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5. Author(s)  
1. Stanley P. Yoder  
2. Judith A. McDivitt  
3. Robert Hornik  

6. Contributing Organization(s)  
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KNOWLEDGE OF ORAL REHYDRATION AND RESPONSE TO DIARRHEA: A COMPARISON AMONG HEALTHCOM SITES*

P. STANLEY YODER
JUDITH A. MCDIVITT
ROBERT HORNK

University of Pennsylvania, Philadelphia

ABSTRACT

This article examines evidence for the relationship between knowledge of diarrhea and oral rehydration and treatments given for diarrhea among young children in seven different research sites. The evidence comes from cross-sectional analyses of household surveys conducted for the evaluation of oral rehydration programs. The cross-site comparisons show that mothers or caretakers who understand most about the dangers of diarrhea are not more likely to treat the diarrhea, but that those who understand the benefits of using oral rehydration are more likely to give fluids, particularly oral rehydration solutions, than those without such understanding.

*The research described in this document was funded by the Communication for Child Survival Project (HEALTHCOM). HEALTHCOM was a project of the Office of Health, Bureau for Research and Development, of the U.S. Agency for International Development. It was conducted by the Academy for Educational Development (AED), contract no. PD-1018-C-00-5036-00, and its subcontractors: the Center for International, Health and Development Communication, Applied Communication Technology, Needham Porter Novelli and PATH. This article is the responsibility of the authors and may not represent the views of those who supported the research.
INTRODUCTION

Oral rehydration therapy has been widely promoted in developing countries as an effective way to prevent deaths from dehydration following childhood diarrhea. Most developing countries have established special programs for the control of diarrheal disease (CDD) within Ministries of Health in order to improve the clinical care of cases of diarrhea by health workers and to promote the use of oral rehydration therapy (ORT) by caretakers. Mothers and caretakers of young children have been made a focus of CDD programs because the majority of episodes of diarrhea already receive some sort of treatment at home, and giving fluids at home can effectively prevent dehydration.

The World Health Organization has offered broad recommendations for effective prevention of dehydration from diarrhea [1]. WHO advises mothers that if a child has diarrhea, they should continue feeding, give home fluids, including oral rehydration salts (ORS), and take the child to a health facility if the symptoms persist. In this framework both the water-sugar-salt solution (SSS) and ORS are recommended as fluids to give at home, but water, tea, rice water, and juices may also be given.

CDD programs have responded to WHO recommendations by developing health education campaigns to teach mothers and caretakers of young children about diarrhea, dehydration, the preparation of SSS and ORS, and the importance of continuing feeding during and after illness. This strategy assumes that home treatment of childhood diarrhea will be substantially related to knowledge about diarrhea and oral rehydration, and will result in appropriate practice.

Evidence about this assumed relationship between knowledge and treatment actions remains ambiguous in published literature on ORT promotion. This article examines the relationship between knowledge and treatment actions taken at home for childhood diarrhea in seven separate research sites involved in the Communication for Child Survival (HEALTHCOM) project [2]. If comparisons across sites discover similar patterns in the relation of knowledge to treatment actions, the results take on added significance. We focus on the relationship between three types of knowledge related to diarrhea and oral rehydration and corresponding actions which each type of knowledge is expected to influence:

1. knowledge about the dangers of diarrhea and treating a case at all;
2. knowledge about dehydration and the effects of oral rehydration and the use of fluids of any kind;
3. self-perceived knowledge that one knows how to prepare either SSS or ORS and giving that solution for diarrhea.

Each of these relationships between knowledge and treatment action is assumed to be logically linked. Mothers who know more about diarrhea or that diarrhea may be dangerous are thought to be more likely to treat it. Whether or not a caretaker gives a sick child anything at all is important because a certain
proportion of cases of diarrhea are not treated at all. Those who understand that loss of fluids leads to dehydration and that ORT restores fluids are expected to give fluids more than those without that understanding. And mothers who believe they know how to prepare SSS or ORS are more likely to use SSS or ORS than those who do not think they know the proper preparation.

The decision of whether and how to treat a child with diarrhea depends, of course, on many other factors besides knowledge of diarrhea and ORT. A mother or caretaker may make her own diagnosis of the illness, or may respond to symptoms other than loose stools, and give something other than ORT [3-4]. A mother may not have access to ORS packets because they are not locally available or she cannot afford to purchase them [5]. Some mothers have tried the ORS solution and found their child rejects it, or that other demands on their time and energy prevent them from giving it [6]. However, given the considerable emphasis CDD programs have placed on knowledge factors, the relationship of knowledge to treatment actions seems worth investigating.

