



Westinghouse Electric Corporation

## ORAL REHYDRATION SALTS: AN ANALYSIS OF AID'S OPTIONS

PROJECT 936-5939-12  
OFFICE OF HEALTH

PDC-1406-I-02-4062-00,W.O.2

SEPTEMBER 1984

ORAL REHYDRATION SALTS:  
AN ANALYSIS OF AID'S OPTIONS

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Contract No: PDC-1406-I-02-4062-00, Work Order 2  
Westinghouse Health Systems  
Columbia, Maryland

Project No: 936-5939-12

September 1984

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## I. INTRODUCTION

### A. SCOPE AND ORGANIZATION OF THE REPORT

This introduction has established the background, context, assumptions and definitions of an analysis of the Agency for International Development's (AID) options as regards the supply of oral rehydration salts (ORS). The remainder of the report addresses questions which are pertinent to AID's future role as an assistance agency anxious to ensure that sufficient supplies of ORS are available. The central question posed at the start of the analysis was: What are the constraints and opportunities of central procurement of ORS by AID? While this issue remained in the forefront--and is discussed in detail--it became evident that a broader approach was needed. The analysis, therefore, also examines the potential role of AID in assisting in-country production, providing ingredients in bulk and supporting activities which are necessary adjuncts to the availability of ORS.

Chapter II of the report presents the findings of the analysis. The final chapter documents the conclusions drawn and recommendations made. Appendix A lists the people who were kind enough to share information and ideas during the course of this study. Appendix B contains supplementary material.

### B. BACKGROUND

For a number of years AID has been taking steps to develop and refine its role as regards oral rehydration therapy (ORT). In November 1980, an option paper developed by this consultant laid out some of the major issues and candidate approaches. In the late 1970s and, especially, since 1980, AID has emphasized ORT as a programmatic response to the goal of reducing infant and child morbidity and mortality in the developing world, and some notable achievements have been made through both central, regional and mission-funded research and project implementation efforts. The International Conference on ORT, initiated and sponsored in part by AID, was held in June 1983 and proved to be an unparalleled opportunity for the exchange of ideas and experiences, for establishing the state-of-the-art of ORT and for reiterating the commitment to ORT of the international health community.

Other assistance organizations have also taken an active role in ORT. The United Nations Children's Fund (UNICEF) has been helping with the effort to provide Oral Rehydration Salts (ORS) for the past ten years. The World Health Organization (WHO) arranged for trials of ORS production as early as 1969, and, in 1978, WHO's Program for the Control of Diarrheal Diseases was authorized by the World Health Assembly. These international

efforts have helped lead to widespread acceptance of ORT and to the establishment of mechanisms through which developing countries can seek advice and other kinds of support for ORT efforts. AID should recognize the legacy and continued importance of the efforts of other agencies as it seeks ways to carry out its own objectives in collaboration with developing countries and with other multilateral and bilateral assistance organizations.

AID's commitment to ORT is clear. The Agency's Health Sector Strategy, approved in May 1983, states: "Priority focus (is given to) a basic package of proven, cost-effective technologies delivered in primary health care programs." It goes on to state: "Promotion of ORT will be encouraged in health facilities, including hospitals, as well as at the community level." In his closing remarks at the June 1983 conference, Mr. McPherson, the Administrator of AID, made the following statement:

"We ask the world community and we pledge our efforts to make substantial progress to having the therapy widely available within five years. We challenge each developing country government to determine specific goals for ORT use in their land. Worldwide doubling of the use of ORT each year for the next five years is a reasonable goal."

### C. ASSUMPTIONS OF THE ANALYSIS

This report documents the findings of an analysis of the supply and demand for ORS and makes recommendations about AID's role as a supplier of ORS to AID-assisted countries in the future. The analysis does not question the following basic assumptions:

1. That oral rehydration therapy is, and will continue to be, an acceptable method of treating dehydration and that ORS is an integral part of any attempt to introduce and increase the use of ORT;
2. That ORT is, and will continue to be, a high priority among those responsible for planning and implementing health programs in developing countries and that assistance agencies (including AID) will continue to support ORT activities in these countries.

These assumptions provide the backdrop for the analysis. The analysis does not critically examine the extent to which ORT should be emphasized, nor the extent to which the use of ORS should be encouraged.

#### D. DEFINITION OF ORS

ORS is a combination of chemicals which, when mixed together in water, become an appropriate oral therapy to combat the mild to moderate dehydration which results from cases of diarrhea. Infants and young children are particularly in need of ORT, both because they are more likely to get diarrhea and because the loss of minerals and water as a result of diarrhea is more rapid and more dangerous for small bodies.

In this analysis, ORS is defined as being the dry ingredients which, with water, make what is known as the "complete" or "WHO" formula. This formula specifies that the following chemicals in the indicated amounts should be mixed with one liter of water:

Sodium chloride	3.5 grams
Sodium bicarbonate	2.5 grams
Potassium chloride	1.5 grams
Glucose (anhydrous)	20 grams

Anhydrous glucose may be replaced by 22 grams of glucose monohydrate or by 40 grams of sucrose. A statement has just been issued by WHO and UNICEF announcing that clinical trials have shown that 2.9 grams of trisodium citrate (dihydrate) is an acceptable substitute for the sodium bicarbonate component of the formula shown above. This statement is reproduced in Appendix B.

The analysis reported here does not discuss the clinical appropriateness of these formulae, nor does it address the use of simple salt and sugar solutions except insofar as alternative solutions affect the demand for and supply of ORS. The implications of the newly approved ORS with citrate are discussed to the extent that they are relevant to the production and distribution of ORS.

#### E. THE PRODUCTION OF ORS

The production of ORS requires the mixing of the four chemicals in the specified proportions. Once mixed, the powder may be packaged in quantities which correspond to the amount of water which should be added to make up the solution. Because ORS mixed with water does not keep longer than 24 hours without spoilage, it is preferable to keep ORS in powder form until ready to use it. Recent advances in containers which retard spoilage may make liquid ORS a viable product, but this has yet to be proved a practical approach to most developing country situations.

ORS in powder form is not a particularly stable mixture. If the raw materials are not properly dried before packaging or if moisture seeps into the packet, an interaction takes place between glucose and sodium bicarbonate, leading to a decomposition of glucose and resulting in a change of color. The change does not affect the effectiveness of ORS, but does affect its

solubility, acceptability and shortens its shelf-life. The deterioration can be eliminated by packing the glucose separately. Deterioration can also be reduced if air conditioned, dehumidified production facilities are used and packaging carefully controlled. The newly approved ORS formula which substitutes citrate for bicarbonate largely eliminates this deterioration problem.

The packaging of ORS depends on the quantity being produced, how soon it will be used and how far and where it has to travel. Small quantities of ORS can be prepared in a hospital pharmacy and, if they are to be used immediately, can be distributed in polyethylene or paper sachets. If a decentralized, "cottage industry" approach is used, ORS can be prepared in a simple facility and distributed in the immediate vicinity in polyethylene or paper packets. It has been estimated that such an approach requires equipment costing about \$2,500, suggesting that production of at least 50,000 packets a year is required to justify the investment. Further, the cost of establishing a quality control laboratory and the logistics of obtaining and distributing the raw materials may limit the attractiveness of this decentralized approach.

For amounts of ORS between two and four million packets a year, semi-automatic equipment can be used. A mixer mixes the raw materials and a hand-dosing machine can be used to measure the ORS into a partially presealed sachet which can then be sealed with a hand-operated sealer. This kind of process can use packaging made of paper, polyethylene or aluminum foil, depending on what is available and the conditions under which the ORS will travel to its end users. The costs of equipment vary with the availability of local machinery and materials.

An automated machine is recommended when over four million packets a year are to be produced. This equipment requires an environment of no more than 40% humidity, needs daily maintenance and demands high quality ingredients and packaging materials. The basic cost of machinery is at least \$70,000. A laminated aluminum foil has been shown to be the best packaging material under these circumstances and offers the best chances for extensive distribution and long-term storage without spoilage. Automated machines do not easily handle ordinary polyethylene material, suggesting that one advantage of the newly approved citrate formula, which can be packed safely in polyethylene, will not pertain to automated production.

ORS tablets have recently become available. A major drug company, Ciba-Geigy, is producing an effervescent tablet which contains the correct amount of ORS for 120 ccs of the fluid. The Program for Appropriate Technology in Health (PATH) has been experimenting with a tablet that can be produced in developing countries, and has developed one that dissolves in 150 ccs of

water. Both of these tablets use the newly approved citrate formula which is much easier to put in tablet form than the formula using bicarbonate. The effervescent tablet requires specialized equipment and is more difficult to produce than the one developed by PATH, which can be made with fairly standard tableting equipment.

