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Mass Media and Health Practices

IMPLEMENTATION

PRINCIPAL HEALTH CONSIDERATIONS
FOR A PUBLIC EDUCATION CAMPAIGN ON
PREVENTION AND TREATMENT OF INFANT DIARRHEA

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Document #

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PRINCIPAL HEALTH

CONSIDERATIONS FOR A PUBLIC EDUCATION CAMPAIGN ON

PREVENTION AND TREATMENT OF INFANT DIARRHEA

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BACKGROUND

On September 30, 1978, the Academy for Educational Development was contracted by the United States Agency for International Development to implement a five-year mass communication project. The project seeks to develop a methodology for the application of mass communication to the prevention and treatment of acute infant diarrhea in rural areas of two developing countries. The long term development goal of the project is to strengthen the health education capacity of the cooperating Ministries of Health. The project is divided into four sequential phases: Phase One - a developmental investigation of the problem; Phase Two - a public education campaign using radio, graphic material and face-to-face support; Phase Three - analysis of project results; and Phase Four - dissemination of those results to the world community of development communication professionals. Stanford University was contracted to evaluate the project, which is a joint effort of the Office of Education and Office of Health within the AID Development Support Bureau.

This document is an attempt to review the major health considerations facing the organization of a public education campaign on the prevention and treatment of infant diarrhea. It is not a comprehensive medical description of infant diarrhea, nor a thorough review of the diarrheal control literature. It looks at infant diarrhea from the perspective of a community educator and asks, "What are the important behaviors which must be understood before a successful educational campaign in this area can be affected?" The primary purpose of this document is to assist the directors of the Mass Media and Health Practices Project design the pre-program developmental investigation phase of project activity. We hope that it will also prove valuable to planners of similar projects.

A. The Health Problem: Acute Infant Diarrhea

It has been estimated by WHO that in 1975 there were some 500 million episodes of infant diarrhea, resulting in the death of five to eight million children below the age of five in Africa, Asia, and Latin America.

Studies in Guatemala indicate that a village child may have as many as six to ten bouts of diarrhea a year, each lasting an average of three days. In addition to being a pervasive killer, diarrhea is also a significant contributor to malnourishment in those children who survive. Diarrhea acts through increased malabsorption, reduced food intake caused by loss of appetite and food withdrawal, and fever to deprive children of needed nourishment.

Diarrhea is caused by both bacterial and viral agents, but the precise etiologies of diarrhea in developing countries is not well understood. Bacterial agents are transmitted by physical contact while viral agents rely largely on droplet or air-borne transmission. Bacterial agents account for the largest number of diarrheal episodes in poor countries and usually occur in a summer seasonal peak. The general clinical profile for both bacterial and viral cases is similar.

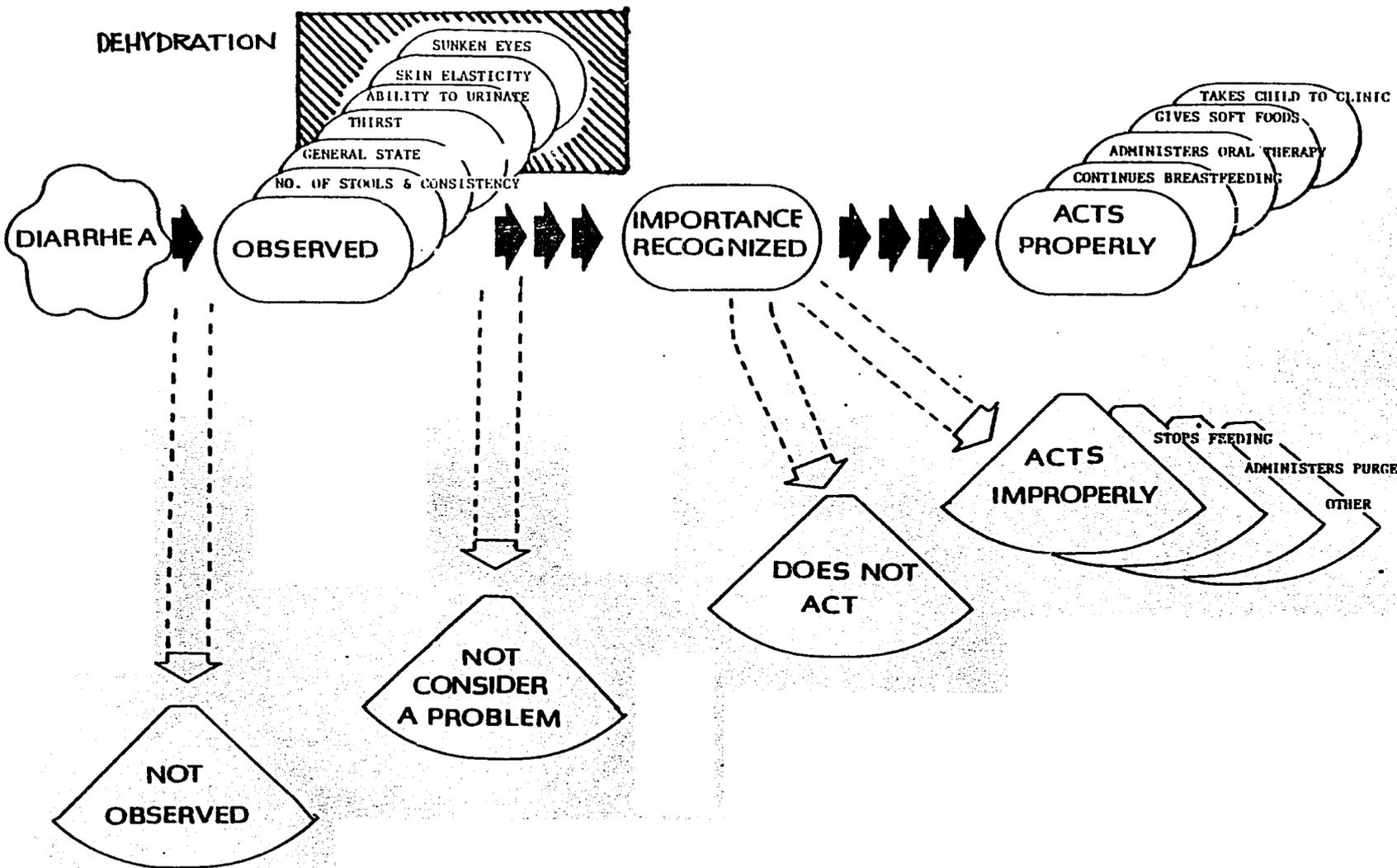
Unsanitary birth procedures and a mother's dirty hands or breasts represent potential sources of contamination to the newborn infant but these are slight compared to those encountered as the child grows and begins to drink water and eat weaning foods. The primary source of bacterial contamination is human feces. Adults can discharge disease-causing bacterial agents in their feces and yet manifest no symptoms of disease. These agents may be transmitted to the child in a variety of ways including (a) direct contact with feces through another person's dirty hands, (b) direct contact through the child crawling on unclean surfaces, (c) indirectly through contaminated water which is then transmitted to the child through drinking water, bottle formula, or weaning foods, or (d) indirectly through hand transmission during preparation of weaning foods. Perhaps the most prolific source of infection is weaning foods. As they sit in tropical heat, bacterial growth increases phenomenally and contact with large numbers of these agents will produce diarrhea.