STUDIES OF ORT PROMOTION

Studies of the use of oral rehydration therapy for childhood diarrhea have examined two main types of hypotheses: those suggesting that social, economic, and health service factors affect ORT use, and those suggesting that individual knowledge affects use. With regard to the former, as Ittiravivongs and colleagues have noted, “it is generally believed that the use of ORT is likely to be related to the education, economic status, cultural practices, and the role of the health provider [7, p. 215]. In particular, higher education and the use of health facilities have been shown to be associated with higher use of ORT [8-9]. In countries where most ORS packets are obtained at health centers, the use of such facilities will certainly affect use of packets. Results of such studies are used to identify groups in the population most and least likely to use oral rehydration.

Hypotheses suggesting that individual knowledge affects use most often examine the relationship between mothers’ knowledge of diarrhea, dehydration and SSS or ORS, and giving oral rehydration solutions. Investigations in this category include studies on local classification of diarrhea [4, 6, 10-11], on the characteristics of episodes, on knowledge of dehydration [12-13], on knowledge of the preparation of SSS and ORS [14], or on beliefs affecting treatment choice [15]. Among these types of studies of cognitive factors, however, it is mothers’ knowledge of dehydration that has received the most attention in public health.

The attention paid to knowledge of dehydration has been based on the assumption that once mothers learned about the beneficial effects of ORT, they would be far more likely to give fluids to children with diarrhea. Only one of the available studies examines this issue directly, but two others show related results. In their study of ORS knowledge and use in Haiti, Coreil and Genece found no relationship between how the effect of using ORS was perceived (cure for diarrhea,
rehydration, preventing dehydration) and whether ORS was considered as an effective treatment [5]. In a study in northern India, Bentley found that while those who understood the rehydrating function of ORS were more than twice as likely to use it right away for diarrhea, this knowledge of rehydration was less important in explaining use than was mothers’ education and fear of death from diarrhea [12]. In the Kakamega district of Kenya, where nearly 50 percent of episodes of diarrhea were treated with ORS, P. R. Kenya and colleagues found that most mothers thought ORS packets cure diarrhea and a small minority thought it could rehydrate [13].

This image of mixed results resembles findings of studies which have more broadly examined the relationship of knowledge to behavior regarding treatment of diarrhea. Evaluations of ORT campaigns have frequently found major changes in knowledge among the population exposed to the campaign: knowledge that diarrhea should be treated, that diarrhea can lead to water loss, that giving fluids restores water to the body, and knowledge about proper mixing of the solution. CDD programs have given high priority to increasing caretakers’ awareness of the potential seriousness of diarrhea, the dangers and signs of dehydration, and the efficacy of ORT, and increasing their skills in preparing and administering oral rehydration solutions, and in recognizing when medical treatment is needed [16]. However, increased knowledge as measured in surveys has not necessarily been associated with increased use of ORT [17]. Nor have studies documented the cross-sectional relationship between particular types of knowledge and related behavior.

To provide information about this relationship, this study compares data from seven sites to examine the relationship between specific types of knowledge commonly addressed in ORT communication campaigns and the practices this knowledge may influence. Showing a cross-sectional correlation between a specific type of knowledge (e.g., of the rehydrating function of fluids) and behavior does not permit us to infer that an educational campaign that increases knowledge of dehydration will necessarily increase the recommended practices, yet it does suggest that such a campaign may succeed if other circumstances (access, resources, past experience) permit. Thus if it can be shown that mothers with better knowledge of diarrhea or oral rehydration are more likely to give fluids or SSS or ORS, that would suggest that communication campaigns may be able to increase ORT use by teaching those forms of knowledge to the public. On the other hand, the failure to find such a correlation would suggest that a campaign seeking to increase knowledge of dehydration is not likely to be worthwhile.

**Background**

Two of the earliest programs developed to promote the use of oral rehydration therapy took place in the early 1980s in Honduras and The Gambia as part of the USAID-sponsored Mass Media and Health Practices (MMHP) project. In
Honduras, mass media and interpersonal channels addressed the diagnosis of diarrhea and dehydration, the danger of dehydration and the need for fluids and especially for ORS, the preparation and administration of ORS, and prevention of diarrhea [17, 18]. The Gambia also used a multiple channel approach to reach mothers with information about symptoms and treatment of dehydration and seasonal differences in diarrhea, about SSS as a solution to give children during diarrhea, and about correct mixing and administration of SSS [19]. Longitudinal surveys showed that large proportions of mothers in both countries learned about dehydration, about the need for ORT, and about mixing and administration and also showed significant increases in use of the solutions [17-19].