#### F. CURRENT PRACTICES OF ORS PRODUCTION

Each of these types of ORS packet production is currently in use. UNICEF estimates that packets of ORS sufficient to make 200 million liters of solution are now being produced on an annual basis worldwide. WHO reports that ORS is being produced in 38 developing countries. A list of these countries is reproduced in Appendix B. In less than one-quarter of these countries can all of the component ingredients of ORS packets be obtained locally. However, a number of these countries are now, or soon expect to be, self-sufficient in ORS, and some have even become exporters.

Since 1979, both WHO and UNICEF have been supporting the production of ORS in developing countries through technical assistance, the supply of equipment, raw materials and packaging materials. Guidelines for the production of ORS have been available since 1980 and supplementary guidelines, taking into account the citrate ORS formula, will be available before the end of 1984. The United Nations Industrial Development Organization (UNIDO) has also been providing assistance to local production, especially through its mandate to support small-scale industries. More recently AID has been providing some technical assistance through the PRITECH project and through activities related to the Agency's private sector initiative.

In-country production is supplemented by ORS packets made available by international agencies. These packets are produced on automated equipment using the sturdiest packaging materials. UNICEF is the largest provider of these packets, with WHO, AID and some other bilateral agencies also providing packets for distribution.

The ORS tablet produced by the drug company is available in some developing countries. The tablet developed by PATH is arousing a great deal of interest in developing countries and, now that the citrate formula is approved by WHO and UNICEF, PATH will proceed to assist organizations overseas to establish production capability.

## II. FINDINGS OF THE ANALYSIS

This chapter discusses four aspects of ORS:

- The demand for ORS;
- The supply of ORS;
- Factors expected to affect supply and demand in the future; and
- Alternative mechanisms within AID which could be applied to meeting the demand for ORS.

The final chapter of the report, which follows, summarizes conclusions and makes recommendations to AID.

### A. THE QUESTION OF DEMAND FOR ORS

No one knows, or can be expected to know, the demand for ORS except in the broadest terms. Too many of the variables that influence demand are difficult to predict with any certainty. It is possible that, over time, new knowledge and experience with diarrheal disease control will result in more accurate models of ORS demand.

Meanwhile, gross estimates of need suggest there may be as many as a billion episodes of diarrhea among the world's children under five each year, of which 90 percent could be treated with ORT. If somewhere between one and two liters of ORS fluid is appropriate per diarrhea episode, this results in a need for about 1.5 billion liter packets of ORS a year. For purposes of comparison, it is worth noting that UNICEF estimates that annual global production of ORS from all sources totals 200 million one liter packets. Of course, a considerable number of the diarrheal episodes are never treated, are treated with traditional or other alternative remedies, and/or result in death.

As a part of this study, a cable was sent by the Office of Health to all USAID Missions asking for specific information about ORS needs. A copy of this cable is included in Appendix B. Thirty-four USAID field offices replied to the cable: 14 in Africa, 6 in Asia, 11 in Latin America and the Caribbean (LAC) and 3 in the Near East. The information in these replies is summarized below.

Nine USAID Missions expressed interest in obtaining ORS through a central AID process: six in Africa, one in Asia (to meet a short-term need), two in the Near East. The cables suggest that, in many countries in Africa and the Near East, reliance is being placed on UNICEF to continue to meet the need

for ORS. However, in a number of countries in Asia and LAC, in-country production of ORS is sufficient to meet demand. Local production of ORS is of interest to a number of countries in Africa and the Near East too, and plans are under way in almost all countries to establish in-country production of some kind.

The cable responses do not provide adequate information to address the question of total demand in any rigorous way. This is, in part, because some responses estimated total demand in the country while others reported only the number of packets needed to support AID activities and some did not include any information about demand. They suggest an annual demand for about 9 million packets of one liter size in the nine African countries for which information was provided; somewhere in the range of 54 million packets are estimated as the demand in the six Asian countries; about 8 million packets are estimated for the three Near East countries; and approximately 30 million packets are suggested as the demand in the eight LAC countries for which information was given. These rough estimates suggest that about 100 million packets could be used if they were made available in those countries for which some information was given.

These estimates of demand do not provide much guidance as to the real need for ORS packets to meet global needs, and they only begin to address questions about how much ORS might appropriately be made available through AID. However, they begin to establish a framework within which AID can gather and analyze information about demand. They also identify several countries where packets of ORS made available by AID would be of interest. Further, considerable interest was expressed in AID assistance in other aspects of ORT, especially marketing and aspects of in-country production.

## B. ALTERNATIVE WAYS IN WHICH DEMAND CAN BE MET

As briefly touched on in the Introduction, the demand for ORS can be met by packets donated or sold by international agencies and by in-country production of ORS packets. This section examines these approaches. Following this, the analysis looks into questions of innovations related to ORT which can be expected to affect features of demand and supply of ORS.

### 1. ORS PACKETS SUPPLIED BY INTERNATIONAL AGENCIES

#### 1a) The Role of UNICEF

Since 1974-75, UNICEF has been making packets of ORS available to developing countries. The decision was made early to make packets that were appropriate for one liter of solution. This decision was based upon experience with ORS in cholera therapy and in rehydrating adults as well as children. UNICEF recognizes the problems of a one liter packet, but argues that

changing the size of the packet now would cause confusion and be undesirable.

The number of packets of ORS supplied by UNICEF was approximately 26 million in 1980, 25.5 million in 1981, 16 million in 1982 and 29.5 million in 1983. UNICEF estimates that it will supply 65 million packets in 1984. Appendix B contains a summary of UNICEF-supplied packets by country for 1980-1983.

UNICEF makes packets of ORS available to government and non-government organizations both without charge and through reimbursable procurement. The local UNICEF representative acts as the gate-keeper to the agency and works with the local requestor to determine the appropriateness of the request, the accuracy of the estimated demand, and how the order will be paid for. UNICEF includes ORS as item 15-611-05 in its UNIPAC catalog.

UNICEF tries to place orders with several producers of ORS at any one time, so as to increase the chances of a good supply flow and to keep prices down. The current UNICEF suppliers are companies in Switzerland, West Germany and Italy. Supplier selection is based on competitive bid and suppliers may be located anywhere in the world. UNICEF is currently paying between 4 and 5 cents per liter packet. This price is ex-factory and does not include transportation or handling costs which are about a further 2 cents per packet. The price has come down in recent years because of the increasing volume of orders and competition among suppliers. The recent strength of the U.S. dollar has also influenced the quoted price because the goods are paid for in local currency but the international price is quoted in dollars. These packets of ORS are warehoused by UNICEF in Copenhagen, Denmark, from whence they are shipped to developing countries.

UNICEF also guarantees that it will purchase any surplus stocks from producers it has helped to establish in developing countries. As yet this role has been minimal. Further discussion of this aspect of ORS supplies is found in the following section on in-country production.

In the long-run, UNICEF expects to decrease its role as a supplier of pre-packaged ORS produced in industrialized countries and, instead, to concentrate on assisting in-country production and other aspects of ORT programs. However, this is a long-term perspective and UNICEF recognizes that it will be some years before in-country production can keep pace with demand.

#### lb) The Role of WHO

WHO has taken, and continues to take, a leading role in in-country ORT programs and in research. WHO has not been very much involved in supplying ORS packets, relying on its close collaboration with UNICEF to take care of this aspect of ORT. The Pan

American Health Organization (PAHO) has undertaken some ORS procurement activities, but on a small scale and as a short-term response to an immediate demand.

1c) The Role of AID

AID has been a supplier of ORS since 1981. Before that time AID, upon occasion, bought packets from UNICEF to meet the needs of AID project activities. This process required a source origin waiver and was not satisfactory once AID's needs for ORS began to increase alongside the Agency's emphasis on ORT programs.

A request to AID from Burma for one million pre-packaged ORS packets prompted AID to request the General Services Administration (GSA) to solicit bids from U.S. firms. Although a number of American companies had previously expressed interest in supplying ORS for AID's needs, only one potential producer actually came forward with a bid. This firm, Jianas Brothers, remains the only U.S. company to be a satisfactory supplier to AID. A second supplier was used for a brief while but, after being inspected by GSA, was taken off the eligibility list. Jianas Brothers has been inspected by GSA and placed on its Quality Assurance List and has also been informally assessed and complimented by WHO's expert in ORS production.

The packets of ORS produced by Jianas Brothers are made according to the same specifications as those used by UNICEF, except for a slight change in the wording on the label. The price at which AID buys from Jianas Brothers is between 8 and 9 cents per packet ex-factory, and a further 2 to 2-1/2 cents for shipment by sea.

AID buys ORS from Jianas Brothers either through orders placed by GSA or through purchase orders directly from USAID Missions. The Office of Foreign Disaster Assistance (OFDA) has also bought ORS packets from the firm, using its own direct purchasing procedures. The purchases are made on an as-needed basis and in lots as small as 60,000 packets. The current situation does not allow the company to rationalize its production nor to predict the size of its orders for durable materials which might lead to cost savings and more reliable and rapid delivery of these materials. In the case of OFDA, some unpredictability is inevitable, but for other AID needs a more consolidated approach to placing orders would allow Jianas Brothers (or another supplier) to improve its production process.