Because stool consistency and frequency varies from one child to another, the mother is considered the best judge of abnormality. Generally any increase in the number and liquidity of stools will be recognized as diarrhea. In some cases, the child may recover from the diarrhea within 24 hours, but a usual episode will last three days. In most cases, continued diarrhea will produce dehydration. The mother's response to diarrhea is highly dependent (see following graph) upon cultural practices but generally includes one or all of the following reactions:

1. Withhold food in the belief that it caused or may worsen the diarrhea, and an accompanying belief that the child's system needs to "rest."
2. Administer a cathartic or laxative purge to eliminate the cause of the diarrhea which may be seen as worms, parasites, etc.
3. Administer an anti-diarrheal substance which may reduce the amount of stool but will neither destroy the pathogen or improve the hydration.

If the child does not recover, prolonged or severe diarrhea will usually lead to dehydration. Dehydration in infants is particularly dangerous, because such a large percentage of the child's total body weight is body fluid and because the child is dependent on others to provide fluids. The physical signs of dehydration include the following:

MATERNAL RESPONSE TO INFANT DIARRHEA



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1. Dryness of mouth.
2. Loss of appetite.
3. Decreased skin turgor.
4. Sunken fontanel and eyes.
5. Crying without tears.
6. Vomiting.
7. General listlessness.

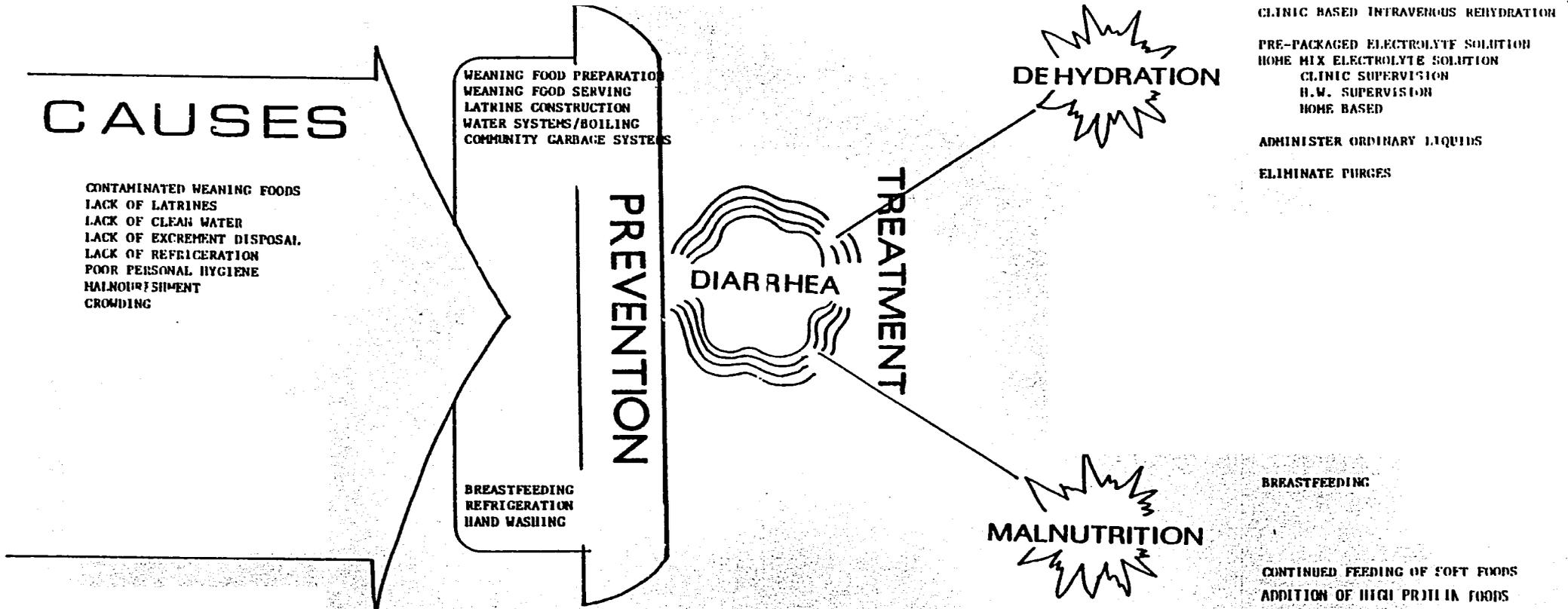
Even without proper care at this stage some children will recover, but some will continue to dehydrate and die. Death from diarrheal dehydration can occur within a matter of hours depending upon the severity of the diarrhea, the mother's response, and the child's prior nutritional level. Undernourished children tend to get diarrhea more frequently and more severely.

