Home management of childhood diarrhoea in southern Mali—Implications for the introduction of zinc treatment

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Abstract

Diarrhoea remains one of the leading killers of young children. A recent meta-analysis demonstrated that a two-week course of zinc tablets once daily significantly reduces the severity and duration of diarrhoea and mortality in young children (Bhutta et al., 2000. Therapeutic effects of oral zinc in acute and persistent diarrhea in children in developing countries: Pooled analysis of randomized controlled trials. \textit{American Journal of Clinical Nutrition}, 72(6), 1516–1522). Formative research is being conducted in a number of countries to prepare for the large-scale promotion of this new treatment. In-depth and semi-structured interviews with parents, community health workers, and traditional healers were conducted to examine the household management of diarrhoea in the Sikasso region of southern Mali in preparation for the introduction of a short-course of daily zinc for childhood diarrhoea at the community level. Supporting data from a subsequent household survey are also presented. Although nearly all parents knew oral rehydration solution (ORS) could replace lost fluids, its inability to stop diarrhoea caused parents to seek antibiotics from local markets, traditional medicines or anti-malarials to cure the illness. The notion of combining multiple treatments to ensure the greatest therapeutic benefit was prevalent, and modern medicines were often administered simultaneously with traditional therapies. As parents often deem ORS insufficient and judge that an additional treatment should be combined with ORS to cure diarrhoea, the concept of joint therapy of zinc and ORS should be well accepted in the community. Mothers-in-law and fathers, who play a significant role in decisions to seek treatment for sick children, as well as traditional healers, should also be considered when designing new programs to promote zinc. Similarities with formative research conducted for a previous generation of diarrhoea control programmes are discussed.

Introduction

Zinc treatment for childhood diarrhoea

Mortality in young children has declined substantially over the past several decades, in part due to the promotion of oral rehydration therapy (ORT) for diarrhoea and dehydration (Banwell, 1990; Guerrant, Carneiro-Filho, & Dillingham,
However, diarrhoea remains a leading cause of mortality, accounting for approximately 18% of the 10.6 million deaths in children under five that occur each year (Bryce et al., 2005). Recent studies have demonstrated the effectiveness of zinc supplementation during and after episodes of diarrhoea in children. Pooled analysis identified a 15% lowered probability of continued diarrhoea among children with acute diarrhoea receiving zinc (95% CI, 5–24%) and a 24% lowered probability among children experiencing persistent diarrhoea (95% CI, 9–37%) (Bhutta et al., 2000). Moreover, children with persistent diarrhoea receiving zinc had a 42% lowered rate of treatment failure or death than the untreated group (95% CI, 10–63%) (Bhutta et al., 2000). In light of these findings, the World Health Organization and UNICEF now recommend that children under five years with diarrhoea receive 20 mg zinc for 10–14 days, in addition to the newly formulated lower osmolarity oral rehydration salts (ORS) (WHO/UNICEF, 2004).

Along with these guidelines come new questions regarding how best to integrate and market zinc therapy in different settings. Effectiveness studies are currently being conducted in several countries to look at how to incorporate zinc into the local health care system, while some programs have already made zinc available in the community. The potential of zinc to reduce child morbidity and mortality has reawakened interest in diarrhoea control programs. Key concerns include how promotion of zinc may affect treatment of diarrhoea with ORS, as well as how it may influence the inappropriate use of antibiotics and other treatments. This paper presents the findings of baseline qualitative and survey research on the household management of children with diarrhoea in Bougouni district, Mali, which was used to develop health worker training and communication materials for a pilot introduction of zinc treatment. The research findings emphasize several important issues that may warrant consideration when designing programs to introduce zinc therapy to treat childhood diarrhoea in other settings.