During 1983, AID purchased 4.3 million packets of ORS, of which 1.5 million were purchased through GSA. Up until mid-July, 1984 purchases by AID totalled almost 3.3 million packets, of which 1.6 million were purchased through GSA and a further 200,000 purchased by OFDA. The remainder were purchased through USAID purchase orders (2.8 million in 1983 and 1.7 million in

January-July 1984). During these same periods, Jianas Brothers sold almost one million packets to PAHO and 400,000 packets to UNICEF. Appendix B contains a summary of these purchases from Jianas Brothers.

Jianas Brothers is a packaging contractor. When its machines are not being used for ORS, they are used for other mixing and packaging tasks. The company estimates that its capacity to produce ORS with its present equipment and working only one eight-hour shift is 26 million packets a year. The company reports that production runs of less than one million packets are not cost efficient as they are insufficient orders to attract significant discounts from the suppliers of component materials. Once this level is reached there are probably not significant cost-savings to be achieved until a predictable production level of somewhere between 20 and 30 million is realized. At this point savings can be expected in packaging materials.

The problem faced by a firm like Jianas Brothers is that the present unpredictable, ad hoc AID ordering system does not allow them to fit in with normal industry patterns. Suppliers of chemicals and, especially, packaging materials, as well as label printing contractors expect three to four months time between receiving an order and delivering a product. AID, however, expects Jianas Brothers to respond to specific orders of varying size within a short time frame and provides no clue as to the size or timing of any subsequent order. Jianas Brothers is placed in a position, therefore, of having to ask its suppliers to respond in unusual ways--which does not allow for bargaining over prices--or to itself stockpile materials that it has no guarantee of using. The extent to which a more direct approach to ordering ORS packets would result in a lower price would require detailed analysis, but it is likely that some savings would be possible.

#### 1d) The Role of Other Agencies

UNICEF reports that, in 1983, almost 81 percent of ORS packets supplied to developing countries by international sources were made available by UNICEF, 12 percent by AID, and five percent by the International Dispensary Association in Amsterdam. Other international sources provided less than one percent each (Red Cross 0.8 percent, WHO 0.6 percent and SIDA 0.3 percent). Information made available by UNICEF about the distribution of these ORS packets by each source is presented in Appendix B.

#### 2. ORS PACKETS PRODUCED IN-COUNTRY

As described in the Introduction, in-country production of ORS may be automated, semi-automated or on a "cottage industry" basis. The raw ingredients and the packaging material may be locally produced or imported. If ingredients are imported, they

may be brought in separately or pre-mixed. Packaging materials can be imported in various stages of readiness, from sheets of material to pre-cut strips already sealed on three sides. This section discusses in-country production using automated and/or semi-automated methods only.

WHO reports that 38 developing countries have in-country production of ORS. Fewer than one-quarter of these production facilities have access to all the necessary components from local sources. Anhydrous glucose is not widely available and is generally imported. In many cases also the packaging materials have needed to be imported but the newly-approved citrate formula, which can be packed in polyethylene rather than foil, may result in less need to import materials. Countries have taken various positions as regards import duty payable on ORS component materials.

A major problem with in-country production which has been identified by ORS experts is the development and maintenance of adequate quality control techniques and procedures. As one person put it: "It's very easy to make ORS of low quality." However, ORS quality can be assessed with proper laboratory checks and ORS is, in fact, easier to make than other products commonly made in developing countries, such as vaccines.

A second problem is that of establishing a properly controlled environment. For automated equipment, humidity must be controlled at less than 40 percent. Semi-automatic equipment is less fussy, but too much moisture in the atmosphere reduces the efficiency of both mixing and dosing machinery and thus decreases quality and/or increases downtime for inspection and maintenance.

Thirdly, some production units have been hampered by problems of machinery breakdown, erratic electricity supplies and the need to have properly trained technicians and adequate spare parts. These ubiquitous problems of technology transfer require careful planning before installation and stockpiling of components.

Fourthly, local production has been hampered by the need to establish reliable means of obtaining some of the materials. Anhydrous glucose, in particular, has been a problem as it is produced in only a few countries. Assistance agencies have, in many cases, continued to assist local production through the supply of materials.

The cost-effectiveness of in-country production of ORS using automated and semi-automated machinery has been questioned. The costs and prices of ORS packets produced in one country are not readily compared with those in another country. Factors such as in-kind contributions of land and labor have to be taken into account, as do pricing decisions which may or may not include government subsidies as well as policies about taxation, import

duties and the use of foreign exchange. Further, equipment, technical assistance and supplies may be donated by international agencies on a one-time or continuing basis. While these factors might well distort true costs, other factors also need to be taken into any consideration.

In-country production allows for packaging of ORS in different sized packets to meet local needs. It also allows for the printing of labels in any language and/or with locally appropriate graphics. Further, in-country production can take advantage of whatever ingredients are locally available and these may be lower priced and more readily obtainable than imported goods. Finally, in-country production can have a role in stimulating local industrial development, reducing dependency and fostering national pride.

UNICEF and WHO have been collaborating together in support of in-country production of ORS since 1979. Guidelines have been available since 1980. UNIDO has also been assisting countries with ORS production. More recently, AID has been providing assistance, mainly through the PRITECH project. These assistance efforts have been largely directed at government initiatives to produce ORS. Such government initiatives include production by state-owned and para-statal organizations. Assistance to commercial concerns in developing countries has, to date, been considered outside the mandate of some international agencies but AID's private sector initiative is likely to result in assistance to local commercial concerns.

### C. FACTORS EXPECTED TO AFFECT SUPPLY AND DEMAND IN THE FUTURE

A wide variety of factors can be expected to affect characteristics of the supply and demand for ORS in the future. The most relevant of the factors which relate to AID's role in ORS are briefly discussed below.

#### 1. ALTERNATIVE ORS FORMULAE

The ORS formula using citrate instead of bicarbonate, recently approved by WHO and UNICEF, will have an impact on features of both demand and supply. The formula results in somewhat decreased stool output, suggesting that it may be seen by both health care providers and family members as a "better medicine." This, and the fact that it has a more attractive flavor, may increase acceptance and result in it being easier to promote ORS as an appropriate therapeutic intervention. The citrate formula is also less demanding in terms of packaging requirements, suggesting that in-country production of this ORS formula could be both easier and less costly, resulting in greater supply through local producers. The extent to which price is a barrier to ORS use is not known, but changes in price as a result of increased local production may have an impact on demand.

It is important to realize, however, that the acceptance of the citrate formula does not in any way diminish the value of the bicarbonate formula. In areas where bicarbonate is plentiful, the more established formula should be produced. Also, the use of polyethylene packaging instead of foil is not an essential feature of the citrate ORS. If ORS packets are to travel great distances under difficult circumstances and/or to be stored for long periods, there may still be advantages to a stronger laminated foil packet in order to reduce packet damage, even if it is initially more costly.

Further innovations in ORS formulae can be expected. "Super ORS" formulations of various kinds are under review and can be expected over the next few years. Other mixtures which take into account the addition of different liquids may also be introduced. WHO and UNICEF are looking closely at these innovations as they are developing and will continue to play a valuable oversight role.

## 2. ALTERNATIVE PRESENTATIONS OF ORS

ORS packets are the dominant form of presentation at present but are far from ideal. A pre-mixed liquid is attractive because it would reduce dilution problems, but it has been difficult to devise an appropriate container and to solve problems of sterilization. The TETRAPAK container for ORS is now being marketed in some locations and may prove to work well in situations where transportation and other logistical obstacles are not too severe, such as in urban centers with good product distribution systems.

The ORS tablet does not eliminate the need for mixing with water but has the attraction of being readily associated with medicinal, oral therapy. It also is easy to use and mixes with a glass full of water, which is simpler than a larger amount to explain and results in rapid use and less waste. The tablet developed by PATH can be made in developing country situations. The experience with the Ciba-Geigy tablet suggests that ORS tablets are very attractive to consumers and retailers alike.

These alternative presentations--and others that may yet be developed--will expand the range of options available to purchasers of ORS. The extent to which this will change features of supply or demand will not be clear for some time.

## 3. ALTERNATIVE MEASURES TO COMBAT DIARRHEAL DISEASES

The etiology of diarrheal diseases is not well understood and research findings can be expected to lead to alternative approaches. Vaccines, for example, offer the promise of significantly reducing the prevalence of diarrheal diseases and, consequently, the need for ORT but vaccine development takes several years. Other measures, from more widespread immunization against

related diseases such as measles to breakthroughs in water and sanitation technologies, could all eventually impact on the present tragic situation. Reductions in the number of children who get diarrhea and/or the average annual number of episodes per child would have a direct affect on the demand for ORS.

