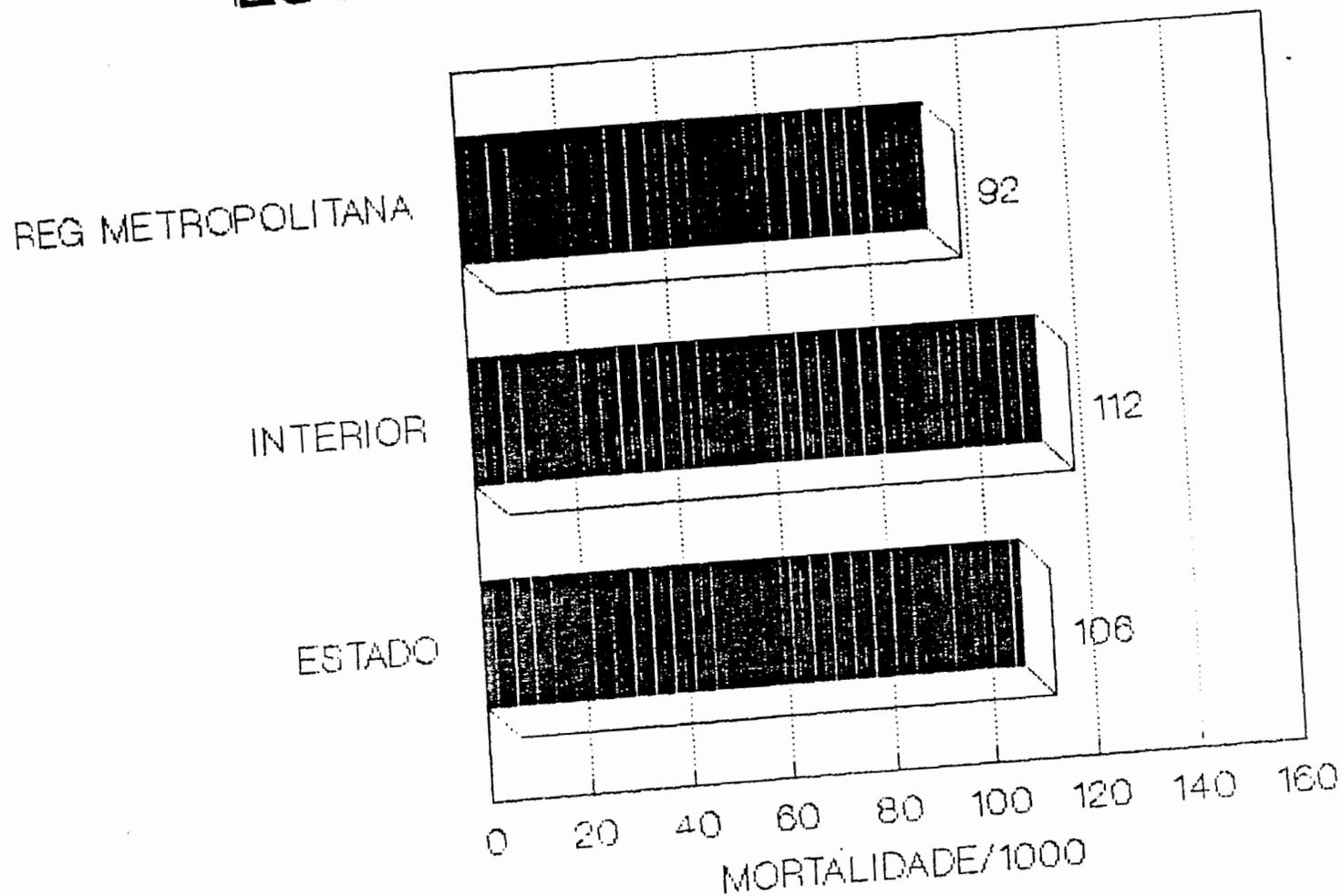
f) Control of Respiratory Infections: Respiratory infections are extremely frequent and constitute the third cause of infant mortality. The early treatment of these infections can prevent a number of deaths.

g) Redistribution of Health Resources: While many high risk mothers and children do not get adequate care, the health services concentrate their services (sometimes in an unmeasured way, as in the case of caesarean section) resulting in greater accessibility among higher socioeconomic groups, and therefore those of lower relative risk. The existing resources must be redistributed and increased for the high risk groups as a priority.



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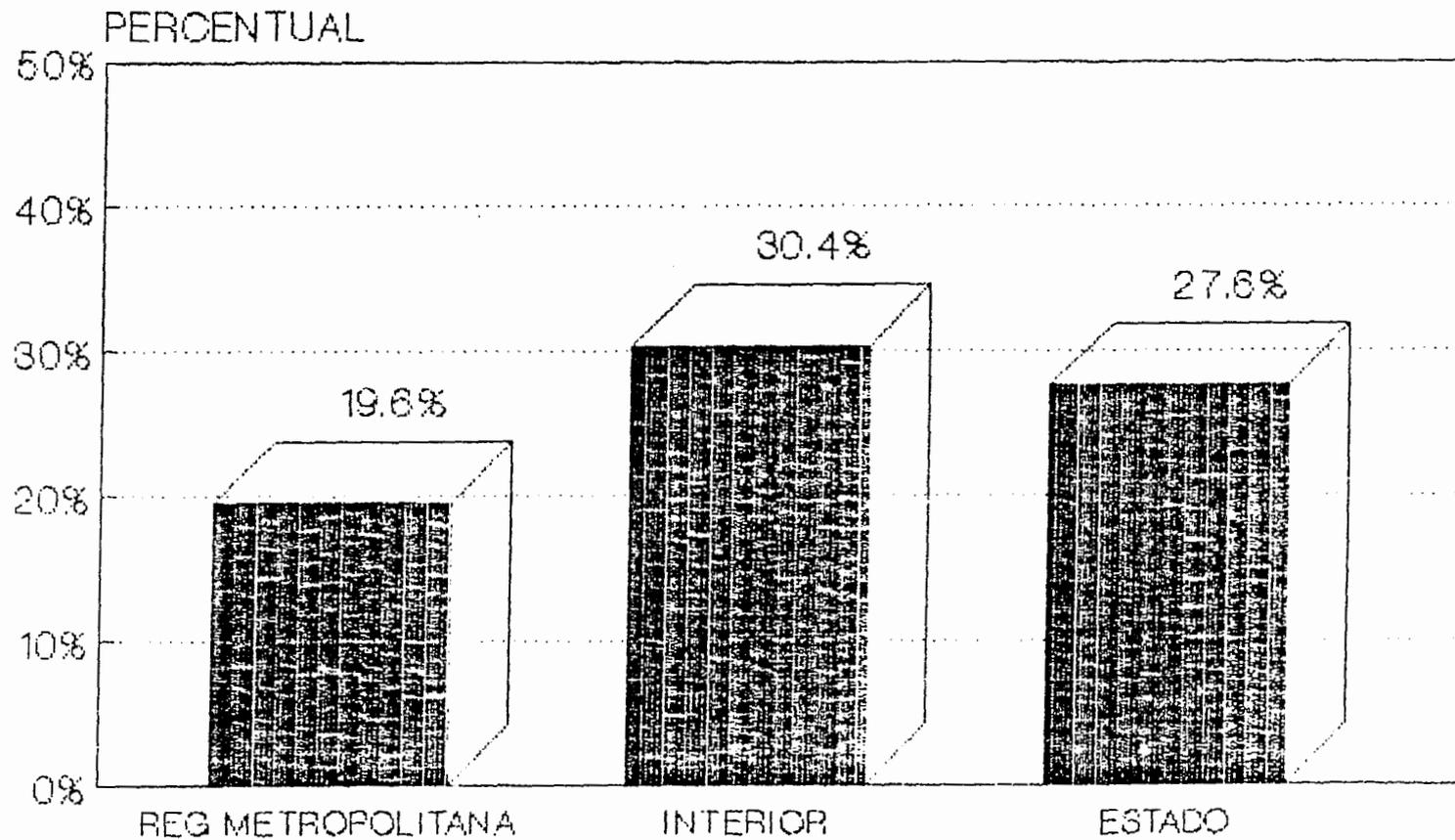
MORTALIDADE INFANTIL ESTADO DO CEARA