Household management of diarrhoea: lessons for zinc promotion

The household management of childhood diarrhoea was a significant focus of public health inquiry in the 1980s when many countries first established national diarrhoea control programs. These programs promoted different forms of ORT, including ORS, breastfeeding, handwashing and other hygiene behaviours, and often drew upon anthropological methods and concepts to inform intervention design. Of principal concern was how to characterize ORS in the community—as a cure for diarrhoea or as a means to replace lost fluids. Programme managers feared that labelling ORS as a cure for diarrhoea might lead to overly high expectations of its therapeutic ability and eventual dissatisfaction among users, but that portraying it as a means to replace lost fluids would not provide enough incentive to support its regular use. This issue was examined in many countries, both before and after the implementation of interventions to promote ORS/ORT (Bentley, 1988; Coreil & Genece, 1988; Green, 1986; Hudelson, 1993; Kendall, 1983; Kendall, Foote, & Martorell, 1983; Kendall, Foote, & Martorell, 1984; Mull & Mull, 1988; Scrimshaw & Hurtado, 1988). Ultimately, a majority of programs adopted a marketing approach that highlighted the ability of ORS to increase strength, prevent dehydration and save children’s lives, while acknowledging that it did not stop diarrhoea (Weiss, 1988). Similar to ORS, careful consideration must be paid to how zinc is labelled and marketed in health programmes. The same balance that was sought between encouraging the prompt use of ORS whilst not raising unrealistic expectations is also relevant to the introduction of zinc therapy. Parents may be less willing to seek out and pay for a nutrient, but promoting zinc as a medicinal treatment may disappoint if expectations of an immediate, observable improvement are not fulfilled.

Another consideration when designing interventions to promote zinc will be local terminology for diarrhoea illnesses and their perceived causes. Teething is associated with diarrhoea in infants in a wide array of settings (Ene-Obong, Iroegbu, & Uwaegbute, 2000; Kapoor & Rajput, 1993; Olango & Aboud, 1990; Stapleton, 1989). Diarrhoea associated with teething is often perceived not as an illness but rather as a normal stage of childhood development, and treatment may not be sought until symptoms of severe dehydration or vomiting develop (Omotade, Adeyemo, Kayode, & Oladejo, 2000; Smith et al., 1993). Other causes of diarrhoea cited across a range of studies include the consumption of certain foods or spoilt breast milk, an imbalance of hot and cold, changes in weather, worms, pollution or exposure to impure things, malevolent spirits or evil eye, moral misbehaviour of parents during pregnancy or lacta-
tion, infection, and emotional states such as loneliness and fear (de Zoysa et al., 1984; Green, Jurg, & Djedje, 1994; Kauchali, Rollins, & Van den Broeck, 2004; Lozoff, Kamath, & Felman, 1975; Nichter, 1988; Weiss, 1988). Rarely do complex local taxonomies of diarrhoeal illnesses mirror the distinction between complicated and uncomplicated diarrhoea that health providers recognize. Programmes need to examine how to promote zinc therapy as an appropriate treatment for all classifications of diarrhoea, so that it does not become associated only with treatment for certain milder forms of diarrhoeal illness.

The most serious and life-threatening cases of diarrhoea are often attributed to an external agent such as a spirit or a jealous person, and are therefore treated with traditional therapies related to these perceived causes. A sunken or depressed fontanel is frequently a symptom of severe dehydration caused by diarrhoea, but is often ascribed to supernatural causes (Green, 1985, 1986; Kay, 1993; Lozoff et al., 1975; Mull & Mull, 1988). In Honduras, four major local aetiologies attribute diarrhoea to worms, evil eye, sunken fontanel, and potentially fatal indigestion, or empacho. The latter three causes were linked to envy that targets young, weak children and are treated with traditional therapies (Kendall et al., 1983). Among the Gogo of Tanzania, simple cases of childhood diarrhoea are seen as resulting from normal environmental or physical factors. However, severe, life-threatening cases are often attributed to transgressions of sexual taboos by the parents, particularly mothers (Mablia, 2000). Programme planners must decide what claims should be made for zinc in cases of serious diarrhoeal illness and how to encourage care-seeking from a health facility for episodes of severe or prolonged diarrhoea.

The context for diarrhoea control programmes has changed considerably since the early 1980s when a number of anthropological studies examined the household management of diarrhoea in order to inform the design of interventions to promote ORT. There has been tremendous growth in care-seeking from the private and/or informal health sector in most countries, new diseases such as HIV/AIDS have emerged as public health threats, and a range of new disease-specific programmes are being implemented. At the same time, district health systems continue to be extremely weak, and the role of the state in health is hardly perceptible in many settings (Leonard, 2005; Segall, 2003). This article examines the applicability of formative research to inform interventions to promote the joint treatment of diarrhoea with ORS and zinc for acute diarrhoea. The findings emerging from this study are specific to the context in southern Mali; however, many issues discussed here merit consideration when planning the promotion of zinc in other settings.

