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Cultural and Social Context of Dysentery: Implications for the Introduction of a New Vaccine

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ABSTRACT

Dysentery, a severe form of diarrhoeal disease, is a major cause of morbidity and mortality. Paradoxically, virtually no studies have been conducted to examine beliefs and behaviours associated with dysentery. The explanatory model of dysentery was explored in a community in Dhaka, Bangladesh, to understand the acceptability of a vaccine against dysentery. A local term for bloody dysentery is widely known, and residents describe a progression of symptoms, which closely mirrors the biomedical model of the disease. Due to the symbolic significance of blood loss and the fact that there is much uncertainty regarding treatment, bloody dysentery is perceived to be extremely serious. Causal interpretations most commonly relate to humoral theories, and remedies involve the consumption of 'cooling' foods that will reduce the heat associated with dysentery. Despite many misconceptions about vaccines and the fact that this approach contradicts aetiological explanations, the perceived severity of the illness makes vaccines attractive compared to other preventative measures. The results illuminate relevant information for the implementation of a new vaccine.

***Key words*:** Dysentery; Diarrhoea; *Shigella*; Explanatory models; Ethnomedicine; Ethnographic research; Bangladesh

INTRODUCTION

Over the past four decades, extensive research has been carried out in Bangladesh on the epidemiological and clinical aspects of diarrhoeal disease, particularly as they relate to cholera. Although research and resultant interventions have significantly reduced the rates of diarrhoeal illness, diarrhoea still accounts for over 10% of childhood deaths annually (1), contributing to an even greater share of morbidity (2) with rates highest among the poorest populations (3). While the political and economic environment clearly contributes to the continuation of high rates of diarrhoeal illnesses, another explanation relates to the appropriateness of medical and public-health interventions that have been developed to prevent diarrhoeal illnesses and their availability and relevance, particularly to high-risk populations.

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Shigellosis, one of the most severe forms of diarrhoeal disease, is a major cause of morbidity and mortality, accounting for an estimated 1.1 million deaths annually (4). In addition to the death and suffering which occur with acute illness, shigellosis can lead to complications that may persist and cause serious health problems long after the episode has passed. The vast majority of cases occurs in developing countries and tends to attack and be most severe among populations living in impoverished settings (4,5). In Bangladesh, the disease is believed to be endemic. Dysentery, the clinical term to describe bloody diarrhoea, is often coupled with fever and abdominal pain and contributes to 12% of diarrhoeal cases; an estimated 80-90% of dysentery is caused by *Shigella* species (6). In areas where dysentery is more prevalent, rates are even higher, accounting for 39% of all diarrhoeal episodes (7). While the use of oral rehydration solution (ORS) allows most watery diarrhoeal illnesses to be successfully managed at home, it provides little benefit to patients suffering from shigellosis (4). Furthermore, treatment of shigellosis requires laboratory confirmation for accurate diagnosis and

antimicrobial drugs for treatment, many of which have become ineffective over time due to the spread of drug-resistant strains (8,9). Because of the severity of the disease, its highly infectious nature, and the inherent difficulties associated with prevention, particularly in overcrowded areas with poor populations, together with the problems involved in diagnosis and treatment, a vaccine offers a viable alternative for the control of shigellosis.

Remarkably little research has been conducted in Bangladesh on the interactions of cultural dimensions and social circumstances influencing the management of diarrhoeal illnesses. Much of the in-depth research has failed adequately to distinguish between culturally-constructed classifications of diarrhoeal illnesses and the extent to which beliefs relating to specific illnesses guide treatment practices. While researchers working in the South Asian region have demonstrated that such data are essential for the development of successful interventions (10-14), most ethnographic data have focused on watery diarrhoea used for designing strategies promoting ORS (15). Presently, there are no ethnographic data examining the linkages of cultural beliefs and the social conditions and behaviours associated with dysentery in Bangladesh. As a result, there are few community-based efforts that differentiate between dysentery and secretory diarrhoea.

Epidemiological, sociobehavioural and costing studies were undertaken to identify relevant information for policy-makers involved in the implementation of a *Shigella* vaccine. This paper presents results from the sociocultural and behavioural study which was designed to provide a contextual framework for understanding local interpretations and accompanying health practices that may affect community acceptability of a future *Shigella* vaccine programme. The theoretical approach used is built on the concept of 'explanatory models' introduced by Kleinman (16), which provides a valuable conceptual and analytic tool for the investigation of local belief systems and care-seeking behaviours. The concepts of 'explanatory models' and 'cultural models' can be used interchangeably, referring to individuals' culturally-constructed ideas about the aetiology, symptoms, appropriate treatments, and expectations of outcomes of specific illnesses. The theory assumes that the problem-solving process of individuals relating to illnesses invloves drawing both on cultural information and social circumstances.