ESTIMATIVA PARA 1983-84

INFANT MORTALITY
STATE OF CEARA

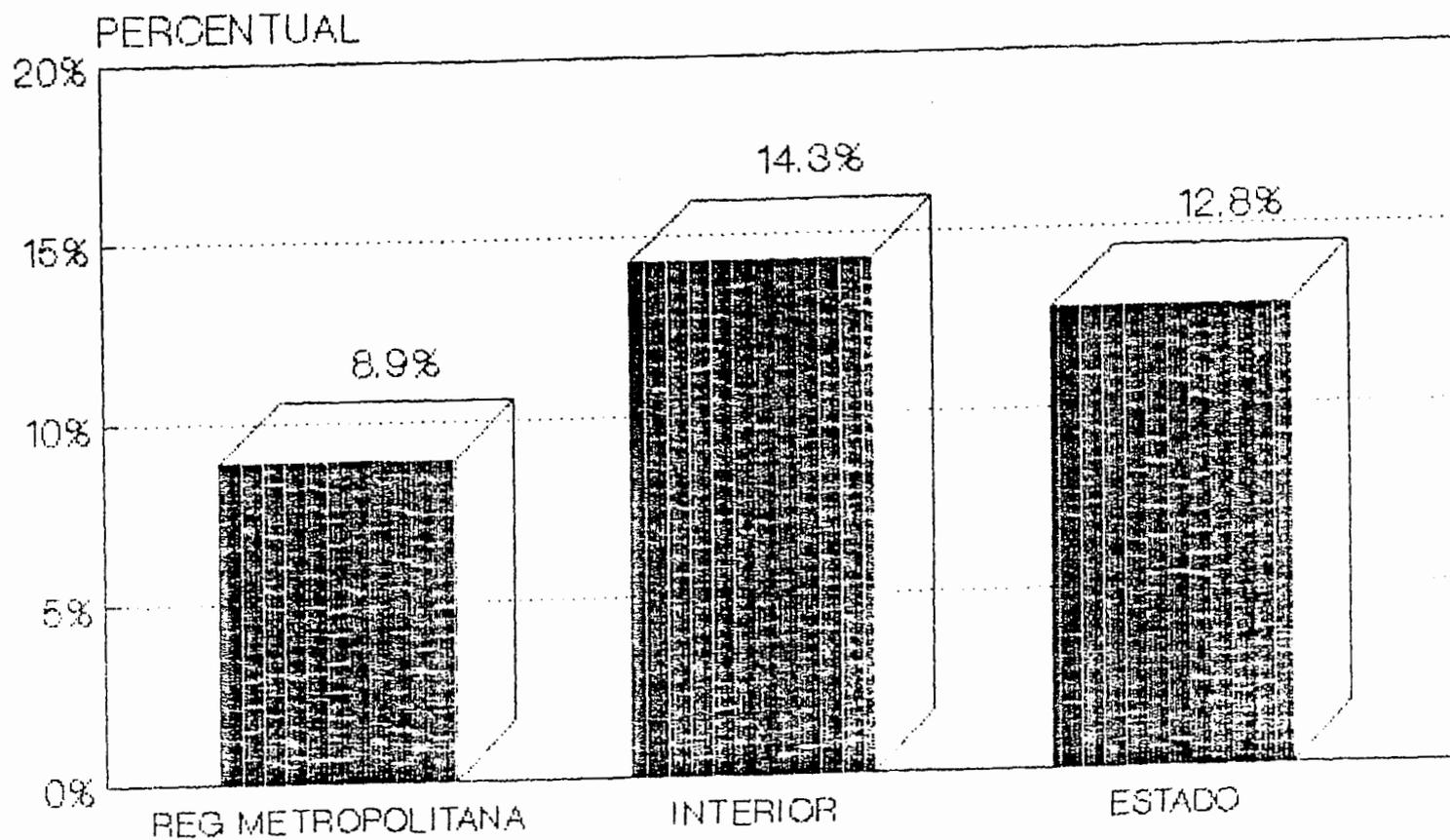
PREVALENCIA DE DESNUTRICAO DEFICIT DE ESTATURA EM CRIANCAS DE 0 A 2 ANOS



CEARA, 1987

PREVALENCE OF MALNUTRITION HEIGHT DEFICIT, IN CHILDREN 0-2 YEARS

PREVALENCIA DE DESNUTRICAO DEFICIT DE PESO EM CRIANCAS DE 0 A 2 ANOS

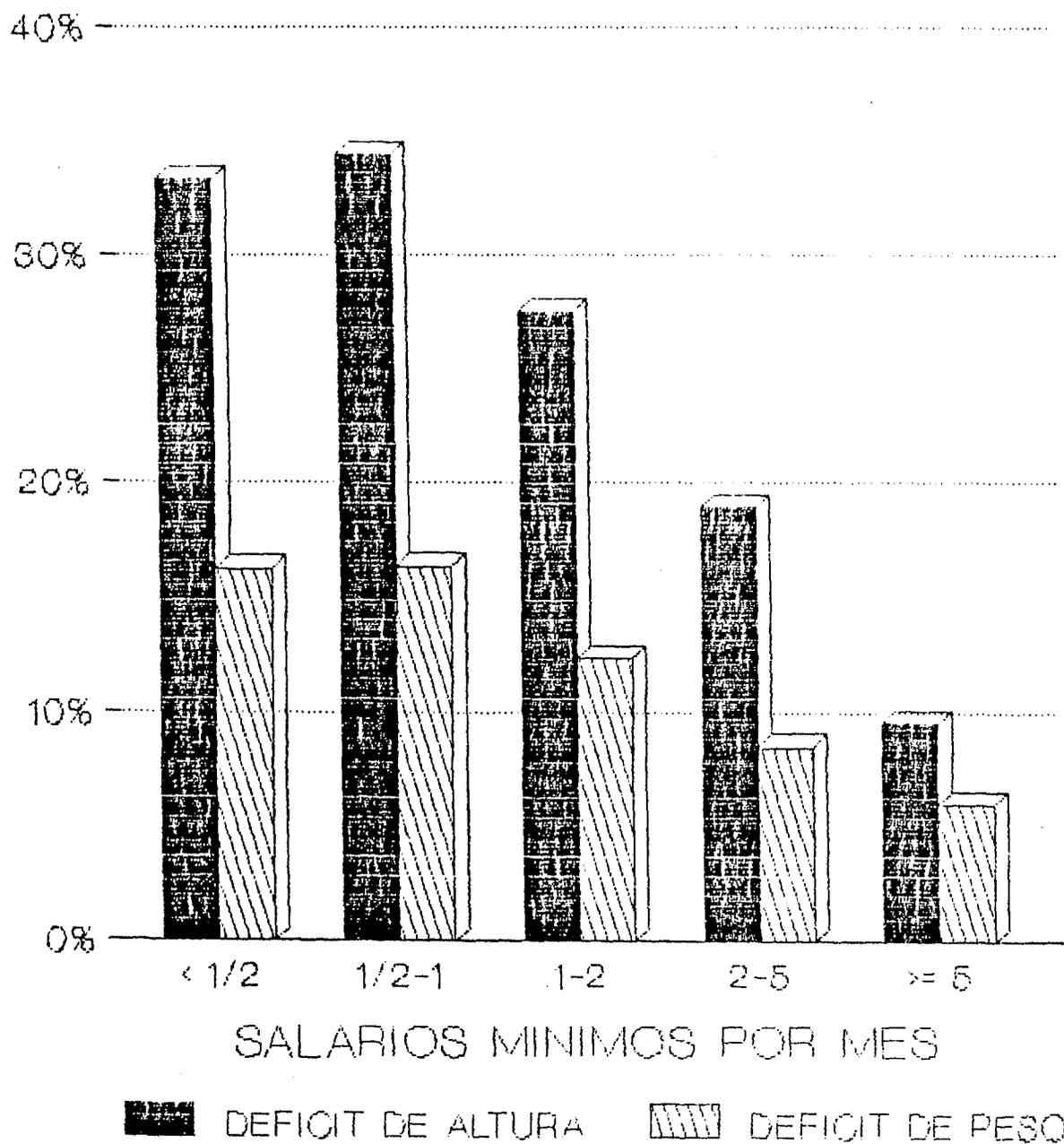


CEARA, 1987

PREVALENCE OF MALNUTRITION WEIGHT DEFICIT IN CHILDREN 0-2 YEARS

FIGURA 4

DESNUTRICAO CONFORME A RENDA FAMILIAR

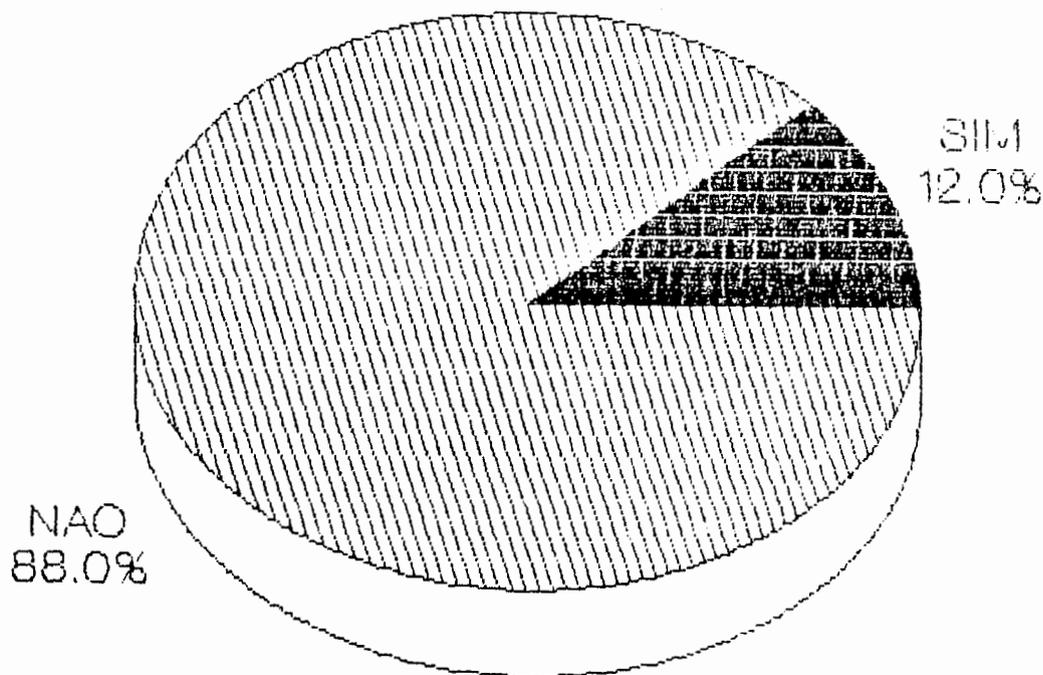


CEARA, 1987

MALNUTRITION - HEIGHT AND WEIGHT DEFICITS
BY INCOME LEVELS

FIGURA 5

CRIANCAS COM DIARRREIA NO DIA DA ENTREVISTA



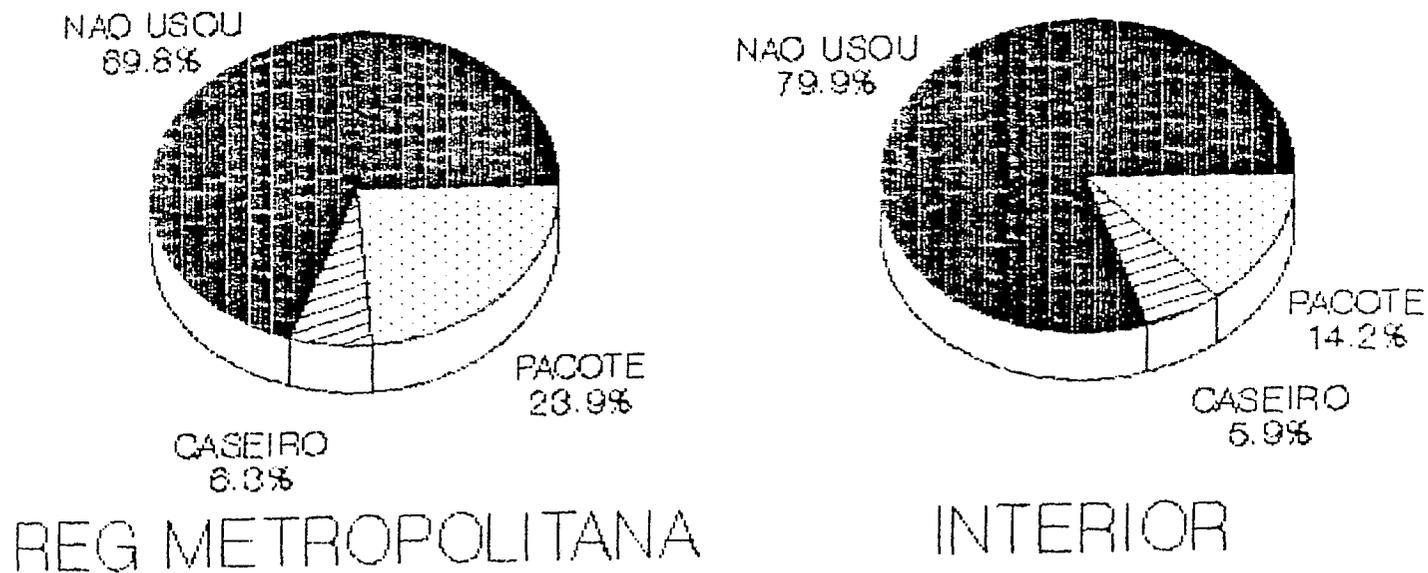
CHILDREN WITH DIARRHEA
ON THE DAY OF THE INTERVIEW

