



**ROYAL GOVERNMENT OF BHUTAN**

**NATIONAL INFLUENZA PANDEMIC  
PREPAREDENESS PLAN**

**Updated Version  
2011**

**Thimphu  
August 2011**

*For obtaining hard copies of this NIPPP or to provide feed back please write to:*

Preparedness and Mitigation Division  
Department of Disaster Management  
Ministry of Home and Cultural Affairs  
Near Motithang BOD, POBox 1493  
Thimphu, Bhutan  
Tel/Fax: +975-2-334944 / 322945

Department of Public Health  
Ministry of Health  
Royal Government of Bhutan  
Kawajangsa, PO Box: 726  
Thimphu, Bhutan  
Tel:+975-2-322602, 322351, 328091, 328092, 328093

National Center of Animal Health  
Department of Livestock  
Ministry of Agriculture and Forestry  
P.O. 155, Serbithang, Thimphu, Bhutan  
Phone: +975-2-351083/351093/351568  
Fax: +975-2-351095  
Email: rvec@druknet.bt

## **Table of Content**

ACRONYMS	7
EXECUTIVE SUMMARY	9
I. INTRODUCTION AND BACKGROUND	12
1.1. Background on Pandemics	12
1.1.1. Avian Influenza H5N1	12
1.1.2. Pandemic Influenza A 2009 H1N1	13
1.2. Demographic Profile of the Country	14
1.3. Background on Human Health and Animal Health Administration	15
1.3.1. Human Health Care System	15
1.3.1.1. Health Care at National Level	15
1.3.1.2. Health Care at Regional Level	16
1.3.1.3. Health Care at District Level	16
1.3.1.4. Health Care at Sub-District Level	16
1.3.1.5. Disease surveillance and HIMS	17
1.3.2. Animal Health Care System	17
1.3.2.1. Department of Livestock	17
1.3.2.2. Bhutan Agriculture and Food Regulatory Authority	18
1.3.2.3. Animal Disease Surveillance and Response	19
1.3.2.4. Poultry production systems	20
1.3.2.5. Risk Assessment	21
II. EMERGENCY MANAGEMENT AND COORDINATION OF AVIAN AND HUMAN INFLUENZA	
2.1. Institutional Arrangement for Influenza Pandemic	23
2.1.1. National Steering Committee for the NIPPP	23
2.1.2. National Executive Committee	24
2.1.3. Coordinated Incident Command Structures	25
2.2. Intersectoral Response	27
2.2.1. Lead agencies	28
2.2.1.1. Ministry of Health (MoH) as lead agency	28
2.2.1.2. Ministry of Agriculture and Forests (MoAF) as lead agency	28
2.2.1.3. Ministry of Home and Cultural Affairs as a lead agency in Emergency Management	28
2.2.1.4. Dzongkhag/District Administration	28
2.2.2. Sectoral Response	29
Healthcare	29
Food and Fuel Supply	29
Law and Order	30
Finance and Insurance	30
Power and Electricity	31
Transportation	31
Telecommunication	32
Education	33
Water and Sanitation	33
Private Sector	34

2.3. International Organizations	35
<b>III. HUMAN HEALTH: INFLUENZA PANDEMIC PLANNING</b>	<b>38</b>
3.1. Objective	39
<b>3.2. Influenza Pandemic Preparedness Strategies – Preparedness Phase</b>	<b>39</b>
3.2.1 Planning, Coordination and General Measures	39
3.2.1.1. Incident command structure for influenza pandemic	40
3.2.1.2. Pan Operability	41
3.2.2. Surveillance and Monitoring	41
3.2.2.1. Laboratory Diagnostic Capacity	42
3.2.2.1. Rapid Response Team	42
3.2.3. Health Care Capacity Planning	43
3.2.3.1. Surge Capacity – Health workers, health facilities and supplies	44
3.2.3.2. Health Workers’ Capacity Development	45
3.2.3.3. Multi Sectoral Task Force	45
3.2.3.4. Stockpile of antiviral drugs and personal protective equipment	46
3.2.3.4.1. Antiviral Drug	46
3.2.3.4.2. Personal Protective Equipment and Masks	46
3.2.3.4.3. Treatment of human influenza cases	47
3.2.3.4.3. Antiviral Prophylaxis	47
3.2.4. Public Health Measures	48
3.2.4.1. Communication	49
<b>3.3. Influenza Pandemic Response Strategies – Response Phase</b>	<b>50</b>
<b>3.3.1. Scenario 1: Low overall population attack rate</b>	<b>50</b>
3.3.1.1. Planning, Coordination and General Measures	50
3.3.1.1.1. Incident Command Structure – Response Phase	51
3.3.1.1.2. National Incident Command Centre (NICC)	51
3.3.1.1.3. Incident Operation Centre (IOC)	52
3.3.1.1.4. Rapid Response Team (RRT)	54
3.3.1.2. Surveillance, Early Warning and Monitoring	55
3.3.1.2. Rapid Containment	55
3.3.1.3. Health Care Capacity Response	56
3.3.1.4. Public Health Measures	57
<b>3.3.2. Scenario 2: Moderate overall population attack rate</b>	<b>57</b>
3.3.2.1. Response action for low virulence	57
3.3.2.2. Response action for high virulence	58
3.3.2.2.1. General Measures	58
3.3.2.2.2. Surveillance and Monitoring	58
3.3.2.2.3. Health care capacity response	58
3.3.2.2.4. Public Health Measures	59
<b>3.3.3. Scenario 3: High overall population attack rate</b>	<b>59</b>
3.3.3.1. Response action for very high virulence	59
3.3.3.1.1. General Measures	59
3.3.3.1.2. Surveillance and Monitoring	60
3.3.3.1.3. Health care capacity response	60
3.3.2.1.4. Public Health Measures	60

#### IV. ANIMAL HEALTH: CONTROLLING THE DISEASE IN ANIMALS AND PREVENTING SPREAD TO HUMAN

4.1. Objective	61
Veterinary Response to HPAI Strategies	61
4.2. Phase 1: Keeping Bhutan Free of Avian Influenza	61
4.2.1. Surveillance for early detection of incursion of HPAI	61
4.2.2. Upgradation of Laboratory Diagnostic Capacity	64
4.2.3. Veterinary Vigilance Team	65
4.2.4. Import Ban of Poultry and Poultry Products from HPAI affected Countries	66
4.2.5. Border Control	66
4.2.6. Training of veterinary staff on prevention and response to HPAI Outbreak	67
4.2.7. Upgrading of Biosecurity of Poultry Farms	67
4.2.8. Strengthen Disease Reporting System	67
4.2.9. Awareness Campaigns	67
4.3. Phase 2: Veterinary Response to HPAI Outbreak	68
4.3.1. Incident Command Structure for HPAI Response	68
4.3.1.1. National Incident Command Centre (NICC)	69
4.3.1.2. Incident Operation Centre (IOC)	70
4.3.1.3. Rapid Response Teams -Livestock	72
4.3.1.4. Disease Investigation Team	72
4.3.1.5. Surveillance Team	72
4.3.1.6. Three-D Team	73
4.3.1.7. Quarantine and Movement Control Team	73
4.3.1.8. Medical Team	74
4.3.1.9. Logistic Team	74
4.3.1.10. Information and Communication Team	74
4.3.1.11. Law and Order Team	74
4.3.1.12. Compensation Committee	74
4.3.2. Case Definition for HPAI	75
4.3.3. Low Pathogenicity Avian Influenza (LPAI)	75
4.3.4. Differential Diagnosis	76
4.3.5. Infected and Suspect Infected Place Procedures	76
4.3.5.1. Declaration of Provisional Protection Zone	77
4.3.5.2. Detention of suspected birds/flock in the provisional protection zone	77
4.3.5.3. Declaration of Protection Zone	77
4.3.5.4. Declaration of Surveillance Zone	77
4.3.6. Stamping for Control of HPAI Outbreak	78
4.3.7. Strategic vaccination during outbreak	80
4.3.8. Enhanced bio-security at poultry farms and associated premises	80
4.3.9. Compensation for culled birds, eggs, feed, etc	80
4.3.10. Personnel Safety	81

#### V. RISK COMMUNICATION AND PUBLIC INFORMATION MANAGEMENT STRATEGY

5.1. Background	82
5.2. Risk Communication Strategy	82
5.3. Public Information Management Strategy	82
5.4. Communications objectives	83