MATERIALS AND METHODS

Research site

The study area, Kamalapur, is a densely-populated urban hub spread over four sq km in the bustling southeastern sector of Dhaka city. Conditions reflect the circumstances of many communities that are rapidly growing in urban centres as the once rural population of Bangladesh is quickly becoming urbanized. In fact, the population in the Kamalapur study area doubled from 1997 to 2000, when it reached 118,654 largely as a result of immigration from rural areas. The result of this rapid growth is a chaotic hodgepodge of permanent structures and clusters of temporary squatter settlements, representing the mix of living arrangements and symbolic of the breadth of socioeconomic backgrounds of the inhabitants, the majority of whom is poor.

A pluralistic system of healthcare is available in Kamalapur, including government, non-government and private health facilities offering biomedical care. There is also an eclectic mix of local practitioners providing a wide range of services. These include medicine shopkeepers referred to as *daktars*, registered pharmacists, homoeopathic doctors, and trained physicians, and a spectrum of magico-religious healers, such as *kobiraj* (herbalists and spiritual healers), *fokir* (spiritual healers), canvassers (travelling salesmen selling concoctions of herbs and amulets), and *huzur* (Islamic spiritual healers).

Research design and methods

Data were collected between August 2001 and June 2002. The research strategy entailed a breadth of complementary methods developed to gather in-depth, descriptive information. These included key-informant interviews, semi-structured interviews with community residents, community leaders and healthcare providers, freelisting and rating exercises, hypothetical case scenarios and detailed accounts of self-treatment and sequences of healthcare-seeking behaviours from confirmed *Shigella* cases. This range of methods allowed for the triangulation of findings, thus enhancing the interpretation of the data and facilitating our ability to validate information as the study evolved. The primary aims of the research include the following: (a) to describe the perceived vulnerability, aetiology, and severity of dysentery in relation to other common diarrhoeal illnesses; (b) to delineate healthcare-seeking behaviours associated with dysentery; (c) to assess the local understanding of immunization and the perceived need for a *Shigella* vaccine; and (d) to determine potential constraints to introducing a *Shigella* vaccine.

Key-informant interviews were conducted at the outset of the project and provided critical information for determining variables for the selection of the community resident respondents. Key informants included six mothers, two community leaders, and two health providers, and the interviews continued over the duration of the project. Purposive sampling was used for identifying 30 selected community resident respondents; the sampling framework was guided by such criteria as gender, age, religion, socioeconomic status, and duration of stay in Kamalapur. Community leaders and healthcare providers known to treat suspected dysentery were selected with the help of the community residents. Cases of shigellosis were identified through the epidemiological study, which has a surveillance system in place, and confirmed through laboratory tests. We selected the most recent child and adult cases of shigellosis, which included eight children and four adults. Three data-collectors conducted the interviews, and the respondents were interviewed over a series of visits. Table 1 presents the sampling design.

Table 1. Sampling design of primary respondents

Type of respondent	No. interviewed
Key informant	10
Community resident	30
Community leader	10
Health provider	12
Confirmed shigellosis cases	12

Key-informant interviews were coded on Atlas.ti (17), a text-organizing software, and clippings of responses generated through the semi-structured interviews were compiled on a word processor. Both the sets of data were analyzed at an ideational level, with an overall concern of how research themes fit into discourses and relationships, which unravelled within and across groups of respondents. The primary aim was to identify what Nichter describes as the cultural competency (4), which relates to sharing of interpretive schemes and behaviours associated with dysentery. Demographic information obtained from each respondent was analyzed on SPSS 10.0, and Anthropac (18) was used for evaluating the freelisting and rating data. The study was approved by the Ethical Review Committee of ICDDR,B: Centre for Health and Population Research.

RESULTS

Profiles of respondents

Demographic and socioeconomic information, presented in Table 2, show that the male respondents were older than their female counterparts, and a higher percentage of females had attended school. All the respondents were Bangalee, and the majority was Muslim. The average years residing in Kamalapur was similar in both the groups. According to the 2003 census data, the demographic information collected from the respondents is representative of the adult population residing in Kamalapur (Brooks A. Personal communication, 2004). The exception was years of education among both male and female respondents, which was higher than expected.

