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## Pathogen overload in Bangladesh

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### ABSTRACT

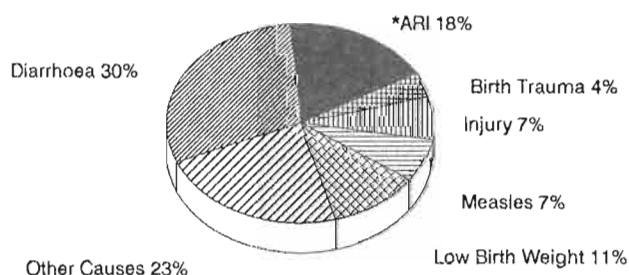
Environment and health have always been relevant themes in development. The magnitude of the ecological impact of development in industrialized countries has made it difficult to focus attention on the more basic problems of the least developed countries. The depletion of the ozone layer and green house effect are dominant in environmental discussions even in Bangladesh where national scientists, donor experts and environmental activists overlook a more immediate health risk of massive faecal contamination.

### BACKGROUND

The greatest environmental threat to the 115 million people who live in the most densely populated agricultural country in the world is human faeces. The mortality rate among preschool children provides the most convincing data. Figure 1 gives a breakdown of under-five mortality. Diarrhoea is caused by faecal contamination and accounts for the largest single cause of deaths. In a global perspective Bangladesh which has only 2 per cent of the world's population but accounts for 6 per cent of the world's young child mortality. From the 79 million annual episodes of diarrhoea about 300,000 children's lives are claimed.

Contact with human excreta spreads polio, jaundice, typhoid, dysentery as well as diarrhoeal diseases all of which have been effectively controlled in the developed countries through public health measures including safe water supply and sanitary disposal of excreta. While Bangladesh can do little about ozone depletion, it can devote attention to creating a safer and more healthy environment through improved sanitation.

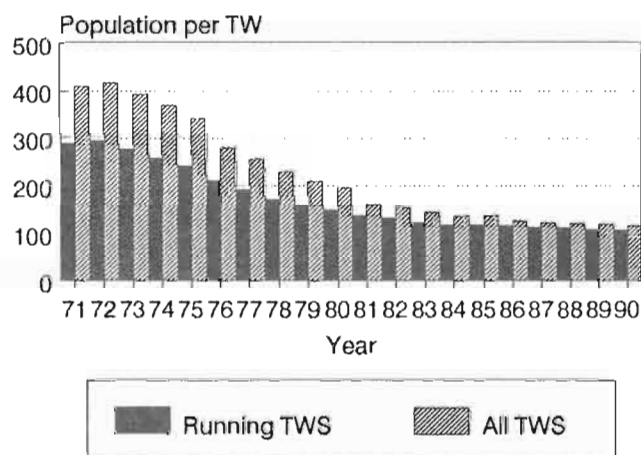
Figure 1 Causes of Child Mortality.



\* ARI- Acute Respiratory Infection

Half of the population live below the poverty line. The per capita GNP is \$170 which ranks Bangladesh 133rd out of 142 countries. Government expenditure in the social sector is equally low at \$4 per capita, ranking Bangladesh 127th (*Grant 1991; Haq 1990*). The good news is that 80 per cent of the rural people have access to potable water, defined as using tubewell water for drinking and 80 per cent live within 150 meters of a tubewell (see figure 2).

Figure 2 Tubewell - Rural Water Supply Coverage



But this is counteracted with the bad news which is that only 6 per cent of rural people use a sanitary latrine. Although about one third of this population use a fixed place to defecate, the most common is a "hanging" latrine, which consists of a structure of bamboo stilts with a platform to squat a few feet above a water (river or pond) source. It is believed that the water will carry away the dirt but this spreads the pathogens more widely.

### RESEARCH ON DIARRHOEA AND SANITATION

Ninety five per cent of mothers recognize and discriminate between watery and persistent or chronic diarrhoea but when asked to identify the cause of diarrhoea, only 1 per cent specifically mentioned contact with faeces. However, 57 per cent of mothers point to polluted water as a cause of diarrhoea. This stronger association between water and diarrhoea is reflected in the government's tubewell installation programme, widely supported by donors, politicians and the media whose basic aim is to prevent diarrhoea outbreaks. The investment in handpump tubewells by government and UNICEF between 1975 and 1990 is seven times greater than the corresponding investment in sanitation. It is no wonder then that coverage in water supply is so much greater!