## **List of Appendixes**

- A1. WHO Pandemic Phase Descriptions and Main Actions by Phase
- A2. Organogram of the Ministry of Health
- A3. Organogram of the Animal Health Administration of the Ministry of Agriculture and Forests
- A4. Contact list of Departments and Officials
- A5. SOP-Avian Influenza Surveillance in Humans
- A6. Contact Tracing Form
- A7. SOP-Clinical Management Guidelines
- A8. SOP-Infection Control Guideline
- A9. SOP-Quarantine Guideline for Avian Influenza
- A10. SOP-Rapid Containment Operation Protocol
- A11. SOP-PPE Use Guideline for PI
- A12. Laboratory Form for PI
- A13. SOP-HPAI Surveillance for AI
- A14. SOP-AI Disease Outbreak Investigation
- A15. SOP-AI Decontamination
- A16. SOP-AI Movement and Quarantine Control
- A17. SOP-Collection of Swab Samples
- A18. SOP-Collection of Blood Samples
- A19. SOP-Necropsy Samples
- A20. SOP-AI Sample Preparation, Preservation and Storage
- A21. SOP-AI Sample Transportation
- A22. SOP-Diagnostic kits for Rapid Antigen Detection Test
- A23. SOP-Diagnostic Test for Virus Isolation
- A24. SOP-Diagnostic Kits for HA/HI Test
- A25. SOP-Diagnostic Kits for PCR
- A26. SOP- Use of PPE for AI
- A27. Laboratory Sample Datasheet for AI
- A28. Laboratory Sample Datasheet for AI - wild birds/animals
- A29. SOP-Culling and Disposal
- A30. Social Distancing Guideline
- A31. Tool Kit for school on prevention of influenza pandemic infection

## ACRONYMS

ADLO:	Assistant District Livestock Officer
ADB:	Asian Development Bank
AFB:	Acid Fast Bacilli
AFP:	Acute Flaccid Paralysis
AIDS:	Acquired Immune Deficiency Syndrome
ANM:	Auxiliary Nurse Midwife
ARI:	Acute Respiratory Infections
BAFRA:	Bhutan Agriculture and Food Regulatory Authority
BHU:	Basic Health Unit
BSL:	Biosafety Level
CLO:	Chief Livestock Officer
CRQO:	Chief Regulatory and Quarantine Officer
CVO:	Chief Veterinary Officer
DCVO:	Deputy Chief Veterinary Officer
DCCC;	District Culling and Compensation Committee
DHSO:	District Health Supervisory Officer
DLO:	District Livestock Officer
DMO:	District Medical Officer
DOC:	Day Old Chicks
DoL:	Department of Livestock
DoPH:	Department of Public Health
DVED:	Drug, Vaccine, Equipment Division
DVO:	District Veterinary Officer
ELISA:	Enzyme Linked Immunosorbent Assay
ENT:	Ears, Nose & Throat
EOC:	Emergency Operation Center
FAO:	Food and Agriculture Organisation
GNM:	General Nurse Midwife/Staff Nurse
HIV:	Human Immuno Deficiency Virus
HMIS:	Health Management Information System
HPAI:	Highly Pathogenic Avian Influenza
IEC:	Information Education & Communication
IFAT:	Immunofluorescent Antibody Technique
IHR:	International Health Regulations
IMTF:	Inter-Ministerial Task-Force on Multi-Sectoral Pandemic Preparedness and Response
JDWNRH:	Jigme Dorji Wangchuk National Referral Hospital
LEC:	Livestock Extension Centre
LSU:	Laboratory Services Unit
MCH:	Maternal & Child Health
MoAF:	Ministry of Agriculture and Forests
MoH:	Ministry of Health
MoHCA:	Ministry of Home and Cultural Affairs
MEA:	Ministry of Economic Affairs
HPAI:	Highly Pathogenic Avian Influenza
NCAH:	National Centre for Animal Health
NCD:	Nature Conservation Division
NIPPP:	National Influenza Pandemic Preparedness Plan

NTF:	National Task Force
NTC:	National Technical Committee
OPD:	Out Patient Department
PHL:	Public Health Laboratory
PPE:	Personnel Protective Equipment
RGOB:	Royal Government of Bhutan
RI:	Regulatory Inspector
RNR:	Renewable Natural Resources
RRH:	Regional Referral Hospital
RRT:	Rapid Response Team
RSPN:	Royal Society for the Protection of Nature
RVL:	Regional Veterinary Laboratory
SAARC:	South Asian Association for Regional Cooperation
TB:	Tuberculosis
TCP:	Technical Cooperation Project
UNICEF:	United Nation's Children Fund
WB:	World Bank
WHO:	World Health Organization
VHW:	Village Health Worker



## EXECUTIVE SUMMARY

Influenza pandemic is an epidemic of a contagious viral disease of the respiratory tract that becomes very widespread and affects a whole region, a continent of the world. It is a major threat to public health worldwide because of its ability to spread rapidly through populations and to cause complications.

Highly pathogenic avian influenza caused by influenza A subtype H5N1 has emerged as a potential candidate for the next influenza pandemic. The virus has affected poultry and wild and migratory birds in 61 countries since 2003 and as of September 2009 has been detected and reported in neighboring countries of India, China, Bangladesh, Nepal and Pakistan. The virus has expanded its host range and has affected a wide range of birds in the wild and in zoos, and mammals which included humans, pigs, domestic cats and tigers.

As of September 2010, 505 laboratory confirmed human cases of avian influenza, of which 300 were fatal have been reported globally. The virus has affected multiple countries in Europe, the Near East, Africa and Asia.

Humans are considered to be aberrant hosts and do not transmit infection to any degree, but they are at risk of reaching spillover host status due to viral evolution, which could result in a global influenza pandemic with serious consequences on health and will cause major social, economic and political disruption.

In January 2004, following the epidemic outbreak of H5N1 in Southeast Asian countries Bhutan's Ministry of Agriculture and Forests (MoAF) and Ministry of Health (MoH) initiated contingency measures to prevent incursion of H5N1 virus into the country and to strengthen the surveillance system in the agriculture and human sectors in order to detect and respond to any outbreaks rapidly. Focal officers were identified from the Department of Livestock, Bhutan Agriculture and Food Regulatory Authority (BAFRA) of MoAF, and the Department of Public Health of MoH to facilitate collaboration between the two ministries to implement contingency measures. A risk assessment was carried out by the National Centre for Animal Health (NCAH) of the Department of Livestock during the period January to February 2004. The assessment at that time indicated a very low risk for incursion of the virus into the country. This risk has greatly increased by 2006 to 2009 period due to repeated widespread epidemic outbreaks of H5N1 virus in neighboring districts of West Bengal and Assam states of India.

Bhutan has a human population of approximately 0.7 million people (2004 census) and a poultry population of 230,000 chickens in two semi-commercial farms<sup>1</sup>, three government farms<sup>2</sup> and the rest in backyard farms. Bio-security in these farms ranges from very low to moderate. One hundred and seventy-five livestock extension centre present at 205 Gewogs (block level) report unusual mortality in poultry in the villages to the four Regional Livestock Development Centres (previously Regional Veterinary Laboratories) or to the NCAH and they follow up these reports with epidemiological and laboratory investigations. In addition, monthly animal health reports are posted on the MoAF website ([www.moa.govt.bt](http://www.moa.govt.bt)). As of September 2009 the veterinary laboratory diagnostic capability was limited to rapid tests for avian influenza A virus. The MoAF has formulated policies regarding culling and compensation for farmers should the need arise. Work on segregating piggery farms from poultry farms in the Government owned farms and some of high risk villages had been initiated.

---

<sup>1</sup> Pradman at Wangchutaba and Bama at Genkha

<sup>2</sup> Located at Paro, Lingmethang, Gelephu

In the human health sector, 172 Basic Health Units (BHUs) report monthly morbidity data to the district health supervisors who then compile and consolidate reports received from all BHUs and the district hospital and send them to the Health Information Unit at National level on a quarterly basis. Information about any suspected disease outbreak is sent rapidly through telephone and teams from the district or central level are then deputed to investigate the outbreaks. As with the Veterinary laboratories, the Public Health Laboratory diagnostic capability for influenza virus is limited to rapid tests for Influenza A. Health care facilities at district and national levels also lack infection control capacities to isolate and treat human cases of avian influenza. Seasonal influenza vaccination is not practiced in Bhutan.

Following the outbreak of H5N1 in Southeast Asia and its neighbouring countries in 2004, the Royal Government of Bhutan recognized the need for a coordinated national preparedness mechanism to prevent from possible impacts of entry of highly pathogenic avian influenza (HPAI) into the country. This led to the early implementation of a number of contingency measures across Bhutan. These mechanisms, along with other preparedness efforts, have resulted in relatively low rates of H5N1 and Pandemic H1N1 in Bhutan compared with the rest of the region. 32 cases H5N1 have been confirmed in poultry, while no human cases have been confirmed to date (as of March 2011). With regards to H1N1, a relatively low 2,431 cases has been confirmed in humans and no deaths have yet been reported as of end 2010.

Realizing that a pandemic preparedness plan would be critical to ensure that core capacities be developed to respond effectively to any outbreak of HPAI and pandemic influenza the MoAF and MoH drafted the National Influenza Pandemic Preparedness Plan (NIPPP). The NIPPP identifies resource needs and sets out procedures for mobilizing and deploying expertise and services quickly to pre-empt any pandemic and reduce its impact. The NIPPP is an all-government document that details the arrangements and specific actions to be carried out in the management of pandemic influenza.

The objectives of the NIPPP are:

- (i) to reduce the opportunities for human infection,
- (ii) to strengthen surveillance and early warning system and response,
- (iii) to contain or delay spread of virus at the source,
- (iv) to minimize morbidity, mortality and social disruption, and
- (v) to monitor and evaluate the response capacity.

