

CAUSES OF CHILDHOOD DIARRHEA AS PERCEIVED BY MOTHERS IN THE PUNJAB, PAKISTAN

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Abstract. This study was carried out in the southern Punjab, Pakistan, to outline the causes of childhood diarrhea as perceived by mothers. Two hundred households in ten villages were randomly selected. Information was obtained from mothers, through a questionnaire, in-depth interviews, and direct observations. The focus was on obtaining information from mothers of children who were below five years of age. Causes of diarrhea reported by mothers were categorized in seven different domains. Causes relating to the digestive system, especially consumption of too much food, were the most important, followed by causes pertaining to contamination and those pertaining to the humoral theory of 'hot' and 'cold'. The mothers' health status was perceived as determining the health of her child through her breast milk. Through in-depth interviews, diarrhea as a symptom of envy and malice was brought up. The study draws attention to the complexity and heterogeneity of beliefs, attitudes and practices concerning diarrhea. This makes it difficult to come up with general rules for health education campaigns. Rather, in health education, the outstanding 'good' and 'bad' behavior should be selected and should be the focus. On the other hand, the heterogeneity of beliefs, attitudes and practices prevailing in the community could make mothers more receptive to new ideas than when a small set of rigid cultural norms would dominate thinking on disease transmission and hygiene. The study found that despite the mother's central role as caretaker one should not focus only on the traditional mother-child relationship, but also include the husband-wife relationship, and target other individuals involved in setting norms within the household or within the nearby community.

INTRODUCTION

A child under five years of age in Pakistan is estimated to suffer from an average of five episodes of diarrhea per year (Biloo and Ahmed, 1997). Diarrhea is the leading cause of childhood death in Pakistan. Several factors are likely to contribute to the very high diarrhea morbidity and mortality rates, including poverty, female illiteracy, poor water supply and sanitation, poor hygiene practices, and inadequate health services. In the 1980s, the government, supported by UNICEF and the WHO, launched programs with the aim of reducing the severe burden of childhood diarrhea, mainly by promoting oral rehy-

dration therapy (ORT). However, death from diarrhea still persists as a major problem. Although diarrheal disease is recognized as a major problem in Pakistan, few studies on this issue have been conducted at the community level. Mull and Mull (1988) emphasized the importance of incorporating mothers' perceptions of childhood diarrhea in ORT programs. Several other studies have also been conducted from a clinical perspective, but only a few community-based behavioral studies have been carried out (Mull and Mull, 1988; Malik *et al*, 1992b; Chavasse *et al*, 1996).

Improving domestic hygiene practices is potentially one of the most effective means of reducing the burden of diarrhea in children (Curtis *et al*, 2000). However, health education and hygiene promotion programs can only be successful if they are based on the current level of knowledge, perceptions, and practices of mothers with respect to child diarrhea and hygiene. Against this background, a study was carried out among 200 sample households in ten villages in an irrigated

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area of the southern Punjab, Pakistan. The objective was to assess the perceptions of mothers about childhood diarrhea at the community level, to contribute to appropriate policies aimed at controlling diarrheal diseases.

MATERIALS AND METHODS

Study area

The study was conducted in the Bahawalnagar District in the southern Punjab, on the edge of the Cholistan Desert. Irrigated fields, bush scrub between the farmland, and clearly defined villages of between 200 and 400 homesteads dominate the landscape. Poor irrigation water management and improper drainage have caused water logging and salinization of the agricultural lands, reducing the agricultural productivity and making the provision of on-site sanitary facilities increasingly difficult. The temperature in the area ranges from 2°C in January to 48°C during the summer months from May to August.

