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Inside

Estimated incidence of cholera in the catchment area of two diarrhoeal diseases hospitals in Dhaka City

icddr,b conducts pathogen specific diarrhoeal surveillance by testing a 2% sample of patients hospitalized with diarrhoea in its Dhaka Hospital and 10% of patients in the Mirpur Treatment Centre. Estimating cholera incidence in the catchment area of these hospitals using only the hospital data underestimates the cholera burden because many patients seek treatment elsewhere or do not seek care at all. We conducted a survey in the catchment area of these two icddr,b hospitals to identify severe diarrhoea cases and estimated population-based incidence of cholera in hospital catchment areas. The proportion of severe diarrhoeal patients who were admitted to surveillance hospitals was 0.62 (95% CI: 0.54-0.69) in the Dhaka Hospital catchment area and 0.33 (95% CI: 0.24-0.42) in the Mirpur Treatment Centre catchment area. We projected 16,950 *Vibrio cholerae* cases in Dhaka Hospital and 1,640 cases in Mirpur Treatment Centre among all patients admitted from those catchment areas during

icddr,b

KNOWLEDGE FOR GLOBAL LIFESAVING SOLUTIONS

March 2010 to February 2011. We estimated the incidence of *Vibrio cholerae* was 280 (95% CI, 251-317) in Dhaka Hospital catchment area and 474 (95% CI, 369-663) in Mirpur Treatment Centre catchment area per 100,000 population in 2010.

Cholera is usually transmitted through faecally contaminated water or food (1,2). The aetiologic agent of cholera, *Vibrio cholerae*, causes 3-5 million cases of secretory diarrhoea and >100,000 deaths annually worldwide, especially in low income countries characterized by poor sanitation and unsafe drinking water (3). In Bangladesh, cholera is a major public health problem (4). Although cholera is a vaccine preventable disease the cost-effectiveness of a vaccination programme cannot be evaluated without an estimate of incidence. Each year icddr,b's Dhaka Hospital and Mirpur Treatment Centre provide care for >150,000 patients with diarrhoeal illness (5). As part of the hospital-based diarrhoeal diseases surveillance, these hospitals enrol a systematic proportion of admitted patients to test for *Vibrio cholerae* and other enteric pathogens. However, there are limited data on diarrhoeal patients admitted to other hospitals in Dhaka, as well as the population-based incidence of cholera. We conducted a survey in the catchment area of these two icddr,b hospitals to identify severe diarrhoea cases and estimated population-based incidence of cholera in the hospital catchment areas by using both hospital-based surveillance data and catchment area survey findings.

For hospital-based diarrhoeal surveillance, Dhaka Hospital enrols every 50th admitted patient and Mirpur Treatment Centre enrols every 10th admitted patient. A rectal swab is collected from each surveillance enrolled patient to test for *Vibrio cholerae* and other pathogens.

To define the hospital catchment area, we reviewed the electronic hospital database of patients admitted during November 2009 until October 2010, which included the patients' addresses. We selected the *thanas* (an administrative area) where two-thirds of the admitted patients resided as the hospital catchment areas. In Dhaka Hospital, 67% of admitted patients came from 18 *thanas*, including 14 *thanas* inside the Dhaka Metropolitan area. In Mirpur Treatment Centre, 83% of admitted patients came from two *thanas* (Kafrul and Pallabi) inside the Dhaka Metropolitan area. Though patients from a *thana* were found admitted to both Dhaka Hospital and Mirpur Treatment Centre, none of the *thanas* were selected as hospital catchment areas for both hospitals according to catchment area selection criteria.

To estimate the proportion of severe diarrhoea patients in the hospital catchment areas who were admitted to the surveillance hospitals, we selected 17 clusters from the defined hospital catchment area of each hospital. We selected *mahalla* (smallest urban geographic unit) as the cluster to survey in the hospital catchment areas. First we listed the population of *mahallas* of selected catchment *thanas* in a spreadsheet and then used a probability proportion to size sampling approach to select the *mahallas*. In each selected *mahalla,* the field research team first visited the local city corporation office. With the help of city corporation officials the team identified the boundary and center point of the *mahalla*. Starting from the center point in a randomly selected direction, the team visited households until they contacted 10,000 people in the *mahalla*. In each household they asked if any household member had severe diarrhoea in the previous 12 months. We defined severe diarrhoea as frequent loose or liquid stools for which a person had to be admitted to a health care facility, or had to receive intravenous rehydration, or had died as a result of the diarrhoeal illness. If any household member met the case definition, the field research team administered a questionnaire to collect information on history of illness and health care utilization along with demographic characteristics.

In the surveillance hospitals, we extrapolated the total number of *Vibrio cholerae* cases among patients admitted from the hospital catchment area by applying the rate of *Vibrio cholerae* positivity among surveillance enrolled patients to all patients admitted from the hospital catchment area. We estimated population-based incidence of cholera by using data from both hospital surveillance and the catchment area survey and applying the following formula:

$$\text{Incidence of cholera} = \frac{Vcc}{Cpop * P}$$

Where,

- Vcc= Laboratory confirmed *Vibrio cholerae* O1/O139 cases over 12 months.
- Cpop= Catchment area population.
- P= Proportion of catchment area severe diarrhoea patients who were admitted to surveillance hospital.