CEARA, OUT-DEZ 1987

64

FIGURA 6

USO DE REIDRATANTE ORAL EM CRIANCAS COM DIARRREIA

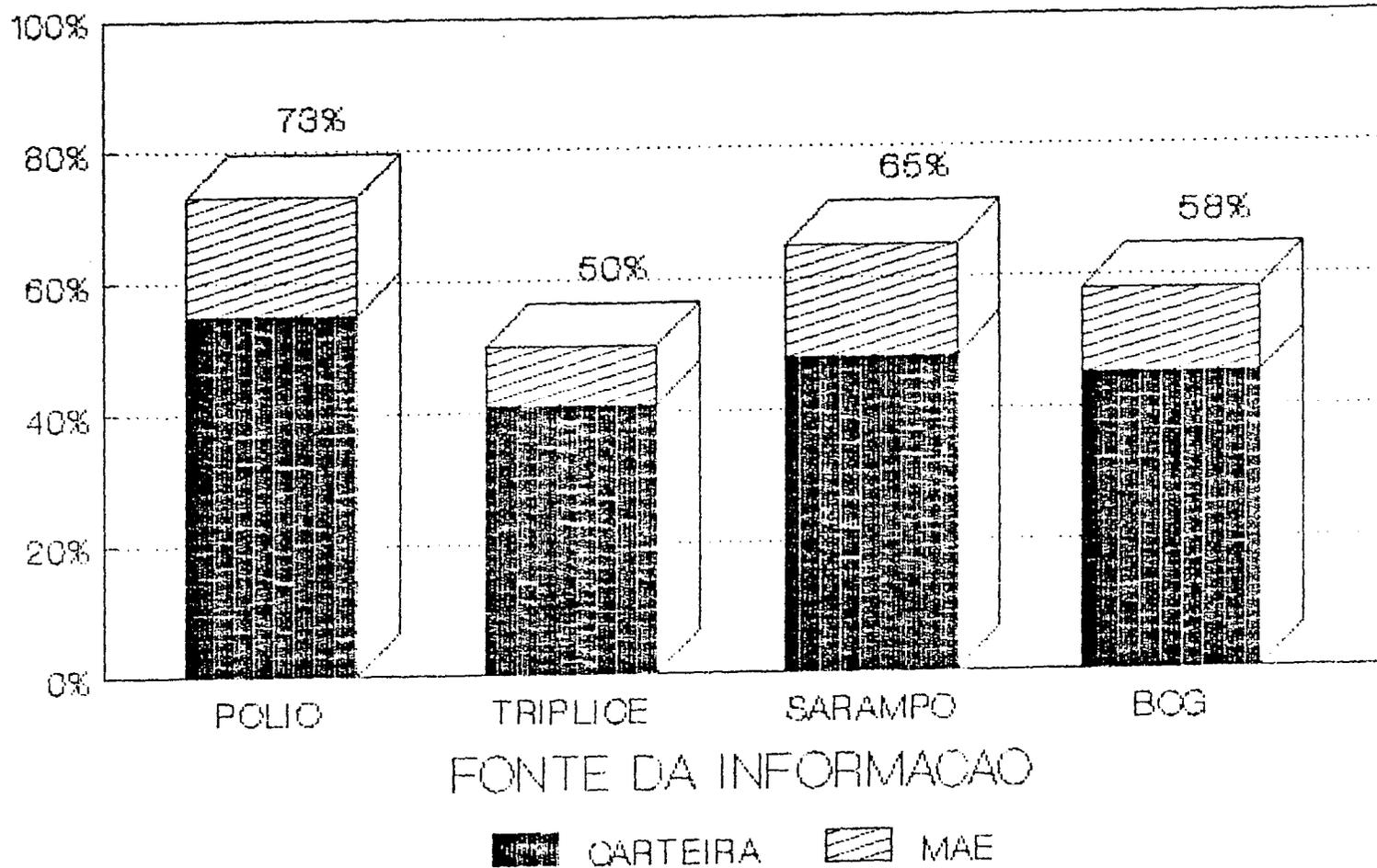


CEARA, 1987

USE OF ORS IN
CHILDREN WITH DIARRHEA

5

COBERTURA VACINAL EM CRIANCAS DE 12-23 MESES



FONTE DA INFORMACAO

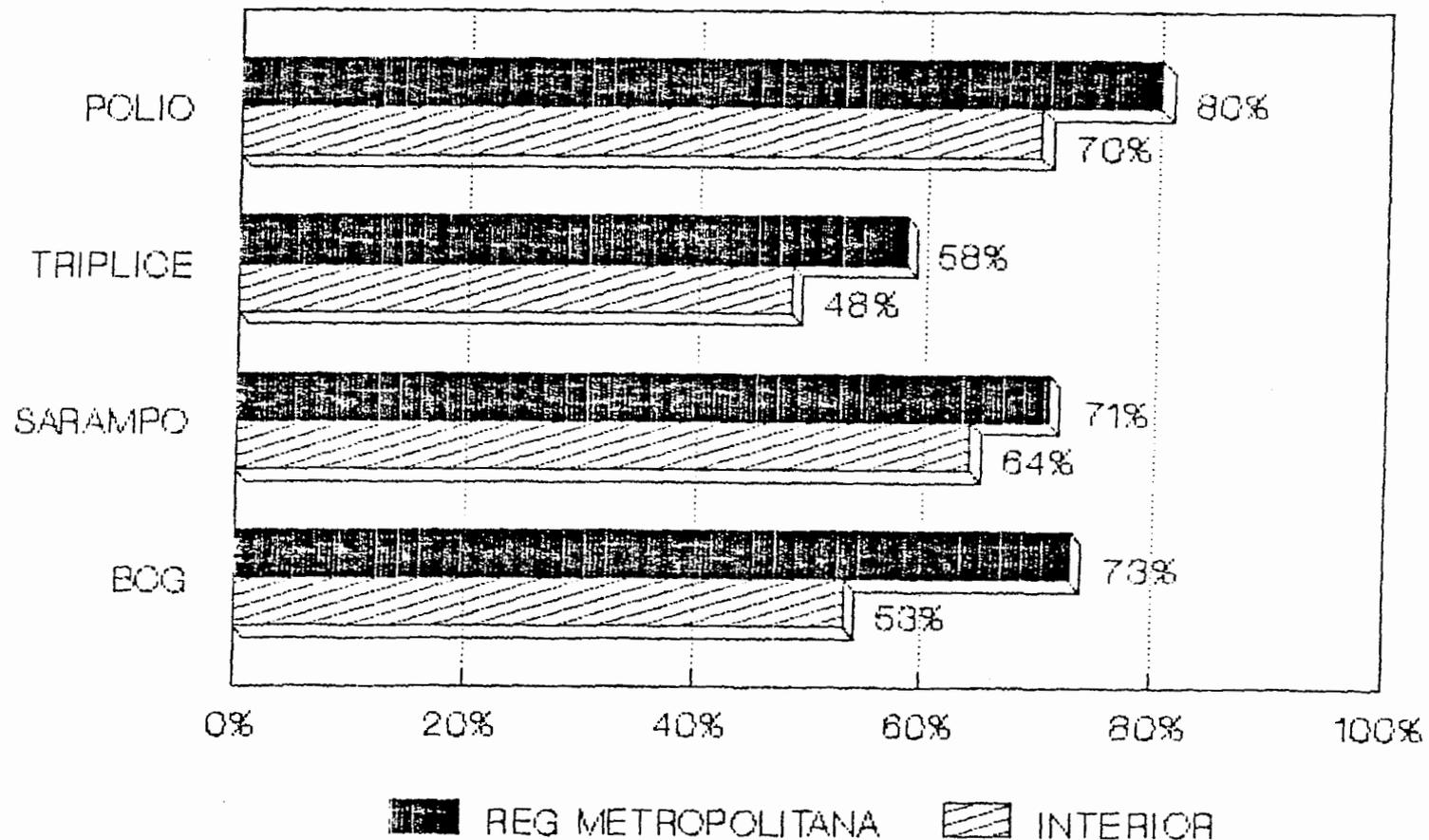
CARTEIRA MAE

CEARA, 1987

VACCINE COVERAGE AMONG CHILDREN 12 - 23 MONTHS,
BY SOURCE OF INFORMATION

FIGURA 8

COBERTURA VACINAL EM CRIANÇAS DE 12-23 MESES (DOSES INFORMADAS)

