Soc. Sci. Med. Vol. 27, No. 1, pp. 5–16, 1988
Printed in Great Britain.

0277-9536/88 $3.00 + 0.00

CULTURAL MODELS OF DIARRHEAL ILLNESS: CONCEPTUAL FRAMEWORK AND REVIEW

MITCHELL G. WEISS
Department of Psychiatry, The Cambridge Hospital and Departments of Social Medicine & Health Policy and Psychiatry, Harvard Medical School, 25 Shattuck Street, Boston, MA 02115, U.S.A.

Abstract—Health planning for diarrheal diseases must be responsive to both epidemiological patterns and local perceptions of health, illness and need. A conceptual framework that relates patterns of distress, explanatory models, help seeking and treatment practices to knowledge and use of oral rehydration therapy (ORT), dietary management, other specific treatments and health policy issues provides the basis for our review of research on diarrheal illness-related beliefs and practices. The ethnomedical model asserts that efforts to secure the compliance of target populations are likely to be inadequate without an alliance between health professionals and communities to identify and address mutually comprehensible objectives that are perceived locally as meaningful and relevant. An appreciation of local cultural models and the diversity of cultural contexts enables health professionals to (1) recognize the significance of local perceptions of diarrheal illness with respect to pertinent outcomes and perceived needs, (2) develop ways to introduce recommendations that communities will accept, and (3) make appropriate use of existing community resources representing local traditions. An agenda for needed research concludes the review.

Key words—diarrhea, ethnomedicine, oral rehydration, explanatory models

Diarrheal diseases pose a major worldwide health problem, frequently associated with poverty, malnutrition and infection, killing 5–7 million people each year according to current WHO estimates. The development of oral rehydration therapy (ORT) provides a relatively simple, inexpensive way to effectively prevent and treat the dehydration of childhood diarrhea [1]. Much is also known about dietary management, but the social and cultural contexts in which diarrheal illness occurs are complicated, like the pathophysiology of the diseases themselves, and it is often difficult to translate biomedical knowledge into effective health policy.

Health professionals who understand local interpretations of cause, course and treatment of diarrheal illness are better able to communicate with the people they serve. They understand how puzzling biomedical explanations might sound in the community, and they can explain recommendations for prevention and treatment in a manner that makes them acceptable within the context of local beliefs and practices. They can understand the logic of behaviors that are irrational by biomedical standards, the appeal of these behaviors, and the reluctance to relinquish them. By listening attentively and respectfully, attempting to understand the experience of illness, not just its pathophysiology, health professionals build an alliance with the community. The process of eliciting local perceptions provides a model that may also enhance compliance when health educational programs are introduced and when patients and their families hear recommendations for treatment and prevention.

Public health programs often concentrate on strategies for convincing people to comply with professional recommendations. Although rational according to biomedical standards, these recommendations may seem irrational in the community because they are at odds with local beliefs and practices. Physicians concern themselves primarily with dehydration, a consequence of diarrhea, rather than diarrhea itself, and they advocate continued eating and fluid replacement with a large volume of oral rehydration solution. But continuing to eat and drink is counterintuitive to many people for an illness characterized by frequent liquid stools. They feel that the recommended treatment might fuel the symptoms.

Doctors in the West also advocated withholding fluids for diarrhea well into this century. Long after several pioneering physicians in the 1880s had demonstrated that intravenous rehydration was a sensible and life-saving therapy for cholera, established treatment for that disease included food and fluid restrictions, bleeding and cautery. An authoritative medical journal, *The Lancet*, recognized the importance of intravenous rehydration therapy shortly after Dr Latta in Scotland reported dramatic results. An editorial in 1831–32 chastised the medical profession for their "all but cowardly timidity" in refusing to pursue this approach. Only months before, however, the same journal had published an article suggesting "plugging the anus with a cork, smooth, oiled, and secured with a T-bandage" [2].

Clinicians of the era were committed to bloodletting for treating cholera. Their enthusiasm motivated the first reported cardiac catheterization, performed by Dr Dieffenbach in 1832 to remove blood from the left ventricle of a severely dehydrated man with cholera because his peripheral vessels were depleted. The patient, of course, "rendered his soul" shortly after the procedure [2]. A medical historian concludes, "In the whole of the history of therapeutics before the 20th century there is no more grotesque chapter than that on the treatment of cholera, which was largely a form of benevolent homicide" [3]. Leaders of the European and American medical community no less notable than Virchow and Osler advocated purgatives and emetics, recom-

mendations that guided treatment until the middle of the present century [2].

Rehydration therapy has now become the mainstay of treatment for life-threatening diarrheal diseases, both epidemic cholera and childhood diarrheas. Successful program strategies, however, consider not just the physiology and pathophysiology of disease, but the general development context, in which poverty, malnutrition, and other infectious diseases may be prominent. More recent strategies also consider the cultural context that determines perceptions of illness and how people respond to it. Anthropologists and other social scientists use ethnographic methods combined with quantitative survey techniques to study the social and cultural context of illness, help seeking and treatment. Applied social science research has also studied the promotion and acceptance of ORT.

Several concepts that medical anthropologists have developed over the past decade provide a framework for our review:

(*1*) *Patterns of distress* refer to the constellation of symptoms that people complain about and the ways they experience the effects of illness [4]. People may associate symptoms and other features of distress in culture-specific patterns. These local syndromes, which may constitute categories of folk illnesses, often vary from standard Western descriptions of diseases. Identifying patterns of distress permits comparison of similarities and differences between local and biomedical perspectives with respect to perceptions of illness, concerns about illness, perceived needs for health services and the acceptability of specific treatments.

(*2*) *Explanatory models* characterize the meaning people attribute to illness as they try to explain it [5]. This review refers to this concept to specify perceived causes of diarrheal illnesses—particular physical, social, supernatural, humoral and other explantions—with reference to the underlying system of beliefs in different cultures.

(*3*) *Patterns of help seeking.* In every culture, especially traditional societies, people seek help for distress from diverse sources [6]. Help providers are associated with modern or traditional medical systems, religious healers, family or community leaders, or other local institutions. Both ideological and practical considerations influence the choice of healers. Preferences for medical help seeking may vary according to features of the illness; sociodemographic characteristics of the individual and family; the reputation, availability and prior experiences with various sources of medical help, or other factors.

(*4*) *Specific treatments.* Sometimes specific treatments are related to socioeconomic and other contextual factors, patterns of distress, explanatory models, or help seeking. Interpretations of how a particular treatment works with respect to beliefs about the cause of illness are often an important determinant of treatment preferences, but the pattern of interrelationships linking different aspects of a cultural model is complex. Some traditional healers offer antibiotics or even ORT; a supernatural explanation does not preclude adjusting diet. Local cultural contexts underwrite family judgments about help seeking, treatment and evaluations of whether care (including biomedicine) is acceptable or successful. Local power relationships in the social network may be a stronger determinant of treatment behavior than the recommendations of health care providers.