Methods

Study site

This study was conducted in the Kologo and Zantiebougou health zones of Bougouni district in Sikasso Region, Mali, 150–250 km south of the capital Bamako. Study participants reside in rural villages located 5–40 km from community health centres, and most belong to the Bambara ethnic group and speak Bambara in the home (Imperato, 1975). Chronic childhood malnutrition is common, as indicated by a 47% estimated prevalence of stunting in this region. In a national survey conducted in 2001, the prevalence of diarrhoea among children less than two years of age was estimated at 21%, and only 15% of mothers whose child had experienced diarrhoea during the past two weeks reported using an ORS packet to treat their children (EDSM-III, 2001).

Data collection

Data collection for the study took place from July through December 2003, and examined local Bambara language terminology and classification of diarrhoeal illnesses, perceived causes of illnesses and reported symptoms, use of ORS, antibiotics and other treatments for diarrhoea, household decision making for care and treatment, patterns of care seeking, and community sources of care. Illness narratives (n = 14) were elicited from parents who sought care for their child with diarrhoea from (a) the local community health centre, (b) community health worker, and (c) parents who sought care outside the formal health sector from a traditional healer, market vendor or other provider. In practice, the boundaries between the formal and informal or traditional sectors are considerably blurred: parents often treated their child in the home with therapies acquired outside the formal health sector before seeking care from a health centre, while others first sought care from a health centre or community health worker before resorting to home care after an initial
treatment failure. Furthermore, there is flow of medications between the sectors and some providers practice in multiple sectors, similar to findings elsewhere in the region (Leonard, 2005).

Expanding upon themes that emerged from analysis of the in-depth illness narratives, semi-structured interviews \((n = 19)\) were conducted with parents who had sought care from the different sources. These interviews also included several listing and ranking exercises aimed at eliciting complete lists of treatments and sources of care for childhood diarrhoea. Community health centre personnel \((n = 5)\), community health workers operating village drug kits \((n = 12)\), and traditional healers \((n = 6)\) were also interviewed about how they diagnose and treat children presenting with diarrhoea, their views on how diarrhoea is perceived and treated by parents, and their thoughts on the use and value of ORS.

This paper also presents selected results related to caretakers’ knowledge and treatment practices for diarrhoea resulting from a household survey conducted in March–April 2004 prior to introduction of zinc. Housing compounds were chosen proportional to their size using a systematic sampling scheme. In the sampled compounds, 352 caretakers of children who had been sick in the previous two weeks were interviewed; of these cases, 228 reported symptoms of diarrhoea in the previous two weeks.

**Results**

**Local terminology and knowledge of diarrhoea**

Several words exist in Bambara for diarrhoea, the most general of which is *konoboli*, literally meaning “stomach (*kono*)-running (*boli*)”. *Konoboli* refers to common, uncomplicated diarrhoea characterized by frequent or loose stools, but can be further refined by adding adjectives, such as *gnibo konoboli* (teething diarrhoea) or *konoboli jima* (watery diarrhoea). Terms for serious forms of diarrhoea such as *togotogonin* and *konorojoli* do not include the term *konoboli*. These illnesses were characterized by informants as having more serious symptoms such as blood or pus in the stool, extreme weakness and/or stomach pains, and vomiting. While parents typically regard *konoboli* as a common, non-life-threatening illness of children, they recognize that complicated forms such as *togotogonin* (sometimes translated as “dysentery”) or *konorojoli* (literally “internal wound”) are potentially dangerous and require more care. Of the 228 cases of diarrhoea that were reported during the household survey, parents labelled episodes of simple diarrhoea, termed as *konoboli*, in 128 (56.7%) of reported cases, whereas the term for the severe form of diarrhoea *konorojoli* was applied in 90 (39.5%) cases and *togotogonin* was the term applied in eight (3.5%) cases.

While approximately one quarter of parents attributed diarrhoeal illnesses to contaminated water or food, the most common causes of diarrhoea cited without prompting were teething (50.3%) and *sumaya* (46.2%), a Bambara term for febrile illness (often translated as malaria), as shown in Table 1. Many parents stated that since teething was the root cause of many episodes of childhood diarrhoea, nothing effective could be done to cure or treat the illness episode. As diarrhoea is often accompanied by a fever, many parents also conclude that *sumaya* (~malaria) was the ultimate cause of the diarrhoea. During interviews, a smaller number of parents reported that diarrhoea could be