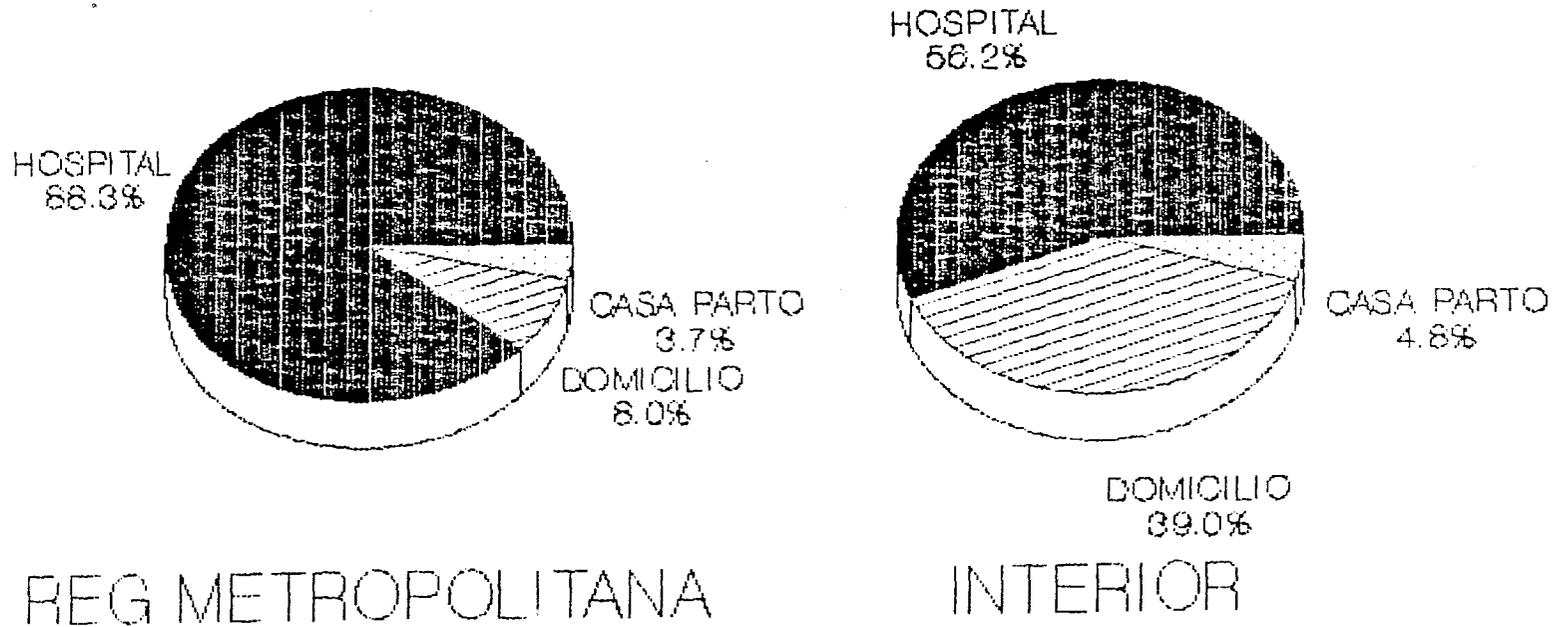


CEARA, 1987

VACCINE COVERAGE AMONG CHILDREN 12 - 23 MONTHS, INCLUDING INFORMATION FROM VACCINE CARDS AND FROM MOTHERS

FIGURA 9

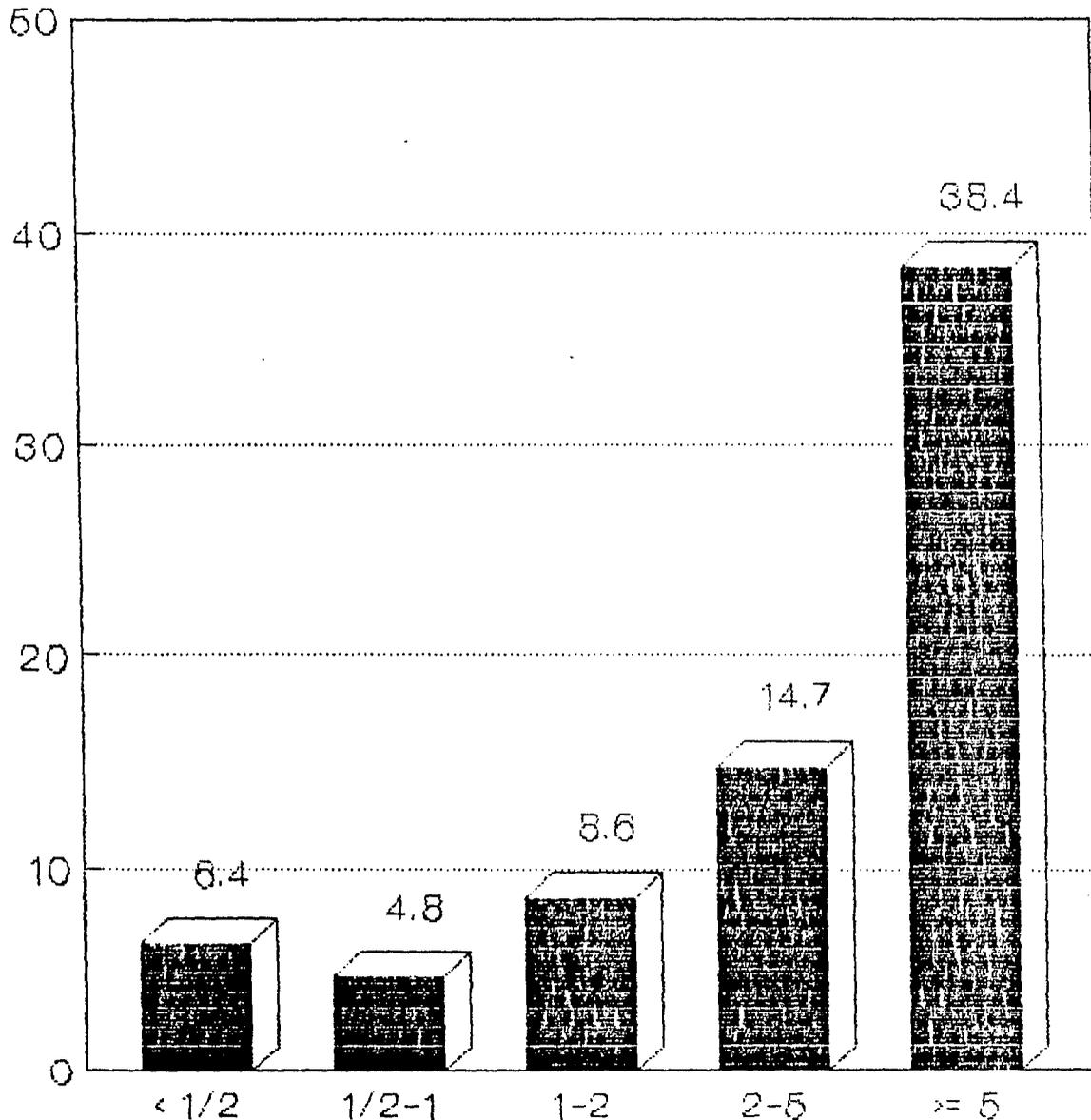
LOCAL DO PARTO



CEARA, 1987
PLACE OF DELIVERY

FIGURA 10

PARTOS POR CESAREANA (%) CONFORME A RENDA FAMILIAR



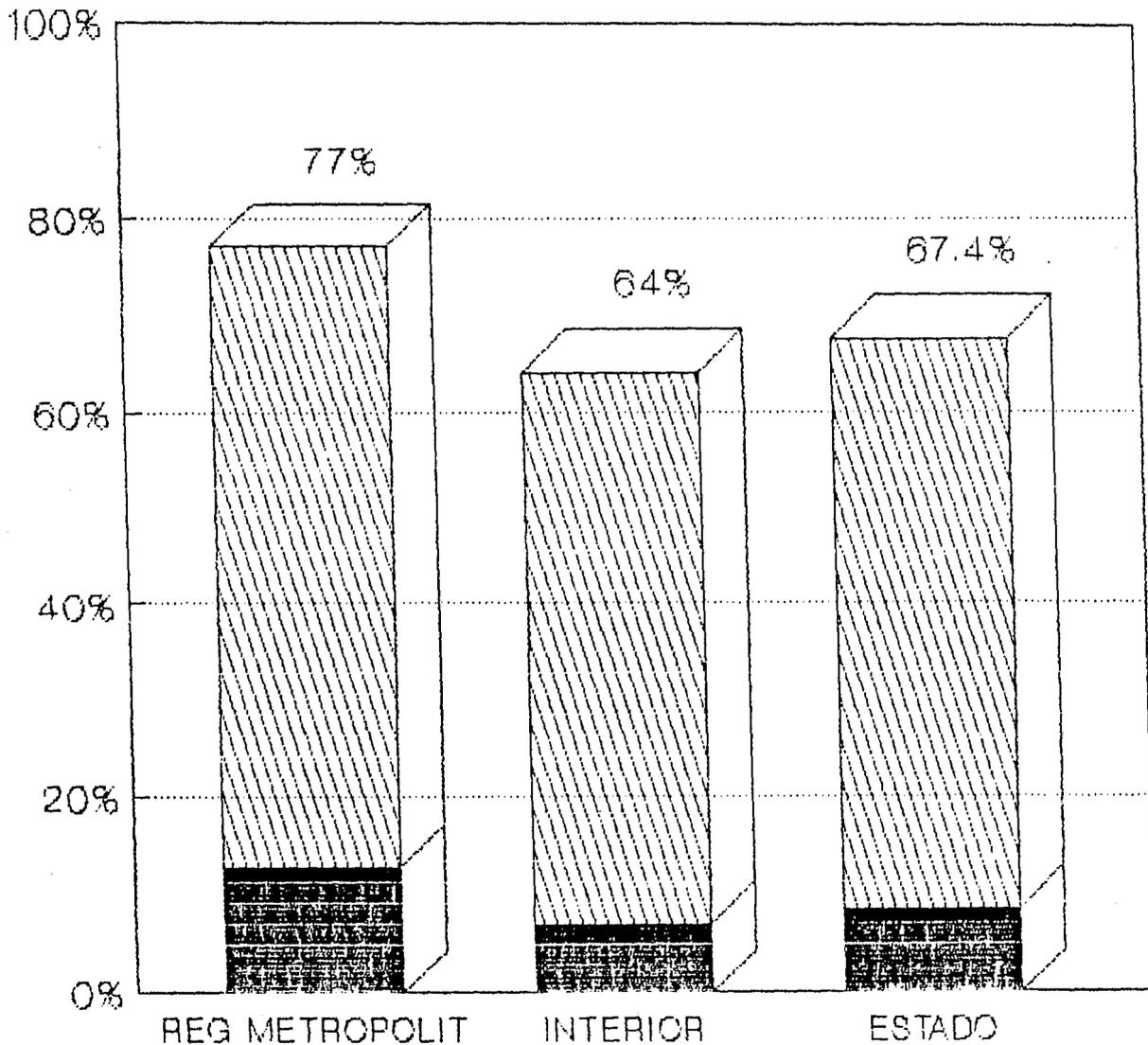
SALARIOS MINIMOS MENSAIS

CEARA, 1987

DELIVEIRES BY C_SECTION, BY INCOME LEVEL

FIGURA 11

USO DO CARTAO DE SAUDE E PESAGENS RECENTES



PESADAS NOS ULT. 3 MESES

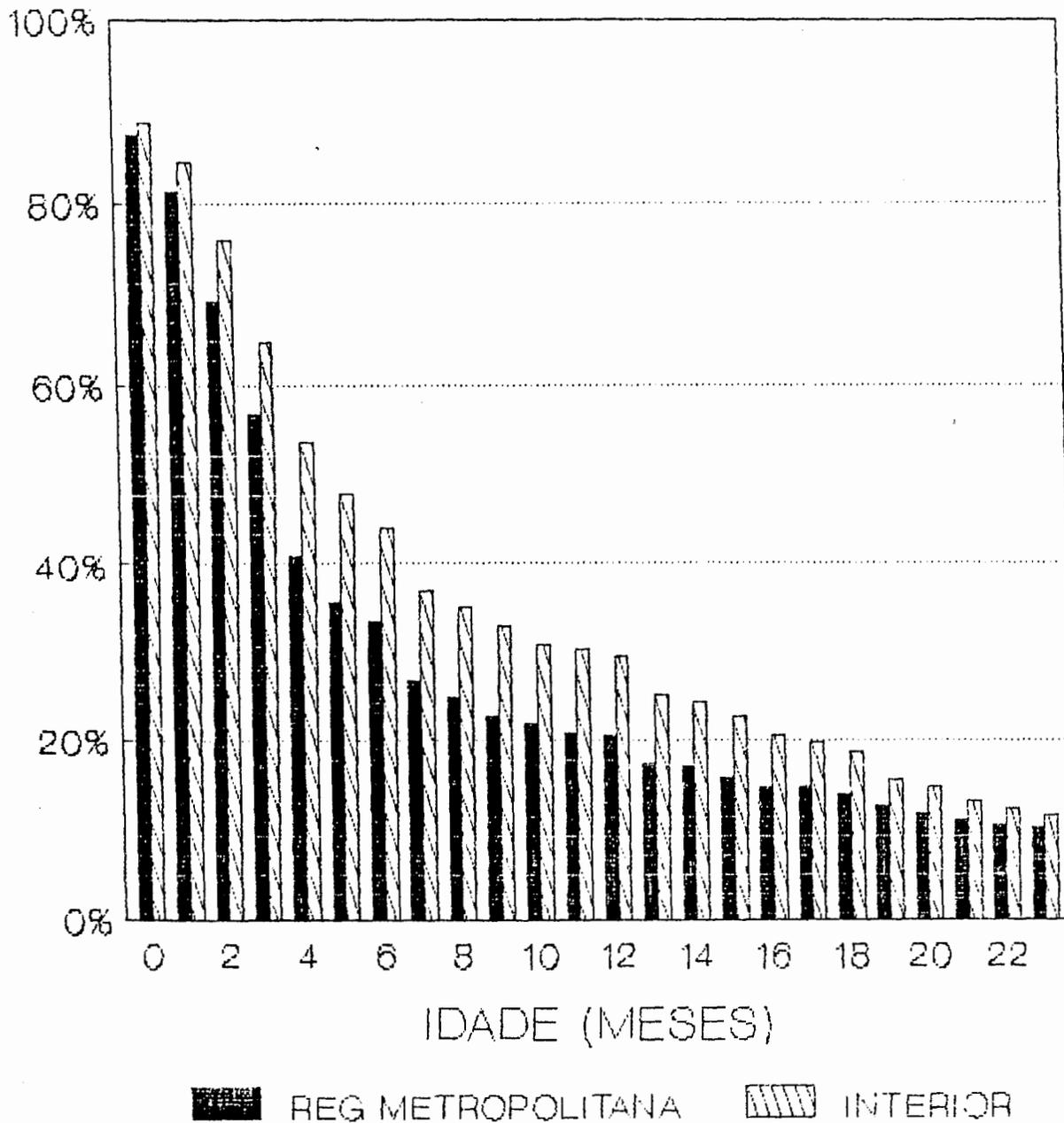
■ SIM ▨ NAO

CEARA 1987

PERCENTAGE OF CHILDREN WITH A GROWTH CHART AND WITH A WEIGHT RECORDED DURING THE PRECEDING 3 MONTHS

FIGURA 12

PERCENTUAL DE CRIANÇAS AMAMENTADAS



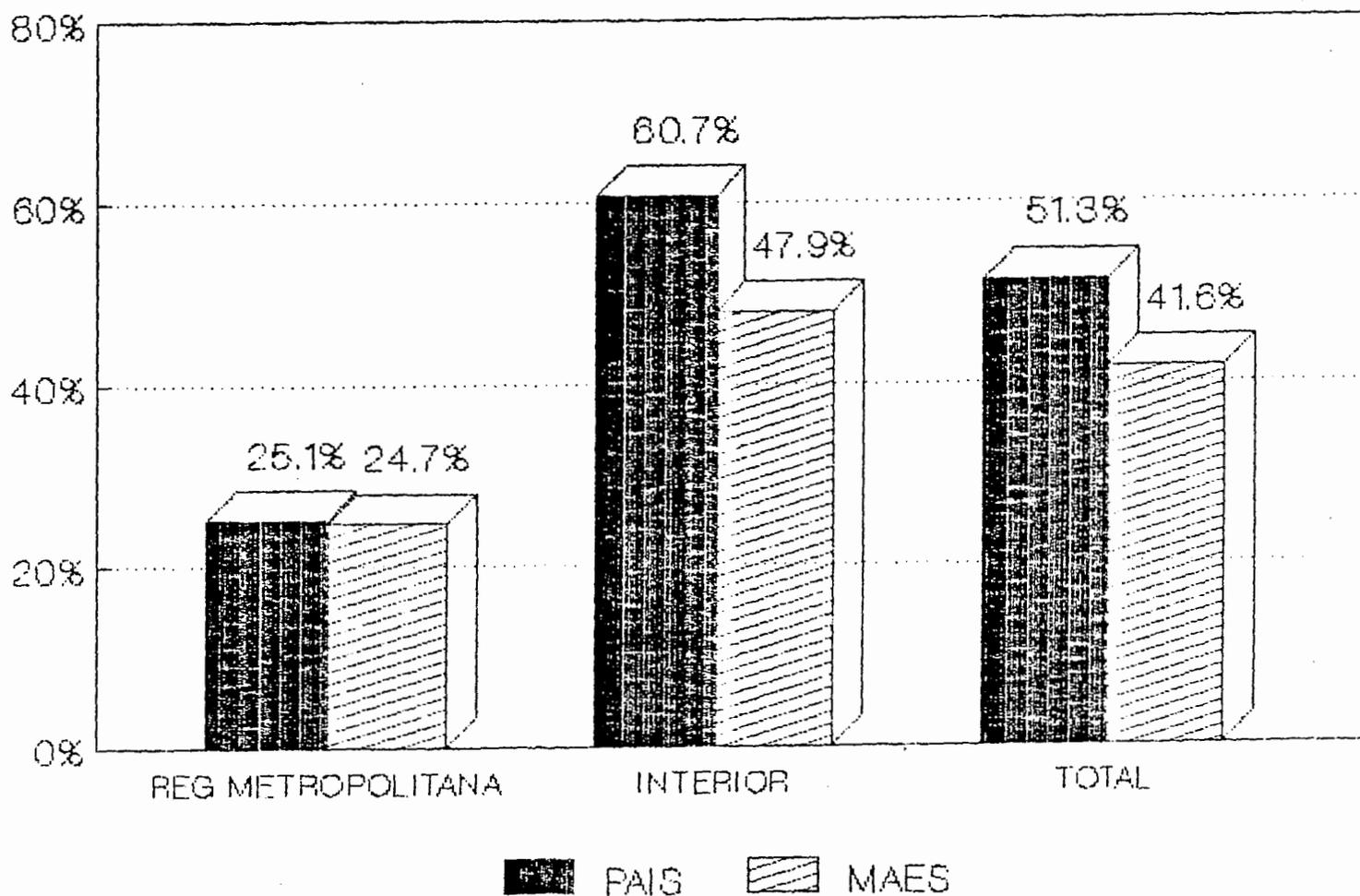
CEARA, 1987

PERCENTAGE OF CHILDREN
BEING BREASTFED, BY AGE

71

FIGURA 13

PERCENTUAL DE ANALFABETISMO ENTRE OS PAIS DE CRIANCAS CEARENSES



PERCENTAGE OF ILLITERACY
AMONG PARENTS

1987

APPENDIX E

BRAZILIAN POPULAR HEALERS AS EFFECTIVE PROMOTERS OF ORAL REHYDRATION THERAPY (ORT) AND RELATED CHILD SURVIVAL STRATEGIES¹

Marilyn K. Nations,² Maria Auxiliadora de Sousa,³
Luciano Lima Correia,⁴ and Diana Maria Nunes da Silva⁵

INTRODUCTION

Intense poverty, periodic droughts, high illiteracy, and staggering infant mortality make health conditions harsh for children in northeastern Brazil. A 1986 UNICEF-sponsored study (1) found the highest infant mortality in Brazil to occur in the northeastern capital

of Fortaleza, in Ceará State, where it reached the distressing level of 110-139 deaths per thousand live births in families with poor and uneducated mothers.

