



## Outbreak, Surveillance and Investigation Reports

Field Epidemiology Training Program, Bureau of Epidemiology  
Department of Disease Control, Ministry of Public Health, Thailand

Tel: +6625901734-5, Fax: +6625918581, Email: osireditor@osirjournal.net, <http://www.osirjournal.net>

### Outbreak of Newcastle Disease among Recipients of the Poultry Dispersal Program in Bohol, Philippines, February 2013

Emerson P Tapdasan<sup>1,\*</sup>, Wongsathapornchai K<sup>2</sup>, Chanachai K<sup>2</sup>, Benigno CC<sup>3</sup>, Gundran RS<sup>4</sup>, Daguro LI<sup>1</sup>, Lapiz SMD<sup>1</sup>

1 Office of the Provincial Veterinarian, Provincial Government of Bohol, Tagbilaran City, Philippines

2 Coordinating Center of Field Epidemiology Training Program for Veterinarians, Department of Livestock Development, Bangkok, Thailand

3 Regional Office for Asia and the Pacific, Food and Agriculture Organization of the United Nations, Bangkok, Thailand

4 College of Veterinary Science and Medicine, Central Luzon State University, Muñoz, Nueva Ecija, Philippines

\* Corresponding author, email address: [emtapz@yahoo.com.ph](mailto:emtapz@yahoo.com.ph)

#### Abstract

Newcastle disease (ND) is a disease endemic among poultry that causes huge economic losses in the Philippines, including the Province of Bohol. On 5 Mar 2013, the Office of the Provincial Veterinarian (OPV) received a report on high mortality of native chickens in four villages of Valencia, Bohol. A team from OPV went to the affected villages to conduct a disease investigation. Objectives of the investigation were to determine the cause and source of the outbreak, and recommend control measures to prevent future outbreaks. Initial information revealed that all affected farms received native chickens distributed by a government agency. The investigation was, hence, conducted in all 47 recipient farms using a structured questionnaire. Blood samples from ill chickens without history of vaccination were collected for hemagglutination inhibition (HI) test to determine antibodies against ND virus. Clinical signs and serological test suggested that the outbreak was caused by ND virus. Univariate analysis revealed that parent stocks which were introduced to farmers on 28 Feb 2013 were the risk factor (OR=19.2, 95% CI=3.5-105.9) for the outbreak in the four villages. Traceback investigation identified possible source of infection as the introduction of infected poultry from a dispersal program of the government. This outbreak underscored the need to strengthen movement control in all ports of entry in the province. Likewise, chickens under the dispersal programs must be vaccinated and quarantined before distribution to recipient farmers.

**Keywords:** newcastle disease, poultry, Bohol, Philippines

#### Introduction

Newcastle disease (ND) is a poultry disease caused by paramyxovirus type 1 (APMV-1), genus Avulavirus, belonging to the subfamily Paramyxovirinae, family Paramyxoviridae.<sup>1,2</sup> It is characterized by gastrointestinal, respiratory and neurological signs.<sup>1-3</sup> Mode of transmission is through direct contact with infected birds or indirect contact through inanimate objects.<sup>1-4</sup> Newcastle disease virus (NDV) is also a human pathogen and the most common sign of infection in humans is conjunctivitis that develops within 24 hours of NDV exposure to the eye.<sup>3,4</sup> Reported infections in human have been non-life-threatening and there is no evidence of human-to-human spread.<sup>3-6</sup>

ND affects about 200 birds species, including chickens around the world.<sup>5</sup> ND has been regarded as endemic since its recognition in Indonesia and England during

1926.<sup>7</sup> In the Philippines, the disease occurs all year round in all 81 provinces, including the Province of Bohol wherein poultry raising is an important mean of livelihood for smallhold farmers. Poultry population in the province comprised largely of native chickens produced by smallholders for about 90%. Thus, ND has been a serious problem as it causes major losses to these farmers. To prevent these losses, the Philippine Bureau of Animal Industry (BAI) has developed the Newcastle Disease Control Program (NDCP) in 2003. The program included disease surveillance, vaccination, quarantine, information, education and communication campaign, and seminars for livestock technicians, which aimed for early detection and recognition of suspected ND cases. In vaccinating poultry, live viruses of low virulence (lentogenic) or moderate virulence (mesogenic) and inactivated vaccines are used depending on disease situation and requirements of BAI.<sup>8</sup> ND is diagnosed

through virus isolation and subsequent characterization as well as hemagglutination inhibition (HI) test.<sup>2-7</sup> Although HI test is used widely in ND serology, its usefulness in diagnosis depends on immune status of the birds to be tested and prevailing disease conditions.<sup>2</sup>