As Fig. 1 indicates, each of these sets of variables, which together characterize the "cultural construc-

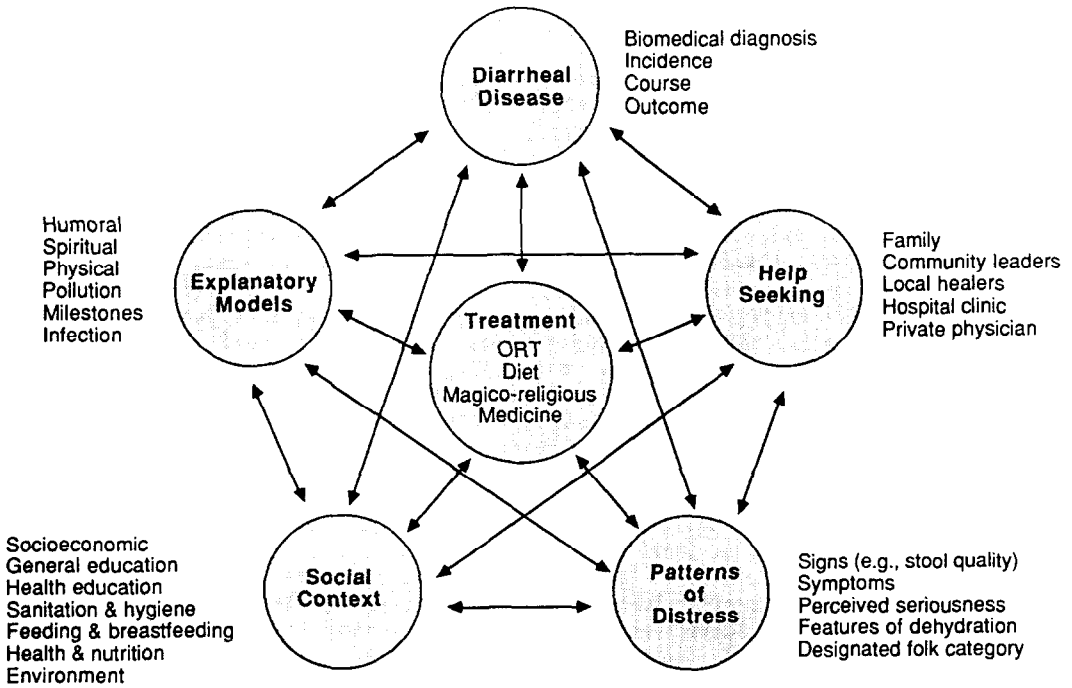

Fig. 1. Cultural construction of diarrheal illness: interrelationship of social factors, illness experience, help seeking and outcome.

tion of illness" [5, pp. 119–178], is related to the others. Each represents a facet of the complex relationship between a disease and the cultural context in which it occurs. Dunn refers to this pattern of interrelationships as a "causal web" [7] or "causal network" [8]. Viewed in this way, the disease agent is a causal factor, but it is one among many determinants of the experience of illness.

The ethnographic methods of anthropology offer a powerful technique for elucidating this network of interrelationships among beliefs and practices associated with health and illness. An informed ethnographer enters a community and studies it from the inside, on its own terms, and only then relates findings to formulations of health problems (or other issues) conceptualized outside the community. Based on in-depth knowledge of a community gleaned first-hand from a variety of sources, the ethnographer provides an account of interconnected forces. Familiarity with the community enhances the validity of observations with respect to cultural meanings.

The techniques of analytical epidemiology, on the other hand, offer a powerful methodology for studying particular relationships *within* the causal web, rather than the entire network. These methods rely on hypothesis testing. Theories derived outside the community typically influence formulation of these hypotheses, but they are more likely to be culturally relevant and useful if they are soundly based in the local experience, gleaned from ethnographic data. Epidemiologists often guide research teams inquiring about the relationships between risk factors, exposures or interventions and disease outcomes. Researchers use statistical methods to demonstrate associations between variables and ensure the reliability of their findings. Anthropologists argue that for these findings to be valid, an ethnomedical perspective is essential [9]. Nations cautions against reliance on decontextualized statistical tools; failure to appreciate the ethnomedical perspective, she argues, transforms this "epidemiological rigor" into "quantitative rigormortis" [10].

A combination of ethnographic and epidemiological methods is likely to be synergistic, enhancing the practical utility of both. Ethnographic findings not only enable researchers to formulate more useful hypotheses, they also complement survey data. The variable sets suggested here to characterize illness-related beliefs and practices—patterns of distress, explanatory models, help seeking and treatment practices—provide a framework for organizing findings from clinical ethnographic study in the community and for generating hypotheses that relate perceptions and the experience of illness to relevant public health outcomes.

It is not feasible to study the entire causal web represented in Fig. 1 with quantitative methods alone, or even the relationships between perceptions and use of ORT represented in Fig. 2 [11]. Ethnographic research is often a necessary first step for generating culturally informed hypotheses that are appropriate for testing with the quantitative methods of analytic epidemiology. Thus, it is useful to review the literature on perceptions of diarrheal illness with reference to this framework and to discuss the relationship between these perceptions and program policies before outlining an agenda for further research.

BELIEFS AND PRACTICES

Researchers have investigated beliefs and practices associated with diarrheal diseases (mainly childhood diarrhea and cholera) and ORT, dietary manage-

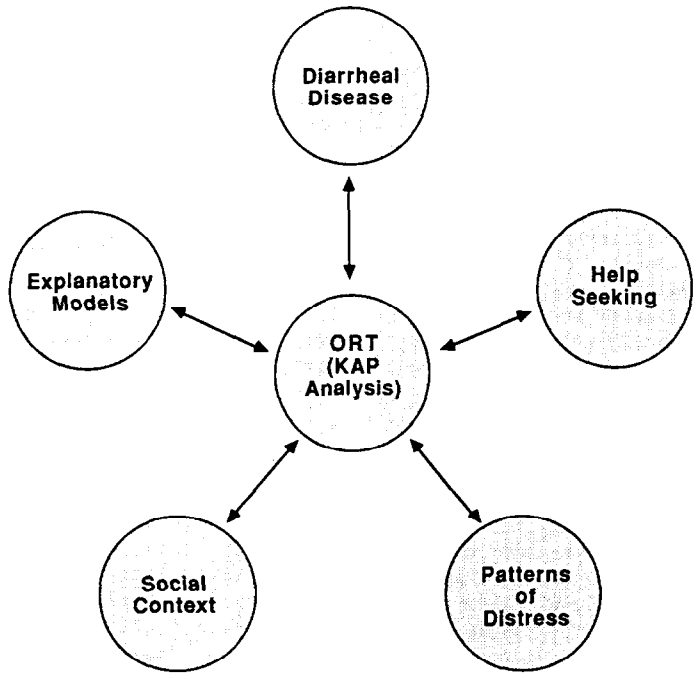

Fig. 2. Cultural context of ORT.

ment, breastfeeding and other pertinent issues. They have employed methods ranging from highly quantitative survey techniques to ethnographic participant observation and open-ended interviews. Many of these studies combine quantitative and subjective methods. The following discussion reviews perceptions of diarrheal illness throughout the world with respect to the framework indicated above.

Patterns of distress

While clinicians may consider signs and symptoms of illness, they diagnose a biomedical diarrheal disease by identifying a microscopic pathogen, or describing tissue pathology or pathophysiology. Patients, on the other hand, pattern their distress according to other features of their illness:

(1) quality of the diarrheal stool,
(2) other signs and symptoms,
(3) perceived seriousness,
(4) perceived vulnerability to complications or other kinds of distress,
(5) level of anxiety,
(6) disturbed interpersonal relationships,
(7) spiritual obligations, concerns, and supports,
(8) local ideas about illness that refer to diarrhea as a primary or incidental feature.