The population of each catchment area was projected for 2010 on the basis of the 2001 Bangladesh census considering an annual growth rate in Dhaka City of 4.1%. We used a linear mixed effect model to adjust the cluster effects in calculating the proportion of severe diarrhoea cases who were admitted to study hospitals and estimated the incidence of cholera with 95% confidence intervals. We performed a two-sample test of proportion to compare the demographic characteristics and clinical signs between cases admitted and not admitted to surveillance hospitals.

From the hospital catchment areas, during March 2010-February 2011, 1,903 patients in Dhaka Hospital and 1,194 patients in Mirpur Treatment Centre were enrolled in diarrhoeal surveillance and tested for *Vibrio cholerae*. Of these, 339 in Dhaka Hospital and 164 in Mirpur Treatment Centre were

Vibrio cholerae positive (Table 1).

Table 1: Hospital-based diarrhoeal diseases surveillance in icddr,b hospitals during March 2010-February 2011

Hospital-based surveillance	Dhaka	Mirpur
% of admitted patients enrolled in hospital surveillance	2%	10%
Patients enrolled in surveillance admitted from catchment areas	1,903	1,194
Vibrio cholerae cases among patients admitted from catchment areas	339 (18%)	164 (14%)

In the hospital catchment survey conducted during December 2010-April 2011, the field team identified 892 diarrhoeal cases in Dhaka Hospital catchment area and 921 cases in Mirpur Treatment Centre catchment area who met the case definition of severe diarrhoea. Among the identified severe diarrhoeal cases, 85% of cases in Dhaka Hospital catchment area and 93% of cases in Mirpur Treatment Centre catchment area were admitted to a health care facility during their illness; the remaining cases received intravenous rehydration at home. In the Dhaka Hospital catchment area, 63% of cases sought care at Dhaka Hospital and in the Mirpur Treatment Centre catchment area, 35% of cases sought care at Mirpur Treatment Centre during their illness (Table 2). Two diarrhoeal death cases were identified from Dhaka Hospital catchment area and three diarrhoeal death cases were identified from Mirpur Treatment Centre catchment area.

Table 2: Findings from hospital catchment area survey

Survey findings	Dhaka	Mirpur
Total population surveyed	1,57,493	1,66,020
Cases met the case definition of severe diarrhoea	892	921
Cases received intravenous rehydration but not admitted to any hospital	137 (15%)	64 (7%)
Cases admitted to any hospital	755 (85%)	856 (93%)
Cases admitted to respective surveillance hospital	565 (63%)	323 (35%)
Diarrhoeal death cases (case fatality)	2 (0.2%)	3 (0.3%)

About half of the severe diarrhoeal cases were male. Thirty eight percent of cases were <5 years old. Adult patients aged 16-60 years old were less likely to be admitted to the surveillance hospitals. Most of the reported symptoms were similar in both admitted and not admitted cases. However, drowsiness and passing of small amounts of urine during illness were significantly higher among cases who were not admitted to surveillance hospitals (Table 3).

Table 3: Demographic characteristics and reported clinical signs of severe diarrhoea cases in the hospital catchment area

Characteristics	Admitted at icddr,b hospitals (N=888) %	Not admitted at icddr,b hospitals (N=925) %	Total (N=1,813) %
Male	51	51	51
Age group			
<5 years	40	36	38
6-15 years	8	7	7
16-60 years*	48	54	51
60+years	5	4	5
Reported symptoms during illness			
Fever	55	58	57
Vomiting	82	83	83
Unable to stay awake/lethargy/ drowsiness**	59	66	63
Loss of consciousness	16	15	16
Small amount of urine†	59	70	65
Sunken eyes	88	87	87

Two-sample proportion test was applied to compare the characteristics between admitted and not admitted cases at icddr,b hospitals: *p<.05; **p<0.01; †p<0.001

Since only a proportion of admitted patients in surveillance hospitals are tested for *Vibrio cholerae*, we projected 16,950 *Vibrio cholerae* cases in Dhaka Hospital and 1,640 cases in Mirpur Treatment Centre among all patients admitted from hospital catchment areas during 2010. By adjusting the hospital-based surveillance data by the proportion of severe diarrhoea cases in the hospital catchment areas who were admitted to the surveillance hospitals, we estimated the incidence of *Vibrio cholerae* was 280 in Dhaka Hospital catchment area and 474 in Mirpur Treatment Centre catchment area per 100,000 population (Table 4).

Table 4: Estimated incidence of Vibrio cholerae *during 2010*

Incidence estimation	Dhaka	Mirpur
Projected *Vibrio cholerae* cases in surveillance hospitals admitted from hospital catchment areas	16,950	1,640
Proportion of severe diarrhoea cases in the catchment area who were admitted to surveillance hospital (95% CI)	0.62 (0.54-0.69)	0.33 (0.24-0.42)
Population in hospital catchment area (in million)	9.73	1.03
Incidence of *Vibrio cholerae* per 100,000 population (95% CI)	280 (251-317)	474 (369-663)

Reported by: Centre for Communicable Diseases, icddr,b.

Supported by: icddr,b.