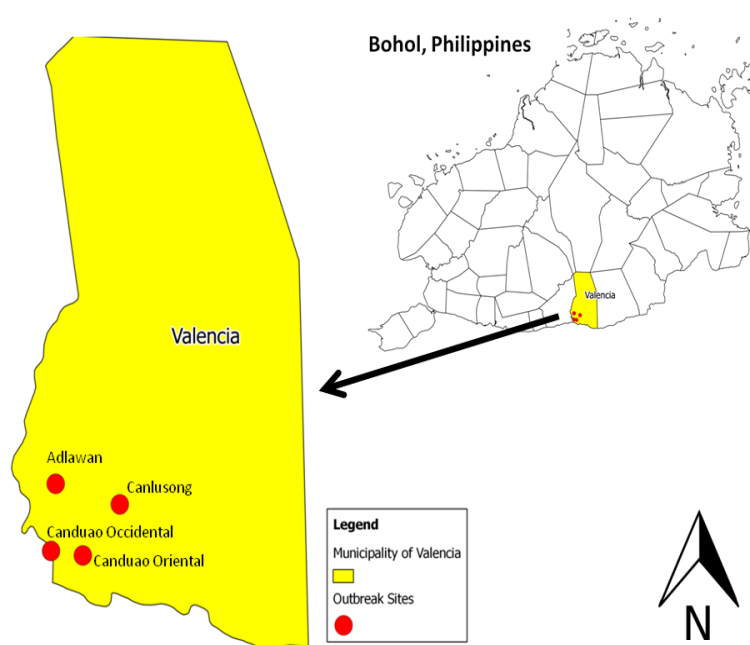
Although the disease is considered as endemic in Bohol, there has been no record of ND outbreaks since 2011, based on available data from the Philippine Animal Health Information System and records of the Office of the Provincial Veterinarian (OPV). Surprisingly, on 5 Mar 2013, the OPV received a report from the Municipal Agriculture Office (MAO) of Valencia, Bohol about massive deaths of native chickens in four villages. Furthermore, MAO and village officials confirmed that there had been no

unusual high mortality among chickens in smallhold farms of the area for many years prior to this event.

On 7-8 Mar 2013, a team with veterinarians and livestock technicians was dispatched by OPV to the affected villages to determine the cause, possible risk factors and source of the outbreak, and provide recommendations to prevent future outbreaks.

## Methods

The outbreak investigation was conducted on 7-8 Mar 2013 in four villages (barangays) of Valencia, Bohol, Philippines, which included Adlawan, Candua Occidental, Candua Oriental and Canlusong (Figure 1). All 47 farms receiving parent stocks of native chicken in Bohol were studied.



**Figure 1. Map of villages affected by newcastle disease outbreak in Valencia, Bohol, Philippines, February 2013**

A case was defined as a poultry farm in one of the four villages with a mortality rate 10% or more and reported any of the following signs: respiratory signs (sneezing, gasping for air, nasal discharge, coughing), nervous signs (depression, muscular tremors, drooping wings, twisting of head and neck, circling, complete paralysis), digestive signs (watery diarrhea),<sup>1,3-6</sup> swelling of eyelids or neck, and sudden death<sup>3</sup> during the period from 1 Feb to 7 Mar 2013.

Structured questionnaires were used to interview the affected farm owners and captured possible risk factors, including type of raising system, practice of vaccination, source of water, feeds used, distance to the nearest poultry farm and source of newly introduced parent stocks. Total 23 blood samples were taken from ill chickens without history of vaccination for HI test<sup>9</sup> to determine presence of

antibodies against NDV. The test was conducted at the Regional Animal Disease Diagnostic Laboratory (RADDL) of the Department of Agriculture - Regional Field Office (DA - RFO) in Cebu Province.

Descriptive statistics was calculated using Microsoft Excel® and map of the outbreak location was plotted using Quantum Geographic Information System (QGIS) software. Level of association and significance between possible risk factors and disease outcome were computed using Epi Info version 3.5.4.<sup>10</sup>

## Results

Of total 36 farms affected (76.6%), all were smallholders with less than 60 birds. Adlawan and Candua Oriental villages had the highest attack rate (Table 1). Two waves of the outbreak were observed, and the number of affected farms during the second

wave, which took place from 28 Feb to 1 Mar 2013, was much higher (Figure 2). The second wave started on 28 Feb 2013, the same day that parent stocks of native chicken were introduced into the farms.

