Behavioral Approaches to the Management of Diarrheal Diseases in Developing Countries: The HEALTHCOM Project

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Running Head: Management of Diarrhea

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It is estimated that 16 million children die needlessly each year--four million from diarrheal disease, three to five million from vaccine-preventable diseases, four million from respiratory infections, and three million from conditions associated with low birthweight and malnutrition (Morley 1973; UNICEF 1985). Oral rehydration therapy (ORT), the promotion of breastfeeding and other nutritionally-related behaviors, and general child survival technologies could save as many as 10 million of these children. But these technologies remain unknown to many, resisted by some, and unused by the vast majority of those most in need.

The magnitude of child survival problems and the availability of new health technologies such as oral rehydration therapy have made it possible to mobilize social concern around the issue of child survival. The international public health community, led by the World Health Organization, UNICEF, and USAID have made ORT, immunization, breastfeeding, and other child survival intervention top priorities for funding and support. Most developing countries in the world today have ORT or immunization programs, but most of these programs are not meeting their expected goals.

Diarrheal disease control (DDC) is another area of opportunity for large-scale impact on child survival. Advances in oral rehydration therapy, combined with the importance of dietary management during diarrhea and prevention-related interventions, are now widely accepted by health professionals

(Snyder et al., 1982; Pierce & Hirschhorn, 1977). But again, effective service delivery lags behind proven technology. Programs must elicit greater physician support, design better ORT production and delivery systems, train health providers, and work to change health-related practices in the home.

The causes of nutritionally related illness and the challenges to adoption of available child survival technologies in developing countries are of several kinds: financial, technical and logistical, cultural, and behavioral. These may be complicated by an inadequately and inappropriately trained workforce, a wasteful fertility pattern, malnutrition, and well-ingrained cultural priorities at odds with certain health promotion approaches or with a formal health services delivery system. While multifaceted strategies may be required to address any of these problems adequately, the technology of behavior change can be helpful at certain levels.

Figure 1 presents the interrelationships of various factors related to malnutrition. The bulk of child survival programs focus on specific health processes and health related behaviors (especially those of mothers). Yet more traditional clinical strategies are not activated until a specific (often fatal) illness occurs. Truly comprehensive strategies must address various influences creating problematic behaviors and illness, especially those which are relatively immediate or "proximal" to the problem.

Insert Figure 1 here

Within the context of nutrition and child survival, an individual mother is faced with difficult choices between existing practices and new remedies. She may have to take a well child to a health center to be stuck with a needle and be fitful all night; she must remember the correct ingredients in home oral rehydration solution; she may have to determine whether her child is malnourished or just small; she must remember when to introduce weaning foods and determine which ones are best; and she may discuss having fewer children with her husband who wants another male child. Each decision suggests a complex set of behavioral influences. New patterns of behavior are not always easily accepted or tolerated. The contribution of behavior analysis within this context has been to probe the reasons that a given practice persists and determine how alternate behavior might be best introduced (i.e. how the behavior can be configured, presented, and encouraged) to ensure it is adopted and maintained over time.

In general, the behavioral strategy is to try to identify existing practices that are compatible with the new ones, to look for approximations to the new practices already available in existing behavior, and to evaluate the actual costs and benefits (both social and economic) of adopting new practices. Behavior

analysts help identify positive consequences which follow adoption of a new behavior and suggest ways to avoid or eliminate punishment (Elder, 1987). They stress that, while there are many means of shaping a new behavior pattern, pleasant consequences or at least the avoidance of aversive ones are essential to its maintenance. Behavior analysts also emphasize the importance of determining whether the frequency and persistence with which a new behavior must be practiced may be realistically expected in various contexts. All of these elements are weighed against the impact of the new behavior on child survival. Some changes in behavior, clearly, would have much greater impact than others.

