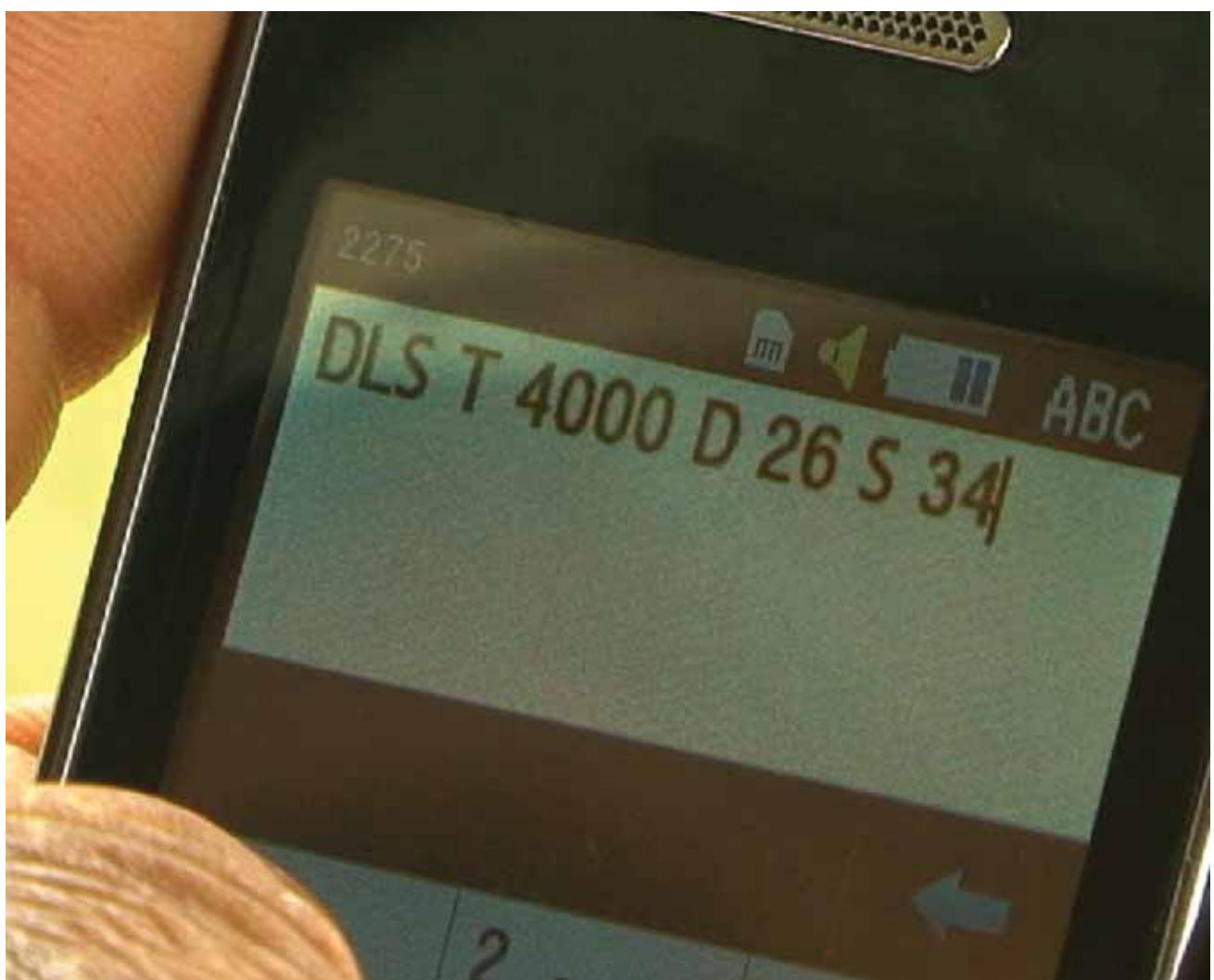


SMS Gateway, Bangladesh

Messages from the farm

Using nothing more than a common mobile phone, Bangladesh's SMS Gateway system has dramatically changed the time it takes for the government to receive and respond to reports of highly pathogenic avian influenza outbreaks. A combination of web-based software, infrastructure, skills and commitment have resulted in a dramatically effective model of rapid response to H5N1 HPAI. The process begins with a community animal health worker at the affected farm, and then moves through a diverse chain that includes upazila livestock officers, veterinary surgeons, couriers, laboratory scientists, the chief veterinary officer, and a rapid response team of culling workers.