Table 2. Demographic information on community residents

Indicator	Females (n=18)	Males (n=12)
Mean age (years)	34 (range 18-56)	43 (range 24-75)
Formal schooling		
Attended (%)	50	33
Mean years	8.1	10.8
Ethnic background	100% Bangalee	100% Bangalee
Religion		
Muslim (%)	78	92
Hindu (%)	22	8
Mean years in area	10.4	11.7

Sixty percent of the sample households were relying on a fixed wage as the primary source of income, with a mean monthly income of 5,162 taka or US$ 89.51 (at the time, US$ 1.00 was equal to 57.67 taka). The rest were receiving a daily wage of, on average, 84.00 taka or about US$ 43.80 a month. The average household size was 5.4, and 58% of the respondents lived in nuclear family structures. All the households had electricity. The main source of drinking-water is piped into communities from the government reservoir and available through spigots or pumps scattered throughout the area.

One group of leaders consisted exclusively of men who had been elected to represent the community. The second group involved informal leaders consisting of two landladies, two businessmen, and an *imam* (religious leader). The health providers interviewed included six *daktars*, two trained physicians, two homoeopathic doctors, one *kobiraj*, and one community health worker. Because the community residents consider *daktars*, trained physicians, and homoeopaths as the most appropriate care providers for dysentery, we included a larger proportion of these practitioners in our sample.

Community perceptions of dysentery

During the first visit with the community residents, freelisting exercises were conducted to generate a preliminary inventory of the cultural domain of diarrhoeal disease and the associated terminology used for describing these

illnesses (19,20). The respondents were asked to list all diarrhoeal illnesses in the area, and probing techniques were used for gathering seasonal variations. Typical of a domain, the procedures elicited a core set of diarrhoeal illnesses frequently mentioned by the respondents (Table 3) and a range of other illnesses of less importance to the community (21). Items that were mentioned first and more often are considered to have a greater significance or saliency in the local framework of diarrhoeal illnesses (22-24). Strikingly, and of particular relevance to this study, bloody diarrhoea, which was uniformly referred to as *rokto amasha*, was the diarrhoeal illness most frequently cited by the 30 respondents. However, *patla paikhana*, which is described as a loose stool, had the highest saliency, while *amasha* and *rokto amasha* were second and fourth respectively, signifying their importance. *Diarrhoea*, which refers to another type of watery diarrhoea, was also perceived to be highly salient.

Table 3. Diarrhoeal illnesses identified through freelists

Item no.	Local names and descriptions of diarrhoeal illnesses	Frequency	Average rank	Smith's saliency
1	*Patla paikhana* (loose or light stool)	24	1.9	.615
2	*Amasha* ('*bijla*' or mucousy stool)	24	3.0	.488
3	Diarrhoea (frequent watery stool often with vomiting)	18	2.4	.438
4	*Rokto amasha* (bloody, mucousy stool)	26	3.7	.358
5	Cholera (frequent watery stool accompanied by vomiting)	10	3.6	.186
6	*Dud haga* (watery, milk-like stool afflicting breastfed infants and children)	10	3.8	.179
7	*Shada amasha* (white, mucousy stool)	4	1.8	.108
8	*Sobuj paikhana* (green stool)	2	3.0	.042
9	*Pet phapa* (loose stool with gas)	1	1.0	.033
10	*Peter gondogol* (loose stool with gas, gurgling stomach, and sulphuric burps)	1	1.0	.033
11	*Ghat bomi* (loose stool with vomiting)	1	2.0	.028
12	*Chitni haga* (watery pieces of yellow stool affecting breastfed children)	2	5.0	.026
13	*Pet kharap* (frequent loose stool)	1	3.0	.022
14	*Pet putput* (frequent defecation causing heat and gurgling '*putput*' sound in stomach)	1	6.0	.010

Using the freelist data, we explored conceptual constructs associated with the prominent diarrhoeal illnesses, including interpretations relating to signs and symptoms, age-specific vulnerability and frequency, causal explanations, and perceived severity, with a primary focus on bloody dysentery and dysentery, which will be referred to in the rest of the paper as *rokto amasha* (in Bangla, *rokto* means blood and *am* is mucous) and *amasha* respectively.