A separate study found that 50% of such infant deaths were due to diarrhea and dehydration, and that diarrheal attack rates among poor Brazilian children in this area rivaled the world's highest (2). Enteric pathogens including enterotoxigenic *Escherichia coli* and rotaviruses were found to be the leading causes of infection. Multiple parasitic infections have also been very common, with *Ascaris lumbricoides*, *Giardia lamblia*, *Entamoeba histolytica*, *Trichuris trichiura*, *Strongyloides stercoralis*, and hookworm occurring in 29% of a group of study children under five years old and in 65% of those five or over (3). Additional data have indicated that moderate to severe malnutrition strikes 30% of the rural children in the northeast region (4), while 53.6% of the "wealthier" and 10% of the "poorest" are not breast-fed (5). On the average,

¹ The work reported here was sponsored by Primary Care Operations Research (PRICOR) (subcontract #85/04/3600), which is operated by the Center for Human Services, 5530 Wisconsin Avenue, Chevy Chase, Maryland 20815 for the Agency for International Development under cooperative agreement No. AID/PSE-5920-A-00-1048-00. Dr. Nations' current position in Brazil is supported by The Health Sciences Education Center (Project HOPE), Millwood, Virginia, USA. This article will also be published in Spanish in the *Boletín de la Oficina Sanitaria Panamericana*, vol. 106, 1989.

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weaning occurs at about two weeks of age.

Available evidence has also shown that most Brazilian mothers see diarrheal dehydration as a serious threat. When we asked the 430 Pacatuba mothers in our pre- and postintervention surveys "Which disease do you consider most dangerous for small children in your community?" the response in 41.2% of the instances was "diarrhea," "dehydration," or a variety of folk-defined illnesses that incorporate these symptoms. Measles (26.4%) and pneumonia or other respiratory illnesses (17.2%) followed (unpublished data). A review of 535 childhood deaths occurring in the rural community of Pacatuba between 1951 and 1984 revealed that a total of 56% were believed by the children's mothers to be caused by diarrhea, dehydration, or folk illnesses involving these symptoms—including "the child's disease" (*doença de criança*), "teething" (*dentição*), "fright disease" (*susto, ventre caído*), and "evil eye" (*quebranto, mau olhado*) (Tables 1 and 2).

Many studies (6-9) have shown that diarrheal deaths can be prevented by oral rehydration therapy (ORT), which has been hailed by *The Lancet* as "potentially the most impor-

TABLE 2. Causes of death involving diarrhea/dehydration (including specific folk diseases) that were cited by mothers of the 535 Pacatuba children referred to in Table 1. (In nine instances the mothers cited two causes of death.)

Cause or causes cited by mother	Deaths	
	No.	(%)
Child's disease (<i>doença de criança</i>)	110	(20.2)
Diarrhea	93	(17.1)
Dehydration	58	(10.7)
Teething (<i>dentição</i>)	20	(3.7)
Fright (<i>susto, ventre caído</i>)	15	(2.8)
Evil eye (<i>mau olhado, quebranto</i>)	8	(1.5)
Subtotal	304	(56)
Other causes of death without diarrhea/dehydration as the primary symptom	240	(44.1)
Total	544	(100)

tant medical advance this century" (10). The idea is deceptively simple: to replace fluids and electrolytes lost during diarrhea with an oral rehydration salts (ORS) solution, thereby keeping the patient alive without trying to cure the diarrhea. Though ORT was discovered in the 1830s in Britain, it was not until the 1960s that the importance of sugar in the ORS solution was understood (11). (We now know that glucose increases the body's ability to absorb fluid some 25 times.)

During the 1971 Bangladesh cholera epidemic, the usefulness of ORS for treating diarrheal dehydration was demonstrated conclusively (11). Despite debates over fine points about the ORS formula's composition (11), the therapy's scientific basis (12) and life-saving capacity, as well as the ability of properly instructed village mothers to accurately prepare and administer the ORS solution (13-16), are well-established. Theoretically, no reason exists for five million

TABLE 1. Causes cited as responsible for their children's deaths by the mothers of 535 Pacatuba children who died between 1951 and 1984 before reaching five years of age. (In nine instances mothers cited two causes of death.)

Cause or causes cited by mother	Deaths	
	No.	(%)
Folk diseases with diarrhea/dehydration	153	(28.1)
Diarrhea	93	(17.1)
Dehydration	58	(10.7)
Measles	34	(6.3)
Pneumonia	18	(3.3)
Other	188	(34.6)
Total	544	(100)

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children worldwide to die annually of diarrhea and dehydration in the 1980s. However, despite its simplicity and economy, and despite a strong promotional campaign by the World Health Organization (WHO), ORT remains unavailable in many areas, including northeastern Brazil, with tragic consequences.

BARRIERS TO LIFE-SAVING ORT

Access to ORT is severely limited in the drought-stricken Northeast. In 1978, when we began our research, only expensive commercial ORS solutions were sold at pharmacies. Dehydrated infants from poor families were treated at home with traditional remedies, or in severe cases were taken to a distant hospital or rehydration center for intravenous rehydration. ORS solutions were not distributed in rural communities until 1982, when the Brazilian National Diarrheal Diseases Control Program was initiated, and since then access to ORS has remained problematic. Indeed, ORT rarely reaches the poorest and sickest children, despite well-intentioned national efforts.

Among the difficulties, according to an evaluation of the National Diarrheal Diseases Control Program (17), are resistance by medical professionals to ORT, deficiencies in primary health care and information infrastructures, lack of trained professionals, irregular ORS distribution, and the extent of the enormous national territory to be supervised. Moreover, government-sponsored ORT training has been earmarked exclusively for health professionals in institutions, and distribution of free ORS packets has been controlled by them. Because manuals, posters, pamphlets, and audiovisual messages only sporadi-

cally (if ever) reached rural areas and were often unintelligible to illiterate people, the ORT message failed to trickle down to poor mothers or to train them in ORS use.

A few examples may help to illustrate the monumental obstacles involved:

Case 1: Sonia

Sonia, a fifteen-day-old infant with profuse watery diarrhea of three days' duration, was carried by her ten-year-old sister at dawn to the state-operated health post. Her mother was homebound, observing the customary forty-day postpartum resting-in period (*resguardo*). Despite their walk in darkness, the children arrived too late to secure a rationed appointment token; they had all been taken. Sonia was turned away empty-handed. When our team visited the clinic, we found a locked storeroom with a stockpile of government-issued ORS decomposing in the tropical heat.

Case 2: Rosa

One-year-old Rosa died of diarrhea and dehydration in early 1985. The traditional healer diagnosed "evil eye." Eveline, her mother, took the child to nine "praying women" to remove the evil force before "it finished the kid's flesh." Although her mother fed Rosa *hortelã*, (mint) tea, sang to her, and rocked her, the child weakened. A pharmacist was consulted who prescribed expensive antibiotics. To purchase these medicines, Eveline and her husband sold their only means of livelihood and transportation: their sewing machine and bi-

cycle. They borrowed money and did odd jobs in the race to earn money for bus fare to take Rosa to the distant hospital before she died. After being rehydrated intravenously, Rosa returned home, where she quickly became dehydrated again and perished.

Case 3: Roberto

Five-month-old Roberto presented to the emergency room (ER) with severe dehydration, vomiting, and profuse, watery diarrhea of over 14 days' duration. Fatima, his mother, had gone to Irmão Pedro's Spiritist Center to remove the *encosto* (spirit of a dead person) causing his diarrhea. She promptly sought the ER when his condition worsened. The attendant was hostile toward Fatima because of her "noncompliance" in vaccinating, registering, and properly nourishing the child, despite Fatima's explanation that free government milk was only given if the baby was registered, for registration he had to be vaccinated, for vaccination he had to be afebrile, and that was impossible because Roberto was *always* sick. Humiliated, Fatima abruptly left the ER. Roberto was dead on arrival at a nearby hospital several days later. Unable to pay for a crude wooden casket, Fatima was not allowed to remove his body from the hospital premises. Only when she bribed the hospital night watchman to scale the morgue wall and snatch Roberto's lifeless corpse was he released into her keeping.

• • •

Poignantly, we see the obstacles to ORT and medical care everywhere: overcrowded health posts; rationed appointments; absentee professionals; uncoordinated and competing national, state, and local resources; top-heavy bureaucracy; faulty supplies; and inappro-

priate health "education" to name a few. Be they economic, political, social, cultural, or educational barriers, one thing is certain: for impoverished families they are real, frequently insurmountable, and deadly.

ONE SEARCH FOR A SOLUTION: AIMS AND METHODS

Nations (5, 18, 19) hypothesized in early 1980 that providing access to lifesaving ORT in northeastern Brazil would depend on integrating ORT into the indigenous medical system. Lay healers would have to be mobilized because they were the *frontline* caretakers of children suffering from enteric infections and dehydration; 83.5% of the rural mothers of varying socioeconomic strata first sought healers (20), and 91.9% of the urban mothers having their children admitted to health facilities for intravenous rehydration consulted a healer prior to admission (21). Nations (5, 18, 19) also argued that such an alternative, culturally appropriate, delivery strategy needed to be low in cost, located near poor homes, accessible by foot, understandable to illiterate mothers, dedicated to the use of simple technology, driven by the energy and concern of villagers, advertised by word-of-mouth (not by costly mass media campaigns), and provided with a guarantee of backup hospital services when needed.

Following this line of reasoning, in January 1984 we initiated a two-year research project in the Department of Community Health at the Federal

University of Ceará to test the theory that mobilizing and training popular healers in ORT and related child survival strategies would produce a significant improvement in the health knowledge, attitudes, and practices of village mothers without changing essential elements of the indigenous medical system. Specifically, we postulated that trained popular healers would (1) increase the awareness, use, and proper preparation of ORS, particularly of homemade solutions; (2) curb dangerous food withholding and promote continued feeding during diarrhea; (3) increase vital breast-feeding during the disease episode; and (4) reduce the use of costly, commercially promoted ORS and nonindicated pharmaceuticals. We also postulated that popular healers could promote these changes in hard-to-alter health behaviors without significantly changing the established pattern of resort to healers, deeply engrained folk concepts of diarrhea etiology, or widespread use of medicinal teas for treating diarrhea.