A quick guide to Bangladesh's SMS Gateway



Dr Musaddique Husain

Chief Veterinary Officer
Department of Livestock Services, Bangladesh

'The SMS Gateway has shown excellent results in Bangladesh. We plan to continue with it and expand it in the years ahead'



What is the SMS Gateway?

The Short Messaging System (SMS) Gateway system in Bangladesh was developed in 2010 by the Food and Agriculture Organization of the United Nations (FAO), with support from the United States Agency for International Development (USAID). By dialling a unique four-digit number that has been set aside by prior agreement between all cellphone service providers, a coded message from the field is relayed directly to a server at FAO. If the message indicates the suspicion of an outbreak, an automatic SMS from the server instantly alerts the Upazila Livestock Officer and the Additional Veterinary Surgeon, who will arrange an immediate investigation. If the threat is assessed as real and serious, a sample carcass is collected and couriered to one of seven Field Disease Investigation Laboratories or the Central Disease Investigation Laboratory in Dhaka. If H5N1 HPAI is confirmed, then the flock is culled within hours.

What has been its impact?

1. Significantly improved and systematic detection of outbreaks of H5N1 HPAI.
2. Significantly improved reporting of outbreaks.
3. Improved capacity and systems at the field level to survey, assess and detect outbreaks.
4. Developed capacity of community animal health workers.
5. Significant improvement in the country's rapid response capacity against H5N1 HPAI.

What makes the SMS Gateway work?

1. The software is tailor-made to suit the administrative infrastructure in Bangladesh.
2. All players at every level of the collaboration have been thoroughly trained to understand how the SMS Gateway works, and what their role in it is.
3. It is a committed collaboration between the government, the private sector, international agencies, donors, and the grassroots community.
4. It has been developed with Bangladesh's existing telecommunication technology and human resources, and thus is easy to sustain.
5. The effectiveness of the SMS Gateway was established through a pilot project, with sufficient time to demonstrate that it worked.
6. The Bangladesh government backs the project completely, and is committed to raising the resources to sustain and expand it.
7. It is web-based and data can be accessed by authorized personnel through the Internet.
8. It is thoroughly monitored and assessed, and able to generate data about its impact and viability.

What is special about the SMS Gateway?

Before the SMS Gateway system, detection and response in Bangladesh were opportunistic, characterized by variable speed. The SMS Gateway system has made effective response, usually within 24 hours, a reality, and helped to dramatically prevent H5N1 HPAI outbreaks from spreading further.

Phone Number	Message	Total No	Dead No	Si
01711466630	T 4000 D 26 S 34 C	4000	26	34
01717786157	T 1793 D 7 S 0 N	1793	7	0
01823103129	T300 D1 S 50 C	300	1	50
01728011333	T 700 D 0 S 6 N	700	0	6
01922040413	T 1354 D 1 S 2 B	1354	1	2
01716802925	T 825 D 27 S 38 C	825	27	38

The server in the FAO office automatically alerts the appropriate Upazila Livestock Officer and the Veterinary Surgeon if an SMS coming in from the field indicates reason to suspect an outbreak of H5N1 HPAI

The power of a message

A single SMS flies from the farm to the lab and back in under 24 hours — and changes the meaning of emergency response in Bangladesh

GHIASUDDIN never dreamed that a single SMS message would lead to him restarting his life as a newly enlightened poultry farmer who knew how to keep his farm biosecure. And that too so soon after he had set up his poultry farm. But on a morning in 2011, the birds began to drop dead where they stood. Ghias noticed that several of them were unsteady on their feet, and some had discoloured wattles. By 9 in the morning, when the Community Animal Health Worker made his weekly rounds, he had lost 26 birds.

