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Inside

Changes following the Demand Based Reproductive Health Commodity Project (DBRHCP)

The Bangladesh Ministry of Health and Family Welfare (MoHFW) launched the three-year Demand-Based Reproductive Commodity Project in July 2005. The overall goal was to improve the access, quality and delivery of health services, particularly reproductive health, with a focus on women of reproductive age. In the project areas, the existing service delivery approaches were modified to improve access, quality and delivery of reproductive health services, including provision of contraceptive methods and ante-natal and post-natal care. The baseline and endline surveys reported improvements in selected reproductive health indicators among married women over the project period, and suggest that improving services can improve utilization.

Bangladesh had a population density of 966 persons per square kilometer and a population of 142.6 million as of 2007 (1). One of the challenges in Bangladesh is to achieve

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replacement level fertility, where on average a woman would have 2.1 children to replace herself and her mate. To achieve this, there must be an increase in users of permanent and semi-permanent contraceptive methods. Previous family planning and reproductive health programmes in Bangladesh have traditionally been supply-oriented; they aimed to provide the means of effective contraception and family planning. This strategy was remarkably successful through the 1980s until the mid 1990s when the total fertility rate declined rapidly (2). However, since 1998 there has been little decline in fertility (2). In addition to the problem of stagnant or slow fertility decline, reproductive health in Bangladesh faced other challenges, one of the most important being the lack of acceptance of various types of available contraceptive methods leading to discontinuation of use. A study conducted in rural Bangladesh reported that discontinuation among oral pill user women was 43% and the commonest reason for discontinuation was perceived side effects (3). This lengthy period of stagnation in the total fertility rate exposed the limitations of the country's supply-oriented system.

The National Institute of Population Research and Training (NIPORT) under the Ministry of Health and Family Welfare (MoHFW) of the Government of Bangladesh launched the three-year Demand-based Reproductive Commodity Project (DBRHCP) in July 2005.The study has been implemented in four wards of Dhaka City Corporation and two rural upazilas, or sub-districts. Four implementing partners, the Population Council, Research Training and Management International, John Snow International/Deliver Bangladesh and ICDDR,B were involved in this project.

Under the DBRHCP, the existing government service providers were trained on quality service provision. Behaviour change communication materials were developed and peers were introduced at the community level to act as health promoters and to build referral linkages between community and the providers. It was anticipated that the entire chain of service provision would be improved over the project period, including service delivery, follow-up and counselling, record keeping, reporting and monitoring, as well as logistics and supplies.

ICDDR,B conducted the baseline and endline household surveys in three areas: four slum areas of Dhaka city with a population of 141,912; one rural sub-district in Sylhet Division in the north-east of the country with a population of 323,357; and another rural sub-district in Chittagong Division in the south-east of the country with a population of 260,983. The DBRHCP respondents were selected by simple random sampling of people living in the three project sites. These included currently married women

of reproductive age from 10-49 years, their husbands, and their adolescent daughters aged 13-19 years. For the baseline survey, 19,671 women, 2,433 husbands, and 3,196 adolescent girls were interviewed. This article only highlights the findings from 19,637 women who were interviewed at endline to capture the changes in selected reproductive health indicators over the project period.

The ICDDR,B evaluation found improvements in some reproductive health indicators. The urban slum area had the highest contraceptive prevalence rate for all methods among the three areas; 59% at baseline and 65% at endline. The contraceptive prevalence rate for any modern method increased significantly from baseline to endline in Dhaka (51% to 58%) and in Nabiganj (20% to 30%). However, there was little change in contraceptive prevalence rate in Raipur (43% to 44%). In all areas significantly higher proportions of women used injections at endline compared to baseline. In all areas oral pills were the most commonly used contraceptive method (Table 1).

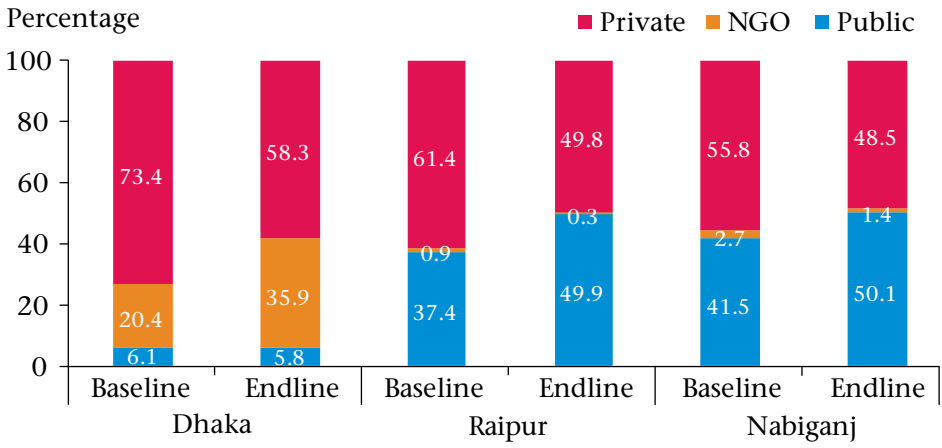
Table 1: Use of contraceptive methods by women of reproductive age in three project areas

