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Inside

Handwashing behavior in rural Bangladesh

We conducted a baseline evaluation for a large intervention project that has a primary objective of promoting handwashing with soap or ash at key times--before preparing food, before eating or feeding a child, after defecating and after cleaning an infant who has defecated. In 100 randomly selected communities in 34 districts of Bangladesh, field workers observed the proportion of persons who washed their hands and 2 months later returned to the same communities and interviewed residents about their handwashing behavior. Among the 20,546 key times observed, study subjects washed their hands 11,800 (55%) of the time, though in only 350 episodes (1.7%) did they wash both hands with soap or ash. Efforts to improve handwashing in Bangladesh need to focus on transforming people's hand rinsing practice into thorough handwashing with soap.

In small studies targeting hundreds or a few thousand households, interventions that promoted handwashing with soap consistently reduced diarrhea and respiratory disease (1,2). It is challenging, however, to implement handwashing promotion on a large scale.

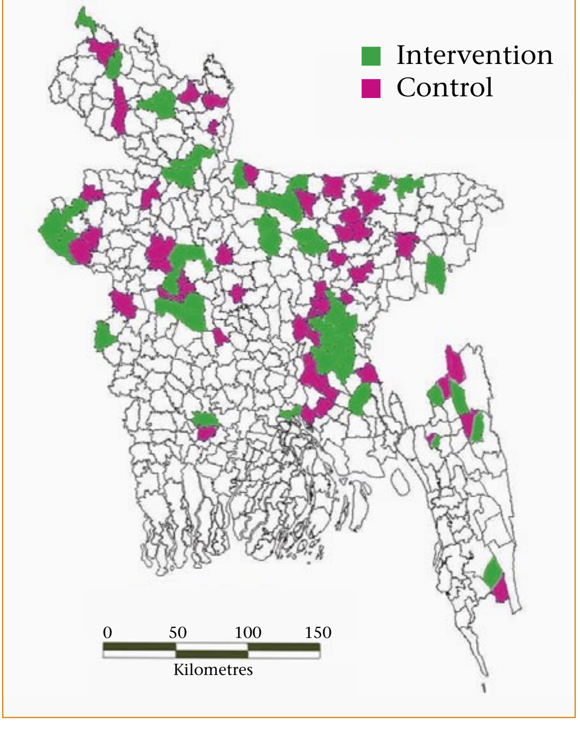
icddr,b

KNOWLEDGE FOR GLOBAL LIFESAVING SOLUTIONS

The Government of Bangladesh, Department of Public Health Engineering in collaboration with UNICEF and with support from the Department for International Development (DFID) of the British Government has launched a programme, `SHEWA-B' (Sanitation, Hygiene Education and Water supply-Bangladesh) that is among the largest intensive handwashing, hygiene/sanitation and water quality improvement programmes ever attempted in a developing country. The intervention is targeting 30 million underserved people in Bangladesh. A primary objective of the intervention is to increase the proportion of persons who wash their hands with soap or ash at key times, i.e. before preparing food, before eating, before feeding a child, after defecating and after cleaning a child's anus. There are some data from Bangladesh that suggest that washing hands with ash reduces the concentration of fecal organisms on hands (3).

ICDDR,B was contracted to perform the health impact evaluation for this intervention. We report a summary of the baseline findings on handwashing practices. We used population proportional to size sampling to select 50 villages from SHEWA-B intervention communities and another 50 comparison villages from nearby upazilas that were judged to be similar (Figure 1). Beginning from the center of the village, field workers identified households with children under the age of 5 years. The trained field workers then performed 5-hour structured observations of handwashing behavior between 9:00 AM and 2:00 PM in 1,000 sampled households. They noted handwashing behaviour at key times.

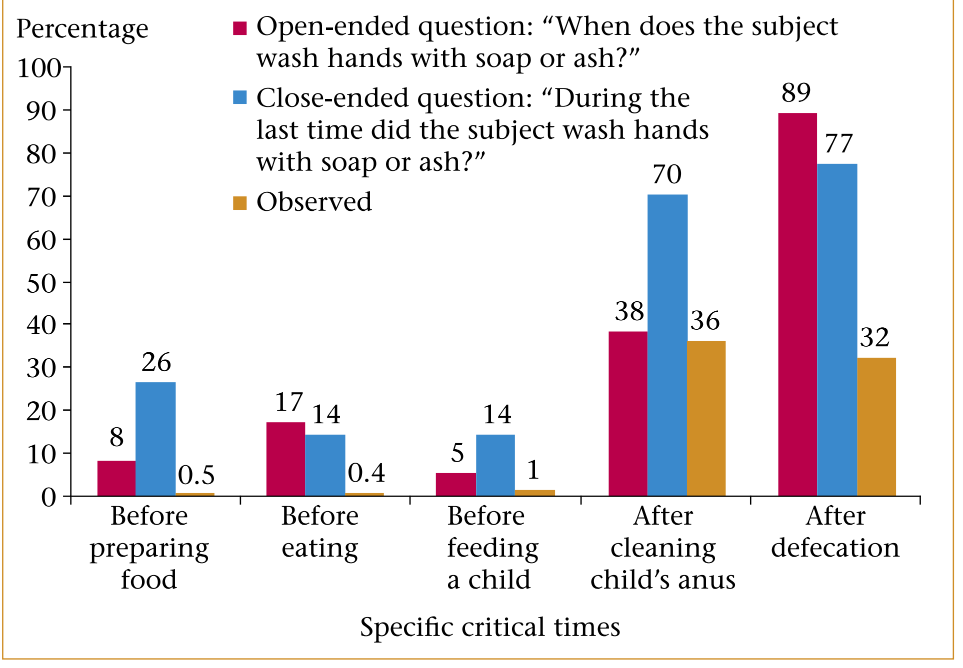
Figure 1: Upazillas included in the SHEWA-B Health Impact Study



