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REPORT OF A CONSULTATION ON ORS SUPPLY  
AND DISTRIBUTION IN NIGERIA

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## CONTENTS

	<u>Page</u>
I. Scope of Work	1
II. Summary of Findings and Recommendations	1
III. Overview of Health Services and ORT in Nigeria	6
A. Organization of Health Services	7
B. Current ORT Activities	9
IV. Estimation of ORS Requirements	13
A. Methods of Estimating ORS Requirements	13
B. Preliminary Estimates of ORS Requirements in Nigeria	15
C. Service-Based Estimates for Nigerian Public Health Facilities	15
D. Five-Year Estimates of ORS Requirements	20
V. Supply of ORS to Public Health Services	24
A. Initial Supply by Donor Agencies	24
B. Long-Term Procurement of ORS	25
C. Distribution of ORS	28
D. Information Requirements	29
VI. Commercial Distribution of ORS	31
VII. Supply Issues in Local Production	32
VIII. Organization of Nigerian CDD Activities	33
Annexes	34ff.
Annex A: Schedule of Activities and People Met	
Annex B: Population-Based and Consumption-Based Estimates of ORS Requirements	
Annex C: ORT Programme Review Notes, UNICEF	
Annex D: Nigerian Paediatricians and the Child Survival Revolution	
Annex E: Standardization of Home-Made Salt-Sugar Solution for the Treatment of Acute Diarrhoeal Diseases of Childhood in Nigeria	

## Nigeria -- Basic Information

People 93,730,000 population (1984 mid-year estimate)  
20% under age 5

3 major languages (Yoruba, Hausa, Ibo)

250 tribal groups and dialects

19 states with populations of about 2.5 to 7 million each

Health Infant Mortality: 100 per 1000 live births (180-200 in some surveys)

Life Expectancy: 41 years (1980), 50 years (1985 est.)

Diarrhea Incidence: 2-5 episodes per child under 5 per year (current unpublished data)

Economy Currency: 1# (naira) = US\$ 1.15 (quite variable)

### Abbreviations

CDD Control of Diarrhoeal Diseases  
EPI Expanded Program on Immunization  
FMoH Nigerian Federal Ministry of Health  
LGA Local Government Area  
SSS Salt-sugar solution

## I. SCOPE OF WORK

In his report on a July, 1984 visit to Nigeria Dr. Robert L. Parker, PRITECH proposed this consultation on production and distribution of ORS in Nigeria. Production expertise was provided by Mr. Hans Faust, Industrial Engineer, WHO/UNICEF, Geneva, whose findings are detailed in his separate report. The consultancy on supply and distribution of ORS which is presented in this report was arranged by PRITECH at the request of UNICEF and the USAID representative in Lagos, Ms. Keys MacManus, with the concurrence of the Federal Ministry of Health, Lagos. The scope of work as proposed by Dr. Parker and revised in March 15 and March 26, 1985 memos from Dr. Alau Brody, UNICEF ORT Promotion Officer included the following objectives:

1. Review present ORT program planning and the implications of such plans for ORS supply and logistics.
2. Recommend methodologies for assessing ORS requirements and for collecting data needed for estimating ORS requirements.
3. Develop proposals for using and/or improving existing systems of procurement and distribution of drugs and vaccines in Nigeria to assure regular supply of ORS at all levels of the Nigerian health system where training in ORS is initiated.
4. Suggest marketing and distribution strategies which make possible the widest availability of ORS within the objectives of the national CDD program, including both public and private sector considerations.
5. Recommend the resources and expertise required and available to put suggestions and recommendations into practice.

## II. SUMMARY OF FINDINGS AND RECOMMENDATIONS

The two week visit included meetings with Federal Ministry of Health officials and UNICEF staff in Lagos as well as visits to health officials and potential producers in the states of Oyo, Kaduna, and Sokoto. Virtually everyone met during the visit was aware of ORT/ORS and enthusiastic about their potential role in training, production, or distribution.

Knowledge of ORT has existed in Nigeria since the 1970s, but a national CDD program was not drafted until 1984. Revision and implementation of the program has proceeded slowly, but the groundwork now appears to have been laid for more rapid implementation activities. Specific findings and recommendations from this visit include the following.

## A. Areas of Consensus

Although a national CDD program has not yet been formally adopted, those involved in CDD activities appear to have reached consensus on the following points:

1. There is an adequate infrastructure and sufficient potential public and commercial demand for ORS to justify encouraging and facilitating local production.
2. For most public health activities, salt-sugar solution (SSS) should be taught for home use in the prevention of dehydration and the treatment of mild dehydration; ORS packets should generally be reserved for use in health facilities and by community health workers.
3. Educational and promotional activities should start with physicians and progress rapidly to training of nurses, midwives, and other health workers. Community level promotion through mass media (good coverage in at least some states), schools, and other methods is currently intended to follow after adequate training of the health care providers.
4. The standard measure for SSS and eventually for ORS should be 600 ml., which can be measured as one beer or "Treetop" bottle (600 ml.) or two soft drink bottles (290 to 350 ml).
5. The SSS, based on local research, should be one common teaspoon (3 ml.) of salt, 10 common teaspoons of sugar or 5 cubes, and 600 ml. of drinking water.

## B. Areas of Continuing Discussion

The following are apparently unresolved issues which need to be addressed as part of the process of revising the national CDD plan:

1. Coordination of Training and Supply Activities -- A number of training programs have already been conducted and more are being planned by Federal and state governments and by donor agencies. At the same time, the FMOH has made available 500,000 packets of ORS for use by the states and Sokoto state is just awarding a tender for the direct purchase of 100,000 packets of ORS. Unfortunately, supply of ORS without proper training has already resulted in potentially harmful misuse of ORS packets. At the same time, efforts to rapidly train large numbers of health workers without an established ORS supply network can create unnecessary frustration and disillusionment on the part of health workers.

Recommendations: Problems with estimation of ORS requirements, overstocks, understocks, misuse of ORS packets will occur wherever training and supply activities are not coordinated. To the maximum extent possible, expansion of ORS distribution should proceed simultaneously and in the

same institutional sequence as diffusion of ORT training. Maximum coordination may at times require modification of training plans to fit supply constraints and vice versa.

2. Estimation of ORS Requirements -- Realistic estimation of ORS requirements depends on (1) definition of the ORT program in which ORS will be used and (2) availability reasonably complete data on population, health care utilization, diarrhoeal morbidity, and related factors -- neither of which exist at the present time. Very preliminary estimates based on data and assumptions detailed in this report suggest a potential public sector demand of 5 to 8 million packets per year after three to five years and a potential commercial sector demand of 10 to 15 million packets per year with aggressive promotion.

Recommendations: As a national CDD program is defined, the preliminary estimates in this report should be continually revised on the basis of program planning and systematic data collection.

3. Procurement of ORS -- Will the long-term procurement of ORS be the responsibility of the Federal government, the state governments, donor agencies or some other source? Start-up procurement by donor agencies with long-term procurement through state pharmacy units would be the approach most consistent with present policies and practices. For procurement by the states to be a successful long-term strategy, there are several potential problems which need to be addressed by the ORT program.

Recommendations: UNICEF and USAID should establish as soon as possible the amount of support they will provide for start-up ORS procurement and communicate this information Federal and state government. To assure regular supply of ORS through existing state supply channels, educational and promotional efforts will need to be directed toward medical opinion leaders, chief pharmacists, and the members of the drug committees in each state. States should be provided with information on international ORS prices, supply sources, and the cost-effectiveness of ORS versus the other, more costly, diarrhoeal preparations currently bought by the state drug committees. Some states may need assistance in making general improvements in their procurement procedures.

4. Distribution of ORS to Public Health Facilities -- ORS could be distributed through the state health services drug distribution channels, through the EPI channels or through commercial channels. Although Nigeria has a relatively good transportation infrastructure (roads, vehicles, fuel, airlines), the availability and efficiency of transport appears to vary considerably from state to state.

Recommendations: Distribution through the EPI network may prove

efficient in demonstration zones, but is likely to prove inadequate for statewide distribution. At present, it appears that the best long-term strategy would be to distribute ORS through the existing state drug distribution channels. States with particularly weak public drug distribution systems may need assistance in improving their systems or identifying other channels for ORS distribution.

5. Information Requirements -- Planning national and state CDD programs will require a considerable amount of information which is not yet readily available.

Recommendations: Data collection activities should include: (1) obtaining available data from National Health Planning on estimated population distribution by state and LGA; outpatient utilization of hospitals, health centers and dispensaries; diarrhoeal disease occurrence at health facilities, etc.; (2) establishing a simple reporting system for clinical and supply-related information at demonstration facilities; and (3) establishing a more basic reporting system for use at all facilities trained in ORT and supplied with ORS packets.

6. Commercial Distribution of ORS -- With an estimated 40 companies involved in some form of pharmaceutical manufacture, 1200 registered retail pharmacists (out of a total of 3000 registered pharmacists), and over 20,000 licensed patent medicine shops, the Nigerian commercial network has access to a large segment of the population. Even most rural LGAs have at least one patent medicine shop and in some cases there are more patent medicine shops than dispensaries. If each retail pharmacy and patent medicine shop sold only one ORS packet per day, five days a week, national sales would exceed 5 million packets per year.

Recommendations: Educational efforts and possibly regulatory efforts aimed at pharmacists and patent medicine shops should encourage proper ORS use and discourage the all too typical pattern of antibiotic and antidiarrhoeal sales. While planning for these efforts can start immediately, it is suggested that implementation of such efforts follow the educational activities aimed at the medical and nursing professions.

7. Relationship of CDD Activities to Private Industry -- The private pharmaceutical and commercial distribution industry can play an important role in producing and promoting ORS in Nigeria. At the same time, some current industry practices run counter to public health objectives.

Recommendations: It is strongly urged that all parties involved in CDD activities consider carefully the various roles which private industry might play before embarking on a course of either cooperation or confrontation, influence through incentives or influence through regulation.

8. Supply Issues in Local ORS Production -- During the visit at least four potential local producers were visited by Mr. Hans Faust, ORS production expert from WHO/Geneva. Technical aspects of these visits are discussed in Mr. Faust's report. In summary, it appears that local production is feasible with semi-automatic equipment capable of producing 1 to 4 million packets per year per installation.

Recommendations: There are several supply-related concerns which should be considered by national and state CDD planners: (1) companies may need assistance in assuring import licenses necessary for a steady supply of raw materials, (2) with the potentially large and lucrative commercial market, local production may not be sufficient for government needs, and (3) the structure of the local pharmaceutical market often results in prices substantially above reasonable market prices (IV solutions costing less than N 0.50 on the world market sell for N 2.50 at the factory and are purchased by the government through distributors for N 8.00 to N 15.00).

9. Information about Maternal/Consumer Behavior -- There is a great deal of anecdotal information about the way in which Nigerian mothers define and respond to diarrhea in their children and apparently several studies of this are in progress. Much of this information comes from providers of health care. However, it appears that less than one in five cases of infant and childhood diarrhea in Nigeria is seen by the health care system. It is not known the extent to which the remaining four out of five cases are treated with home remedies, treated with patent medicines, treated with remedies from traditional practitioners or simply not recognized by the mother as representing illness.

Recommendations: Available information and current studies need to be reviewed from the viewpoint of national and state CDD planning. This information can be used to specify needs for additional field-based research.

10. Organization of Nigerian CDD Activities -- The size and political geography of Nigeria present numerous practical problems for any national program. Thus far, CDD activities have been undertaken jointly by various offices in the Federal and state ministries of health and the donor agencies without the creation of a CDD program per se.

Recommendations: Observations during this visit support the growing consensus that, in the near future, ORT/CDD will need (1) its own identity; (2) a Federal Ministry of Health office to coordinate ORT/CDD activities; and (3) as part of a national CDD plan, a clear division of responsibility between the Federal level and the state level.

### C. Potential Areas of Continuing PRITECH/USAID Activity

USAID/Lagos has arranged and is continuing to arrange training programs which are partly or largely concerned with ORT. USAID is also involved in a variety of health assessments and health programs related to ORT. Finally, in the report on her January 5-19, 1985, visit to Nigeria, Joyce Lyons, Management Sciences for Health/PRITECH suggested several other areas for PRITECH assistance. There are, in addition, the following potential areas for continuing PRITECH involvement:

1. Follow-up consultation on ORS requirements, information requirements and data collection for managing Federal and state ORT activities, procurement of ORS and distribution of ORS (late fall, 1985).
2. Consultation on promotion of ORT through retail pharmacies and patent medicine shops (fall, 1985 or spring, 1986).
3. Assistance in the design and implementation of a field-based study of maternal and family beliefs and practices related to diarrhea and dehydration, if after reviewing all available studies it appears that such information is still needed for the design and implementation of an effective ORT program (beginning summer, 1985).
4. Assistance in the design and implementation of a field-based follow-up study of mothers who have received training on home-made SSS at the ORT demonstration sites (begin anytime).

Such a study should test the validity of assumptions regarding the availability of common measures (spoons and bottles) and the effectiveness of the teaching received at the demonstration site (about four to six months after national CDD office established).

5. Once a national CDD office is established, assistance in helping to recruit and train Nigerian specialists in ORT program planning and design, ORT promotion and marketing, and ORT supply and distribution.