The NIPPP incorporates the following major strategic actions to achieve the aforementioned objectives:

- Establish Executive Committee and National Steering Committee to develop policies, undertake political decisions for implementation of the plan and ensure collaboration amongst relevant sectors;
- Establish explicit incident command systems to respond effectively to influenza outbreak in animals and humans;
- Outline sectoral roles, responsibilities and functions of human and animal health and other sectors on emergency management.
- Develop laboratory capacities of the MoAF (NCAH, four RVLs, and the Veterinary laboratory of BAFRA) and the MoH (National Public Health Laboratory, National Referral Hospital Laboratory and two Regional Referral Hospital laboratories) to diagnose H5N1 and other influenza virus through provision of appropriate equipment, reagents and training of laboratory staff;

- Institute proper laboratory based surveillance system to monitor influenza in humans and animals, especially in poultry throughout the entire country, and compile, analyze and report on surveillance data on a weekly basis;
- Identify and train Rapid Response Teams (RRT) at district and national levels for conducting epidemiologic investigations and rapid responses to outbreaks in both the animal and human health sectors;
- Formulate policies and decide on methods for safe and humane culling and disposal of infected and in-contact poultry
- Develop policies and guidelines for adequate compensation to farmers for culling of poultry;
- Implement segregation of piggeries and poultry farms at high risk areas wherever possible;
- Strengthen bio-security measures in poultry farms;
- Strengthen border controls and surveillance;
- Provide adequate Personnel Protective Equipment (PPE) and training on use of PPE for persons working in laboratories, health care facilities and farms and also for cullers and any other workers at risk;
- Stockpile antiviral drug and develop a clear-cut policy for strategic use of the antiviral drugs;
- Develop and implement a risk communication strategy for high risk occupational groups, media and general community;
- Develop health and essential services contingency plan for implementation during outbreaks in poultry or in the phase of pandemic;
- Explore ways to have access to appropriate vaccines if and when they are required;
- Establish and strengthen mechanisms for collaboration and rapid sharing of information with international agencies such as the World Health Organization (WHO), the World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO).

WHO has developed a set of definitions that classify the phases of a pandemic. During a pandemic, WHO will announce the onset of each phase based on international evidence from the WHO Pandemic Taskforce and international consultation. Bhutan's National Influenza Pandemic Preparedness and Response mechanism is based on the WHO phases. For detailed description of the WHO pandemic Phases, please refer to Appendix I.

## **I. INTRODUCTION AND BACKGROUND**

### **1.1. BACKGROUND ON PANDEMICS**

Each century has witnessed an average of three pandemics of influenza occurring at intervals ranging from 10 to 50 years. They started abruptly without warning, engulfed the globe with ferocious speed and caused illness in more than 25% of the total population. In the last century, pandemics of influenza occurred in 1918-19 (Spanish Flu), 1957-58 (Asian Flu), and 1968-69 (Hong Kong Flu). An estimated 40-50 million persons died during the great influenza pandemic of 1918-19 in less than one year. Most deaths occurred in young and healthy persons in the 15 to 35 years group. Spanish Flu caused a form of viral pneumonia that killed healthy and fit persons within 48 hours. The pace of spread and the rate of death outstripped response capacity at every level, resulting in severe social and economic disruption. Although the influenza pandemics that hit in 1957 and 1968 were less virulent and the world was better prepared to cope with it, each one of them was responsible for deaths of 1-4 million people.

There are *three* pre-requisites for an influenza pandemic:

- (i) *emergence of a novel virus with a high degree of susceptibility among the population at risk,*
- (ii) *ability of the virus to replicate and cause disease in humans,*
- (iii) *an efficient person to person transmission mechanism.*

#### **1.1.1. BACKGROUND ON AVIAN INFLUENZA H5N1**

The first two pre-requisites have already been met by the current circulating H5N1 virus and therefore it is considered to be a potential candidate for the next influenza pandemic.

The current epidemics appeared to have arisen due to the establishment of H5N1 infection in wild birds around 2000 to 2002 period, following earlier evolution of multiple genotypes from the precursor H5N1 virus first identified in geese in China in 1996. This virus appeared to have arisen by genetic reassortment among earlier progenitor viruses which infected a number of different bird species. Once the epidemics were seeded into various countries in the region, continuing transmission has depended principally on movement of live birds through marketing channels within country and possibly between countries, which have caused the large scale epidemics, and made control very difficult in countries which have complex poultry trading patterns. There appears to have been interchange of infection between wild bird (principally the family Anatidae) and domestic bird (principally ducks, geese, and quails) reservoirs, which then cause spillover infection into chickens and other domestic poultry, and from there into a range of mammalian species.

Outbreaks of H5N1 in domestic poultry reported to the OIE between December 2003 and 30<sup>th</sup> September 2009 totals to 6621 in 50 countries, 76 in India, 322 in Bangladesh, 97 in China, 2 in Nepal, 51 in Pakistan, 1141 in Thailand, and 93 in Myanmar. A total of 62 countries notified H5N1 outbreaks in domestic poultry and wildlife between December 2003 and September 2009.

The H5N1 virus which has caused the Asian epidemic had emerged by around 1996, when it caused an outbreak of influenza in geese in Guangdong, China, with high death rates, and it may have already been circulating in the region some years earlier. It came to international attention in 1997 when it caused an outbreak of severe disease in poultry in Hong Kong SAR, because for the first time a true avian influenza virus caused serious human disease, with 18 people clinically

affected and six deaths. Subsequent serological evidence has indicated that additional people were infected with the virus without showing clinical signs, and there was evidence of occupational exposure. Previously it had been considered that true avian viruses could not cause serious disease in man, but since 1997 the H5N1 virus has caused further severe cases of human disease, and avian viruses of H7 and H9 subtypes have caused human infection, with one fatality in the Netherlands due to an H7N7 virus.

During the current H5N1 outbreaks, more than 150 million birds were destroyed or died and the direct economic costs to affected countries amounted to US\$ 8-12 billion. A modest pandemic over one year could cause losses as high as 3% of Asian GDP and 0.5% of world GDP. This is equivalent to a GDP loss of about \$150-200 billion. Therefore, in addition to high morbidity and mortality, the next pandemic may cause massive social, political and economic disruption.

By 8 June of 2010, a total of 499 confirmed cases and 295 deaths (case fatality ratio 60%) in humans had been reported to WHO.<sup>3</sup>

As of March 2011, 32 cases H5N1 have been confirmed in poultry, while no human cases have been confirmed to date in Bhutan.

The ongoing H5N1 epidemics in poultry and the occurrence of disease caused by H5N1 in man created a high sense of awareness of the imminent likelihood of a new pandemic, irrespective of whether it would be caused yet by another influenza A virus or a re-assortment of the currently circulating H5N1. This NIPPP was developed to ensure that all the needed resources, expertise and services can be mobilized and deployed rapidly to reduce the morbidity, mortality and social disruption to the minimum. Establishment and strengthening core capacities to preempt and control the next pandemic would also be useful in dealing with other infectious disease epidemics and public health emergencies of international concern as required under IHR (2005).

Despite its vulnerability, no human cases of H5N1 have been detected in Bhutan. Virus could conceivably enter via infected poultry, migratory birds or infected humans. The border between Bhutan and India is porous and there is a heavy traffic of people and goods between Bhutan and India. The majority of poultry imports come from India.

### **1.1.2. BACKGROUND ON PANDEMIC INFLUENZA A 2009 H1N1**

In April 2009 a novel Influenza A(H1N1) virus emerged in Mexico and US. On 25 April 2009, WHO announced that the emergence and rapid spread of the novel virus constituted a public health emergency of international concern. On 11 June 2009 WHO declared that the pandemic alert level has risen to Phase 6. Subsequently, Influenza A (H1N1) spread globally with the virus reported in all continents in less than six weeks. As of end of May 2010, the influenza pandemic was reported laboratory confirmed cases at least 214 countries and territories, including at least 18,114 deaths reported from 135 countries and territories.<sup>4</sup> Due to decreasing transmission from human-to-human in the second half of 2009 and expected to circulate in forms of seasonal flu, WHO announced that the Influenza A H1N1 event has moved to post-pandemic period on 10 August 2010.

---

<sup>3</sup> Animal and Pandemic Influenza, A Framework for Sustaining Momentum, Fifth Global Progress Report, July 2010

<sup>4</sup> Ibid.

Regarding Influenza A (H1N1), a relatively low 2,431 cases have been confirmed in humans and no deaths have yet been reported as of end 2010. Additional cases in forms of seasonal flu had been detected in 2011.

#### 1.4. DEMOGRAPHIC PROFILE OF THE COUNTRY

The Kingdom of Bhutan, a landlocked 38,394 square kilometer country, is situated between latitude 26.45 N and 28.10 N and between longitudes 88.45 E and 92.10 E with India in the west, south and east and China (Tibet) in the north. The entire country is mountainous with flat land limited to southern borders and valleys. The terrain encompasses the rolling Indian plains about 180 meters above sea level and the snow-capped Himalayan Mountains of over 7,550 meters above sea level. The economy is primarily based on agriculture and livestock and hydropower. About 69.1 per cent of Bhutan's population of 672,425 (RGOB, 2005<sup>5</sup>) relies on agriculture and contributes about 45% of the GNP. More than 90% of the people depend on subsistence farming. Forestry contributes 15% to the GNP and industry and mining 10%.