Two months later, field workers conducted a survey that included questions on handwashing behaviour and other variables in these same 1,000 households, and an additional 700 neighboring households. The combined results from intervention and control area are presented to provide a description of a large area of rural Bangladesh.

We measured handwashing practices in several different ways. When field workers asked subjects open-ended questions "When and how do you wash your hands with soap or ash?", the proportion who mentioned washing hands at key times was different than when specific questions were asked about whether or not the subject washed their hands with soap or ash at each key time (figure 2). However, study subjects consistently reported washing their hands with soap much more frequently than they were observed to.

Figure 2: Washed hands with soap or ash (one or both hands)



During the observations about half of the study subjects made some effort to wash their hands at most of the key times. Usually, this was just rinsing with water (Figure 3). Indeed, washing both hands with soap or ash, was quite uncommon, ranging from <1% of people before eating to 23% of people who cleaned a child's anus after defecation. Overall, among the 20,546 key times observed, study subjects washed their hands 11,800 (55%) of the time, though in only 350 episodes (1.7%) did they wash both hands with soap or ash (figure 4).

Figure 3: Proportion observed to wash both hands with water alone compared to those washing with water and soap

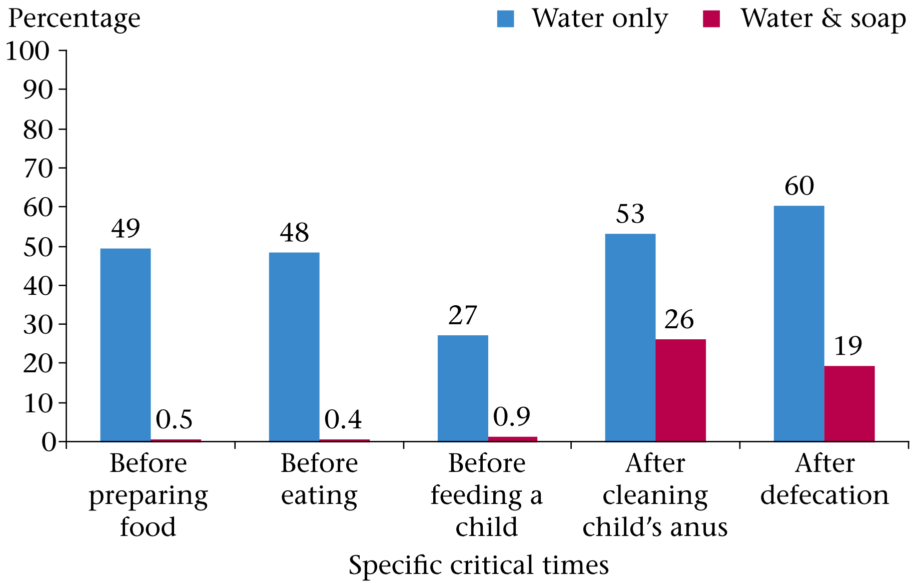
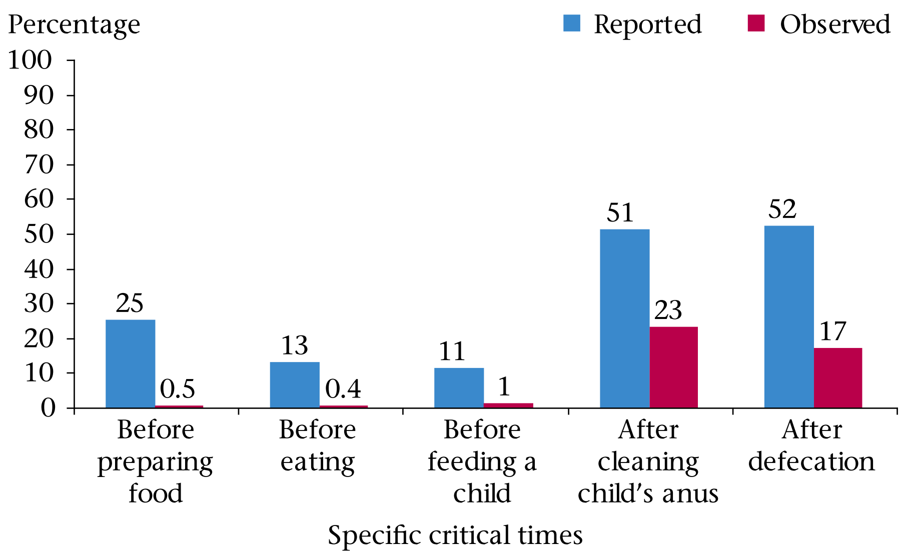