The Hakra 6R canal irrigates approximately 50,000 hectares of land and supports a population of 160,000 concentrated in 94 villages. The annual rainfall averages only 200 mm and the groundwater is brackish. The population is therefore entirely dependent on irrigation water for both agricultural and domestic supplies. The population obtains water for domestic purposes directly from the irrigation canals or from a *diggi*, which is a round, rectangular or square water reservoir, made from cement, located in the center of each village. *Diggi*'s are supplied with irrigation water on a weekly or fortnightly basis (van der Hoek *et al*, 1999). To supplement the water supply from the village water tanks and irrigation canals, people have installed hand and motor pumps and have dug wells along irrigation canals to capture the seepage losses. This seepage water accumulates on top of the saline groundwater next to these water bodies and is of much better quality than the surface water (van der Hoek *et al*, 2001). However, the supply from these seepage wells is relatively limited and runs dry if the canals have been closed for extended periods. Households in two of the selected villages were linked to a central water supply system but this water also originated from the canal system. The population is primarily occupied in agriculture, with approximately half the families being landowners and the remainder being tenant farmers or casual laborers. Women contribute with livestock rearing and seasonal work, such as cot-

ton picking and rice transplanting. The large majority of the people in the area are of Punjabi origin, while a minority of the families are of Pathan descent, a group that migrated from the northern areas of Pakistan. Major settlement took place in 1933 following the completion of the irrigation canal system, and in 1947 following the partitioning of India and Pakistan. The majority of the population is Sunni Muslim and a lesser number is Christian or Hindu. The social organization is dominated by caste and sub-caste structures and by the extended family. Most women shift into the husband's parents' home following marriage. *Purdah*, the segregation of women from outsiders, plays an important role in the community. In families adhering to a strict *purdah*, participation of women in public life is very limited. In most families of the selected households, the need for females to contribute to agricultural production outside the compound influenced the degree of *purdah*.

Pluralistic medical setting

A variety of health care services exist in the study area, representing practitioners of modern western medicine, *hakims* (traditional healers), faith healers, homeopaths, *dais* (traditional birth attendants) and a number of other service providers. The different medical systems co-exist at the village level and a single practitioner will often make use of a range of disciplines from both modern and traditional medical concepts. In addition, *mullahs* (religious faith healers) and other individuals with a profound knowledge of the Koran, provide healing by reading verses from the Koran. These references from the Koran when written on a piece of paper, are locally known as a *taveez* (a sort of amulet that is carried by the patient or that is dissolved in water and then drunk). The western services include both government and private practices. The government curative services are organized around hospitals, health centers and dispensaries. The outreach preventive services are supported by female health workers and communicable disease control officers. However, the government services suffer from a lack of resources and shortage of staff. Private practitioners include fully qualified medical doctors in the urban centers, to unskilled allopathic practitioners in the villages. A variety of drugs, such as allopathic, homeopathic and unani medicine are available from pharmacies, general village shops or homestead outlets [Unani medicine (literally 'Ionian', in Greek) is based on the

humoral theory of Hippocrates and is practiced by *hakims* and is a therapy also referred to as *hikmat*. For a more complete description of this medical tradition the reader is referred to Zakar MH (1998).

Definition of diarrhea

The Urdu term *daast* was used in the study area to define the passing of non-bloody stools and the Punjabi term *marror* for bloody stools (these terms were chosen as they were most commonly used locally and did not have misleading connotations, such as the term *julab*, which is used to describe non-bloody diarrhea associated with flushing of the digestive system by means of purgatives. This was practiced by adults and not small children and was perceived differently from other forms of 'diarrhea'). The term cholera was also used locally for extremely watery diarrhea accompanied by vomiting and fever. In this study, diarrhea was defined as three or more loose or watery non-bloody stools over a 24-hour period. Dysentery (diarrhea with blood or mucus) was defined as one or more bloody loose stools over a 24-hour period. However, when a respondent referred to diarrhea in general, the enumerators did not necessarily probe for the exact description. The study focused on diarrhea in children below the age of five, although not all the respondents knew the exact age of their children.

Selected households

On the basis of a stratified random selection, a total of ten villages located along the 45-km Hakra 6R irrigation canal were identified to represent the whole Hakra 6R area. An updated voter's list was used to make a random selection of 200 households in the ten villages in proportion to the population size of the villages. A household was defined as all individuals permanently living within the same compound and eating from the same pot. However, if it exceeded ten individuals only the core family (husband, wife, their children and their parents) was included. Farming was the main occupation of 138 (69%) of the heads of the selected households, followed by farm laborer (29 households, 14%), employees in the service sector (19 households, 10%), shopkeepers (8 households, 4%) and teachers (4 households, 2%). Only 22% of the mothers were able to read or write. About 50% of the school-aged children did not attend school.