Contraceptive methods	Dhaka (%)		Raipur (%)		Nabigani (%)		Total	
	Baseline (n=5,477)	Endline (n=5,670)	Baseline (n=6,433)	Endline (n=6,211)	Baseline (n=6,288)	Endline (n=6,419)	Baseline	Endline
All methods	58.7	64.9*	49.9	50.2	22.3	33.7*	43.0	48.9
Any modern method	51.1	58.7*	43.3	44.5	19.7	30.1*	37.0	43.9
Female sterilization	0.5	3.4	0.2	2.4	0.1	2.7	0.2	2.8
Male sterilization	0.1	0.9	0.01	0.3	0.01	1.0	0.0	0.7
Pill	33.9	29.3	28.6	22.3	14.4	18.4	25.3	23.1
IUD	0.7	0.5	1.3	1.2	0.6	0.6	0.9	0.8
Injection	9.4	17.4*	10.6	15.1*	2.4	4.2*	7.4	12.0
Implants	1.8	1.7	0.7	1.0	1.2	1.4	1.2	1.4
Condom	4.7	5.5	1.9	2.1	1.0	1.7	2.5	3.0
Any traditional method	7.6	6.2	6.6	5.7	2.6	3.6	5.6	5.0
Periodic abstinence	5.2	3.6	4.0	3.2	1.8	2.3	3.6	3.0
Withdrawal	2.0	32.2	1.7	1.8	0.5	1.0	1.4	1.6
Herbal	0.4	0.4	0.9	0.7	0.3	0.3	0.6	0.4

*shows statistically significant difference between baseline and endline (p<.001)

In the rural areas, a significantly higher proportion of women at endline compared to baseline obtained contraceptive methods from the public sector; in Raipur, this increased from 37% to 50% (p<.001),while in Nabiganj it increased from 41% to 50% (p<.001). In urban areas, a significantly higher proportion of women obtained contraceptive methods from NGO sectors at endline compared to baseline (20% to 36%) (p<.001) (Figure 1).

Figure 1: Latest source of obtaining family-planning supplies in baseline and endline



In Nabiganj a higher proportion of women at endline (57%) compared to baseline (43%) received antenatal care (ANC). Similarly, in Raipur a higher proportion of women at endline (81%) compared to baseline (78%) received ANC during their last pregnancy. Such changes were not observed in the urban slum areas. In all areas a higher proportion of women at endline compared to baseline received post-natal care (PNC) (Table 2).

Table 2: Status of ANC and PNC services by area over project period

Contraceptive methods	Dhaka (%)		Raipur (%)		Nabigani (%)	
	Baseline (n=5,477)	Endline (n=5,670)	Baseline (n=6,433)	Endline (n=6,211)	Baseline (n=6,288)	Endline (n=6,419)
Received ANC	82.5	80.0	77.9	80.6*	43.9	57.1*
Received PNC	37.1	89.8*	39.7	89.0	33.7	87.3*

*shows statistically significant difference between baseline and endline (p<.001)

Reported by: International Centre for Diarrhoeal Diseases Research, Bangladesh

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Comments

The evaluation of the DBRHCP interventions was to assess family planning user perspectives and changes in key indicators including the contraceptive prevalence rate, ANC, PNC, and health care utilization from

public sectors. There were improvements in several important reproductive health indicators. This suggests that the efforts to positively improve services affected selected outcomes in the community, most importantly through increased contraceptive prevalence rates and more frequent ANC and PNC visits.

Two out of the three project areas showed a statistically significant increase in the use of contraceptive methods by women of reproductive age. What is more encouraging is that the injectable method of contraception, which is a semi-permanent method, increased in all three areas. This can lead to a better 'method mix' that might help achieve replacement level fertility in the long term. With the significant increase in PNC in all project areas, more mothers were educated on post-partum contraception and birth spacing. Both the public and the NGO providers played an active role in counselling for uptake of the appropriate method. Through the uptake of a modern methods, women might be able to delay conception.

Since there was no control area and the present study adopted only a pre-post evaluation approach, it is possible that these improvements were part of broader secular trends, but given the general level of stagnation in these outcomes over the past decade, this is unlikely.

The costs of the various components of this project have been collected and a cost estimation will be completed with a view to scaling up the DBRHCP. At this stage, the study findings suggest that investment in the reproductive health sector through government projects positively improves community reproductive health outcomes. Therefore, the Government might consider allocating resources to scaling up DBRHCP in other areas.

These findings can be used to develop appropriate strategies for improved reproductive health service delivery that are demand-based, effective and replicable in the national programme. Without considerable modification to make reproductive health a client-orientated service, Bangladesh is unlikely to achieve replacement level fertility in the near future. Continued systematic evaluations of innovative projects are required to improve reproductive health outcomes, particularly in low performing areas of Bangladesh.

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Cholera outbreak in Pabna

In October 2009, a joint investigation team from the Institute of Epidemiology, Disease Control and Research (IEDCR) and ICDDR,B investigated an outbreak of diarrhoea in Pabna district. A total of 753 people were admitted with diarrhoea in Pabna District Hospital within first two weeks of October; two died. The outbreak spread throughout Pabna Municipality and Pabna Sadar Upazila. Epidemiologic and laboratory investigations suggested that the outbreak was caused by *Vibrio cholerae*. A sudden upsurge of cases following heavy rainfall, a widespread distribution of cases without common exposure, and detection of coliforms from the shallow tube wells and piped water in the affected communities suggested water contamination as the most likely source of this outbreak. Therefore, to prevent future outbreaks, awareness campaigns should promote boiling water or using chlorine tablets at home as an immediate measure to prevent further spread of the disease. At the municipal level, ensuring chlorination in the piped water supply may also prevent future outbreaks.