#### 4. INCREASED EMPHASIS ON ORT IN DEVELOPING COUNTRIES

Over the past few years there has been a gradual but dramatic increase in the emphasis placed on ORT in developing countries. Assistance agencies such as UNICEF, WHO and AID deserve much of the credit for this. As a result of the increased emphasis, ORT is now a generally accepted component of the response of developing country governments to the health problems of their people. Demand for ORS has escalated as a result.

#### 5. INCREASED COMMERCIAL ATTRACTIVENESS OF ORS

Largely stemming from this increased acceptance by governments and the accompanying visibility of ORT as an important public health measure, commercial companies are finding ORS to be an increasingly attractive product. Many multi-national companies have produced, and continue to produce, competing medications, almost all of which are not regarded by WHO as ideal. Even so, some companies are now exploring the possibility of making and marketing WHO-approved ORS. American companies have not been in the forefront, perhaps because there seems to be no domestic market for ORS. Companies from Japan, Finland and Great Britain, however, have been holding discussions with WHO about the possibility of ORS production for sale to international agencies, governments and commercially. The Swiss-based company Ciba-Geigy seems to have been most forward-looking in this regard.

Commercial concerns in developing countries have been quicker to respond to the potential of the market for ORS. In some countries dozens of products promoted for use against diarrhea are now on the shelves of pharmacies. Many of these products are produced in-country and very few are made according to the WHO-approved formula. However, these same companies as well as others are increasingly aware of ORS as an attractive product.

This commercial interest may result in increased supplies of WHO-approved ORS, both for use in public sector ORT programs and for sale through private pharmacies. The extent to which competition among suppliers will bring prices down is far from certain as many current suppliers are tolerating little or no profit now.

#### 6. BETTER EDUCATION AND MARKETING TECHNIQUES

ORT is a complicated process and one which runs counter to many cultural beliefs. As experience is gained with how to

promote ORT to the general public in developing countries, there is every chance that demand for ORS will increase.

## 7. IMPROVED HEALTH SYSTEM LOGISTICS

In many countries the dominant distributor of ORS is the government's health system. Problems of logistics hamper the distribution of packets as well as the teaching of families how to use them. If ways are found to improve the management of supplies of ORS and/or to increase the distribution of ORS through commercial channels, it is likely that the demand for packets will increase.

### D. MECHANISMS AVAILABLE WITHIN AID

This final section of the chapter identifies the alternative ways in which AID could play a role in increasing the supply of ORS. The next chapter presents conclusions and recommendations which relate AID's options to the analysis of supply and demand.

#### 1. COLLABORATE WITH UNICEF IN ORS SUPPLIES

Prior to the time that an ongoing need for ORS packets was identified by AID, the occasional need would be met by AID buying packets from UNICEF. This mechanism requires a special source origin waiver because the goods were not produced in America. A recent memorandum of understanding between UNICEF and AID makes it somewhat easier for the agencies to collaborate in commodity supplies, but does not resolve the basic issue of source origin. However, it would theoretically be possible for AID to get permission to make a major purchase from UNICEF and then to have supplies of ORS shipped by UNICEF whenever and wherever AID needed to distribute the ORS.

This alternative is not very politically attractive because it would be better to buy from an American supplier. However, UNICEF is now obtaining ORS at a per packet price of 4 to 5 cents while AID is paying between 8 and 9 cents for an essentially identical product. If this price differential were to continue, AID could contribute almost twice the amount of ORS to meet the world's needs by taking advantage of the lower prices available to UNICEF.

If this means were chosen, negotiations between AID and UNICEF would need to establish any fee or handling charge levied by UNICEF and the means by which AID could be guaranteed prompt delivery for its own needs. AID would also need to establish the quantity of ORS it would want to procure over a given time period and to develop a mechanism to pay for this procurement and then allocate payments for ORS supplies needed by different budgetary units within AID.

## 2. CONTRACT WITH A U.S. MANUFACTURER THROUGH CENTRAL PROCUREMENT

This mechanism would be modeled upon that used by AID to purchase contraceptive products for AID-funded activities. Under these procedures a system would be established to allow USAID Missions to identify the amount of ORS they wish to obtain over a given period. The Office of Population asks USAIDs to make calculations and complete standard forms which document their needs for the year and estimate their needs for two years. The Office then analyzes the USAID data and informs the Regional Bureaus of the money needed to pay for these supplies, and the project accounts from which these funds should be transferred. The Office of Population, based on these data and their own central requirements, arranges for a procurement contract with a supplier.

Once the contract is established, the manufacturer supplies the contraceptives according to an agreed-upon schedule. Supplies are warehoused and shipped overseas on the basis of the information given by the USAID Missions. The Office of Population sends shipment requests monthly to GSA, which contracts for shipment. The Office also liaises with USAID offices as to shipments and requires notification of receipt from the receiving organization.

A mechanism such as this has certain advantages if applied to ORS. A proper supply system is in place, with accountability established for the various components of the system. The manufacturer knows well in advance what is expected, and is able to plan an efficient operation. The price offered is based on a predictable order and cost-savings can be passed on to AID. If one recipient organization misjudges its needs, the system allows for the re-allocation of supplies to another location, rather than building up excessive supplies in-country. AID and the contracted manufacturer develop a close working relationship and can share ideas about improvements to the system and/or the product.

The constraints of such a system, when applied to ORS, are that AID's demand for ORS may not be large enough to warrant the administrative effort required. Further, and perhaps more important, individual countries may not be able to predict their needs with sufficient accuracy, nor sufficiently far ahead to make such a system workable. The Office of Population suggests that at least 15 countries should participate in such a central procurement system to make it feasible. Evidence from AID's field offices suggests that there are not that many countries which would be interested in such a system for ORS.

### 3. CONTRACT WITH A U.S. MANUFACTURER AND ESTABLISH A STOCKPILE

A similar approach, but one which might resolve problems of uncertainty as to demand, would be for AID to establish a stockpile of ORS packets. AID's central Office of Health would secure sufficient funds to contract with a manufacturer to produce a predictable amount of ORS. These packets could then be produced according to a rational, and cost-efficient, production schedule and stockpiled. AID field missions and others in need of ORS (central projects, PVOs, OFDA, etc.) could then request supplies of ORS as they needed them and the ORS could be shipped from the warehouse to wherever it was needed.

This approach would alleviate the manufacturing and administrative problems of the existing ad hoc process, increase the chances of cost-saving and still result in an adequate supply being available. The major disadvantage is the risk that the amount contracted for exceeded the amount of ORS requested by AID programs. As experience was gained, however, this risk would diminish and any excess supplies could certainly be used by UNICEF or other agencies.

Such an approach would require AID to decide how best to arrange for payment. When the contraceptive commodity program was initiated, the Office of Population was in a position where it could fund supplies and make them available without requiring reimbursement from other AID resources. This policy has changed but it offers an attractive model--especially as a short-term response. If AID could make available sufficient resources to pay for an initial stockpile of ORS without requiring Regional Bureaus and USAID Missions to reallocate their resources in order to pay for ORS supplies, there is every chance that the momentum of the enthusiasm over ORT would be enhanced. If, however, AID offices are required to redirect their scarce health funds, problems of competing demands and delayed decision-making are inevitable.

An alternative to a special fund dedicated to the purchase of ORS supplies might be some kind of revolving fund. This might take the form of initial payment to a supplier by the Office of Health and subsequent reimbursement by Regional Bureaus and USAID Missions as ORS supplies were ordered.

### 4. ASSIST IN-COUNTRY PRODUCTION BY THE PUBLIC SECTOR

AID could help governments in developing countries to establish or increase production of ORS for their own use. UNICEF and WHO have a great deal of experience in this approach and collaboration should be close. AID's role, under this alternative, would be to donate production equipment, supplies and technical assistance.

Earlier sections of this report have described the production process and the problems associated with production in less than ideal circumstances. Equipment must be accompanied by enough spare parts and must be placed in a proper environment. Donating machines without paying attention to these constraints is irresponsible and not helpful.

Some or all of the components of ORS packets have to be imported in most countries. AID could donate these components. The need for foil packaging will diminish as production of the citrate ORS formula increases. Polyethylene packaging materials are more readily available on the local markets. The ingredients of ORS may be imported separately or pre-mixed. Jianas Brothers, for example, can sell drums of pre-mixed ORS ingredients for about 4 cents for a dose to mix with one liter of water. Separate ingredients of adequate quality may be locally available or could be imported by U.S. suppliers. Proper packing and shipping techniques are essential to prevent spoilage. Also, the issue of any import duty needs to be explored.

Technical assistance in ORS production could be made available to governments through a number of AID channels. The Indefinite Quantity Contracts in Health are one such means, as is the PRITECH project. In seeking out technical expertise in this area, AID contractors may need to supplement their usual resources with specialists in such areas as engineering, logistics and manufacturing.