Signs, symptoms, and vulnerability

Descriptions of *rokto amasha* typically included a constellation of signs and symptoms, such as bloody and mucousy stool, stomach cramping accompanied by a persistent need to defecate but an inability to produce much stool, fever, general malaise from straining, paleness and weakness due to blood loss, extreme pain and heat around the naval, which is believed to be the centre of the illness, aching of the joints, loss of appetite, and weight loss. Some respondents indicated that the afflicted individual goes from passing a liquid, then mucousy, and then bloody stool. Other respondents suggested that the stool is laden with fat, which to cleanse the body must be discarded. If the condition persists, the respondents asserted that the health of the patient could deteriorate quickly, leading to acute disorders, a general breakdown of the body, and an inability to work.

While *rokto amasha* as viewed is extremely dangerous and known to cause intense suffering, the respondents also confirmed that it occurs relatively infrequently compared to other diarrhoeal illnesses. Another important distinction is that the duration and recovery period is perceived as much longer. The condition is known to affect both adults and children and is believed to be seasonal, occurring most frequently during the rainy and cold seasons. Several respondents explained that men are inflicted more often because they frequently eat outside the home in local food shops. Some informants indicated that the person afflicted with *rokto amasha* might never get cured, and in these cases, symptoms are known to continue throughout life or to lead to death.

Causes of dysentery

The community residents and leaders clearly differentiated between the causes of diarrhoea in the form of watery diarrhoea and *rokto amasha*. Watery diarrhoea

is commonly associated with uncleanliness, and some also mentioned evil eye or stepping over a stool. In contrast, *rokto amasha* is linked to the intake of 'hot' foods, referring to the hot/cold humoral theories that are followed in regions of Asia, Africa, and Latin America (25,26). These humoral traditions still influence causal interpretations and often guide therapeutic interventions during times of illness. Specifically, *amasha* is perceived to be a hot illness, which comes from the overconsumption of hot foods, creating an imbalance in the body and producing internal heat and fever. Foods that can provoke symptoms of *amasha* include hot spices, particularly chillis, and items not necessarily hot in temperature but known to produce heat in the body*. In the case of breastfed children, the explanation was that the mother had eaten too much hot food, which contaminated her breastmilk and affected the young child. The cognitive nature of this belief asserts that an internal balance must be achieved to maintain health—the way to counteract heat in the body is to consume foods or drinks with cooling properties.

The respondents also suggested that poor food habits, such as eating irregularly or on an empty stomach (an empty stomach is believed to be more susceptible to the development of internal heat), particularly when foods perceived as 'hot' are consumed, could cause *kosha* (constipation) and lead to *rokto amasha*. *Kosha* signifies that the body is both dry and hot and is also linked to excessive intake of hot foods. One elderly male informant explained, "If your food habit is bad, you get *kosha*, which turns to *amasha*. Bad food habits mean not taking cold food and always eating hot food. If someone takes hot food, it makes the body hot. When one's body cannot remain cold (due to the excessive consumption of hot food), he or she gets *rokto amasha*." Another common interpretation was that if *amasha* or s*hada amasha* is not treated properly, the condition evolves to *rokto amasha*. Other less common causal explanations include consumption of rotten food or that the condition is hereditary.

Views of the healthcare providers on the aetiology of *rokto amasha* illuminate striking patterns, clearly dividing types of healthcare providers by their adherence to folk beliefs. Specifically, the *daktar, kobiraj,* and homoeopathic doctors cited hot food, constipation, and irregular eating habits as the primary causal explanations, while the trained physicians attributed the onset of *rokto amasha* to unclean water, unhygienic eating conditions, or consumption of rotten or stale food. When we explored local belief systems with the physicians, they denied any knowledge of humoral explanations. Pigg has described the tendency of trained biomedical practitioners working in pluralistic health systems to disassociate themselves from or even devalue folk theories in an effort to align themselves with modernity (27).