In Bangladesh, diarrhoeal diseases are one of the top five causes of mortality in all age groups combined, causing 68,000 deaths in a year (1). According to Bangladesh Health Bulletin 2009, diarrhoea was the leading cause (15%) of hospitalization in public sector facilities in 2008 (2). Ten percent of Bangladeshi children aged less than 5 years reportedly suffered from at least one episode of diarrhoea, within two weeks prior to the Bangladesh Demographic and Health Survey 2007 (3).

On 13 October 2009 a daily newspaper reported an outbreak of diarrhoea in Pabna district. An outbreak investigation team from the Institute of Epidemiology Disease Control and Research (IEDCR) and ICDDR,B went to Pabna on 14 October 2009, to identify the aetiologic agent, source of transmission and to propose control measures. The outbreak investigation team contacted the Civil Surgeon's Office in Pabna District to collect preliminary information. The acting Civil Surgeon reported a sudden upsurge of diarrhoea cases in Pabna District during the first week of October. We collected monthly statistics of reported diarrhoea cases in Pabna District during the last 5 years. We also collected the number of diarrhoea cases detected at the community level reported by the Upazila Health and Family Planning Officer (UHFPO) of Pabna Sadar Upazila, and the combined total for the remaining eight upazilas of Pabna district since 01 October.

In the last five years, more diarrhoea cases were reported from Pabna

District during the period of April-September compared to the period of October-December, although fewer cases were reported throughout the last two years (Figure 1). The number of diarrhoea case admissions in the hospital started increasing following rain during 22-24 September 2009. The number of diarrhoea cases again increased sharply during a rainy period from 5-9 October (Figure 2). Since 01 October, 753 persons with diarrhoea were admitted in Pabna District Hospital. The number of cases reported from the community level of the Pabna Sadar Upazila also increased sharply since 07 October (Figure 3). Based on preliminary information, we defined a case as a person living in Pabna district who had a history of diarrhoea since 01 October 2009.

Figure 1: Diarrhoea trend in Pabna District (1 January 2005-14 October 2009)

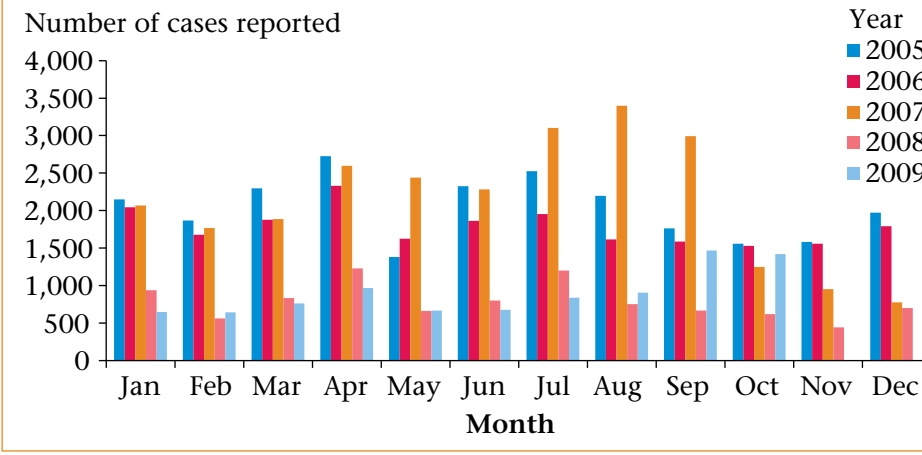


Figure 2: Admission of diarrhoea cases in Pabna District Hospital and daily rainfall

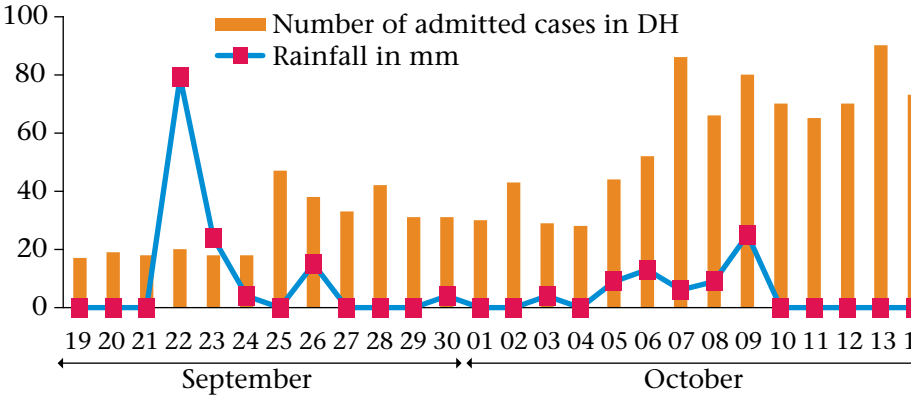
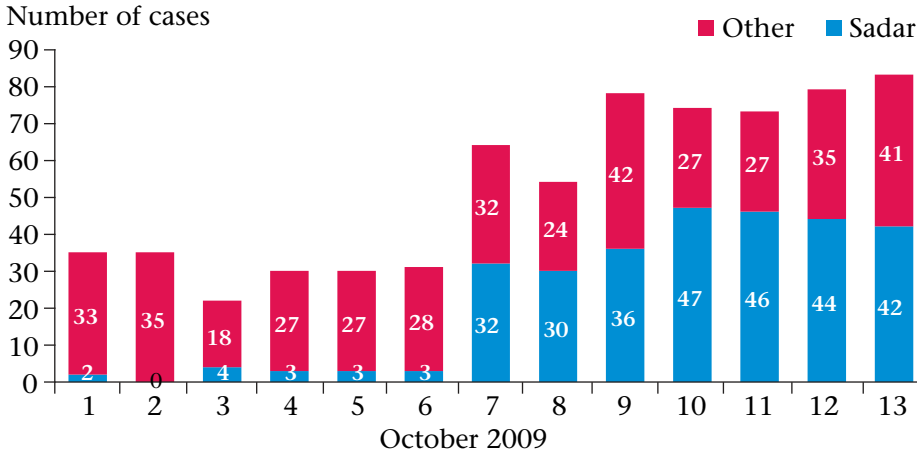