##### 5. ASSIST IN-COUNTRY PRODUCTION BY THE PRIVATE SECTOR

AID can also assist in the establishment or expansion of ORS production in the private, for-profit sector of developing countries. Through the Bureau for Private Enterprise (PRE), AID can help companies in developing countries to conduct feasibility studies and obtain loans from PRE's revolving fund. Health and medical products and services are one of two priority sectors for PRE activities. Proposals for loan funds are assessed on the basis of feasibility and development impact. Interest on loans is at fixed competitive rates and loans are for a period not to exceed 15 years.

As a result of AID's private sector initiative, Regional Bureaus have been developing projects to assist entrepreneurs in developing countries to increase their involvement in development activities. The approaches of the Regional Bureaus vary but regional projects of this type may offer opportunities to assist in the commercial production of ORS. For example, the Near East Bureau is currently assisting Yemen, Jordan and Tunisia to assess their needs and the feasibility of alternatives through the Bureau's private sector project.

The International Executive Service Corps (IESC) is an organization of retired American executives who are willing to provide short-term technical assistance overseas on a cost reimbursement basis. IESC receives some core support from PRE and is establishing a network of liaison offices in developing countries. A request to IESC from AID to identify experts in the production of products like ORS would likely yield a cadre of specialists who could then be contracted by AID and/or in-country commercial concerns to provide the needed assistance.

6. REQUEST THAT ORS AND/OR ITS INGREDIENTS BE DESIGNATED PART OF THE PL 480 PROGRAM

It has been suggested that ORS could become a commodity available to AID-assisted countries through the PL 480 program. This would require Congressional approval. ORS is designated by the Food and Drug Administration as a medicinal food, suggesting that it could be made available through this means.

An alternative approach would be to consider including the component ingredients of ORS under the PL 480 program. Anhydrous glucose, in particular, is badly needed and difficult to obtain. Such a move would assist in-country production in countries where the ingredients are not readily available. Again, Congressional action would be required.

### III. CONCLUSIONS AND RECOMMENDATIONS

This final chapter of the report documents the conclusions of the analysis and makes recommendations to AID about the Agency's future role.

1. There is now, and will continue to be, an inadequate supply of pre-packaged ORS.

There is general agreement that the worldwide supply of pre-packaged ORS is less than the amount needed. This shortfall takes into account both packets available from international sources and as a result of in-country production.

Recommendation: AID should now be, and should continue to be, concerned about the worldwide supply of ORS in relation to demand.

2. The size of the gap between demand and supply of ORS is not known and is unpredictable.

The demand for ORS in pre-packaged form is not known, partly because demand is based on factors which cannot accurately be assessed and forecasted and partly because demand is related to political and logistical characteristics which may change at any time. The promotion of ORT by WHO, UNICEF, AID and others, for example, has led to many governments expressing interest in ORT programs and thus in obtaining ORS. However, if the advocacy of ORT slows or stops, this interest might well lessen or disappear. Similarly, as countries begin ORT programs and obtain ORS, they may find logistical problems of distribution overwhelming and thus stockpile initial supplies of ORS and not order more.

The supply side of ORS packets is also uncertain as more countries begin in-country production, as commercial concerns consider their options and as development assistance agencies make decisions about future objectives.

Recommendation: AID should maintain a flexible and short-term perspective on its role as a provider of ORS.

Recommendation: AID should establish and maintain an information system that provides guidance as to changes taking place in characteristics of ORS supply and demand.

3. There is an immediate need for ORS packets.

Despite the points above, there is a need for pre-packaged ORS now. AID can help alleviate this shortfall by making a large number of packets available over the next 6 to 12 months. However, because of longer term uncertainties, AID would be unwise to establish a system for ORS procurement which rests upon the premise of continuing procurement.

Recommendation: AID should not establish a central procurement system for ORS similar to that of the Office of Population's contraceptive commodity program.

Recommendation: Instead, AID should contract through GSA with a U.S. producer to supply ORS packets in large quantity over a 6 to 12 month period and on a one-time basis. A special dedicated fund should be established that guarantees payment of this order or a revolving fund could be created and be replenished through purchases from this central stock by Regional Bureaus, USAIDs, centrally-funded projects and AID grantees and contractors. The supplier should warehouse the ORS and, with GSA, make arrangements for shipment from this stockpile as orders are placed.

Recommendation: AID should not be overly concerned about the difference in price between UNICEF supplies and American supplies. The difference may well narrow in the future.

Recommendation: AID should consider repeating this process a second or third time if demand warrants it.

4. Features of the ORS packet could be improved.

The ORS packet developed by UNICEF has design features which could be improved. The one liter size is not appropriate in many situations but is generally known. The packets are difficult to open. The foil packaging material is not essential if the newly approved citrate formula is used, though it may still be warranted for reasons of durability. Improvements in labeling--both the text and the process--may also be advisable.

Recommendation: AID should work with experts with relevant experience, including any suppliers of ORS, to improve the design of the ORS packet and to incorporate improvements in the product procured by AID. Shelf-life studies of different combinations of ingredients and packaging should be carried out.

5. The availability of ORS packets in different sizes is attractive.

The one liter packet is less than optimal but has become a part of most ORT programs. It may be desirable for a smaller packet to be made available to ORT programs by an assistance agency as well as, or possibly instead of, the one liter size.

Recommendation: AID should investigate the demand for ORS packets of less than one liter size.

Recommendation: If one size of smaller packet is being used by ORT programs in a sufficient number of countries to warrant it, AID should consider making ORS packets of this size, as well as the one liter size, available through a central commodity program.

Recommendation: AID should be very cautious about making ORS packets of more than two sizes available because of the dangers of confusion at the country level.

6. Alternative presentations of ORS are an attractive prospect.

The alternative presentations of ORS, both liquid and the tablet, are attractive adjuncts to packets of ORS.

Recommendation: AID should consider assisting in the development, promotion and supply of alternative ORS presentations.

Recommendation: If, in the long term, these alternative presentations prove to be better than ORS in packet form, AID should consider making the products available through a central supply system of some kind.

7. In-country production of ORS is the appropriate response in the long-run.

Over time, in-country production of ORS will reduce the need for internationally produced and available ORS packets. Organizations in the public and private sectors of developing countries are potential producers of ORS. AID has several mechanisms through which the Agency can assist these organizations.

Recommendation: AID should advocate and support in-country production of ORS by both public sector and private sector organizations.

Recommendation: AID should limit its support to those organizations which produce an ORS product approved by WHO.

Recommendation: AID should insist on adequate quality control of ORS produced in-country.

Recommendation: AID support should include the donation of equipment, supplies and technical assistance.

Recommendation: AID's Offices of Health and Population, Bureau for Private Enterprise and Regional Bureaus should collaborate together and with UNICEF and WHO experts to develop a consistent approach to providing assistance for in-country production.

Recommendation: AID should support the identification and orientation of a cadre of specialists available to provide technical assistance in ORS production.

Recommendation: No equipment should be made available by AID without sufficient spare parts and provision for adequately trained maintenance and repair technicians.

Recommendation: AID should negotiate with developing country governments to assure that any import duty on ORS production requirements is reasonable.

Recommendation: AID should be prepared to continue to assist in-country producers with supplies of ORS components if they are not locally available.

Recommendation: AID should be prepared to accompany assistance with in-country ORS production with assistance in package design, public education, marketing, distribution and other features of an effective ORT program.

8. The provision of ORS is only one component of the response to dehydration associated with diarrheal diseases.

ORS availability is important and can greatly affect the morbidity and mortality associated with diarrheal diseases, but it is only one feature of an appropriate response to this global problem. As experience is gained with the introduction, institutionalization and continued support of diarrheal disease control measures, certain issues are emerging as being particularly deserving of attention.

Within the scope of ORT programs, these issues include appropriate support materials, education and marketing through mass media channels, the need for an appropriate and consistently used type of measuring device for water, and logistics design and continued support. In searching for ways to supplement existing knowledge about appropriate therapy for dehydration, these issues include when ORT should start, the use of alternative rehydrating fluids, and

discrimination among types of diarrheal diseases and associated responses. There are equally important issues in areas such as the prevention of diarrheal diseases and strategies to reduce vulnerability through improved nutrition.

Recommendation: In its enthusiasm to address problems of ORS supply, AID should not lose sight of the fact that ORS is only one feature of ORT programs.

Recommendation: AID should also recognize that ORT programs are only one aspect of approaches to combat diarrheal diseases.

Recommendation: AID should continue to support research and implementation efforts which have the objective of improving access to health interventions (including ORT) which are appropriate to the circumstances of developing countries.

Recommendation: AID should continue to develop and support strategies which assist developing countries to reduce morbidity and mortality through a variety of approaches.

Recommendation: AID should continue to work towards closer collaboration with other national and international efforts to improve health in developing countries.