B. WHO's Diarrheal Disease Control Program (See Graph II)

Perhaps the most comprehensive, and certainly the most recognized program for controlling infant diarrhea is being promoted by the World Health Organization. The WHO program hinges upon the discovery of a single modality, oral rehydration fluid which can be used to treat 85 to 95 percent of cases of dehydration from watery diarrhea in all age groups. This oral rehydration therapy (ORT) does not cure diarrhea, but prevents dehydration which leads to death. ORT largely replaces intravenous therapy which requires trained personnel, sterile fluids, and expensive equipment. ORT is simpler to administer, and much less expensive. This makes it less dependent upon highly trained health workers and fixed facilities, and compensates more quickly for nutritional loss due to diarrheal disease. ORT is not the only element in the WHO program, however. WHO also emphasizes the need for the following:

1. Adequate feeding during and after diarrheal bouts, including breastmilk, diluted formula, and regular foods given to children
2. Antimicrobial agents, spasmolytics, and antidiarrheal drugs are not advocated because they distract the health care system from adequate oral therapy, or they may actually prolong the carriage of organisms in the gut and inhibit recovery.
3. Support of breastfeeding for its immunological properties and because it reduces the risk of exposure to contaminated substances.
4. Effective water and sanitation systems along with appropriate food and personal hygiene practices.
5. Health education programs which build upon an understanding of traditional practices and beliefs to promote positive changes in decision makers, mothers, health personnel, and community leaders.

POTENTIAL DIARRHEAL CONTROL ACTIVITIES



6. Epidemiological surveillance to determine prevalence and incidence of diarrhea in order to select populations at high risk.

A seventh factor, the elimination of laxatives which act to increase the intensity of diarrhea, should be added.

C. Experience with Diarrheal Disease Control Components

In reviewing prior experience with diarrheal disease control programs, it is necessary to discuss specific elements of such programs independently. Few countries have taken the entire WHO proposed program and implemented it uniformly. Indeed, the official formulation of the WHO program is only two years old. There has been considerable experience with individual aspects of the program, however, particularly those aspects which most concern the MM&HP Project; namely, water and sanitation, breastfeeding, and the application of oral rehydration therapy. For the purposes of this document, highlights of the past experiences and research will be cited with particular attention given to those aspects.

1. Water Supply:

Many experts would agree with researchers at the University of North Carolina at Chapel Hill when they concluded in a 1978 report to USAID:

"The field study, over the limited period of four years did not demonstrate that a safe and available water supply leads to a decrease in diarrheal morbidity. The results of the study confirm what experts have surmised. When the study started, there was still confidence that the direct relationship between water supply and diarrheal disease could be demonstrated in the field. Epidemiologists now have reservations about the usefulness of these field studies because of the difficulties in isolating the numerous variables involved."

A 1976 World Bank study supports the view that conclusive results on the linkage of water supply improvements and positive changes in health status cannot be provided by field experiments due to the complexity of variables involved.¹

Two aspects of water supply are commonly stressed. Most attention has been given to the provision of clean water. This effort has focused on new water sources, reduced contamination, or sterilization through boiling. The first alternative is often expensive, the second usually involves the construction of latrine systems which are discussed below, and the third has

¹ "Measurement of the Health Benefits of Investment in Water Supply," Report No. PUN 20, January 1976, CPS, PVO, The World Bank.

been criticized as impractical in rural areas where fuel shortages and delays caused by boiling and subsequent cooling of water, are common. More recently, experts like Richard Feachem have supported water abundance over water purity. They argue that it is scarcity of water which prevents people from using it in personal hygiene. An abundant supply of moderately clean water which villagers use to wash hands frequently, is preferable, they say, to impractical water purification schemes.

There continues to be optimism that clean water and salutary water practices will lower diarrheal morbidity, but it is generally agreed that morbidity is affected by so many other factors that measurable effects are not presently demonstrable in the field.