**Figure 1. Dzongkhag/District maps of Bhutan**

The population is largely rural, with 79 per cent of the population living in villages, despite a growth in urban drift in the recent years. It is estimated that 42.1 per cent of the population is under the age of 15 years and 7.2 per cent above 60 years. The crude birth rate during 2000 was 34.09 per 1000 population and the crude death rate was 8.64 per 1000 population during 2000. The total fertility rate was 4.7 and there has been a general decrease in the population growth rate from 3.1 in 1994 to 2.5 in 2002. The sex ratio of males per 100 females during 2001 was 102.

<sup>5</sup> RGOB, (2005). Office of the Census Commissioner, Population and Housing Census of Bhutan 2005, Thimphu.

## **1.5. BACKGROUND ON HUMAN HEALTH AND ANIMAL HEALTH ADMINISTRATION**

Health care infrastructure, disease surveillance and response system and laboratory capacities in both human and animal health sectors are summarized below.

### **1.5.1. Human Health Care System**

The health care service in Bhutan is provided through a four-tiered network consisting of a National Referral Hospital, Regional Referral Hospitals, District Hospitals and Basic Health Units (BHU). There are total 642 health facilities which consist of 30 hospitals, 174 BHUs and 440 out-reach clinics at the community level. In addition to this, traditional medicine services are available in all the districts hospitals. There is no private medical facility in Bhutan.

The organogram of the Ministry of Health is illustrated under Appendix 2. The Department of Medical Services looks after the curative services and the Department of Public Health responsible for disease control programs.

The country is divided into 20 districts (Dzongkhag) and each Dzongkhag is under the administrative control of the Dzongda. The health care service in the district is under the Dzongkhag administration. The districts are further divided into gewogs. Each district has a district hospital and most of the gewogs have a Basic Health Unit. Primary health care is provided by the basic health units and the district hospital provide secondary health services. The District Medical Officer (DMO) and the District Health Officers (DHO) looks after the health care service.

#### **1.3.1.1. Health Care at National Level**

##### **Jigme Dorji Wangchuk National Referral Hospital (JDWNRH)**

The Jigme Dorji Wangchuk National Referral Hospital (JDWNRH) is the largest hospital and serves as the national referral hospital in the country. It would act as the nodal hospital for providing technical backup to other hospitals during an outbreak of HPAI which would include manpower (relevant experts) and for treatment of severe cases.

The laboratory has culture facilities for bacteria but has no facility for virus culture/isolation. The laboratory does not carry out any test for viruses. There is no microbiologist in the country.

##### **Public Health Laboratory**

The Public Health Laboratory (PHL) currently located within JDWNRH is the main public health reference laboratory in Bhutan.

PHL has been assigned the task of investigating disease outbreaks and maintaining disease surveillance but the absence of trained epidemiology staff in Bhutan at district as well as central level is perhaps the greatest drawback which needs to be addressed. Currently PHL also does not have adequate infrastructure in terms of functional laboratory space, appropriate equipment,



communication and data management hardware and software as well as efficient monitoring mechanism.

### **Health Information Management System (HIMS)**

The HIMS under the Planning & Policy Division of the Ministry of Health currently collects and compiles all health data and other information using the Health Information Management System (HIMS) software. Monthly reports are sent from the BHUs to the respective district hospital which are compiled by the DMO/DHSO (District Medical Officer/District Health Supervisory Officer) and sent to this Unit on a quarterly basis. The HIMS Unit will document all cases of HPAI.

### **Information Communication Bureau**

ICB will develop relevant IEC materials for dissemination to Health workers, general population and specific target groups.

### **Drug, Vaccine, Equipment Division**

DVED will coordinate procurement of drugs, equipment, laboratory & hospital supplies and distribution of supplies to the districts.

#### **1.3.1.2. Health Care at Regional Level**

Mongar and Gelephu Regional Hospitals provide referral services to districts in eastern and central regions.

These two Regional Referral Hospitals would act as the nodal hospital for providing technical backup to district hospitals within their region during an outbreak of HPAI which would include manpower (relevant experts) and for treatment of severe cases. The laboratories of the regional referral hospitals would also be upgraded and equipped to test clinical samples for influenza.

#### **1.3.1.3. Health Care at District Level**

District hospital is headed by District Medical Officer, assisted by nurses, technicians, supporting staff and a District Health Officers.

The District Hospitals would provide local response and treatment of cases during an outbreak or isolated case of HPAI within their district which would include isolation and treatment of cases. The district hospital will be equipped to collect and send clinical samples to the laboratories of Regional Referral Hospitals or the PHL for testing for influenza.

#### **1.3.1.4. Health Care at Sub-District Level**

The Basic Health Unit provides primary health care including treatment of common ailments and MCH services. Each BHU has one Health Assistant, one basic health worker, one ANM and one supporting staff. BHUs send Morbidity report (every month), Activity Report (every month), AFP report, salt analysis report and death report to the District Health Officer.

BHUs would monitor their catchments areas and report any upsurge in ARI illnesses to the district health authorities on a weekly basis. Any unusual increase in the cases would be investigated by District health officials lead by CMO.

#### **1.3.1.5. Disease surveillance and HIMS**

Reports generated by BHU are sent to District Health Officer who compiles and consolidates the reports from all BHUs and District Hospital and then sends to the central level (Health Information Management System Unit) through e-mail or fax. At the national level the HIMS Unit collects and compiles all health information and data using the Health Management Information System (HMIS) software.

During disease outbreak the BHU (if the outbreak occurs within the BHU catchment area) would report to the district health authorities who in turn would report to the district authorities and Department of Public Health or PHL. Depending on the severity and cause of the outbreak and the capacity of the district health facilities, a Rapid Response Team comprising of relevant programme personnel, medical specialist and laboratory personnel from the PHL would be mobilized and deployed to the outbreak area to investigate and control the outbreak. At the same time the Technical Committee formed at the Department of Public Health monitors the situation and reports to the Secretary and Minister. Availability of telephones at the BHU and district levels and internet connection at district level facilitates the rapid transmission of information during the outbreak.

ARI report is compiled, analyzed and reported every week at all levels. Any unusual increase in the cases would be investigated. The BHUs and the District Hospitals have been given standardized reporting forms to report the morbidity, mortality and other health data collected at that level.

The routine laboratory based surveillance system for influenza is initiated and organized by the PHL. The two Regional Referral Hospitals would be upgraded to test samples for influenza and some district hospitals are equipped to collect and send the samples to the PHL or the laboratories of two Regional Referral Hospitals.

### **1.3.2. Animal Health Care System**

The divisions related to animal health of the Ministry of Agriculture and Forests (MoAF) are shown under Appendix 3.

#### **1.3.2.1. Department of Livestock**

The Department of Livestock is the main agency responsible for animal health, production including Feed and Fooder Development. The institutions responsible for animal health services in the country include the National Centre for Animal Health (NCAH), four Regional Livestock Development Centres (RLDCs), previously known as Regional Veterinary Laboratories (RVL), 3

satellite laboratories, National Veterinary Referral Hospital (NVRH) at Thimphu, 20 District Veterinary Hospitals, and 175 Livestock Extension Centres or RNR centres. The human resource capacity of animal sector is given in Table 2.

**Table 1: Animal Health Resource in Bhutan**

S.No.	Health Personnel	Year – 2007
1	Veterinarians	35
2	Degree in animal production	10
3	Paravets (Central program)	133
4	Paravats (Dzongkhags)	348
5	Lab Technicians/Assistants	114
	BAFRA Technical Persons	
6	Regulatory Inspectors	40
7	Food Inspectors	29
8	Lab. Technicians	13
9	Veterinary pathologists	1
11	Food chemist	1
12	Veterinary Microbiologist	1
13	Animal Feed Technologist	1
	Total personnel	654

Source: National Centre for Animal Health, Department of Livestock, MoAF, 2009

Almost all animal health services are provided free by the Government including medicines and drugs, except in NVRH where a cost recovery scheme on medicines and drugs and a minimal charge for the services has been introduced. A priority objective of the RGOB is to lift the living standards of farming communities by increasing their income from livestock and other agricultural activities. Livestock Extension/RNR Centres provide a wide range of services at village level, which include treatment of sick animals, vaccinations, de-worming, and sterilization of animals.