While health professionals concern themselves mainly with dehydration, which they identify as a life-threatening consequence of diarrhea, people in the community may view diarrhea and signs of dehydration as unrelated, as indicators of different diseases with some common features, or they may interpret diarrhea as the consequence of a disease defined by signs and symptoms of dehydration.

Among Tamil speakers in South India, *behdi* is a general term for diarrhea. It refers to various kinds of abnormal stool, which may be watery or contain froth, pus or blood. People in this region, however, would not consider an infant with sunken fontanelle, sunken eyes and weakness—all symptoms of dehydration—plus vomiting and diarrhea to have *behdi*, but something else they call *dosham*. They prefer different kinds of help for each illness. If the symptoms of dehydration are not acute and the diarrhea is green, the diagnosis is *patchi dosham*. Another variant is called *kisiru* [12].

In Swaziland, traditional healers identify a combination of signs and symptoms that include sunken fontanelle, sunken eyes, vomiting, weakness, crying and a fixed stare as a disease called *kuhabula*. Diarrhea may accompany this illness, but it is not an outstanding feature. *Umshekho* is the more common form of diarrhea; the stool may be any color but green, and it has a porridge-like texture. The patient's stomach grumbles, he has little appetite, and he may vomit. *Umphezulu* refers to a similar illness in which diarrhea is green and blood vessels on the stomach and forehead have a greenish hue [13].

In Swaziland and South India, these patterns of distress are each associated with distinct explanatory models, help seeking and treatment, but the patterns of distress that Bentley identifies in North India are not [14]. These villagers in the North Indian state of Haryana classify diarrheal illnesses according to stool quality: bloody stool, watery stool, 'bits and pieces', and green stool; but they do not distinguish cause or treatment on the basis of these categories. Escobar and co-workers in Lima, Peru asked patients whether they recognized types of diarrhea according to qualities of stool, like those specified above [15]. Although many did, these were not indigenous categories as they were in studies like Bentley's. Escobar has actually screened for knowledge of categories formulated elsewhere, rather than eliciting indigenous categories.

Other authors working in Latino cultures discuss indigenous categories of diarrheal diseases [16, 17]. Kendall and his collaborators summarize four types [18, 19]:

(1) *Empacho* is a common diarrheal illness that may become serious, possibly fatal. The patient passes stool in short, explosive water bursts. Diarrhea and constipation may be intermittent; fullness (especially on the right side) and flatulence are common, as are characteristic changes in the skin.

(2) Evil eye (*mal de ojo* or *ojo*) is a serious, potentially fatal, diarrheal illness. Symptoms of both include fever, stomach upset and sunken eyes (and red eyes from *mal de ojo*). Speculation about a jealous relative, neighbor or friend who might have caused the illness may be a prominent feature, either leading to or following from the diagnosis. Certain people inflict this disease on others, sometimes unintentionally, by means of penetrating visual rays. Children are often the victims.

(3) Fallen fontanelle (*caida de mollera*) is a descriptive term that defines a very serious folk illness. People believe that tissue supporting the fontanelle caves in because the infant's palate has not developed properly, leaving it vulnerable to injury from a fall or the effects of incompetent handling by the infant's mother.

(4) 'Worms' (*lombrices*) designates the most common type of diarrhea, so common that it is not necessarily considered abnormal. People believe it is normal for worms to live in the gut. Only when disturbed do they leave their sack and begin wandering through the body, causing illness. They should then be treated and expelled with purgatives; otherwise, they might cause worm fever (*fiebre de lombrices*), a very serious disease.

From her research in Northeastern Brazil, Nations [16] identifies spirit intrusion (*sombra*) and adds intestinal heat (*quintura do intestina*), fright disease (*susto*), and a few reports of 'microbes' to these categories. Afflicted with *susto*, a child suddenly stops eating and becomes weak and thin.

From his study of beliefs about diarrhea in Bangladesh, Green [20] specifies four categories of (*dasto*): (1) a general, undifferentiated type, (2) diarrhea with vomiting and weakness, which some people called cholera, (3) bloody diarrhea, considered the most dangerous kind (*amashaya*), and (4) diarrhea with greenish or yellowish mucous stool (*buniaga*). The Bangladeshis he surveyed did not include symptoms of dehydration among indigenous categories of diarrheal illness, but when asked, they recognized symptoms of dehydration as complications of diarrhea.

Explanatory models

People distinguish indigenous illness categories according to the features of subjective distress, as above, as well as perceived causes. Whether or not they classify categories of illness based on ideas about cause, explanatory models may be important determinants of patterns of distress (e.g. evil eye above), help seeking, treatment, and preventive measures. Several explanatory models for diarrheal illness recur in many cultures, acknowledging the following causes:

(1) foods that are fatty, not cooked adequately, heavy, etc.,
(2) imbalance of heat and cold that may be associated with foods, exposure to drafts or seasonal changes,
(3) normal or poor quality breast milk,
(4) physical factors, such as a fall or poor caretaking,
(5) supernatural causes, including possession, sorcery or evil eye,
(6) pollution from exposure to or inauspicious contact with ritually impure persons or things,
(7) moral misbehavior, including deeds of the sick person or a sick child's parents, especially promiscuous sex and sexual intercourse or pregnancy while breastfeeding,
(8) natural consequence of milestones, especially teething, crawling and walking,
(9) infection, which may be associated with hygiene and sanitation (but which may be difficult to distinguish from ideas about pollution).

Specific examples reported by medical ethnographers overlap. For example, certain foods may disrupt the balance of heat and cold, but they also have other qualities that produce illness or modify their humoral properties: in South Asia, melons are cool and would seem, therefore, to be favored for diarrheal illnesses, which are hot, but they are explicitly prohibited because they are associated with cholera [21].

Although details vary, the imbalance of heat and cold as a cause of diarrheal illness is a recurring theme in many cultures. Nations refers to a syndrome of intestinal heat (*quintura do intestina*) among villagers of Northeastern Brazil. Kendall and co-workers report that many Hondurans believe an improper mixture of hot and cold foods may cause *empacho*. Johnson found that Hispanic Americans in South Texas consider diarrhea a cold illness, requiring treatment with hot substances [17]. Escobar's study showed that 42% of the subjects he interviewed in the squatter settlements of Lima, Peru also believed diarrhea was a cold illness [15].

Among South Indians heat is the most common cause of diarrhea (*behdi*); they attribute heat in the body to eating hot foods or breastfeeding [12]. Kumar and co-workers [22] report similar findings from their study in Chandigarh, North India. Bentley found that villagers of Haryana identify hot breast milk among the causes of diarrhea. Many North Indians believe heat in summer and cold in winter both produce diarrheal illness [14, 21]. Shahid and co-workers in Bangladesh [23] and Srinivasa and Afonso in Goa [24] specify only cold air. Some Africans believe hot, cold and rainy seasons, as well as change in seasons, may all cause diarrhea [13, 25].

Most authors mention that certain foods—either the wrong type, the wrong mix or incorrectly prepared—may cause diarrhea irrespective of their hot and cold properties. Heavy foods, inadequately cooked foods, or missing meals may cause *empacho* [19]. Many authors also mention bad breast milk: studies in the Philippines [26], Zimbabwe [25], American Samoa [27], Bangladesh [20], and elsewhere.

Although people cite infection or 'microbes' infrequently in developing countries, the idea that dirt or pollution may cause diarrhea is common. Crows, considered polluting in South India, are believed to cause one kind of diarrhea, called *patchi dosham*, if they fly over a mother whose stomach is empty or a child's clothes at dawn or dusk. Contact with a menstruating woman or a woman who has not bathed after sexual intercourse may also produce the same effect [12].