Figure 4: Washed both hands with soap or ash



At the end of the interview, data collectors asked the subjects to wash their hands as they usually did following defecation. Fifty-five percent of mothers and 42% of children age 3-5 years washed both hands with water and used soap and/or ash. Among the subjects who used soap, the median rubbing time with soap was 14 seconds.

Reported by: Programme on Infectious Diseases and Vaccine Sciences, ICDDR,B and UNICEF

Supported by: UNICEF, Dhaka, Bangladesh

Comments

In a broad cross section of households in rural Bangladesh respondents consistently reported washing hands with soap at key times, and when asked to wash their hands over half did so thoroughly. However, on observations conducted 2 months previously, while over half of subjects did make effort to wash their hands at key times, they generally only rinsed their hands with water.

The research studies that have demonstrated marked reductions in diarrhoeal disease with handwashing all promoted handwashing with soap (1,2). The good news is that the residents of these communities had good knowledge of when handwashing with soap was recommended, and a little over half of them had a habit of at least rinsing their hands at those key times. The challenge for handwashing promotion programmes is to further develop these behaviours so that people habitually use soap when they wash their hands.

The study subjects reported washing their hands more frequently than they were observed to. This pattern has been noted in prior studies in Bangladesh and other countries (4,5). This finding demonstrates that asking people about their handwashing behavior does not provide a valid assessment.

This study population was not representative of all Bangladesh. The upazilas (sub-districts) selected for the SHEWA-B intervention were chosen because they were of high need. However, they are a large population drawn from across Bangladesh and the behaviours in the control communities was similar to the intervention communities (data not shown) which suggests that their behaviours are not exceptional.

Behaviour change in public health is difficult, but the Government of Bangladesh and UNICEF are focusing on an important behaviour. We will provide follow-up on this ambitious intervention in subsequent issues of the HSB.

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Outbreaks of tetrodotoxin poisoning following consumption of puffer fish in Bangladesh, 2008

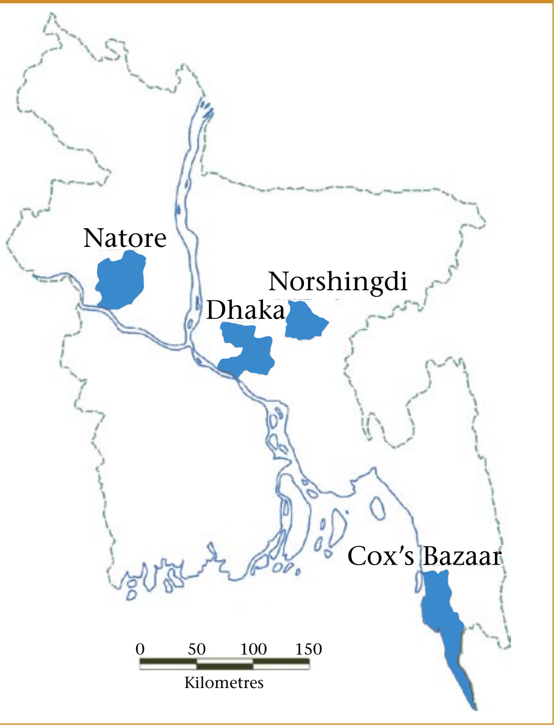
Sporadic occurrences of tetrodotoxin poisoning following consumption of puffer fish have previously caused deaths in Bangladesh. During April-June 2008, three outbreaks of puffer fish intoxication were reported from Narshingdi, Dhaka and Natore Districts; 84 people experienced illness and 12 of them died (14%). Lack of knowledge about puffer toxicity or familiarity with sea puffer varieties in rural areas contributed to the outbreaks. Nationwide dissemination of messages about potentially fatal outcomes after eating puffer fish may help prevent future outbreaks.

Puffer fish, also known as blow fish or balloon fish in English, and locally known as *potka* or *tepa* fish, belong to the order Tetraodontiformes (1). In Bangladesh there are 13 species of the fish; two of them live in fresh water and the rest in the ocean (2).The puffer's toxin, tetrodotoxin (TTX), is a potent neurotoxin which can cause rapid death in people who eat the fish by blocking sodium channels in the excitable cell membranes (1,3). The fish itself is unaffected by the poison due to a mutation in the protein sequence of its cell membranes (4). The toxin is present in highest concentrations in the liver, ovaries, intestines and skin of the fish; the body musculature is usually free of the poison (1,5). Not all species of puffer fish are toxic. Some are only slightly to moderately toxic, although published reports of toxicity are not available for each species in Bangladesh (6). The toxicity of the fish varies according to its sex, geographical distribution and season. The fish is more poisonous immediately prior to and during its reproductive season (5,6) and the females are more poisonous than the males, as the ovaries are more toxic than the testes.