Almost half of farmers in Adlawan (46.8%) had less than 20 heads of native chickens. Majority of the affected farmers had more than 30 years experience in poultry raising (97.8%).

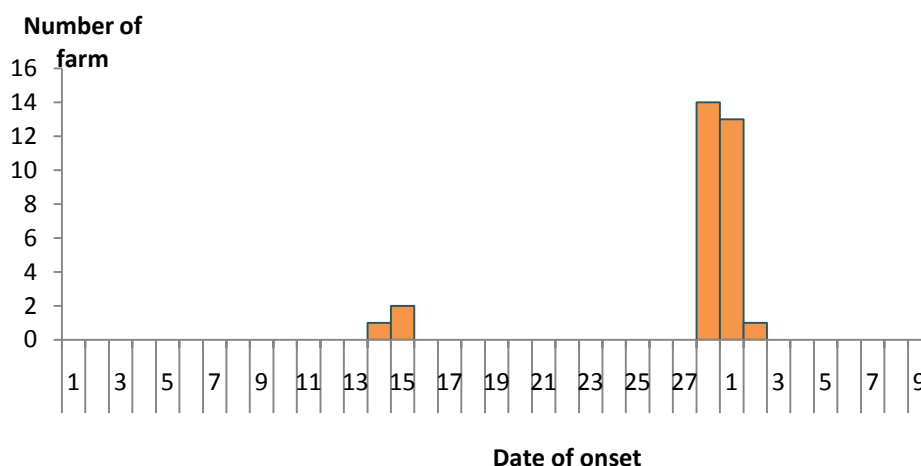
HI test revealed that 91.3% (21/23) of bird samples tested positive for antibodies against NDV. Although the affected farms reported several respiratory,

nervous and digestive signs of poultry disease within the period from 1 Feb to 8 Mar 2013, the most frequent signs reported were serous nasal or oral discharge and sudden death among birds (Figure 3).

All affected farms received the parent stocks of native chicken from a national government agency under the livestock and poultry dispersal program for smallholders. The parent stocks were introduced into the affected farms for two times on 13 and 28 Feb 2013, which were provided by a supplier in Bohol and a supplier from a live-bird market in nearby island province of Cebu respectively (Figure 4).

**Table 1. Descriptive analysis of native chicken farms in Bohol, Philippines, February 2013 (n=47)**

Variable	Category	Total number of farm	Attack rate (%)
Village	Adlawan	20	42.6
	Candua Occidental	5	10.6
	Candua Oriental	16	34.0
	Canlusong	6	12.8
Farm size (bird)	(Mean=24.7, median=20, mode=20)		
	<20	22	46.8
	20-40	15	31.9
	41-60	8	17.0
	>60	2	4.3
Age of owner (year)	(n=46, mean=53.7, median=54, mode=54)		
	<30	1	2.2
	30-40	6	13.0
	41-50	12	26.1
	51-60	17	37.0
	>60	10	21.7
Distance from the nearest farm (meter)	(n=45, mean=55.4, median=20, mode=20)		
	<20	12	26.7
	20-40	10	22.2
	>41	14	31.1