In several parts of Africa researchers mention that uncovered food exposed to flies has long been considered a source of diarrhea, independent of recent health education about sanitation and hygiene [13, 25]. In Bangladesh, some people consider dirt and dirty habits a cause of measles, and emphasize the importance of keeping patients with measles clean [23]. Worms explain diarrhea in many Latino cultures, and this explanation has also been reported elsewhere, but with lesser emphasis [20, 24].

People relate diarrhea to childhood milestones, especially teething, in many parts of the world. Crawling, walking, talking and in parts of Africa, seeing a tree for the first time are also mentioned [12, 14, 15, 18, 22, 25, 28, 29].

Physical trauma may also play a role. In Central and South America many people attribute a sunken fontanelle to a fall, which might result from parental neglect or some other physical jarring [16–18]. In South India people explain that a fall may sometimes produce a 'tangled intestine' and diarrhea [12].

Spiritual, social and moral causes often intermingle. Nations [16] refers to an envious glance as a cause of evil eye (*quebranto*, *mau olhado*), and she considers the intrusion of a dead person's spirit into a child's body in Northeastern Brazil. In South India, if a mother feeds her infant after seeing a woman who has miscarried, or should she see a funeral bier, cross a grave or visit the house of a recent death, her child may become sick with diarrhea [12].

An interesting cultural difference emerges regarding the eagerness or reluctance of some Asians and Africans to admit spiritual models to Western medical ethnographers: Green [20] notes that Bangladeshis may have overemphasized supernatural ideas about illness to please him, but de Zoysa and co-workers [25] mention that villagers in rural Zimbabwe were reluctant to admit spiritual causes, overemphasizing 'medical' causes.

From a worldwide survey, Cutting and co-workers [30] report that the association between diarrhea and parental sexual infidelity is especially strong in Africa. A nursing mother among the Binis of Bendel State in Nigeria is forbidden to engage in sexual intercourse; if she does, her baby will 'suck semen

from her breasts' and become ill [31]. Similarly, in Zimbabwe sex and pregnancy are forbidden while a mother is breastfeeding. Nursing in the presence of another child, who might be stronger, can also make her infant sick [25].

Many Asians and Africans associate cholera with supernatural causes. An epidemic in Mali was so severe that people thought it must have come from God rather than a lesser deity [32]. South Asians have personified cholera for centuries and built shrines to the deity [33]. Muslims believe that *djins* bring the disease into people's homes. Some suggest that cholera is retribution for sins, especially for illicit sexual intercourse, and that children suffer from the sins of their parents [34].

Help seeking

A variety of health services and local healers treat diarrhea. These include:

(1) government health services,
(2) private cosmopolitan (allopathic) practitioners,
(3) homeopaths,
(4) practitioners of formal traditional indigenous medical systems,
(5) an array of local healers of various descriptions—including religious healers, sorcerers, herbalists, and so forth,
(6) pharmacy and druggists,
(7) family and community leaders.

In lesser developed countries traditional healers are usually more readily available than cosmopolitan medical services. For example, Green [13] reports that there is approximately one indigenous healer in Swaziland for every 110 people, compared with one physician per 10,000 people. Green and Makhubu [29] distinguish harmful practices of these healers from their useful functions.

In some cases, healers specialize in treating specific categories of folk diarrheal illness. Nations [16] describes several kinds of healers who attend to different types of diarrhea in Brazil: *rezadeiras* administer prayers, *Mae de Santo* are voodoo healers, and *raizeiros* are herbalists. Mexican-American mothers in South Texas call upon a specialist, whose skill may be widely recognized in the community, to treat sunken fontanelle (*caida de mollera*) [17].

Lozoff and co-workers [12] found that although South Indians in Tamil Nadu attend the outpatient clinic of the medical college for simple diarrhea (*behdi*), for *dosham*, the more serious disorder, people consult the traditional South Indian healer (*vaidyar*) who is skilled in Ayurveda and Siddha medicine. They also consult healers with a special knowledge of sacred verses, called *manthramkaran*. Because they consider *dosham* a matter of ritual pollution, these people believe allopaths cannot help.

In Bangladesh, Muslim religious healers (*mullabee shahebs*) perform a *bandokawra* ceremony, involving some degree of quarantine, to protect homes from cholera. Chen discusses the local response to annual outbreaks of cholera in Malaysia, where a *bomo* offers a sacrifice and the local imam invokes the help of Allah [35]. Shahid and co-workers [23] found that in Bangladesh the most popular healers for diarrhea associated with measles among the people they studied were homeopaths and herbalists, especially in combination. Faruque and colleagues report that some mothers are likely to treat watery diarrhea at home, but they take children with bloody diarrhea to local healers [36]. Green [20] found than many Bangladeshis prefer a kind of healer he describes as an unqualified allopath, known as *daktar*, for treating childhood diarrhea. De Zoysa and co-workers [25] found that people consult herbalists (*n'anga*) infrequently to treat diarrhea in rural Zimbabwe, but they commonly use herbal remedies in the home.

Where modern medical facilities are available, they are usually popular for treating diarrhea. Nevertheless, because some people consider many of the most serious cases as something other than diarrheal disease, with diarrhea an incidental or unrecognized problem, they do not come to health clinics when it would make the most difference; they go elsewhere instead. *Dosham* in South India, sunken fontanelle (*caida*) in Latino cultures, and *kuhabula* in Swaziland are examples of severe dehydration conceptualized as illnesses other than diarrhea, for which local beliefs and practices favor spiritual help or mechanical manipulation [12, 13, 16, 18].

Treatment

The diverse group of medical help providers in the community, knowledgeable relatives, and others in the social network may recommend an equally diverse array of treatments. They fall under the following broad categories:

(1) adjusting diet and fluid intake or withholding food and fluids;
(2) changing breastfeeding routines;
(3) cleansing the gastrointestinal tract with enemas, purgatives, and emetics;
(4) local herbal remedies;
(5) ritual and devotional practices to promote spiritual healing;
(6) other locally sanctioned interventions (e.g. abdominal massage, manipulation of the soft palate and skin over the fontanelle, cutting gums for teething diarrhea, etc.);
(7) cosmopolitan medicines, including antimotility agents, adsorbents and antibiotics;
(8) ORT.

Nations [16] describes the local treatment of a number of diarrhea-related folk illnesses in Northeastern Brazil. For evil eye, a healer (*rezadeira*) passes three leaves over a child's body while praying to extract the evil influence. For sunken fontanelle, a healer may hit the infant's buttocks to realign a dislocated internal body part, tap its feet or pull its hair. For spirit intrusion, healers negotiate with the spirit; to purge intestinal heat, they recommend cold food and bathing. These Brazilian villagers believe that prayers and prolonged breastfeeding may prevent diarrheal illnesses. In Lima, Peru among those who consider diarrhea a cold disease, mothers commonly bring infants to the clinic bundled and overdressed [15]. In Honduras, many people use cleansing purgatives, abdominal massage, and adsorbing agents to treat *empacho* [19].

For the life-threatening dehydrating diarrheal illness in South India (*dosham*), a vaidyar chants and

ties a ritual thread around the sick child's belly. Both Hindus and Muslims might visit a Mosque to hear the Koran and receive the healing breath of the religious leader blown upon the child. Srinivasa and Afonso [24] report that in Goa family members tie onion or garlic over the child's navel to soothe the abdomen.