Comments

Although the two icddr,b hospitals play an important role in treating diarrhoeal patients in Bangladesh, especially in Dhaka City, surveillance in these two hospitals could only provide information about admitted patients. This study provides a credible estimate of cholera burden in the hospital catchment areas by using findings from both hospital-based surveillance and catchment area survey. The incidence of cholera was found higher in Mirpur Treatment Centre catchment area. This supports the rationale of establishing the Mirpur Treatment Centre in 2008. Prior to 2008, a higher number of diarrhoeal patients from the Mirpur area were consistently admitted to Dhaka Hospital each year. Estimated incidence of cholera is higher in both of the study hospitals' catchment areas compared to findings from a cholera vaccine randomized-controlled trial in Kolkata, India, conducted during 2006 to 2009, where incidence of cholera among the placebo control group was 131 per 100,000 population (6).

The majority of admitted patients come from areas within the Dhaka metropolitan area or just outside the boundaries. Our defined catchment area for Dhaka Hospital covers approximately 10 million people. Therefore, the estimated incidence for the Dhaka Hospital catchment area can be considered as the cholera incidence in Dhaka City.

This study captured diarrhoeal cases who were either admitted to a health care facility or who received intravenous rehydration at home. However, there might have been some other patients infected with cholera who experienced severe diarrhoea, yet who only received oral rehydration or other treatment at home during their illness. This study did not count those cases and so provides a conservative estimate of the cholera incidence in the hospital catchment area.

The estimated incidence of cholera is high in the study areas. Preventive actions like behaviour change interventions, hand washing promotion and point of use water treatment could be taken to reduce the burden of cholera. A low cost cholera vaccine is available which can be used in high risk areas.

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Recurrent animal and human anthrax outbreaks in Bangladesh: Improved vaccination strategies needed

In the past two years, during April-October, 39 anthrax outbreaks in humans were reported from 13 districts in Bangladesh. Collaborative teams from the Institute of Epidemiology, Disease Control and Research (IEDCR) and icddr,b investigated 25 of those outbreaks in five districts where 190 suspected cases of animal anthrax and 414 suspected human cases were identified. Low livestock anthrax vaccination coverage resulting from insufficient supply of livestock anthrax vaccines and shortage of vaccinators contributed to the occurrence of these outbreaks. Steps should be taken to ensure complete coverage of livestock anthrax vaccination before April each year in Pabna and Sirajganj districts, which have large animal populations and frequent outbreaks.

Anthrax is primarily a disease of the ruminants caused by the spore forming bacteria *Bacillus anthracis*. Human exposures to *B. anthracis* spores may cause cutaneous, gastrointestinal or respiratory tract infections based on the route of entry (1). Naturally occurring anthrax is a common problem around the globe. Sporadic cases and epizootics occur in livestock and in wild animals in the USA, Canada and other high income countries (2). Outbreaks in animals, frequently with associated human illness, are reported from countries in Africa and in Middle and South Asia, especially in countries with poor livestock anthrax vaccination coverage (2). Published reports of anthrax in animals in Bangladesh date back to 1948. Anthrax was periodically reported both in animals and humans in Bangladesh between 1949 and 1986 (3,4). After 25 years of no reported anthrax outbreaks in humans, a cutaneous anthrax outbreak was detected in Bangladesh in August 2009 (5). Since then anthrax outbreaks have repeatedly been reported from different parts of the country (6).

Since 2009, collaborative teams from the Institute of Epidemiology, Disease Control and Research (IEDCR) and International Centre for Diarrhoeal Diseases Research, Bangladesh (icddr,b) have been investigating cutaneous anthrax outbreaks in humans which were associated with anthrax infection in livestock (5,7). During 2009-2010, the teams investigated 14 outbreaks, in which 273 persons were identified with suspected cutaneous anthrax. These outbreaks in humans were all preceded by the slaughtering of moribund cattle suspected of having anthrax in the outbreak areas. There was no report of human deaths related to anthrax in those outbreaks. With many outbreaks reported through informal sources, the actual disease burden of both animal and human anthrax cases in the country is unknown.

We present here an update on the anthrax outbreak investigations conducted since August 2009 in Bangladesh, including 11 outbreaks investigated in 2011. The goal of this analysis is to describe the outbreaks in terms of size, season, and geographic location in an attempt to make recommendations for future prevention strategies.