### 1.3.2.2. Bhutan Agriculture and Food Regulatory Authority

Bhutan Agriculture and Food Regulatory Authority (BAFRA) have been established as the regulatory agency for import and export of animal, plant and their products including food commodities. For this, BAFRA has established offices at 20 districts, one city, 6 strategic check posts, 5 major and 7 small official entry points through which import and export of animal, plant and their products are being regulated. BAFRA has established comprehensive animal quarantine stations at 3 major entry points and is in the process of setting up 3 additional quarantine stations. The Bio-security Policy of the Kingdom of Bhutan, 2008 set out the bio-security policies for Bhutan and BAFRA has been designated as the competent authority to coordinate implementation of the policies. The Rapid Response Team within BAFRA is established with members located in the strategic locations along the Bhutan-India international border entry points. They shall coordinate, manage and oversee the implementation of the regulatory and preventive measures on the incursion and control of HPAI under the directives and in consultation with BAFRA head office.

BAFRA also implement ban on movement of animal and animal diseases within the country during the outbreaks of notifiable diseases and maintain disease surveillance and monitoring in commercial farmers registered with BAFRA.

## Roles & Responsibilities

- Check the flow of diseases and pests pertaining to livestock to prevent introduction of pest and diseases that are not in the country or wide spread in the country;
- Extend cooperation in controlling /preventing the movement of pests and diseases in international trade;
- Ensure that the quality of livestock products imported or produced in the country meets the minimum standard requirements;
- Regulate the import and export of livestock and livestock products;
- Implement ban orders on the import of live poultry and unprocessed poultry products from affected countries;
- Help prevent the spread of the disease by quarantining affected focal areas and restricting movement of poultry and poultry products from these areas to unaffected areas within the country.

With regards to HPAI, BAFRA's roles and responsibilities are as follows:

### a) Before entry of the disease into the country

- Enforce ban and other regulatory measures on the import of poultry, poultry products and other risk goods from the countries affected with HPAI.
- Border control through maintenance of stringent surveillance and monitoring activities along the borders to curb illegal movements of poultry, poultry products and other risk goods including disinfection of vehicles and other risk goods at entry points.
- Monitoring of implementation of strict biosecurity measures in the commercial broiler and layer farms, conveyance and processing of poultry and their products in the country. In addition, maintain surveillance and monitoring of these farms in the country for signs of avian flu regularly.
- Collect samples of the suspected cases and submit them to, RLDCs and NCAH for testing against HPAI.
- Regulate movement of live birds within country.
- Educate commercial poultry farmers on the importance of maintaining adequate bio-security in farms and other preventive measures to avoid avian flu virus and early signs of avian flu and how and where/whom to notify any suspected cases.
- Educate commercial poultry farm workers, meat vendors and handlers on the health risk of exposure to avian flu virus and measures to reduce the risk of exposure through education and awareness campaign.

### b) During outbreak of HPAI in the country:

When suspected cases are encountered quarantine the outbreak area and enforce standstill movements of susceptible species, their products and other risk goods from that area temporarily with immediate effect till the case is confirmed negative to HPAI virus.

During outbreaks of avian flu, quarantine the affected areas and implement stamping out procedure to control the disease by depopulation, disposal and decontamination including enforcement of movement control.

Notify trading partners in other countries about the outbreaks and infected areas. In addition, notify importing agencies and countries if poultry and poultry related products from infected places have been exported and provide details of the event.

Undertake surveillance in collaboration with the Department of Livestock to support a declaration of freedom in accordance of OIE standards.

### 1.3.2.3. Animal Disease Surveillance and Response

The Department of Livestock maintains disease surveillance across the country through the network of Livestock/RNR Extension Centres, district veterinary hospitals, RLDCs, National Veterinary Referral Hospitals whereas BAFRA maintain disease surveillance at commercial livestock farms and livestock and their product processing establishments.

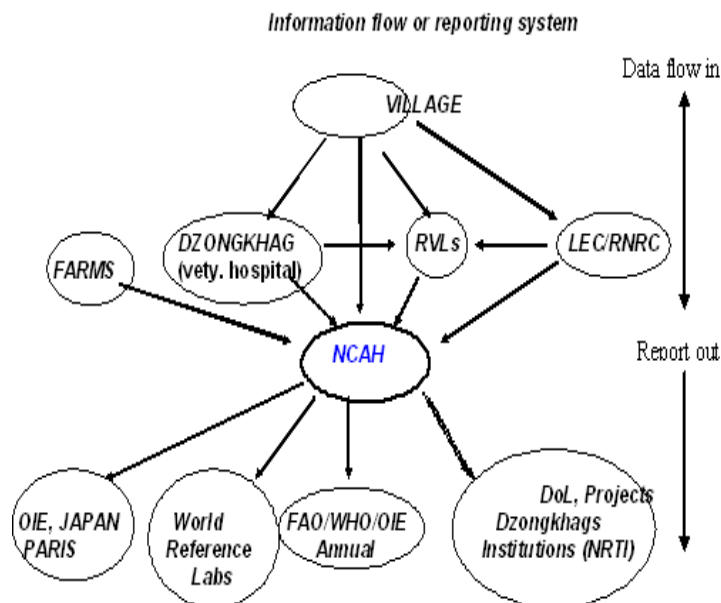
The livestock owners report any suspected case of notifiable disease verbally by himself or appointed messenger to the livestock/RNR extension staff and to the *Gup/Man Ap/Tshogpa/Choepoen* (village leaders). The livestock extension staff then reports the outbreak by the fastest means; fax, telephone, wireless, and/or e-mail, in the Flash Report Form 6B to the District Livestock Office, RLDCs and NCAH.

The RLDCs or NCAH will then investigate the outbreak and provide necessary recommendations of disease control measures. The District Livestock Office will then issue ban order on movement of animal and animal products including risk goods from and around the infected areas. BAFRA will then implement all regulatory measures related to disease control measures.

### Animal Disease Reporting System

The livestock/RNR extension centres, district veterinary hospitals, government farms send monthly disease report to RLDCs. The RLDCs then compile them on regional basis including disease detected by RLDCs and are sent to NCAH. The NCAH then consolidate monthly disease reports sent from RLDCs including disease reports submitted from laboratories of NCAH, RLDCs and satellite laboratories and publish quarterly and annual animal health bulletin. The NCAH is also mandated to send regular disease reports to OIE and other international agencies. The flow diagram for disease reporting system is given in Figure 2.

BAFRA compile monthly disease reports detected at import inspection, at abattoirs and backyard meat processing units and commercial farms. In addition BAFRA also record movement of livestock and livestock products within the country.



**Figure 2. Showing animal disease reporting system amongst various agencies.**

#### **1.3.2.4. Poultry production systems**

Bhutan has a poultry population of about 230,000 birds comprising of local poultry and imported commercial strains.<sup>6</sup> There are two semi-commercial farms close to the Thimphu and one at Gelephu (including small hatchery unit of 10,000 DOCs per week capacity) which have moderate to low biosecurity and three government poultry farms in three separate districts. In addition, there are many smallholder poultry farms (Sector 3) comprising 50-500 birds mainly at Tsirang, Gelephu, Sarpang, Pasakha, Samtse, Trashigang and few in other districts for egg and meat production. The rest of the poultry farming (Sector 4) is village based where households keep few birds (2-10) with minimal biosecurity for local consumption. In most parts of the country, however, poultry are usually kept for eggs only. Pigs and chickens are raised together (in different buildings) on some farms.

A small number of ducks are kept by some people, mainly in the southern Dzongkhags, and comprises about 10% of the poultry population. They are kept for both eggs and meat. A few (negligible numbers) ducks are also kept as pets in other parts of the country.

#### **Imports of poultry products**

Poultry and poultry products from AI affected countries were banned since January 2004. Bhutan is heavily dependent on India for poultry and poultry products including poultry feeds. Major proportion of table eggs and all day-old chicks (both broilers and layers) supply comes from India until the outbreak of H5N1 was reported in India in the year 2006-2007 period. In addition, Bhutan imports hatching eggs and DOCs and parent stocks from other countries like New Zealand and other countries. Bhutanese farmers now started importing DOCs of both layers and broilers from Nepal after wide-spread outbreaks of H5N1 in West Bengal and Assam during 2007 to 2009 periods. The government still allows import of table and hatching eggs, frozen poultry meat and other poultry products from farms located outside West Bengal and Assam which are approved by the Ministry of Agriculture and Forests.

Poultry and poultry products imported into Bhutan are permitted entry into the country only if accompanied by a certificate from an authorised government veterinary officer stating freedom from notifiable diseases like Avian Influenza at the farm of origin. In case of import of day old chicks, they are quarantined in the farm for a period of 15 days during which they are kept under close observation for signs of diseases. If any signs of diseases are observed during the quarantine period, they are investigated in detail and samples are collected and submitted to veterinary laboratory of BAFRA and laboratories under the Department of Livestock for disease diagnosis. Eggs and dressed chicken meat imported for human consumption are inspected as to whether or not they are safe for human consumption and certified accordingly. Chicken meat like other fresh meat of other species is inspected daily by BAFRA inspectors for safe human consumption at retail meat shops.