In Swaziland where teething is believed to cause diarrhea, parents rub a traditional medicine on the gums to make the teeth grow faster, but in Kenya they sometimes cut the gums [28]. Healers in Swaziland fumigate to protect a child from the evil vapors they believe cause diarrheal and general illnesses. They may also give a prophylactic enema, a decoction of herbs to drink, and 'vaccination' by cutting a child's belly and rubbing ashes of burnt medicines into the wound. To treat *umphezulu*, the serious diarrheal illness with green or yellow stool, they administer enemas to drain the bad air in the child's body.

Treatment of many folk illnesses associated with diarrhea often involves some dietary adjustment, which may be dangerous if it promotes dehydration. Some authors report that in parts of South Asia, people restrict foods and fluids, contributing to both malnutrition and dehydration [24, 37]. Not so everywhere: Bentley [14] found that in North India mothers continue breastfeeding and maintain fluids, although they change the diet, giving softer, cooler foods (see also [21]). Green [20] reports that parents restrict most solid foods in Bangladesh.

Studies by Fernandez and Guthrie [26] among the Filipino urban poor and de Zoysa and co-workers [25] in rural Zimbabwe found that mothers there discontinue breastfeeding because of diarrhea. In Swaziland, on the other hand, healers and family advise mothers to continue nursing during a diarrheal illness. As they do in many other parts of the world, mothers give various teas, porridges, and other liquids [13]. Green [20] suggests that investigators have probably underreported the extent of fluid replacement because most studies inquire about *treatment* for diarrheal illness instead of observing what actually happens. Survey techniques may fail to elicit a report that fluids are given, because people do not consider these fluids medicine and because the relationship between what people say and what they do is complex.

In some communities where it has been promoted effectively, knowledge, acceptance, and use of ORT has been increasing. As one might imagine, the situation varies considerably throughout the world as a result of program strategies and local perceptions [38]. Cutting's worldwide survey indicates that the use of ORT and intravenous (i.v.) hydration grew during the last decade, from 50% of a potential maximum response in 1976 to 75% in 1979 for ORT, and from 46 to 58% over the same period for i.v. hydration [30]. At the same time, use of kaolin dropped from 35 to 19%, sulfa from 31 to 18%, and the use of antibiotics was relatively stable. A recent report by Coreil working in Haiti shows that some traditional healers, mainly injectionists and midwives, have incorporated ORT into their treatment of diarrheal illness. Some of these healers referred to fluid maintenance to explain its efficacy [39].

Kendall and co-workers [19] reported limited success in the program to promote the use of ORT in Honduras, but they also report failures that they blame on the unwillingness of program planners to incorporate ethnomedical research findings (which I will discuss in the next section). Bentley [14] found that among the 40% in her sample who had tried ORT and would not use it again, 81% rejected it because it didn't stop diarrhea, as they had expected it to. Green [20] also found that many subjects in Bangaladesh expected ORT to cure diarrhea. Fifty-eight percent of his sample had tried it at least once. Mothers consider ORT a cold substance and therefore acceptable, and many of them use force-feeding techniques appropriately to administer ORS to reluctant children.

RELATING PERCEPTIONS TO PRACTICAL ISSUES

Nearly all of the research investigating diarrheal illness-related beliefs and practices has attempted to generate findings of practical significance. Some authors merely present findings and hope others will make use of them, but some also consider clinical and programmatic issues, suggesting policy and additional research requirements. An important principle emerges from this literature to guide health policy:

Successful health care programs should be designed to address both biomedical considerations, which health care professionals recognize as critical, and local concerns, which the community considers critical.

In order to integrate these two perspectives, several authors emphasize the importance of using folk categories to communicate ideas about diarrheal illness in health educational programs [13, 16, 18, 19]. For example, Kendall advises that to convey the idea of infection, it is better to use the term *bichos* (little animal), which people know, than a technical term like microbe, which is unfamiliar. Instead of discrediting folk models, planners might recognize them as local idioms, and take up the challenge of finding ways to use those idioms to address biomedical concerns. Green observes that it is easier to do for some concepts in some settings than for others: for example, the idea of air-borne infection is inherent in traditional ideas about toxic vapors in Swaziland, but it is much more difficult to convey the concept of water-borne infection [13].

While it is reasonable to expect areas of conflict between different perspectives, one also expects they might complement one another. Folk models often focus on *why* illness occurs, referring to a system of cultural meanings, while Western biomedicine emphasizes the mechanism of *how* it occurs [25]. The report of epidemic cholera in Mali illustrates this complementarity. Even though supernatural explanations remained popular, many people were also eager to be vaccinated, even traditional healers who were treating cholera [32]. Studies have identified settings where it is useful to reinforce existing cultural perceptions, like the cultural bias against the use of antispasmodics and antimotility agents for treating diarrhea associated with measles [23], or the emphasis placed on continuing breastfeeding throughout the course of diarrheal illness in Swaziland [13].

Recognizing the important relationship between health, illness, healing and the cultural context that defines them, one can better appreciate the local meaning of help seeking preferences. Interventions that involve rituals, like the *bandokawra* ceremony in Bangladesh for cholera or public health programs for mass vaccination and strict quarantine measures, which also have limited biomedical efficacy, reduce anxiety in the face of helplessness [33] by galvanizing social supports through a culturally sanctioned course of action. Rituals give meaning to mysterious experiences that are deeply threatening. They represent attempts at effective control, reaffirming cultural meanings, myths and values. Culturally sanctioned responses to illness reestablish social ties that become conflicted or fragmented by disease and death, and sometimes by public health programs as well when these programs are insensitive to conflicts between their policies and cultural values in the community.

People are loath to change traditional practices that provide a valued sense of effectiveness. Some behaviors are more resistant to change than others [40]. Maina-Ahlberg [28] cites responses to childhood diarrhea in rural Kenya that resist change: (1) cutting a child's gums for teething diarrhea, which aside from the trauma is likely to make the child unwilling to drink oral rehydration solution because it stings the wounds, and (2) withholding milk and fluids from these children. Other researchers have studied biomedically harmful practices: withholding food, interrupting breastfeeding and administering enemas for diarrhea [13, 20, 36].

While health planners frequently explain program failures by lamenting the unwillingness of target populations to change their ways, health planners may be just as conservative with respect to their own traditions [41]. Kendall blamed failures in the program to promote ORT in Honduras on the unwillingness of health officials to incorporate ethnomedical research findings. Because people believe the folk illness *empacho* must be treated with purgatives, his group concluded no medicine thought to inhibit diarrhea would be acceptable. As he predicted, nearly all persons studied who did not use ORT suffered from *empacho*. Kendall argued that ORT should be promoted as a purgative for treating this folk illness. He also observed that the laborious efforts to teach people about 'dehydration', a biomedical concern that made no sense to them, left them feeling that they did not understand the health professionals, and the professionals did not understand them. Kendall discussed two reasons for program failures, blaming the medical establishment: (1) they refused to target treatment to a folk category of illness because they did not want to lend credence to a competing conceptual framework, and (2) they refused to promote ORT as a purgative because they did not want to sanction a policy they feared some people might misconstrue as advocating purgatives to treat diarrhea.

Lozoff's group questioned why patients who had the most severe dehydration from diarrhea were not coming for treatment at the medical college in Vellore, while others with less severe diarrheal illness *were* coming. Allopathic clinicians were concerned because these children needed treatment for severe dehydration. People in the community, however, believed they needed help from traditional healers to combat the effects of pollution. Because no plan existed that was capable of acknowledging both needs, many children died.