Figure 3: Reported number of diarrhoea cases from community level (From 1 October 2009)



From the admission records of Pabna District Hospital, we collected the demographic details of 251 case-patients treated at Pabna District Hospital (Table 1). Among these cases, 52% were male. The distribution of cases was higher among those aged 15-25 years (30%) and 25-35 years (18%). Among the 251 cases, 115 (46%) lived in Pabna Sadar Upazila, 98 (39%) in Pabna Municipality and 14 (6%) in Atgharia Upazila. In Pabna Sadar Upazila, which surrounds the Pabna Municipality, cases were distributed in all its unions, with a higher percentage of cases in Dogachhi (26%) and Hemayetpur (16%) Unions, two of the closest unions to Pabna Municipality. Cases from Pabna Municipality were spread all over the municipality, with higher number of cases from Shalgaria (18%) and Radhanagar (12%) areas.

Table 1: Demographic characteristics of cases (N=251)

Demographic characteristics	n (%)
Sex	
Male	131 (52)
Female	120 (48)
Age group in years	
0-5	29 (12)
5-15	24 (10)
15-25	75 (30)
25-35	46 (18)
35-45	26 (10)
45-55	17 (7)
55+	18 (7)

We interviewed 18 (25%) of the 73 cases who were admitted in Pabna District Hospital on 14 October using a standardized case investigation form. The median age of the interviewed cases was 17 years and 10 (55%) were female. All the interviewed cases in the hospital had history of sudden

onset of acute watery diarrhoea, dehydration and weakness. Most of the cases also reported concurrent vomiting. Based on the diarrhoea treatment guidelines of the World Health Organization (WHO), the physician on duty diagnosed 'some dehydration' in 12 (67%) and 'severe dehydration' in 4 (22%) of these 18 cases at the time of admission. Eight (44%) of the 18 interviewed case patients had at least one other family member who had suffered with similar symptoms since 01 October. All cases mentioned that they drew drinking water from a shallow tubewell. Four of them mentioned that they also occasionally used piped or pond water for household use, such as bathing, washing utensils and clothes. None of the cases mentioned using boiled water for drinking. We collected rectal swabs in bacterial transport media from 16 of the interviewed cases in the hospital.

Using the hospital records, we visited communities which had clusters of diarrhoea cases during the current outbreak. We visited 20 households located in Dogachhi Union, a crowded low-income area in Pabna Sadar Upazila, and three areas, Ramchandrapur, South Raghabpur and Shalgaria, all within Pabna Municipality. We interviewed 12 cases in those households who had recovered from diarrhoea following admission in the District Hospital and their family members to explore their possible common exposures. We also visited the household of a case who had died in Pabna District Hospital during this outbreak. We enquired about the source of their drinking water supply and we observed the sanitation facilities of the households. All these 12 cases and their family members reported using shallow tubewell water for drinking and piped or pond water for bathing, washing utensils and clothes. Most of the household tubewells we observed were in close proximity to latrines. We collected water samples from the tubewell and pond of the household of the dead case in Dogachhi Union, and from two tubewells in the crowded low-income area in Pabna Sadar Upazila. We also collected a tap water sample from a household in Shalgaria area of Pabna Municipality.

To explore the supply system of water to Pabna Municipality, we met the Mayor and Engineer who reported that ground water for this area is drawn through 10 deep tubewells located throughout the municipality and then directly distributed to households through an inter-connected piped water system, without any treatment. We visited one pump site situated in Shibrampur, which supplies water to both Shalgaria and Raghabpur, where there were a high number of cases during this outbreak. We found the Shibrampur pump area secure and clean with no visible sign of leakage. There was an overhead water reservoir that was not currently in use.

Rectal swabs collected from the admitted cases in Pabna District Hospital were tested in the IEDCR microbiology laboratory. *Vibrio cholerae* was

isolated from eight (50%) of 16 samples. Out of these eight *Vibrio cholera* positive samples, seven (88%) were *Vibrio cholerae* Ogawa and one (12%) was non Ogawa non Inaba. In a sensitivity test, all the samples were found to be resistant to Tetracycline, Nitrofurantoin, Doxycycline, Erythromycin and Ampicillin. All the samples were sensitive to Ciprofloxacin, Ceftriaxone and Cefuroxime.

Coliforms were isolated from all of the five water samples tested at the IEDCR microbiology laboratory, including the piped water sample that connected to the municipal supply.