HEALTHCOM grew out of the MMHP project and expanded the use of communication to promote ORT and other Child Survival strategies to other countries throughout the world. The new programs used the same overall methodology but each site developed its own promotional strategies for oral rehydration [20]. The actual solutions promoted differed as did the channels for diffusion. Nigeria and Zaire promoted only SSS and rice water; Ecuador and West Java promoted ORS only, while the Philippines promoted ORS and rice water; Lesotho promoted both SSS and ORS, and Central Java promoted giving any kinds of fluids immediately and also giving ORS.

The degree to which the concept of dehydration was discussed in these sites varied but was less than was found in The Gambia and Honduras. Projects combined the promotion of oral rehydration through the media with training of health workers and community volunteers with differing degrees of emphasis. In each site at least four or five messages were diffused by several channels, which resulted in rather different exposure to specific messages by segments of the population.

The specific messages used by these programs also varied considerably. Some programs stressed the dangers of diarrhea and the importance of treating it with oral rehydration (West Java and Lesotho). Others focused on the meaning of dehydration and the effects of dehydration in order to persuade caretakers to use ORT (Central Java and Ecuador). Some programs also presented ORT as a new and better way to treat diarrhea. With the exception of Central Java, each of these programs also tried to teach the public about how to prepare oral rehydration solutions.

**METHODOLOGY**

The data used in the analyses were collected in surveys conducted to evaluate the HEALTHCOM projects. The data from four sites (Central Java, Ecuador, Lesotho, West Java) come from surveys carried out after a period of ORT promotion conducted by the health services assisted by HEALTHCOM. The data from Zaire, Nigeria and the Philippines were collected before any special ORT promotion was undertaken.
Samples

A sample of primary caretakers (usually the mother) of children under five years of age (in Zaire it was children under three) was drawn in each site from existing sampling frames developed for the census or from sampling frames developed by commercial research organizations. The samples were drawn through a two- or three-stage cluster procedure. Two-stage samples consisted of random selection of census areas followed by random selection of caretakers within those areas (Ecuador; Lesotho; Niger State, Nigeria; Lubumbashi, Zaire). In three-stage samples (Central Java; West Java; Philippines), districts or other large geographic units in target areas were chosen randomly in proportion to the population, then census areas within districts and caretakers within census areas were chosen randomly. Table 1 shows the size and nature of the samples in each site along with the type of ORT promoted.

In most sites, the sampling frames were chosen to measure change in behavior in specifically targeted regions rather than in the entire population of a country. In Ecuador and Lesotho the samples were drawn from national frames, while in Nigeria, households from all of Niger State were sampled. In Central Java only two regencies were sampled; in West Java, five regencies were sampled. In the Philippines three regions were included in the sample, while in Zaire the sampling frame was limited to the city of Lubumbashi. The area of the sampling frame was usually dictated by the scope and reach of project activities.

<table>
<thead>
<tr>
<th>Site</th>
<th>Date of Survey</th>
<th>Number of Clusters</th>
<th>Total Sample</th>
<th>Number of Recent Cases</th>
<th>Type of ORT Promoted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecuador (country)</td>
<td>1987</td>
<td>60</td>
<td>1453</td>
<td>341</td>
<td>ORS</td>
</tr>
<tr>
<td>Central Java (two regencies)</td>
<td>1989</td>
<td>50</td>
<td>800</td>
<td>146</td>
<td>fluids and ORS</td>
</tr>
<tr>
<td>West Java (five regencies)</td>
<td>1990</td>
<td>50</td>
<td>1000</td>
<td>216</td>
<td>ORS</td>
</tr>
<tr>
<td>Philippines (three regions)</td>
<td>1987</td>
<td>60</td>
<td>1200</td>
<td>258</td>
<td>ORS and rice water</td>
</tr>
<tr>
<td>Lesotho (country)</td>
<td>1990</td>
<td>40</td>
<td>1016</td>
<td>288</td>
<td>SSS and ORS</td>
</tr>
<tr>
<td>Nigeria (Niger State)</td>
<td>1988</td>
<td>45</td>
<td>1065</td>
<td>506</td>
<td>SSS</td>
</tr>
<tr>
<td>Zaire (City of Lubumbashi)</td>
<td>1990</td>
<td>75</td>
<td>1153</td>
<td>536</td>
<td>SS and rice water</td>
</tr>
</tbody>
</table>
Treatment Variables

The set of questions included in all seven survey sites allows us to consider treatment actions from three different perspectives: doing anything at all, giving fluids of any kind, and giving a special rehydrating solution. Mothers or caretakers were asked about the most recent episode of diarrhea in one of their children under five years of age and about the symptoms of illness they observed. They were then asked a series of questions about treatment of the episode without any mention of possible treatments. The series of questions asked was the following:

1. Did you give the child anything for the illness or did it go away by itself?
2. Did you do anything at home to care for the child or treat the diarrhea?
3. What did you give the child?
4. Did you go anywhere to get advice or treatment?
5. Where did you go?
6. What advice or treatment were you given?
7. Did you go anywhere else for advice or treatment?
8. Where did you go?
9. What advice or treatment were you given?