Shahid and his colleagues [23] in Bangladesh and Maina-Ahlberg [28] in rural Kenya observed that people interpret the diarrhea associated with measles as a favorable sign, indicating the resolution of the measles. In that context, treatment that they thought might stop diarrhea, which would interfere with resolution of the 'real' disease, was unacceptable.

Many authors emphasize the importance of aiming health education programs at women; they are most often the ones who recognize illness and make decisions about treatment and help seeking. Escobar's study implied that health education programs using mass media, particularly television, should target 13–18-year-old women, especially domestic servants. De Zoysa also reported that in Zimbabwe men referred questions about diarrhea to women. On the other hand, in Bangladesh, even though women are most directly involved in the care of children, when they need medicine, Green found that men decide what to buy [20]. Social marketing strategies for promoting ORT or reducing inappropriate use of antibiotics and antispasmodics in Bangladesh should therefore acknowledge the role of men.

Public health programs and applied research have emphasized promoting appropriate use of ORT. Recent applied research in Peru and Nigeria attempts to draw upon culturally informed country-specific information to develop a program for the dietary management of diarrhea to improve outcomes with respect to nutrition [42].

Oral rehydration therapy

Much of the literature on behavioral aspects of diarrheal illness focuses on ways to make ORT available where and when it will do the most good. Because children may reach cosmopolitan health services late in the course of illness and because it is so important to start rehydration therapy early to prevent serious dehydration, several authors emphasize the importance of training mothers to administer ORT before taking their children for help outside the home, either to a local healer or elsewhere [18, 20].

Coreil and Genece employed ethnographic and survey methods in Haiti to study the influence of several sets of variables on the use of ORT, including beliefs and practices concerning diarrheal illness, socioeconomic status and exposure to health training programs among rural and urban mothers [43]. They found that these mothers' beliefs about how ORT works (whether it cures or replenishes fluids) determined their treatment preferences (homemade solutions versus packaged ORS), as well as the lag time before they initiated treatment. Prior help seeking at medical clinics *was* associated with use of ORT, but family use of traditional medicines (prior treatment) was not. Their findings indicate that literacy and beliefs about ORT are important determinants of use in Haiti and should be addressed in health educational programs.

The need for improving health education about the role of oral rehydration for diarrhea is not confined

to developing countries. A study in New Zealand found that mothers there may have *less* information about the need for oral rehydration than mothers in some Third-World countries, where the burden of diarrheal diseases is heavier and more attention has been given to health education [44].

To promote its acceptance and use, ORT should be marketed in a manner consistent with local humoral theories concerning the balance of hot and cold [15]. Johnson [17] suggests that a red or pink package, indicating a hot treatment for a cold disease, would appeal to Mexican-Americans. Lozoff speculates that honey, which people in South India consider cold, would be more acceptable in the ORT solution than sugar, which they consider hot, to treat a disease associated with excess heat. Her study also concludes that it would be useful to consult with local healers to ensure that a locally promoted, biomedically recommended formula is also culturally acceptable.

Other authors advise that until such time as the ORT solution is modified to include an agent like trisodium citrate or something else that reduces stool frequency or volume, marketing information should acknowledge that ORT does not stop diarrhea [13, 23]. By determining patterns of distress and expectations from treatment, social marketing efforts can better address other local concerns, such as increasing strength, preventing weakness, and saving children's lives. Green cautions, however, that with an emphasis on strength and vigor, the use of ORT as a tonic for well children might become a problem [20]. Although it may prove useful to promote ORT in some settings as a special solution that purifies or cleanses the body, if it is promoted as a purgative, it should be distinguished from general purgatives to avoid encouraging their continued use for treating diarrhea.

Focusing on the importance of promoting the use of ORT by mothers in the home, Kendall's group in Honduras [18] argues that it should be described as a powerful medicine. Perhaps it might be associated with the potency of i.v. hydration by a picture on the label. Focusing on a strategy to promote ORT among traditional healers in Swaziland as a supplement to their spiritual healing, Green [13] argues just the opposite: he advises that ORT be promoted as a simple replacement solution of salt, sugar and fluid, rather than a powerful Western medicine, which local healers might be reluctant to use. Green implies that if ORT were carefully promoted in this manner, healers in Swaziland might be willing to administer it before starting their ritual healing ceremony.

Other researchers also advocate incorporating traditional healers into the health care network and training them to administer ORT [45]. Nations [16] observes that the healing ceremonies in Northeastern Brazil often last from 3 to 9 days, providing a good mechanism for follow-up. In a more recent report she shows how traditional healers have integrated ORT into religious healing ceremonies for treating diarrheal illnesses [46]. Green [20] reports that *daktars* are the opinion leaders concerning matters of health care in Bangladesh. Instead of competing with them, health professionals should enlist their support through health education. De Zoysa advocates training local healers (*n'anga*) in Africa. Lozoff suggests that the relationship between physicians and clergymen in the West might serve as a model for developing relationships between physicians and healers in developing countries.

ADDITIONAL RESEARCH

Although many health professionals and even WHO documents already acknowledge the influence of culture [47], without an adequate conceptual framework it has been difficult for them to incorporate ethnographic data in their programs and clinical activities. The conceptual framework I have suggested organizes ethnographic findings in a manner that enables these health professionals to apply them effectively.

Further research is required to identify locally valid associations relating cultural models of diarrheal illness to use of ORT, dietary management, other interventions and illness outcomes. In most cases, ethnographic methods should precede formal hypothesis testing. Researchers should also complement quantitative survey research with subjective data from substantial experience in the field. Without this extensive field experience, it is impossible to distinguish what patients and healers say from what they do.

Kendall criticizes the limitations of the 'what if?' survey format. Survey results in Honduras, unlike the ethnographic component of his study, underestimated the significance of *empacho* and its implications for the acceptance and use of ORT [19]. Subjects' responses to questions about hypothetical situations do not necessarily predict what they do in actual situations. For example, Bentley's survey data in India show that mothers believe *chapati* (North Indian bread) is harmful for children with diarrhea. But when she followed actual cases, she observed that they continued feeding *chapati* none the less. Reliance on survey research alone would be misleading [14].

Clinical ethnographic data make it possible to generate and test culturally informed hypotheses. The model suggested in Figs 1 and 2 provides a framework for organizing and studying beliefs and practices. Drawing on this framework and the pertinent literature, the following 11 questions constitute an agenda for further research:

(1) What are the effects of diarrheal illness beyond the immediate complaints of the acute presentation? What impact does it have on school, work, associated malnutrition, and other medical and social sequelae? What are the patterns of distress associated with diarrheal illness over the long term?

(2) What factors determine a response to diarrheal illness that results in childhood malnutrition? What are the local beliefs and practices concerning anorexia of the child, withholding food by the child's caretakers, or interrupted breastfeeding?

(3) How can planners accommodate both professional and popular objectives most effectively? What is the relationship between perceived needs and needs defined by health professionals?

(4) In what ways might the culture of health professionals and planners be at odds with their stated objectives?

(5) What factors distinguish what people say from what they do with respect to ORT? What are their expectations from it? How do they understand the benefits of ORT?