<table>
<thead>
<tr>
<th>Causes n = 352</th>
<th>Mentioned without prompting(^a)</th>
<th>Rating when prompted by interviewer</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Always</td>
</tr>
<tr>
<td>Teething(^b)</td>
<td>177 (50.3)</td>
<td>195 (55.6)</td>
</tr>
<tr>
<td><em>Sumaya</em> (~Malaria)(^b)</td>
<td>150 (42.6)</td>
<td>151 (43.3)</td>
</tr>
<tr>
<td>Badly prepared or stored food(^b)</td>
<td>91 (25.9)</td>
<td>212 (60.4)</td>
</tr>
<tr>
<td>Dirty water</td>
<td>79 (22.4)</td>
<td>149 (42.3)</td>
</tr>
<tr>
<td>Mother’s breast milk</td>
<td>45 (12.8)</td>
<td>51 (14.5)</td>
</tr>
<tr>
<td>Too much pepper in the food</td>
<td>0</td>
<td>7 (2.0)</td>
</tr>
<tr>
<td>Too much salt in the sauce(^b)</td>
<td>0</td>
<td>5 (1.4)</td>
</tr>
</tbody>
</table>

\(^a\)Not mutually exclusive; total greater than 100%.

\(^b\)1 case missing \(n = 351\).
transmitted from a mother through breast milk, could be caused by a mother who was not sufficiently clean, or by a mother’s improper sexual behaviour.

Patterns of care seeking

Treatment of an episode of diarrhoea typically begins in the home with traditional medicines (bamanafura or Bambara medicine) and/or antibiotics, which are available for purchase from vendors in the village or nearby market (Table 2). Traditional Bambara therapies are comprised primarily of leaves, roots or bark which are boiled, strained and cooled, creating a broth (Hielscher & Sommerfeld, 1985; Imperato, 1970, 1975, 1981). This infusion is used as both a topical wash and a medicinal drink, and is administered to the child 2–4 times per day as long as the illness persists. A broth made from the boiled leaves of a guava tree was the most frequently mentioned traditional treatment for diarrhoea, although several dozen other ingredients were also identified. Ingredients for traditional medicines are readily available, and are either collected from around the village or purchased at the market for a nominal fee, making them appealing to families with limited access to cash. Antibiotics can also be easily obtained from markets and ambulatory vendors, and pills can be purchased individually or a few at a time to minimize the cost (less than 0.03 USD each). The identity, source or quality of antibiotics sold by market vendors is typically unknown as many pills are sold loose from unlabeled jars or bags. Tetracycline appears to be the most common antibiotic used to treat childhood diarrhoea (although this antibiotic is not recommended for children under the age of eight years). Among the 228 caretakers interviewed in the household survey, antibiotics were the most commonly reported treatment given to children within the first 24 h of their diarrhoeal illness (Table 2).

If a child’s illness does not improve after two or three days of treatment in the home, parents may seek care from a community health worker who manages a village drug kit, from the community health centre, or from a traditional healer. Parents are able to purchase malaria medicines, ORS packets, paracetamol, and several other items from village drug kits. Although community health centres are stocked with most essential medications and staffed by a nurse and an assistant midwife, many parents take their children there only in cases of serious illness. This is due to a variety of reasons, but the direct costs of consultation fees and medications, as well as indirect costs associated with reaching the centres contribute to reluctance to seek care there. Traditional healers, often respected elders of the community, are primarily herbalists consulted for their knowledge of how to prepare more powerful or complicated traditional medicines.

When parents detect symptoms of severity which exceed those of a normal bout of ‘teething’ diarrhoea, especially when diarrhoea is accompanied by malaise or fever, which is recognized as a probable indication of sumaya (~malaria), they may seek care from a village drug kit or health centre. However, obtaining anti-malarial drugs to treat the febrile illness is of much greater priority than of acquiring ORS to treat the diarrhoea. Relatively few parents reported having sought care for an illness characterized by diarrhoea alone, and those who did were motivated to do so by the perceived severity or prolonged duration of the symptoms.

Recourse to traditional healers and traditional medicines was found to occur at nearly any point along the illness spectrum. While traditional therapies are usually the first step in the treatment process, they are by no means discontinued or replaced after the introduction of modern medicines. Rather, modern medicines are provided in addition to traditional therapies, as both are viewed as having their own strengths and weaknesses. Modern medicines are said to be very strong and fast acting, although this strength brings with it potentially harmful side-effects. Alternatively,
traditional medicines are thought to be slower acting, but can be used to treat a wider range of conditions and do not cause serious side-effects. Importantly, traditional medicines can be obtained for little or no cost, whereas access to modern medicines is limited by user fees at health centres, the cost of the medication itself, as well as a range of indirect costs.