Mothers were able to mention multiple treatments given when asked about treatments. In another section of the interview about feeding during the episode of diarrhea, mothers were asked whether they gave the child anything special to drink (Central Java, West Java, Lesotho, Zaire), whether the child was given more to drink than usual (Central Java, Ecuador, Lesotho, Nigeria, Philippines), or whether there were drinks they gave more of (West Java). In each case mothers were also asked what fluids they gave. The three treatment variables and the measures used to construct them are listed in Table 2.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measures Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother did anything at all</td>
<td>Mother gave any treatment or gave more to drink or special drinks</td>
</tr>
<tr>
<td>Three-level treatment variable—no treatment, home-available fluids only, or oral rehydration solution</td>
<td>Mother gave water, tea, rice water, SSS, ORS, or any other drinks as treatment or as a special drink. Herbal medicines were not included because very small volumes were given.</td>
</tr>
<tr>
<td>Mother gave oral rehydration solution</td>
<td>Mother gave SSS or ORS as a treatment or as a drink.</td>
</tr>
</tbody>
</table>
Although the treatment questions were generally asked of all mothers who reported an episode of diarrhea, the analyses considered only cases of diarrhea that were current or that had occurred less than one month before in all sites. While relatively few mothers reported that their child never had a case of diarrhea, the proportion of mothers reporting recent cases (current or less than one month ago) varied widely among the sites (see Table 1).

**Knowledge Variables**

Three dichotomous measures of knowledge about diarrhea and ORT were developed: knowledge that diarrhea was serious or dangerous, knowledge about the rehydrating effects of SSS or ORS, and self-perceived knowledge of SSS or ORS preparation. Because programs differed in their focus and their range of messages, the available measures differ across sites as will be discussed.

Knowledge about the danger of diarrhea was measured in two ways. In five sites (Ecuador, Lesotho, Nigeria, the Philippines, and Zaire), mothers were asked to name the signs or symptoms indicating that diarrhea is serious. Mothers who mentioned no signs or only one correct sign were categorized as having low knowledge on this measure, while those who mentioned two or more correct signs were categorized as having high knowledge. In Central Java and West Java, mothers were asked whether diarrhea is dangerous or not for a child under five. Those answering "yes" were considered to have high knowledge, while those answering "no" or "don't know" were coded as having low knowledge. While the two measures are not identical, they seem sufficiently similar to allow for comparison.

Knowledge about dehydration was measured by asking mothers who knew about SSS or ORS what the solution does to help a child. In the three African sites, mothers were asked about the effects of using SSS and, in a separate part of the interviews, about the effects of ORS. Since SSS was promoted more heavily than ORS in these sites, the responses to SSS effects were used. In the other sites, where ORS rather than SSS was promoted, the answers about ORS were used. A dichotomous variable was created categorizing respondents as having "high knowledge" and "low knowledge." Mothers who said the solution replaces water or fluids were put into the high knowledge category, while those who gave any other answer were put into the low knowledge category.

A mother's perception of whether she knew how to prepare an oral rehydration solution was measured by asking mothers if they knew how to prepare the solution promoted in their country. For this study, the knowledge variable of interest was whether caretakers believed they knew how to make the SSS or ORS solutions correctly. It was hypothesized that the use of those solutions would be a function of self-perceived knowledge rather than accurate knowledge. In fact, the proportion of those who claimed to know how to prepare the solutions who gave an
accurate recipe varied sharply, from 38 to 89 percent, with a median of 51 percent across the five sites with mixing information.

It is widely recognized that factors such as a mother's education, the distance to health facilities, and the symptoms observed during episodes of diarrhea may also affect treatment choices [7]. Dichotomous variables were created for each of these factors in order to control for their effects on the relationship between knowledge and behavior.