Data collection

The study was carried out among the selected

households in the period March to December 1998 using mothers as respondents. In-depth information was only collected from mothers in households with children below five years of age. Two English-speaking female secondary school graduates from the area were trained to use structured and semi-structured questionnaires. Neither of these enumerators originated from the selected villages. Pictures of certain hygiene practices were also used to generate feedback from the mother. In-depth interviews were conducted by one of the authors in 35 households located in Hakra 6R of which 10 were visited several times. The criteria for choosing a household for an in-depth interview was primarily based on the presence of a child below the age of five years suffering from diarrhea, and families belonging to different levels and castes. Some of the in-depth interviews took the form of focus group discussions in which several female relatives and female neighbors participated. Information was also collected throughout the study period by way of 'village walks' and interviews with key informants such as government personnel, traditional medical practitioners, village leaders, and shopkeepers.

RESULTS

Causes of childhood diarrhea as perceived by mothers

Based on the field studies, it was possible to classify the causes of childhood diarrhea as perceived by the mothers. The information obtained through the questionnaires has been classified in Table 1. These data, combined with the causes presented by the mothers in the in-depth interviews, led to a classification of seven different domains to explain causes of diarrhea. Diarrhea that was perceived to be caused by envy and malice came up in the in-depth interviews, but not in the questionnaire survey, and is therefore not included in Table 1.

Concepts of the digestive system and food intake

The majority of the mothers considered a too high food intake the major cause of diarrhea (Table 1). A typical answer of a mother of a child suffering from diarrhea was 'I do not understand why, my child has eaten fine'. One mother stated that four of her five children between the ages of two and eleven were suffering from diarrhea due to over-eating and that she would feed them less in the future. All digestive processes were perceived

Table 1

Mothers' perceived causes of childhood diarrhea in Hakra 6R, Pakistan. The information is based on household questionnaire surveys. Up to three causes were registered from each respondent.

Domain	Cause of diarrhea	Number (%) of respondents
Digestive system and food intake	Too much food	131 (66)
	Too little food	8 (4)
Humoral theory	Humorally hot and cold food	14 (7)
	Cold or hot environment	32 (16)
Breast milk	Bad breast milk	3 (2)
Contamination	Contaminated food	51 (26)
	Contaminated water	9 (4)
	Insects or flies	3 (2)
	'Dirtiness'	15 (8)
Soil eating	Soil eating	13 (6)
Others	Teething	11 (6)
	Other causes	31 (16)
	Do not know the cause	4 (2)

to take place in the stomach (*meda* in Punjabi). The size of the stomach was perceived to be quite small and its capacity to digest limited, especially in children. Only a few respondents were aware of the existence of intestines. It was believed that when eating too much, the food could not circulate properly in the stomach, resulting in incomplete digestion and diarrhea. The mothers believed that a distended abdomen was the visual indicator that a child had had more food than the digestive system could handle. Not only solid foods, but also liquids in large amounts would provoke diarrhea. Too much of certain kinds of foods or combinations of food were perceived as inappropriate and associated with having a bad influence on the stomach. Very sour and very sweet foods were examples. Spicy food was related to diarrhea, despite this being part of the normal diet of small children. Buffalo and cow milk were considered as difficult to digest and easily causing diarrhea. Drinking water and at the same time eating certain foods such as *chapati* (flat wheat breads) was considered inappropriate. The combination of water and melon was seen as the cause of cholera. Chemically treated products or powdered milks were seen as damaging to the stomach. It was only in a few cases that the mothers mentioned too little food as a cause of diarrhea.