A variety of studies in the literature have demonstrated the effectiveness of behavior-analytic procedures for promoting child nutritional health. While most of these studies were initially in the area of family planning, recent efforts have addressed malnutrition and immunizations as well. For example, Guthrie et al. (1982) demonstrated the efficacy of positive reinforcement in improving young mothers' feeding patterns for their babies. The authors noted that children among rural populations in the Phillippines suffered from calorie deficiencies and less than recommended amounts of thiamine and riboflavin. A severe restriction in dietary fats also resulted in endemic failure to absorb fat-soluble vitamin A. They designed an intervention which rewarded Filipino mothers for continuing to breastfeed until their children were 12 to 15 months old; for supplementing

breast milk adequately beginning about the fourth month; for planting green, leafy vegetables near the home; for evidencing weight gain in the child each month; and for returning to the Health Center for checks on the child's health, diet, and progress. The incentives provided were polaroid photos of the mothers and their children when the latter gained weight.

Following an initial demonstration of success in a pilot study, Guthrie and his colleagues expanded their approach to three "under-five" clinics in upland barangays. One clinic served as a "usual-care" control group, offering the customary health education and weight monitoring. Another offered "health coupons" which made the holder eligible for drawings of sacks of rice or corn, held every three months. A mother who maintained her child in a normal weight-band or who moved her child from underweight toward normal weight received coupons. The third clinic took photographs of the children when they gained weight.

Results indicated that children from the ages of 18 months to 30 months significantly improved i the two groups where reinforcing consequences were provided compared to those in the control group. (No differences were found for children 17 months or younger.) The two types of reinforcement worked equally well in producing the changes. These authors noted that the growth rates in these areas were still not up to the level of urban children, but did evidence substantial gains.

A second application of positive reinforcement for

accelerating appropriate nutrition-related behaviors was demonstrated in a program carried out in four "well-baby" clinics in low-income colonias located in Tijuana, Mexico (Elder and Salgado, 1988). Prior to this study, it was determined that no major barriers prevented mothers of under-fives from attending the clinics on a prescribed weekly basis for immunizations, weight-monitoring, and (if needed) nutritional education and supplementation. However, attendance rates at the four clinics were at less than 50 percent of targets. An incentive system was planned whereby a mother could receive a lottery ticket as frequently as once per week for attending and going through appropriate clinic procedures for reaching weight goals. Over a six-month period, drawings were held at each clinic at the end of every week for three bags of groceries. The intervention was "staggered" across four months, with one clinic per months beginning the intervention.

After seven months, improvement in clinic attendance averaged over 25 percent, ranging from 0 to 40 percent. Anecdotally, it appeared that morale among both paid and volunteer staff also increased substantially, as a function both of having more active work days and of the fiesta atmosphere attending the Friday clinic/lottery days. Indeed, volunteer staff as well as clients attended more frequently. The disincentives of effort and time to go to the clinics were overcome in some cases with this simple and inexpensive lottery.

Behavior Analysis in The Gambia -- the HEALTHCOM Example

Background

The Agency for International Development (through its Office of Health and Office of Education within the Bureau for Science and Technology) funds a special program called Communication for Child Survival, or HEALTHCOM, which makes use of behavior analysis tools. From 1982-1992, HEALTHCOM (and its predecessor the Mass Media and Health Practices Project, MMHP) is working in up to 17 countries to create effective public education programs aimed at significant behavior change. HEALTHCOM is committed to strengthening local institutional capacities to use communication more systematically and provides both short and long-term technical assistance for training and development. Primary attention is given to diarrheal disease control, immunization, breastfeeding, vitamin A rich diets, general infant nutrition, malaria control, and personal hygiene.

One example of how HEALTHCOM has applied behavior analysis principles to bringing about the appropriate use of child survival technologies is the "Happy Baby Lottery" conducted in The Gambia during 1982.