2. Sanitation Systems:

Experience with the introduction of sanitation systems is actually more limited than that of water supplies. Here again, there is confidence, founded on human logic and an understanding of the sources in rural communities, that investment in sanitation systems is justifiable. But there is very little direct evidence to demonstrate that such systems reduce diarrheal morbidity in the field. Evidence often cited is drawn largely from experience in the U.S. which shows that over the period between 1900 and 1930 in New York City, a period when water and sanitation systems along with refrigeration were widely introduced and the general socioeconomic level increased significantly, infant mortality decreased from 145 per 1000 to 60 per 1000. The largest percent of these deaths was caused by diarrheal dehydration. It has been argued that the reduced mortality was a consequence of the new infrastructural changes. Pineo and Buckles point out in a study on Mexican water and sanitation, "The realization of any health benefits at all requires that water supply, proper excretion disposal, and public hygiene improvements be regarded as related and necessary components of a single sanitation package."¹ Unfortunately, most research projects in poor countries are limited to dealing with only one or two of these changes at a time and over a much shorter period. The argument is not that water and sanitation programs are not useful, but that they do not produce short-term measurable effects, particularly when they are introduced independent of each other.

3. Breastfeeding:

The promotion of breastfeeding has taken on a political complexion during the past few years. The increasing use of formula feeding by mothers, particularly in urban and semiurban areas is considered one of the leading causes of diarrhea, malnutrition, and other infant disorders in these populations. Many mothers adopt formula feeding because of its flexibility and ease of use, freeing them to work. Others are convinced by the aggressive marketing campaign of commercial formula companies and by the appeal of

¹ Pineo, Charles and Buckles, Patricia. Full Report: Water Supply and Sanitation Component. Mexico Rural Development Project, July 1979. The World Bank.

modernity that bottlefeeding has come to represent: Most poor mothers have no safe water to mix with the formula, no way to properly maintain bottle sterility, and often dilute the formula to make it last longer. These actions increase the likelihood of bacterial contamination and reduce the nutritional benefit of the product. As a response to this growth in improper bottlefeeding, a campaign has been launched worldwide to promote continued breastfeeding and to develop appropriate weaning foods for children.

Breastmilk plays an important role in both the prevention and treatment of infant diarrhea. From a prevention viewpoint, breastmilk provides a natural immunity and is generally safe from contamination. From a treatment viewpoint, breastmilk, when given during ORT, helps provide extra water in addition to the salts in ORT, and helps restore the nutritional status of the child. Some questions do remain about lactose intolerance during episodes of diarrhea.

The promotion of breastmilk during episodes of diarrhea is hindered in some areas by the belief that breastfeeding following sexual activity causes diarrhea. For this and other reasons it is a common practice for mothers to stop breastfeeding when a child contracts diarrhea. Continued breastfeeding is then a logical target for instructional concern in the MM&HP Project. It relies on no outside resources but does represent a significant and difficult behavior to reinforce.

4. Weaning Foods:

It is generally held that "breast milk alone, from adequately nourished mothers, is sufficient food for infants up to six months of age. After six months, breast milk is a valuable supplement to weaning food." Breast is Best: Bibliography on Breast Feeding and Infant Health in Developing Countries. The actual weaning period varies from one culture to another. Supplemental feeding can be introduced almost immediately after birth in some cultures. It is more common that at three to five months, mothers will start introducing weaning foods, yet in some cultures weaning may be delayed until the ninth or tenth month. Weaning practices represent an important area for project research. In addition to identifying existing weaning schedules it will be necessary to look at the kind of weaning foods and the way in which they are prepared.

A great deal of research has been done on weaning food adaptation and development. Many experts argue that the former is preferred, especially in poor communities where people have few resources to purchase new weaning foods. Some aspects of preparation which seem crucial appear to be cooking temperature which destroys bacteria, reducing the time between food preparation and child feeding, hand-washing before food preparation which will reduce bacterial contamination, and use of clean or boiled water when possible. These prevention oriented behaviors are added to a shorter, but equally important list of treatment or recovery behaviors associated with weaning foods. Whitehead has pointed out that children recovering from illnesses need to produce catch-up growth.

Controversy continues to surround decisions about optimal weaning food composition. Experts like David Morley argue that new protein is not needed. Rather the addition of high calorie liquid fats commonly found in oils work to conserve and protect the protein already available in most weaning diets. Food bulk plays an important role in this process as well. Morley has pointed out that unreasonably large quantities of rice, for example, are required to meet growth needs, especially those manifested by children recovering from illness. This suggests that feeding messages in the MM&HP Project will have to be carefully selected with an understanding of existing local diets and availability of liquid oils.

5. Oral Rehydration Therapy:

While these factors play important roles in the overall WHO program, it is oral therapy which offers practical new hope that thousands of infants can be saved by moving effective treatment out of the clinic and into the community. The rationale for ORT rests upon new understanding of how the human digestive system operates. During diarrhea the gut loses the capacity to absorb sodium, and electrolyte imbalance occurs along with direct fluid loss. Research on cholera patients demonstrated that sodium absorption is restored in the presence of glucose and that the absorption of oral bicarbonate and potassium is not lost during diarrhea. Bicarbonate is added to the formula to correct acidosis while potassium is used to replace potassium lost directly through increased stool.