(6) How do ecology and culture interact? How do ecological factors translate into biological and psychosocial needs? Consider what the appropriate role for ORT might be, technically, in a particular community with respect to local patterns of diarrheal diseases there (for example, in a setting of chronic parasitic diarrhea [48])?

(7) What are the implications of help seeking in the context of political, economic and other macro-social forces? How does treatment from private practitioners differ from treatment in government clinics? What effects do the economics of private practice have on the treatment of diarrheal diseases, and how can private practitioners be enlisted to cooperate in a program to provide optimal health care for diarrheal diseases?

(8) How do local cultures and the culture of biomedicine interact in community health centers? How are policies and practices in local clinics in the Third World different from analogues in developed countries? How well does what actually happens in the clinic conform to what health officials believe takes place or should take place there? How well does it meet expectations and perceived needs within the community?

(9) In developing countries drug salesmen are a major source of medical information for many practitioners. What is their impact and the impact of pharmaceutical companies on the treatment of diarrheal illnesses?

(10) Researchers may have underestimated the use of rehydration fluids (teas, porridges, etc.) in the home because people do not consider them medicines and underreport their use for diarrhea [20]. How frequently are such solutions used? What is the composition of these solutions with respect to their sugar and electrolyte content, and might they be suitable to promote as locally acceptable alternatives to commercial oral rehydration preparations?

(11) Regarding the relationship between help seeking and treatments, local practices of traditional healers need to be better understood. What are the effects of what they do and the drugs they give, considering their biological and psychosocial impact? What are their attitudes toward ORT, dietary management and other critical interventions? Might some of them be enlisted in local programs? What criteria should identify those with whom cooperation is appropriate?

This review indicates that some of these questions have received considerable attention, others almost none. Together they inform different facets of the complex relationship between culture and diarrheal illness, and we need to know more about each of them. Detailed case studies, prospective family studies, and in-depth study of functioning health services (traditional and modern) hold perhaps the greatest potential for gathering useful data on illness-related beliefs and practices. A research instrument capable of guiding a clinical ethnographic assessment and collecting quantitative and subjective data on perceptions of illness, perhaps a version of the Explanatory Model Interview for Classification (EMIC) specific for diarrhea, will be highly useful [49].

CONCLUSIONS

The ethnomedical perspective challenges models that view local beliefs and practices merely as obstacles in the path of progress. Efforts to induce compliance are not enough. Health professionals must establish alliances with the communities they serve if health education and health services are to be effective. An appreciation of local cultural models and the diversity of cultural contexts enables health professionals to (1) recognize the significance of local perceptions of diarrheal illness with respect to pertinent outcomes and perceived needs, (2) develop ways to introduce recommendations that communities will accept, and (3) make appropriate use of existing community resources representing local traditions.

Acknowledgements—The Acute Diarrheal Disease Research Program (ADDRP) of the Harvard Institute for International Development supported preparation of this review. An earlier draft was presented to the ADDR Technical Advisory Group in October 1986. Helpful comments of Margaret Bentley, Arthur Kleinman, Richard Cash and Jeannine Coreil are gratefully acknowledged.

REFERENCES

1. *Proceedings of the International Conference on Oral Rehydration Therapy (ICORT), 7–10 June, 1983.* Agency for International Development, Washington, D.C., 1983.
2. See Carpenter C. C. J. Treatment of cholera—tradition and authority versus science, reason, and humanity. *Johns Hopkins med. J.* **139,** 153–162, 1976.
3. Howard-Jones N. Cholera therapy in the nineteenth century. *J. Hist. Med.* **27,** 373–395, 1972.
4. Nichter refers to these patterns as "idioms of distress". See Nichter M. Idioms of distress: alternatives in the expression of psychosocial distress. *Cult. Med. Psychiat.* **5,** 379–408, 1981.
5. Kleinman A. *Patients and Healers in the Context of Culture.* University of California Press, Berkeley, Calif., 1980.
6. Leslie C. Medical pluralism: a symposium at the post-plenary session on medical anthropology of the Xth International Congress of Anthropological and Ethnological Sciences, University of Poona, India, December 1978. Proceedings in special issue of *Soc. Sci. Med.* **14B,** 1980.
7. Dunn F. L. and Janes C. R. Introduction: medical anthropology and epidemiology. In *Anthropology and Epidemiology* (Edited by Janes C. R., Stall R. and Gifford S. M.), pp. 3–34. Reidel, Dordrecht, 1986.
8. Dunn F. L. Causal assemblages in epidemiology as sources of hypotheses in anthropological research. Paper presented at *Annual Meeting of the American Anthropological Association,* 4 December 1975. Quoted by Nations [10, p. 99].
9. Kleinman A. International health care planning from an ethnomedical perspective: critique and recommendations for change. *Med. Anthrop.* **2,** 71–96, 1978.
10. Nations M. K. Epidemiological research on infectious disease: quantitative rigor or rigormortis? Insights from ethnomedicine. In *Anthropology and Epidemiology* (Edited by Janes C. R., Stall R. and Gifford S. M.), pp. 97–123. Reidel, Dordrecht, 1986.
11. Dunn refers to the "epidemiological paradox", the epidemiologist's "decreasing ability to deal quan-