### III. OVERVIEW OF HEALTH SERVICES AND ORT IN NIGERIA

With a population of nearly 100 million people living in nineteen states covering an area about the size of California, Nevada and Arizona combined, and with three major languages and 250 tribal groups and dialects, Nigeria exhibits considerable geographic, cultural and organizational diversity. Not surprisingly, this diversity is reflected in its health care and ORT activities.

## A. Organization of Health Services

Health care in Nigeria is provided by public health services, private clinics and hospitals, private voluntary organizations (PVOs) and a wide range of traditional healers. The relative strength of each source of health care varies considerably from one part of the country to another, with private and PVO care being much less available in the north.

1. Private health care -- Private health care has been growing in the coastal part of the country (the "West") and there is one chain of private hospitals based in Lagos which has a good reputation and reportedly operates ten hospitals. It was not possible during this visit to assess the proportion of health services provided by the private physicians, but they have an important potential role which needs to be considered more thoroughly in planning future ORT activities.

2. Private voluntary organizations -- PVOs appeared to be stronger in the southern part of the country (the "West" and the "East" in local terms), in part because the north is largely Muslim and has not had the same level of missionary activity. The Christian Health Association of Nigeria operates a pharmaceutical supply service known as CHANPHARM located in Jos, Plateau State. There were mixed reports about CHANPHARM and we were unsuccessful in efforts to contact CHANPHARM during the visit. From available information, it appears that PVOs are already aware of and involved in ORT activities, but we were unable to explore their present and potential future roles during this visit.

Nigeria is expecting a large USAID grant for PVO involvement in ORT. Thus far two organizations have been mentioned as possible recipients of funds: the Paediatric Association of Nigeria (PAN) and the National Association of Nigerian Nurses and Midwives (NANNM). PVOs which operate health services and provide direct patient care should also be considered for funding.

3. Traditional medicine -- Traditional practitioners are the primary source of care for a large, but apparently unquantified portion of the population. Efforts have been made to include traditional birth attendants (TBAs) in government health activities. Kano State, for example, trained 1651 TBAs between 1978 and 1981.

The traditional healers have a national association which is working for wider acceptance of traditional medicine. In newspaper articles appearing during our visit, the group reported being in contact with the WHO Traditional Medicine unit and claimed to have a cure for diarrhea which WHO was investigating. At present, Nigerian medical doctors seem strongly opposed to formally involving traditional healers in ORT, although there is a feeling that the traditional healers will probably adopt ORT if it becomes widespread and credible.

In some countries traditional healers are helping to bring ORS to segments of the population who might otherwise be missed. The

appropriateness and potential effectiveness of involving Nigerian traditional healers should be considered as part of the long-term ORT program.

4. Government Health Services -- Government health services exist at three levels:

- (1) Federal;
- (2) state; and
- (3) local governmental area (LGA).

The Federal government has responsibility for a large number of regulatory and coordination activities, but provides a relatively small proportion of direct health services. Federally operated health facilities include: 12 university teaching hospitals associated with the 12 medical schools, 6 specialty hospitals (3 neuro-psychiatric and 3 orthopaedic hospitals), and a small number of clinics designed to serve Federal employees.

Each of the 19 states has its own Ministry of Health and its own Health Management Board. In general, the Ministry of Health is responsible for regulatory functions, training, and preventive health services. The Health Management Boards are usually responsible for curative medicine, which includes the operation of state health facilities. Responsibility for specific functions can vary from state to state. Pharmaceutical procurement, for example, is under the Health Management Board in Kaduna State, but under the Ministry of Health in Sokoto State.

The state MOH usually has a chief health officer and the Health Management Board has a chief medical officer or principle medical officer. Again, the division of authority and responsibility between these two posts varies among states. When the two officials are in conflict it can have a significant negative impact on health programs.

Each state typically manages 10 to 20 general hospitals, up to 6 specialty hospitals, and 20 to 60 health centers (Rural Health Centers, Basic Health Services Scheme Health Clinics, Women and Children Welfare Clinics, Primary Care Clinics, and Family Health Clinics) throughout the state.

Each state is divided into 15 to 30 LGAs which are responsible for many of their own services. In addition to state-run general hospitals and health centers, each LGA has about 10 dispensaries (5 to 20, depending on size) and often an equal number of leprosy clinics.

The staff and operating budgets for health centers and dispensaries are provided by various combinations of state and LGA resources. For example, some states provide LGA-operated dispensaries with drugs from the state medical store and some do not. Nigeria has experienced severe financial troubles over the last two years and, as a result, states have cut back on providing LGAs with drugs and supplies.

## B. Current ORT Activities

Knowledge of ORT has existed in Nigeria since the 1970s and the Institute for Child Health, University of Lagos, has had an ORT project for about ten years. Paediatricians in Nigeria have been participating in WHO-sponsored research for several years and the results of a Nigerian double-blind study of the new citrate formula have just been forwarded to Geneva.

There has existed a National Committee on DDC for several years. The Committee is chaired by Dr. A.O. Sorungbe, Chief Consultant Epidemiologist and includes participation from the FMOH Health Planning Division, Public Health Services, Epidemiology Unit, Primary Health Care Division, and Health Education Unit. UNICEF, WHO, and USAID, including several PRITECH consultants, have made major contributions to the process.

Action on ORT was spurred by a February, 1984 visit by James Grant, Executive Director of UNICEF, during which the Head of State for Nigeria made a strong personal statement concerning EPI and ORT. Following this a national CDD plan was drafted (annexed in Robert Parker's July, 1984 visit report). However, as of this visit the national CDD plan has not been revised or formally adopted, no one has been officially appointed CDD coordinator, and no CDD office exists in the Ministry of Health. Dr. Salawu of the Epidemiology Unit is providing some coordination for the FMOH, although she is not in a policy-making position.

Even though no national CDD plan exists, there seems to be general agreement on the following points:

- a central goal should be effective preventive action in the home, including home preparation of SSS;
- ORS packets should generally reserved for use in health facilities and by community health workers;
- national mass media campaigns should be avoided until a large proportion of the doctors, nurses and other health workers accept and correctly understand ORT;
- training and promotional efforts should focus first on doctors, nurses, and auxiliary health workers.

The FMOH and international agency plans and documents seem to suggest a phased approach which looks something like the following:

Phase I Awareness -- Nearly everyone we met during the visit was aware of ORT, although there was also a great deal of misinformation;

Phase II Standards -- Local research has established guidelines for measuring water, salt and sugar (Annex E), which

hopefully will be adopted nationally;

- Phase III Zonal Demonstrations -- A demonstration project at Massey Street Children's Hospital is already serving as a model and teaching center for nurses and doctors from other areas. It is intended that demonstration projects be established at one hospital, health center, and dispensary in each of the four health zones in Nigeria (northeast, northwest, southeast and southwest); these projects are aimed at building the credibility and acceptance of ORT by doctors and nurses;
- Phase IV State Capital LGA Programs -- Following the EPI model, extend training and programming to capital LGAs in all 19 states;
- Phase V State-Wide Programs -- Continue to extend training to cover staff at all levels in each state;
- Phase VI Community Outreach and Mobilization -- The current plan suggests establishing credibility for and knowledge of ORT among doctors and other health workers before moving into the community with outreach programs, school programs, mass media, etc.

At present, UNICEF is working with the FMOH, PAN and other organizations to develop standard educational materials, to establish the demonstration projects, and to plan national expansion of ORT activities and ORS supply. USAID is active in arranging a variety of training activities which are summarized in the report of Joyce Lyons' recent PRITECH visit to Nigeria.

In 1984, Dr. Sulaiman, FMOH Director of Health Planning, ordered 500,000 ORS through UNICEF reimbursable procurement. These packets arrived at the Federal medical stores at Oshodi on October 18, 1984. This order was apparently not coordinated with other CDD activities. In any case, each state was informed that it could collect up to 25,000 packets from Oshodi warehouse. As of March 20, 1985, twelve out of nineteen states had collected a total of 267,740 packets.

Follow-up at the state level found that these packets were distributed by either the state EPI program or the state medical store. The packets were divided among health facilities according to standard formulas that are used for rationing most drugs and supplies. At the few hospitals and health centers which we visited, packets were being consumed rather slowly. Packets were being dispensed to mothers with verbal instructions and none were used at the hospital or health center. The chief consultant in pediatrics at one hospital claimed that he dispensed ORS packets to poorer mothers with instructions to mix the packet with "a pint" of water. More well-to-do mothers were given a prescription for Pedialyte to be mixed half-and-half with 5% dextrose water.

Since he was aware that local measures were not one liter, the pharmacist at one teaching hospital was telling mothers to pour part of the packet into a soft drink bottle, then fill it with water. The EPI coordinator responsible for distributing ORS in one state reported instructing EPI staff to have mothers mix the contents of the packets with one "Treetop" bottle of water (about 600 ml) -- instructions which, if followed, would yield a dangerously high concentration of ORS.

The chief pharmacists in two states and one teaching hospital reported buying small amounts of some form of ORS since at least the late 1970's, but the only significant supplies of ORS had been provided through UNICEF and the Federal Ministry of Health. However, Sokoto State, in which there was a great deal of ORT interest, is in the process of awarding a tender for 100,000 packets of ORS for 1984/1985. The best offer was 65 kobo or about US\$ .71 per packet!

One of the most exciting projects is the first of many planned ORS demonstration units. Launched February 5, 1985, the Massey Street Children's Hospital program consists of an outpatient area devoted exclusively to oral rehydration and teaching of ORT. Upon registering at the OPD, all mothers are asked if their children have diarrhea. With few exceptions, any child with diarrhea is triaged directly to the ORT unit, where rehydration therapy begins immediately. Children are then evaluated in the unit by doctors to determine whether there are associated illnesses such as malnutrition or malaria.

As of March 19, the unit had seen about 500 children. Only a handful required intravenous therapy ("drips"), in contrast to reportedly large numbers of children previously receiving drips. During the first six weeks of operation, only two of the 500 children died. In 1984 there were 227 diarrheal deaths -- four to five per week. February and March are low seasons for diarrhea, with rates being about half those of peak seasons. Thus, at least twelve deaths would normally have been expected during the six week period in which only two occurred -- an impressive record if it is to continue!

The Massey Street Children's Hospital is already serving as a training unit for nurses from other hospitals and health centers. It is expected that demonstration units will soon be established in each of Nigeria four major health zones. A brief, but comprehensive registration card has been developed for data gathering in these demonstration units (Figure 1).

At the time of our visit, plans were being made for another meeting of the national CDD committee, during which it is expected that current activities and future plans will be reviewed.

Figure 1: ORT Registration Card

Registration No. \_\_\_\_\_ Serial No. \_\_\_\_\_

## CLINICAL CHART TREATMENT OF DEHYDRATION (ORT)

Name \_\_\_\_\_ Date Admitted \_\_\_\_\_  
 Address \_\_\_\_\_ Age \_\_\_\_\_ Sex \_\_\_\_\_  
 \_\_\_\_\_ Weight \_\_\_\_\_ Temp \_\_\_\_\_  
 \_\_\_\_\_ Mild  
 Time Onset of Treatment \_\_\_\_\_ Clinical Assessment \_\_\_\_\_ Moderate  
 \_\_\_\_\_ Severe

Nutritional Status: \_\_\_\_\_ Good  
 \_\_\_\_\_ Marginal Dietary History: \_\_\_\_\_  
 \_\_\_\_\_ Malnourished \_\_\_\_\_ Breastfed to age: \_\_\_\_\_  
 \_\_\_\_\_ Bottled from age: \_\_\_\_\_  
 \_\_\_\_\_ Weaning foods (specify): \_\_\_\_\_

Remarks: \_\_\_\_\_  
 (fill where appropriate)

Drug Therapy: \_\_\_\_\_  
 Health Education: \_\_\_\_\_ Feeding \_\_\_\_\_ SSS \_\_\_\_\_ Dehydration signs \_\_\_\_\_  
 Follow up by: \_\_\_\_\_ Nutritionist \_\_\_\_\_ Social worker

Time and date discharged or transferred: \_\_\_\_\_  
 Put on I. V.? \_\_\_\_\_ (amount given)

### ESTIMATED FLUID REQUIRED \_\_\_\_\_

Time Period	Amount ORS Given Child	MENTAL STATE			EYES		Ant. Fontanelle		SKIN			Stools No. & Consistency	Vomiting
		Normal	Drowsy	Semi-Conscious	Normal	Sunken	Normal	Sunken	Normal	Dry	Poor Elasticity		
Onset													
1 hour													
3 hours													
6 hours													
12 hours													
18 hours													
24 hours													
_____													
_____													
<b>TOTALS</b>													

#### IV. ESTIMATION OF ORS REQUIREMENTS

In their early phases many ORT programs suffer from either substantial oversupply or substantial undersupply of ORS packets. Programs begin with essentially no existing ORS supply and a theoretically huge potential demand. Figure 2 summarizes the range of factors which can influence the effective supply of and demand for ORS packets.

Actual usage of ORS can vary profoundly, depending on the distribution structure and promotional methods. For an example, in an Egyptian experimental study of nearly 29,000 children between age one month and less than five years, there was a ten-fold variation in ORS usage with different intervention strategies.