The study was carried out in Pacatuba, a rural community of 7,000 inhabitants located 32 km from the Ceará state capital of Fortaleza, a rapidly modernizing city of two million in the extreme Northeast. Pacatuba is no longer an isolated, homogenous village of subsistence farmers of Dutch, Portuguese, African, and indigenous descent. City ways have encroached. It is now a stratified community with three distinct neighborhoods. The wealthier people typically live in the town center, work as merchants, civil servants, and teachers, and enjoy the conveniences of electricity, automobiles, televisions, ranges, and refrigerators. Fecal contamination is low in their homes, which have piped water and flush toilets. Migrant wage laborers live in an intermediate, modernizing neighborhood where men must travel to distant construction jobs. Here dogs and

pack animals roam the streets, which wind through a maze of tightly packed adobe and plaster houses. Few desirable conveniences are affordable. Water from a community faucet is contaminated, and feces are disposed of in crude pits. Pacatuba's poorest inhabitants, farmers or sharecroppers who struggle to grow the beans, rice, and manioc root that barely sustain them, live in an isolated section where drab adobe houses lack even such basics as floor coverings, stoves, sinks, and pit privies. What human excrement is not eaten by pigs is washed into a nearby stream, where families collect highly contaminated water to drink, bathe, and wash their clothes.

To conduct the work described here, 46 popular healers were recruited and trained. These included 20 "prayers" (*rezadeiras*), seven Afro-Brazilian priests (*Umbandistas*), four spiritists (*espíritas*), three popular pharmacists, one lay "doctor," one herbalist (*raizeiro*), and 10 visiting Protestant prayers (*oradores*). Thirty-four of the 46 were women and 12 were men, their ages ranging from 35 to 82 years. On the average, group members had 24 years of healing experience. The ratio of healers to inhabitants was 1:150, a figure considerably larger than the ratio of doctors to inhabitants (1:2,000). Seventy-one percent of the healers lived and practiced on the poor urban periphery of Pacatuba, while 29% were located in the town center, where all of the medical services (four health posts) were located. All of the resident healers were professed Catholics, though they often practiced other religions in tandem. We found that in general the healers were trusted, astute clinical observers, knowledgeable

about antidiarrheal plant remedies, skilled at accurate preparation of ORS solutions (16), and pragmatic in integrating modern therapies that work (e.g., prescribing an antibiotic while in a trance state).

The different kinds of healers differ in significant ways. *Rezadeiras* cure with prayer and power received from God or from an ailing healer before death. *Umbandistas*, priests of a sect synthesized from ancient African, Brazilian, and Catholic beliefs, heal diarrhea while in a trance, possessed by spirit guides or *orishas*. *Espiritas* are mediums who adhere to the famous teachings of French physician-spiritist Alan Kardec to diagnose and treat. *Raizeiros* or herbalists treat with medicinal plants and more recently with modern pharmaceuticals. Lay "doctors" acquire their skills largely from popular magazines, drug advertisements, and television.

Despite this subspecialization, the healers' spiritual/supernatural skills are sought because diarrhea and dehydration are popularly thought to be symptoms of folk illnesses—including "evil eye" (*quebranto*, *mau olhado*), "fright" disease (*susto*), spirit intrusion (*sombra*, *encosto*), intestinal heat (*quentura do intestino*), and fallen fontanelle (*caida da moleira*).

We selected preintervention and postintervention samples of Pacatuba residences as follows: All buildings in the entire town of Pacatuba (including the commercial center and all the surrounding neighborhoods) were identified using a map provided by SUCAM, the government agency responsible for infectious disease control. The 1,484 buildings thus identified were systemati-

cally placed into one of three groups by consecutively numbering the buildings in each row or along each street 1, 2, or 3 according to physical position and then placing every building numbered 1 in group 1, every building numbered 2 in group 2, and every building numbered 3 in group 3. Our preintervention sample was drawn from group 1 and our postintervention sample from group 2. Group 3, which was originally to have been tested after six months (at the midpoint of the intervention) was not tested due to time and monetary constraints.

Subsequent door-to-door visits were conducted by our local research team to identify homes in each group having at least one child under five years of age. In all, 843 (56.8%) of the potential study homes were disqualified after the home visit (431 had no child under five years old; 191 were abandoned, unoccupied, or closed; 103 were nonexistent residences, most of which had been dismantled and moved; and 103 housed small businesses or religious centers). Also, occupants of nine homes refused to participate, and the residents of six others were unavailable ("at the river washing clothes") despite two repeat visits. After these disqualifications, 204 homes remained in our preintervention group, 226 in our postintervention group, and 211 in our unstudied group. In all, 641 buildings (43.2%) were identified as having at least one child under five years old, and 430 of these homes were studied.

The mothers or primary child caretakers in the 204 group 1 homes were interviewed by four local research assistants concerning ORT and diarrhea-related knowledge and practices during a three-month period extending from mid-August to mid-November of 1984. Households were classified into four socioeconomic levels (1 being the poorest and 4 the least poor) using the following

criteria: (1) per capita income for the previous month, (2) the type of floor and wall construction, (3) the type of sanitary facilities, and (4) the source of drinking-water. Level 1 included households with a monthly per capita income less than US\$5.98, dirt floors, straw and mud thatch walls, no toilet, and river drinking-water. Level 2 included households with a monthly per capita income of US\$5.98–11.73, dirt floors, brick walls, a pit privy, and a community water faucet. Level 3 included households with a per capita income of US\$11.74–29.38, cement floors, thatched walls, a septic tank with running water, and protected well water. Level 4 included households with a per capita income above US\$29.38, cement floors, brick walls, a flush toilet, and piped-in drinking-water. Assignment to a level was made if the house met at least three of these four

criteria. In the case of a split, the house was assigned to the lower level. Of the 204 selected preintervention households, 66 were placed in Level 1, 70 in Level 2, 31 in Level 3, and 37 in Level 4.

During a twelve-month period (December 1984–November 1985) we carried out the following activities: The 46 popular healers were identified and tactfully contacted; 12 meetings were held with the healers in their homes; and through much dialogue and joint participation, the healers and authors together planned the rest of the intervention.

Specifically, the healers were taught about the basic biomedical concept of dehydration because we believed the process and its direct relationship with diarrheal and infant death was largely unappreciated by healers. To translate biomedical notions in a way understandable to healers, we used visual models (withered *pinhão* leaves, a gourd leaking water, a deflated plastic ball, etc.). We also built on the colorful and



A Brazilian traditional healer demonstrates the indigenous ritual of "lifting" a child's "fallen fontanelle" in her curing-room stocked with homemade ORS-tea supplies.

descriptive popular terminology already known by healers to describe such things as (1) a recessed fontanelle—"deep" (*funda*), "splintered" (*lascada*), "split" (*rachada*), or "distorted" (*disfigurada*) fontanelle or "fallen fontanelle" (*caída da moleira*); (2) a severely dehydrated child's eyes—"angel eyes" (*olhos de anjo*), "broken vision" (*vista quebrada*), "faint eyes" (*olhos esmurecidos*), "drooping eyes" (*olhos descuidados*), "dead eyes" (*olhos mortos*), and "deadened vision" (*vista amortecida*); (3) the skin of a dehydrated child—"skin stands up" (*pele fica em pé*), "wilted skin" (*pele murcha*), "dried skin" (*pele ressecada*), "loose hide" (*couro largado*), and "dry meat" (*carne seca*); (4) the fluid and electrolyte loss in the intestine—"dry guts" (*tripas secas*); and (5) lack of urination—"urine prison" (*prisão de urina*).

The healers were also shown how to prepare a simple homemade ORS solution. This ORS-tea, as we will call it, was developed by healers during a "kitchen session." In this session they blended their tasty and revered antidiarrheal medicinal teas with salt (40–60 mmol/l) and sugar, recognizing the benefits of both. A simple bottlecap measuring device was adopted. Seven heaping capfuls of sugar and one level capful of salt placed in one liter of unsweetened tea or filtered or boiled water was agreed upon by the healers and our research staff as the ORS-tea recipe for slightly to moderately dehydrated children, because it met scientific requirements (22) and because the number seven has magical qualities in Brazilian folk medicine. The healers were also instructed in the preparation of free, government-issued

(CEME) ORS packets containing the complete WHO salt formula (2% glucose, 90 mmol/l of sodium chloride, 1.5 grams of potassium chloride, and 2.9 grams of sodium bicarbonate) and were provided with an ample supply of CEME packets to treat cases of moderate to severe dehydration.

In addition, five basic health messages were delivered and reinforced. These were (1) give ORS-tea for diarrhea and dehydration or any folk illness or condition (e.g., "dry meat," "angel eyes") that is similar; (2) continue feeding during diarrhea and do not withhold food; (3) encourage breast-feeding during the episode; (4) eliminate drugs to treat diarrhea (except when indicated by laboratory tests); and (5) ask people to seek the healer quickly at the onset of diarrhea/dehydration. Healers were then trained to teach mothers ORS-tea preparation using our simple graphic instructions. In so doing they would prepare the first liter with the mother, counting the measures of salt and sugar out loud as they were added to the solution. At the outset, healers performed all the popular prayers and rituals for the presenting complaint (e.g., "evil eye") as usual. Preparation and administration of the ORS-tea followed, this being integrated into the religious context as each healer desired in creative and eclectic ways—for example, by offering ORS-tea to saints' images, blessing ORS-tea as holy water (*agua benta*), adding diarrheal terminology to prayer verses, etc. The healers were also taught five high-risk indicators for referral to pediatric health services, these being (1) vomiting of ORS-tea or CEME ORS, (2) prolonged fever, (3) convulsions, (4) "prison of urine" or lack of urination, and (5) severe dehydration or folk conditions that represent drying.

Teaching materials were "re-written" by the healers and a local artist

in a graphic style easily understandable by illiterate mothers. Four simple but dignified "curing rooms" of mud and thatch were added onto healers' homes by villagers to serve as both religious centers and rehydration posts. Sixteen more existing rooms in healers' homes were given a face-lift with fresh paint and decorated with statues and pictures of healing saints. Various supplies—including a water filter, plastic storage containers, one-liter bottles, a funnel, a table and plastic tablecloth, benches, hammocks, diapers, and mixing spoons—were also provided.

Pacatuba's healers distributed approximately 7,400 liters of ORS-tea in 12 months, at a cost of US\$0.48 per month per healer for salt and sugar.

After the intervention, during December 1985 and January 1986, a postintervention survey on ORT and child survival knowledge and practices was administered to the mothers or primary child caretakers in the 226 group 2 homes by the same four local assistants who administered the preintervention survey. These postintervention households had socioeconomic backgrounds comparable to those of the preintervention households: 71 were at Level 1, 64 at Level 2, 51 at Level 3, and 40 at Level 4. Statistical differences between preintervention and postintervention responses were assessed using Chi-square analysis.

RESULTS

Results of the preintervention and postintervention surveys are shown in Tables 3 and 4. These data clearly demonstrate that the healers had a significant impact on vital child survival beliefs and practices of Pacatuba mothers. Specifically, over the study period the healers significantly increased the moth-

ers' awareness, use, and proper preparation of ORS; reduced dangerous withholding of food; promoted continued feeding, including breast-feeding, during diarrhea; and reduced the use of costly commercial ORS and nonindicated drugs. However, the healers' efforts did not significantly alter prevailing public patterns of healer use, belief in diarrhea folk etiologies, or use of medicinal teas.

Lay Awareness, Use, and Proper Preparation of ORS

Contrary to what we had expected, in 1984 some 84.2% of the mothers interviewed had believed that ORS must be given when diarrhea strikes a child; this high percentage climbed significantly higher, to 93%, after the healers' ORT program. Awareness that "soro" or rehydrates (oral or intravenous) existed was ubiquitous; 96.1% of all the mothers had *ouvido falar* ("heard it mentioned") before the intervention. This high level of general awareness apparently increased between the preintervention and postintervention survey to 98.7%, an improvement that was not statistically significant. However, a highly significant increase ($p < .001$) occurred in the mothers' awareness of homemade ORS; that is, only 2.9% knew of it beforehand, while 71.2% did afterward.

It seems clear that introduction of the healers' homemade ORS-tea was responsible for this dramatic increase; for while no mother mentioned ORS-tea beforehand, 72% of all mothers and 74.6% of the poorest (Level 1) mothers did so afterward. It should be noted that the news of ORS-tea spread

TABLE 3. Data obtained from mothers and healers through the preintervention and postintervention surveys regarding the healers' impact on Pacatuba child survival activities in 1985.