The WHO formula is consequently composed of these four ingredients per litre of water:

- Glucose 20.0 g
- Sodium Chloride 3.5 g
- Sodium Bicarbonate 2.5 g
- Potassium Chloride 1.5 g

The following description is offered to help the reader understand what ORT looks like in a particular administration setting. Other regimens will be described later, but the prepackaged, mother-administered model is a sufficient basis for describing the major ORT elements.

At the first sign of prolonged diarrhea, the child's mother obtains a one litre aluminum foil packet of pre-mixed oral rehydration salts. She adds these salts to a one litre container of the cleanest water available, not necessarily boiled water. She mixes the salts until dissolved and then uses a spoon to administer small amounts of the solution to her child over a 24-hour period. As she administers the solution, the child's stool volume may increase, potentially a sign to the mother that the solution is causing more diarrhea, and the child may begin vomiting. During the first 24-hour period, the mother gives the child all the breastmilk and/or plain water the child will take. If the diarrhea continues after three days, the mother should seek medical assistance. When the child's diarrhea stops, the mother should continue to feed the child breastmilk and foods which the child customarily eats, adding high calorie foods if possible for several days

after the episode. A detailed breakdown of this behavior sequence is presented in the accompanying Gr.III. Research on the efficacy of oral therapy in clinical or controlled field environment has been extensive, and has demonstrated the basic effectiveness of ORT when compared to IV therapy in rehydrating even severely dehydrated infants.

In contrast to clinical settings, however, the experience with applying oral therapy at the community level is heavily anecdotal. A recent bibliography on diarrheal disease reported "... (our) search has uncovered three published and two unpublished reports on community-based ORT, a startlingly small proportion of all ORT research." Reservations among experts about the safety of community-based ORT persist. AED has identified no one willing to argue that the potential dangers are greater than the potential benefits. Indeed, the same bibliography cited above states, "The existence of outstanding issues in ORT should not delay the expansion of ORT program activities in clinic and non-clinic settings." But there is relatively little research information on several critical issues relating to safety and efficacy, particularly in the community setting. These issues fall into three broad categories: mixing, administration, and acceptance.

a. Mixing: The critical mixing debate involves the level of sodium concentrations given to a sick infant. Over-concentration of sodium in infants can cause hypernatremia and lead to shock and subsequent death. The potential for hypernatremia appears to be increased in dehydrated infants. Research has not yet established the permissible range of sodium variation but it is certain that doubled ($\text{Na}=180$) mixing of the WHO formula (adding half as much water as required) represents danger to some children. Triple mixing of the solution (adding $1/3$ the amount of water) is life-threatening.

Double and triple concentrations can occur in several ways. If the mother mixed a full packet in a single glass of water instead of a litre container, or if a mother used a litre container but added two or three packets, believing the child needed a stronger dosage of the medicine, the child could receive dangerously high concentrations of sodium chloride. There does not appear to be any biological fail-safe mechanism, such as a child rejecting high concentrations of sodium. Consequently, some children could die from improperly mixed solutions of ORT salts.

These problems are compounded in home-mix settings when mothers are not only asked to add a premixed packet to the right volume of water but are asked to determine the correct volume of salts and sugar as well. One research effort, conducted as part of the MM&HP Project showed that the volume of locally available spoons and glasses is highly variable in rural Honduran communities making standardized volumes difficult to establish. Information from other programs has suggested that "mothers often prepare over-concentrated solutions at home." Attempts to reduce these risks with specialized spoons, varying packet volume to coincide with local mixing receptacles, and pinch and scoop methods, have not been well researched. This places considerable, some would argue unreasonable, responsibility on the instructional quality of media alone. Researchers like Sedgwick and Cutting have argued that the less supervision, the greater the errors. A

GRAPH III

Refers to rural mothers with children suffering from diarrhea but no serious signs of dehydration

Motivation	Feel need for medication	<ul style="list-style-type: none"> Knows that diarrhea can cause death/malnutrition Knows that fluid loss can be replaced Recognizes child as being sick with diarrhea Recognizes sickness is severe enough to require fluid replacement Believes diarrhea is an illness which can be treated successfully Believes in her own ability to make/give fluid
	Feel need for packet	<ul style="list-style-type: none"> Believes packet works to replace fluid lost and save child's life Believes packet works better than other alternatives Feels she can afford packet Feels getting the packet is worth the bother
	Feel need to feed child during episode	<ul style="list-style-type: none"> Knows good food and full diet (including breastfeeding) should be continued Believes child with diarrhea needs and will accept food
Procurement	Know about packet	<ul style="list-style-type: none"> Knows where to go Knows what to ask for Knows how much it costs
	Purchase packet	<ul style="list-style-type: none"> Have the money Packet must be available where she goes to get it Have the time/capacity to go and get it
	Purchase correct amount of packets	(Decisions not made here as yet)
	Acquire appropriate mixing vessel	<ul style="list-style-type: none"> Vessel must be present in the house Mother must recognize vessel as being appropriate Vessel is not being used for something else when needed Vessel must be clean
Mixing	Open packet without spilling salts	
	Add salts from packet to vessel	<ul style="list-style-type: none"> Add all the packet Add only the contents of the one packet Add nothing else
	Add water to same vessel	<ul style="list-style-type: none"> Add correct volume (fill the vessel without spilling) Add as clean water as possible (tea) Add nothing else
	Stir salts to dissolve	<ul style="list-style-type: none"> Recognize when the salts are dissolved A utensil for stirring must exist Stirring utensil must be relatively clean
	Do not boil mixture	
Administration	Use a small spoon to give child the one litre mixture over the next 24-hour period along with water, breastmilk, and juices. Continue this regimen for three days or until the diarrhea stops.	<ul style="list-style-type: none"> Have small spoon or bottle available for bottle-fed babies Believe that child can consume the recommended volume Remember to give the child small amounts over time Recognize what a 24-hour period is Store solution in place where it will not be disturbed or forgotten Believe that breastfeeding is all right when child has diarrhea Have breastmilk, or give water or juices Give sufficient volume of water and juices Believe child is capable of taking all these liquids Go and get another packet, or buy packets at once Evaluate whether child (a) still has diarrhea, but is not becoming dehydrated, (b) is becoming dehydrated, or (c) has no more diarrhea Have confidence in her own evaluation of child's status Feed child regularly and with appropriate diet in spite of diarrhea
	If diarrhea continues after three days, if continuous vomiting occurs, or if child can not or will not drink, seek help	<ul style="list-style-type: none"> Recognize that diarrhea continues Believe that health worker can help Be able to take child to health worker Perceive vomiting as continuous