The most important steps in minimizing the chances of significant shortages or overstocks are:

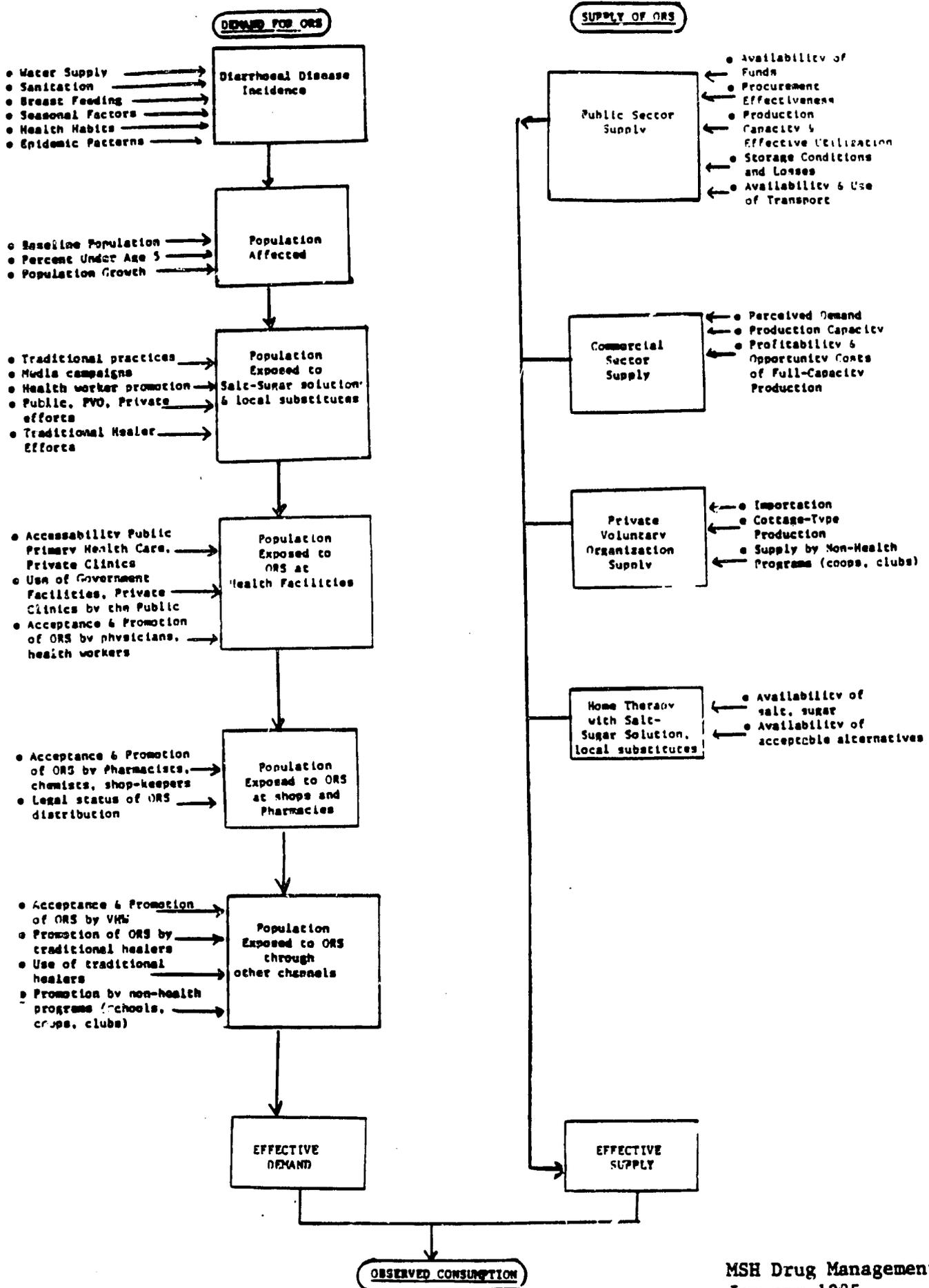
1. Make initial estimates as realistic as possible based on actual health service utilization data.
2. Establish from the beginning a basic information system to closely monitor ORS consumption.
3. If possible, plan on ordering initially at three to six month intervals, rather than nine to eighteen month intervals. This allows for frequent adjustment of order quantities.
4. Develop contingency plans which indicate what action will be taken if consumption is one-third of predicted consumption or if it is three times what is expected. The contingency plans, which need not be elaborate, should be based on information about available storage space (the requirement for which can easily be calculated from carton sizes), alternative suppliers (including telex numbers and payment terms), supplier lead times, and shipping routes.

##### A. Methods of Estimating ORS Requirements

There are three basic methods for estimating ORS requirements:

1. Service-Based -- Estimate the number of children under age 5 with diarrhea who are being seen at health facilities and, on the basis of the standard norm of treatment, calculate the number of ORS packets needed.
2. Population-Based -- Estimate the total population under age five, survey or estimate the prevalence of diarrhoeal disease, and based on the expected standard of treatment, calculate the quantity needed.
3. Consumption-Based -- Gather information on historical consumption patterns from medical stores or health care

Figure 2: Model for Planning ORS Requirements



facilities at which ORS is being distributed and, on this basis estimate the quantity needed for the entire program. Use of this method is usually limited by the lack of reliable, representative consumption data.

When the determination of ORS requirements is based on estimated parameters, then high, medium, and low estimates should be made using the extreme values of the estimated parameters. This gives planners a better sense of the range of ORS usage which they should be prepared to accommodate.

#### B. Preliminary Estimates of ORS Requirements in Nigeria

Realistic service-based or population-based estimates of ORS requirements depend on: (1) definition of the ORT program in which ORS packets will be used and (2) availability of reasonably complete data on population, health care utilization, diarrheal morbidity, and other factors -- neither of which exist in Nigeria at the present time. Nevertheless, it was possible to make some preliminary estimates of ORS consumption based on data collected during the consultation. Table 1 presents a summary of these estimates.

The service-based estimate includes only consumption of ORS at Federal, state and LGA health facilities. The population-based estimate considers commercial and traditional sources of ORS. The consumption-based estimate considers only recent issues from the central Federal medical store. The service-based estimate is the most relevant for program planning and is discussed below. The basis for the population-based and consumption-based estimates are given in Annex B.

#### C. Service-Based Estimates for Nigerian Public Health Facilities

The service-based estimates shown in Table 1 indicate the potential annual ORS consumption in Federal, state and LGA health facilities after three to five years of vigorous education, training and promotion of ORS. The following variables were used to make the projections:

Total National Population -- Taken to be 95,000,000.

Number of Attendances per Person per Year -- This is the average number of outpatient visits recorded for each person each year. This figure was obtained by dividing all recorded outpatient attendances in a given year by the estimated population for that year in each of three states.

Percent of Patients Under Age 5 -- The percent of outpatients who are less than age 5.

Percent of Patients Under Age 5 with Diarrhea -- Most records indicate only the percent of children for whom diarrhea was the presenting complaint ("primary diarrhea"). However an aggressive ORT program will also treat children with

**Table 1. PRELIMINARY Estimates of ORS Requirements for Nigeria**

**NOTE:** These estimates are based on approximated and incomplete data. They are intended primarily to demonstrate a methodology. The estimates should be revised as more current and more accurate data becomes available.

<b>Projected Annual ORS Consumption (millions of packets)</b>			
	<u>Low</u>	<u>Medium</u>	<u>High</u>
<b>Service-Based Estimate (a)</b>	1.1	7.6	20.9
<b>Population-Based Estimate (b)</b>	1.4	19.0	114.6
<b>Consumption-Based Estimate</b>	1.0	---	---

(a) Estimate for ORS requirements at Federal, state, LGA facilities only.

(b) Estimate for ORS requirements at public health facilities, retail pharmacies, patent medicine shops, and all other outlets.

diarrhea secondary to measles, malaria and other diseases. Therefore, data must be collected on both primary and secondary diarrheas.

Percent with Diarrhea Treated with ORS -- Since it is likely that many cases of diarrhea will be mild enough to be treated at home with SSS, it is necessary to estimate the percent of children who will be treated using ORS packets.

Liters of ORS per Child Treated -- Experience from Massey Street Children's Hospital indicates that the unit uses about 2 liters per child treated. Subsequent experience and changes to 600 ml individual packets or 6 liter institutional packets may influence this figure.

Table 2 summarizes the data collected during this consultation to estimate the above planning parameters. The only variable for which there is no available data is the percent with diarrhea who are treated with ORS. Low, medium, and high estimates of 33 %, 50 % and 80 % were used for the calculations. The estimate of 50 % is based on the expectation that a large proportion of diarrhea is relatively mild and that busy outpatient clinics will not use their time or ORS for on-site treatment of mild cases. These assumptions need to be validated by experiences from the field.

Table 3 presents the low, medium, and high estimates of serviced-based ORS requirements. Looking at the medium estimate, the calculation assumes a population of 95 million for the country, an average of one outpatient attendance per person per year, an average of 40 percent of these visits for children under age 5, an average of 20 percent of children under age 5 with diarrhea (15 percent primary, 5 percent secondary diarrhea), an average of 50 percent of children with diarrhea being treated with oral rehydration solution, and an average of 2 sachets used per child. This yields a medium estimate of:

$$95,000,000 \times 1.00 \times 0.40 \times 0.20 \times 0.50 \times 2 = 7,600,000.$$

As more experience accumulates, the actual numbers used in the calculations will change, but the basic methodology should remain sound. The method should be valid for national and state estimates. However, below the state level -- for individual LGAs and individual health facilities -- actual numbers of visits should be used, rather than estimates based on population. This is necessary because of the high migration to LGAs with larger or more specialized facilities.

**Table 2. Data Used for Making Service-Based Estimates of Public ORS Requirements**

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Total National Population: 93,730,000 1984 mid-year estimate

Number of Attendances per Person per Year:

- 1.16 Sokoto State, 1981, State and LGA facilities
- 1.05 Kano State, 1982, State and LGA facilities
- 0.44 Kaduna State, 1984, State facilities only; does not include LGA dispensaries, etc.

Percent of Patients Under Age 5:

- 45.8 Kaduna State Health Centers, 1982
- 41.2 Sokoto University Teaching Hospital, 1984 ("pediatric," which usually means under age 12)
- 24.0 Ibadan Community-Based Distribution Project, 1981-1984

Percent of Patients Under Age 5 with Diarrhea:

- 20.9 Gongola State, January-February, 1985, survey by Africare of 0-3 year olds at 8 hospitals and clinics.
- 19.0 Oluyoro Hospital, 1978-1979 (infants and children)
- 17.1 Massey Street Children's Hospital Acute Care visits, 1984.
- 10.9 Ibadan Community-Based Distribution Project, 1982-1983 (adults and children)
- 10.7 Sokoto State First Aid Centers, 1981 (adults and children)
- 8.5 Women and Childrens Welfare Clinic, 1984 (infants and children)

Liters of ORS per Child Treated: At the Massey Street Children's Hospital demonstration project, 40 to 60 liters per day are prepared for 15 to 20 children.

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**Table 3. Service-Based Estimate of Annual ORS Requirements for Public Health Facilities**

	<u>Low</u>	<u>Medium</u>	<u>High</u>
<b>Total National Population (millions)</b>	95	95	95
<b>Number of Outpatient Attendances per Person per Year</b>	0.80	1.00	1.10
<b>Percent of Patients Under Age 5</b>	0.30	0.40	0.50
<b>Percent of Patients Under Age 5 with Diarrhea</b>	0.15	0.20	0.25
<b>Primary</b>	(0.10)	(0.15)	(0.18)
<b>Secondary</b>	(0.05)	(0.05)	(0.07)
<b>Percent with Diarrhea Treated with ORS</b>	0.33	0.50	0.80
<b>Liters of ORS per Child Treated</b>	1	2	2
<b>TOTAL ESTIMATED ORS REQUIREMENTS (millions of liters)</b>	1.128	7.600	20.900

#### D. Five Year Estimates of ORS Requirements

It goes without saying that estimates based on estimates become progressively less reliable. Nevertheless, to demonstrate the approach, it is worth taking the above estimates one step further to project the growth of public health facility demand for ORS over the next five years. More accurate projection of demand will require more precise data and a national CDD plan establishing the sequence for training in ORT and for expanding the distribution of ORS packets.

Two five year projections were done, one based on expanding the distribution system for ORS following the EPI pattern as proposed in one UNICEF working document and the other based on simultaneous expansion of the distribution network in all states from hospitals gradually to health centers and dispensaries. Both estimates use the medium estimate parameters from Table 3. Neither estimate provides for changes in the total population, the percent under age 5 or other parameters in the estimate.

1. Projections Based on EPI Model -- Table 4 presents the projections based on the EPI pattern described in one UNICEF working document. The projections assume that distribution of ORS packets will begin with capital LGAs and then extend gradually to other LGAs. The projections also assume that the capital LGAs and the LGAs included earlier in the process are larger and draw more patients. Finally, they assume that demand in each newly added LGA will grow gradually over a period of 18 months before reaching its expected steady state.

In Table 4 the annual consumption of ORS packets for capital LGAs was estimated at 50,000 each, 35,000 each for the next 19 LGAs, then 25,000 each for the next 152 LGAs, then 20,000 each for the last 113 LGAs.