Although mothers do not associate diarrhoea with faecal contamination, they rank latrines as a priority after food, water and shelter. Privacy and convenience are the two most frequent responses in support of latrine use. It is important to note that hanging and sanitary latrines are equal in terms of providing privacy (DPHE/UNICEF/DANIDA). Presently only the squat plate and concrete rings of a sanitary latrine are promoted and sold. It is up to the user to build the superstructure.

A combination of these factors may well be the reason why the promotion of sanitary latrines on the basis of health benefits alone, which has been the central theme of the sanitation programme since 1972, has not been as successful as tubewells. Latrines are not usually perceived as having a health benefit, except to educated. Furthermore, sanitary latrines are more expensive and more difficult to build than traditional hanging latrines. The initial cost, difficulties with logistics and time required for construction and installation are significant factors in choosing a latrine type. A hanging latrine is easier to build although not necessarily as convenient because a sanitary latrine is constructed within the compound which is more accessible to women and children.

#### REVIEW OF SANITARY LATRINE PROMOTION

The Government's DPHE (Department of Public Health Engineering) imported a latrine slab design from Chiang Mai, Thailand in 1963. The design was modified and introduced in ten *thanas* (an administrative unit consisting of a population of approximately 200,000 people). By 1964 UNICEF supplied materials and logistical support for 10,000 latrines to rural households. After a year of testing, the size of the trap was reduced which cut down on the quantity of water needed to flush the latrine. The programme went national in 1972 and was intensified in 1978. Regrettably, the sanitation coverage has not increased significantly. From 1962 to 1990 it rose from 3 per cent to 6 per cent only.

Donors, DPHE and UNICEF are making a concerted effort to dramatically improve latrine coverage during the 1988 to 1993 programme period. Production of squat plates and rings have increased by 58 per cent. In the financial year 1989/1990, 140 per cent of the government target was achieved. However, the programme has to be considered within the context of a growing population and even if DPHE doubled production, it would take another 50 years to produce enough latrines for existing families, not including the 300,000 new latrines required annually just to keep pace with population growth.

The government, UNICEF and NGOs are not the only suppliers of latrines. Fortunately, there is a thriving private sector. Just as half of the 1,500,000 handpumps were produced and installed privately, so too are entrepreneurs building latrines for profitable sales. The promotion of sanitation through the private sector is currently being studied by the Swiss Development Cooperation. Initial findings indicate a rapidly expanding cottage industry which is meeting a growing demand for sanitary latrines (Chadha, Strauss 1991).

UNICEF is the major donor to DPHE for their rural water and sanitation programme. With twenty years of experience and consistent support from the Swiss Development Cooperation and DANIDA, considerable progress has

been made in the water sector but miserable results have been observed on the sanitation front. World Bank and ICDDR,B (International Centre for Diarrhoeal Disease Research, Bangladesh) undertook an intensive study of water and sanitation in the mid-1980s. After installing a latrine in every household and sinking a tubewell within 25 meters of all homes in the study area, they found that the strongest impact of the project intervention was apparent in the percentage of days with diarrhoea, which remained constant in the intervention area but nearly doubled in the control area. Although this may not appear to be significant, given seasonal flooding and the pathogen overload in the environment which causes seasonal epidemics of diarrhoea, it may be a very positive indication of the potential impact of improved sanitation. Furthermore, they found a 25 per cent reduction in watery diarrhoea in the study area (Aziz et al. 1990).

#### THE 1990s AND BEYOND

By 1989 it became apparent that UNICEF and DPHE would have to do things differently if the failures of the previous three decades were to be overcome. Taking courage from the successful immunization programme which increased coverage from a mere 2 per cent to around 70 per cent between 1986 and 1990, we set about to "rethink" our approach to sanitation.

Technical modifications were made by promoting one slab and one ring as compared to the former policy of selling one slab and five rings. The subsidized price was decreased from \$13 to \$5.60. Installation has also been made much easier. Although technically this shallow pit waterseal latrine will fill up faster (1-2 years) than a 5-ring pit (5 years), the change in strategy is intended to stimulate demand and induce larger numbers of people into the habit of using latrines.

**Conditionality** was the first strategic principle addressed. The programme had always provided incentives through price subsidies. We decided to link tubewell allocations and installations to latrine construction. In an independent survey conducted 12 months after the introduction of a policy, which required at least one half of the ten families who apply for a tubewell to first install a latrine, it was found that: 1) 90 per cent of beneficiaries were aware that latrine construction should precede tubewell installation, 2) 40 per cent had improved their hygiene practices, 3) 60 per cent had attended one or more hygiene education sessions, and 4) 87 per cent received information about sanitary latrines. Progress was also seen on the number of latrines installed for every tubewell with the least successful *upazila* (administrative unit of 200,000 population) achieving three latrines per tubewell and the most successful nine. The average was five. The total target was fully met.