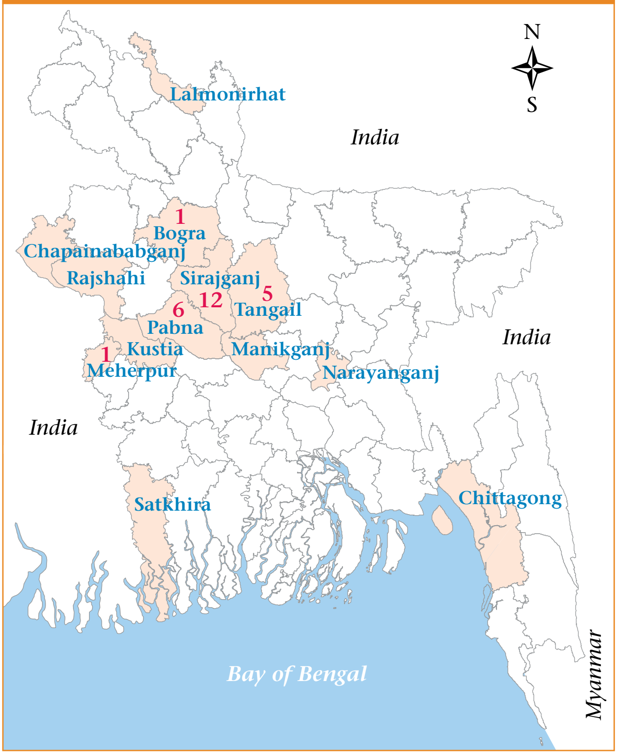
We summarized data about the dates, locations, and the number and clinical presentation of human and animal cases from all the anthrax outbreak investigations conducted by IEDCR and icddr,b collaborative investigation teams. Methods applied in the outbreak investigations are previously described (5,7). We defined a suspected human case of cutaneous anthrax as any person who suffered from acute onset of a skin lesion with papule or vesicle or skin ulceration with raised margin and central black eschar from three weeks before the date of slaughtering the first sick animal to three weeks after the slaughtering of last sick animal in the outbreak area. We defined a suspected case of gastrointestinal anthrax as a person in the affected communities who ate meat or handled the raw meat of cattle, goats or sheep and developed a febrile illness associated with either oral ulcer, sore throat, vomiting or diarrhoea from the date of slaughtering the first sick animal to three weeks after the slaughtering of last suspected animal anthrax case in the outbreak area. A suspected case of animal anthrax was defined as sudden death or convulsion of a ruminant, with or without fever, 30 days prior to the date of onset of first human case of cutaneous anthrax in the outbreak area until the date of investigation. We also summarized risk factors reported for human and animal cases, including vaccination and slaughtering exposure.

We also conducted a case study on the livestock anthrax vaccination status of an anthrax affected sub-district. We collected information about the number of vaccine doses received, the number of ruminants living in the sub-district, and the number of persons responsible for vaccination.

Since August 2009, health officials confirmed human cutaneous anthrax infections in 13 districts. In five districts, we investigated 25 anthrax outbreaks in humans during the same time period (Figure 1). Eighteen of these 25 investigated outbreaks occurred in two northwestern districts, Pabna and Sirajganj, the traditional "milkshed" areas in Bangladesh where commercial milk industries collect milk from individual farms and cooperatives (8). All human outbreaks investigated were preceded by exposure to an animal slaughtered with suspected anthrax infection.

We identified 190 suspect animal cases in these outbreaks, 126 (66%) cattle, 59 (31%) goats, 4 (2%) sheep and 1 (1%) buffalo. Among those 126 (66%) died from illness, 54 (28%) were slaughtered after illness onset and 10 (5%) were sick during investigation or were sold alive in a market. The median number of animal cases identified in these outbreaks was 4 (range: 2-24). Thirty three (25%) of the 131 animals, whose vaccination histories were collected, were reportedly vaccinated for anthrax in the previous 12 months.

Figure 1: Districts with reported anthrax cases and number of outbreaks investigated in Bangladesh during August 2009-September 2011



We identified a total of 414 human cases in these 25 outbreaks (Table 1) (Figure 2). Among them 378 were suspected cutaneous anthrax cases (Figure 3: see page No. 22), 27 were suspected gastrointestinal anthrax cases and 11 cases had symptoms of both cutaneous and gastrointestinal anthrax. The median number of human cases identified in these outbreaks was 13 (range: 4-46). Ninety-three percent of the cutaneous anthrax cases participated in butchering of a sick slaughtered animal or were present at the slaughtering site within 0 to 22 days prior to their onset of illness (median: 2 days).

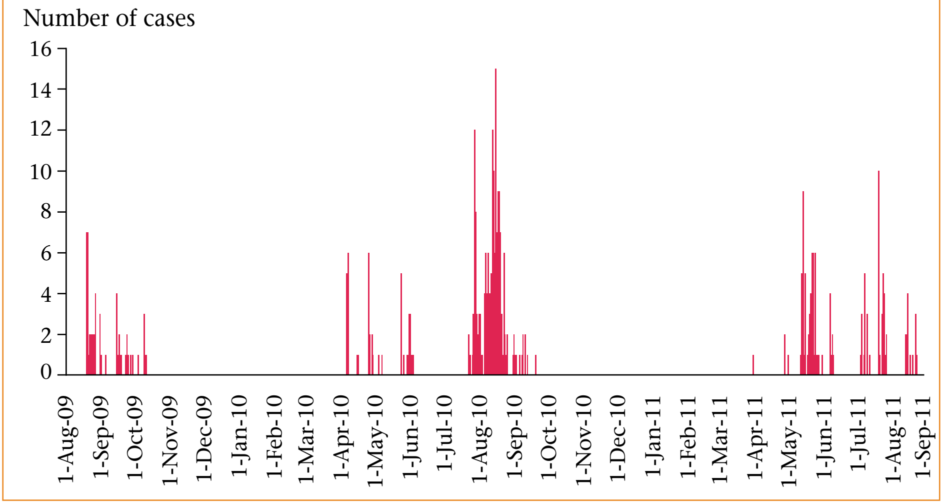
The median time from the date of illness onset of the index case to the date of reporting the outbreak was 13 days (range: 3-42 days). Thirteen (52%) of the 25 outbreaks were reported first by newspapers, eight (32%) were first reported by local health officials, three (12%) were reported through personal communication and one (4%) was detected by the outbreak investigation team during a separate field investigation (Table 1).