If supplies are provided according to this EPI model, the requirements for July-December, 1985 are estimated at 220,000; 1 million packets for 1986; 5.8 million packets for 1987 and 7.6 million packets for 1988 and beyond.

2. Projections Based on Simultaneous Expansion in All LGAs -- Another model for the diffusion of ORT training and subsequent packet distribution could be based on the following sequence: four zonal hospitals, health centers, and dispensaries, followed by programs in all capital LGAs, followed by programs in the hospital outpatient areas in all LGAs, followed by programs in health centers in all LGAs, followed by programs in all dispensaries in LGAs. This assumes that ORT training and supply will follow the typical distribution pattern of facilities central to the capital, then hospitals, then health centers, then dispensaries.

Basing projections on this sequence of training and supply activities should not be taken to mean that ORT should routinely be introduced at hospitals before health centers and health centers before dispensaries.

**Table 4. Service-Based Five-Year ORS Projections  
Based on EPI Model**

	Estimated Demand in Millions of Packets					
	July- Dec 1985	Jan- June 1986	July- Dec 1986	Jan- June 1987	July- Dec 1987	Jan- June 1988
4 Capital LGAs	100	100	100	100	100	100
15 Additional Capital LGAs	--	150	300	350	375	375
19 Add'l LGAs	--	--	250	300	332	322
152 Add'l LGAs	--	--	--	1,500	1,750	1,900
113 Final LGAs	--	--	--	--	1,000	1,130
Other Demand*	120	70	30	0	0	0
<b>TOTAL DEMAND</b>	<b>220</b>	<b>320</b>	<b>680</b>	<b>2,250</b>	<b>3,557</b>	<b>3,827</b>

**Summary of Annual Demand:**

1985 (July-December)	220,000 packets
1986	1,000,000 packets
1987	5,807,000 packets
1988	7,654,000 packets

\* Existing demand by states for ORS supplies available at the Federal pharmaceutical warehouse Oshodi. This demand is absorbed in the LGA figures as the program expands.

The projections are meant to illustrate the method.

The first step is to estimate the number of visits at each type of health facility. Table 5a provides low, average, and high visit rates for hospital outpatient clinics, health centers and dispensaries observed states. The estimated consumption of packets per health facility is based on the parameters used for the medium estimate in Table 3.

Table 5b shows the hypothetical expansion of ORT training and ORS supply to health facilities over a five year period. Official estimates of the number of hospitals, health centers and dispensaries in Nigeria were not available at the time of this writing, so these figures are estimated from the three states for which information was available.

Finally, in Table 5c ORS packet requirements are estimated on the basis of the consumption patterns in Table 5a and the expansion of health facility coverage in Table 5b.

Once a national plan and state plans are developed, these estimates can be revised to fit the agreed upon sequence of ORT training and ORS distribution.

**Table 5a. Estimated ORS Consumption at Hospitals Outpatient Clinics, Health Centers, and Dispensaries.**

	Annual Number of Attendances (nearest 1000)(a)			Estimated Annual ORS Consumption per facility
	<u>Low</u>	<u>Average</u>	<u>High</u>	
Hospital Outpatient Clinics	17,000	120,000	1,400,000	9,600
Health Centers (b)	21,000	46,000	103,000	3,700
Dispensaries	3,000	18,000	56,000	1,400

(a) Based on data from Kano, Sokoton, and Kaduna States

(b) Includes Rural Health Center, BHSS Health Clinics, Women and Children Welfare clinics, Primary Care Clinics, and Family Health Clinics.

**Table 5b. Hypothetical Number of Health Facilities at Each Level Whose Staff Have Received ORT Training and Which are Supplied with ORS**

	Number of Health Facilities Using ORS				
	1985	1986	1987	1988	1989
Hospital Outpatient Clinics	20	50	150	250	250
Health Centers	30	120	260	400	500
Dispensaries	20	300	900	1600	2400

**Table 5c. Hypothetical ORS Requirements at Each Level of Health Facility, 1985-1989**

	Estimated ORS Requirements (1000s liters)				
	1985	1986	1987	1988	1989
Hospital Outpatient Clinics	192	480	1,440	2,400	2,400
Health Centers	111	444	962	1,480	1,850
Dispensaries	28	420	1,260	2,240	3,360
<b>TOTAL</b>	<b>331</b>	<b>1,344</b>	<b>3,662</b>	<b>6,120</b>	<b>7,610</b>

## VI. SUPPLY OF ORS TO PUBLIC HEALTH FACILITIES

Issues related to ORS supply in public health facilities include the initial supply of ORS by donor agencies, plans for long-term procurement of ORS, plan for distribution of ORS and information system requirements for on-going management of ORS supplies.

### A. Initial Supply by Donor Agencies

Based on past practices and anticipated funding, it is likely that UNICEF and possibly USAID can provide large amounts of initial ORS stocks. However, in order for the Federal MoH and the states to begin planning for on-going ORS supplies, it will be useful for UNICEF, USAID, and other donor groups to specify as soon as possible the number of packets they will provide or length of time during which they will provide packets.

The number of packets required will depend on the supply strategy adopted by donor agencies. Based on the estimated requirements in the preceding section, packet requirements would be:

<u>Strategy</u>	<u>Annual ORS Requirements</u> (Number of packets)
1. Supply zonal demonstration project only.	60,000 - 100,000
2. Supply any demonstration project which applies for assistance.	150,000 - 200,000
3. Supply capital LGAs (19) as in EPI	800,000 - 1,200,000
4. Supply all EPI LGAs (38)	1 - 2 million
5. Supply all Federal, state, and LGA facilities	Up to 5 million per year after three years

Once donor agencies have determined their level of support, this can be clearly communicated to Federal and state officials.

If donors elect to provide large quantities of ORS during the first few years of the program, they should consider carefully their policy with regard to procurement from local producers. Obviously, support for local producers will encourage more local production. This in turn should increase competition and eventually lower prices. (Market dynamics in Nigeria are such that locally produced ORS is likely to be considerably more expensive than ORS supplied through UNICEF unless special action is taken.)

In the preceding section on ORS requirements, we emphasized that estimates of ORS requirements should be considered preliminary until the program is more fully defined and actual demand is observed. For this reason, it is suggested that donors initially procure ORS on a

six month supply cycle. While the program is expanding, a four to six month safety stock should be established and order quantities should be based on planned expansion in ORT activities as well as the most current information on issues from Federal and/or state supply points.

The UNICEF Supply Officer reports that travel time from Copenhagen to Lagos is two to three weeks and that ships leave Copenhagen about twice each month. But demand for ORS is high at UNIPAC and shipment delays are likely. Therefore, until delivery times are clearly established, a lead time of six months should be anticipated from initial inquiry until goods are received and cleared from the port.

Thus, an order initiated in June, 1985 should arrive by December, 1985 and should cover the expected demand between January and June, 1986.

#### B. Long-Term Procurement of ORS

Assuming that UNICEF and other donor agencies will not be providing ORS on a continuing basis, there are three potential mechanisms for procuring ORS for Nigerian public health facilities:

- (1) Federal procurement through the EPI program, which now procure only vaccines;
- (2) Federal procurement through the FMOH Pharmacy Department, which now procures only Dangerous Drugs for national distribution;
- (3) State procurement through their pharmacy services, the mechanism currently used for all pharmaceuticals other than Dangerous Drugs and vaccines.

The FMOH Director of Pharmaceutical Services was clear and unambiguous in his desire not to have his section involved in procuring ORS on a national basis. Although the states have been picking up the ORS ordered by Dr. Sulaiman at the pharmacy warehouse at Oshodi, this is an exception to routine supply procedures and probably not the best long-term solution.

Officials from the three states visited all expressed a strong preference for having ORS bought by their own pharmacy units, rather than depending on the Federal government. The Federal government was viewed as being unreliable and too bureaucratic.

ORS could be procured by the national EPI program and distributed through EPI channels. While EPI channels may be the most convenient means to distribute initial stocks of donor-supplied ORS, adding ORS to EPI would probably prove to be an undesirable additional burden to the EPI program. In addition, ORT programs have the potential of expanding much more rapidly than EPI.

Thus, it appears that the best long-term option is for states to procure ORS directly as part of their routine drug supply activities. This approach has the following advantages:

- (1) It is most compatible with current supply activities.
- (2) Procurement mechanisms are well-established in most states.
- (3) Port-clearing and delivery to state medical stores follows established patterns.
- (4) State-level ordering brings procurement decisions closer to the consumption points, making shortages and overstocks less likely.

At the same time, there are concerns which should be addressed in considering state drug supply mechanisms for providing ORS, including:

- (1) Drug budgets-- The adequacy of past state drug budgets is unknown, but recent drug budgets have been severely limited. In 1984 many states bought essentially no pharmaceuticals because of severe shortages in the availability of foreign exchange. States have recently begun buying on a month by month basis and some are planning annual tenders again. In one state a huge six-warehouse central pharmacy complex was virtually empty at the time of our visit.

In Kaduna State, the drug budget for 1983 was N 7 million, but only N 5 million was released. In 1984 N 3.5 million was budgeted, but these funds were just recently released (Kaduna State has an estimated population of 7 million people). Similarly, Oyo State has a drug budget of about N 3.5 million to provide for 95 state health facilities and a population of 6 million. Sokoto State estimated its drug budget to be N 3 million this year (population of 7.5 million, about 50,000 inpatient admissions and 8 million outpatient visits per year).

Limited funding for drugs appears to be a combination of resource limitation at the state level and severe restrictions on foreign exchange at the Federal level.

- (2) Supply to LGA Facilities -- Related to the lack of funds is the fact that several states have stopped supplying LGA facilities (dispensaries primarily) with drugs and supplies or provide only very limited quantities. The ability of the LGAs to buy on their own is not known, but it is likely that they would have to buy at high, local market prices.
- (3) Lack of Support from State Pharmacists and Drug Committees -- Procurement with state drug budgets requires that the chief pharmacist include ORS on draft procurement lists and that the state drug committees (consisting of anywhere from six to sixty physicians and pharmacists) approve the purchase of ORS.

Most states are buying antidiarrheal preparations, anti-

biotic preparations for use in treating diarrhea, and some form of oral rehydration preparation -- often Pedialyte or a non-WHO salt packet. None of the state pharmacists interviewed have enough knowledge of the cost-effectiveness of ORS and the hazards or wastefulness of antidiarrheals and antibiotics to advocate for ORS purchase. It appears that physicians on the state drug committees have not been interested in ORS either (except for recent interest in Sokoto State).

Thus, state pharmacists and members of state drug committees must become involved if the states are to be expected to procure adequate quantities of ORS.

- (4) Lead Time -- Depending on the time of year, the lead time for a routine drug order is six to twelve months. This leadtime must be anticipated if ORT programs are to depend on state procurement of ORS. Some states, however, have the flexibility to make local procurements on a monthly basis. Although more costly, this may help to ensure a regular supply of ORS.
- (5) Procurement Efficiency -- When bought through the state drug committees, ORS will compete with several hundred other products for limited funds. On the basis of observations during this visit, it appears that public drug procurement in Nigeria is administratively efficient, but in practice quite wasteful.

Procurement lists consist of large numbers of brand name drugs whose cost can be several times that of therapeutic equivalents which can be bought by their international non-propriety (generic) name -- often from the same manufacturer. This, combined with an incomplete knowledge of low-cost, high-quality supply sources, means that the limited funds available for drug purchases are in many instances used inefficiently.

In summary, procurement of ORS through state drug committees (and their parallel bodies at Federal teaching and specialty hospitals) appears at present to be the best long-term source of ORS for public health programs. However, for this to be a reliable source of continuing ORS supply it will be necessary for the national and state CDD programs to work closely with state chief pharmacists and drug committees to inform them about international ORS supply sources and world ORS prices (until local production is sufficient), convince them through demonstration projects of the cost-effectiveness of ORS, and coordinate with them the timing of ORS purchases within the context of expected ORS demand and normal supply lead times.

Finally, if the opportunity presents itself, there is a great deal of work which WHO, USAID, UNICEF or other groups can encourage and support in the area of improving the selection, procurement, and use of essential drugs. Any improvement in the drug supply system should improve the likelihood of regular supply of ORS.

### C. Distribution of ORS

The structure of the ORS distribution network will depend in part on whether ORS is purchased at the national or state level. If ORS is purchased at the national level, then provision needs to be made for distribution to the states.

During the first six to eighteen months of a national ORT program, distribution from Lagos to the states could be accomplished using the EPI vehicles (a fleet of Toyota Hiace's -- one for each state) and pick-up schedule. However, with a large scale program in each state the volume of ORS required would necessitate separate trips simply to collect ORS supplies. Alternatively, UNICEF has found the commercial distribution network to be quite efficient in distributing emergency shipments of essential drugs to the states. In the absence of regular Federal to state deliveries of other items (family planning commodities, essential drugs, etc.), it is suggested that, if ORS is purchased at the Federal level, distribution to the states be done with commercial transport.