Humoral theory in relation to seasons and temperature

In the study area, food products such as meat

and green mango were classified as hot, whereas sugarcane and milk were seen as cold. Egg was normally categorized as a hot food item but would change humoral quality according to the way it was prepared. For instance, an omelet with chilies and salt or egg yolk mixed with honey was considered hot while boiled egg with salt was said to have a cooling effect. Important for humoral hot and cold foods, was the season of the year and the ambient temperature. Wheat, which was harvested in the summer season, was believed to be very hot while the heat would decrease during storage. Oranges and lemons, which were fruits from the cold season, were defined as cold. Equally, a person's body or stomach was perceived as accepting more of a certain food at certain times. One family interviewed felt best in taking cold foods, as they believed they had hot bodies. According to them, their child was most likely to get diarrhea from an excess of hot food. In contrast, another mother stated that only cold food could cause diarrhea. Diarrhea could be classified as hot, from eating too much hot food in the summer, or cold, from an excess of cold foods under colder weather conditions. Bloody diarrhea, locally called *marror*, and generally accompanied with fever, was thought to be caused by consuming hot foods. Watery diarrhea, such as cholera, was in several cases referred to as cold and caused by cold food.

Breast milk in relation to diarrhea

The mother's eating habits and health status

were perceived as determining the health of her child through her breast milk. The quality of breast milk was also linked to the concept of humoral qualities. Hot or cold imbalances would affect the milk resulting in a deterioration of its quality and causing diarrhea in the child. Some mothers explained that after working a long day in the field under the hot sun, their breast milk would turn bad [see Mull and Mull (1988) for similar examples]. It was explained that gas would be created in the heated breast resulting in diarrhea of the child. A consequence of this belief was the maternal practice of washing herself in order to cool down before breast-feeding. Cold weather was also believed to affect the quality of the breast milk. Some breast-feeding mothers would also take medication themselves when their child suffered from diarrhea under the belief that the child's illness was related to the health status of the mother through the breast milk.

As described by Mull (1992) from other parts of Pakistan, in this area pregnancy was also believed to make the milk bad. Therefore, breast-feeding was to be interrupted after 1-3 months of pregnancy. Another reason for interrupting breastfeeding was that a new pregnancy would decrease the amount of milk produced by the mother. It was believed that continuing with breast-feeding during pregnancy might affect the unborn child mentally. The Koran directs mothers to breastfeed boys for no more than two and a half years while girls could be breast-fed longer. In practice, in the study area girls were breast-fed for around one and a half years and boys for around two years. Kulsoom and Saeed (1997) have also reported the early discontinuation of breast-feeding for female children from Lahore. A mother of a one and a half year old child suffering from diarrhea was uncertain about what had caused the diarrhea. The severe state of the child's illness made her suspicious of being pregnant, but often mothers were hesitant to talk about a pregnancy and bad breast milk. Mothers, as well as modern practitioners, used the child's health condition as a measure of the quality of the breast milk. Mothers with dehydrated and malnourished children were often diagnosed as having bad milk and as a result the child was weaned. To define the quality of the breast milk, several cases were registered where women would test the breast milk by making an ant drink the milk. If the ant remained alive the milk was considered good. This test was often used to establish the cause of death of a child. It appeared that the mothers were

inclined to interrupt breast-feeding to protect themselves by not having their breast milk blamed for the child's illness by the husband or mother-in-law.

In the questionnaire survey, mothers only rarely mentioned breast milk-related causes of diarrhea. It took repeated household visits to generate information on this taboo. The mothers would not only be blamed for the quality of their milk, but also for not producing enough milk. However, lack of breast milk was never mentioned explicitly as a cause for diarrhea. Many breast-feeding mothers would give additional milk, depending upon availability. Goat milk was preferred, while buffalo and cow's milk, though easily available, was considered difficult to handle by the stomach. In addition, nearly all mothers would give their infants water soon after birth. One or two spoons of water were generally given after breast-feeding. This amount would increase gradually, and by the time the child was about six to seven months old it would get about one and a half-cups of water three to four times a day. The use of water and animal milk to supplement breast-feeding from early childhood has also been documented among the poorer households around Lahore (Ashraf *et al*, 1993). While breast milk could be potentially bad, in general it was perceived as good for the child and also seen as the cheapest means to feed the child. Weaning foods were often a financial burden and were therefore often introduced late. For example, a woman who had two and a half month old twins said that she would breast feed them along with giving them cow's milk. She planned to continue breast-feeding for one and a half years and would introduce other food when they were one year old.