The combined administration of several different medicines is often viewed as the most effective means of overcoming illness. Particularly when faced with a severe illness, the notion of mixing or complementing traditional medicines with modern ones in order to benefit from the advantages of each is very prevalent. As one father responded, “when an illness catches you, you shouldn’t sit on one of your hands.” However, the combination of many treatments often leaves parents unsure about the individual effectiveness of each. When a two-year old child experienced an episode of diarrhoea, his parents first began treatment with chloroquine and ORS purchased from the village drug kit. After two days passed with little improvement in his condition, the parents then added several traditional therapies prepared by a village healer. When asked which medicine was responsible for curing the child’s illness, the mother replied:

There is a marriage of the treatments. We used many traditional medicines plus chloroquine and ORS. Therefore, when the illness ended, one cannot know which medicines brought a cure.

While acknowledging the efficacy of modern medicines, some parents and community health workers reported that certain childhood illnesses, including a few locally recognized forms of severe diarrhoea, could only be successfully treated with traditional therapies. Unfortunately, these are serious illnesses that might most benefit from medical treatments. Such an illness is kono (literally “bird”), characterized by convulsions and altered mental status, symptoms which may correspond to cerebral malaria or meningitis. Parents and CHWs alike stated that if kono is suspected, a child must only receive traditional treatment, as an injection from a health centre would likely cause death. Similar locally defined illnesses have been reported in other regions of Mali (Castle, 1994), and in other parts of Africa such as Tanzania (Makemba et al., 1996) and Kenya (Mwenesi, Harpham, Marsh, & Snow, 1995). Severe childhood illnesses that are locally classified as “not for hospital” illnesses have been described in other parts of West Africa (Hill, Kendall, Arthur, Kirkwood, & Adjei, 2003). Furthermore, nearly every single parent explained that a child with a depressed fontanel, a sign of dehydration often due to diarrhoea, could be cured only by incantations performed by elderly women healers (musokoroba) or traditional healers. Several parents said that certain complicated forms of diarrhoea (those accompanied by either blood in the stool or vomiting) could only be cured with traditional medicines, although most recognized the need to seek care at a health centre.

**Oral rehydration solution (ORS)**

ORS is referred to in Bambara, in both the formal health system and at the community level, as keneyaji, meaning water (ji) of good health (keneya). In the study area, ORS has been promoted through the radio, television and child survival projects. ORS is commonly administered in combination with traditional medicines or antibiotics, and this is in large part due to the perceived purpose of ORS. When questioned about the role of ORS, most parents exhibited a clear understanding of its purpose to replace fluids lost during an episode of diarrhoea. While parents appreciated the ability of ORS to replace lost fluids, they were significantly more concerned with stopping or curing the child’s diarrhoea. Because it lacks curative ability, ORS was not viewed as a sufficient treatment if provided alone. Rather, ORS needed to be completed or complemented with another treatment, such as traditional medicines or antibiotics that would serve the function of curing the diarrhoea while ORS played the secondary role of replacing lost fluids.

Corresponding with the low levels of ORS usage described by parents, community health workers operating village drug kits reported that parents rarely came to them intending to purchase ORS or seeking care specifically for a child’s diarrhoea. When children with diarrhoea were brought to the drug kit, CHWs infer that parents were primarily motivated to do so by the simultaneous presence of fever or an extended unsuccessful treatment at home with traditional medicines. Diarrhoea in the presence of fever was nearly always treated as case of malaria. As one CHW explained, “There are some parents who come asking for ORS, but I tell them that their child also needs chloroquine, and so I sell them the two.” Also similar to the attitude of parents, but even more apparent and pervasive,
CHWs expressed uniform reservations about the effectiveness of ORS. Nearly all CHWs repeatedly stressed the inability of ORS to stop or cure diarrhoea:

ORS is for lightening the illness, but it can’t completely cure the diarrhoea. It’s only for replacing water that the child has lost. The sale of ORS is very slow with us.

Another CHW discussed how parents were only interested in curing their child’s diarrhoea:

We say each time that ORS doesn’t stop diarrhoea, but it replaces water from the body. Therefore, according to parents, if it doesn’t stop the diarrhoea, they don’t really have any confidence in it.

Because of the perceived limitations of ORS and its lack of a curative effect, not only are CHWs aware that parents combine traditional medicines or antibiotics from market vendors with ORS, they often encourage them to do so. When asked if he was familiar with the traditional medicines parents frequently give their children, one CHW replied:

Yes, I can cite the types of traditional medicines— they are the same as the ones I counsel parents to use in addition to ORS. Traditional medicines are easy to get and they stop the child’s diarrhoea. That’s why I instruct parents to use them in addition to ORS, which replaces water from the body, as traditional medicines complete the treatment.