**Mobilization** of salaried people and organized professionals for targeted promotion of latrines was the second step. The mobilization of Islamic leaders was accomplished through holy injunctions from the *Koran*. *The Child in Islam* was compiled by the Al-Azhar University in Egypt and translated into Bangla to promote sanitation. The Islamic *Hadith Sharif* provides clear teachings on sanitation and personal hygiene: "Beware the three damnations: Defecation in the water ways and sources, the streets and the shade." "Beware the two damnations: Disposing of the

human excreta in the streets or the shade." "None of you is to urinate in the stagnant water then bathe in it."

Given that the people of Bangladesh are 89 per cent Muslim, speak one language and are ethnically homogeneous, it is relatively easy to disseminate these messages on sanitation through the mosques and *Imams*. Figure 3 provide a breakdown of the various categories involved in the promotion of sanitation.

**Figure 3** Potential Sanitation Promoters.

Primary School Teachers	160,000
NGO extension workers	10,000
LGEB Personnel (Local Govt. Engineering Bureau)	9,000
Elected Representatives	16,000
Family Welfare Visitors	5,000
Family Welfare Assistants	20,000
Health Assistants	13,000
Bangladesh Rural Development Board Workers	4,000
DPHE Personnel	4,000
<i>Imams</i> (Islamic religious leaders)	200,000
<b>Total</b>	<b>441,000</b>

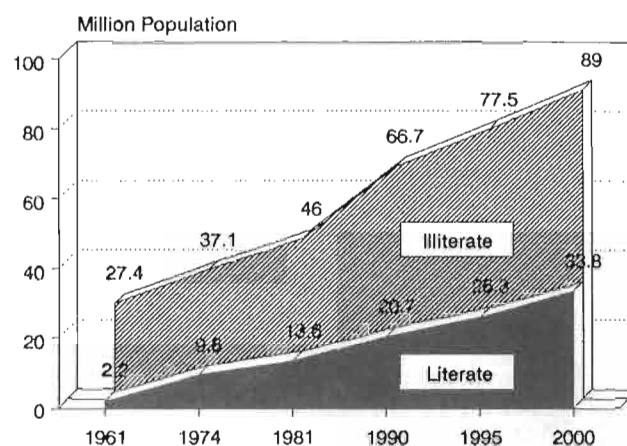
**Promotion of latrines as convenience and for privacy** along with personal hygiene through both governmental and non-governmental organizations was the third strategy. Promotion of latrine usage has been incorporated into the primary education curricula. Large NGOs such as BRAC (Bangladesh Rural Advancement Committee), Grameen Bank and Rangpur Dinajpur Rural Services encourage their constituencies to install sanitary latrines together with 75 smaller social service groups, many with UNICEF assistance. Radio transmission reaches all villages and over a quarter of households in Bangladesh have a personal radio which offers an excellent medium for promoting the sanitary latrine. As distinct from the past twenty years, the promotion of latrines now focuses on convenience and privacy rather than on health benefits.

We also used **participant-observer research methods** to understand positive deviance, e.g., why rural households built latrines. The following was a typical and often repeated story: While travelling in a remote area we came upon a compound with a new latrine. The head of the household explained to us that "times were changing" and that his son had recently married. The bride's family had "demanded" a proper latrine. Clearly, the attitude of women is important as population pressure mounts. They need privacy and a latrine in the compound is indeed an asset, especially from the women's perspective.

We also **surveyed the purchasers** of subsidized DPHE latrines and found: 1) they lived nearby, e.g. within three kilometers of the production and sales unit, 2) they were relatively well off economically, 3) the reason for installing a latrine was related to their perception of the health benefit and 4) over 80 per cent of the heads of households were literate. However, more recent research of all categories of sanitary latrine users found that social pressure was increasingly an important factor in promoting construction of sanitary latrines. Over two thirds of the respondents cited neighbours as exerting the most influence on their decision. All surveys have found a high degree of correlation between education and latrine use. This poses an enormous challenge given low literacy levels. Figure 4 clearly illustrates that the illiterate population is increasing

faster than the educated. Another reason why the promotional messages have to focus on convenience and privacy.