Severity of dysentery

Perceptions of the severity of *rokto amasha* in relation to other diarrhoeal illnesses were assessed through a rating exercise. Based on the analysis of the freelists, combined with information collected from the informants, 16 common diarrhoeal illnesses, each with different signs and symptoms and causal explanations, were selected (Table 4). Twenty-eight community residents rated the diarrhoeal illnesses under study on a bipolar three-step scale in groups of most serious and least serious, with a provision for an intermediate group. The results shown in Table 4 provide additional data on how *rokto amasha* fits into the local structure of diarrhoeal illnesses. Here we can see that along with cholera, *diarrhoea*, and *painna diarrhoea*, which are described as containing mostly water, *rokto amasha* is considered among the most serious of the diarrhoeal illnesses. The community residents suggested that the high level of perceived seriousness relates to the fact that, in the case of watery diarrhoea, there is widespread understanding and confidence in the treatment, which involves taking ORS, while there is much uncertainty regarding the treatment for *rokto amasha*. Furthermore, several community residents emphasized that the condition can cause serious economic hardship in households, particularly if wage earners are afflicted, or can lead to death. One community leader stated, "It is a big concern for people living in this area. It is very serious because people can die due to *rokto amasha*." All the respondents particularly emphasized the serious health implications associated with chronic blood loss. A shopkeeper explained, "There is severe abdominal pain and weakness. Due to weakness, people can't work, particularly hard work. The health breaks down,

*Results from freelists of hot foods carried out with 28 respondents elicited over 200 foods that are considered hot. The list encompasses a wide range of food items, including meats, fish, fruits and vegetables, and spices, illustrating the diversity of the cultural beliefs. Based on the analysis of the data, the 10 foods with the highest saliency are beef, jackfruit, hilsha fish, mango, pumpkin, milk, pangas fish, egg, duck, and mutton. Interestingly, chilli was number 17 on the list

Table 4. Perceptions elicited from community residents of severity of diarrhoeal illnesses

Ranking	Local name and description of diarrhoeal illness*	Mean score†
1	Cholera	1.00
2	Diarrhoea	1.07
3	*Painna* diarrhoea (stool looks like water)	1.18
4	*Rokto amasha* (bloody, mucousy stool)	1.21
5	*Dud haga* (watery, milk-like stool afflicting breastfed children)	1.82
6	*Krimi amasha* (mucousy stool with worms)	1.82
7	*Thanda paikhana* (green stool, afflicts babies)	1.89
8	*Shada amasha*	2.11
9	*Amasha*	2.11
10	*Patla paikhana*	2.21
11	*Pet kharap*	2.43
12	*Sabuj paikhana*	2.46
13	*Pet putput haga*	2.50
14	*Chebre chebre paikhana* (stool is yellow, foamy with bad smell)	2.54
15	*Peter gondogol*	2.57
16	*Chakra chakra paikhana* (watery with yellow pieces of solid stool)	2.64

* Only descriptions of illnesses not already listed in Table 3 are included
†The mean scores were generated on Anthropac using 1 for most severe, 2 for moderately severe, and 3 for least severe

people lose blood, and if you lose blood that means you are losing strength and nourishment and the body can no longer function."

Management of dysentery

Treatment practices and care-seeking for *rokto amasha* were explored in various ways, including direct questioning of the respondents, the use of hypothetical cases, and interviews with confirmed cases of dysentery. The data show two distinct patterns of management regardless of the age of the afflicted individual. In poorer families subsisting on daily wage earnings, care-seeking outside the household is commonly postponed over a long time despite the fact that the condition is perceived to be very serious. Home remedies entailing the consumption of foods known to cool the stomach are first employed to counteract the heat during illness episodes. After several days of passing stool with blood and mucous, the respondents commonly decided that the situation was dire, expressing particular concern about blood loss, and determined that additional care was needed, which is most frequently first sought with a *daktar*. If the treatment fails, a heightened sense of urgency creates a greater willingness to obtain care from trained clinicians, even if it requires spending more money. The reluctance to seek care at the time the illness is recognized appeared to be strongly influenced by the household economic situation. In fact, some households were so poor that even the administration of food therapies was problematic. The following description (in box) depicts the pattern of illness management followed by poor households.

The data gathered from economically more solvent families subsisting on a fixed income suggest that the perceived seriousness of the condition inspired prompt care-seeking. Perceptions of appropriate treatment modalities involve a range of providers, including paediatricians, homeopaths, and *daktars*, and treatments were often taken concurrently. It was also deemed critical to carry out simultaneous therapeutic home remedies entailing the consumption of 'cold foods.'

Management of *rokto amasha* in a poor household

Amina, a six-month-old baby, is the daughter of a rickshaw-puller. A few days prior to our interview, she was diagnosed with *rokto amasha*. Her mother explained that the first day Amina experienced loose motion (*patla paikhana*), and she gave the baby ORS. After two days of loose motion, mucous appeared in Amina's stool, and the mother responded by consuming only cold foods to counterbalance through breastmilk the heat in Amina's stomach. On the third day, blood appeared in her stool, and her mother immediately understood that the condition was *rokto amasha.* The family continued to manage the illness at home, and by the fourth day, the loss of blood made them anxious, prompting the family to seek outside care from a *daktar*. When we inquired about the delay in care-seeking, the mother explained, "Money is the main problem to get treatment. We are poor."