Ghias's chickens were infected with highly pathogenic avian influenza, better known as H5N1 HPAI. By evening that day, the outbreak had been confirmed by a laboratory test in Dhaka, and by nightfall a rapid response team from the Upazila Livestock Office had come to cull the surviving chickens. When the sun rose the next morning, there was nothing left of Ghias's livelihood. He would have to start all over again after the mandatory three month quarantine period.

Miraculously, while Ghias's chicken were culled, life remained undisturbed at the farms of Masud and Jibon, a mere 150 meters or so away. The outbreak at Ghias's farm had been detected, reported, diagnosed and contained so swiftly that the dreaded H5N1 HPAI had simply not had the time to spread. Behind the rapid-fire response was a sophisticated communication technology based on the cell phone and piloted in Bangladesh by the Food and Agriculture Organization of the United Nations (FAO), with support from the United States Agency for International Development (USAID).

The SMS Gateway system is demonstrating its potential to transform the speed and quality of the response to emerging disease threats. In 2010, almost 70 percent of Bangladesh's 31 outbreaks of H5N1 HPAI were reported through the SMS Gateway. In 2011, the performance was even better

While 4,000 chickens were culled on an infected farm barely 150 metres away, Masud's farm remained untouched by avian influenza, thanks to prompt reporting and swift action enabled by the SMS Gateway



Avian influenza broke out only 150 metres away — but Masud's chicken stayed safe, thanks to the SMS Gateway



Dr Mat Yamage

Chief Technical Adviser/FAO ECTAD
Country Team Leader, Bangladesh

In 2010, almost 70 percent of Bangladesh's 31 outbreaks of H5N1 HPAI were reported through the SMS Gateway. In 2011, the performance was even better — 87 percent of the 61 outbreaks were reported using this technology'

— of the 61 outbreaks so far, over 87 percent have been reported using this transformative technology. Nothing illustrates the transformation so well as the outbreak in Dohar, Bangladesh.

THREE FARMS STOOD NEXT TO each other with barely 150 metres of paddocks in between. The largest belonged to Ghiasuddin, once a cloth trader but since 2009 a poultry farmer. The smaller farm of Masud was next, and visible beyond it was poultry farmer Jibon's farm. By epidemiological logic, if there were to be an outbreak of H5N1 HPAI in any of the three farms, the other two would be directly at risk because of their extreme proximity.

H5N1 HPAI broke out at Ghiasuddin's farm on a morning in February 2011. "The birds were dying where the stood," said Ghiasuddin. "Some had discoloured wattles, and others were walking unsteadily." Mokles, the community animal health worker (CAHW) trained by FAO, arrived around nine that morning to enquire after the poultry's health. By then 26 birds had died, and Ghiasuddin had noted that an additional 34 looked very ill.

Over 1000 CAHWs in 334 upazilas have been retrained under the SMS Gateway project. Each of them visits around 50 poultry-owning households every day and asks a set of questions about their health, filing a report and also sending off a routine SMS to the server at FAO. However, if the farmer reports unusual mortality (typically greater than 5 percent of the flock), with symptoms that include bluish combs or wattles, and bleeding under the skin of feet, legs or breast, the CAHW sends off a coded SMS signalling his suspicion that an outbreak of H5N1 HPAI may be underway. Seeing the situation in Ghiasuddin's farm, Mokles sent off the following SMS: *DLS T 4000 D 26 S 34 C*. The coded message contained key information about the outbreak in a format that could be read by FAO's server.

The first three letters, *DLS*, told the mobile service provider to reroute the message to the server at the FAO office. The next letter, *T*, was followed by the *total* number of birds in the farm concerned. This was followed by *D*, with a number after it indicating the number of *dead* birds reported by the poultry farmer. The number following the fourth letter, *S*, indicated the number of birds suspected to be ill. The last letter, which can be *B* or *C*, told the server if the outbreak was at a *backyard* or a *commercial* farm.