Two categories of education were created: mothers with up to six years of primary school, and those with more schooling than that. For distance to health facility, mothers who lived within thirty minutes' walk from a facility comprised one category, and those living further away the other. Finally, cases of diarrhea were classified on the basis of the number of certain symptoms reported for the episode. The symptoms examined were: vomiting, fever, a child being active or not, and a child being judged as very sick or not so sick. Those who reported none or one of these items were placed in one category, and those reporting more than one item in the other.

RESULTS

The first research question concerns the relationship between knowledge of the dangers of diarrhea and treating at all. Caretakers reported giving treatment to most episodes of diarrhea. The percentage of cases receiving treatment at all ranged from lower levels in Nigeria (68%) and West Java (71%), through intermediate levels in Lesotho (75%), Zaire (77%), and the Philippines (80%), to higher levels in Central Java (87%) and Ecuador (88%).

Overall, mothers who knew more signs of serious diarrhea or that diarrhea is dangerous were not significantly more likely to give some sort of treatment than those who knew less (see Table 3). The bivariate relationships between knowledge and behavior were significant at $p < .05$ in Ecuador, Nigeria, and West Java. However, when health care access, education, and severity of the episode were controlled through logistic regression, the only remaining significant association was in West Java. There, mothers who knew diarrhea is dangerous were more likely to have treated the last recent episode of diarrhea. However, since the vast majority of mothers already knew that diarrhea is dangerous, increasing this knowledge would be unlikely to have a substantial effect on treatment. In short, knowing more about diarrhea made little difference in whether the cases received any kind of treatment.

The second research question asked whether those who know about dehydration and the benefits of ORT will be more likely to give fluids (home fluids, SSS, or ORS) than those who do not know. A single variable was created which classified mothers into three categories: giving no fluids at all, giving fluids other than SSS or ORS, and giving SSS or ORS, whether other fluids were given or not.
Table 3. Doing Anything At All and Knowledge of Diarrhea

<table>
<thead>
<tr>
<th></th>
<th>Knowing Signs that Diarrhea is Serious</th>
<th>Odds Ratios and Confidence Intervals after Controlling for Access, Education and Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low K</td>
<td>High K</td>
</tr>
<tr>
<td>Ecuador</td>
<td>71.4</td>
<td>90.3*</td>
</tr>
<tr>
<td></td>
<td>(42)</td>
<td>(298)</td>
</tr>
<tr>
<td>Philippines</td>
<td>83.6</td>
<td>87.3</td>
</tr>
<tr>
<td></td>
<td>(61)</td>
<td>(314)</td>
</tr>
<tr>
<td>Lesotho</td>
<td>70.5</td>
<td>80.3</td>
</tr>
<tr>
<td></td>
<td>(156)</td>
<td>(132)</td>
</tr>
<tr>
<td>Nigeria</td>
<td>63.9</td>
<td>73.9*</td>
</tr>
<tr>
<td></td>
<td>213</td>
<td>173</td>
</tr>
<tr>
<td>Zaire</td>
<td>76.2</td>
<td>78.6</td>
</tr>
<tr>
<td></td>
<td>(265)</td>
<td>(271)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Knowing That Diarrhea is Dangerous</th>
<th>Odds Ratios and Confidence Intervals after Controlling for Access, Education and Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low K</td>
<td>High K</td>
</tr>
<tr>
<td>Central Java</td>
<td>81.8</td>
<td>87.8</td>
</tr>
<tr>
<td></td>
<td>(22)</td>
<td>(122)</td>
</tr>
<tr>
<td>West Java</td>
<td>53.6</td>
<td>75.0*</td>
</tr>
<tr>
<td></td>
<td>(28)</td>
<td>(188)</td>
</tr>
</tbody>
</table>

* Bivariate relationship significant at $p < .05$.

In four out of the seven sites there was a strong and significant association between knowledge of the effects of rehydrating solutions and treatment with fluids (special fluids or SSS/ORS). A similar trend was seen in a fifth site, Central Java, although it did not reach statistical significance at the $p = .05$ level. In the other two sites (the Philippines and Zaire), there was essentially no association. Each of the statistically significant associations was maintained after multivariate discriminant analysis controlled for education, distance from the nearest health facility, and severity of the illness. In each case, mothers with higher knowledge were more likely to give fluids or ORS/SSS (see Table 4).