Management of *rokto amasha* in a more solvent household

One night Halim, a 12-month old boy, started defecating loose stools and vomiting. The next morning his parents took him to a clinic where he was treated. After some days, he started to produce white-like stools (*shada am*), and subsequently, there was blood, which led the parents to believe that his condition had become very serious. The father insisted on seeking care from the nearest homoeopath. After seven days of treatment, the blood had disappeared but white, mucousy stools continued. Halim's parents decided to return to the clinic where they received medicine for three days; however, the condition continued. The father returned to the homoeopath where he received another medication and, on the second day of the homoeopathic treatment, blood once again was visible. That evening they took the baby to what they described as a child specialist. The doctor prescribed two treatments—one entailing a series of injections and the other, ingestion of oral syrup. After a couple of days, the blood and mucous disappeared, and the family stopped the treatment; however, the family still deemed it necessary to travel to their natal village to seek additional care from a *kobiraj*. Upon their return, the baby started producing a light, mucousy stool accompanied by vomiting. This time they visited a paediatrician who prescribed a month-long medication regime. Describing his improved condition, the mother explained, "He defecated a good stool, without blood." Throughout the illness event, both mother and child followed a careful regimen of cold foods intended to balance the perceived heat presumably causing the young child's condition.

In both the groups, we can see a configuration of beliefs interacting with social conditions to guide care-seeking. Generally, adherence to treatment regimens is poor and based on the disappearance of bloody or mucousy stools, resulting in the high probability of treatment failure, return visits to health practitioners, and repeated intake of antibiotics.

Influences of culture and social conditions on prevention

When we explored views on preventative strategies to avoid *rokto amasha*, the vast majority of community residents suggested that measures should primarily involve maintaining a balanced diet. This would entail eating cold foods and drinking large quantities of water, which has a cooling effect, and avoiding too many hot foods. Following a regular eating schedule was also cited frequently. A smaller number of the respondents referred to sanitary measures, such as drinking boiled water or water from a tubewell, washing food properly, avoiding the consumption of rotten foods, washing hands after defecation, and using a sanitary latrine. However, due to an inability to follow local dietary rules and regulations, the economic and physical environments, and the perceived unpredictability of illness episodes, about half of the respondents suggested that these measures are difficult to maintain and are, therefore, rarely followed. The result is a general level of skepticism about prevention. Highlighting barriers to following preventative measures, one respondent stated, "Most people here are poor…. behind my house there is a slum; if you go there you will see that the poor people are just barely surviving. They are busy with their work and simply trying to stay alive." A female respondent explained, "I can keep my house neat and clean. I can boil water, but the garbage outside, the bad smell, mosquitoes, unsanitary latrines…the children of the slum defecate here, and the air is polluted. The environment is very bad, that is why it is difficult to avoid *rokto amasha* and other diarrhoeal illnesses." Another respondent said, "In this slum, there are five toilets, and 500-600 people use them. The latrines are not clean, as it is too difficult to keep them clean." The respondents commonly expressed a need for more assistance from the public sector, indicating frustration that the government authorities have taken virtually no initiative to improve the sanitation system in the area.

Cultural perceptions of vaccines

Explorations into the conceptualization of vaccines elucidated various beliefs relating to their purpose, for whom vaccines are intended, and appropriate characteristics. Results of our inquiries show that, from a biomedical standpoint, about half of the community respondents were knowledgeable about the benefits of vaccines, stating that they "protect against illness" or "keep people free from disease", while the others had a limited understanding. Several health providers also suggested that their clientele are often confused about the purpose of vaccines, and the responses from both *daktars* and homoeopathic doctors illustrate that practitioners might also be misinformed.

The community residents most commonly perceived vaccines to be for young children and women of reproductive age. However, the respondents also conveyed the belief that people of any age or sex can benefit from vaccination. Information needed before agreeing to vaccination includes possible adverse effects, its benefits

(e.g. efficacy and any additional health advantages), eligibility for vaccination, the method and place on the body of its administration, monetary costs, number of doses, duration of protection, and the possibility of its leaving a permanent scar. Other issues raised included the fear that the vaccine might inactivate other medications or vaccines, induce weight gain, or necessitate subsequent food restrictions; day labourers in particular expressed concerns about swelling at the injection site, pain, and fever.