The Gambia is Africa's smallest country just two miles wide and 250 miles long, with a population of approximately 640,000. HEALTHCOM assisted the national campaign to educate rural mothers in the proper treatment of acute infant diarrhea. The Gambia's national diarrheal disease control policy advocates home

use of a simple oral rehydration solution (ORS) made in the home from water, sugar, and salt, to prevent dehydration the most serious consequence of common acute diarrhea. Oral rehydration fluid can be used to treat 85-95 percent of cases of dehydration from watery diarrhea in all age groups. Two other factors are also important: adequate feeding during and after diarrheal bouts (including continued breastfeeding of infants) and the elimination of laxatives in the treatment of diarrhea. In The Gambia, a standard formula for oral rehydration solution was developed, using a local soft drink bottle and cap for measurement (Conteh et al., 82).

Procedure

The problem was how to teach mothers throughout the country to mix an effective oral rehydration solution. Literacy was very low and instruction over radio alone was deemed insufficient. To provide an incentive for mothers to seek out information and learn how to mix ORS, The Gambia's Medical and Health Department created the "Happy Baby Lottery" as a national contest offering inexpensive but attractive prizes to mothers who could demonstrate how to mix correctly a simple oral rehydration solution. The Lottery was carried out during the months of September and October 1982. Three communication channels helped publicize the program: radio broadcasting (two-thirds of rural compounds in The Gambia have a working transistor radio),

pictorial graphic materials, and face-to-face instruction by healthworkers and other rural opinion leaders (Figure 2).

Insert Figure 2 Here

Figure 3 provides a schematic illustration of the Lottery planning and process principles. Preliminary research (point A) showed that the rationale for using ORS and the missing behavior itself were not as simple and straightforward as thought; that radio was more limited medium than hoped; that no strong distribution system existed; and that visual literacy, or the ability to understand immediately a two-dimensional drawing, could not be assumed in the population.

The decision was then made (point B) to address these problems by providing a strong incentive to acquire the flyer (participation in the mixing contests was not allowed without a flyer), a strong incentive to listen (to learn the formula one had to listen to the radio), and an incentive to actually mix the formula (the public mixing contest itself). After the Lottery (at point C) emphasis turned toward generalizing the reinforcement from the Lottery to the health benefits of oral rehydration therapy.

Insert Figure 3 Here

Central to the Lottery was the colorful 8"x11" handbill (Figure 4) showing the Julpearl bottle and cap formula for the sugar-salt solution. Color coding assured that mothers could attend to different portions of the poster identified during mixing and administration explanations provided on the radio. This "auditory-visual-matching" technique was used to overcome widespread visual illiteracy.

Insert Figure 4 Here

Prior to the Lottery, four months of broadcasting sensitized mothers to the life-threatening aspect of diarrhea, namely dehydration, and introduced the sugar-salt solution as a means of preventing it. Training workshops for 150 key health personnel throughout the country ensured that the campaign's radio message would receive interpersonal reinforcement from health workers in the field.

Results

Approximately 200,000 of the mixing-pictures were delivered by the Mass Media Project staff to 20 health centers and dispensaries throughout the country. A portion of these were distributed to mothers at the health centers by the local government health workers, and the rest were delivered in turn to a network of some 800 village volunteers who had been trained by

the health workers as village "diarrhea experts" following their own training at the project's workshops. Each "expert mother" was given a "happy baby" flag.

During this same time an intensive publicity campaign about the Lottery began on Radio Gambia in four local languages explaining that the mixing picture was to be used as the ticket for entering the Lottery, and encouraging each woman to obtain one and to learn how to mix the sugar-salt solution. A series of radio programs interpreting the mixing picture and explaining key points of administering the solution were aired throughout the Lottery period.