The concept of 'dirty' and diarrhea

Mothers related diarrhea to unclean food (*ganda* in Urdu). Food contaminated by flies, dirty utensils and unwashed hands could cause symptoms such as stomach pain and stools having a bad smell. The concept of 'dirty' was to a large extent associated with the visible, particularly flies, which were seen as 'dirty' creatures spoiling food by laying eggs. Generally flies were seen as belonging to the domain of 'dirty' along with crows and feces. In some cases, fly eggs were associated with germs, but only a few mothers would bring up the concept of germs or bacteria. A minority of mothers said that flies could spread diseases. Educated mothers were also unaware that diarrhea could be transmitted from child to

child. One elder woman said that they had a lot of flies in their house because the field where women went to defecate was very near. She explained that when they would make *chapati*, another woman always had to assist by removing the flies. However, she did not seem to make a direct link between the potential pathogens in the feces and the flies acting as carriers.

Contaminated water was seldom mentioned as a cause for diarrhea, and only if it was visibly polluted such as when a fly had rested on a pitcher. Generally, the responding mothers did not complain about the water quality, despite the problems the study area was facing (Nielsen *et al*, 2001; van der Hoek *et al*, 2001). Drinking water would very rarely be boiled, even though it was a common perception among the mothers that boiled water was good for a child suffering from diarrhea. Some mothers gave the impression that boiling the water was not a preventive measure, but rather a treatment.

Soil eating

It was very common for children to eat soil. This was seen as causing diarrhea and was related with the concept *kabaz*, which implied that the child would have constipation for 1-2 days, as the stomach had turned dry. The child would then become pale in the face and the teeth would turn extra white. When the child would get hungry after eating soil, it would eat more food and the stomach would enlarge. Eventually the stomach would turn hot, resulting in diarrhea. The mother of a child who had soil around the mouth accepted it as a natural practice. Soil eating was often explained by 'the child likes it' and often seen as the child's response to lack of minerals and reduced growth.

However, some mothers disputed this and thought it was because of a lack of proper care by the mother. Soil eating was also believed to cause worm infections resulting in diarrhea. Worms were believed not to exist in a well functioning stomach. Worms were related to reduced child growth. The poor digestion resulting from worm infestation would make the child feel hungry and eat more, which was believed to cause an enlarged stomach. The mother would give less food, as the child would otherwise not be able to sleep at night owing to an itching belly. However, one woman explained that, because of worms, the children would weep from hunger and she would therefore give a lot of food, more than normal because of the passing of stools.

Diarrhea as a symptom of envy and malice

Athra and *sokra* were feared illness categories related to envy and malice. When a child died because of diarrhea, *athra* and *sokra* were often the explanation. *Athra* and *sokra* are transmitted by the passing of a shadow over a child or its mother, according to the respondents. The main difference between *athra* and *sokra* was the age of the victims. *Athra* was related to stillbirth, abortions, or infants dying within the first weeks after birth. It could be passed from generation to generation and was in fact a disease of the mother but which caused her child to die. In contrast, *sokra* affected older children, and could also be passed by one child to another by the cast of a shadow. This, for instance, would happen when a mother and her sick child met another child that would pass below their shadow. Elder women were more willing to share their experiences and knowledge, and three of them said that they had lost 5-6 children each to these perceived illnesses. They explained that *athra* and *sokra* were very much a reality in young mothers' lives. One mother had a two-month-old child who died recently. Previously she had lost other children, ranging from 2 days to 20 days old. It was said that she suffered from *athra*.

An older woman illustrated a child's condition with *athra* or *sokra*, by raising her arm while pointing to her hanging skin and said that this was how those children would become. She explained that besides having diarrhea and dry skin, the child would vomit, have fever, would weep all the time, be weak and not grow. She herself had lost two children to *sokra*. She explained that her children had contracted *sokra* because she had crossed a stream that was flowing from the house of a woman who had taken a bath. She had illicitly dug a small canal passing *sokra* via the running water to her house. In some cases, transmitting *sokra* may not be intentional, but occur because of carelessness.

It was believed that a mother who had taken a bath with a *taveez* was potentially dangerous, as she could transmit the disease to others via the verses of the Koran, as they had been dissolved in the water. This meant that a woman with wet hair, or one wearing a *taveez*, was a symbol of potential danger. On the other hand, the only way for a child to get better was by means of a *taveez*. Most children were observed to be wearing a *taveez*, though often against other problems such as fright and weeping. One mother said: 'Some-

times the taveez has an effect and sometimes not, just like with medicine'.