	Percentage of mothers (healers) interviewed		Change (% of survey population)	p value
	Preintervention survey (n=204 households)	Postintervention survey (n=226 households)		
Mother believes must give ORS for diarrhea	84.2	93.0	+8.8	p < 0.01
Mother knows of any ORS	96.1	98.7	+2.6	
Mother knows of homemade ORS	2.9	71.2	+68.3	p < .001
Mother knows of healers' ORS-tea	0.0	72.0	+72.0	
Mother knows of and correctly prepares ORS-tea	0.0	28.2	+28.2	
Mother has fed healers' ORS-tea to child at least one time	0.0	54.2	+54.2	
Mother most often uses healers' ORS-tea	0.0	38.7	+38.7	
Healer knows ORS-tea recipe	0.0	100.0	+100.0	
Healer knows of and correctly prepares ORS-tea	0.0	100.0	+100.0	
Mother knows of free CEME ORS packets	56.4	75.2	+18.8	p < .001
Mother knows of and correctly prepares CEME ORS packets	55.4	67.0	+11.6	p < .02
Mother most often uses CEME ORS packets	20.6	26.8	+6.2	p > .05
Mother most often uses commercial ORS packets	37.0	11.5	-25.5	p < .001
Mother most often uses prebottled "Pedialyte" ORS	33.3	21.7	-11.6	p < .01
Mother uses "antidiarrheal" drugs	93.1	72.6	-20.5	p < .001
Mother withholds food/milk during diarrhea	71.1	53.1	-18.0	p < .001
Mother withholds food/milk during diarrhea more than five days	18.6	8.8	-9.8	p < .01
Mother believes in breast-feeding during diarrhea	71.2	92.0	+20.8	p < .001
Mother consults traditional healer for child's diarrhea	83.5	83.2	-0.3	p > .05
Mother first seeks healer for diarrhea	78.7	76.0	-2.7	p > .05
Mother first seeks doctor for diarrhea	18.2	17.7	-0.5	p > .05
Mother first seeks pharmacy attendant for diarrhea	3.0	0.0	-3.0	
Mother believes in folk etiology of diarrhea	42.5	42.6	+0.1	p > .05
Mother believes in "medical" etiology of diarrhea	54.3	54.9	+0.6	p > .05
Mother believes in feeding child medicinal teas for diarrhea	76.2	82.7	+6.5	p > .05

TABLE 4. Survey data on the healers' impact (see Table 3) grouped according to the interview subjects' socioeconomic levels.

	Percentage of mothers or primary caregivers interviewed (204 preintervention, 226 postintervention)							
	Level 1 (poorest)		Level 2		Level 3		Level 4 (least poor)	
	Pre- intervention	Post- intervention	Pre- intervention	Post- intervention	Pre- intervention	Post- intervention	Pre- intervention	Post- intervention
Mother knows of homemade ORS	4.5	74.6	2.9	73.4	0	64.7	2.7	70
Mother knows of healers' ORS-tea	0	74.6	0	73.4	0	64.7	0	70.0
Mother knows of and correctly prepares ORS-tea	0	31.0	0	35.5	0	20.0	0	22.5
Mother has fed ORS-tea to child at least one time	0	62.0	0	62.5	0	43.1	0	41.0
Mother most often uses healers' ORS-tea	0	41.9	0	43.8	0	32.8	0	30.8
Mother knows of free CEME packets	59.1	87.3	60.0	75.0	54.8	68.6	45.9	62.5
Mothers knows of and correctly prepares CEME ORS packets	54.5	86.0	64.7	64.0	54.8	59.0	40.5	50.0
Mother most often uses CEME ORS packets	31.1	40.0	15.2	23.6	17.9	22.4	14.7	11.5
Mother most often uses commercial ORS packets	52.5	7.6	40.9	14.6	28.6	19.4	8.8	3.8
Mother most often uses pre-bottled "Pedialyte" ORS	6.6	9.5	37.9	17.9	39.3	25.4	67.6	48.1
Mother uses "antidiarrheal" drugs	92.3	63.3	90.0	67.2	93.5	80.4	100.0	87.5
Mother withholds food/milk during diarrhea	66.7	50.7	72.9	59.4	64.5	45.1	81.1	57.5
Mother believes in breast-feeding during diarrhea	76.9	97.2	72.4	93.8	77.4	84.0	54.0	90.0
Mother consults traditional healer for child's diarrhea	87.9	84.5	80.0	92.2	83.9	76.5	81.5	75.0
Mother first seeks doctor for diarrhea	10.7	20.0	17.1	8.0	12.9	22.0	37.8	25.0
Mother believes in feeding medicinal teas for diarrhea	78.5	90.1	79.7	84.4	80.6	76.5	62.1	75.0

by word-of-mouth. No advertising or mass media was used. The healers also successfully encouraged 54.2% of all the mothers and 62% of the poorest ones to feed ORS-tea to their sick children. Even 41% of the least poor (Level 4) mothers had used the healers' simple solution.

A test was conducted by our field researchers that required 13 healers participating in the project to recite the ORS-tea recipe given them and to prepare the solution as they had been taught during previous training sessions. This test demonstrated that all the healers (100%) recalled the exact recipe given them. Laboratory analysis of the solutions prepared by seven of the 13 healers selected at random showed that none were dangerous hypernatremic solutions and that the healers had prepared homemade ORS solutions comparing favorably with the standard CEME (WHO) formula in terms of safe and effective sodium and glucose content (22).

At the end of the program, 28.2% of the mothers surveyed (and even higher percentages of the often illiterate mothers in Levels 1 and 2) said they knew of and had correctly prepared the healers' ORS-tea. Of this 28.2%, nearly all (95.8%) learned to make the ORS-tea from one of the project's 46 traditional healers; relatively few said they were instructed by a doctor (2.8%) or by members of the research project staff (1.5%).

A highly significant increase ($p < .001$), from 56.4% to 75.2%, occurred in the proportion of mothers who knew of CEME packets. This came about as a byproduct of the project, which concentrated on homemade ORS-tea but did instruct healers in CEME packet preparation and provided "backup" CEME packets for markedly dehydrated children. As in the case of ORS-tea, the greatest increase in awareness occurred among the poorest (Level 1) mothers, only 59.1% of whom knew about CEME

packets beforehand, as compared to 87.3% afterwards. However, while the mothers' collective knowledge of how to use the CEME packets increased significantly ($p < 0.02$), actual use of the CEME packets did not show a statistically significant rise.

Improved Feeding Practices

Presumably in response to the healers' work, the percentage of mothers withholding food and milk during diarrhea to "rest the bowel" or "starve the illness" declined significantly. That is, beforehand 71.1% of the mothers said they restricted food (usually milk and manioc, rice, or wheat cereals or *minguas* and other solids) during diarrhea. Afterward, 53.1% still said they restricted vital nutrients. The reduction in prolonged food withholding (for over five days) was more pronounced, the percentage of mothers who restricted milk or food for over five days declining by 9.8%, from 18.6% to 8.8% ($p < .01$). The largest decrease in this harmful nutritional practice occurred among the poorest mothers, 24.2% of whom withheld milk or food over five days beforehand, while only 8.4% did so afterward.

Similarly, the healers convinced a significant ($p < .001$) share of the mothers that they should breast-feed their infants during diarrhea. The percentage of women who believed breast-feeding should continue during diarrhea was already high (71.2%) beforehand, but apparently due to the healers' efforts it increased to 92%. The greatest increase (36%) occurred among the least

poor (Level 4) mothers, who typically breast-fed least in Pacatuba (23). This did not resolve the problem of rampant artificial feeding, however, since many women (including half of the Level 4 mothers) do not breast-feed their infants; weaning occurs very early; and so mothers of infants with diarrhea may have no breast-milk to give even if they wish to do so.

Use of Commercial ORS and Drugs

Healers' assertions that cheap ORS-tea or free CEME ORS would "lift (*levantar*) their child" (rehydrate) like costly prebottled or prepackaged salts sold at the pharmacy had a significant impact on the preferred type of ORT.

Before ORS-tea was available, commercially sold packets of dry salts were the favorite; 37% of all the mothers (52.5% of the poorest and 8.8% of the least poor) preferentially bought packets at the pharmacy at a cost of US\$.25-\$1.00 per package. The next-preferred ORS was the expensive (\$2.25 per 750 ml) prebottled "Pedialyte" bought preferentially by 33.3% of all the mothers, but mostly by the least poor (67.6%). Still, 6.6% of the Level 1 mothers, 37.9% of the Level 2 mothers, and 39.3% of the Level 3 mothers "most often" purchased the costly solution. In general, the mothers reasoned that the exorbitant price was for a super-concentrated ORS that acted like a "strong" medicine; so they typically administered only a spoonful or so, no more. CEME packets were the least favored, being used most often by only 20.6% of the mothers, apparently because of limited availability. In all, 31.1% of the poorest (Level 1) mothers depended most often on free CEME ORT, despite the barriers, to rehydrate their children.

Following introduction of ORS-tea, this tasty, popular solution became the preferred rehydrant, with 38.7% of all mothers (41.9% in Level 1 and 30.8% in Level 4) preferentially using the homemade remedy. The percentage most often using the costly commercial ORS packets fell drastically, from 37.0% to 11.5% ($p < .001$); the most significant drop occurred in the poorest households, where 44.9% of the mothers said they stopped preferential use of the commercial packets while 41.9% said they preferentially used ORS-tea. The percentage most often using expensive "Pedialyte" decreased significantly ($p < .01$), by 11.6% overall, and by 19.5% (from 67.6% to 48.1%) among the Level 4 mothers. No significant change ($p > .05$) was detected in the percentage of mothers most often using the CEME packets.

Dangerous drugging of children with diarrhea decreased notably during the study period, the percentage of mothers using "antidiarrheal" drugs falling a highly significant 20.5% ($p < .001$). So, whereas a shocking 93.1% of the mothers used pharmaceuticals (e.g., antibiotics such as chloramphenicol and tetracycline, cathartics, antimobility agents, and pectin-containing antidiarrheals) to treat diarrhea/dehydration beforehand, 72.6% did so afterward. The greatest change (in 29% of the mothers) was found among the Level 1 mothers, who were the poorest and least able to afford expensive and nonindicated drugs (92.3% of the Level 1 mothers favored drug treatment beforehand as compared to 63.3% afterward). The smallest reduction was found among the Level 4 mothers, 100% of whom be-

lied in drug therapy before the healers' warnings and 87.5% of whom continued to do so afterward.

Popular Medical Beliefs and Practices

Our survey findings indicate that the healers successfully introduced a new technology (ORS-tea) and altered detrimental child survival practices without destroying their own folk medicine. No significant change ($p > .05$) occurred in the number of mothers who believed they should take a child with diarrhea to the traditional healer for cure. The high percentage of mothers who believed this before the intervention (83.5%) was nearly the same (83.2%) afterwards.

Similarly, no significant change ($p > .05$) was found in the percentage of mothers who said they first took children with diarrhea to a healer. The percentage, which was high initially (78.7%), appeared to decrease slightly (to 76%) afterwards. At the same time, the percentage of mothers seeking out the Afro-Brazilian priest-healers appeared to rise 2%. Likewise, no significant changes were found in the small percentages of mothers first seeking physicians or pharmacy attendants.

Similarly, belief in diarrheal folk etiologies appeared to remain generally unaltered ($p > .05$). Before the intervention, 42.5% of the mothers believed in folk etiologies of diarrhea including fright or *susto* (17.7%), teething or *dentição* (14.4%), evil eye or *quebranto* (4.7%), intestinal heat or *quentura* (2.9%), and falling or *queda* (2.9%). Afterward, the percentage subscribing to folk etiologies was similar (42.6%).

Likewise, the popularity of "medical" explanations (although many of these were folk versions) did not change significantly ($p > .05$). Before the intervention, 54.3% of the mothers sub-

scribed to such explanations, 25.7% saying the cause of diarrhea was related to unhealthy food (e.g., "strong," "weak," "fatty," or "heavy" food or to dirt-eating), 12.7% saying the cause was intestinal "worms," 11.2% blaming poor hygiene (including dirty water, flies, poorly washed baby bottles, unwashed fruit, walking barefoot, or playing in the sand), and 4.7% relating the cause to the quality or preparation of the infant's milk. Afterward, 54.9% of the mothers subscribed to these "medical" etiologies, with a nearly identical distribution.