Four weeks after distribution of the mixing-picture tickets, the names of 18 villages from all over the country were drawn randomly and announced over the radio. Each of these villages was visited by a contest judge, one of the local health workers. Every woman in the village who came to the contest with a mixing-picture in hand was eligible to enter an initial drawing. The contest chose 20 women who then had a chance to demonstrate their mixing knowledge. Each of the 20 women who then had a chance to demonstrate their mixing knowledge. Each of the 20 women who correctly demonstrated how to mix the sugar-salt solution won a prize of a one-liter plastic cup. If she could correctly answer at least three out of five questions about how to administer the solution she also won a second prize which was a bar of locally made soap. She then became eligible for the Grand Prize Drawing

of a special one-hour program broadcast on Radio Gambia in which a Gambian VIP would draw and announce the winners of 5 radio-cassette players from among the villages who had participated most actively in the village contests.

In choosing the contest prizes, project staff sought items that were locally available and inexpensive but useful and appealing to village mothers and, if possible, related to or consistent with project goals. The plastic cup, the most common vessel for drinking water and a convenient one-liter measure and the bar of local soap satisfied these criteria. To make them more colorful and attractive, each was decorated with a bright red decal with a picture of a happy baby.

The more expensive grand prizes, radio-cassette players (highly valued possessions in rural villages) were offered to generate high interest in participating in the lottery and in following it on the radio. The community prizes, too, were planned to sustain wide interest and to encourage maximum participation. A 50-kg bag of sugar, which could be used to make the sugar-salt solution, and 100-kg bag of rice, another commodity highly valued during the pre-harvest "hungry season" when the lottery was held, were selected after project staff had confirmed that traditional means of sharing such donated goods existed in the villages so that the prizes would not be monopolized by one or two village leaders.

The 72-village contest generated a great deal of enthusiasm

in the rural areas. In some villages, as many as 400-450 women turned out with mixing-pictures in hand ready to participate. Other village contests were accompanied by festive drumming and dancing, and in at least one village a sheep was purchased by the village elders and cooked to feed the contest participants.

The "Happy Baby Lottery" came to a conclusion on October 9 when The Gambian President's wife, drew and announced the names of the grand prize winners in a special one-hour trilingual broadcast on Radio Gambia.

During the two weeks that followed, the project staff was on the road again delivering radio-cassette players, bags of rice, and bags of sugar to the lucky Lottery winners all over The Gambia, while a series of pos-Lottery spots began on the radio congratulating winners and consoling losers with the message that the real prizes in the Happy Baby Lottery, of course, were healthier, happier, Gambian children.

As shown in Figure 5 below, the 84 percent of mothers who <u>did</u> participate learned significantly more than those who did not. Behavior analysis made an important contribution to this success.

Insert Figure 5 Here

Discussion

Although not typically thought of as targets for behavior analysis, diarrhea, malnutrition, and related threats to child survival can be reduced by changing mothers health related behaviors. The application of teaching and motivational principles derived from behavior analysis have enhanced child survival programs by teaching new health practices, promoting first trials of these new practices, increasing clinic attendance, and the growth rate of rural children.

The application of behavior analysis procedures is now being extended to the prevention, diagnosis, and treatment of child health problems in many developing countries by HEALTHCOM and various other public health programs. For example, behavioral observation methodologies and the use of positive reinforcement to increase appropriate health workers' as well as mothers' behaviors are currently being applied to a nationwide program in Honduras for the reduction of infant mortality due to Acute Respiratory Infections (ARI), perhaps an even greater killer than diarrhea. Behavioral tools will, hopefully, prove useful in addressing increasingly diverse problems as well as the causal conditions relating to their onset. With each application of these new tools, the goal of "health for all by the year 2000" may come closer to reality.