mass communication campaign would obviously reach a significant percent of mothers who had no other source of information or supervision available.

The importance of potassium is also being debated. Some point out that in children who have been severely purged or who have experienced severe vomiting, potassium is significantly depleted, and these children will require additional potassium directly. Lack of potassium can cause a distended abdomen, making administration of fluids difficult. Mothers may be reluctant to give liquids to these children because of the increased stomach size. Severe potassium deficiency can lead to arrhythmia, muscle wasting, kidney dysfunction, and possibly death. There is not conclusive evidence on how widespread this problem may be or exactly what potassium levels are required, although WHO believes that the potassium levels in their formula are adequate. The potassium debate does raise questions about the efficacy of simple sugar and salt solutions, however.

b. Administration

In addition to incorrect mixing, there are a number of administration behaviors which, if properly performed, could affect the efficacy of the home-based therapy. These include: continuing to administer some strong purge; giving too little of the OR solution because mothers feel the baby will not drink so much fluid; withholding free water and/or breast milk during therapy, thus adding to the danger of high sodium concentrations; adding other substances to the mix; boiling the mixture; over-diluting the mixture; and withholding food in the belief that the OR solution contains sufficient nutritional value. Each of these behaviors individually holds the potential for significantly reducing the effectiveness of the therapy.

c. User Acceptance

Finally, anecdotal evidence suggests that user acceptance of oral therapy is affected by three factors: vomiting, increased stooling, and user concern over modernity of treatment. In the first instance, vomiting is generally associated with viral diarrhea and will often be more prevalent in winter months. Vomiting is important because it is often a sign to the mother that oral feeding is impossible. In fact, the child will benefit from ORT, but the mother must simply allow the child to rest a moment and give the solution more slowly.

In the second case, it is clear that in dehydrated children, ORT may increase stool volume. This represents no danger to the child because most of the fluid is being absorbed and acting to rehydrate the child. But to a mother whose principal concern is to stop the diarrhea, increased stool or continued diarrhea is a negative consequence, perhaps sufficient to prevent her from continuing ORT. More seriously, it may be a sign that she should increase the dosage of the solution to compensate for what she perceives to be the failure of the medicine. It has been suggested that adding starch, amino acids, polypeptides, and other substances might stimulate absorption of the fluid secreted in the bowels as well as the oral fluid itself. This would reduce the stool volume and reinforce the mother's expectations of an effective diarrheal medicine. But such formulas have only

been proven effective in closely observed clinical settings. Others have argued that ORT might be marketed as a "purge," reinforcing the mother's belief that the renewed stooling is eliminating evil substances. This increases the likelihood that mothers would use real purges which are counter to proper treatment.

The third aspect related to user acceptance is the image of modernity; the concern that a clear, water-like liquid replacing the complex looking IV therapy will be considered second-class medicine. Experiences in India tend to support this concern. Relatives of patients in refugee camps in India requested IV's for their relatives even though ORT was working quite well. It is reported that rural Hondurans prefer injections to oral medicine because injections are "more professional, modern, and effective."

These appear to be problems which can be addressed in a variety of ways: adding something to the solution to make it look more "serious," marketing it as an oral IV solution, emphasizing fancy packaging, de-emphasizing its simple ingredients, and making sure that ORT is used in hospitals and clinics as well as in rural areas. But again, relatively little research has been done in this area.

d. Delivery:

A lively discussion among the community of physicians and practitioners is now taking place over the most appropriate distribution mixing and administration regimen for oral rehydration therapy. There is general agreement among most informed individuals that ORT is vastly superior to IV therapy because it is simple and relatively safe. There is little disagreement that ORT actually works to rehydrate even severely dehydrated children in clinical settings. The debate centers around how ORT should be used and distributed. The range of alternatives from most conservative to most radical include:

1. Complete formula (all four ingredients) prepackaged and distributed to health posts where it is mixed and administered by a health worker.

In this setting ORT is superior to IV because it is cheaper, safer, and simpler. Because it is based in a fixed facility, however, it is still limited to reaching that small percentage of the population which actually uses health posts.

2. Complete formula, prepackaged and distributed to village health workers who have received some simple training in mixing and administration requirements.