Puffer fish toxicity is one of the most common causes of poisoning among people in the coastal areas of Asia (1). In humans the toxin causes deadening of the tongue and lips, dizziness, and vomiting followed by numbness and prickling over the body, rapid heart rate, decreased blood pressure, and muscle paralysis. Death results from respiratory arrest because of paralysis of the diaphragm. Patients who live longer than 24 hours after eating the fish generally survive (7).

During April-June 2008, three outbreaks of puffer fish poisoning were reported to the Institute of Epidemiology, Disease Control and Research (IEDCR) from Narshingdi, Dhaka and Natore districts (Figure 1). A collaborative team from IEDCR and ICDDR,B investigated all the outbreaks. The investigation team then visited Cox's Bazaar to explore the experiences of the local fisherman with catching and selling sea varieties of the fish and their knowledge about its toxicity and symptoms of intoxication.

Figure 1: Map of Bangladesh showing locations of Norshingdi, Dhaka, Natore and Cox's Bazaar Districts



The team identified people who had eaten puffer fish in the outbreak areas by asking villagers and local health authorities. They asked people who ate the fish about their knowledge about toxicity, previous experience with eating the fish, location of purchase, and symptom onset. The team collected exposure and illness histories for persons who died by interviewing their family members.

In Narshingdi District on 9 April 2008, 40 people consumed the fish, all of whom developed illness; five of them died (13%). The team investigated 16 case patients who were clustered in six households and resided in one village. Local respondents reported that they last saw the fish in their locality 20-30 years ago and at that time they knew it was poisonous. However, since it was available in the local markets again, they believed that it was no longer poisonous. Villagers in the outbreak area explained that on the day of the outbreak, the fish had arrived from Kuliarchar Upazilla in the neighboring Kishoreganj District. The fish had reportedly come to Kuliarchar from Cox's Bazaar. In Kuliarchar Upazilla a fish seller and two of his family members also developed illness after eating the fish; the fish seller and his daughter died.

On 3 June 2008, Dhaka Medical College hospital reported a cluster of puffer poisoning from Tejkunipara in Dhaka District. Eleven persons ate the fish, nine of them developed symptoms, and three died (27%). Persons involved in the outbreak were given the fish by their relative who was a community waste cleaner. He took five discarded fishes home and although cases reported that he told them that it was puffer fish, they were not aware of its toxicity.

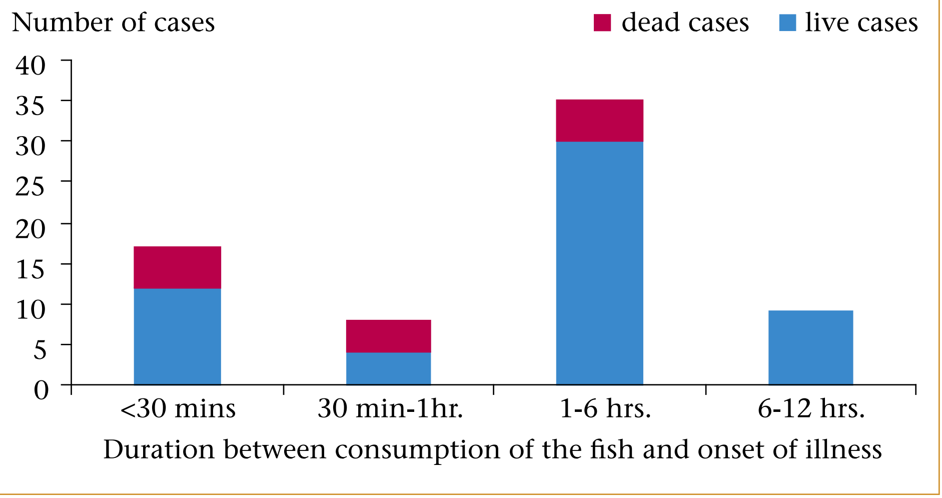
On 8 June 2008, 60-70 kgs of puffer fish were sold in the local fish market of Domdoma Village in Shingra Upazilla in Natore District. We investigated exposures for 65 villagers who consumed the fish; 35 of them developed illness and four died (6%). In this outbreak, 44 (70%) respondents knew that it was puffer fish. Though most of them (94%) eat the freshwater species of the fish, which is widely available in their village rivers and *beels* (water body), especially after the rainy season, they never became ill after eating the fish. They reported that the fresh water variety of the fish is very tasty. Therefore, they thought that the larger puffers would be tastier and did not believe it would be poisonous.

All the cases in the three outbreaks reported rapid onset of symptoms after eating the fish including tingling sensations, heaviness and numbness in the tongue, dizziness, headache, inability to walk and generalized weakness (Figure 2).