A few CHWs stated that they also indicate to parents which drugs they should purchase from market vendors, and others mentioned that they also referred children with diarrhoea to traditional healers to obtain additional treatments.

All traditional healers were familiar with and understood the use of ORS, and all reported recommending it to parents. Healers also stated that they recommend that parents first treat diarrhoea with ORS before switching to traditional therapies. One healer even reported that he refuses to treat a child before the parents have tried using modern medicines. All of the healers also stated that if parents brought a child who looked severely ill, or if they themselves had treated a child for 2–3 days without improvement, they insisted that the parent bring the child to a community health centre.

Rather than seeing themselves as being in competition with the formal health care sector, traditional healers perceived themselves as acting in collaboration with the CHW in their village. Several healers mentioned examples of “working together” with CHWs, such as one healer who accompanies mothers to visit the CHW when they are confused about how to treat their child with modern medicines. After receiving a description of zinc therapy and how it would soon be available to treat diarrhoea along with ORS, healers were enthusiastic about its potential use. One healer asserted,

If you bring these tablets here, I won’t treat diarrhoea any longer. I myself will go and buy the tablets from the village drug kit and will give them to the children who are brought to me.

Household decision-making on management of child illness

In addition to a child’s mother, the father, grandmothers, and male head of household often play a significant role in deciding how health care is pursued for sick children. Within the household, the mother and other women, particularly the mother-in-law, have the primary role of caring for the child, and treatments administered within the home are typically under the jurisdiction of women. Consequently, traditional medicines are often the first attempt in the treatment process as they are easily gathered and prepared, often without cost, and their administration may not require discussion or involvement with male members of the household.

Many informants stressed the importance of their mother-in-law in diagnosing childhood illness and initiating the treatment process, and noted that it was their mother-in-law who decided when and what traditional therapies should be administered. Several informants also indicated that they first took their child to see the elder women/mothers of the village, who were able to tell them what caused their child’s illness and what traditional medicines should be used to treat it. Furthermore, it was repeatedly suggested that inexperienced young mothers, especially first time mothers, do not know about childhood illnesses, and must rely upon the knowledge of older mothers to instruct them. As one informant explained, “Childhood illnesses are numerous among us, but young mothers do not know which disease causes the child to suffer. But if the mother brings the child to an old woman, she
can determine the nature of the disease and tell which traditional treatments to give. Old mothers, they know about childhood sickness.”

When health care is sought outside the home, the father and/or male head of household is typically consulted, and many mothers reported having to ask for money several times before being granted license to bring the child to either the CHW or community health centre. Community health workers also reiterated this sentiment, believing that the cost of modern medicines often stopped or delayed parents from purchasing them. Regarding the difficulty for women to obtain permission or resources necessary to seek outside treatment, one CHW stated:

Many of the people who come to the drug kit are women. If women come I tell them to buy ORS, but they say their husbands refuse to give money. Nevertheless, I give them ORS and later I go and see their husband to explain the reason. Afterwards, he pays me.

Other mothers reported several unsuccessful attempts to obtain money from their husband, leaving them access only to traditional medicines and possibly a few antibiotics from the market to treat their child’s diarrhoea.

Medicines purchased from market vendors seem to fall midway along the treatment spectrum between care administered inside and outside the household. Some women must ask their husbands for money to pay for medicines available from vendors. However, due to the inexpensive prices of these drugs and the ability to purchase single tablets rather than the whole course of treatment required by CHWs or health centre pharmacies, most women can acquire a few antibiotic tablets without requesting financial resources from other family members or involving them in the treatment process. Since traditional medicines and drugs available from ambulatory vendors are often the least expensive treatment options, as well as typically under the purview of women, it is not surprising that these two sources dominate treatment of childhood diarrhoea.