#### **1.3.2.5. Risk Assessment**

---

<sup>6</sup> RNR Survey, 2002

As part of contingency measures and risk assessment on the incursion of avian influenza into the country was carried out by NCAH from January to February 2004. The risk assessment was carried out by adopting following methods:

- A questionnaire was developed to obtain data from farms and meat vendors/dealers;
- Visited all government central farms and as many backyard farms and poultry meat vendors and dealers as possible for collection of information in high risk areas;
- Performed clinical surveillance on these farms and inspection of the dressed chicken kept for sale on the counters of meat vendors;
- Collected serum samples for laboratory screening for Influenza A;
- Collected information on the sources of live birds and birds for wet markets at the major towns;
- Collected information on sources and volume of live poultry imports for broiler, layer and breeding purposes.

The amount of poultry imported into the country, particularly live birds was relatively less as there are only few poultry farms which imported about 3,000-5,000 broiler chicks every 7-10 days. However, number of farmers taking up poultry rearing is growing every year. They are mostly small-scale farmers rearing 50 to 500 birds per farm and most of the chicks/pullets for layers are supplied from the Government farms. During the period from July 2002 to June 2003 a total of 93,650 DOC broilers and 1,620 DOC layers were imported from India, mostly from one farm in Siliguri. Between July 2003 and 9<sup>th</sup> January 2004 (BAFRA progress report and permits issued record), 48,500 broiler chicks were imported from the same farm in Siliguri. The three Government farms have imported DOCs from Venkateshwari farm, Pune, India.

The assessment and subsequent surveillance has found no evidence of presence of the HPAI in Bhutan's poultry population. The risk assessment identified a serious risk of entry across the extensive and porous southern border with India during times of outbreaks in that country, and a need for strict movement control of live birds and unprocessed or contaminated poultry products from India at all times was found necessary. The utmost importance of ensuring that all stakeholders, veterinary and regulatory staffs are kept on full alert to prevent any illegal and unauthorized imports of poultry and unprocessed poultry products was also recognized.

Bhutan is on the flyways of migratory birds from Siberia in Russia and Tibet, China. Migratory birds' movement amongst Bhutan, India and Bangladesh was also observed which presented HPAI risk to Bhutan. However, migratory water birds are considered to be relatively low risk for introduction of HPAI virus. This is because infection levels in migrating birds, if virus is present, are low and there are limited opportunities for contact with domestic poultry in Bhutan. Despite these natural safeguards, migratory and wild water birds (particularly egrets) and other wild birds, including indigenous species and common birds, pigeons and garbage feeders such as Indian house crows and black kites, should be monitored for evidence of infection. While the risk of incursion of the virus by migratory birds was relatively low during the risk assessment period, the risk has increased significantly after the wide spread epidemic outbreaks of H5N1 in neighboring districts of West Bengal and Assam states of India. Therefore, vigilance and surveillance needs to be strengthened and should be maintained consistently until no further outbreak of H5N1 occurs in India.

## **II. EMERGENCY MANAGEMENT AND COORDINATION OF AVIAN AND HUMAN INFLUENZA**

An emergency, such as a pandemic, that potentially affects the whole of society requires national coordination and decision-making. Actions will need to be taken to protect and reduce the impact of the emergency on Bhutan as a whole. In such event, strategic decisions will be made centrally through establishment of process and systems through effective co-ordination, cooperation and leadership.

### **2.1. Institutional Arrangement for Influenza Pandemic**

A pandemic due to avian or other type of influenza would be considered a national emergency and therefore formation of a National Steering Committee (NSC) as the highest decision making body chaired by the Honorable Prime Minister and members comprising of high-level decision makers from key sectoral agencies is essential for smooth implementation of NIPPP, particularly at times of pandemic. In addition, a National Executive Committee (NEC) comprising of directors of relevant stakeholder agencies is essential to initiate contingency measures for prevention and response for HPAI and pandemic outbreaks. The Executive Committee will also oversee implementation of the NIPPP and projects supporting implementation of the NIPPP.

#### **2.1.1. National Steering Committee for the NIPPP**

The National Steering Committee (NSC) will facilitate the implementation of the National Influenza Pandemic Preparedness Plan during Phases 4 to 6. The National Steering Committee shall be chaired by the Prime Minister and shall include high level decision makers from various Ministries and entities to make critical contributions to political decision making during the three main WHO pandemic Phases.

Members:

1. Prime Minister - Chairman
2. Minister, Ministry of Health
3. Minister, Ministry of Agriculture and Forests
4. Secretary, Ministry of Agriculture and Forests
5. Secretary, Ministry of Health
6. Secretary, Ministry of Finance
7. Secretary, Ministry of Information and Communication
8. Secretary, Ministry of Home and Cultural Affairs
9. Secretary, Ministry of Economic Affairs
10. Secretary, Ministry of Education
11. Secretary, Ministry of Works and Human Settlement
12. Secretary, Ministry of Foreign Affairs
13. Secretary General, Bhutan Chamber of Commerce and Industries
14. Chief, Royal Bhutan Police
15. Attorney General, Office of the Legal Affairs

Roles and Responsibilities:

- Make policy decisions for the implementation of the NIPPP
- Mobilize required resources for implementation of the NIPPP;
- Endorse the updates of NIPPP;



- Approve inter-sectoral lead agencies and ensure coordination amongst all relevant sectors which would be involved in effective implementation of the NIPPP during Phase 4 and above of the WHO pandemic phases;
- Declare different Phases of pandemic based on the recommendations of the National Technical Committee if human to human infection occurs (Phase 4 above) and activate State Emergency, if necessary;
- Direct NEC to form committees and task forces as necessary.
- Ensure inter-sectoral collaboration and partnership with international, regional and bilateral agencies including the World Health Organisation (WHO), the United Nation's Children Fund (UNICEF), the Food and Agriculture Organisation of the United Nations (FAO), the World Organisation for Animal Health (OIE), the World Bank (WB), the Asian Development Bank (ADB) and the South Asian Association for Regional Cooperation (SAARC).

The National Steering Committee shall meet once a year and as and when required. A simple majority shall constitute the quorum for convening the meeting. The National Steering Committee shall seek technical recommendations from experts within MoAF, MoH and the IMTF for decision making processes.

### **2.1.2. National Executive Committee**

The National Executive Committee (NEC) shall be responsible for providing overall guidance, direction and monitoring of the implementation of the NIPPP. The committee shall be responsible for overseeing the implementation of any project supporting implementation of NIPPP.

Members:

1. Director, Department of Public Health, Ministry of Health, Chairman during human phase.
2. Director, Department of Livestock, Ministry of Agriculture and Forests, Chairman during animal phase
3. Director, Department of Medical Services, Ministry of Health
4. Director, Bhutan Agriculture and Regulatory Authority, Ministry of Agriculture and Forests
5. Director, Department of Disaster Management, Ministry of Cultural and Home Affairs
6. Focal Officer/Programme Director, NCAH, Animal Health, Serbithang
7. Focal Officer, Human Health.
8. Focal Officer, BAFRA
9. Focal Officer, Information and Communication Services, MoAF
10. Focal Officer, Information and Communication Bureau, MoH

Roles and Responsibilities:

- Review and update the NIPPP from time to time;
- Keep the NSC updated on new developments of the epidemic worldwide and nationally;
- Develop guidelines, protocols and procedures for implementing the NIPPP;
- Initiate activation of National Incident Command Centre for response to AI outbreak in birds and/ or humans.
- Recommend import/export bans of poultry, poultry products and other risk goods for prevention of incursion and/or spread of HPAI virus into and within the country. The recommendations should be science-based and be decided in collaboration with other

- relevant stakeholders such as the Ministry of Economic affairs, BCCI, etc. for endorsement by the Ministry of Agriculture and Forests;
- Designate sectoral media spokespersons for risk communication, one each from MoH and MoAF; In case of public emergency, consult with the National Steering Committee and the Cabinet Secretariat to appoint a Spokesperson.
  - Endorse press releases and briefings prepared by each concerned Ministries (in case of avian influenza – MoAF and in case of human influenza - MoH) for dissemination to the public;
  - Identify the inter-sectoral lead agencies for effective implementation of the NIPPP;
  - Ensure the adequacy, timeliness and relevance of communications activities.