## APPENDIX A

### PEOPLE CONTACTED

The following people were kind enough to respond to questions, provide information and/or review the draft of this report:

#### AID Officials

Dr. George Curlin, S&T/H  
Mr. Robert Clay, S&T/H  
Dr. Ann Van Dusen, S&T/H  
Ms. Anne Tinker, S&T/H  
Dr. Roslyn King, S&T/H  
Dr. James Heiby, S&T/H  
Dr. Carl Kendall, S&T/H  
Mr. Constantine Vardas, SER/COM/CPS  
Mr. Don Newman, S&T/POP  
Mr. Robert Dodson, PRE/PPR  
Ms. Hope Sukin-Klauber, FVA/PRE  
Dr. Joe Davis, AFR/RA  
Mr. Charles Johnson, NE/TECH/HPN  
Dr. Pamela Johnson, NE/TECH/HPN  
Mr. William Goldman, ASIA/TR  
Dr. Huey Mays, ASIA/TR  
Dr. Anthony Meyer, S&T/ED  
Mr. Jack Slusser, OFDA/OS

#### Others:

Dr. Roger Goodall, UNICEF  
Mr. Robert Hogan, WHO  
Mr. Gregory Jianas, Jr., Jianas Brothers  
Dr. Russell Ellison, Ciba-Geigy  
Ms. Rebecca Fields, PATH  
Ms. Margot Zimmerman, PIACT/PATH  
Dr. Norbert Hirschhom, JSI  
Mr. Howard Barnham, World Bank  
Mr. James Greene, World Bank  
Ms. Sally Coghlan, PRITECH  
Mr. Mark Rasmuson, PRITECH  
Dr. Katherine Elliott, Consultant  
Mr. Steve Fabricant, Consultant  
Ms. Jean Pease, ISTI  
Ms. Subhî Mehdi, ISTI

APPENDIX B

SUPPLEMENTARY MATERIAL

This Appendix contains the following supplementary material:

1. WHO and UNICEF Statement on ORS Formulation Containing Trisodium Citrate
2. Developing Countries Undertaking Production of ORS (provided by WHO)
3. Cable Sent to USAID Missions
4. Summary of ORS Packets Supplied by UNICEF
5. Number of ORS Packets Purchased from Jianas Brothers 1983, January-July 1984 (provided by AID/SER/COM/CPS)
6. Summary of ORS Packets Supplied Globally in 1983, by Region and Source (provided by UNICEF)



ORAL REHYDRATION SALTS (ORS) FORMULATION CONTAINING TRISODIUM CITRATE

1. In 1982-1983 the WHO Diarrhoeal Diseases Control (CDD) Programme supported laboratory studies to identify a more stable ORS composition, particularly for use in tropical countries, where ORS has to be packed and stored under climatic conditions of high humidity and temperature. The results of these studies demonstrated that ORS containing 2.9 grams of trisodium citrate dihydrate in place of 2.5 grams of sodium bicarbonate (sodium hydrogen carbonate) was the best of the formulations evaluated.<sup>1</sup> The formulae of the standard ORS (ORS-bicarbonate) and ORS containing trisodium citrate dihydrate (ORS-citrate) are shown below:

<u>ORS-bicarbonate</u>	<u>grams/litre</u>	<u>ORS-citrate</u>	<u>grams/litre</u>
Sodium chloride	3.5	Sodium chloride	3.5
Sodium bicarbonate (sodium hydrogen carbonate)	2.5	Trisodium citrate dihydrate	2.9
Potassium chloride	1.5	Potassium chloride	1.5
Glucose anhydrous	20.0	Glucose anhydrous	20.0

2. Following these stability studies, 7 clinical trials were undertaken with the support of the CDD Programme, in which the efficacy of ORS-citrate and ORS-bicarbonate was compared. All but one of these trials had a double-blind study design.

Four of the 7 studies were undertaken in children below 2 years of age with moderate to severe non-cholera diarrhoea. The ORS-citrate was received by 128 children and found to be uniformly as effective as ORS-bicarbonate in correcting acidosis. In 3 of the 4 studies from which preliminary data are available, there was a trend towards a reduction (8-14%) of diarrhoea stool output in children receiving the ORS-citrate.

The remaining 3 studies were undertaken in adults and older children with cholera who presented with dehydration and acidosis. In the 112 patients receiving ORS-citrate (68 adults, 44 children), the acidosis was corrected at a rate equal to that in patients receiving ORS-bicarbonate. In addition, preliminary data from all 3 studies indicate that the diarrhoea stool output was considerably less (reduced by 26-46%) in those treated with ORS-citrate.

<sup>1</sup> Siewert, M. & Gnekow, H. Über die Stabilität von Glucose-Elektrolyt-Mischungen (Oral Rehydration Salts; ORS) zur Therapie von Durchfallerkrankungen. Pharmazeutische Zeitung, 128 (22): 1169-1174 (1983)

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It appears from these results that, in comparison with ORS-bicarbonate, ORS-citrate corrects acidosis at an equal rate and its use results in less stool output, especially in high-output diarrhoea (e.g., cholera). The latter observation is most probably due to a direct effect of trisodium citrate in increasing intestinal absorption of sodium and water.

3. Countries should have no hesitation in continuing to use ORS-bicarbonate, which is highly effective in the treatment of dehydration. However, because of its better stability and apparently greater efficacy, WHO and UNICEF now recommend that countries use and produce ORS-citrate where feasible. As in the case of any new drug, countries electing to use ORS-citrate should monitor carefully its performance during the first months of its routine use.

Where ORS-bicarbonate is at present being produced, the production of ORS-citrate should not require any changes in equipment or new investment. Where ORS-bicarbonate is being packed in aluminium laminate, on automatic equipment, the same type of packaging material can be used for ORS-citrate. Where climatic conditions allow, a laminated compound containing less or even no aluminium may be acceptable.

In countries where ORS-citrate is to be produced with semi-automatic equipment and use is to be made of a relatively cheap, locally available packaging material, such as polyethylene, there may be a saving of up to 50% in the cost of packaging material, and 10-20% in the final packet cost.

To avoid confusion in the field, the packets supplied globally by UNICEF (ex UNIPAC) will continue to be of the same appearance as in the past. The price of a packet containing ORS-citrate will probably remain the same if the slightly higher cost of trisodium citrate can be offset by a less costly packaging material.

4. WHO will be issuing, in late 1984, a revision of its "Guidelines for the Production of Oral Rehydration Salts" (document WHO/CDD/SER/80.3), which will provide detailed information about the production of ORS-citrate. Any questions about ORS-citrate should be directed to the Director, Diarrhoeal Diseases Control Programme, World Health Organization, 1211 Geneva 27, Switzerland.

Table 6: DEVELOPING COUNTRIES UNDERTAKING PRODUCTION  
OF ORAL REHYDRATION SALTS

Region	Country
Africa	Burundi
	Ethiopia
	Kenya
	Lesotho
	Mozambique
	Upper Volta*
	Zaire
Americas	Argentina
	Brazil
	Colombia
	Costa Rica
	Dominican Rep.
	El Salvador
	Haiti
	Honduras
	Mexico
	Paraguay
	Peru
	Venezuela
	Eastern Mediterranean
Egypt	
Iran (Islamic Rep. of)	
Pakistan	
Syrian Arab Rep.	
Tunisia	
Europe	Morocco
South-East Asia	Bangladesh*
	Burma
	India
	Indonesia
	Nepal
	Mongolia*
Thailand	
Western Pacific	China*
	Dem. Kampuchea*
	Malaysia
	Philippines
	Republic of Korea

\*indicates those using a cottage industry approach

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ORIGIN OFFICE STHE-01  
INFO ARAF-02 AFEA-03 AFSA-03 AFFW-04 AFVW-03 AFDR-06 AFCA-03  
AASG-01 ASPT-02 ASPH-02 AALA-01 LACE-03 LACA-03 LADP-04  
LADR-03 ARIE-01 NEDP-03 NETC-04 NENA-03 PPCE-01 PDPR-01  
PPPB-02 PPDC-01 OIRM-02 ASPD-03 ASTR-02 C-02 CALI-02  
CPP-01 CPS-02 CSE-02 SAST-01 NEE-03 NHC-09 AFDA-01  
ES-01 CDC-06 RELO-01 STHP-01 MAST-01 ACSP-02 LACA-03  
ASBI-02 CNEA-03 /110 A4

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APPROVED BY AID/ST/W:GURLIN  
AID/AFR/TR/MN:CGURNEY (DRAFT)  
AID/ASIA/TR:WOLDMAN (DRAFT)  
AID/LAC/DR/MH:LMORSE (DRAFT)  
AID/NE/DP:CJOHNSON (DRAFT)  
AID/PPS/PCPR/HR:ABLOOM (DRAFT)  
AID/SER/CGH/CPG:CVARDAS (DRAFT)

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SUBJECT: HEALTH: REQUEST FOR MISSION'S ASSISTANCE IN  
ANALYSIS OF ORAL REHYDRATION SALTS DEMAND

1. SUMMARY: AID/W IS RE-EXAMINING THE CONSTRAINTS TO  
AND OPPORTUNITIES FOR BULK OR CENTRAL PROCUREMENT OF  
ORAL REHYDRATION SALTS (ORS) AND ASKS MISSIONS TO ASSIST  
IN IDENTIFYING COUNTRY-SPECIFIC INFORMATION ABOUT DEMAND  
AND SUPPLY/PRODUCTION ALTERNATIVES.