Discussion

The impact of previous efforts to promote ORS was evident in interviews with parents and CHWs. Most informants were familiar with ORS and recognize its ability to replace lost fluids. However, it may be this correct understanding that is contributing in part to minimal use of ORT, as curing a child’s diarrhoea is given much higher priority than responding to dehydration. Considering the difficulty in acquiring potable water in rural settings and the high prevalence of childhood diarrhoea in Mali (Plate, Strassmann, & Wilson, 2004), it is not surprising that increasing fluid consumption in a child experiencing diarrhoea may not only be inconvenient, it may also seem counter-intuitive. Since parents clearly understand that ORS cannot stop diarrhoea, it is also logical that they regularly utilize traditional treatments or medicines from market vendors that are believed to have curative abilities, as well as cost less than ORS. Seeking treatment from a village drug kit or at a community health centre may not occur until several days after the onset of the illness, at which time the child may be seriously ill and dehydrated. This delay in pursuing proper care may increase morbidity and the risk of mortality, and compromise parents’ faith in modern treatments when they are used as a last resort. Furthermore, the recourse to drugs from market vendors perpetuates unnecessary and excessive use of antibiotics (Maiga, Haddad, Fournier, & Gauvin, 2003).

While the use of traditional and ambulatory treatments may have a negative influence on the use of ORS in the Sikasso region at present, the prevalent notion of mixing or blending treatments may facilitate the promotion of ORS and zinc as joint treatments for diarrhoea. Although parents appreciate the role of ORS to replace fluids, treatment of diarrhoea with only ORS is thought to be incomplete and must be augmented with a curative treatment to alleviate illness symptoms. Consistent with this rationale, parents may adopt the use of both treatments together rather than replacing ORS with zinc. Early experience with promoting the joint treatment of ORS and zinc in this study was met with enthusiasm by parents, who were eager to administer both treatments in response to their child’s diarrhoea. Counselling messages included statements that zinc could give ‘force’ and increase a child’s strength after an episode of diarrhoea, and many parents remarked at how it increased their child’s appetite, giving credence to this claim. Furthermore, the use of zinc and ORS as a ‘complete’ treatment for diarrhoea, particularly as the first recourse, may consequently lead to a natural reduction in the use of antibiotics and other questionable medicines available at
markets. Significant changes in these two important outcomes, increased use of ORS and decreased use of antibiotics, resulting from the introduction of zinc therapy has already been shown in studies in Asia (Baqui et al., 2004; Bhandari et al., 2005). In addition to discouraging the use of antibiotics for non-dysenteric diarrhoea, counselling messages must also stress the importance of continuing zinc treatment for the full two week course, which ensures that expectations of providing strength and reducing future cases of illness will have the most likelihood of being fulfilled.

Another finding of this research relates to the presence of multiple causal models of diarrhoeal illnesses. Depending on the situation, diarrhoea can be regarded as an independent illness, as in the case of *togotogonin* ( ~dysentery), a symptom associated with another illness such as *sumaya* (~malaria), a marker of a normal developmental process such as childhood teething, or a consequence of the child’s parents practicing proscribed behaviours. Each locally recognized type of diarrhoea may correspond to different therapies, and more severe types of diarrhoea are often not considered to be amenable to treatment with ORS. Programmatic efforts to promote proper treatment must take into account local classifications and understandings of illness causation and identify local terminology for all types of diarrhoea. As has been found in many other settings, more serious forms of diarrhoea in this study site were less likely to receive modern treatment than simple cases of diarrhoea. Promotional activities and educational messages must encourage treatment with ORS and zinc for all local classifications of diarrhoea, with an emphasis on encouraging appropriate care and referral for severe forms of illness.

Several new disease-specific programmes are being implemented in Mali, most notably for malaria and HIV/AIDS. Activities carried out by these programmes affect preventive and curative practices, not only of the target diseases, but also health-related practices more generally. In southern Mali, efforts to raise awareness of the signs and treatment of malaria have led many people, including health care providers, to immediately identify and treat any illness characterized by a fever as malaria, although it may or may not be the cause. Results of this study suggest that when fever occurs in the presence of other symptoms such as diarrhoea, treatment of the fever with an anti-malarial becomes the priority to the exclusion of management of other symptoms such as diarrhoea and rapid respiration (a possible sign of pneumonia). Over-diagnosis and treatment of malaria delays appropriate recognition and treatment of other illnesses such as diarrhoea and acute respiratory infections and increases the burden of mortality and morbidity caused by these illnesses. It may also cause parents to become disappointed with the efficacy of anti-malarial medicines when they do not reduce fever that is due to an illness other than malaria. This situation, however, is unlikely to change dramatically until improved illness diagnosis and case management are more widely available and community health care systems are strengthened.