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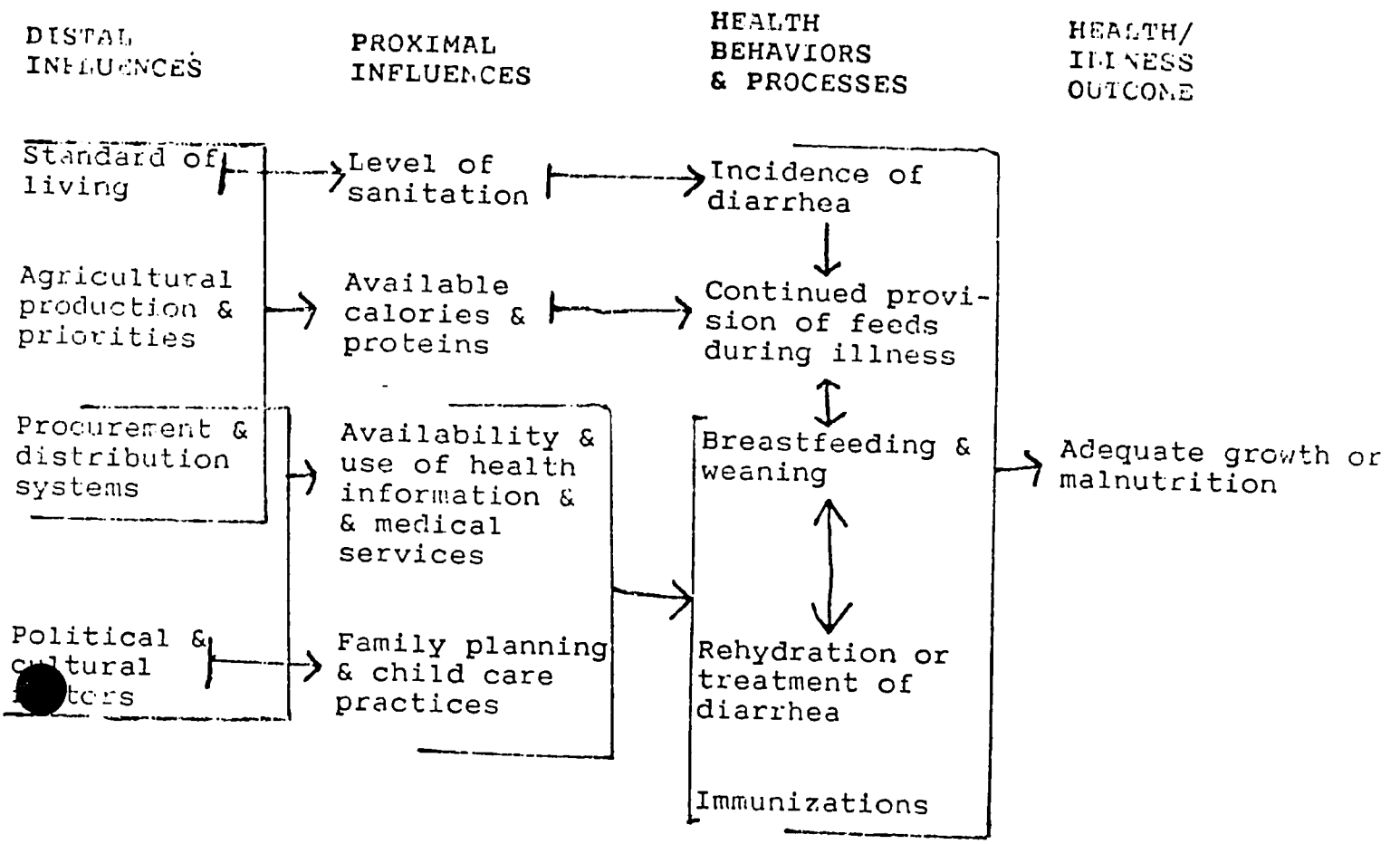
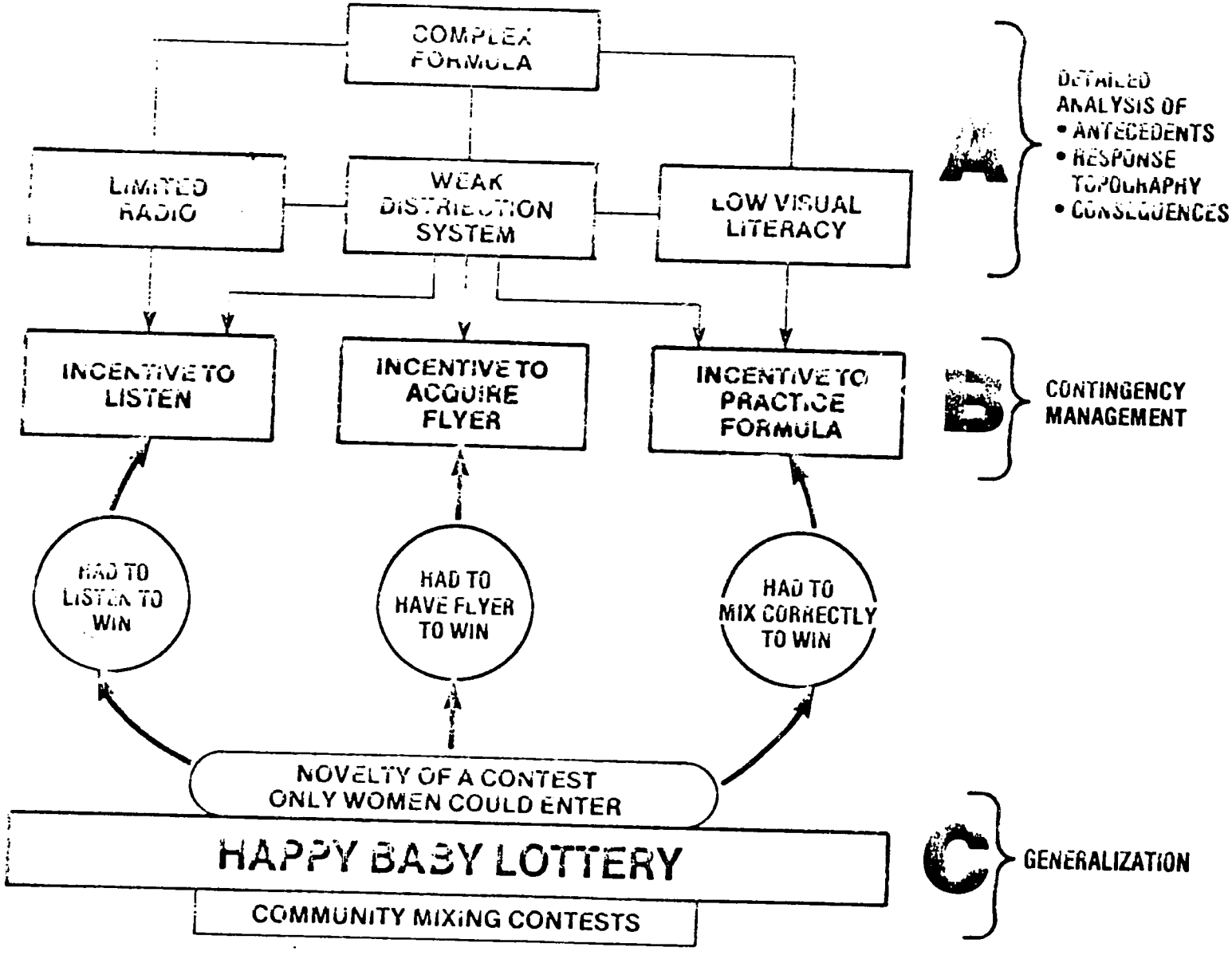