At the state level, there are three distribution networks which currently supply government health facilities: (1) the state drug supply systems, (2) the EPI cold chain system, and (3) commercial distributors, in the case of health facilities which have their own budget to buy drugs locally. In the EPI program, each state has been provided by UNICEF with a few vehicles to start the program, but expansion of the distribution system to the entire state is the responsibility of the individual state governments. So too with ORS, it is probably best to encourage each state to determine its own distribution network for ORS. However, a few overview comments might be useful.

Nigeria has a relatively good transportation infrastructure, including roads, vehicles, fuel, and airlines. Since ORS requirements at most facilities will be relatively modest (one carton of 1000 packets every three to six months), it is reasonable to think only about existing state government drug and EPI distribution networks and not look to the commercial sector for distribution of ORS within individual states.

The EPI network which now exists (19 becoming 38 LGAs) appears to be efficient and is well-supplied with vehicles. The availability of transportation at local health facilities varies considerably from state to state, and LGA to LGA. In Sokoto LGA, for example, nearly all vaccines must be delivered to health facilities by state EPI vehicles, whereas in Kaduna LGA, the EPI program delivers vaccines only when available local clinic vehicles break down.

Use of the EPI distribution network for ORS is attractive, since a regular delivery schedule is being instituted and transportation is available in those LGAs with an established EPI program. However, since ORT does not require the large capital investment and tightly managed logistics system needed for EPI,

it is likely that ORT programs and the need for ORS distribution will expand much more rapidly than the EPI network. It would therefore appear that the EPI distribution network could be useful for ORS primarily during the early demonstration phases of the program.

This leaves existing state drug distribution networks as the remaining alternative for distributing ORS. These networks also vary from state to state and LGA to LGA. A useful part of Federal MoH and donor ORT activities would be to assist individual states in strengthening their drug distribution systems.

#### D. Information Requirements

Effective planning and management of ORT programs requires a variety of information, much of which is currently lacking in Nigeria. The WHO Manual for the Planning and Evaluation of National Diarrhoeal Diseases Control Programmes (WHO/CDD/SER/81.5 Rev. 1 (1984)) provides a very useful overview of the information required and the methods for collecting this information (pg. 10-13, 43-44, 77-86).

As with any information system, it is preferable to keep the system simple by collecting only that information which is needed for clinical and management decision-making and to collect the information as efficiently as possible.

The three data-collection methods relevant to ORT in Nigeria and the information required from each method are,

- (1) Routine Reporting -- Each clinical facility involved in ORT should report certain basic data, including,
  - number of patients seen each day/week/month
  - number of children under age five
  - percent of children with diarrhea
  - weekly/monthly consumption of ORS.
  
- (2) Sentinel Facility Reporting -- Since it is usually not feasible to get accurate, complete, and detailed information from all facilities, it is useful to select a small number of facilities which are representative, willing and capable to collect additional specific data, including,
  - percent of children under five with primary & secondary diarrhea;
  - percent of children with mild, moderate, severe diarrhea;
  - percent treated with ORS only & amount of ORS used;
  - percent treated with IV drips with or without ORS;
  - referral rate & mortality rate related to diarrhea;
  - daily, weekly, and monthly ORS consumption;
  - quantity of ORS which is spoiled, deteriorated, or

otherwise unused and wasted.

Initially, the sentinel facilities can be the demonstration facilities created to educate physicians and nurses about ORT. As the program expands, more representative facilities should be chosen for on-going data collection.

The "Clinical Chart/Treatment of Dehydration (ORT)" developed by Dr. Okaehialam, UNICEF and others for use in ORT demonstration projects (Figure 1) represents an excellent model for clinical information. In addition, each facility should maintain a stock card for recording ORS receipts and utilization. Stock cards exist at health facilities, but frequently are not kept current.

(3) Special Studies -- Finally, the state and national CDD program should determine the need for and coordinate, if not conduct, special studies needed to plan, implement and evaluate the effectiveness of ORT activities. Such studies might include,

- survey of current maternal beliefs and behavior regarding the recognition and treatment of diarrhea;
- survey of current buying habits with regard to anti-diarrheal patent medicines;
- survey of maternal understanding of and response to educational programs presented by nurses at demonstration facilities (ie, study of teaching effectiveness);
- longitudinal survey of hospitalization rates, IV therapy rates, and mortality rates at selected hospitals and health centers.

As a preliminary step to all data collection activities, the national CDD program should establish a set of definitions to be used for all ORT-related data collection and research. Without a common set of definitions, it will be difficult, if not impossible, to compare and combine data from different studies, different facilities, or different states. National ORT data collection guidelines should consider,

- definition of diarrhea;
- age groups for reporting purposes (under 1? under 2? under 3? under 5?);
- measure of ORS use ("packet"? liter? ml?);
- definition of mild, moderate, severe dehydration;
- acute versus chronic diarrhea.

The sooner the data collection system is established and the sooner common definitions are established, the easier it will be to develop a comprehensive national CDD plan and to monitor CDD activities.

## VI. COMMERCIAL DISTRIBUTION OF ORS

Nigeria has an active pharmaceutical industry with great potential for production and distribution of ORS. Roughly 80 % of pharmaceutical products are imported in finished dose form and about 20 % involve some degree of local production by some 40 pharmaceutical firms, three of which are government-sponsored. The last two years have been difficult for the industry because of foreign exchange restrictions.

There are approximately 3,000 registered pharmacists in Nigeria, about 1200 of whom operate private retail pharmacies. The Pharmaceutical Society of Nigeria consists of four member associations, the Association of General Practice Pharmacists, the Association of Hospital Pharmacists, the Association of Industrial Pharmacists and the Association of Academic Pharmacists. There are six schools of pharmacy in the country and programs in clinical pharmacy are developing at three of the schools. The Registrar for the Pharmacist's Board of Nigeria felt that the associations would be quite interested in participating in ORT education, production, and distribution. One potential barrier is that the Society has recently been quite critical of UNICEF for its role in procuring essential drugs and, in doing so, undermining local industry.

In addition to retail pharmacies, Nigeria has over 20,000 patent medicine shops licensed by the states to sell nonprescription drugs, although, in fact, they sell many prescription drugs too. Even most rural LGAs have at least one patent medicine shop and in some LGAs there are more patent medicine shops than dispensaries.

Pharmaceutical products, including antidiarrheal agents, are found throughout the marketplaces. One product which is heavily promoted by Beecham Limited ("By Appointment to H.M. the Queen") is Lucozade, a 710 ml bottle of carbonated glucose water supplemented with caffeine, citric acid, lactic acid, vitamin C, and some miscellaneous ingredients -- "The sparkling glucose drink -- replaces lost energy." This product, which sells for 5 to 7 nira is ubiquitous in the markets and now comes first before flowers as the item to take when visiting sick relatives at home or in the hospital. Thus, the commercial sector has already demonstrated its ability to successfully promote the concept of a "magic drink" for certain illnesses.

Although the commercial sector clearly has a well-established and potentially important infrastructure for ORS distribution, the current promotional and sales efforts are much the same as those elsewhere: antidiarrheal combinations including kaolin, various spices, narcotics, etc. as well as antibiotic preparations. Thus, a great deal of effort will have to be directed toward educating the entire commercial sector. In this regard, it will be important for the CDD program to consider carefully the relationship it wishes to develop with private industry.

In Nigeria drug control is a Federal matter. Therefore, the industry can be approached with a regulatory, potentially confrontational perspective. On the other hand, industry has also demonstrated some tendency toward enlightened self-interest and is potentially a cooperative partner in the promotion of ORT. Therefore, it is strongly urged that all groups involved in CDD activities consider carefully the various roles which industry might play before embarking on a course of restrictive legislation.

A useful starting place might be with a meeting which includes representatives from each of the member associations of the Pharmaceutical Society of Nigeria. Each association has an important potential role in different aspects of ORS.

## VII. SUPPLY ISSUES IN LOCAL PRODUCTION

During the visit, Mr. Hans Faust, WHO/UNICEF, Geneva, visited and advised several potential local production sites, including AstraArewa, Ltd. in Kaduna, Sokoto Investment Company, Ltd. in Sokoto, the FMOH Pharmaceutical Manufacturing Laboratory at Yaba near Lagos, and the Biomedical Services Company Limited in Ilorin. Technical aspects of these visits are discussed in Mr. Faust's report. However, there are several supply-related concerns which should be considered by national and state CDD planners.

First, recent foreign exchange restrictions have created raw material shortages. At the present time, only a few of the raw materials needed for ORS production are available in the country. Thus, local producers may need some assistance in obtaining import licenses. One option would be for Federal or state governments to import the raw materials as part of their pharmaceutical procurements, then contract the packaging and finishing to the local producers.

A second concern is that, with a large and potentially lucrative commercial market, local production may not be sufficient for government needs. In addition, there is a certain producer preference for the commercial market. This seems to be based partly on higher prices, but possibly more importantly on more reliable payment from commercial wholesalers and retailers than from the government. Thus, it may be important for the government to maintain flexibility to use both domestic and foreign supply sources.

Thirdly, the structure of the local pharmaceutical market often results in prices substantially above reasonable market prices. For example, IV solutions costing less than N 0.50 on the world market sell for N 2.50 at the factory and are purchased by the government through distributors for reportedly N 8.00 to 15.00. ORS which costs less than N 0.10 through UNICEF is offered by commercial tenders at N 0.60. Thus, without the type of packaging contract mentioned above or some other form of control,

it is quite likely that local production will result in higher, rather than lower prices. Whether there is a net savings in foreign exchange will depend on the plant's efficiency.

Thus, although local production is feasible and desirable in many ways, there are certain potential problems which need to be addressed in order to assure a steady supply for the public and private sectors.

#### VIII. ORGANIZATION OF NIGERIAN CDD ACTIVITIES

The size and political geography of Nigeria present unique problems for planning and organizing a national CDD program. Thus far, CDD activities have been undertaken jointly by various offices in the Federal and state ministries of health and the donor agencies without the creation of a CDD program per se. While, this appears to be advantageous in certain respects, there appears to be a growing need for the formation of a CDD program in the Federal Ministry of Health and, eventually, in each state.

Since ORT programs rely heavily on transfer of information and behavioral changes, rather than on an elaborate logistics network, there is the potential for ORT activities to grow rapidly.

In establishing a national CDD program, it will be important to distinguish the roles of the Federal and the state governments. At the Federal level it may be useful to develop a local team of FMOH staff with expertise in specific aspects of ORT to serve as resource people for the state programs. Thus, a Federal level CDD epidemiologist might work with the states on data collection and analysis, while another Federal CDD person might be trained to help states work with local retail pharmacies and patent medicine shops.

Experiences from other countries which have been rejected at the Federal level as irrelevant to Nigeria may in fact have valuable application in individual states. As states identify their own CDD coordinators, these coordinators will benefit from selected visits to other countries and to international CDD conferences.

The states remain skeptical of many Federal activities and at least some of the states have significant initiative and organizational capability. It will be important for Federal CDD to provide strong guidance for the states who need it, while at the same time not holding back those states capable of substantial progress on their own.

## ANNEXES

- Annex A: Schedule of Activities and People Met**
- Annex B: Population-Based and Consumption-Based Estimates of ORS Requirements**
- Annex C: ORT Programme Review Notes, UNICEF**
- Annex D: Nigerian Paediatricians and the Child Survival Revolution  
Richard S. Reid**
- Annex E: Standardization of Home-Made Salt-Sugar Solutions for the Treatment of Acute Diarrhoeal Diseases of Childhood in Nigeria**

**Annex A: Schedule of Activities and People Met**

**Monday, March 18**

Arrival Lagos, Late Afternoon

**Tuesday, March 19**

UNICEF - Dr. Alan Brody

Dr. Gary Gleason, Communications Support Officer

Dr. Teddy Okeahialam, Dept. of Paediatrics, College of Medicine,  
University of Nigeria, Enugu Campus; Temporary Advisor to  
UNICEF

USAID

Ms. Keys MacManus

Mrs. H.O. Shitla-bey, Public Health Officer

Massey St. Children's Hospital

Dr. Opaleye, Chief Consultant, Paediatrics, Massey Street  
Children's Hospital, Lagos

**Wednesday, March 20**

Dr. Salawu, Epidemiology Unit, FMOH

Oshodi Warehouse

Alexander Malyavin, Epidemiological Technical Officer, UNICEF  
Warehouse Officer, FMOH EPI Program

FMOH

Dr. Philip Emafo, Director, Pharmaceutical Services

Mr. Brown, Chief Pharmacist

**Thursday, March 21: Travel by car to Ibadan, Capital of Oyo State**

University College Hospital, Ibadan

Dr. O. Seriki, Dept. Paediatrics

Community-Based Delivery (CBD) of Low-Cost Family Planning and  
Maternal and Child Health/Women and Development, Ibadan

Dr. Bill Gibb, UCH/Columbia University

Mrs. W.E. Delano, Nurse

Martin McCann, Director, CUSO (Canadian Development Group),  
Ibadan

Oyo State Health Council

Dr. O.A. Afonja, Chairman

Harriet Olusola Abimboleg, Chief Pharmacist

Friday, March 22: Travel by air to Kaduna, Capital of Kaduna State  
Kaduna State MOH and Health Management Board  
Dr. Suleman Sani, Chief Medical Officer  
Dr. Y.D. Armiya'u, Chief Executive, Kaduna State Health Management Board

Kaduna State EPI Program  
Dr. M. Nadarajah, Consultant  
Mr. C. Zwahu, Principle Health Superintendent  
Mr. H. Kusada, Principle Health Superintendent

Kaduna State Medical Stores  
Mrs. Saadatu, Assistant Chief Pharmacist in Charge of Stores

Dr. I. Aliya, Private Paediatrician, Kaduna, Member State Health Management Board, Member Astra-Arewa Ltd. Board of Directors

UNICEF, Kaduna  
Mr. Hussein Bin-Human, Program Officer

Astra-Arewa Ltd.