**Figure 4** Bangladesh Adult (15+) Literacy Rate.



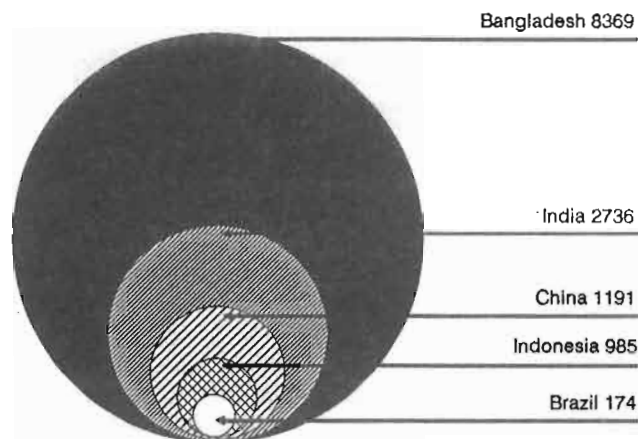
## DISCUSSION

An estimated 28,000 metric tons of faecal matter is deposited in the public domain of Bangladesh every day. The resulting contamination of water sources and food causes 79 million episodes of diarrhoea annually among under-5 children and 300,000 deaths. It is therefore most appropriate that ICDDR is located in Bangladesh. UNICEF, WHO and many bi-lateral donors and NGOs have placed high priority on ORT (Oral Rehydration Therapy) for treatment of dehydration caused by diarrhoea. Bangladesh is self sufficient in the manufacture of ORS (Oral Rehydration Salts), and more importantly, over 90 per cent of housewives know how to mix *laban* (salt) *gur* (molasses) solution - the low cost, home-made equivalent of ORS. This is largely due to a decade of door to door education by BRAC and numerous other NGOs and government health workers. Unfortunately, ORT has not had the health impact expected, partially because of the pathogen overload in this crowded, hot and humid environment where the diarrhoeal diseases have continued to flourish. But then ORT is only an antidote for dehydration (albeit a very effective one) and not a preventative measure. Despite successful efforts to expand access to tubewells and promote ORT, the priority for the 1990s is sanitation. The acceleration of tubewell installations from 19,465 to 59,870 between 1989 and 1990 proves that Bangladesh has the capacity to dramatically implement priority projects. Six hundred twenty village-based latrine production units were established by 1990: in 1991 the number rose to over one thousand. Even these, however, can not meet the demand which is created by the conditionalities and social mobilization. The private sector is rapidly responding to meet increased demand for sanitary latrines. Simple pit latrines are being promoted especially through the *Ansar* and *Village Defense Party* for those who can not afford concrete slabs.

**Population density** The importance of the pathogen overload is understood more clearly when we see figure 5 which compares the population density of several large countries. While this density works in favour of access to potable tubewell water, it works against sanitation.

Bangladesh culture is water centered which is due to the abundance of surface water and the flooding which occurs annually. In a small country with a high population density, such an environment can be extremely health hazardous. Diseases are transmitted much more easily than in more arid circumstances. Therefore, an important part of the solution to the pathogen overload issue is a latrine in every house.

**Figure 5** Comparative Population Density per 1000 Hectares.



**Peace dividend** Although it is amply apparent that the military and para-military receive more than their fair share of the national budget it was also obvious that we had no hope in convincing the government to reduce military expenditure and give the money to sanitation.

The idea of a peace dividend was pursued through the *Ansar (para-military)* and Village Defense Party who have 4,500,000 members. Being well organized and disciplined we convinced their leadership to order members to construct a latrine in their homes, then to dig pit latrines in all the houses of their 12,000 adopted villages throughout the country. We also convinced the *Ansar/VDP* leadership and DPHE that men and women in uniform were ideally suited for the promotion, installation and monitoring of sanitation, in other words use of discipline and occasional coercion was encouraged. After all, the public health threat of improper excreta disposal is a serious matter which must be tackled by all available means. The promotion of sanitation through incentives has been a failure, therefore the combination of some "sticks" as well as continuing "carrots" forms the new strategy to include these para military personnel.

Finally, in the last stage, with coverage moving from 6 per cent in 1988 to 11 per cent in 1990 and a projected coverage of around 20 per cent by 1993, we anticipate that a "center of gravity" will be created wherein the people of Bangladesh will spontaneously build their own latrines. In other words, the coverage level has been enhanced through conditionality and demand creation via a social mobilization campaign based on convenience and privacy rather than health benefits and involving unconventional

(para military) partners. All of these factors have helped in generating an increase in demand which will contribute to cultural change personal hygiene and sanitation.

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