titatively with causal assemblages as their size and complexity increase, and as their scope extends into the psychosocial domains" [10, p. 119].
12. Lozoff B., Kamath K. R. and Feldman R. A. Infection and disease in South Indian families: beliefs about childhood diarrhea. *Hum. Org.* **34,** 353–358, 1978.
13. Green E. C. Traditional healers, mothers and childhood diarrheal disease in Swaziland: the interface of anthropology and health education. *Soc. Sci. Med.* **20,** 277–285, 1985.
14. Bentley M. D. The household management of childhood diarrhea in rural North India. *Soc. Sci. Med.* **27,** 75–85, 1988.
15. Escobar G. J., Salazar E. and Chuy M. Beliefs regarding the etiology and treatment of infantile diarrhea in Lima, Peru. *Soc. Sci. Med.* **17,** 1257–1269, 1983.
16. Nations M. K. Spirit possession to enteric pathogens: the role of traditional healing in diarrheal disease control. *Proceedings of the International Conference on Oral Rehydration Therapy, 7–10 June, 1983,* pp. 48–52. Agency for International Development, Washington, D.C., 1983; and Nations M. K. Illness of the child: the cultural context of childhood diarrhea in Northeast Brazil. Ph.D. dissertation in Medical Anthropology. University of California, Berkeley, Calif., 1982.
17. Johnson C. A. Infant diarrhea and folk medicine in South Texas. *Texas Med.* **75,** 69–73, 1979.
18. Kendall C., Foote D. and Martorell R. Anthropology, communications, and health: the mass media and health practices program in Honduras. *Hum. Org.* **42,** 353–360, 1983.
19. Kendall C., Foote D. and Martorell R. Ethnomedicine and oral rehydration therapy: a case study of ethnomedical investigation and program planning. *Soc. Sci. Med.* **19,** 253–260, 1984.
20. Green E. C. Diarrhea and the social marketing of oral rehydration salts in Bangladesh. *Soc. Sci. Med.* **23,** 357–366, 1986.
21. Real M., Kumar V., Nanda M. and Vanaja K. Beliefs and practices of urban mothers regarding "hot" and "cold" foods in childhood illnesses. *Ann. trop. Paediat.* **2,** 93–96, 1982.
22. Kumar V., Clements C., Marwah K. and Diwedi P. Maternal beliefs regarding diet during acute diarrhea. *Ind. J. Paediat.* **48,** 599–603, 1981; and Kumar V., Monga O. P. and Jain N. K. The introduction of oral rehydration in a rural community in India. *Wld Hlth Forum* **2,** 364–366, 1981.
23. Shahid N. S., Mizanur A. S. M., Aziz K. M. A., Faruque A. S. G. and Bari M. A. Beliefs and treatment related to diarrhoeal episodes reported in association with measles. *Trop. Geogr. Med.* **35,** 151–156, 1983.
24. Srinivasa D. K. and Afonso E. Community perception and practices in childhood diarrhea. *Ind. Pediat.* **20,** 859–864, 1983.
25. De Zoysa I., Carson D., Feachem R., Kirkwood B., Lindsay-Smith E. and Loewenson R. Perceptions of childhood diarrhoea and its treatment in rural Zimbabwe. *Soc. Sci. Med.* **19,** 727–734, 1984.
26. Fernandez E. L. and Guthrie G. M. Belief systems and breast feeding among Filipino urban poor. *Soc. Sci. Med.* **19,** 991–995, 1984.
27. Eppling P. J. and Siliga N. Notes on infantile diarrhoea in American Somoa (A sketch of indigenous theory). *J. trop. Pediat.* **13,** 139–149, 1967.
28. Maina-Ahlberg B. Beliefs and practices concerning treatment of measles and acute diarrhoea among the Akamba. *Trop. Geogr. Med.* **31,** 139–148, 1979.
29. Green E. C. and Makhubu L. Traditional healers in Swaziland: toward improved cooperation between the traditional and modern health sectors. *Soc. Sci. Med.* **18,** 1071–1079, 1984.
30. Cutting A. A. M., Omer R. I. and McLean S. J. A worldwide survey on the treatment of diarrhoeal disease by oral rehydration in 1979. *Ann. trop. Paediat.* **1,** 199–208, 1981.
31. Isenalumhe A. E. and Oviawe O. The changing pattern of post-partum sexual abstinence in a Nigerian rural community. *Soc. Sci. Med.* **23,** 683–686, 1986.
32. Imperato P. J. Cholera in Mali and popular reactions to its first appearance. *J. trop. Pediat.* **77,** 290–296, 1974.
33. Nalin D. R. and Haque Z. Folk beliefs about cholera among Bengali muslims and Mogh buddhists in Chittagong, Bangladesh. *Med. Anthrop.* **1,** 55–68, 1977.
34. One should consider these reports in both cultural and historical perspective: Clergymen in Oxford, England—Vaughan Thomas and others—also explained the cholera epidemic of 1832 as divine punishment for "vicious indulgences" (Morris R. J. Religion and medicine: The cholera pamphlets of Oxford, 1832, 1849 and 1854. *Med. Hist.* **19,** 256–270, 1975).
35. Chen P. C. Y. Socio-cultural aspects of a cholera epidemic in Trengganu, Malaysia. *Trop. Geogr. Med.* **23,** 296–303, 1971.
36. Faruque A. S., Rahman A. S. and Zaman K. Young childhood diarrhoea management by mothers and village practitioners in rural Bangladesh. *Trop. Geogr. Med.* **37,** 223–226, 1985.
37. Khan M. U. and Ahmad K. Withdrawal of food during diarrhoea: major mechanism of malnutrition following diarrhoea in Bangladesh children. *J. trop. Pediat.* **32,** 57–61, 1986; and Kumar V., Clements C., Marwah K. and Diwedi P. Beliefs and therapeutic preferences of mothers in management of acute diarrhoeal disease in children. *J. trop. Pediat.* **31,** 109–112, 1985.
38. Baumslag N., Davis R., Mason L. G., McQuestion M., Sabin E., Snyder J. and Wiesenthal A. *Oral Rehydration Therapy: An Annotated Bibliography.* PAHO and WHO, Washington, D.C., 1980.
39. Coreil J. Innovation among Haitian healers: the adoption of oral rehydration therapy. *Hum. Org.* **47,** 48–58, 1988.
40. John Cassel refers to a hierarchy of traditional practices based on their resistance to change. He cites examples from his experience at the Polelo clinic in South Africa. Depending on how the community perceived interventions he proposed to deal with malnutrition with respect to cultural traditions, people readily accepted some suggestions (e.g. planting vegetables); others required energetic promotion before they were accepted (eating eggs), and others were unacceptable regardless of how they were promoted (drinking cow's milk). See Cassel J. A comprehensive health program among South African Zulus. In *Health, Culture, and Community* (Edited by Paul B.), pp. 15–41. Russell Sage Foundation, New York, 1955.
41. Reflecting on standard explanations of health program failures, D. Banerji asserts that the "basic malady of the system [has been confused with the] bogey of resistance of villagers to the acceptance of Western System of Medicine . . . [but] mostly it is health services that failed the villagers rather than the reverse" (Banerji D. Social and cultural foundations of health services in India. *Inquiry* **12,** 70–85, 1975). For a discussion of Banerji's views and the views of other Indian social scientists and health officials in an analysis of the history of the Indian community health workers program, see Leslie C. What caused India's massive community health workers scheme: a sociology of knowledge. *Soc. Sci. Med.* **21,** 923–930, 1985. For another recent analysis of health programs in Nepal focusing on the culture of health planners and government bureaucrats, see also Justice J. *Policies, Plans and People.* University of California Press, Berkeley, Calif., 1986.
42. Brown K. H., Huffman S. L., Smith W. A., Bentley M. E., Pelto G. H. and Black R. E. Interdisciplinary

development of an intervention to promote improved dietary management of diarrhea. Unpublished manuscript.
43. Coreil J. and Genece E. Adoption of oral rehydration therapy among Haitian mothers. *Soc. Sci. Med.* **27**, 87–96, 1988.
44. Brieseman M. A. Knowledge and practice of New Zealand mothers in the treatment of infantile diarrhoea. *New Zealand med. J.* **97**, 39–42, 1984.
45. Nations M. K., Araujo J. G., DeSousa M. A. and Guerrant R. L. Care within reach: appropriate health-care delivery in the developing world. *New Engl. J. Med.* **310**, 1612, 1984.
46. Nations M. K., Rebhun L. A. and Correia L. Mystification of a simple solution: ORT in Brazil. Unpublished manuscript.
47. I appreciate the examples suggested by Dr Jeannine Coreil: WHO. Guidelines for the Trainers of Community Health Workers on the Treatment and Prevention of Actue Diarrhoea. WHO/CDD/SER/80.1, Geneva, 1980, p. 4; and WHO. A Manual for the Treatment of Acute Diarrhoea. WHO/CDD/SER/80.2 REV.1. Geneva, 1984, p. 4. Kendall's reports, already discussed, indicate that at least in some settings it is an unwillingness, not just inability, that limits the incorporation of ethnomedical research findings, which results in the unfortunate consequences he described in Honduras.
48. See the brief discussion of mortality from acute watery diarrhea vis-à-vis dysentery in Rifkin S. and Walt G. Why health improves: defining the issues concerning 'comprehensive primary health care' and 'selective primary health care'. *Soc. Sci. Med.* **23**, 559–566, 1986.
49. See Weiss M. G., Desai A., Jadhav S. S., Behere P. B., Gupta L., Channabasavanna S. M. and Doongaji D. R. Humoral concepts of mental illness. *Soc. Sci. Med.* In press. The EMIC has been adapted for a study of "Culture and Control of Diarrheal Illness" in Thailand.