2. AID/W APPRECIATES MISSION EFFORTS TO RESPOND TO  
PREVIOUS REQUESTS FOR INFORMATION ABOUT DIARRHEAL  
DISEASES AND ORAL REHYDRATION THERAPY (ORT). THE  
PURPOSE OF THIS REQUEST IS TO GATHER DATA NECESSARY FOR  
AN ANALYSIS OF GLOBAL ORS NEEDS AND TO ESTABLISH WHETHER  
OR NOT AID/W SHOULD TAKE STEPS TO UNDERTAKE BULK OR  
CENTRAL PROCUREMENT OF ORS PACKETS.

3. AID/W REQUESTS MISSION ADVICE AS FOLLOWS: (AID  
PROGRAMS): (A) ESTIMATE NUMBER OF ONE LITER ORS PACKETS  
WHICH COULD BE DISTRIBUTED THROUGH AID PROGRAMS IN  
CALENDAR 1985 AND 1986. (1) WITH EXISTING PROJECTED  
FUNDING RESOURCES AND (2) WITHOUT FUNDING CONSTRAINTS.  
(B) IDENTIFY CHANNELS THROUGH WHICH THESE PACKETS COULD

BE DISTRIBUTED AND PERCENTAGE OF PACKETS THROUGH EACH  
CHANNEL FOR CALENDAR 1985 AND 1986. CHANNELS MIGHT  
INCLUDE MOH, OTHER GOVERNMENT MINISTRIES, PVO(S),  
COMMERCIAL OUTLETS, ETC.

(MOST COUNTRY PROGRAMS): (A) IDENTIFY CURRENT SOURCES OF  
ORS IN YOUR HOST COUNTRY; SIZE OF ORS PACKETS FOR EACH  
SOURCE; NUMBER OF PACKETS OR PERCENTAGE EXPECTED TO BE  
PROVIDED BY EACH SOURCE. (INCLUDE BOTH EXTERNAL SOURCES  
AND IN-COUNTRY PRODUCERS.) (B) IDENTIFY ADDITIONAL  
POTENTIAL SUPPLIERS OF ORS IN YOUR HOST COUNTRY AND THE  
NUMBER OF PACKETS WHICH COULD BE PRODUCED BY THESE  
SOURCES IN CALENDAR YEAR 1985 AND 1986. (INCLUDE BOTH  
EXTERNAL SOURCES AND IN-COUNTRY PRODUCERS).

4. WITH A CENTRAL PROCUREMENT MECHANISM, AID/W COULD  
PROVIDE ORS OUTSIDE OF AGENCY PROJECTS, E.G., TO SUPPORT  
A NATIONAL PROGRAM, PVO PROGRAMS, ETC. INDICATE TO WHAT  
EXTENT SUCH SUPPORT WOULD BE FEASIBLE OR DESIRABLE IN  
YOUR COUNTRY.

5. THE ANALYSIS WILL ALSO CONSIDER COMPLEMENTARY  
ACTIVITIES WHICH AID/W MIGHT UNDERTAKE. ADVICE ON USAID  
INTEREST IN THE FOLLOWING WOULD ALSO BE APPRECIATED: (A)  
ASSISTANCE WITH IN-COUNTRY PRODUCTION; (B) SOCIAL  
MARKETING FOR ORS; (C) ALTERNATIVE ORS PACKAGING  
TECHNOLOGY; (D) ALTERNATIVES TO ONE LITER ORS PACKETS.

6. IN THE ABSENCE OF ADEQUATE DATA ON WHICH TO BASE  
ESTIMATES, YOU MAY WISH TO USE THE FOLLOWING GUIDELINES.  
FIRST, MAKE AN ESTIMATE OF THE POPULATION WHO WILL  
ACTUALLY BE REACHED WITH HEALTH SERVICES DURING THE  
DESIRED TIME FRAME. THIS COULD BE IN THE CONTEXT OF A  
NATIONAL PROGRAM, SOME SUBDIVISION THEREOF, OR A SMALLER  
SCALE DEMONSTRATION ACTIVITY. IN DEVELOPING COUNTRIES,  
APPROXIMATELY 15 PERCENT OF THAT POPULATION SIZE (OR YOUR  
BEST ESTIMATE OF THE PROPORTION OF CHILDREN UNDER 5 YEARS  
OF AGE) WOULD CONSTITUTE THE TARGET 0-5 GROUP. MULTIPLY  
THAT NUMBER BY 6-12 PACKETS FOR EACH DIARRHEAL EPISODE  
AND AN AVERAGE OF 3 EPISODES ANNUALLY OR YOUR BEST  
ESTIMATE OF EPISODES (DEPENDING ON COUNTRY HEALTH  
CONDITIONS AND DELIVERY MECHANISM). YOU WOULD THEN  
ESTIMATE THE PERCENTAGE OF CASES WHICH WOULD  
REALISTICALLY BE IDENTIFIED AND REACHED-AND MULTIPLY BY  
THAT. THAT WILL GIVE THE TOTAL ESTIMATED ANNUAL ORAL  
REHYDRATION PACKET NEEDS FROM WHICH PACKETS AVAILABLE  
FROM OTHER SOURCES, LOCAL OR OTHERWISE, WOULD BE  
SUBTRACTED.

7. IN DISCUSSIONS WITH THE MOH CONCERNING POTENTIAL AID  
PROCUREMENT OF ORAL REHYDRATION PACKETS, WE URGE YOU TO  
STRESS THAT WE ARE EXPLORING THE POSSIBILITY AT THIS  
STAGE AND CAN MAKE NO COMMITMENTS ON PROCUREMENT, PENDING  
FURTHER CONSIDERATION OF GLOBAL NEEDS AND ADMINISTRATIVE  
ARRANGEMENTS.

8. THIS INFORMATION WILL BE USED IN AN AID STUDY ON ORS  
PROCUREMENT. THE FINDINGS OF THIS REPORT WILL BE SHARED  
WITH USAID (S) WHEN FINALIZED. PLEASE SEND REPLY TO ST/W  
BY AUGUST 24, 1984.

9. THIS IS NOT TO IMPLY THAT PACKETS ARE THE ONLY  
TREATMENT FOR DEHYDRATION. AID RECOGNIZES THAT DIARRHEA  
MAY OCCUR WHERE ACCESS TO PACKETS IS LIMITED AND THAT  
PEOPLE MAY NEED TO RELY ON THE HOME-BASED SOLUTIONS. AS  
SUCH, FAMILIES NEED TO BE TAUGHT HOW TO MAKE HOME-BASED  
SOLUTIONS AND SHOULD USE THEM EVEN IF DEHYDRATION OCCURS  
WHEN PACKETS AND MEDICAL ATTENTION ARE NOT POSSIBLE. DAM

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DIARRHOEAL DISEASES CONTROL PROGRAMME

SUMMARY OF ORS PACKETS SUPPLIED BY UNICEF  
(ex Warehouse UNIPAC in Copenhagen)

(Source of information computer printout, UNIPAC, dated 1 January 1984)

WHO REGIONS

	1980	1981	1982	1983	1984
AFRO	2 662 230	2 248 410	2 916 260	5 980 150	
AMRO	4 303 884	3 857 000	3 803 500	4 534 120	
EMRO	6 754 650	4 987 100	4 077 250	6 968 330	
EURO	1 805 920	5 094 960	757 000	11 750	
SEARO	8 165 270	7 840 620	2 919 700	6 770 510	
WPRO	2 462 830	1 399 460	1 326 000	5 502 917	
<b>TOTAL</b>	<b>26 154 784</b>	<b>25 427 550</b>	<b>15 799 710</b>	<b>29 767 777</b>	<b>(est.) 65,000,000</b>