These individuals would recognize who needs the formula, how much they need, and know how to mix and give it properly. They would have a standard litre container and would understand the danger points involved in the therapy. Even though the training for such an individual is relatively simple, many argue that it is still too expensive to train and support such a health worker in every village.

3. Complete formula, prepackaged and distributed through some commercial or public system directly to mothers.

In this model, the mothers would learn how to mix and administer the solution from written instructions included in the package, from verbal instructions given at the time of purchase, or from radio broadcasts. This approach has the potential for getting the solution to a large number of families, but raises questions about mixing and administration safety.

4. Simple formula (only salt and sugar) advocated by health workers and mass media so that mothers can actually make and administer the solution in their own home, with little or no outside assistance.

The major strength of this approach is that it ensures the widest degree of distribution by using substances already present in the home. It also introduces the highest degree of risk by increasing the potential for improper mixing and administration and by excluding the potassium which may be critical to children who have been severely purged or who have been vomiting. In areas where sugar and salt are scarce it raises problems of availability and cost.

The latter alternative has spawned a series of technologies to help reduce the potential for improper mixing. These include a pinch and scoop technique, a simple spoon made locally from a bottle top, and a variety of commercially produced, double-ended spoons for measuring sugar and salt concentrations. Indeed a good deal of tinkering with new ORT technologies is taking place. Experiments with plastic packaging rather than more costly aluminum, with packages which convert into one litre containers, with tablets rather than powders, with one glass rather than one litre volume are now taking place.

A number of other variations are often discussed: the formula is mixed in large quantities at health posts and distributed from there; health workers teach mothers the first administration and then mothers acquire future solutions through commercial channels; and a natural source of potassium like banana, coconut milk, or lemon is added to the sugar and salt solution; cottage industries are developed locally; packages are made standard containers or packets.

Another debated issue is who should receive ORT. Must every one of the 500 million annual episodes of diarrhea be treated by ORT? Because there is no way of predicting early in a given episode whether a child is to be part of the one percent who will suffer severe dehydration and possible death, some experts argue yes, give ORT to as many children as possible, and as early as possible in the episode. Others respond, "but how can we produce so many packets? The cost would be staggering." (At UNICEF's eight cents a package this is a total of about \$40 million a year in packets alone.)

The counter argument is made: yes, that is why the simple sugar and salt solution prepared at home is preferable. The advocates of packaging counter that the dangers of home-mix are too great and too little understood.

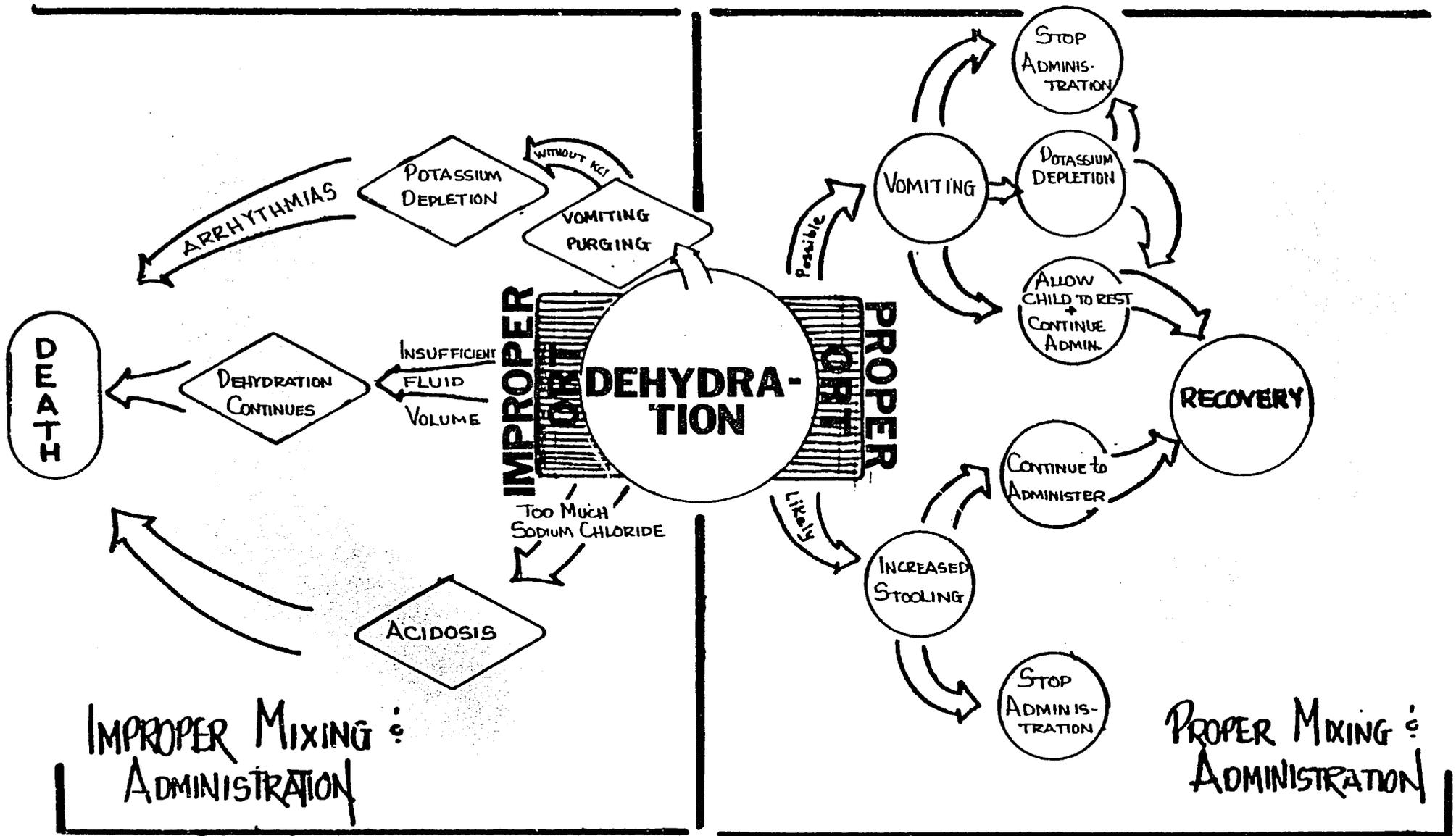
One system frequently discussed seeks to resolve this conflict by specific application regimens to particular groups of infants segmented by degree of dehydration. For example, as a mother first detects signs of diarrhea, she is encouraged to avoid purges, continue giving the child liquids and administer the simple formula, home-mix. If the diarrhea continues and early signs of dehydration appear, she should acquire the pre-packaged ORT formula from some local distribution point (a store, health center, midwife, etc.) and administer it during a 24 hour to 3 day period. During this time she should continue to breastfeed, provide free water, and feed soft foods if the child will tolerate them. If the dehydration becomes more serious she should seek medical assistance. Oral therapy should be available through all community health workers and in all health centers and hospitals in the country. IV should only be used in cases of shock.

