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

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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,

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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 Measles (26.4%) and pneumonia or other respiratory illnesses (17.2%) followed (unpublished data).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)

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.

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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" (*fundada*), "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 descuidos*), "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,

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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SUMMARY

In an effort to promote the use of oral rehydration therapy (ORT) against childhood diarrhea, 46 popular healers in the northeast Brazilian community of Pacatuba were trained in homemade oral rehydration salts (ORS) preparation and critical child survival strategies. A mixture of ORS and local medicinal tea was devised, and this combination, together with other appropriate features of the therapy, was integrated into the healers' rituals.

Over the course of 1985, this activity caused a substantial increase in the percentage of mothers who were using cheap homemade ORS preparations. Some 72% of the mothers with children under five years old in Pacatuba became aware of the healers' ORS-tea, and 54.2% administered it to a child with diarrhea at least once.

Significant increases also occurred in the percentage of mothers aware of free government (CEME) ORS packets and the percentage who said they would continue breast-feeding a child with diarrhea. In addition, significant declines were registered in the percentages of mothers withholding food or milk from their children during diarrheal episodes, buying costly ORS dry salts or prebottled "Pedialyte," and administering "antidiarrheal" drugs. Toward the end of 1985, a review of the healers' knowledge showed that all recalled the ORS-tea recipe and could accurately mix the ingredients.

There is no evidence that these activities and results wrought any other substantial alterations in the healers' own folk medicine. No significant change was found in the percentage of mothers who believed they should take a child with diarrhea to a healer, nor did the percentages of mothers believing in

various folk etiologies of diarrhea appear modified to any significant degree.

In general, the Pacatuba program's impact on public awareness and use of ORT compares favorably to that achieved by many official medical ORT programs in other areas. Hence, the approach of skillfully integrating ORT and other child survival strategies into popular medicine is one that appears sensible and effective for Northeast Brazil and quite possibly for other developing areas as well.

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Scholarly papers on and references to ethnoveterinary medicine (folk knowledge and practices of animal health and disease) are being sought for the purposes of compiling an annotated bibliography and preparing an interdisciplinary anthology. This subject area includes folk therapies and prophylaxes for livestock disease or injury, indigenous animal husbandry measures to prevent or cure animal health problems, and popular theories on veterinary etiology, epidemiology, and diagnosis. Persons who have worked on these topics with any ethnic group in the world are invited to contact Dr. E. Mathias-Mundy at CIKARD (Center for Indigenous Knowledge for Agricultural and Rural Development), 318 Curtiss Hall, Iowa State University, Ames, IA 50011, USA, phone (515) 294-0938.