### **Frequency of meetings and quorum**

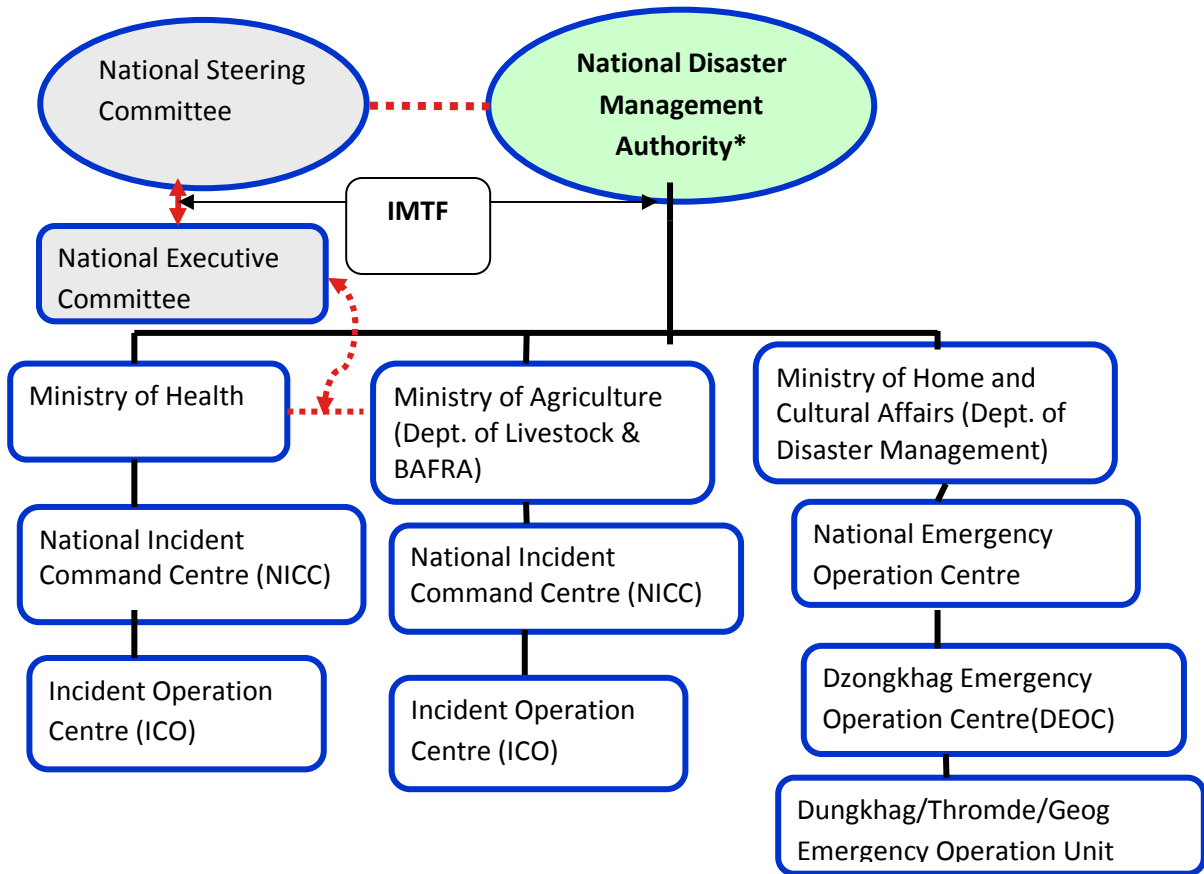
The Executive Committee for the NIPPP shall meet quarterly or as and when required. The committee will also meet as and when there are outbreaks in neighbouring/trading countries to decide on bans and other regulatory issues or when there are serious public health threats. A simple majority shall constitute the quorum and as far as possible all the members shall be present. In addition, technical experts shall be invited for the meeting.

### **2.1.3. Coordinated Incident Command Structures**

The Incident Command Structure for medical and veterinary response to avian and human influenza outbreak respectively has been developed following the broad guideline of the National Disaster Management Framework and in keeping in view of the requirement of highly technical and sector-based response for HPAI outbreak as shown in Figure 3.

The Incident Command Structures have been adopted for proper co-ordination of the key stakeholders during the operation. The incident command structure will allow smooth flow of information from the national level to the incident area and vice versa.

Membership and coordination of the Incident Command Centers and Incident Operation Centers for both animal and human health is given in *PART III. Human Influenza: Preventing disease in humans' pandemic preparedness and respons and PART IV. Animal Health: Controlling the disease in Animals and Preventing disease spread to human.*



**Figure 3. Emergency Coordination and Management Structure for Pandemic Preparedness and Response.**<sup>7</sup>

With adoption of the draft Disaster Management Bill, NDMA<sup>8</sup> would co-ordinate integration of pandemic influenza prevention, preparedness and response with existing disaster management frame work at all levels. This would include a co-ordinated mechanism for health and sectors beyond health for maintaining essential services and continuity of operations. NDMA would monitor the progress of the pandemic and the impact of the mitigation measures in health and sectors other than health.

<sup>7</sup> The structure is based on the current draft Disaster Management Bill.

<sup>8</sup> Current responsibility is undertaken by the Department of Disaster Management, Ministry of Home and Cultural Affairs.

## **2.2. Intersectoral Response**

Each Government Ministry or Agency, informed and directed by the NEC is a lead institution for leading planning, preparedness and response in the sectors it serves. Ministries and agencies also play an important role in intelligence and surveillance among their sector institutions: for example by tracking workforce or student absence at schools, movements at the border and impacts on the economy and critical infrastructure. For this purposes of emergency management, it is important that Ministries and Agencies, responsible for, carry out these responsibilities in a well co-ordinated fashion. Intersectoral response is critical during Pandemic Phases 4, 5 and 6, when there is rapid human-to-human transmission that involves nationwide and whole-of-society preparedness.

The National Steering Committee engages with the wider government sector through the Inter-Ministerial Task-Force in Multi-sectoral Pandemic Preparedness (IMTF), which provides technical and communication support among sectors. The National Steering Committee is to ensure coordination among all essential sectors identified below.

Lead agencies are agencies that have a mandate (through legislation or agreed authority) for the control of an incident. A lead agency monitors and assesses the situation, co-ordinates national support, reports to the NSC and the NEC and provides policy advice. In a national emergency, the lead agency directs and manages the operational responses of its sector as necessary.

10 essential sectors along with Lead Government Agency are identified as follows:

- Healthcare (Ministry of Health)
- Food and Fuel Supplies (Ministry of Economic Affairs and Ministry of Agriculture and Forests)
- Finance and Insurance (Ministry of Finance)
- Law and Order (Ministry of Home and Culture Affairs)
- Power and Electricity (Ministry of Economic Affairs)
- Transportation (Ministry of Information and Communication, RSTA)
- Telecommunication (Ministry of Information and Communication)
- Education (Ministry of Education)
- Water and Sanitation (Ministry of Works and Human Settlements)
- Private Sector (Chamber of Commerce and Industry, Ministry of Economic Affairs)

These essential sectors address critical areas of the national pandemic response. Lead agencies have responsibility for particular sector, within which agencies with operational roles in a pandemic response will work together (or will establish new work streams where appropriate) to ensure an integrated and co-ordinated interagency response. For example, the Ministry of Works and Human Settlement leads the water and sanitation sector and coordinate necessary activities along with district authorities and city corporations. Critical infrastructures should be protected during any disaster, including an influenza pandemic.

In order to ensure a safe and stable living environment, social functions and economic activities should be maintained during the pandemic period. Therefore, both public and private sectors have to be prepared for the occurrence of an influenza pandemic.

The major impact of a pandemic on the governments and enterprises will be manpower shortage for a prolonged period, since many employees will be sick or have to be away from work to care for their families. Furthermore, some might even refuse to work due to the fear of becoming

infected at workplace. All sectors should formulate or revise their emergency plans to strengthen their continuity strategies and infection control measures against the effects of the influenza pandemic.

### **2.2.1. Lead agencies**

One of the critical components of an effective pandemic response is the relationship between the lead agencies and the other government and local organizations that have an involvement in emergency management.

In comparison to its role in the more common types of natural disaster, in a pandemic the health sector has the particular responsibility, through its lead agencies (MoH and MoAF) and operationally through Dzongkhag Sector Heads and Regional Veterinary Offices, to manage the country's response. The Ministry of Home and Cultural Affairs and designated local Emergency Operation Centers (EOC) have responsibility for, and are critical to, the management of emergencies in the community.

#### **2.2.1.1. Ministry of Health (MoH) as lead agency**

In a human disease epidemic or pandemic, the Ministry of Health will be the lead agency. The Ministry has already taken a lead role in planning for an influenza pandemic, and this role would continue into the response phase of a pandemic. (Please refer to ***PART III. Human Influenza: Preventing disease in humans' pandemic preparedness and response.***)

#### **2.2.1.2. Ministry of Agriculture and Forests (MoAF) as lead agency**

For an animal disease, whether epizootic or panzootic (the animal health equivalents of epidemics and pandemics respectively), MoAF will be the lead agency. If a human contracted the disease as a result of handling affected animals, MoAF would continue as lead agency, working closely with the MoH on the risks associated with the human case or cases and possible human-to-human transmission. (Please refer to ***PART IV. Animal Health: Controlling the disease in Animals and Preventing disease spread to human.***)

Where human-to-human transmission of an animal disease occurs in Bhutan or overseas and there is an indication of possible pandemic spread, the MoH becomes the lead agency for managing the pandemic. The MoAF would, however, continue with incursion response activities, if there was disease in animals. Additional roles of MoAF would have in any pandemic situation includes assisting with welfare recovery, assisting with legal and border issues with other agencies, and assisting the MoH with laboratory testing.

#### **2.2.1.3. Ministry of Home and Cultural Affairs as a lead agency in Emergency Management**

The Department of Disaster Management (DDM) under the Ministry of Home & Cultural Affairs (MoHCA) has been identified as the national focal agency by the Cabinet to coordinate disaster management activities in the country. The department has been entrusted to support, coordinate and manage activities with regards to any disaster management in the country. DDM has developed the National Disaster Management Framework and Disaster Management Bill is submitted to the government for enactment during the forthcoming National Assembly Session (winter of 2009). DDM will be a main coordinator of the National Emergency Operation Centre (EOC) and will be responsible to communicate with and coordinate Dzongkhag Emergency Operation Centres (EOC) on management of emergencies.