Diarrhea as a result of other symptoms

Certain symptoms or physical states were perceived as causes of diarrhea, such as teething, throat pain, dehydration and general weakness. Diarrhea was expected with the arrival of every tooth. This was because when teeth appeared, the head would become heavy with an excess of heat. Mothers believed this to be a necessary evil as the child would otherwise suffer from eye or headaches, which were considered more harmful for the child than diarrhea. However, contrary to what has been found elsewhere, this study found that diarrhea associated with teething was perceived as a serious event that required the same amount of care as other types of diarrhea (Mull and Mull, 1988; Nichter, 1988; Malik *et al*, 1992b). Only a few mothers would not treat diarrhea linked to teething because it was felt to be a necessary process to expel the surplus heat by means of passing loose stools. A few respondents explained that when teething, the child would not be able to eat but only drink and this would result in the passing of loose or watery stools. It was believed that a child suffering from throat and breathing problems would have a lot of gas production in the stomach, resulting in diarrhea.

Several informants linked diarrhea to a local illness category called *kandii*, which is best understood as symptoms related to a sunken fontanelle. A very similar illness was described under the name *kandi-pota* by Malik *et al* (1992b), and in a study conducted in Sind as *sutt* by Mull and Mull (1988). *Kandii* was caused mainly by an imbalance in the humoral diet and it could make the child weak. The uvula would turn backwards instead of hanging down, causing throat problems and pain. Another common symptom of *Kandii* was that the skin of the ear would turn light to almost transparent. A doctor could only treat the fever and diarrhea, not the *Kandii* itself, which was dealt with by spiritual practitioners or by elders applying traditional treatment.

DISCUSSION

Mothers in this part of Pakistan have diverse and complex explanations for the causes of childhood diarrhea; explanations that may be used in combination and often in succession as the child's disease evolves. These explanations and perceptions are arrived at by individual experiences and

information provided by medical practitioners, and are influenced by the norms set by family members and in the wider community, often reflecting deep-rooted religious and cultural beliefs.

This study indicates that to achieve a positive impact of health education in relation to childhood diarrhea it is necessary to target not only the mothers but also a wider group of people within the community, including traditional medical practitioners, religious leaders and elders. Despite the mother's central role as caretaker one should not operate on the traditional mother-child relationship but also include the husband-wife relationship, including the important role played by the grandmother and mother-in-law. The male head of the household has clear expectations from his wife and this determines her social standing where the role of being a 'good' wife and 'good' daughter-in-law is central in shaping her role as a caretaker of the household and her children. A study undertaken in the same area, focussing on the link between preventive hygiene practices and childhood diarrhea, illustrated how hygiene practices related to the wife's perception of status rather than reflecting a preventive measure (Nielsen *et al*, 2001). Further, a study conducted in Punjab showed how crucial it was for the mother to live up to such expectations and how the fulfillment of these expectations would define their understanding of health and disease (Winkvist and Akhtar, 1997). As has been found elsewhere, the variation in hygiene standards between households was related to the socioeconomic status and the educational level of the mother (Malik *et al*, 1992a). It is also clear that a preventive program centered on diarrhea will have to work not only with the official health department institutions and staff, but also with the diverse group of health care providers and organizations influencing practices and norms. This may include the traditional healers, local pharmacists, formal and informal educational institutions for both children and adults, and the farmers' organizations in charge of managing water within the irrigated area. The inclusion of organizations not normally involved in health promotion should be encouraged to facilitate a broad acceptance of the health message, making use of the possibilities for outreach and to ensure that the promoted activities are based on feasible approaches to water supply and sanitation.