Hard-to-reach populations

Given the problems associated with prevention and treatment, and the resources needed to clean the environment and improve the water supply, the majority of community leaders agreed that the most effective way to prevent *rokto amasha* is through a vaccination programme. Both community leaders and health providers stressed that the poorest and the least-educated segment of the population would be the most difficult to persuade to participate, and they particularly singled out day labourers who due to their subsistence needs and work schedule, which entails long hours seven days a week, are hard to reach. They also explained that the work schedule of day labourers forces them to eat street foods, which typically have a high content of spices and oil and are, therefore, categorized as 'hot', and thus partake in perceived risky behaviours. In addition, their lifestyle minimizes exposure to health-education messages and correspondingly limits their understanding of the benefits of vaccines and heightens concerns about injections. The community leaders underscored that fears about side-effects, which could lead to missed days of work and lost income, and the monetary costs involved in receiving a vaccine, would further limit their interest.

Other potentially hard-to-reach community members identified include newly-arrived immigrants, the elderly, and the most indigent segment of the population, a sector that leaders and health practitioners emphasized cannot afford to prioritize preventative measures. When describing this group, one respondent explained, "Many people think that they or their babies are not sick now so why would they take the vaccine? There are some people who think that it is better to get sick of measles once or twice, that way the preventative power increases." A female respondent stated, "When we get sick we want to pay for treatment. When we aren't sick we don't think about it, that we need to be careful about disease. For this reason, we would consider a vaccine an extra expense."

Despite this, the vast majority of the community residents viewed vaccine as the optimal measure to combat *rokto amasha*. This seems to relate to perceptions of illness severity and subsequent social and medical consequences as well as positive past experiences with vaccines, which the community residents frequently link to protection from debilitating childhood illnesses, such as polio, small pox, measles, diphtheria, and tetanus, and improved health. One respondent explained, "People know that if they take vaccines they can remain free from polio and measles for their whole life. They think that it is a very strong medicine." In addition, because vaccines are commonly administered through injections, which are associated with powerful medicine, they gain special recognition and respect. The combination of these factors has fostered an inherent trust of vaccinations. We also learned that barriers associated with other preventative measures and treatment options, particularly relating to costs, interact to make vaccines attractive.

DISCUSSION

One of the important features of 'explanatory models' is its flexibility as an analytic tool. Our data illustrate how it can be employed to examine perceptions of a specific illness event (as in Kleinman's original formulation) and how it is equally useful for describing individual signs and symptoms for different categories of the same biomedical disease or comparing them across diseases that belong together from an 'etic' or biomedical perspective. Using this framework, our findings illuminate strong patterns relating to the local explanatory model of *rokto amasha*, which can be sharply contrasted to other local categories of diarrhoeal illnesses, each with distinct cultural constructs, aetiologies, and associated responses. The widespread recognition of illness terminology and prevailing belief in blood as an index of dysentery, and the degree of shared cultural knowledge as well as its intricacy relating to illness attributes and risky behaviours, much of which corresponds with the biomedical model, suggests that the residents of Kamalapur have had extensive experience with *rokto amasha*. Information gathered on the seriousness of the illness indicates that, in the general cultural context of diarrhoeal illnesses, *rokto amasha* is viewed as a very dangerous condition, which is more serious compared to the local category of mucousy or 'white' dysentery. The perceived severity appears to be related first to the cultural conceptualization of blood loss and, as the illness progresses, serious long-term health and economic

consequences; of added concern is the belief that effective treatment is costly. Compared to other illnesses described as watery diarrhoea or 'loose motion', for which there is a widely-recognized home remedy, there is much uncertainty regarding the efficacy of treatment for *rokto amasha*, which generally begins with food therapy. While most respondents indicated that the most effective care provider is the trained physician, many stated that economic constraints often prevent this as an option. Economic factors also delay care-seeking, thus prolonging the convalescence period and causing both social and economic hardships for the family involved, often leading to prolonged health effects.