**Figure 2. Date of onset of affected native chicken farms in Bohol, Philippines, February 2013 (n=36)**

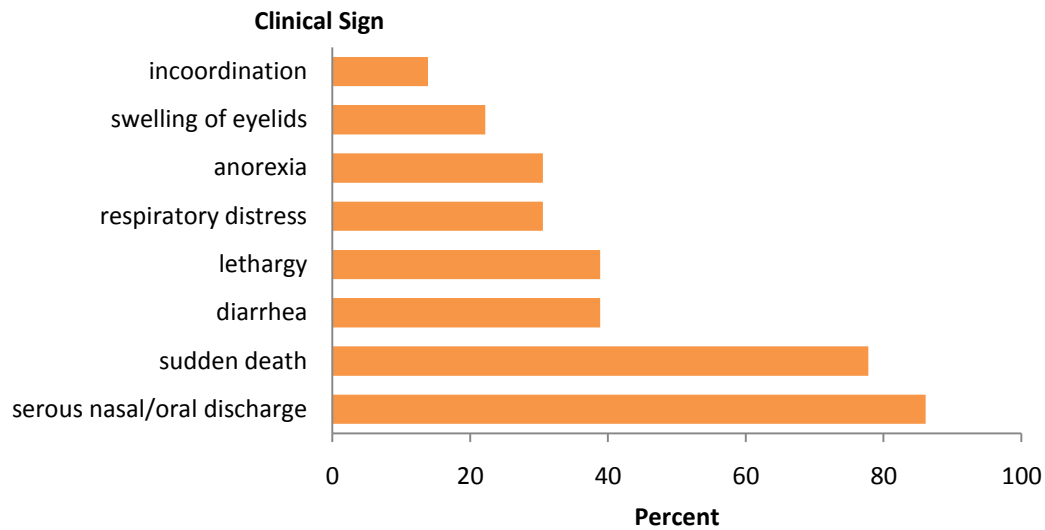


Figure 3. Most frequently reported clinical signs in affected native chicken farms in Bohol, Philippines, February 2013

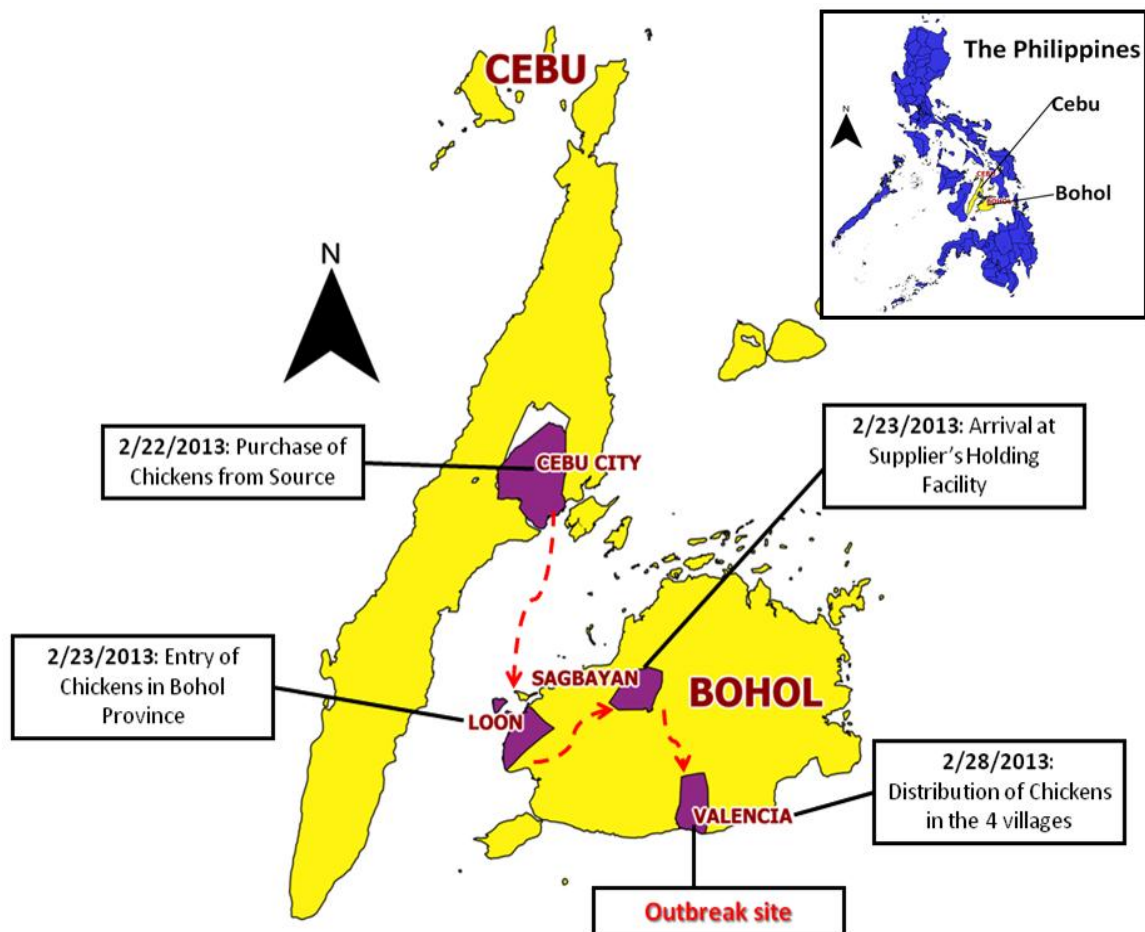


Figure 4. Transport route of parent stocks of native chickens introduced to farms in Valencia, Bohol, Philippines on 28 Feb 2013