Two outbreaks, one in Bogra in July 2011 and the other in Tangail in August 2011, were reported following reported human deaths from suspected anthrax. According to the family members of the two deceased persons, a 70 year old male from Bogra and a 40 year old male from Tangail, both males had symptoms of suspected cutaneous and gastrointestinal anthrax. Both of them participated in butchering a sick animal. The person from Bogra did not receive any biomedical treatment. The other person received two doses of oral Cefixime 200 mg.

Table 1: Suspected number of different types of human cases and reported human deaths, August 2009-September 2011

Outbreak No.	Month	Year	District	Source of information	No. of days between date of illness onset of index human case and date of outbreak report	Total no. of human cases
1	August	2009	Pabna	Personal communication	5	35
2	September	2009	Sirajganj	Personal communication	14	15
3	October	2009	Sirajganj	Outbreak follow-up team	7	5
4	April	2010	Tangail	Local health officials	13	14
5	April	2010	Tangail	Local health officials	13	13
6	May	2010	Tangail	Local health officials	9	8
7	June	2010	Tangail	Local health officials	12	9
8	July	2010	Sirajganj	Newspaper	22	37
9	July	2010	Pabna	Newspaper	31	16
10	July	2010	Sirajganj	Newspaper	26	8
11	August	2010	Pabna	Personal communication	4	36
12	August	2010	Sirajganj	Local health officials	9	46
13	August	2010	Sirajganj	Local health officials	20	43
14	August	2010	Sirajganj	Newspaper	21	7
15	April	2011	Pabna	Local health officials	42	4
16	May	2011	Sirajganj	Newspaper	14	19
17	May	2011	Sirajganj	Newspaper	5	11
18	May	2011	Sirajganj	Local health officials	3	5
19	May	2011	Sirajganj	Newspaper	5	4
20	May	2011	Pabna	Newspaper	9	9
21	May	2011	Sirajganj	Newspaper	33	6
22	June	2011	Pabna	Newspaper	8	9
23	June	2011	Bogra	Newspaper	19	28
24	June	2011	Meherpur	Newspaper	13	13
25	August	2011	Tangail	Newspaper	9	14
Grand total						414

Figure 2: Distribution of date of onset of human anthrax cases identified during outbreaks investigated in Bangladesh, August 2009-September 2011



By selling the meat of a sick slaughtered animal, some farmers recovered 25%-33% of the market price of a healthy animal of the same size. As milk production and selling is a major economic activity, death of an anthrax infected animal resulted in large economic losses for the affected households.

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Comments

During August 2009-September 2011, anthrax outbreaks were recurrently detected in Bangladesh during summer and monsoon seasons, from April-October, with most of the outbreaks reported from the northwestern districts. Although 39 outbreaks were reported, IEDCR did not investigate 14 reported outbreaks due to the characteristic pattern of recurrent outbreaks and scarce resources for outbreak investigations. Outbreaks of anthrax in Bangladesh are likely to recur because the country has a favourable climate for sporulation and survival of anthrax spores (2,9). Given the endemic nature of anthrax among livestock in Bangladesh and the financial incentives for rural farmers to slaughter sick animals (7), animal vaccination is the best strategy to prevent future outbreaks.

Our investigations indicate that most ruminants in Bangladesh are not routinely vaccinated against anthrax. The Livestock Research Institute (LRI) is the only producer of livestock anthrax vaccine in Bangladesh, and they produced an average of 3.9 million doses of anthrax vaccines per year during 2004-2010 (personal communication). The total cattle population of 23 million is more than five times greater than the number of vaccines produced per year (10), suggesting that shortages in vaccine supply likely contribute to outbreaks. However, even if the vaccine supply increases to meet this demand, there is currently insufficient government veterinary staff to vaccinate all ruminants. For example, there are an estimated 260,000 ruminants and only three vaccinators in one sub-district where an outbreak occurred last year (personal communication with sub-district livestock officer).

Under these circumstances, efforts to focus limited vaccination resources on the animals at highest risk could reduce the number of outbreaks. While anthrax outbreaks were detected from all over the country, most were identified in Sirajganj and Pabna, the two districts with a large animal population (3). One strategy to reduce the number of outbreaks could be to prioritize animals in these districts for vaccination. Outbreaks occurred from April-October suggesting that ruminants in these districts should be vaccinated early in the year to protect them during the months of highest risk. To meet the shortage of vaccinators in these areas, trained personnel from other low-risk areas may be temporarily placed in these districts during the vaccination season or alternatively local informal veterinary service providers might be trained to vaccinate the animals. Also, a public-private partnership between Department of Livestock Services (DLS) and the commercial milk industries that collect milk from those areas might be a useful strategy to ensure coverage of livestock vaccination in those areas.

Additional research could also highlight other ways to reduce the risk of anthrax infection among ruminants. There are several hypotheses regarding how animals acquired anthrax in Bangladesh during these outbreaks, such as grazing in pastures contaminated with anthrax spores or through feeding a cow bonemeal contaminated with anthrax bacilli. Systematic data collection during outbreaks about these risk factors could be useful in informing anthrax prevention interventions. Considering the deaths of animals that were reportedly vaccinated within the previous year, studies should be done to assess the effectiveness of the livestock anthrax vaccine used in Bangladesh.

Two human fatalities occurred among patients with suspected anthrax and outbreaks were reported to IEDCR on average two weeks after they began. To ensure early detection of the suspected anthrax outbreaks and prompt treatment of suspected human cases, community level health workers should be trained on recognizing and prompt reporting of suspected anthrax outbreaks.