Figure 1: Factors Related to Malnutrition

Two Gambian women mixing the sugar-salt solution, using a flyer which was also the entrance ticket to the "Happy Baby Lottery."


COMPLEX FORMULA
LIMITED RADIO
WEAK DISTRIBUTION SYSTEM
LOW VISUAL LITERACY
A
DETAILED ANALYSIS OF
• ANTECEDENTS
• RESPONSE TOPOGRAPHY
• CONSEQUENCES
INCENTIVE TO LISTEN
INCENTIVE TO ACQUIRE FLYER
INCENTIVE TO PRACTICE FORMULA
B
CONTINGENCY MANAGEMENT
HAD TO LISTEN TO WIN
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HAD TO MIX CORRECTLY TO WIN
NOVELTY OF A CONTEST ONLY WOMEN COULD ENTER
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COMMUNITY MIXING CONTESTS
C
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Figure 1

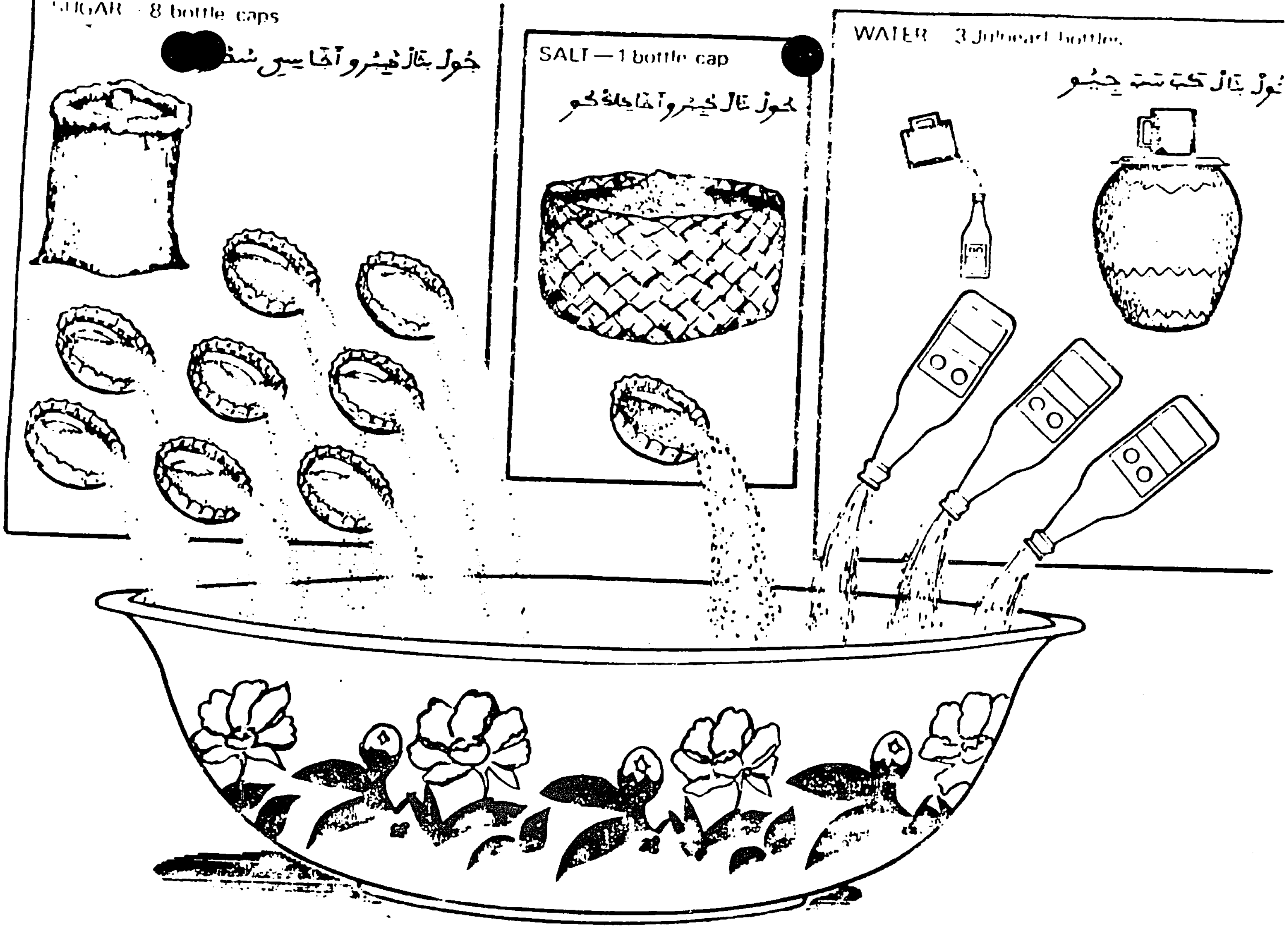
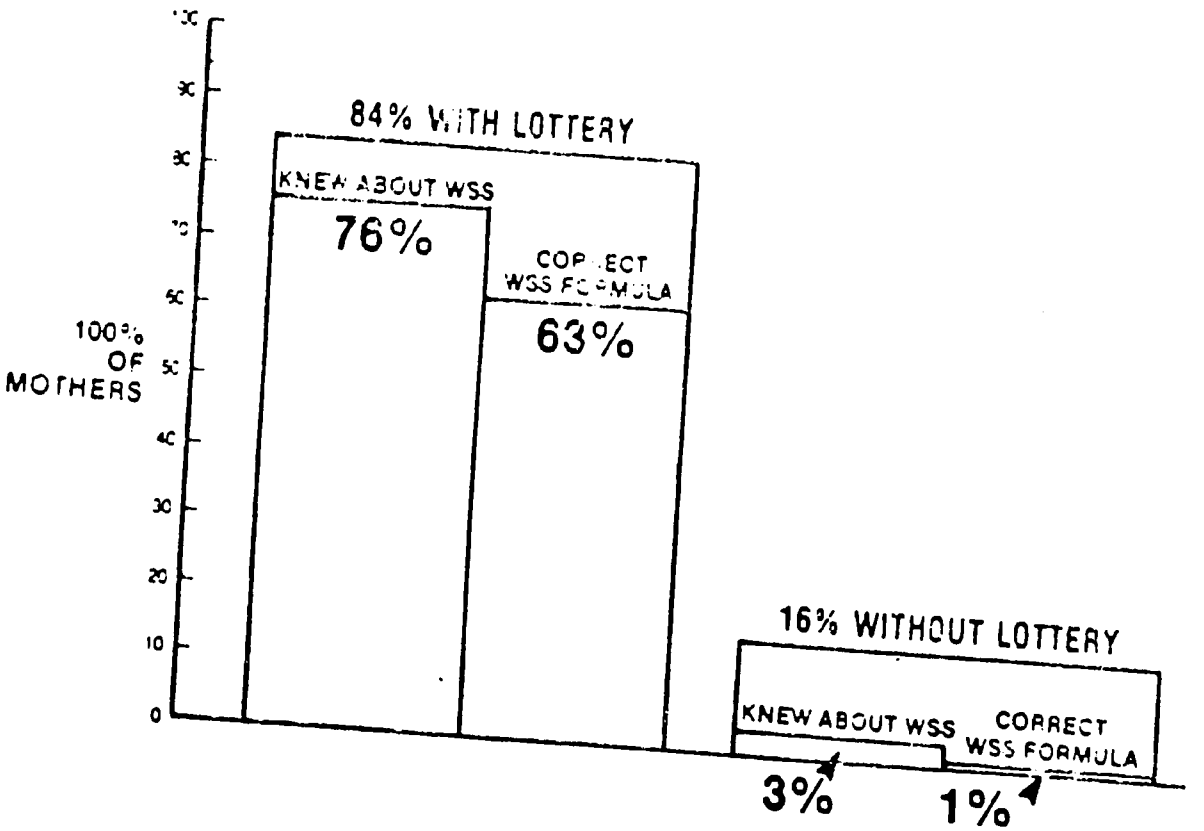


Figure 2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CORRECT
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3%
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Figure 3