In this model, the least dehydrated child gets the highest risk sample ORT formula. Most episodes would probably end without further complication. As dehydration increases, safer but less available packets are used and will probably prevent most of the remaining episodes from becoming more serious. In the relatively few cases where diarrhea and dehydration continue, either because the previous treatment failed to work or because it was administered improperly, then the least available treatment alternative, the fixed health facility, becomes necessary. The principal difficulties with this seemingly ideal model are:

1. the instructional burden is maximized because all regimens must be taught to all people, and
2. those most likely to need the packets and the health facilities are those least likely to have them because they are the poorest and most isolated.

D. Potential Diarrheal Control Messages

In reviewing the experience with diarrheal control, and the continuing debate over community delivery of ORT, several areas stand out as potential message concerns for a public education campaign in this area. These include breastfeeding, weaning food practices, personal hygiene, use of purges, and the mixing and administration of oral electrolyte therapy. Areas such as latrine construction, development of village water systems, refrigeration, and reduced crowding have been excluded not because they are less important, but because they represent areas in which large-scale infrastructural investment is usually necessary. Preference in this program has been given to aspects which rely almost exclusively upon behavioral changes in the target population to produce subsequent changes in health status. The graph on the following page summarizes the basic community behaviors associated with a comprehensive diarrheal control program.



O.R.T. CONSEQUENCE MODEL

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From an instructional viewpoint, these behavioral changes raise critical questions which must be answered within the context of a specific cultural group. They do not cover every aspect of a functioning diarrheal control program, but rather focus on issues of special importance. They include:

Prevention-Related Issues

1. What personal hygiene practices (hand washing) will be accepted and will help reduce hand-carried contamination?
2. Can acceptable breastfeeding practices be introduced which will help reduce the risk of contamination and provide nutritional value during bouts of diarrhea?
3. What practical weaning food practices will reduce contamination and provide catch-up growth after bouts of diarrhea?

As regards the application of oral therapy and sodium concentrations in WHO pre-packaged formula:

4. Does a standard liquid volume container exist commonly in the target area?
5. Does the target community have an adequate level of experience and ability to follow verbal mixing instructions?
6. Does sufficient experience exist with regular administration of liquid remedies to make home administration practical?
7. Does the target population's attitude toward medicine suggest that double or triple concentrating of salt will be common?

Or sodium concentration in home-mix simple sugar and salt sugar:

8. Are sugar and salt commonly available in the target area?
9. What measuring instrument will be required to ensure accurate concentrations of salt and sugar?
10. Does the population's attitude toward salt and sugar permit these ingredients to be mixed in the appropriate manner?

Importance of Potassium

11. Do members of the target population usually give purges as a remedy for infant diarrhea?
12. Does vomiting occur frequently as part of the diarrheal episode?
13. Is an appropriate village source of potassium available?

Recognition of the Problem

14. What immediate outcome does the target population expect from an effective diarrheal remedy?
15. Will increased stool volume after administration of ORT deter the target population from continued administration of the solution?
16. Does the population prefer medicines which are foreign and modern or traditional remedies familiar to them?
17. Do members of the target population accept diarrhea as a serious problem about which they wish some help?
18. Do members of the target population recognize dehydration and can they differentiate levels of severity?

Delivery

19. What is the most credible source of information on infant diarrhea among the target population?
20. What is the most effective distribution point for pre-packaging ORT in a rural village?

Accurate answers to twenty questions will help determine the basic messages which an effective public education campaign should promote. They require a sensitive understanding of the target population attitudes, knowledge and behavior, and demand a systematic process for collecting, analyzing, and interpreting their significance. Subsequent MM&HP Project documents will explore specific techniques for collecting this and other related information.