We also found that, because of the existing water and sanitation conditions in the community, the residents feel that they are unable to protect themselves. The enormity of the problems, which are continuously being exacerbated by the incremental increase in population and the transient lifestyle of inhabitants, is impossible for the local population to redress without outside assistance involving major infrastructural development. The respondents expressed a general cynicism about any interest on the part of the Government to make significant social or sanitary reforms in the near future. Although the residents have been bombarded with messages regarding the importance of drinking purified water and eating fresh food in light of the extent of the water and sanitation problems, there is general skepticism regarding the usefulness of those protective measures. Furthermore, poverty and unstable work routines disable a large proportion of residents to follow routinely such preventative strategies as using sanitary latrines or even boiling water, which involves prohibitive fuel costs. As a result, the residents are unlikely to employ scarce household resources to invest in what they perceive as futile preventative strategies.

While from a biomedical standpoint, we uncovered many misconceptions about the purpose and some doubts about the cost benefits of a vaccine, we also generally found that vaccines garner a certain respect for their effectiveness in preventing particular illnesses and enhancing the health of recipients. Our findings suggest that perhaps because they are associated with injections, medicines, and treatment, which in this context play a strong role in maintaining health, vaccines often fall out of the general rubric of prevention, which is regarded as time-consuming, costly, and ineffective. They are rather frequently viewed as a sort of panacea to health problems, and our data suggest that a vaccine would be a welcomed alternative to preventative measures and the potential treatment sequences and expenses associated with *rokto amasha*. Furthermore, while the local causal interpretation associates *rokto amasha* with humoral theories, residents seem to be willing to accept the possibility that, due to its seriousness, the intake of cold foods may not be adequate to reverse the condition. The challenge will be to reach the poorest section of the population, particularly day labourers, whose lifestyles both heighten their susceptibility to contract the disease and lower their willingness to accept a vaccine.

The findings once again reveal that only through thickly-descriptive data can the complex interrelationships between cultural meanings and knowledge and behaviours associated with illness events be thoroughly explored. The triangulated methodology used in this study provided a richness of data to understand an amalgam of cultural and social influences on responses to an illness. Such detailed information is critical for the successful introduction of a new vaccine, particularly in regard to targeting hard-to-reach and most vulnerable populations. Promotional schemes advocating vaccines should incorporate aspects of illness conceptualization, including indigenous terms, the perceived seriousness of signs and symptoms, and causal explanations to educate communities in a way that is sensitive to local cultural models and sociocultural contexts. Pertinent information, such as the symbolic significance of blood in relation to the ethno-diagnosis of illness and corresponding treatment approaches, and the degree of blood loss, which constitutes an important characteristic of illness severity, could be used for distinguishing between other diarrhoeal illnesses and win acceptance of a vaccine. This sort of distinction will avoid confusion, ensuring that people understand that the vaccine can only prevent *rokto amasha* and not other diarrhoeal diseases. The findings can also be used for devising special strategies to transfer knowledge and facilitate participation (e.g. sliding fee scales, special clinic hours, administration of vaccines in the work place) among those sectors of the population with limited exposure to health-related information and resources to access and use public-health measures.

These ethnomedical research findings should also be applied to community-based programmes aimed at promoting behaviours known to reduce the risk of exposure and improving management strategies of dysentery. The

data can be used for conveying information that underscores the differences between treatment for watery diarrhoea and invasive dysenteries, referring to the local names and interpretive signs and symptoms associated with culturally-meaningful classifications of dysentery and other indigenous categories of illness. Appreciation of the local terminology and cultural knowledge may enhance the ability of health workers to communicate about disease contagion and convey illness-specific messages about preventative and treatment strategies without appearing to judge those afflicted with the disease or at the highest risk for exposure due to limited social and economic resources (4). In this way, more effective contact with the residents will be facilitated. As other anthropologists have argued, local language of illness and classifications of diarrhoeal illnesses could also be used for improving the collection of descriptive epidemiological data (4,28,29).

In conclusion, the introduction of a vaccine without an understanding of the perceptions of illness and demand for vaccines in their social and cultural context could lead to low rates of acceptance, especially among socially-peripheral populations, whose traditional experiences create doubts about efficacy, adverse effects, and the positive value of vaccines. When launching a vaccination programme, approaches should, thus, attempt to bridge biomedical and sociobehavioural perspectives by taking into account cultural constructs, perceived social risks and consequences of the illness, and the social circumstances of the target population. Particularly in pluralistic health systems, where contesting alternative traditional medicines and aetiologic explanations exist (30), such information is needed for policy-makers and programme planners to address barriers to use and access that may foster non-acceptance of vaccines and to develop culturally-relevant recommendations to communities.

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