Birth of the SMS Gateway

The proprietary software for using the SMS Gateway technology in the fight against H5N1 HPAI was developed by a team of FAO's computer technologists with inputs from epidemi-

TIMELINE OF AN EMERGENCY RESPONSE — POWERED BY THE SMS GATEWAY

9.06 am



The Community Animal Health Worker makes his weekly visit to Ghiasuddin's farm.

9.32 am



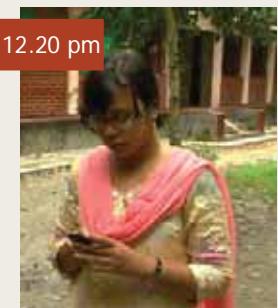
Suspecting an outbreak of avian influenza, he sends a message using the SMS Gateway. It reaches FAO's server in seconds.

12.11 pm

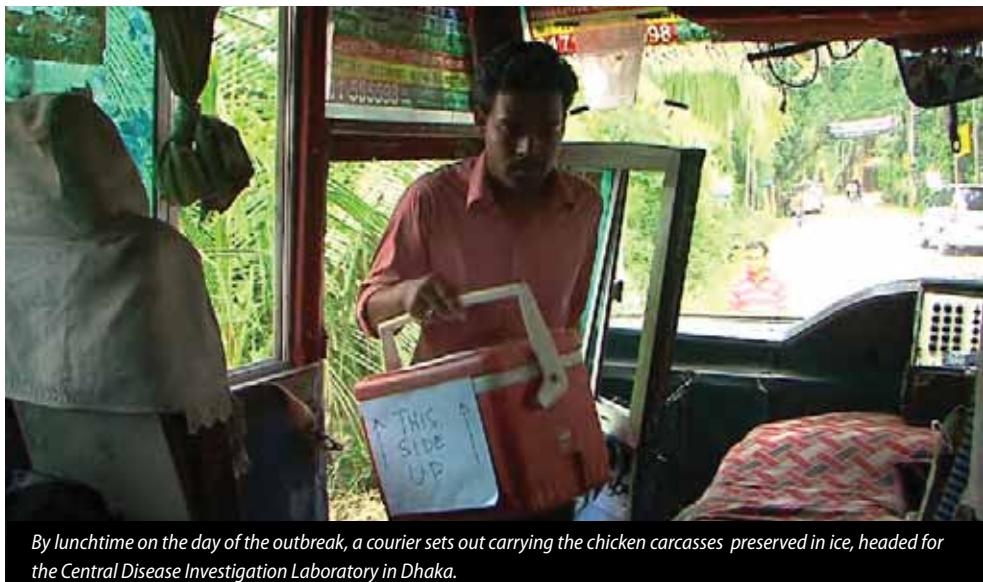


The Veterinary Surgeon and the Additional Veterinary Surgeon arrive and collect chicken carcasses that will be tested in a lab for H5N1 HPAI.

12.20 pm



A second message confirming the suspicion is sent using the SMS Gateway.



By lunchtime on the day of the outbreak, a courier sets out carrying the chicken carcasses preserved in ice, headed for the Central Disease Investigation Laboratory in Dhaka.

ologists and veterinarians from the FAO Technical Unit for the Avian Influenza Programme. In a nutshell, the technology re-routes coded messages from the field to a server in the FAO office in Dhaka. The server's software analyses the message, and instantly shoots off a second message to officials in the Upazila Livestock Office, including details of the suspected outbreak of H5N1 HPAI.

In Ghiasuddin's case, Dr Arif Hasan and Dr Nilima Ibrahim, both veterinary surgeons, were at Ghiasuddin's farm by noon, barely three hours after the CAHW's first message. After following due biosecurity protocol, and donning face masks and gloves, they entered Ghiasuddin farm to inspect the dead birds. There seemed little doubt that it was an outbreak of H5N1 HPAI. A few dead birds' carcasses were bagged and packed in ice for sending to the laboratory for testing.

A second message was sent now to the FAO server, identical to the first, though the numbers of dead and suspected ill chickens were updated. In addition, the last letter was *S*, confirming the *suspicion*. If it had turned out to be a false alarm, the letter *N* would have been sent instead.