Sunday, March 24: Travel by car to Sokoto, capital of Sokoto State  
Sokoto State  
Stalin Ewoigbokhan, Sokoto State EPI Coordinator, Sokoto State Ministry of Health  
Musa Ahmed Bungudu, Principle Health Educator, Primary Health Care Unit, Sokoto State Ministry of Health

Monday, March 25  
Sokoto State Ministry of Health  
Mrs. Hajia Fatima Ibrahim, Commissioner  
Alhaji Husaini Aliyu, Permanent Secretary  
Alhaji Yusuf Jega, Principal Secretary  
Alhaji Abdullahi Birnin Kebbi, Project Manager, Primary Health Care Unit  
Alhaji Budah, Chief Pharmacist  
Umer J. Ahmed, Principal Pharmacist

Sokoto University Teaching Hospital  
Dr. Alhaji Shehu Suleiman, Director of Administration  
Dr. T.J. Matthew, Director of Clinical Services and Teaching  
Dr. De, Chief Consultant, Pediatrics

Sokoto Investment Company, Ltd.  
Mr. L. Ammani, Controller

Sokoto State Ministry of Health Epidemiology Unit  
Alhaji Rabo, Project Manager  
Abubakar Sidik, Coordinator EPI

Sokoto State Health Services Management Board  
Alhaji Nuhu B. Koke, Chairman  
Dr. A.M. Maishana, Secretary

Dr. (Mrs.) A.J. Suka, Principle Medical Officer

Tuesday, March 26

Women and Children Welfare Clinic, Sokoto  
Dr. (Mrs.) Essau  
Mrs. Matankari, Chief Health Sister

Travel by air to Lagos

UNICEF

Wednesday, March 27

UNICEF

Mr. Lloyd W. (Bill) Clayton, Programme Support and Supply Officer

Federal Ministry of Health  
Dr. Salawu, Epidemiology Unit

West African Pharmaceutical Federation  
Mr. M.C. Azuike, Secretary General, West African Pharmaceutical  
Federation and Registrar, Pharmacist's Board of Nigeria

Thursday, March 28

Federal Ministry of Health, UNICEF, USAID Meeting

Mr. Obolami, National Health Planning  
Key MacManus, USAID  
Dr. Salawu, Epidemiology Unit, FMod  
Dr. Nike Grange, Lagos University Hospital, Department of  
Paediatrics  
Dr. Gary Gleason, UNICEF  
Dr. Hans Faust, WHO/Geneva  
Dr. T.C. Okeahialam

Friday, March 29

General FMOH Meeting with International Donor Agencies

Dr. E. N. Nsan, Minister of Health, FMOH

Meeting with FMOH Health Planning

Dr. Sulaiman, Director of Health Planning  
Ms. Keys MacManus, USAID

## ANNEX B. Population-Based and Consumption-Based Estimates of ORS Requirements

The consumption-based estimate presented in Table 1 is based simply on the observation that, since the Federal Ministry of Health warehouse at Oshodi received a stock of 500,000 sachets of ORS in October, 1984, they have been issued at the rate of roughly 46,400 sachets per month to twelve of nineteen states. For all nineteen states, this would represent an annual consumption of 881,600 sachets per year. Given the circumstances under which these ORS sachets were procured and are being distributed, this figure is probably unreliable for any form of estimate of future demand.

The parameters used to make the population-based estimated are shown in Table B. There appears to be general agreement that the population is about 95,000,000 at the present time, although some estimate slightly higher. Since there has not been a census since 1963, estimates of the under age 5 population are also uncertain. Most estimates are close to 20 percent.

Data on the incidence of diarrhea in the under age 5 population are also difficult to obtain. Pediatricians seem to feel that an incidence of two cases per child per year is reasonable. However, unpublished data from studies currently in progress suggest a true incidence of 5 to 6 cases per child per year. No estimate of severity of these cases was available.

Since ORS may ultimately be sold through retail pharmacies, patent medicine shops, and by some traditional healers as well as distributed through public health facilities, consumption will depend on access to ORS through any or all of these channels. There is absolutely no data to suggest the potential access, so estimates of 25 %, 50 %, and 75 % were made virtually arbitrarily.

The percent of children with access to any of these sources of care who actually are treated with ORS will also vary. Again, there is no data, but we estimate that as few as one-third and as many as two-thirds of children identified as having diarrhea will received ORS. In light of the probable cost and the short duration of most diarrhea, it is likely that most children will only receive on the average one or two sachets of ORS per episode.

Combining the low, medium, and high estimates of these parameters yields estimates of ORS requirements ranging from 1.4 million per year to 114 million per year. This 80-fold variation in estimates of ORS requirements underlines the importance of collecting additional data and verifying existing on the population, on diarrheal disease incidence and on treatment patterns.

**Table B. Population-Based Estimate of Annual ORS Requirements for Nigeria, All Sectors**

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	Low	Medium	High
Total National Population (millions)	95	95	95
Percent under age 5	.18	.20	.24
Cases of diarrhea per year per child under age 5	1	2	5
Percent of children (cases) with access to any form of health care (see text)	.25	.50	.75
Percent of children treated with ORS	.33	.50	.67
Number of packets per case treated	1	2	2
<b>TOTAL ESTIMATED ORS REQUIREMENTS</b> (millions of liters)	1.4	19.0	114.6

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[note: The following notes represent discussions held by UNICEF programming staff during the first day of a Retreat held 8-9 March, 1985. They are a summary of ideas and issues considered by one of four groups which held discussions that afternoon. This particular group was asked to look at ORT programming. The notes are thus merely "thoughts in progress", and are in no way meant to represent either Nigerian Government or UNICEF policy.]

In developing countries in general, mortality from diarrhoeal diseases, and specifically from dehydration, approaches the combined mortality of the six killer diseases tackled by EPI. The data available indicates that Nigeria is not different from other countries in this respect. The group therefore agreed that ORT must be considered one of our very high priority programme components.

The central objective of an ORT programme in Nigeria is to significantly reduce such mortality. (Evaluation mechanisms need to be set in motion so that level of achievement of this objective can be measured.)

It was agreed that major reductions in child mortality from diarrhoea depend upon early home action by parents to prevent dehydration and to forestall the potential nutritional complications of diarrhoea. Such early home action will require parents to acquire extensive new knowledge, and to receive that knowledge within a social context which will encourage them to put that new knowledge into action. It was agreed that, in the longer term, such new knowledge should be provided to parents via every sort of willing and able communication and organizational channels available to reach them.

It was also agreed, however, that such general action to extend knowledge about ORT will not result in widespread changes in behaviour unless the health system itself -- from policy echelons to the rural health posts -- becomes involved in the practice and promotion of ORT. This is not the case at the moment, so that any attempts to promote ORT to the public are likely to create confusion and possibly some conflict, given the alternative recommendations on diarrhoea management that health workers are promoting.

An ORT programme in Nigeria must therefore first (or concurrently) set out to achieve certain service-level objectives related to:

- 1) Provision of ORT services in health facilities, whereby ORT is the first line of treatment of diarrhoea, and parents of children receiving such treatment are given training on diarrhoea management consonant with ORT.
- 2) Mounting of health system outreach activities to train parents on ORT.

The group reviewed and generally approved UNICEF's ORT activities planned for the period March to July, 1985. These are aimed at creating a skeletal infrastructure of institutions and trained personnel that would be able to initiate activities under point (1) in the previous paragraph.

These activities are also aimed at gaining a knowledge base necessary for initiating any kind of wider scale activities under points (1) and (2) above. The group felt that these activities could also be used to broaden our knowledge about possibilities for community action on ORT. As those involved in ORT activities are already stretched to the limit, however, it was felt that UNICEF would need to allocate additional resources of staff time to this aspect of the programme.

The March to July activities planned are as follows:

I. Expansion of the Massey Street demonstration model into two Lagos clinics. Objectives of this exercise are:

- a. To gather knowledge about optimal design of ORT services at the clinic and health post levels.
- b. To gather knowledge about issues involved in the reorientation of health workers on ORT, and in the implementation of ORT activities in clinics and health posts.
- c. To develop "demonstration models" of ORT services and parent education at different levels of the health system.
- d. To identify and involve personnel who can serve in subsequent zonal implementation of ORT activities.
- e. To provide opportunities to develop and pre-test training and communication support materials for ORT programme development.

II. Adapting the Lagos State experiences, UNICEF and the Federal Ministry will assist the development of three other ORT zonal demonstration models (at Enugu, Yola and Sokoto), encompassing facilities at hospital, clinic and health post levels. The objectives of these activities are the same as in (I), in addition looking at regional variations.

III. The March-July period will be used to develop prototypes of training designs and communication support materials. These will be designed to provide health workers with knowledge about the principles of ORT, as well as to provide them with ideas for putting such principles into practice in a programme that can marry curative and preventative activities in the context of the Nigerian health-care delivery system. The group proposed special attention to development and testing (in the zonal centres) of prototype research designs to examine knowledge, attitudes and practices of parents in specific community contexts, and to apply the findings to the ongoing improvement of health education techniques and materials being used by the health workers. [It was suggested that additional resources of staff time and expertise might be required for this purpose.]

Work is also planned to develop materials, a training design, and a practicum for pre-service training on ORT for health workers. This will involve UNICEF, PRITECH (USAID sponsored), and the Primary Health Care Unit of the Federal Ministry.

IV. Development of a programme with the Paediatrics Association of Nigeria-- During March and April, PAN and UNICEF will explore ways in which the country's 200-300 paediatricians might take a lead role in the reorientation of other health personnel concerning ORT, and by June will attempt to formulate a programme that might facilitate their carrying out such a role. Implementation might begin by June or July, probably in the form of initial zonal workshops to orientate and involve paediatricians concerning ORT and its implementation in the Nigerian health system.

Activities in these four areas are aimed at laying foundations for initiation of useful, immediate-action-oriented State Planning Workshops, beginning in July, 1985. Such workshops would be designed to lead to a quick implementation of ORT programmes and their expansion in each of the 19 states. The group proposed the following objectives for the July 1985 to February 1986 period:

- 1) With WHO assistance, mounting of at least three State managerial training workshops on ORT (in July, September, and November). these would provide ORT orientation and training of State managers and at least two other persons from each of the 19 states by January, 1986.
- 2) Establishment of ORT hospital demonstration facilities in each of the 19 states by January, 1986.
- 3) Training on ORT (knowledge and implementation) for heads of all government health institutions (including local government maternities) in the initial 38 LGA's of the EPI programme, by March, 1986.
- 4) Assure provision of adequate supplies of ORS packets for in-clinic ORT treatment of all diarrhoea cases in the 38 LGAs.

The group felt that if the resources can be found to implement the above objectives by March, 1986, then the schedule for further implementation of ORT in Nigeria would be as follows:

March, 1986 to February, 1987:

- In conjunction with EPI community communication activities, bring knowledge of ORT to at least 50% of parents of 0-2 year olds in the initial 38 LGAs.
- Expand ORT services into all government health institutions in an additional 152 LGA's, through training of heads of institutions.
- Assure adequate numbers of ORS packets for in-facility treatment of all cases of diarrhoea in the first 190 LGA's.

March, 1987 to February, 1988:

- Bring knowledge of ORT to at least 80% of relevant parents in the initial 38 LGA's.
- Bring knowledge of ORT to at least 50% of relevant parents in the second cohort of 152 LGA's.
- Expand ORT services into all government health institutions in the remaining 113 LGA's.
- Assure adequate numbers of ORS packets for in-facility treatment of all cases of diarrhoea in all public health facilities in Nigeria.

March, 1988 to February, 1989:

- Maintain knowledge of ORT at at least 80% of all parents of 0-2 year olds, and boost ratio of those practicing ORT, in the initial 38 LGA's.
- Bring knowledge of ORT to at least 80% of relevant parents in the second cohort of 152 LGA's.
- Bring knowledge of ORT to at least 50% of relevant parents in the

final cohort of 113 LGA's.

--Assure continued provision of adequate supplies of ORS packets.

March, 1989 to February, 1990:

--Maintain knowledge and boost practice of ORT (as above) in the first 190 LGA's.

--Bring knowledge of ORT to at least 80% of relevant parents in the final cohort of 113 LGA's.

--Assure sustainability of a system that will guarantee continued provision of adequate supplies of ORS packets for in-facility treatment of all cases of diarrhoea, and for meeting public demand for packets for home use.

A final area of programming concerns local production of ORS packets, to meet the obviously great supply requirements the programme as outlined would generate. Activities to explore local production will begin in approximately ten days, with the arrival of two consultants who will examine and advise on issues related to local production and distribution of ORS packets.