Ocean fishermen based in Cox's Bazaar, reported that they often catch puffer fish in their nets when they are trying to catch other fishes. The fish is less valuable to them since local people do not usually eat it as they know that it is poisonous. The peak season for catching puffer fish is in November. Local fishermen recognize four to five different types of puffer fish found in the sea and reported that they weigh between 200 gm-2/3 kg.

The fishermen reported that they usually do not sell the fish. If they catch a large yield of puffers of 20-30kgs, they may sell it to the local fish sellers at 0.18-0.29 US$/kg. The local fish sellers process the fish into dried fish. During processing the fish, they remove the gall bladder, liver, intestines and eggs leaving only the skin and the head. Dried fish preparers believe that the gall bladder and the eggs have the highest concentration of the poison and removing them intact makes the fish edible. The cut fish is sun-dried and distributed to the dry fish markets in Chittagong, Rangamati and Badarban, and is also used to make poultry feed. The local respondents believed that dried puffer fish does not cause poisoning. The local fishermen stated that occasionally some fishermen distribute the fresh fish for sale in other parts of Bangladesh, in hopes that it could be sold more easily in areas where people do not know it is poisonous.

Figure 2: Distribution of cases by duration between consumption of fish and onset of illness



Reported by: Institute for Epidemiology, Disease Control and Research, Ministry of Health and Family Welfare, Government of People's Republic of Bangladesh and Programme on Infectious Diseases and Vaccine Sciences, ICDDR,B

Supported by: Centers for Disease Control and Prevention, USA and World Health Organization

Comment

Though sporadic episodes of puffer fish poisoning in Bangladesh have been reported, three outbreaks of puffer fish poisoning in a single year suggests, this is an important health problem (1,2). All persons involved in the outbreaks were familiar with puffer fish; they either commonly ate the freshwater varieties, or had seen this fish before. However, they were not aware of its toxicity, partly because of their pleasant experience with freshwater puffers. Globally the food price index climbed 57.5% in the first quarter of 2008 (8) and local economic pressure might have encouraged fishermen to sell puffer fish more frequently than usual and the relatively lower price of the fish may have temped people to purchase it.

Immediately after the first outbreak in Narshingdi, the Ministries of Health and Family Welfare and Fisheries and Livestock launched a mass communication campaign through television and newspapers describing the source, toxicity, and appearance of both the sea and river puffer fish. These messages instructed people to avoid eating any puffer fish. However, those involved in later outbreaks reported they had not received such messages. Future communication strategies should be more accessible to rural people and might include disseminating messages using loud speakers moving through villages on bicycles, vans or rickshaws; staging folk songs; displaying posters on tea stalls or boundary walls of schools and mosques; and distributing leaflets to the villagers on local market (*haat*) days. In addition, messages about toxicity of freshwater puffers or dried puffer fish are likely to be confusing if these are regularly ate without incident. Further investigation into the toxicity of specific species of puffers in Bangladesh is needed to refine prevention messages.

Physicians attending any patient presenting with a history of tingling sensation in the body, with dizziness and limb paresis, should inquire about exposure to puffer fish (9). As tetrodotoxin has no specific antidote, immediate supportive treatment and judicious administration of neostigmine along with atropine can minimize fatalities (5). Physicians suspecting puffer fish poisoning should promptly report cases to the local health authority.

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Monitoring poultry workers with H5 influenza exposure in Bangladesh

The Institute of Epidemiology, Disease Control and Research (IEDCR) initiated a follow-up evaluation of poultry workers who had contact with H5 infected poultry from January to May 2008, based on the reported poultry outbreaks from 39 districts in Bangladesh during that period. Persons who worked on poultry farms where H5 outbreaks occurred and persons who were hired to cull H5 infected poultry during this period were targeted for follow-up. During the 14 day monitoring period, they were given prophylactic anti-viral tablets for the first 7 days, and interviewed and observed for clinical symptoms of influenza-like illness on a daily basis. Only six poultry workers reported influenza-like illness among 2,786 poultry workers who were evaluated for the entire follow-up period, and none had a serious respiratory illness requiring hospitalization. The findings from this evaluation show that the government monitoring system was successful in following-up poultry workers at risk for H5 infection and providing prophylaxis in a systematic way.

In Bangladesh, the first confirmed outbreak of H5 influenza was reported in poultry in March 2007. Forty-seven out of 64 districts of Bangladesh had a confirmed outbreak of H5 in poultry from March 2007 to May 2008. During January to May 2008, 152 outbreaks from 39 districts were reported. Globally, most people infected with H5N1 influenza acquired the infection from poultry raised inside or near their houses (1-3). As approximately 80% of people in Bangladesh live in rural areas, and almost 80% of these households raise poultry (4,5), this is a cause for public health concern. Some rural household activities have been associated with transmission of H5N1 to people like slaughtering, de-feathering, and preparing sick poultry for cooking (6,7).