Package to Dhaka

By around 1 pm, a courier from Dohar was boarding a bus bound for Dhaka, where laboratory scientists had been alerted and were on standby. Two hours later, the carcass was in Dhaka's Central Disease Investigation Laboratory (CDIL). Swabs from the dead birds' carcasses were dissolved in a solution, eight drops of which were placed in the well of a rapid-testing strip. If the sample was



Dr Priya Mohan Das
National Consultant, HPAI
Surveillance, FAO Technical Unit,
Avian Influenza Program

'The range of activities from detection to disinfection used to take about 4.8 days. Now, thanks to the SMS Gateway, this interval has come down to about 1.5 days'



12.53 pm
The carcasses are packed in ice and sent by courier to the rapid testing laboratory in Dhaka, two hours away by bus.



3.07 pm
The test is positive for an outbreak of H5N1 HPAI. Within seconds, a fax is sent informing the Chief Veterinary Officer (CVO) about the outbreak.



7.30 pm
The CVO issues a culling order, and later in the evening, a team of officials from the Upazila Livestock Office arrive to cull Ghiasuddin's 4000 or so chickens.



3 months later
After three months of quarantine, Ghiasuddin gets a generous compensatory cheque from the government and restocks his farm with day-old chicks. This time, his farm's biosecurity is much more robust.



Masud, Poultry farmer

'We knew that our neighbour Ghiasuddin was having sickness among his birds, and we had all been worried. But nothing happened to my birds, Allah be praised'



Within 24 hours of the first SMS, a team arrived to cull Ghiasuddin's remaining 4,000 or chickens that were at risk of H5N1 HPAI. After a few months quarantine, Ghiasuddin received a handsome compensation cheque to help him restock his farm and start over.

positive for H5N1 HPAI, two deep purple lines would appear in the window.

The result was unambiguous: it was avian influenza caused by H5N1 HPAI. A fax message went directly to the office of Bangladesh's Chief Veterinary Officer, Dr Musaddique Husain, who immediately authorized the culling of the remaining chickens on Ghiasuddin's farm. The ULO, receiving the culling order, readied the culling team.

It was a sad day for Ghiasuddin. Shortly after sunset, he watched the culling and burial of his remaining birds. His farm empty, he was required to observe a quarantine of at least three months before re-stocking his farm. During this period, he received a call from the ULO's office, telling him that a cheque from the government compensating him for his loss was ready for collection. The amount went a long way towards helping Ghiasuddin to restart his poultry farm — but with a difference.

"Although I lost everything I owned, this incident has taught me the importance of biosecurity," he says. "My new farm will be a model of biosecurity and health safety for my chickens. I have followed every step and procedure to ensure that I never have an outbreak like that again."

CRACKING THE CODE *The secret language of reporting outbreaks*

T indicates the Total number of birds in the poultry farm

S indicates the number of birds still sick in the poultry farm at the time of the SMS

Tells the mobile service provider to redirect the SMS to FAO's server

D indicates the number of birds reported dead at the time of the SMS

In the first SMS, the alphabet here indicates the kind of farm, with B for Backyard and C for Commercial. In the second SMS, it would be either N (No danger) or S (Suspicion of H5N1 HPAI)

The journey of an SMS message



The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views of FAO.

ISBN 978-92-5-106984-4

All rights reserved. FAO encourages the reproduction and dissemination of material in this information product. Non-commercial uses will be authorized free of charge, upon request. Reproduction for resale or other commercial purposes, including educational purposes, may incur fees. Applications for permission to reproduce or disseminate FAO copyright materials, and all queries concerning rights and licences, should be addressed by e-mail to copyright@fao.org or to the:

Chief, Publishing Policy and Support Branch, Office of Knowledge Exchange, Research and Extension, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy

© FAO 2011



Within three months after his chickens were culled, Ghiasuddin received a compensatory cheque from the government that went towards helping him to restock his farm with day-old chicks. This time, he made sure the farm's biosecurity was much more robust.