Recurrent anthrax outbreaks in animals and humans highlight the urgent need for effective vaccination of livestock against anthrax, especially in Sirajganj and Pabna. Awareness should be raised among the community level health workers as well as the general population regarding early identification and notification of suspected anthrax outbreaks, so that prompt public health action can be taken to minimize human morbidity and prevent possible human mortality.

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Determinants of qualified hypertension diagnosis in surveillance sites of Bangladesh: findings from a cross-sectional study

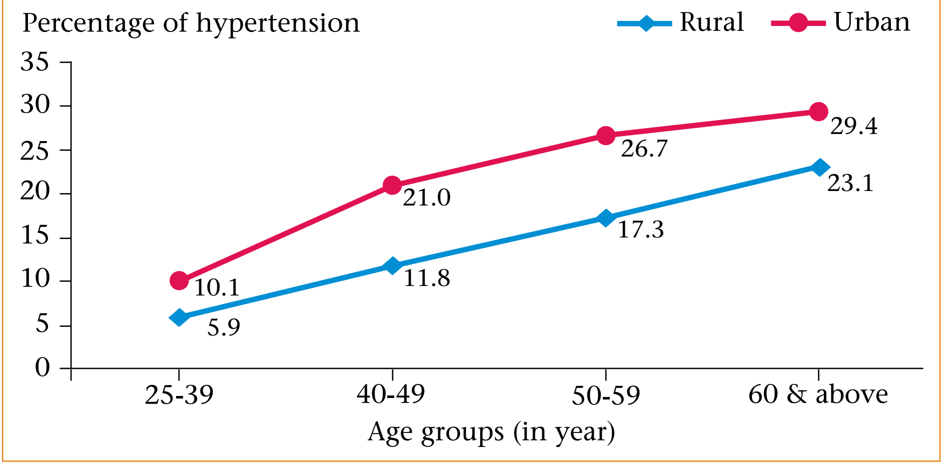
Hypertension, or high blood pressure, is a major risk factor for ischemic heart disease, stroke and kidney failure. We studied hypertension in rural and urban surveillance sites in Bangladesh. Hypertension was reported by 13% of the respondents (16% urban and 12% rural). There is very little information on diagnostic and management practices of hypertension in Bangladesh. In rural areas, unqualified providers (e.g., village doctors) played an important role in diagnoses of hypertension. People with more education, people with more money, and people over the age of 60 were more likely to be diagnosed as hypertensive by the doctors, both in rural and urban areas. To provide quality treatment for the majority of rural, poor populations, the care-giving capacity of the village doctors related to hypertension needs improvement.

The prevalence of hypertension, or high blood pressure, has been reported previously in small scale studies in Bangladesh. In 2004 the reported prevalence of hypertension was 18% among adults of 20 years or older (1). In most people hypertension has no symptoms, but it is a risk factor for cardiovascular diseases (CVD) and kidney failure (2), and an estimated two-thirds of stroke and half of ischemic heart disease cases are attributable to elevated blood pressure (3). Satisfactory management of high blood pressure can minimize complications and undesirable outcomes such as mortality, but it requires early diagnosis and adherence to both medication and behaviour changes. Data regarding the distribution of hypertension and the types of health care providers that are making the initial diagnosis of hypertension in rural and urban areas is lacking. A team of researchers from the Centre for Control of Chronic Diseases in Bangladesh, icddr,b, conducted a study to identify what proportion of people in both rural and urban areas with hypertension received either qualified or unqualified care and what the determinants were.

Using a cross-sectional study design, we collected data during January to March, 2009 from three of icddr,b's rural demographic surveillance sites, Matlab, Abhaynagar and Mirsarai, and one urban surveillance site, Kamalapur. The study population included men and women ≥25 years of age. In the rural sites the study population was sampled from households visited during the regular surveillance rounds. In Kamalapur the target population was visited for this study's data collection purposes only. The participants completed a questionnaire on their socio-demographics, on hypertension and on who made the initial diagnosis.

A total of 39,038 participants completed the survey with 13% of the respondents self-reporting hypertension; 16% in the urban and 12% in the rural area. Prevalence of reported hypertension increased with age (Figure 1), and was higher among women (16% vs 10%, P <0.0001), higher among the least poor quintile compared to the poorest quintile (21% vs 6%, P <0.0001) and higher with increasing education.

Figure 1: Prevalence of reported hypertension by age groups and rural-urban residence



Among respondents self-reporting hypertension, 54% in the rural area and 89% in the urban area were diagnosed by a qualified (MBBS or specialized) doctor. In the rural areas, more MBBS doctors (46%) diagnosed hypertension than village doctors (41%), followed by specialized doctors (7%) (Table 1).