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Comments

Epidemiological, clinical and laboratory data suggest that this was an outbreak of cholera in Pabna Municipality and Pabna Sadar Upazila. *Vibrio cholerae* is one of the three most common pathogens of diarrhoeal diseases in Bangladesh (4) and cholera epidemics are strongly linked to consumption of unsafe water, poor hygiene, poor sanitation and crowded living conditions (5).

The sudden upsurge of cases following heavy rainfall, widespread distribution in Pabna Municipality and Pabna Sadar Upazila without a known common exposure, and detection of coliforms in the water samples suggests water contamination as the most likely source of this outbreak. Cholera outbreaks have been previously reported in the Pabna Municipality areas supplied with piped water systems that lack chlorination (6). The interviewed cases and family members in Pabna Municipality had access to piped water, and although they did not report using it for drinking, they did mention using it for other household and personal uses. The piped water supply system of Pabna Municipality might have facilitated the spread of *Vibrio cholerae*.

The prevailing perception in Bangladeshi communities is that shallow tube-well water is safe and has no risk of contamination. From the five samples collected, three were from shallow tubewells and all were contaminated with coliforms. The heavy rainfall (79 mm on 22 September) just at the beginning of the upsurge of cases may have permitted contaminated surface water to enter shallow tube wells.

During this outbreak, there were clusters of cases in different areas of

Pabna Municipality and Pabna Sadar Upazila. Eight (44%) out of eighteen interviewed cases in the hospital had at least one other family member with similar symptoms in the previous 15 days. Although all the cases mentioned using tubewell water for drinking, none of them boiled water for drinking. This suggests a lack of awareness among the community regarding the measures for the prevention of the disease during such outbreaks.

As a response to outbreaks of enteric infections in communities with untreated piped water supply or with only shallow or deep tubewells, such as the areas affected by this outbreak, chlorination of general water supply or boiling or disinfection of water at home is recommended by the WHO (7). Therefore, as an immediate measure to prevent further spread of such outbreaks, community awareness should be raised and necessary supplies should be provided to the affected community to ensure use of safe water by boiling or using chlorine tablets at home. Also steps should be taken to ensure chlorination at municipality level to ensure the microbiological quality of piped water to prevent future outbreaks.

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The economic burden of influenza-like illness in Mirpur, Dhaka, during the 2009 pandemic: A household cost of illness study

We explored the economic burden of influenza-like illness for 58 households in an urban area of Dhaka, Bangladesh. The median direct cost for treating one episode of influenza-like illness was Tk. 210 (US$ 3) and the median indirect cost was Tk. 134 (US$ 2). Financial burden was greatest for patients earning daily wages whose total cost constituted 35% of their monthly expenditure.

Respiratory tract infections are an important public health concern in low income countries and it is the leading cause of mortality and morbidity among children in Bangladesh (1,2). The annual incidence of acute respiratory infections was 30 episodes per 100 child years in a community based cohort study among children below two years old in Matlab, a rural site in Bangladesh (3). The incidence of acute lower respiratory tract infection related hospital admissions was 50 per 1,000 child years observed among children below five years of age (4). Acute lower respiratory tract infections caused 25% of death among children less than five years of age and 40% of death in infancy (5). Mild respiratory infections are also very common in other age groups: a survey by ICDDR,B suggested that 21% of people of all age groups had influenza-like illness defined by fever, and cough or sore throat, reported in the preceding two months (6). Although we have evidence on the burden of respiratory infections in Bangladesh, little is known about its economic burden. In this article we estimate the economic burden of mild respiratory infections on households and explore the related health-seeking behaviour.

We randomly selected 138 coordinates (latitudes and longitudes) in Mirpur-10, a mixed income neighbourhood in Dhaka, and used global positioning sensing devices to identify these locations (Figure 1). We then selected the nearest household at each location or used a random number list to select a dwelling at locations with multiple households, e.g. apartment buildings. Field research assistants obtained written informed consent from a household adult and administered a standard questionnaire to identify household members who had influenza-like illness during the preceding two months. Research Assistants collected average monthly expenditures (a proxy for household income) and expenditures during the household members' influenza-like illness. We then calculated direct medical

expenditures by adding all costs for consultation, medication, tests, and transport. We also calculated indirect medical costs of both the patients and their caregivers by multiplying the daily wage by the number of workdays lost and days of restricted activity. For the school children, we calculated school days missed due to the illness.

Figure 1: Household locations in Mirpur-10 surveyed for cost of influenza-like illness, Dhaka, 2009. Circles showing location of households corresponding identification number

Three quarters of the respondents were homemakers (102/138) who provided information for 658 household members (mean family size 4.9) (Table 1). The median age of household members was 22 years (inter quartile range: 12-35 years). Their median monthly household expenditure was Tk. 10,000 (US$ 145) (inter quartile range: Tk. 6,000-15,000).

Sixty-nine (11%) of 658 household members had influenza-like illness during the preceding two months. Of these 69 case-patients, 58 (84%) sought care for their illness, an average of 1.5 times. During their first visit, 28 (48%) sought health care from local pharmacies, 15 (26%) from MBBS doctors, 7 (12%) from outpatient departments at public or private hospitals, and 6 (10%) from informal sectors (homeopathic or unlicensed doctors). Fourteen (24%) of the 58 influenza-like illness case-patients were aged younger than 5 years, and 2 (3%) had chronic medical complications. Eleven (79%) of the 14 paediatric patients sought care from licensed practitioners, one went to a homeopathic doctor, one went to an unlicensed doctor, and one visited a pharmacy. Over half of the respondents [37 (64%)

of 58 case-patients] reported distance as the primary reason for choosing a provider.