No statistically significant change ($p > .05$) occurred in the percentage of mothers who recommended medicinal teas for children suffering from diarrhea; 76.2% of the mothers surveyed initially said they believed in such teas, while 82.7% said they did so afterward.

DISCUSSION

Health experts commonly argue for the integration of traditional healers into health care systems, especially those emphasizing primary health care (24-27). Such a policy has been endorsed by international health organizations (28,29) and conferences devoted to pinpointing activities for healers in primary care (30). It is also argued that popular healers can play a vital role in linking lifesaving ORT to the poorest homes in the developing world, where diarrhea and dehydration kill daily (18, 30, 31). In this vein, the results of our study demonstrate that impoverished, illiterate healers—prayers, Afro-Brazilian Umbanda priests, spiritists, herbalists,

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preachers, and popular "doctors"—can be effective promoters of ORT and related child survival strategies. No longer can we dismiss healers—with their prayers, trances, and teas—as curiosities unrelated to medical care; for mounting evidence has shown them capable of playing a vital role in child survival.

ORT Use

The impact of Pacatuba's popular healers on diarrheal disease control surpassed that of many official medical ORT programs. For example, a mass media campaign in Indonesia (32) increased public awareness of ORT considerably (an additional 48.5% of the study population became aware of ORT), but the actual share of the study population that came to make use of homemade ORS for the first time was a relatively small 14.5%. Similarly, two years of ORT promotion in Thailand (33) resulted in only 20% usage. In Bangladesh (34), an ambitious face-to-face educational campaign by trained ORT promoters was highly successful in teaching 90% of the mothers about homemade *lobon-gur* ORS, but only 10% used it; and even after an intensified second effort, use only increased to 35%. In Nicaragua (35), a national mass media campaign to promote "*super limonada*" caused 65% of the mothers studied to be aware that ORS existed, but only 25% said they used it.

Among the best results achieved anywhere were reported by the Haitian National ORT Program (34), which achieved 75% awareness and 30–50% use of ORT (35), while Guatemala (36) and Honduras (37) respectively recorded 47% and 50% ORT use rates in one year.

In other words, the 54.2% ORS-tea use rate found in our study was comparable to the results achieved by the

world's outstanding ORT programs, most of them dependent on intensive mass media advertising, large investments of foreign capital, and an enormous infrastructure of recruited personnel receiving special training—programs that seem prohibitively costly for Northeast Brazil.

If we compare the 62% ORS-tea use rate found among the poorest Pacatuba mothers after the healers' efforts with the ORS use rate emerging from Egypt's National Diarrheal Diseases Program (34), the results are about the same. (Egypt's program, largest in the world and among the most ambitious, was a US\$26 million, five-year undertaking supported by USAID that employed aggressive social marketing through print media, broadcasting, and personal contact, and that engaged local pharmacists in ORS packet production in order to raise the percentage of the population reportedly using ORT from 1% to 60% within a year.) Similarly, a Gambia mass communication ORT project (38) that inundated mothers with 600 radio broadcasts, 250,000 printed flyers, and 1,220 trained ORT promoters yielded higher numbers of mothers (66%) trained to mix homemade ORS but a lower use rate (47%) than that reported in Pacatuba.

Other Benefits

Equally impressive is the fact that the Pacatuba healers, in their soft-spoken yet forceful way, changed key preventive and medication behaviors. Again, their impact here was equal if not greater than that of many well-known national health education efforts.

Among other things, the percentage of mothers not withholding food from infants with diarrhea rose from 28.9% to 46.9%. This latter percentage is higher than the percentages reportedly resulting from intensive training programs in India (39) that directed their efforts at health post staffs, paid community health workers (CHWs), and volunteer CHWs to raise the percentages of mothers not withholding food during diarrhea to 7%, 33%, and 35%, respectively.

After 10 months of aggressive mass media breast-feeding promotion in Gambia (38), 87.6% of the mothers endorsed continued breast-feeding during diarrhea (as compared to 92% in Pacatuba), a percentage that was slightly lower than the 88.3% of the Gambian mothers endorsing this practice at the project's outset.

The Brazilian healers also reduced the percentage of mothers using drugs in treating diarrhea by 20.5%, about the same extent as CHWs (including traditional birth attendants) in Guatemala, who produced a reduction from 65% to 45% in one year of educational activity (36).

It is also clear that when a low-cost ORS (the ORS-tea) was introduced as an alternative to expensive commercial products, people were quick to change their preference to the cheaper home-made solution.

Why have Pacatuba's popular healers been so successful in promoting ORT and other child survival measures? We suspect that their established social roles as spiritual healers (with an average of 24 years' experience) and the profound respect villagers extend to them are two important factors. Young, inexperienced CHWs tell us "When we give ORS it is not worth anything (to mothers), but when the healer gives it from her hands . . . well, it's valued!" When spoken by a healer, something as simple

as a recipe for ORS-tea (or as deadly as a life-threatening warning) is heard by villagers because the message is ultimately sent, they believe, from God, folk saints, and spirit guides. Radio and television, while possessing a certain "magic" of their own, do not convince the deeply religious, we suspect, as well as the healers.

According to healer Dona Vicencia, "ORT will only work if you have a lot of faith; without faith you won't get well. If you take a doctor's medicine, one that the doctor prescribes without faith, it won't work!" This message tends to reinforce our impression. In other words, the mystical transformation of ordinary table salt, sugar, and water into "holy water" (*agua benta*) by healers who bless it, offer it to the gods, or lace it with their own medicinal (and tasty) teas no doubt promotes ORS-tea use.

Moreover, face-to-face communication with a healer a mother knows by name, who is a neighbor, who is available night or day, and who expects no payment ("Nobody sells the words of God!") makes a greater impression than professional, paid ORT-promotion teams that teach and leave.

The healers' generally positive attitudes toward self-care and toward sharing their new ORT knowledge with the mothers is also important. Our experience was that they did not jealously guard this information for professional advantage; as herbalist José María told us: "Every person should know how to prevent, recognize, and cure illnesses and not wait for doctors or even healers,

because every little bit of knowledge cures."

Another important point is that lack of continuity in administering ORT—of the sort experienced by Rosa's family or reported in Mali (40), where 30% to 40% of the dehydrated child patients failed to return to the clinic—is avoided in the popular system. Rituals to remove "evil eye" last for three consecutive days, and strong "evil eye" requires nine return visits to "close the cure." This custom is binding. If a child is too sick, healers call at home or the mother brings the child's garment for blessing by proxy. Follow-up of dehydrated children is built in. Technical terms such as "dehydration," "skin elasticity," and "turgor test" need no mastering by mothers. Healers understand perfectly well when a mother says her infant has "dry flesh," "angel eyes," "broken vision," or "fallen fontanelle," or that its "skin stands up," or that the infant needs "lifting" (rehydrating) with ORS-tea; and the healers have seen this treatment work. As a result, many of the barriers to ORT described by Sonia's, Rosa's, and Roberto's parents are eliminated by healers who have not only the will but the ability to make rehydration feasible.

Our results also indicate that introduction of this new life-saving ORS technology does not require changes in people's refreshingly diverse cultural beliefs and practices. Unfortunately, in the rush to transplant new medical discoveries to the far reaches of the earth, potentially useful practices are often discouraged in the name of "health education." In Gambia, for example, the introduction of ORT resulted in a sharp decline in the age-old custom of using medicinal teas. After only three months of ORT advertising, medicinal tea use had fallen 50%, from 53.8% to 26.4%, and seven months later its use level had plummeted to only 10% (38, 40). The

irony is that next year we may return and tell village mothers we have "just discovered" that the extract from their tea leaves discourages certain pathogenic bacteria, or that their ancient rice-water cure works as a rehydrant, reduces stool output, and is protein-enriched.

A more sensible and effective strategy to promote ORT and other child survival strategies is to integrate them skillfully into popular medicine. We offer this alternative approach as a tangible solution for Northeast Brazil and, perhaps, for other developing areas that share the tragedies of high infant diarrheal mortality, faulty nutritional practices, plummeting breast-feeding rates, rampant drug misuse, and antibiotic resistance; for we have come to believe that the health and survival of multitudes of children demand that this approach receive serious consideration.

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APPENDIX F

APPENDIX F

PROJECT EXPENDITURES, YEAR 1

	AID	HOPE	TOTAL
PERSONNEL/FRINGE	100,019	0	100,019
CONSULTANTS	1,200	0	1,200
TRAVEL/TRANSPORT	9,052	0	9,052
TRAINING	1,583	2,390	3,973
EQUIPMENT	84	0	84
SUPPLIES	5,181	0	5,181
OTHER DIRECT COSTS	24,660	0	24,660
INDIRECT EXPENSES	50,113	0	50,113
EVALUATION	0	0	0
TOTAL	191,892	2,390	194,282

PROJECT EXPENDITURES, YEAR 2

	AID	HOPE	TOTAL
PERSONNEL/FRINGE	150,408	66,872	217,280
CONSULTANTS	3,117	0	3,117
TRAVEL/TRANSPORT	9,593	3,681	13,274
TRAINING	803	0	803
EQUIPMENT	4,206	0	4,206
SUPPLIES	12,790	386,761	399,551
OTHER DIRECT COSTS	59,557	6,946	66,503
INDIRECT EXPENSES	77,097	24,481	101,578
EVALUATION	1,788	0	1,788
TOTAL	319,359	488,741	808,100

PROJECT EXPENDITURES, YEAR 3

	AID	HOPE	TOTAL
PERSONNEL/FRINGE	173,709	16,229	189,938
CONSULTANTS	22,478	0	22,478
TRAVEL/TRANSPORT	20,221	1,665	21,886
TRAINING	2,183	0	2,183
EQUIPMENT	26,719	10,141	36,860
SUPPLIES	1,782	110,824	112,606
OTHER DIRECT COSTS	57,960	20,444	78,404
INDIRECT EXPENSES	106,600	0	106,600
EVALUATION	2,710	0	2,710
TOTAL	414,362	159,303	573,665

BREAKDOWN OF VIVA EXPENDITURE ON DIRECT PROVISION OF SERVICES
OCT 1987 - SEPT 88

	ANNUAL EXPENDITURE	PERCENT OF TOTAL
PERSONNEL	66,549.36	60.0
LOCAL TRANSPORT	6,888.57	6.2
OFFSITE TRAVEL	7,741.55	7.0
SUPPLIES	1,512.04	1.4
EQUIPMENT	23,481.35	21.2
TRAINING	1,098.75	1.0
EVALUATION	2,933.36	2.6
OTHER	705.38	0.6
TOTAL	110,912.52	100.0

TOTAL PROJECT BUDGET BY ITEM, BUDGETED AND ACTUAL

	AID BUDGET	AID ACTUAL	HOPE BUDGET	HOPE ACTUAL	TOTAL BUDGET	TOTAL ACTUAL
PERSON/FRINGE	696,978	424,136	174,244	83,101	871,222	507,237
CONSULTANTS	0	26,795	46,250	0	46,250	26,795
TRAVEL/TRANS	61,154	38,866	15,289	5,346	76,443	44,212
TRAINING	9,400	4,569	2,350	2,390	11,750	6,959
EQUIP/SUPP	110,050	50,762	111,559	507,726	221,609	558,488
OTHER DIRECT	45,340	142,177	11,335	27,390	56,675	169,567
INDIRECT	157,078	233,810	29,270	24,481	196,348	258,291
EVALUATION	20,000	2,710	0	1,788	20,000	4,498
TOTAL	1,100,000	871,248	400,297	704,799	1,500,297	1,576,047

Number of contacts in year 3 by service and project site

Service	Number of Contacts	
	Jubaia	Conjunto Palmeiras
Prenatal care	262	1,333
Postnatal visits	216	492
Medical consults	3,699	730
First aid, etc.	923	0
ORS packets distributed	328	1,467
Home visits	2,762	1,874
Weighing	426	1,355
Deliveries	89	203
Referrals	6	33

VIVA/PROAIS target population, by project site

Community	Total Population	Children under 5	Mothers of children under 5
Conjunto Palmeiras	16,500	2,475	1,655
Jubaia	10,673	1,601	1,070
Total	228,246	34,237	22,893