However, in both Central Java and in the Philippines, the association between knowledge and giving of fluids became significant ($p < .0001$) after controlling for education, distance from a health facility, and severity of the illness. It was, in fact, the factor of severity that made the difference. Thus, when we take account
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Table 4. Distribution Percent of Mothers in Giving Fluid Categories by High/Low Knowledge of Dehydration

<table>
<thead>
<tr>
<th>Site</th>
<th>Level of Knowledge</th>
<th>Special or Extra Fluids (not SSS/ORS)</th>
<th>SSS/ORS</th>
<th>Bivariate Signif.</th>
<th>Signif. After Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n)</td>
<td>No Fluids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecuador</td>
<td>Low (227)</td>
<td>33.5</td>
<td>54.2</td>
<td>12.3</td>
<td>( p &lt; .0001 )</td>
</tr>
<tr>
<td></td>
<td>High (114)</td>
<td>21.9</td>
<td>41.2</td>
<td>36.8</td>
<td>( p &lt; .0001 )</td>
</tr>
<tr>
<td>Central Java</td>
<td>Low (107)</td>
<td>37.4</td>
<td>30.8</td>
<td>31.8</td>
<td>( p = .23 )</td>
</tr>
<tr>
<td></td>
<td>High (39)</td>
<td>23.1</td>
<td>33.3</td>
<td>43.6</td>
<td>( p &lt; .0001 )</td>
</tr>
<tr>
<td>West Java</td>
<td>Low (175)</td>
<td>48.6</td>
<td>34.9</td>
<td>16.6</td>
<td>( p &lt; .005 )</td>
</tr>
<tr>
<td></td>
<td>High (40)</td>
<td>20.0</td>
<td>42.5</td>
<td>37.5</td>
<td>( p &lt; .0001 )</td>
</tr>
<tr>
<td>Philippines*</td>
<td>Low (188)</td>
<td>28.2</td>
<td>54.8</td>
<td>17.0</td>
<td>( p = .29 )</td>
</tr>
<tr>
<td></td>
<td>High (70)</td>
<td>25.7</td>
<td>48.6</td>
<td>25.7</td>
<td></td>
</tr>
<tr>
<td>Lesotho</td>
<td>Low (117)</td>
<td>32.5</td>
<td>25.6</td>
<td>41.9</td>
<td>( p &lt; .001 )</td>
</tr>
<tr>
<td></td>
<td>High (171)</td>
<td>19.9</td>
<td>15.2</td>
<td>64.9</td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>Low (400)</td>
<td>55.8</td>
<td>33.3</td>
<td>11.0</td>
<td>( p &lt; .0001 )</td>
</tr>
<tr>
<td></td>
<td>High (106)</td>
<td>30.2</td>
<td>34.9</td>
<td>34.9</td>
<td></td>
</tr>
<tr>
<td>Zaire</td>
<td>Low (216)</td>
<td>66.7</td>
<td>15.4</td>
<td>17.9</td>
<td>( p = .55 )</td>
</tr>
<tr>
<td></td>
<td>High (139)</td>
<td>65.6</td>
<td>13.2</td>
<td>21.2</td>
<td></td>
</tr>
</tbody>
</table>

*Includes data from only two regions.

of the severity of the episode of diarrhea in these two sites, knowledge does make a difference.

In addition to the overall relationship between knowledge of rehydration and giving of fluids or ORS/SSS, there appears to be an additional effect of knowledge on the use of ORS/SSS specifically as opposed to other fluids. This difference was statistically significant (chi square) in Ecuador (\( p < .001 \)), Nigeria (\( p < .001 \)), and Lesotho (\( p < .005 \)).

In Zaire, where there was no hint of a relationship between knowledge of rehydration and fluid use, only a third of all mothers reported any special fluid use at all. Nigeria and West Java also reported relatively high proportions of cases that received no fluids, but only for the low knowledge category (Nigeria, 56%; West Java 49%).

The third question asked whether mothers who believe they know how to prepare the SSS or ORS solution are more likely to use the solution than those who do not know. The first two columns of Table 5 show strong confirmation for this hypothesis. Belief that one knows how to prepare the solution correctly is strongly related to the use of the solution in every one of the sites where knowledge of preparation was assessed. Data on this question was not
Table 5. Percent Who Gave SSS or ORS by Belief They Knew How to Mix and Accuracy of Mixing Knowledge