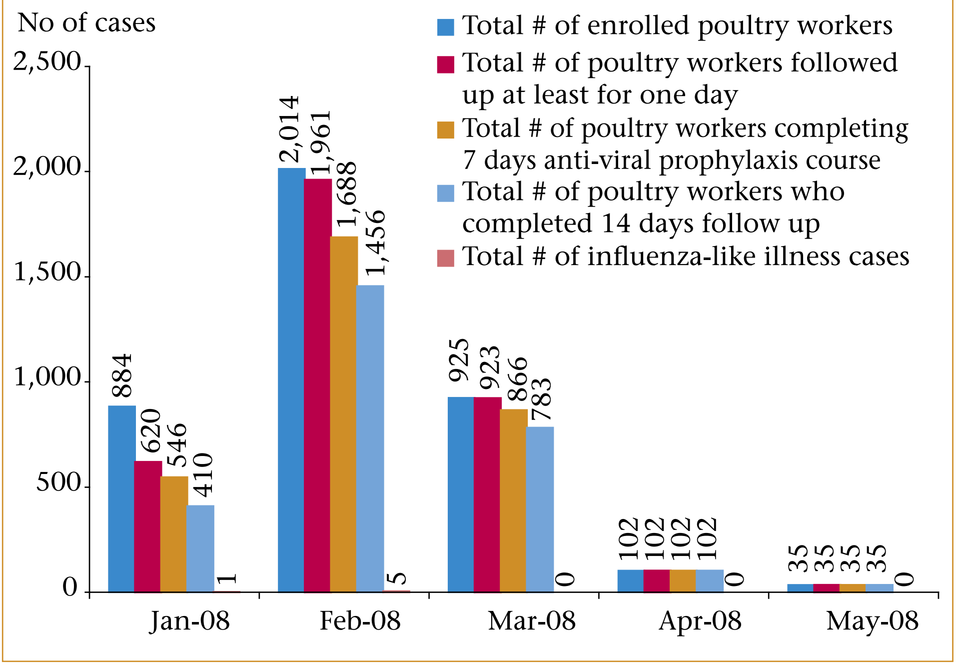
In response to the potential for an H5 pandemic, beginning in March 2007, authorities from the Department of Livestock Services collected samples from poultry farms reporting die-offs (8). The samples were sent to the central national livestock laboratory, Bangladesh Livestock Research Institute (BLRI), for detection of H5 infection. If H5 influenza infection was confirmed on the farm, local livestock authorities culled poultry from the infected poultry farm, plus all surrounding poultry within one kilometer, either in commercial or backyard settings. From May 2008, the culling strategy was changed so that if an outbreak occurred on a commercial poultry farm, only that particular farm would be culled, and if the outbreak occurred in backyard poultry, only poultry farms within 500 meters of the infected poultry would be culled.

Workers at infected poultry farms and people involved in the culling process were at risk of developing H5 influenza because of their close contact with infected poultry. Therefore, Institute of Epidemiology, Disease Control and Research (IEDCR) initiated a follow-up evaluation of the poultry workers and cullers from January 2008 with the objective of providing prophylaxis and treating any cases of influenza-like illness.

Persons who worked on poultry farms where H5 outbreaks occurred and persons who were hired to cull H5 infected poultry from 39 districts were included in the follow-up evaluation. IEDCR developed a training plan and supervisory strategy to ensure daily reporting and follow-up of these poultry workers. Medical Officers and Health Assistants enrolled participants during the culling process, recorded their demographic information, and requested that they report to the health facility each day for 14 days for evaluation. During each visit, participants were interviewed using a structured questionnaire to ascertain symptoms of influenza-like illness, and given free-of-cost prophylactic anti-viral tablets (Oseltamivir 75 mg once daily for seven days) (9). We defined influenza-like illness as sudden onset of fever and cough or sore throat. The Medical Officers and/or the Health Assistants recorded the follow-up information in a structured form at upazila level and sent a daily report to the Civil Surgeon at the district level, who forwarded those reports to IEDCR daily. If there was any delay in receiving the daily report from any district, IEDCR personnel contacted the concerned Civil Surgeon immediately to ensure the report was sent as soon as possible.

We identified 3,960 poultry workers from the reported H5 affected poultry farms in Bangladesh during January to May 2008. We followed-up with 3,641 (92%) of these poultry workers for at least one day, each of whom received at least one dose of anti-viral prophylaxis. Eighty-two percent (3,237) completed the scheduled seven-day course and 2,786 persons (70%) completed the entire 14 days of follow-up. During the monitoring activities, the proportion of poultry workers completing follow-up increased in each consecutive month from January to March 2008, resulting in 100% follow-up during April and May. Regular supervision from the central level contributed to that success (Figure 1).

Figure 1: Follow up of enrolled poultry workers from H5 influenza-affected poultry farms in Bangladesh (January-May 2008)



One influenza-like illness case was reported in January 2008, and another five were recorded in February 2008. IEDCR instructed the local health authorities to confine these six persons to their homes where they received an increased anti-viral treatment dose (Oseltamivir 75 mg, twice a day for 5 days) and daily follow up from a local physician. All six cases were symptom-free within five days of detection of their symptoms, but no laboratory investigation was conducted for H5 influenza.