**NIGERIAN PAEDIATRICIANS**

and the

**CHILD SURVIVAL REVOLUTION**

A LECTURE BY

**RICHARD S. REID,  
UNICEF REPRESENTATIVE, NIGERIA**

at the

**16TH ANNUAL CONFERENCE**

of the

**PAEDIATRICS ASSOCIATION OF NIGERIA**

**1985**

**UNIVERSITY OF IBADAN CONFERENCE CENTRE**

NIGERIAN PAEDIATRICIANS

and the

CHILD SURVIVAL REVOLUTION

Mr. Chairman, honoured guests, I come to you today to speak of a Child Survival Revolution in Nigeria. The Revolution is now afoot and spreading, but it needs each of you, as paediatricians, as its key allies. Given what we have all seen of the powerful takeoff in Nigeria of one element of the Revolution, the accelerated Expanded Programme on Immunisation, since its launching in October by the Head of State, and the strong prospects for a national oral rehydration promotion programme soon, I and my UNICEF colleagues, and more and more of our Nigerian colleagues in health, believe that such a Revolution is not only feasible but well within our grasp. It is as if we had reached the quarterfinals -- perhaps the semi-finals -- of the World Cup. Will Nigeria go to the finals? That will depend in no small part on you here.

Many of you were present in Manila at the International Paediatric Association Congress in 1982, when the Executive Director of UNICEF, Mr. James Grant, pointed out that the achievement of a Child Survival Revolution is a quite achievable goal if enough of us are determined to make it a reality. A commitment to the CSR can offer new hope in these dark economic times to the health of the almost five million children who will be born into poor Nigerian families in 1985. But this is a goal that can be achieved only with the help of those in this hall.

Paediatricians have a tradition of leadership in pursuing an improved quality of life for children. It is almost a cliché to say that

paediatricians, because they deal so much with growth and development (the positive biologic forces) and the dynamics of the family (the core of social structure) are often the most likely group of physicians to stress the social aetiologies of health and illness in addition to the biological under-pinnings of disease.

While paediatricians may deal with "little people", it does seem to me that you have a natural affinity for big issues. And as many of you know better than I, these big issues only respond to a synergistic combination of social and scientific efforts. The use made of medical knowledge, and the efficiency of health protection, depend, after all, chiefly upon social organization. Witness China. Witness Cuba. Dr. Halfdan Mahler, the Director-General of the World Health Organization, has said this:

"Developing countries can extricate themselves from the vicious cycle of disease and poverty. What is the prescription? I submit that it is a social one".

Here in Nigeria the prescription, and solution, can also be a social one, and that is why I am stressing the crucial role of paediatricians like yourselves in this great effort -- an effort which can and will succeed here at home, with large, documented, visible reductions in child morbidity and deaths, but which will also constitute, as it gains momentum, the most important large-scale public health breakthrough in Africa since the eradication of smallpox, and will make Nigeria an undisputed pioneer in child health advances.

I would like next to describe developments around the world which convince us that this revolution in child survival is well and truly underwa

First, however, let me briefly review the current status of children in Nigeria. Excluding China, we have in Nigeria in 1985 the fifth largest child population in the developing world -- some 17 million under-fives, and nearly five million in their first year of life. Of these nearly five million babies, some 600,000 will die before they complete their first year -- that is, 1600 Nigerian infants will die each day in 1985 -- almost of them from causes preventable by the measures of the Child Survival Revolution.

Now five million children is a large practice. But I submit to you that this is, indeed, the group that forms your most important practice, even though you cannot begin to deal with all of them individually. It is in this practice that you, along with others, are most needed, and where you can have the greatest impact in promoting health and combatting disease, disability, and premature death. What is the outlook for the Nigerian children in this huge practice? What is the diagnosis of their life-setting?

Over the past several years, even in the face of the kind of stark and difficult economic times which beset Nigeria today, converging means have been identified -- breakthroughs have been made -- which make a Child Survival Revolution possible now as never before. In large part as a result of the field experience of hundreds of small projects -- some of them undoubtedly led by paediatricians here today -- our attention has increasingly focused on several basic problems responsible for the majority of all children's deaths, including most notably diarrhoea and the six killer diseases covered by the EPI. This focus emphasizes four simple and low-cost -- although not easy -- approaches that have become integral elements of the Child Survival Revolution.

None of these measures -- growth surveillance of small children, oral rehydration therapy, breastfeeding and better weaning, and universal immunization -- grouped together by UNICEF into the acronym GOBI -- is new to you in this hall. The best in paediatric practice and training has stressed these measures for years. In many ways, however, either the technology by which these measures are applied has been greatly enhanced (as with oral rehydration for the great majority of diarrhoeal episodes, more heat-stable vaccines for some immunizations, and cold boxes capable of protecting vaccines in the field for up to ten days), or our appreciation of their value is newly strengthened (as with the importance of breastfeeding and growth surveillance).

Why are these measures so important? The answer will not be complex to any of you.

● First, growth surveillance (using simple cardboard charts the mother keeps at home) is important because parents want to do the best thing for their children, but the majority are not able to recognize the early states of malnutrition when it is still relatively easy to reverse. Malnutrition can be quite invisible. Parents almost always fail to recognize it; even doctors overlook it at times. Paediatricians have long known that regular, incremental gains in height and weight are the surest signs of good health and adequate nutrition. By providing a simple method for monthly growth measurement, mothers can learn whether their children are growing -- and to find remedies, many of which are within their own control, if they are not. Thanks to the latest technology in paper, eight kobo can buy an indestructible growth chart which the mother can keep and

use -- a permanent textbook if you will -- on which other messages, such as EPI reminders, can be printed.

On this topic of growth monitoring and malnutrition there is an irony for Nigeria. The world's first widely-used growth chart, the "Road to Health" chart, was developed in this country in the Fifties by David Morley and his colleagues at Ilesha. Like a prophet ignored in his own country, the Road to Health chart is seldom used in Nigeria today, and its aims of adequate universal nutrition have certainly been missed. How else to explain that 40 per cent of Nigerian children are malnourished, and that the 12-year-old child in rural Kano is 3 inches shorter than his age-mate in Victoria Island or Ikoyi in Lagos?

- Second, the dehydration caused by diarrhoeal infection is one of the largest causes of child death in Nigeria, and contributes to the malnutrition of hundreds of thousand who do not die from it. It kills a child every six seconds around the world. Nigerian under-fives in UNICEF project areas around the country have been found to have six major bouts of diarrhoea a year.

In recent years a dramatic solution has been found -- a solution heralded by the Lancet, the British medical journal, as "perhaps the most important medical breakthrough of the 20th century." This solution, developed by paediatricians and others in a score of countries is oral rehydration therapy (ORT), a simple combination of salt, glucose, and water. ORT, combined with the knowledge that children suffering from diarrhoea should continue to be fed, can prevent the dehydration that

causes most of these deaths. The cost of a cure, through one of the silverfoil packets distributed by WHO and UNICEF, is a few kobo. As you all know, a mixture nearly as effective as these manufactured packets can be made by a knowledgeable mother with sugar and salt.

I know that much more will be said about oral rehydration during this Congress. UNICEF, the Federal Ministry of Health, USAID, and others will soon be launching in Nigeria a major programme of ORT promotion. There seems to be no doubt that such a programme can succeed if it has the proper social marketing and support from health professionals. Honduras, in Central America, is a case in point. In less than two years, an ORT promotion campaign in that country, using radio advertisements and doctors and nurses as trainers, had succeeded in causing 40 per cent of all diarrhoeal cases in a target population of 400,000 to be treated with ORT. Ninety-three per cent of the population were shown by surveys to know of oral rehydration therapy, and 48 per cent had used it at least once.

• Third, the promotion of breastfeeding is important for a variety of reasons. As long recognized, bottle-fed babies of the poor are three to four times as likely to be malnourished; a mother's immunities are not passed along through through bottle-feeding; diarrhoea-causing dirty bottles and contaminated infant formula area all too common; and breastfeeding saves money and also acts as a natural and affordable child-spacing mechanism. UNICEF has found in Nigeria that the decline of breastfeeding in this country is not yet a crisis-level problem. Virtually all rural mothers breastfeed for an average of more than 18 months. In cities such

as Lagos, however, while 85-90 per cent of mothers breastfeed at the outset, the average length of breastfeeding, measured in a 1982 survey of Lagos mothers, is barely more than three months, an alarmingly short period. This early cut-off is often combined with poor weaning practices, although ogi, an excellent weaning food, should be available to all Nigerian mothers. It seems clear that all of us involved in child health will need to be vigilant in the promotion and encouragement of breastfeeding and proper weaning.

- Fourth, immunization (EPI) is vital because together six diseases kill an estimated 325,000 children a year in Nigeria. Measles alone claims 171,000 child lives a year in this country; and for every child who dies of measles, at least one other child survives the disease but is marked by it for life by such handicaps as blindness and deafness. Allowing these deaths and handicaps to occur in these numbers is a grotesque human and monetary waste. The cost of the vaccine that will immunize a child against measles is eight kobo; the cost of treating and hospitalizing a child with measles is N100. Is an ounce of prevention still worth a pound of cure, or have we stood logic on its head?

In child health circles in various parts of the world during the past year, within the context of the Child Survival Revolution, there has been renewed acceleration of the drive toward universal access by 1990 for all children to immunization against the six killer diseases of childhood. A conference at Bellagio, Italy in March of last year, brought together the heads of UNICEF, WHO, the World Bank, UNDP, and the Rockefeller Foundation, along with scientists and health professionals,

to give a major boost to this effort.

Following the Bellagio Conference, Colombia, a country whose political leadership had for some time been characterized by a strong commitment to child health, embarked on an extraordinary national immunization campaign to protect almost a million children under four years of age from measles, tetanus, diphtheria, whooping cough, and polio. Employing a well-developed communications, transport, and health infrastructure, the Colombians literally mobilized their whole country for three days of mass-scale vaccination. With what it achieved, Colombia predicted that 10,000 children's lives would be saved. By the middle of 1984, Colombia stood as the world's first and main symbol of what a developing country could do to give meaning to EPI.

At the end of 1984's summer months, however, another country began to emerge on the world immunization scene, a much larger country whose previous political leadership had not been spectacularly committed to child health, a country beset by huge economic problems, situated in a continent whose health indicators are steadily deteriorating; a country determined to save 200,000 children's lives a year, not 10,000.

That country, of course, was Nigeria. And now, in January 1985, Nigeria with its accelerated EPI stands with Colombia as a beacon and a leader in a drive to control the childhood killer diseases just as smallpox was controlled -- and eradicated -- 15 years ago. The stakes in Nigeria are much higher, however, than they were in Colombia, and the absolute need for success is more stark. The numbers are much greater; the death rate is more glaring; the need in Africa for one sweeping

national achievement, to show the way to others and clear the air of cynicism and inertia, is over-riding.

I think the national EPI programme launched last October by Major-General Buhari will produce that sweeping achievement. I believe that in this programme we are moving toward a major public health breakthrough in Africa. I am not only an optimist; I am looking at the signs, the opportunities, the early results, the evidence before us so far in the early stages of the programme. We have behind us, in the Owo local government area of Ondo State, the splendid achievement of 83 per cent full immunization coverage in one year -- 83 per cent from a starting point of nine per cent. We have a Government leadership in Lagos and in the 19 statehouses which is committed to the national programme, knowledgeable about its aims, needs, and implementation plans, and aware of its international significance. We have in our hands now the first retrospective indications from Owo that the year of vaccination coverage there, from August 1983 through August 1984, may have reduced the incidence of measles by three fourths or more.

Thirteen states have launched the EPI in their capital city local government areas, with the 14th to launch tomorrow; and among those that have had a chance, since their launchings, to get a few real weeks of vaccination under their belts, the results are better than encouraging. Health centres which in past years were vaccinating a few hundred children in a given period are now vaccinating several thousand. Because of the demand in some places, vaccinators have had to work 24 hours non-stop. Despite this pressure to vaccinate, there has to this point been no

break in the supply of vaccines from Lagos to the states.

Given what Colombia has done and what Nigeria is on the way to doing, as well as what other countries, taking their example, are likely to do, I think there is a concrete reason to believe that the universal immunization goal of the year 1990 proclaimed by the World Health Assembly in the mid-Seventies, but widely considered in recent years to be only a rhetorical goal, can be achieved. When it is attained here in Nigeria, I expect that the knowledge and energy of paediatricians like yourselves will have been a critical factor in its success.

You and your fellow paediatricians in Nigeria will never see more than a small minority of the country's children. They will never sit in your offices; their mothers will never seek your advice over the telephone. Yet your generation of paediatricians has an opportunity with staggering implications: to join in this revolution in child survival; to participate in improving child health to an extent that we could not have conceived as possible during your years as medical students or interns. As Mr. Grant did with your colleagues in Manila, I challenge you again to participate enthusiastically in this great venture -- in your teaching, your practice, and your research.

What are some of the things you can do?

1. Be a standard-setter yourself -- promote oral rehydration, growth monitoring, and breastfeeding in your own practice, and, importantly, press the hospitals you use to do likewise. For example, a majority of doctors and hospitals in Nigeria do not yet use ORT.