Table 1: Socio-economic characteristics of the study population surveyed for cost of influenza-like illness in Mirpur, Section-10, Dhaka, 2009

Characteristics	Number (Proportion)
Age of the population	
< 4 years	66 (10%)
5-17 years	193 (29%)
18-49 years	322 (49%)
>50 years	75 (12%)
Family size	
1-4 persons	61 (45%)
>4 persons	74 (55%)
Occupation of respondents	
Housewife	102 (76%)
Service	19 (14%)
Business	14 (10%)
Others	3 (2%)
Average monthly expenditure of households	
Tk. <6,000	37 (28.5%)
Tk. 6,001-8000	21 (16.2%)
Tk. 8,001-10,000	23 (17.7%)
Tk. 10,001-20000	37 (28.5)
Tk. 20,001-30,000	10 (7.6%)
Tk. >30,000	2 (1.5%)

The median direct cost of treating influenza-like illness was Tk. 210 (US$ 3) [inter quartile range: Tk. 50-425] (Table 2). Mean direct costs were least in pharmacies (Tk. 185 or US$ 2.7) and highest in visits to outpatient departments of hospitals (Tk. 425 or US$ 6). Twenty six (45%) of 58 patients had clinical consultations from a licensed practitioner (median consultation fee Tk. 80). The median drug cost was Tk. 165 (US$ 2.4) [inter quartile range: Tk. 46-400] and constituted the majority of direct costs. In addition, nine patients incurred transport costs (median Tk. 40 or US$ 0.60 when seeking care in public or private hospitals). Fourteen (25%) of 58 respondents bought extra food for the patients during their illness, e.g. fruits, milk, eggs, meat and Horlicks® (malted milk drink).

The median indirect cost was Tk. 134 (US$ 2)(Table 2) and accounted for 51% of patients' total costs. Patients earning daily wages, e.g. rickshaw pullers and day labourers, had higher indirect costs (median Tk. 1,357 or US$ 20)(inter quartile range: Tk. 1,240-1,902) than other employed participants (median Tk. 567 or US$ 8.2 (inter quartile range: Tk. 285-977). Among 58 patients, 20 (34.5%) reported a median 4.5 days lost from work (inter quartile range: 2.5-5.5 days) due to influenza-like illness. They incurred a median indirect cost of Tk. 913 (US$ 13.2) per household as a

result of participants' inability to work during their influenza-like illness. Daily wage earners lost more work days (median 5 days) than salaried employees (median 3 days) (p=0.03). Twenty participants also attended their work while ill during 59 restricted activity days (mean 2.9 days). Nine (15%) of 58 caregivers missed a median of 2.2 days from work because they were caring for patients. Nine (15%) of 58 patients were housewives who worked while ill an average of 4.6 days during illness episodes.

Table 2: Different categories of costs for influenza-like illness in Mirpur, Section-10, Dhaka, 2009

Costs	Median Cost Taka (US$)	Inter-quartile Range Taka (US$)
Direct Cost (57)	210 (3)	50-425 (0.7-6.1)
Pharmacies(28)	103 (1.5)	37-287 (0.53-4.1)
MBBS doctor (14)	390 (5.6)	247-620 (3.5-9)
OPD visits (7)	318 (4.6)	290-600 (4.2-8.6)
Homeopathic and unlicensed doctors (6)	125 (1.8)	57-450 (0.8-6.5)
Direct Cost Components		
Medication cost (56)	165 (2.9)	46-400 (0.67-5.8)
Consultation fee (19)	80 (1.1)	35-100 (0.5-1.4)
Transport cost (9)	40 (.6)	30-80 (0.4-1.1)
Indirect Cost (55)	134 (1.9)	**85-513 (1.2-7.4)**
Daily wage earners (6)	1,357 (19.7)	1,240-1,902 (18-27.6)
Patients in business and formal job (14)	567 (8.2)	285-977 (4.1-14.2)
School children (14)	102 (1.5)	42-131 (0.6-1.9)
Housewives (9)	85 (1.2)	68-294 (1-4.3)
Children below 5 years (14)	110 (1.6)	51-136 (0.7-2)
Total Cost (57)	428 (6.2)	169-1,058 (2.4-15.3)
Daily wage earners (6)	1,762 (25.5)	1,652-2,399 (23.9-34.8)
Patients in business and formal job (14)	913 (13.2)	402-1,227 (5.8-17.8)
School children (14)	169 (2.4)	101-258 (1.5-3.7)
Housewives (9)	400 (5.8)	235-909 (3.4-13.2)
Children below 5 years (14)	444 (6.4)	130-706 (1.9-78.4)

Fifteen (26%) of 58 influenza-like illness patients were children enrolled in school; eleven of them were absent from school due to an illness episode for a median of 5 days.

The median total cost for one episode of influenza-like illness was Tk. 428 (US$ 6.2). Households of all influenza-like illness patients spent 9.4% (95%

confidence interval, 5.8-13%) of their monthly expenditure on treatment. Nevertheless, for patients earning daily wages, total cost constituted 35% (95% confidence interval, 14-56) of their monthly expenditure. Of 49 respondents who discussed the impact of influenza-like illness on the household, 37 (75%) reported that the associated expenditures were a financial burden on the household. Three of the most common strategies to cope with the financial burden were using savings (41%), borrowing from neighbours (20%) and reducing other monthly household expenditures (14%).