Table 1: Hypertension diagnosed by type of healthcare providers in rural and urban surveillance sites for males and females*

	Rural (%)			Urban (%)		
	Male	Female	Total	Male	Female	Total
MBBS doctor	48.8	44.5	46.1	68.4	71.8	70.4
Specialized doctor	9.1	6.5	7.4	22.2	15.8	18.4
Village doctor	37.0	42.7	40.7	1.2	1.7	1.5
Paramedic	3.3	4.5	4.1	0.9	1.6	1.3
Pharmacy	0.7	0.7	0.7	5.9	7.7	7.0
Homeopath	0.6	0.6	0.6	0.7	0.5	0.6

*diagnosis by nurse, health worker, kabiraj/spiritual healer are not shown (<0.5% of diagnosis)

The groups most likely to be diagnosed by a qualified doctor were older people (60 years and above) compared to the youngest age group (25-39 years) (OR 1.76 in rural & 3.39 in urban); people with higher education (≥11 years) compared to people with no formal education (OR 3.01 in rural & 1.92 in urban); and people belonging to the least poor quintile compared to the poorest quintile (OR 3.64 in rural and 3.94 in urban) (Table 2)

Table 2: Adjusted odds ratio (OR) and 95% confidence intervals (CI) of diagnosis of hypertension by doctors in rural and urban areas

	Rural Adjusted OR (95%CI)	Urban Adjusted OR (95%CI)
Age group (in year)		
25-39	1	1
40-49	1.21 (0.99-1.46)	1.68 (1.11-2.55)
50-59	1.64 (1.34-1.99)	1.47 (0.92-2.35)
60+	1.76 (1.46-2.13)	3.39 (1.63-7.05)
Sex		
Female	1	1
Male	1.04 (0.90-1.20)	0.96 (0.65-1.40)
Education		
No formal education	1	1
Primary (1-5 years)	1.44 (1.23-1.69)	0.80 (0.49-1.29)
Secondary (6-10)	1.70 (1.42-2.05)	1.48 (0.88-1.29)
Higher education (11+)	3.01 (2.10-4.31)	1.92 (1.01-3.62)
Asset index (quintiles)		
Poorest	1	1
Poorer	1.53 (1.15-2.03)	1.36 (0.72-2.56)
Middle	1.78 (1.36-2.34)	2.63 (1.36-5.09)
Less poor	2.23 (1.72-2.91)	3.20 (1.64-6.22)
Least poor	3.64 (2.80-4.74)	3.94 (2.02-7.69)

Reported by: Centre for Control of Chronic Diseases in Bangladesh, icddr,b.

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Comments

This study found a high burden of self-reported hypertension in this population. The prevalence of self-reported hypertension was higher in the urban surveillance area compared to the rural areas. It was significantly higher among those who belonged to the least poor quintile compared to the poorest quintile. This is consistent with findings that reported higher prevalence of hypertension among higher income groups (4). Hypertension has been labeled a disease of the affluent (4). We found a higher prevalence of hypertension among more educated people who are likely more aware of their health and who access qualified care more frequently.

In the current study, in the rural area, village doctors played an almost equal role to MBBS doctors in diagnosing hypertension. Village doctors and pharmacies supply as much as 67% of the primary health care in Bangladesh (5) as they are the preferred healthcare providers because they are perceived to be more available, accessible, and affordable than other public health care options (6).

There is a shortage of qualified health care providers, and as most rural Bangladeshis rely on unqualified practitioners, our study highlighted their importance for the diagnosis of hypertension in rural areas of Bangladesh. To provide quality treatment for the majority of rural, poor populations we need to improve the care-giving capacity of the village doctors related to hypertension.

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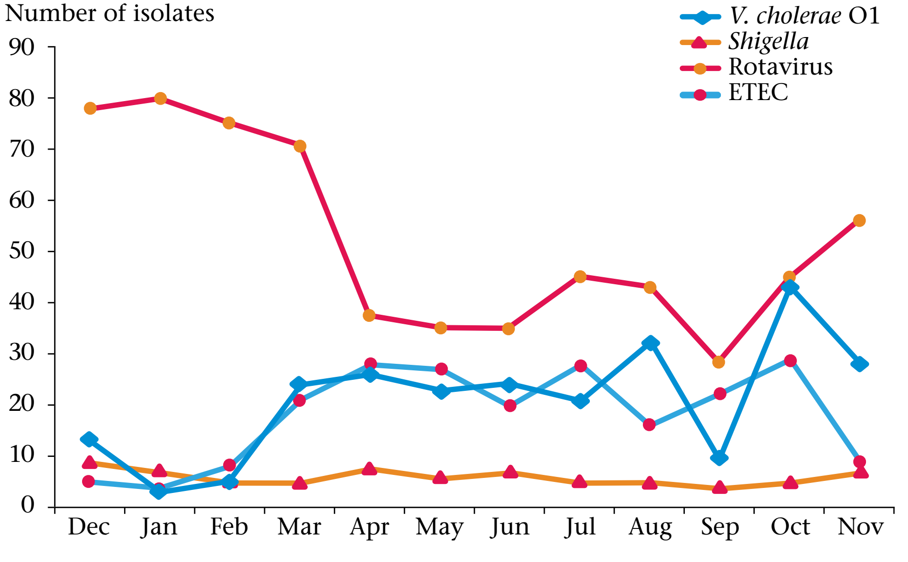
Surveillance updates

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: December 2010-November 2011

Antimicrobial agents	*Shigella* (n=73)	*V. cholerae* O1 (n=251)
Nalidixic acid	Not tested	Not tested
Mecillinam	68.1	Not tested
Ampicillin	60.3	Not tested
TMP-SMX	29.2	2.8
Ciprofloxacin	52.1	98.4
Tetracycline	Not tested	65.7
Erythromycin	Not tested	100.0
Furazolidine	100.0	Not tested