The study identified a larger number of perceived causes of diarrhea than is normally presented in the literature for a specific area. This

provides a greater challenge for health education and other preventive interventions and calls for greater flexibility and adaptability in the implementation of such programs. The study also showed the importance of making use of a number of different approaches when obtaining information on the local perceptions of childhood diarrhea. Important perceptions relating to the quality of breast milk and diarrhea as a symptom of envy and malice came out in the in-depth interviews but were hardly mentioned in the survey approach. This was probably linked to the taboos surrounding these explanations. For these issues to be brought up by the mothers, the setting for the conversation needs to be right and a good rapport is needed with the interviewer. The survey of the households found that consuming food in excess of digestive capacity was the most commonly perceived cause of diarrhea in children. Contaminated food or water tainted by insects were also often seen as causes of diarrhea. However, the understanding of contamination was mainly related to visible pollution or dirt and not related to the concept of germs or bacteria as infective organisms. The balance between 'hot' or 'cold' food and the influence of a hot or cold climate was a frequently mentioned cause of diarrhea. The reference to diarrhea as a 'cold' disease in this study is somewhat different from that of most other studies done in Pakistan, where diarrhea is primarily referred to as a hot disease, either caused by the hot climate or hot foods (Mull and Mull, 1988; Samuelsen, 1994).

The perceived causes of childhood diarrhea illustrate the limited awareness of the role of hygiene in the prevention of diarrhea. Fecal contamination was never presented as a direct cause of diarrhea. A study focussing on preventive hygiene practices in the same study area found that there was insufficient knowledge about the health benefits of sanitation, as only 2.5% of the mothers associated pit latrines with hygiene purposes. Feces were disposed of and removed for esthetic reasons, not because mothers were aware of the spread of diarrhea. This was linked with the local perception of good hygiene revolving around the visible and esthetics, rather than with the objective of ensuring good health (Nielsen *et al*, 2001). Flies or insects are associated with dirtiness and are related to disease. This may provide a good entry point for hygiene education. This idea was also brought up in a study conducted in Northern Pakistan, where the existing beliefs were used to promote fly control (Chavasse *et al*, 1996). Flies

representing a nuisance problem may serve as an entry point to promote improved sanitation. Increased awareness of the importance of hygiene in the spread of disease may be one way to increase the demand for latrines. But the message would still have to be linked to esthetics, and the need for privacy and easy access when promoting the use of latrines among women (Nielsen *et al*, 2001). Hygiene education may be more important once the latrines have been established. Also, a successful implementation of sanitation and hygiene promotion would require community participation at all stages, with special emphasis on women, as advocated by Jamal (1998).

This study identified a number of specific areas where planners of health educational activities should direct their attention. The objective can either be to strengthen existing beliefs in the community or to engage in a discussion to influence or change existing knowledge or practices to prevent disease. Since some of these areas for future emphasis are based on a traditional western medical point of view, of 'good' and 'bad' practices, it is important that the activities are carried out taking into account local culture, beliefs and practical options. Some of the preferred practices may only be common among a small group within the community, but by taking these practices as a starting point, the basis for wider coverage may be increased. Clearly, some deep-rooted beliefs and practices will be very difficult to influence.

A number of existing beliefs and practices should be further promoted through health educational activities:

- Spoiled food can be a cause of diarrhea
- Diarrhea is related to dirty food, dirty hands and flies
- Soil eating can cause diarrhea and worm infections
- Boiling water prevents diarrhea
- Worms in the stomach may cause diarrhea
- Food can be contaminated by flies, dirty utensils and unwashed hands

Clearly, there are a number of examples of beliefs and practices that should be discouraged, or where awareness should be increased through health educational activities:

- High food or liquid intake is a major cause of diarrhea
- An unbalanced diet of hot or cold food causes diarrhea

- 'Bad' breast milk can be a cause of diarrhea
- Pregnancy makes the milk bad
- Hot or cold imbalances affect breast milk and cause diarrhea
- Breast-feeding during pregnancy may affect the mental development of the unborn child
- Mothers should take medicine when the infants suffer from dysentery
- Introduction of weaning foods later than six months of age
- Less food is given to the child suffering from abdominal pain and sleeplessness
- Passing of a shadow over a child may cause diarrhea and death
- Women who take a bath while wearing a *taveez* are a danger to children

Probably the most important issue for future health education is the discontinuation of breast-feeding of a sick child because the mothers believe that something is wrong with their milk. Likewise, the provision of insufficient amounts of liquid to a child with diarrhea must be changed since it may hamper the widespread use of oral rehydration therapy.

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