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Comments

Although influenza-like illness is often a self-limiting disease that does not require treatment, cost attributable to this common illness caused a significant economic burden on families in Mirpur, Dhaka. All direct costs were out of pocket expenditures for participants as they had no health insurance. Only the governmental facilities and the paediatric hospital in Mirpur-2 had subsidized services, but participants rarely visited these facilities as this required substantial transport cost and time (opportunity cost). More than half managed expenses by using savings or borrowing money.

Influenza-like illness can be caused by multiple aetiologies that collectively represent a large economic burden for communities like Mirpur. Mirpur surveillance data, for example, demonstrates that out of 67 children with acute respiratory infections during October-November (the study period), 20 (30%) were infected with rhinovirus, 14 (21%) with viral co-infections, 5 (7%) with adenovirus, 5 (7%) with para-influenza type 2, 4 (6%) with human metapneumovirus, 4 (6%) with influenza viruses, and 2 (3%) with respiratory syncytial virus and 13 (19%) had negative samples suggesting that there may be additional viral and bacterial aetiologies not identified by the surveillance system.

Each respiratory pathogen contributes to the economic burden with influenza-like illness. For instance, a proportion of participating influenza-like illness patients may have been infected with 2009 pandemic A (H1N1) because the study was carried out during the pandemic. If we multiply the rate of 2009 pandemic A (H1N1) positive influenza-like illness (11 per 100 person-years) during the pandemic (6) with total cost, health utilization rate from Mirpur, and the population of Dhaka (10,896,296 people), we can estimate that 2009 pandemic A (H1N1) influenza virus cost the people of Dhaka US$ 6.1 million.

Most participants in our study first sought care at local pharmacies because of their proximity. Consequently, many participants obtained antihistamines, acetaminophen, and antibiotics for the management of influenza-like illness. None of them reported any antiviral medication. Antibiotics, however, were the most costly drug consumed by Mirpur participants. Early treatment with antibiotics can prevent complications from bacterial respiratory infections, particularly among children. Nevertheless, the indiscriminate use of antibiotics may cause an unnecessary financial burden on households and the development of antibiotic resistance in Bangladesh.

This study had important limitations. Our sample size was small and we were unable to verify payment for services. Geographic based sampling was more likely to select households with larger geographical footprints inhabited by wealthier people thus overestimating costs. Although Mirpur-10's data may be representative of similar neighbourhoods of varied socioeconomic strata, it is unlikely to be representative of rural Bangladesh.

Our findings on the economic burden and health seeking behaviour related to influenza-like illness suggest that it causes a significant economic burden and that those ill seem willing to pay for treatment. These findings have two important implications for the public health community. First, we need to further develop programmes aimed at preventing influenza-like illness that are cost-effective, regardless of the aetiology of the illness. Such programmes include scalable hand washing, respiratory hygiene and social distancing campaigns to reduce transmission of respiratory pathogens (7). Second, if the public is willing to pay for treatment, this provides us with an opportunity to review and critically evaluate current treatment patterns in order to generate new evidenced-based treatment guidelines. For example, if one of the most used points of care is local pharmacies, the Government of Bangladesh could take the opportunity to train pharmacy staff to use symptom-based clinical algorithms to guide antibiotic and antiviral use. Such a strategy may improve the quality of care, reduce the financial burden on households and diminish the load on the hospital system.

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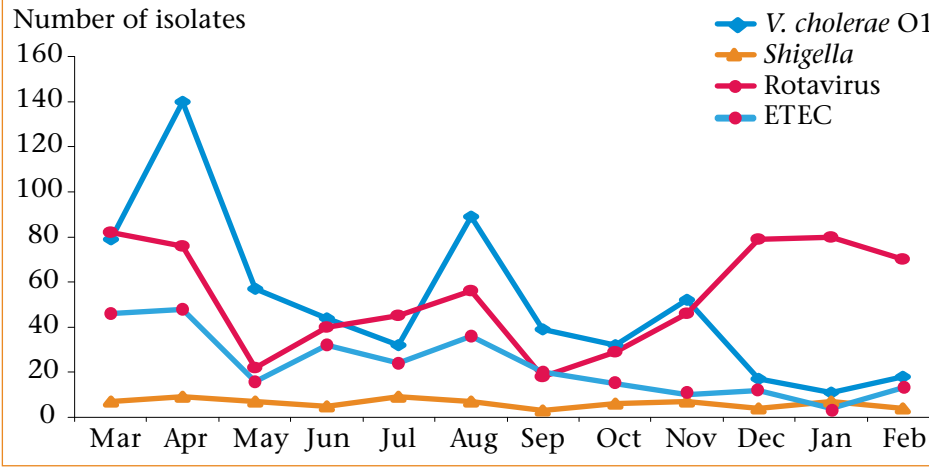
Surveillance updates

With each issue of HSB, updates of surveillance data described in earlier issues are provided. These updated tables and figures represent the most recent observation period available at the time of publication. We hope these updates will be helpful to health professionals who are interested in current patterns of disease and drug resistance in Bangladesh.