<table>
<thead>
<tr>
<th></th>
<th>Saying they don't know how to mix</th>
<th>Saying they do know how to mix</th>
<th>Chi sq. (signif)</th>
<th>Group saying they do know how to mix</th>
<th>Not Accurate Knowledge</th>
<th>Accurate Knowledge</th>
<th>Chi sq. (signif)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecuador</td>
<td>8.8%</td>
<td>22.9%</td>
<td>4.94</td>
<td>25.0%</td>
<td>22.6%</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(57)</td>
<td>(289)</td>
<td></td>
<td>(32)</td>
<td>(257)</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>West Java</td>
<td>3.7%</td>
<td>22.9%</td>
<td>4.21</td>
<td>20.2%</td>
<td>25.5%</td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(27)</td>
<td>(188)</td>
<td></td>
<td>(94)</td>
<td>(94)</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Lesotho</td>
<td>19.6%</td>
<td>64.2%</td>
<td>34.60</td>
<td>60.7%</td>
<td>70.1%</td>
<td>1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(56)</td>
<td>(232)</td>
<td></td>
<td>(145)</td>
<td>(87)</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>3.3%</td>
<td>30.7%</td>
<td>68.19</td>
<td>22.4%</td>
<td>38.7%</td>
<td>6.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(271)</td>
<td>(235)</td>
<td></td>
<td>(116)</td>
<td>(119)</td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zaire</td>
<td>12.6%</td>
<td>21.5%</td>
<td>4.79</td>
<td>15.4%</td>
<td>25.8%</td>
<td>5.48</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(145)</td>
<td>(391)</td>
<td></td>
<td>(162)</td>
<td>(229)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

available for Central Java and the Philippines. We then considered an additional question: among those who said they knew how to mix, were those who had accurate preparation knowledge also more likely to use it than those without accurate knowledge?

Accuracy of mixing knowledge was measured by asking mothers about the ingredients and the proportions they used in mixing the solution. Accuracy, defined as knowing the exact recipe promoted by health authorities, was very high in Ecuador (89%) but lower (between 37-59%) in the other sites. This may be partially explained by the use of ORS packets in Ecuador—packets designed for one liter of water and distributed with a special mixing bag—compared with a recipe for SSS more complicated to remember in the African sites. West Java reported accuracy levels similar to the sites using SSS.

The right side of Table 5 presents the relevant results. In Nigeria and Zaire, both SSS sites, there was a significant relationship between accuracy of knowledge and giving a solution. In West Java and Ecuador, where ORS was promoted, accuracy of knowledge was unrelated to practice. That was also the pattern in Lesotho, where the majority of those who said they knew how to mix gave SSS regardless of whether they provided a precisely accurate formula. In both Nigeria and Zaire, the relationship between accuracy and giving SSS was still significant after controlling for education, distance from a health center, and
mothers’ observations of the symptoms of the episode. The odds ratio for Nigeria was 2.16 [C.I. 1.22 - 3.81]; for Zaire, the odds ratio was 1.88 [C.I. 1.12 - 3.15].

**DISCUSSION**

The examination of the association between knowledge of the dangers of diarrhea or signs of its seriousness and giving any treatment indicates that these types of knowledge of diarrhea do not affect the decision of whether to give any treatment or not. This may be due in part to the fact that while mothers recognize symptoms of diarrhea and the dangers of the illness without any problems, diarrhea occurs often in young children and is often self-limiting. Mothers may see no need to treat illnesses that are common and brief. While mothers recognize that diarrhea can be dangerous, they also know that it is sometimes minor. A general recognition that diarrhea can be dangerous, or an awareness of the symptoms which signal danger, may not mean that each specific case is perceived as dangerous and requiring treatment. While the way the variable was constructed differed in Central Java and West Java from the other sites, the results resemble what was found elsewhere.

This result suggests that efforts to teach mothers about the symptoms of serious diarrhea or its dangers will not likely increase the proportion of cases that receive treatment. The effect could be different in countries with far lower rates of treating at all, for these sites all had relatively high rates of treating at all (68% to 88%).

The association between knowledge of rehydration and giving fluids or SSS/ORS presents a rather different picture, for we find that mothers who know about the benefits of giving ORT are more likely to give fluids than those who do not. In four of the five sites with significant results in the bivariate analysis, the survey was conducted after a period of special ORT promotion by the Ministry of Health. The fact that the association was significant in six of the seven sites after controls, despite the differences in the solutions promoted and the means used for promotion, strengthens the evidence: women who know about the beneficial effects of using SSS or ORS are more likely to give fluids for diarrhea than those who do not know. Whether that knowledge is a marker for having been exposed to a number of different messages about ORT promotion, or that the knowledge itself influenced caretakers' actions, remains unclear from these data.

These results suggest that CDD programs which include messages about dehydration and the benefits of using ORT as a part of a series of messages may increase the use of SSS or ORS. Alternatively, if a CDD program wanted to change from emphasizing SSS/ORS to promoting early use of fluids, as WHO has advocated, and made explicit the link between dehydration and home fluids, they might expect increased fluid use.