Reported by: Avian Influenza Contact Follow Up Monitoring Committee, Institute of Epidemiology, Disease Control and Research (IEDCR), Directorate General of Health Services (DGHS), Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh

Supported by: Directorate General of Health Services (DGHS), Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh

Comment

Improved follow-up of at-risk poultry workers is important for early detection and management of severe respiratory disease. Since the first poultry outbreak in March to December 2007, there was no monitoring of these poultry workers. Following IEDCR's training plan and supervisory strategy, we were able to follow-up at-risk poultry workers during January to May 2008. Findings from the evaluation show that the Government of Bangladesh can be confident that this strategy has been successful in identifying and managing cases of influenza-like illness in these at-risk poultry workers.

Among 2,786 at-risk poultry workers who completed 14 days of follow-up, we found only six with symptoms of influenza-like illness. None of the illnesses were severe and all patients recovered completely. Their influenza-like illnesses could have been caused by a variety of pathogens. Findings from a study on poultry workers in Hong Kong reported mild or asymptomatic H5 infections among that occupational group (10). The prophylactic and treatment dose of Oseltamivir in our follow-up evaluation might have lessened or reduced the symptoms of those six influenza-like illness cases, which is consistent with the findings of improved survival of H5N1 cases from Southeast Asia with earlier treatment with Oseltamivir (11).

Despite ongoing surveillance for H5 influenza-infected poultry in Bangladesh, it was likely that many outbreaks in poultry, especially backyard poultry, were not reported. Even larger commercial poultry producers had significant disincentives to report sick or dead birds, as the compensation from the Government for culling was small compared to the poultry farmers' economic investment. Thus, the surveillance might have missed many poultry workers that had been exposed to H5 influenza. Additionally, many persons involved in the culling process were day laborers from distant villages hired for short term work. Ensuring follow-up for these poultry workers was not always possible for the entire 14 days. Within the structure of our monitoring system, it is possible that mild cases of influenza-like illness could remain unnoticed because of variations of technical capacities among the health care professionals at the local level, but it is unlikely that severe disease among the exposed poultry workers who completed the entire follow-up was unrecognized.

When physicians identify a patient with severe respiratory disease, they should ask about contact with sick or dead poultry within the last one month. They should ask if any recent similar illness has occurred in the family or neighborhood. Physicians should report clusters of severe respiratory disease immediately to IEDCR.

Oseltamivir is currently available at government health care facilities in Bangladesh and it is given to people at risk of H5 influenza infection free of cost. Private physicians should refer patients with respiratory disease and exposure to sick or dead poultry to government health care facilities.

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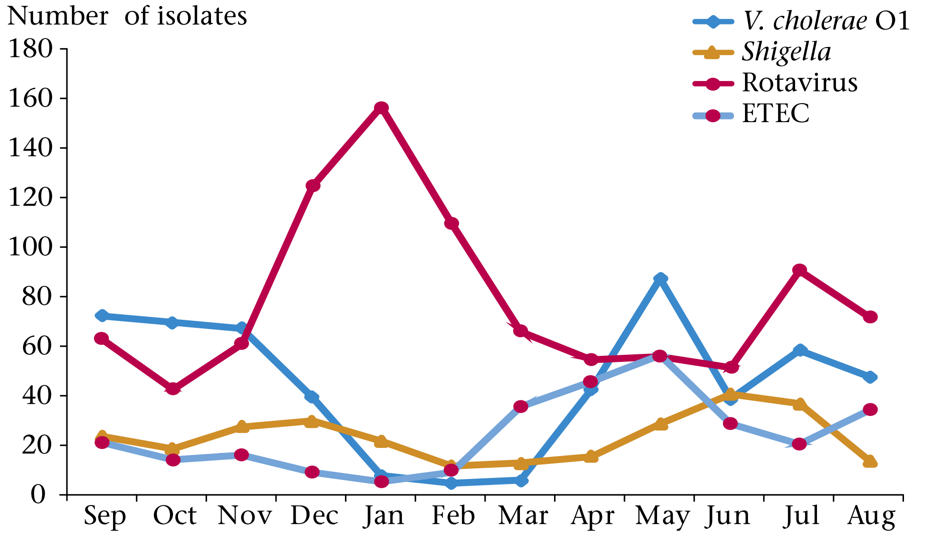
Surveillance Updates

With each issue of the 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.