Monthly isolation of* V. cholerae *O1,* Shigella*, Rotavirus and ETEC: December 2010-November 2011



Antimicrobial resistance patterns of 97 M. tuberculosis *isolates: November 2010-October 2011*

Drugs	Resistance type		Total n=97 (%)
	Primary n=87 (%)	Acquired* n=10 (%)	
Streptomycin	14 (16.1)	3 (30.0)	17 (17.5)
Isoniazid (INH)	4 (4.6)	1 (10.0)	5 (5.2)
Ethambutal	1 (1.1)	1 (10.0)	2 (2.1)
Rifampicin	4 (4.6)	1 (10.0)	5 (5.2)
MDR (INH+Rifampicin)	1 (1.1)	1 (10.0)	2 (2.1)
Any drugs	17 (19.5)	3 (30.0)	20 (20.6)

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

Antimicrobial susceptibility pattern of S. pneumoniae *among children <5 years during October-December 2011*

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	1	1 (100.0)	0 (0.0)	0 (0.0)
Cotrimoxazole	1	1 (100.0)	0 (0.0)	0 (0.0)
Chloramphenicol	1	1 (100.0)	0 (0.0)	0 (0.0)
Ceftriaxone	1	1 (100.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	0	0 (0.0)	0 (0.0)	0 (0.0)
Gentamicin	1	0 (0.0)	0 (0.0)	1 (100.0)
Oxacillin	1	1 (100.0)	0 (0.0)	0 (0.0)

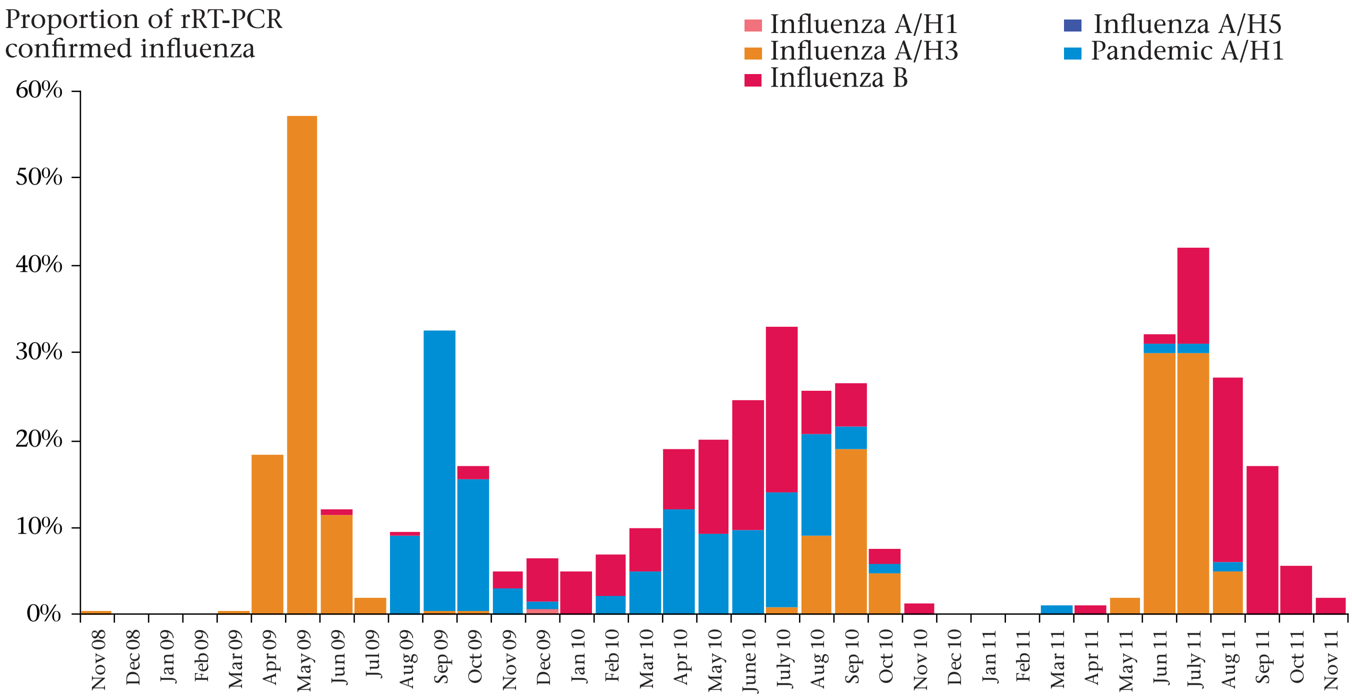
Source: icddr,b's urban surveillance in Kamalapur (Dhaka).

Antimicrobial susceptibility pattern of S. typhi *among children <5 years during October-December 2011*

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	22	14 (63.6)	0 (0.0)	8 (36.4)
Cotrimoxazole	22	14 (63.6)	0 (0.0)	8 (36.4)
Chloramphenicol	22	14 (63.6)	0 (0.0)	8 (36.4)
Ceftriaxone	22	22 (100.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	22	0 (0.0)	22 (100.0)	0 (0.0)
Nalidixic Acid	22	0 (0.0)	0 (0.0)	22 (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 November 2008 and November 2011



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)


Skin lesion of a case of cutaneous anthrax in Bangladesh, July 2011

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