The first result from Table 5 showed a substantial relation between a caretaker’s belief that she could mix SSS or ORS and the tendency to have given
her child the mixture. This is hardly a surprising result. Since both evidence about knowledge and practice were collected simultaneously, the association may reflect the tendency for those who gave the solution to believe they know how to mix it. It may also indicate an effect of self confidence in their mixing skill, or self-efficacy, on their behavior [21]. Despite this ambiguity of causal direction, an intervention that emphasizes teaching people how to mix the solution properly can be recommended. If, as is likely, some part of the association found between belief and use stems from belief causing increased use, having more people who know well how to mix the solution will increase use of SSS or ORS.

The second result from Table 5 raises a different issue and is less reassuring. Substantial numbers of people who could not give an accurate formula said they had given ORS or SSS. Also, the proportion of those who used the solution without knowing the correct recipe for mixing was nearly the same as for those who did give the correct recipe for three sites (Ecuador, Lesotho, West Java). In two of the three African sites (Nigeria and Zaire), accuracy of knowledge was significantly related to likelihood of using the solution.

Why would one find such a contrast in sites? The contrast may stem from the solution (ORS or SSS) promoted in the sites and the amount of information a woman must learn and retain for correct mixing of the solution. In two of the three sites with no association between accuracy and use (Ecuador and West Java), ORS was promoted, while SSS was promoted in the two sites which showed a significant relationship. The amount of information a woman must retain to mix ORS packets correctly is far less than for mixing SSS correctly, for mixing a solution with a packet does not require memorizing a specific formula for ingredients—the instructions are shown (written or illustrated) on the packet. Using SSS, on the other hand, involves learning and recalling how to combine the precise amounts of three ingredients. One then expects that use of SSS is more closely associated with a memory of mixing instructions that ORS use with those instructions.

Given that it is consistently more difficult to remember the proper formula for SSS than for ORS, those who remember the SSS formula are likely to have been exposed to more messages about ORT in general. In short, those who have heard enough about ORT to have remembered the SSS formula will also have heard about how and why SSS should be used. That relationship is less likely to be operating for ORS use.

Since the concern that improperly mixed solutions may be ineffective or even toxic, finding in some sites that many mothers without accurate knowledge were likely to use the solution is disturbing. However, the result does make sense. One would expect a caretaker’s belief that she can mix the solution to affect use of it. While self-perceived knowledge should affect use rates, there is no good reason to expect inaccurate knowledge to correspond to lower use rates. This finding 


underlines the importance of careful teaching and supervision in promoting the use of these solutions.

This investigation of knowledge variables was done to seek evidence for using certain kinds of messages (symptoms of diarrhea, diarrhea is dangerous, giving SSS/ORS will restore lost water) in ORT promotion. There is no evidence linking recognition of the dangers of diarrhea in general with a specific decision to treat a case. This may reflect high levels of recognition that diarrhea is dangerous, reducing the possibilities for associations. It may reflect a recognition that cases vary in severity, so that a belief that diarrhea may be dangerous has little impact on the decision to treat a specific case. On the other hand, there is evidence that knowledge of the beneficial effects of oral rehydration solutions is related to use of fluids and particularly to use of SSS or ORS. Interventions which focus on diffusing this knowledge with other messages are then justified.

Finally, there is a substantial relation between a belief that one can mix a solution and use of that solution, but only an inconsistent one between accurate mixing knowledge and use. One may say that increasing peoples’ mixing knowledge is a condition for greater use, but the belief that one has that knowledge may also motivate that change. Such a belief may be accurate or inaccurate but still motivate use of ORS. This result calls for special care in promoting ORS or SSS solutions to insure that caretakers both recognize the value of using it and learn how to mix it accurately.

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REFERENCES


Direct reprint requests to:

P. Stanley Yoder
Center for International, Health and Development Communication
University of Pennsylvania
Annenberg School for Communication
3620 Walnut St.
Philadelphia, PA 19104-6220
WHO PLAYS?, WHO PAYS?, WHO CARES?:
A Case Study in Applied Sociology, Political Economy and the Community Mental Health Centers Movement
By SYLVIA KENIG

This work provides a detailed look at the concept of community in the literature of the community mental health centers (CMHC) movement from the 1960s to the 1990s. The author takes the analysis well beyond a history of the movement into the realm of applied theory. The purpose of the book is to explore the interwoven dynamics of state policy, market trends and applied theory.

The work breaks new ground in its systematic examination of structural functional and conflict sociology underlying American social psychiatry. The work also provides support for the argument that state policy and market conditions significantly limit and direct the applications of theory.

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