Proportion of diarrhoeal pathogens susceptible to antimicrobial drugs: September 2007-August 2008

Antimicrobial agents	*Shigella* (n=286)	*V. Cholerae* O1 (n=546)
Nalidixic acid	22.2	Not tested
Mecillinam	84.9	Not tested
Ampicillin	49.7	Not tested
TMP-SMX	38.8	0.0
Ciprofloxacin	88.1	100.0
Tetracycline	Not tested	35.2
Erythromycin	Not tested	6.4
Furazolidine	Not tested	0.0

Monthly isolation of* V. cholerae *O1,* Shigella*, Rotavirus and ETEC: September 2007-August 2008



Antimicrobial resistance patterns of 82 M. tuberculosis *isolates: October 2007-May 2008*

Drugs	Resistance type		Total (n=82)
	Primary (n=67)	Acquired* (n=15)	
Streptomycin	8 (11.9)	5 (33.3)	13 (15.9)
Isoniazid (INH)	4 (6.0)	2 (13.3)	6 (7.3)
Ethambutal	0 (0.0)	1 (6.7)	1 (1.2)
Rifampicin	1 (1.5)	2 (13.3)	3 (3.7)
MDR (INH+Rifampicin)	1 (1.5)	2 (13.3)	3 (3.7)
Any drugs	9 (13.4)	5 (33.3)	14 (17.1)

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

Antimicrobial susceptibility pattern of S. pneumoniae *among children <5 years during April-June 2008*

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	24	24 (100.0)	0 (0.0)	0 (0.0)
Cotrimoxazole	24	11 (46.0)	0 (0.0)	13 (54.0)
Chloramphenicol	24	24 (100.0)	0 (0.0)	0 (0.0)
Ceftriaxone	24	24 (100.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	23	23 (100.0)	0 (0.0)	0 (0.0)
Gentamicin	24	1 (4.0)	2 (8.0)	21 (88.0)
Oxacillin	24	22 (92.0)	0 (0.0)	2 (8.0)

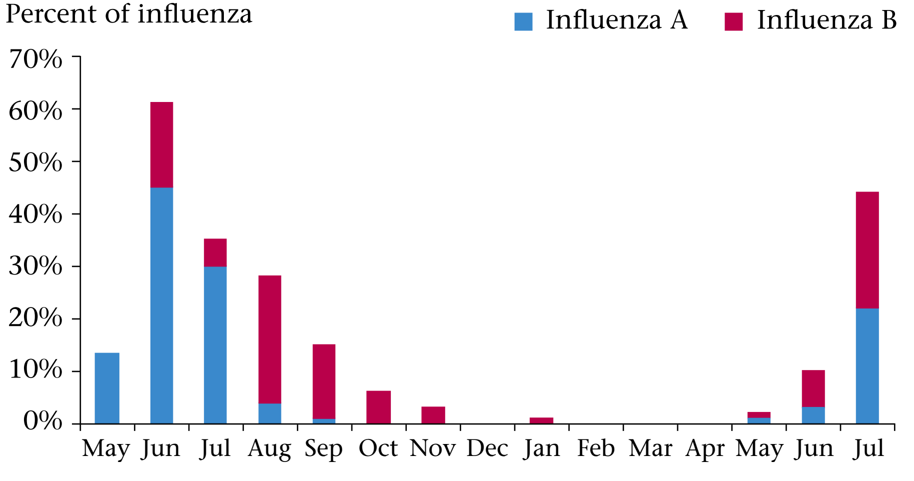
Source: Children participating in PneumoADIP surveillance in Dhaka Medical College Hospital; Chittagong Medical College Hospital; Sir Salimullah Medical College and Mitfort Hospital; ICH-Shishu Sasthya Foundation; Chittagong Maa Shishu O General Hospital; Dhaka Shishu Hospital; Kumudini Hospital, Mirzapur; and ICDDR,B's urban surveillance in Kamalapur (Dhaka) and rural surveillance in Mirzapur (Tangail).

Antimicrobial susceptibility pattern of S. typhi *among children <5 years during April-June 2008*

Antimicrobial agents	Total tested (n)	Susceptible n (%)	Reduced susceptibility n (%)	Resistant n (%)
Ampicilin	75	34 (45.0)	1 (1.0)	40 (54.0)
Cotrimoxazole	75	41 (55.0)	1 (1.0)	33 (44.0)
Chloramphenicol	75	39 (52.0)	0 (0.0)	36 (48.0)
Ceftriaxone	75	75 (100.0)	0 (0.0)	0 (0.0)
Ciprofloxacin	75	42 (56.0)	30 (40.0)	3 (4.0)
Nalidixic acid	75	4 (5.0)	1 (1.0)	70 (94.0)

Source: Children participating in PneumoADIP surveillance in Dhaka Medical College Hospital; Chittagong Medical College Hospital; Sir Salimullah Medical College and Mitfort Hospital; ICH-Shishu Sasthya Foundation; Chittagong Maa Shishu O General Hospital; Dhaka Shishu Hospital; Kumudini Hospital, Mirzapur; and ICDDR,B's urban surveillance in Kamalapur (Dhaka) and rural surveillance in Mirzapur (Tangail).

Percent of influenza positive specimens by month during May 2007-July 2008



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 catch of puffer fish in Cox's Bazaar (Courtesy: Shahana Parveen)

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