2. Spread the word to your colleagues; educate others to the situation and the potential for change on a vast scale. You are the respected spokespersons for children.
3. Advocate formally from your unique and privileged positions in Nigerian society. Use your clout. Put your prestige, influence, title, and knowledge to the service of persuasion. When you speak, other voices tend to hush. Government policy-makers listen to you. Without your active advocacy, no immunisation, oral rehydration, or other primary health care effort can come near to full success.
4. Help us generate ideas on the difficult problems of "going to scale," so that the great majority of children, rather than just an already advantaged minority who have access to doctors and fixed medical facilities, can benefit from these child survival measures. How can we increase our effectiveness in convincing families in remote outreach areas about the importance of having their children immunized? Or of using ORT at home?

I hope you will take my challenge today not merely as rhetorical, but as a true call to action.

As the Secretary General of the United Nations said in 1983:

"There are unmistakable signs that a veritable child survival revolution has begun to spread across the world and offers the hope that the rates of infant and child mortality, still so dramatically high, may be reduced drastically in the foreseeable future."

A child survival revolution can more than halve the daily toll of some 2000 child deaths in Nigeria in a few short years. It can be done. The leadership of the country, from Dodan Barracks downward, has made a commitment that is both courageous and wise in putting itself squarely behind child survival, despite troubling economic preoccupations which could have served as an excuse for benign neglect. The Federal and State health ministries and management boards, and their staffs, have put their shoulders to the wheel. UNICEF and WHO are there. But we need a broad coalition in this revolution, and one of the point positions in our advance must be taken by you as paediatricians. Your leadership and support are crucial. Let us join together to assure, for Nigeria, a pioneering world role in the in-depth expansion of EPI and the promotion of ORT, so that we can, in a phrase I find myself using often, "plant a flag of victory" for this country in the near future.

Thank you.

STANDARDIZATION OF HOME-MADE SALT-SUGAR SOLUTION  
FOR THE TREATMENT OF ACUTE DIARRHOEAL DISEASES  
OF CHILDHOOD IN NIGERIA

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## INTRODUCTION

Management of acute diarrhoea diseases in children commonly takes place at two distinct levels of health care delivery. The first and more important level is in the home where appropriate treatment given early in the course of diarrhoea can prevent the development of dehydration which is associated with a high mortality and morbidity. Children who have failed to receive effective and safe forms of treatment die at home or end up severely dehydrated in health institutions. There, elaborate, invasive, expensive and sometimes hazardous forms of management such as intravenous therapy are undertaken. In spite of these, many children do not survive at the institutional level of management.

The salt-sugar solution is particularly useful for the prevention of dehydration at the onset of diarrhoea at home, although it may also suffice in the treatment of mild dehydration. Most dehydrated children can be treated with oral rehydration salts (ORS).<sup>1</sup> The World Health Organization (WHO) recommended-ORS packet contains potassium chloride and sodium bicarbonate (or trisodium citrate) for correction of possible hypokalaemia and acidosis.

Several studies in many parts of the world,<sup>2-4</sup> have shown that a marked reduction in infant and childhood mortality from diarrhoeal diseases can be achieved if all mothers have the knowledge, and simple skills for preventing dehydration in the home. The widespread use of a home-made salt-sugar solution should satisfy this need provided

mothers are taught the correct amounts of solutes which are effective and safe. Some workers have pointed out the possible danger of hypernatraemia resulting from home made application of this solution where a mother may use an excessive amount of salt. <sup>5-7</sup> Various techniques have therefore been recommended to avoid this, while making a safe <sup>8,9</sup> effective home made mixture.

In Nigeria, we have found that the recommendations made and instructions given to health workers on the preparation of this simple solution vary considerably. There are no recognised local standards and it is likely that there is a wide variation of sugar and salt concentrations in the solutions prepared by mothers; some of these may be ineffective and others potentially harmful to the children.

For effective implementation of Oral Rehydration Therapy (ORT) nation-wide, as an important component of primary health care, there is need for the establishment of an acceptable local standard for the preparation of salt-sugar solution which the average Nigerian mother can learn and use correctly in her home. There should also be some uniformity based on scientific information, on what is taught in health institutions in the country to ensure consistency of knowledge and skills among health workers. It is against this background that this study was carried out by a group of paediatricians and other health workers in collaboration with UNICEF, Nigeria:

1. to determine the amounts of salt and sugar for a

safe, effective home-made solution.

2. to identify easily available measures and containers for the preparation of the solution in the Nigerian home.
3. to adopt a simple, fairly accurate and reproducible method of measuring salt and sugar which can be taught by all health workers and practised by mothers.
4. to produce a formula for a home home-made salt-sugar solution which is feasible and acceptable nation-wide.

#### MATERIALS AND METHODS

Various methods for the preparation of salt-sugar solution which have been described, recommended and practised by health workers in Nigeria were identified.

Measures: It was clear from the onset that a one litre measure is not a common household item in Nigeria.

The standard beer bottle which is already being used by some health workers, is easily available. It measures 650 mls of fluid to the neck and this is twice the full volume of a standard soft-drink bottle. The beer bottle, was therefore accepted as the unit measure of water for this study.

Salt: Preliminary studies were carried out independently in the departments of Paediatrics of Lagos and Benin University Teaching Hospitals by two members of this study group (A.O.G. and D.C.M.) to determine (a) the amount of salt measured with locally available teaspoons using established methods practised by health workers, and (b) the

concentration of sodium in the prepared salt-sugar solutions. It was found that the amount of salt in a level teaspoon when measured by various persons varied from 1.9 to 3.9 gms. with a mean  $\pm$  S.D. of  $2.84 \pm 0.6$  gms. (Table 1). The spoon was levelled in each case with the edge of a knife or handle of another spoon. The solutions were analysed with a flame photometer and the results of the sodium content are shown on Table 2. The wide variation in the results are due to the various sizes of teaspoons and the methods used for levelling the salt. There are over 12 types of teaspoons in Nigerian homes and these vary in volume from 1.8 to 5 mls. However, the most common is the 3 ml teaspoon and it is made both in metal and cheap plastic forms. It is found in most markets in the country and the plastic version costs 10k (10 US cents). It was therefore, accepted as the unit for salt and sugar in this study.

A safe and effective salt-sugar solution should contain 45 to 70 mmol/litre of sodium. The content of one standard WHO recommended Oral Rehydration Salts packet when dissolved in 1 litre of water gives 90 mmol/litre of sodium. The amount of salt required for 45 to 70 mmol/litre of sodium in 650 mls of water was calculated and found to be in the range of 1.71 to 2.66 gms. Therefore, any method adopted for measuring salt for the solution must be easy, and capable of producing an amount within this range using the house hold 3ml teaspoon. The goal of the group then was to evolve a method matching these criteria.

Each participant measured what he or she understood as a 'level teaspoon' of salt and the amount obtained was weighed on a scale with .01gm sensitivity. The results obtained by the group varied considerably as in the preliminary study. It became clear that apart from differences in levelling techniques, there was marked variation in individual concepts of a 'level teaspoon' and this was also responsible for these results. The consensus reached was that a level teaspoon of salt was the amount obtained when a heaped spoonful is levelled right down so that the edge of the spoon is visible and free from salt. (Figure 1). This was tested several times by each participant; it was easy to achieve and the amount of salt obtained with this method was fairly consistent. It was also found that it made no difference if the levelling was carried out with the edge of a finger or knife; in fact, the edge of the little finger while obviously easily accessible also proved to be most effective.

Sugar: The average weight of a cube of sugar was determined as 5.2gms and it was found that both rectangular and square cubes found in Nigeria weighed the same. However, since granulated sugar is becoming more readily available in the Nigerian market and local production is growing, the weight of a level teaspoon of sugar was also obtained. Each participant did several measurements of teaspoon of sugar using the new levelling definition already described for salt. Individual and average weights obtained from the group were recorded.

## RESULT

It was found that the weight of salt in a level teaspoon using the new technique for levelling varies from 1.9 to 2.6gms with a mean of 2.3gms (Figure 2). This narrow variation coincidentally, corresponds closely to the range of amounts required for a safe and effective solution which contains 45 to 70mmol/litre of sodium in 650mls of water.

A cube or rectangular piece of sugar weighs 5.2gms and one level teaspoon of granulated sugar weighs an average of 2.5gms (Figure 3). The amount of sugar required for a four percent solution (83mmol/litre of sucrose in 650mls of water) is approximately 25gms; this is equivalent to 10 level teaspoons of granulated sugar or five cubes.

The marked variation in the amount of salt and the resulting concentrations obtained when different sizes of teaspoons were tested, are shown in Tables 1 and 2. The 3ml teaspoon is the ideal for salt-sugar solution in every Nigerian home. It is easily available and it can be used for measuring the solutes in units of 'One for Salt' and 'Ten for Sugar' which can be remembered by mothers.

## DISCUSSION

Based on this study, a new formula which is recommended for making a safe and effective salt-sugar solution in the Nigerian home consists of:

- |   |               |
|---|---------------|
| 1 level teaspoon of salt                                  | - 1.9 - 2.6gm |
| 10 level teaspoon of sugar (or 5 cubes)                   | - 25gm        |
| 1 beer bottle (or 2 soft drink bottles)<br>of clean water | - 650ml       |

A mixture of these ingredients gives a solution which should contain 45 to 70mmol/litre of sodium and about 83mmol/litre of sucrose. Several mothers were tested at the Massey Street Children's Hospital and they found it easy to measure the salt and sugar correctly by the new finger technique.

It is significant to note from this study that one-quarter of a level teaspoon of salt to a beer bottle of water (a formula which many health workers use) gives 18 to 24 mmol/litre of sodium. This is low for efficacy of the solution; and may give rise to hyponatraemia. Some health workers use the 5ml paediatric teaspoon found in drug packs as the standard measure. One level of salt with this gives a solution which contains 68 to 130mmol/litre of sodium; this may be dangerous. To ensure that the improved formula and the new definition of teaspoon levelling are known to mothers, there must be some re-training among health workers at all levels. Secondly, there should be greater awareness among doctors and nurses on the efficacy of oral rehydration therapy in the country. The reluctance of many health personnel to advise mothers on the use of the home-made solution stems from the lack of information on its effectiveness in spite of its simplicity and non-existence of a scientifically based, well known local standard for preparation.

If most Nigerian mothers can be taught the essentials of diarrhoea management and are able to apply this simple effective technology in their homes, the number of children who die of diarrhoeal diseases or who subsequently become

severely dehydrated and malnourished can be drastically reduced. This has been the experience in many other developing countries.<sup>10-12</sup> Members of this study group are convinced that the health of the Nigerian child can be improved by this inexpensive appropriate technology.

Paediatricians and other health workers should therefore take up the challenge of diarrhoeal diseases and strongly advocate for ORT as a child protection strategy throughout the

country.<sup>13</sup> The use of ORT in the home and at clinics is extremely cost-effective compared to intravenous solutions, drip sets and hospital care related to severe dehydration.

Awareness of ORT in the community will be based on more than improved health education in the clinics and hospitals although these channels and staff commitment are essential.

The media, other related ministries, and women organisations are crucial channels as shown from experiences in other developing countries like Indonesia, Thailand, Honduras,

Haiti and Gambia.<sup>14</sup> ORT should also be introduced into the curricula of teachers' training institutions, and made a practice and testable area for all schools of health technology, nursing and medicine in the country. Oral rehydration therapy has the potential not only of reducing childhood mortality and morbidity but also costs of health care delivery from primary to tertiary levels.

65

## SUMMARY

A study has been carried out to identify local measures and a simple reproducible method for preparing home-made salt-sugar solution in Nigeria. The formula for a standard salt-sugar solution which can be used in any part of the country is, one level teaspoon of salt, 10 level teaspoons of granulated sugar (or 5 cubes) mixed in one beer bottle (or 2 soft drink bottles) of clean water. A level teaspoon defined as the amount obtained when a heaped teaspoon is levelled down so that the edge of teaspoon is visible and free from salt. Using these measures and method, the solution obtained is 650mls and contains 45 to 70mmol/litre of sodium and about 83mmol/litre of sucrose. This is a safe and effective mixture for the prevention of dehydration at the onset of diarrhoea and for the treatment of mild cases of dehydration.

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TABLE 1

Variations in the amount of Salt in a level  
teaspoon measured by several observers  
(preliminary study)

Measure	Levelling Method	Range of quantity of salt (gms)	Mean (gms)
one metallic tea-spoon (3ml)	Edge of knife	1.9 - 3.9	2.84
one plastic tea-spoon (3ml)	"	1.8 - 3.9	2.81
one-half plastic teaspoon (3ml)	"	0.9 - 2.0	1.53
one-quarter plastic teaspoon (3ml)	"	0.6 - 1.0	0.89
one-quarter metallic teaspoon (2ml)	"	0.4 - 0.7	0.57
one plastic tea-spoon (5ml)	"	3.9 - 4.3	4.14

**TABLE 2**

Variations in the Sodium Concentrations of  
Solutions made during the preliminary study.

Amount of Salt	Volume of Water Used	Sodium Concentration (mmol/litre)
one level tea-spoon (3ml)	1 beer bottle (650ml)	52 - 120
one-half level teaspoon (3ml)	"	40 - 64
one-quarter level teaspoon (3ml)	"	22 - 24
one-quarter level teaspoon (2ml)	"	18
one level tea-spoon (5ml)	"	68 - 130