AFRO

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
1. Angola	142 650	244 300	238 200	1 066 000
2. Benin		200 000	200 000	416 000
3. Botswana	20 160		50 000	300 000
4. Burundi		20 000	2 500	120 200
5. Cameroon	2 000			402 500
6. Cap Verde	69 920	10 000	10 000	20 000
7. Central African Rep.		73 100	70 100	573 350
8. Chad	15 000	99 300	144 200	98 200
9. Comores	2 500	10 000		
10. Congo	40 000	15 000	20 000	
11. Equatorial Guinea	5 000	4 200	24 000	3 800
12. Ethiopia	1 259 600	527 000	137 600	50 500
13. Gambia	100 000			100 000
14. Ghana	53 400	58 550	165 160	670 900
15. Guinea Bissau	51 750	151 000	22 000	3 000
16. Guinea		960		
17. Ivory Coast			156 000	
18. Kenya	81 250		2 000	121 500
19. Lesotho			1 000	
20. Liberia	45 750	46 000	45 000	40 000
21. Mali			7 750	1 600
22. Malawi		147 000	391 000	455 000
23. Mauritania	18 000	42 000	30 000	235 000
24. Mauritius		100 000		85 000
25. Mozambique	129 750			30 000
26. Niger				200 000
27. Nigeria	197 000	150 000	100 000	
28. Rwanda	1 000		12 000	150 000
29. Sao Tome & Principe				25 000
30. Senegal	5 000			200
31. Seychelles			30 000	
32. Sierra Leone			10 250	81 500
33. Swaziland	25 000	30 000		35 000
34. Tanzania	5 000	2 000	265 000	10 250
35. Togo		125 000		156 000
36. Uganda	360 000	207 900	327 000	356 150
37. Upper Volta		4 000	8 000	108 500
38. Zaire	20 500	30 000	311 500	50 000
39. Zambia		70 000		15 000
40. Zimbabwe		100		
* Interregional Office	12 000	6 000	11 000	
<u>TOTAL</u>	2 662 230	2 248 410	2 916 260	5 980 150

\*Supplies to UNICEF Regional Office or voluntary agencies with activities in unspecified developing countries

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
1. Bahamas		40 000		
2. Barbados	62 750			
3. Belize				20 000
4. Bolivia	51 750			438 040**
5. Cayman Islands		6 000		
6. Colombia	105 000	3 000	1 000	
7. Costa Rica				160 000
8. Domenica				17 000
9. Dominican Republic	96 750			
10. El Salvador	16 000	60 000		200 000
11. Ecuador	351 850	60 000		
12. Guatemala	35 800	10 000	320 500	693 830
13. Guyana	50 250			
14. Haiti	373 404	100 000		
15. Honduras	50 400	186 000	860 000	600 000
16. Jamaica	94 750	10 000	140 000	
17. Mexico	1 049 930	2 500 000	2 050 000	2 500
18. Nicaragua	1 010 500	712 000	300 000	580 750
19. Panama	5 000	100 000		32 000
20. Paraguay	132 250	150 000	32 000	40 000
21. Peru	80 000			400 000
22. Santa Lucia		20 000		
23. Trinidad-Tobago	12 500			
24. Uruguay				50 000
* USA	125 000			
25. Venezuela	600 000			
* Interregional office				800 000
* Country Planning HQ New York				500 000
<b>TOTAL</b>	<b>4 303 884</b>	<b>3 857 000</b>	<b>3 803 500</b>	<b>4 534 120</b>

\* Supplied to UNICEF Regional Office or voluntary agencies with activities in unspecified developing countries

\*\* Plus 35 000 kg ORS in bulk, giving approx. 1 270 000 packets

EMRO

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
1. Afghanistan		8 000	50 000	966 500
2. Bahrain				160 000
3. Democratic Yemen		20 000	21 000	72 500
4. Djibouti	11 500	60 600	7 600	500
5. Egypt	3 125 760	3 050 000	1 000 000	
6. Israel		20 000	20 000	20 000
7. Iran		100 000		1 000 000
8. Jordan	300 000	600 000	520 000	20 000
9. Kuwait	500 200			
10. Lebanon			284 000	200 000
11. Oman			200 000	100 000
12. Pakistan	1 560 160	70 000	102 500	94 700
13. Palestinians in Jordan		50 000	40 000	
14. Palestinians in Lebanon		10 000		15 000
15. Palestinians in West Bank/Gaza			75 000	
16. Palestinians in Syria				50 000
17. Somalia	359 750	398 500	92 200	233 600
18. Sudan	676 680	1 237 950	495 000	3 085 530
19. Tunisia	200 000		400 000	
20. Yemen Arab Republic	20 600	80 000	5 000	
* Interregional office		25 000	22 000	950 000
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TOTAL	6 754 650	4 987 100	4 077 250	6 968 330
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\*Supplies to UNICEF Regional Office or voluntary agencies with activities  
in unspecified developing countries

EURO

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
1. Algeria	955 840	3 700 000		
* Denmark		24 960		
* France		16 000	4 000	
2. Morocco	300 000	1 000 000		
* Netherlands			490 000	
3. Spain				150
* Sweden				1 000
* Switzerland	530 080	304 000	203 000	10 000
4. Turkey	20 000	50 000	10 000	
* United Kingdom			50 000	600
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TOTAL	1 805 920	5 094 960	757 000	11 750
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\* Supplies to voluntary agencies with activities in unspecified developing countries.

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SEARO

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
1. Bangladesh	919 000	1 008 900	665 650	2 045 310
2. Bhutan	6 400	12 200	12 200	65 000
3. Burma	2 069 000	4 042 450	1 558 100	3 736 600
4. India	334 370	74 720	209 750	160 000
5. Indonesia	4 585 500	1 680 000		477 000
6. Maldives	40 000	58 300	93 000	57 000
7. Mongolia		10 000		
8. Nepal		60 000		
9. Sri Lanka	111 000	894 050	312 000	154 600
10. Thailand	100 000		69 000	75 000
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TOTAL	8 165 270	7 840 620	2 919 700	6 770 510
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WPRO

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
1. Fiji	100 000	100 000	2 000	
2. Kampuchea	500 400	15 000	409 800	3 347 500
3. Rep. of Korea				200
4. Laos		9 500	102 200	400 000
5. Malaysia	25 000			
6. Pacific Islands	15 000			300 000
7. Papua New Guinea	600 000	250 000	200 000	
8. Philippines	32 000			10 000
9. Solomon Islands			30 000	
10. Viet Nam	847 750	1 000 000	500 000	1 445 217
* Interregional Office	342 680	24 960	82 000	
<hr/>				
TOTAL	2 462 830	1 399 460	1 326 000	5 502 917
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\*Supplies to UNICEF Regional Office or voluntary agencies with activities in unspecified developing countries.

Number of ORS Packets Purchased from  
Jianas Brothers 1983, January-July 1984

<u>A.I.D.</u>	<u>1983</u>	<u>1984 (Jan.-July)</u>
<u>Honduras</u>		
Mission purchase	1,800,000	
<u>Dominican Republic</u>		
GSA purchase	1,500,000	
<u>Guatemala</u>		
Mission purchase		60,000
<u>Peru</u>		
Mission purchase		500,000
<u>Zaire</u>		
Mission purchase	1,000,000	1,000,000
GSA purchase		1,000,000
<u>Togo</u>		
GSA purchase		128,000
<u>Mauritania</u>		
AID/OFDA		200,000
<u>El Salvador</u>		
GSA purchase	<u>                    </u>	<u>400,000</u>
Sub-total	4,300,000	3,288,000
<u>Other Agencies</u>		
<u>PAHO for:</u>		
Honduras	30,000	
Dominican Republic	25,000	225,000
Trinidad	120,000	
Barbados	4,000	
Guatemala	125,000	
Jamaica	25,000	
Grenadines	10,000	
Peru	<u>                    </u>	<u>400,000</u>
Sub-total	339,000	625,000
<u>UNICEF for:</u>		
Bolivia	400,000	
Columbia (bulk ingredients)	30 metric tons	33 metric tons
TOTAL (packets):	5,039,000	3,913,000

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30.3.84

DIARRHOEAL DISEASES CONTROL PROGRAMME

SUMMARY OF ORS PACKETS SUPPLIED GLOBALLY IN 1983

	<u>UNICEF</u>	<u>WHO</u>	<u>IDA*</u>	<u>SIDA**</u>	<u>RED CROSS***</u>	<u>USAID</u>
AFRO	5 980 150	10 000	281 370	116 000	142 650	1 200 000
AMRO	4 534 120	-	104 900	-	53 700	3 350 000
EMRO	6 968 330	220 000	196 200	-	36 950	
EURO	11 750	-	-	-	-	
SEARO	6 770 510	-	200	-	14 500	
WPRO	5 502 917	-	1 350 300	-	55 300	
	<hr/>					
	29 767 777 80.7%	230 000 0.6%	1 932 970 5.3%	116 000 0.3%	303 100 0.8%	4 550 000 12.3%
	<hr/>					
		TOTAL	36 899 847 100%			

\* Stichting I.D.A. International Dispensary Association, P.O. Box 3098, NL-1003 AB Amsterdam

\*\* SIDA Swedish International Development Authority, Health Division, Birger Jarlsgatan 61, S-10525 Stockholm

\*\*\* Comité International de la Croix-Rouge, 17 Avenue de la Paix, CH-1211 Geneva.

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