Traditional treatments are unlikely to be replaced soon by modern medicines due to both their low cost and the long tradition of their use. In Honduras, evaluation of a successful ORS campaign revealed that despite increased use of ORS, simultaneous use of other treatments such as traditional teas remained relatively stable (Kendall, 1989). Treatment-seeking behaviour analogous to that portrayed in Mali—the use of traditional medicines for 2–3 days, followed by the use of modern treatments, but a return to traditional treatments in the absence of any noticeable improvement—has also been described in many other settings (Weiss, 1988). There are many social and economic factors that encourage people to pursue traditional therapies, including cost, accessibility, and local social and power structures. Ingredients for traditional medicines can be gathered or purchased at minimal cost, and traditional healers often do not demand payment. Bringing a child to a health care centre may require several hours of travel and cost a substantial amount of time and money, whereas most villages have traditional healers and elderly mothers readily able to dispense health care advice and assistance. Additionally, mothers may seek care from nearby healers before resorting to modern facilities because they know that they share a common conceptual language for discussing health and illness (Green, 1985).

Diarrhoea control programs in other settings have attempted to respond to the widespread use of traditional remedies in a variety of ways that may be adaptable to this setting and others. A project in Brazil taught traditional healers how to make an appropriate ORT out of their favourite medicinal tea for diarrhoea (Nations & Rebhun, 1988). Similar to the sentiments expressed by traditional healers interviewed in Sikasso, *sobadores* of Costa...
Rica did not see themselves as being in competition with modern medicine, but rather as being a part of a larger system (Simpson, 1988). Rather than disregarding the important social role that traditional healers play, interventions might consider taking advantage of their collaborative attitude by including them in program activities such as in the promotion of zinc and ORS (Akpede, Igene, & Omotara, 2001).

Decision-making patterns within the household are one of the greatest influences on the use of traditional therapies and market medicines. Young mothers must often defer to more senior women, particularly to mothers-in-law, who in large part direct and control their activities within the household, concerning diagnosis of illnesses and childcare decisions. Social status and experience provide grandmothers with the authority to make decisions regarding the care of their grandchildren (Almroth, Mohale, & Latham, 1997). Many mothers in this study referred to the dominant role that their mother-in-law played in instructing care for their child with diarrhoea. Often it was the mother-in-law who initiated treatment with traditional therapies or who later decided it was time to seek care outside the home. Recent research in Mali illustrates how intra-household dynamics and social networks influence care seeking for sick children (Adams, Madhavan, & Simon, 2002; Simon, Adams, & Madhavan, 2002). A woman’s status within the household influences her allocation of time on child care and household tasks, whom she must consult about a child’s illness, and if, when and how the child is treated (Castle, 1993). Programs must recognize and take these issues into account when designing interventions (Castle, Traore, & Cisse, 2002).

In attempting to promote the acceptance and uptake of zinc therapy in the community, interventions must be aimed at educating and convincing fathers and grandmothers, as well as mothers, of the value and use of zinc to treat diarrhoea. Beyond holding social status that allows them to initiate and direct the pursuit of health care, grandmothers and fathers often control resources that are necessary for seeking modern medical treatment. Messages must therefore target and convince them of both the medicinal as well as financial value of a joint zinc and ORS treatment. This is particularly true in settings were it may be significantly more expensive to purchase zinc and ORS than to treat diarrhoea with traditional medicines or antibiotics from the market. In emphasizing the long term effects of zinc to provide strength and reduce future cases of diarrhoea, messages can highlight the cost-effectiveness of its use. Furthermore, messages can further discourage the use of antibiotics by portraying them as having little therapeutic value and as an unnecessary cost in response to non-dysenteric diarrhoea, if zinc and ORS are instead used to treat the illness episode. If appropriate, promotional activities for zinc and ORS may also want to exploit the opportunity to increase overall awareness of proper diarrhoea management practices, and include messages pertaining to improved nutritional and feeding behaviours and increased fluids during diarrhoea episodes.

While local understandings of health and illness have a clear influence on the household management of childhood diarrhoea, a myriad of other factors are also at play, including the availability of drugs through local markets and ambulatory vendors, limited financial access to care from community health centres, vertical control programmes for other health problems, and social dynamics within the household and community. While fine-tuning of messages about zinc treatment for diarrhoea will facilitate acceptance of this new treatment, efforts also need to be made to improve financial access to care, strengthen health systems at the district level (Segall, 2003), and define roles for traditional healers, elder women and the full range of actors in the household in promotion of this new treatment. Although this study reflects factors in a specific setting in southern Mali, these same factors are likely linked to the acceptance and uptake of zinc treatment in other settings, and should be thoroughly considered when crafting interventions and messages which promote the treatment of childhood diarrhoea with zinc.

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