Introducing parent stocks to farms on 28 Feb 2013 was a significant risk factor (OR=19.2, 95% CI = 3.50-105.87) for ND outbreak among native chickens in four villages (Table 2). Massive ND vaccination in all chicken population in the 4 affected and adjacent villages, education and communication campaign

among villagers and local officials about backyard biosecurity and movement restriction were done by OPV to control the outbreak. The disease outbreak lasted for two and half months from 28 Feb until 25 May 2013 when the livestock technicians no longer reported additional cases in four villages.

**Table 2. Univariate analysis of farm characteristics and disease outcome in Bohol, Philippines, February 2013 (n=47)**

Variable	Number of farm (%)	Odds ratio (95% CI)
Farmer's age <60 years (n=46)		
Yes	33 (71.7)	1.7 (0.39-6.99)
No	13 (28.3)	Reference
Years in poultry raising (n=46)		
< 10	10 (21.7)	1.3 (0.24-7.47)
≥ 10	36 (78.3)	Reference
Farmer's education (n=45)		
Elementary and below	14 (31.1)	0.6 (0.14-2.59)
High School and higher	31 (68.9)	Reference
Type of raising system		
Free-raising	36 (76.6)	1.3 (0.28-6.14)
Strictly confined	11 (23.4)	Reference
Vaccination		
No	42 (89.4)	0.8 (0.07-8.01)
Yes	5 (10.6)	Reference
Source of water		
Rain water, canal, stream	30 (63.8)	0.6 (0.14-2.83)
Municipal water	16 (34.0)	Reference
Feeds used		
Own feed formulation	34 (72.3)	0.2 (0.02-1.75)
Commercial feeds	13 (27.7)	Reference
Distance to the nearest poultry farm (meter)		
≤ 20	24 (51.1)	0.8 (0.22-3.23)
≥ 21	23 (48.9)	Reference
New parent stocks introduced on 28 Feb 2013		
Yes	37 (78.7)	19.2 (3.50-105.87)
No	10 (21.3)	Reference
New parent stocks introduced on 13 Feb 2013		
Yes	17 (36.2)	0.1 (0.03-0.58)
No	30 (63.8)	Reference

## Discussion

Clinical signs and serological test suggested that the outbreak was caused by NDV. Although the majority of clinical signs in affected poultry farms began on 28 Feb and 1 Mar 2013, the epidemic curve showed that there was another outbreak that started on 14 Feb 2013. This information coincided with the introduction of new stocks through the poultry distribution program of the government, which was a significant risk factor as well. The infection might occur from their origin or during transportation. According to a Provincial Quarantine Officer, under the Philippine quarantine regulations, livestock and poultry traders must be able to secure a livestock handler's license and shipping permit issued by provincial or regional quarantine officers and a veterinary health certificate issued by a licensed veterinarian before their shipments were allowed to enter any island province like Bohol. However in this case, the supplier admitted that he did not possess

any of the above-mentioned documents. Furthermore, the shipment had not been inspected by quarantine officers at the port of Bohol since the trader disembarked at a small port outside the capital city, where there was no designated quarantine officer.

## Limitations

Although all 48 recipients of the native chicken dispersal program in the province were included in the study, the small sample size was the most likely reason for very wide confidence intervals in the inferential analysis of risk factors and disease outcome.

## Conclusion

The outbreak was caused by ND brought about by parent stocks of native chickens introduced into the farms on 28 Feb 2013 under a government-initiated native chicken dispersal program. Chickens without history of vaccination were provided by the commissioned supplier from different live-bird

markets in the neighboring island province and introduced into the four villages in Bohol where there was no vaccination. Failure to intercept the entry of poultry shipment at the port of disembarkation in Bohol also contributed to the disease outbreak.

## Recommendations

This outbreak underscored the need to strengthen veterinary quarantine regulations in all ports of entry in the Province of Bohol, including sub-ports outside the capital city. Chickens under the dispersal programs must be vaccinated against ND and quarantined before distribution to farmers. The results of this investigation, including the recommendations, were presented to the concerned government authorities such as the Provincial Quarantine Office, Department of Agriculture, poultry farmers and other relevant stakeholders for their information and corresponding actions.

## Acknowledgment

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## Suggested Citation

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