Proportion of diarrhoeal pathogens susceptible to antimicrobial drugs: March 2009-February 2010

Antimicrobial agents	*Shigella* (n=75)	*V. cholerae* O1 (n=611)
Nalidixic acid	31.1	Not tested
Mecillinam	62.7	Not tested
Ampicillin	52.0	Not tested
TMP-SMX	40.0	0.3
Ciprofloxacin	76.0	99.8
Tetracycline	Not tested	20.9
Erythromycin	Not tested	0.0
Furazolidine	Not tested	0.0

Monthly isolation of* V. cholerae *O1*, Shigella, *Rotavirus and ETEC March 2009-February 2010



Antimicrobial resistance patterns of 84 M. tuberculosis *isolates: March 2009-February 2010*

Drugs	Resistance type		Total n=84 (%)
	Primary n=71 (%)	Acquired* n=13 (%)	
Streptomycin	16 (22.5)	1 (7.7)	17 (20.2)
Isoniazid (INH)	10 (14.1)	2 (15.4)	12 (14.3)
Ethambutal	1 (1.4)	1 (7.7)	2 (2.4)
Rifampicin	1 (1.4)	0 (0.0)	1 (1.2)
MDR (INH+Rifampicin)	1 (1.4)	0 (0.0)	1 (1.2)
Any drugs	17 (23.9)	2 (15.4)	19 (22.6)

() column percentage *Antituberculous drugs received for 1 month or more

Antimicrobial susceptibility pattern of S. pneumoniae *among children <5 years during January-March 2010**

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	0	0 (0.0)	0 (0.0)	0 (0.0)
Cotrimoxazole	0	0 (0.0)	0 (0.0)	0 (0.0)
Chloramphenicol	0	0 (0.0)	0 (0.0)	0 (0.0)
Ceftriaxone	0	0 (0.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	0	0 (0.0)	0 (0.0)	0 (0.0)
Gentamicin	0	0 (0.0)	0 (0.0)	0 (0.0)
Oxacillin	0	0 (0.0)	0 (0.0)	0 (0.0)

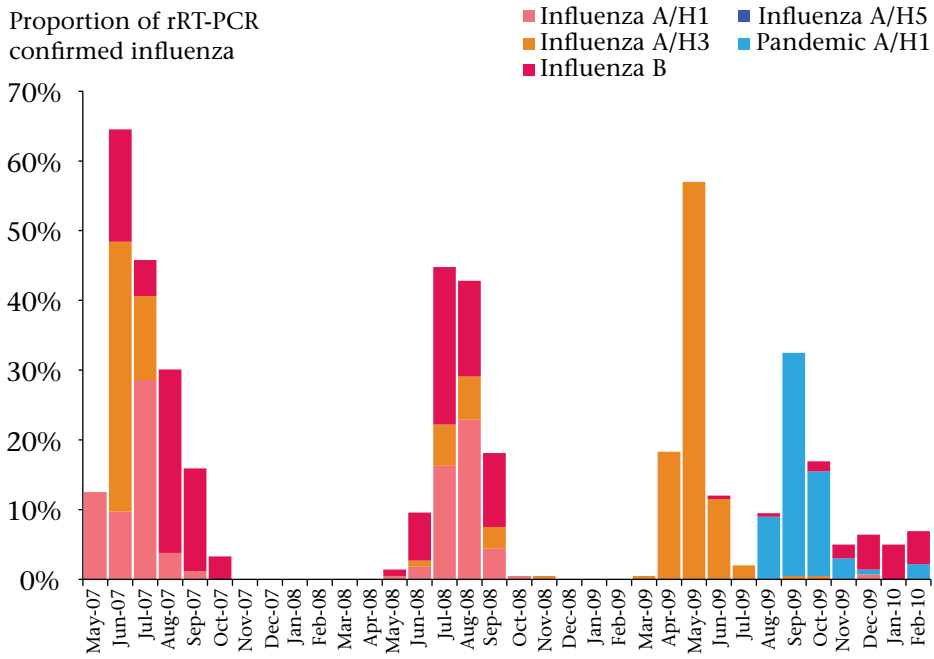
*No *S. pneumoniae* was isolated during this reporting periond.
Source: ICDDR,B's urban surveillance in Kamalapur (Dhaka).

Antimicrobial susceptibility pattern of S. typhi *among children <5 years during January-March 2010*

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	17	8 (47.0)	0 (0.0)	9 (53.0)
Cotrimoxazole	17	10 (59.0)	0 (0.0)	7 (41.0)
Chloramphenicol	17	10 (59.0)	0 (0.0)	7 (41.0)
Ceftriaxone	17	17 (100.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	17	0 (0.0)	17 (100.0)	0 (0.0)
Nalidixic Acid	17	0 (0.0)	0 (0.0)	17 (100.0)

Source: ICDDR,B's urban surveillance in Kamalapur (Dhaka).

Proportion of laboratory confirmed influenza among hospitalized severe acute respiratory illness (SARI) and outpatient influenza like illness (ILI) cases between May 2007 and February 2010



Source: Patients participating in hospital-based influenza surveillance in Dhaka National Medical College Hospital, Community-based Medical College Hospital (Mymensingh), Jahurul Islam Medical College Hospital (Kishoregonj), Rajshahi Medical College Hospital, Shaheed Ziaur Rahman Medical College Hospital (Bogra), LAMB Hospital (Dinajpur), Bangabandhu Memorial Hospital (Chittagong), Comilla Medical College Hospital, Khulna Medical College Hospital, Jessore General Hospital, Jalalabad Ragib-Rabeya Medical College Hospital (Sylhet) and Sher-e-Bangla Medical College Hospital (Barisal)

A field worker is collecting data on health services from a mother

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