#### 2.2.1.4. Dzongkhag/District Administration

District administrations are entrusted with local governance and coordination of all activities, development or otherwise, within their district. All government agencies in a district, including human and animal health facilities work under the Dzongda (district administrator) who will mobilize agencies and coordinate local activities if outbreaks are reported in poultry or humans in his district and as such, Dzongda is one of the members of the field level Incident Operation Centre (IOC).

#### 2.2.2. Sectoral Response

##### I. Healthcare

**Central Government agencies:** Ministry of Health (lead)

**Other agencies:** National Referral Hospital, Regional Referral Hospitals, District Hospitals, Basic Health Units (BHUs), City Corporations, Municipalities, Dzongkhag administrations, Monastic Bodies, Cremation Centers.

##### **Critical Interdependencies:**

Transport (for movement of supplies, personnel, patients and deceased bodies), Telecommunication (for patient care and emergency), Energy (power supply, clinical, mortuary and security systems), Water (healthcare facilities, hygiene), Pharmaceuticals (consumables and treatment of patients), Finance (Ensure medical supply chain)

##### **Roles and Responsibilities:**

###### **Ministry of Health**

- Provide un-interrupted health care services
- Adequate supply of drugs, reagents and other necessary medical supplies
- Adequate supply of health staff
- Monitor and minimize the effects of pandemics
- Develop public awareness and risk communication materials
- Train other non-health sector staff and provide necessary information to other sectors
- Establish appropriate communication channels with other sector institutions

(For broader definition of roles and responsibilities of the Ministry of Health, JDWNRH, Public Health Laboratory, Health Care services at national, regional and district level is identified in Part I. Chapter 1.3.1. Human Health Care System in Bhutan)

###### **City Corporations, Municipalities and Dzongkhag Administration**

- Support to pandemic intelligence and surveillance at municipality and community
- Support to health care sector and medical logistics
- Support in removal, mortuary and cremation of bodies

###### **Monastic Bodies**

- Provide ritual services during mass death
- Provide psycho-social support through religious proceedings

##### II. Food and Fuel Supply

**Central Government agencies:** Ministry of Economic Affairs (lead)

**Other agencies:** Ministry of Agriculture and Forests, Ministry of Information and Communication, Food Corporation of Bhutan, Bhutan Oil Distributor

##### **Critical Interdependencies:**

Transport (for movement of food and supplies), Energy (power supply, industrial production), Water (drinking and agriculture), Finance (Ensure trade transactions),

##### **Roles and Responsibilities:**

***Ministry of Economic Affairs (Department of Trade)***

- Ensure trade facilitation
- Ensure adequate trade, storing and supply of food and essential commodities
- Liaise with the private trade sectors on supply of food and essential commodities
- Issue import licenses for the import of goods from outside countries.
- Impose necessary restrictions for import of poultry and livestock products in terms of HPAI.
- Consult BAFRA on issuance of import licences on livestock and poultry products.
- Establish appropriate communication channels with trade sector institutions.
- Coordinate and monitor import and supply of fuel from India.

***Ministry of Finance (Department of Revenue and Customs)***

- Clearing imported goods at entry points. The department shall support BAFRA in examination and inspection of imported livestock and livestock products including other risk goods to ensure their safety.

***Ministry of Agriculture and Forests***

- Ensure bio and food security in Bhutan
- Provision of safe agricultural food and products

***Ministry of Information and Communication (through RSTA)***

- Provide transportation and logistical support for transportation of food and fuel supply

***Food Corporation of Bhutan***

- Build up adequate stock of food supply in case of emergency

***Bhutan Oil Distributor***

- Build up adequate stock of oil supply in case of emergency
- Establish operational continuity planning for potential disruption

**III. Law and Order (including Immigration)**

***Central Government agencies:*** Ministry of Home and Cultural Affairs (lead)

***Other agencies:*** Royal Bhutan Police (RBP), Royal Bhutan Army (RBA)

***Critical Interdependencies:***

Transport (for movement of personnel and equipment), Telecommunication (for emergency communication), Energy (power supply and security systems),

***Roles and Responsibilities:***

***Ministry of Home and Cultural Affairs (Bureau of Law and Order and Department of Immigration)***

- Overall coordination and support in maintaining law and order
- Coordinate with the NEC required mobilization of law enforcement personnel, including RBP
- Develop, review and revise policies regarding law and enforcement, immigration and movement control for emergency situations
- Control and manage immigration and impose necessary movement control in and out of the country

***Royal Bhutan Police (RBP)***

RBP is entrusted with the maintenance of law and order in the country. The RBP is responsible for this critical function and shall support MoAF and MoH in enforcement of disease control measures and regulations during an outbreak of HPAI in animals or during influenza pandemic.

- Maintain Law and Order
- Respond to requests from medical officers
- Take all measures within their power and authority to protect life and property, and to assist with the movement of rescue, medical, fire and other essential services
- Coordinate movement control over land, including communication and traffic control



- Enforce mechanisms on social distancing, if necessary

**Royal Bhutan Army (RBA)**

- Provide necessary personnel / armed staff support, if necessary
- Provide transportation and logistical support
- Provide security to essential supplies and supply personnel

**IV. Finance and Insurance**

**Central Government agencies:** Ministry of Finance (lead)

**Other agencies:** Royal Monetary Authority (RMA), Banks and Insurance Companies

**Critical Interdependencies:**

Transport (for movement of cash and personnel), Telecommunication (for financial and insurance transactions), Energy (power supply for banking and insurance services),

**Roles and Responsibilities:**

**Ministry of Finance (Department of Revenue and Customs and Department of Public Accounts)**

- Analyze and advice on potential financial implications related to a pandemic
- Maintain continuity of uninterrupted collection of revenues and taxes
- Timely fund transfer, treasury operation, availability of public funds for emergency
- Establish appropriate communication channels with financial sector institutions
- Plan for implementation of price control strategies on food, medicine, fuel and other essential goods and establish trigger points for the implementation of these strategies.

**Royal Monetary Authority**

- Advice in implementation of price control to MoF
- Ensure fund liquidity and operational continuity of financial institutions during influenza pandemics.

**Banks**

- Provide necessary uninterrupted banking services to the public, including sufficient liquidity management.
- To ensure that the flow of credit and finance in the economy so that the flow of other essential services will not disrupted.
- Maintain operational continuity of ATMs for potential social distancing measures.

**Insurance Companies**

- Provide timely payment for health-related and other insurance products during emergencies

**V. Power and Electricity**

**Central Government agencies:** Ministry of Economic Affairs (lead)

**Other agencies:** Bhutan Power Corporation (BPC), Druk Green Power Corporation (DGPC)

**Critical Interdependencies:**

Transport (for movement of staff, equipment and supplies), Energy (power supply and industrial production), Water (drinking and agriculture), Finance (Ensure transactions), Trade and Supply (import of supply and equipment)

**Roles and Responsibilities:**

**Ministry of Economic Affairs (Department of Energy)**

- Develop policies to ensure with decreased energy supply and increased energy demand during emergencies, such as influenza pandemic.
- Coordinate and monitor along with MoFA repatriation of power from India in case if shortage of power supply.
- Establish appropriate communication channels with energy sector institutions
- Maintain business/operational continuity among national energy producers and

distributors

***Bhutan Power Corporation***

- Ensure continuity and timely restoration of provision and distribution of electricity to critical services, such as hospitals, emergency, infrastructure and communication sectors, and general public.
- Strengthen internal resilience towards potential disruption of electricity distribution.

***Druk Green Power Corporation***

- Ensure continuity and timely restoration of production of electricity.

**VI. Transportation**

***Central Government agencies:*** Ministry of Information and Communication (RSTA and DoCA) (lead)

***Other agencies:*** Ministry of Works and Human Settlement (Department of Roads), Drukair and private transportation companies

***Critical Interdependencies:***

Fuel Supply (air and road transportation), Telecommunication (for operations), Energy (power supply), Finance (Ensure supply of equipment and commodities)

***Roles and Responsibilities:***

***Ministry of Information and Communication (Road Safety and Transport Authority and Department of Civil Aviation)***

- Advise on measures to mitigate impacts on transport measures
- Establish appropriate communication and coordination system with transportation sector institutions
- Make a decision to limit or halt international and local air and road transportation
- Provide advice on safety and security to air and road passengers with support from MoH
- Facilitate and make necessary arrangement on air transportation of essential supplies, including drugs, medical supplies, technical assistance and etc.
- Ensure border safety and control measures together with MoHCA and MoH.
- Maintain business/operational continuity among national transportation companies

***Ministry of Works and Human Settlements***

- Maintain and restore main roads and bridges with national importance (for transportation of critical goods, supplies, personnel and passengers)
- Establish operational continuity plan for staff and equipment on maintenance of major routes in case of landslides and absence of staff.

***Drukair***

- Support transportation of necessary supplies of national importance.
- Establish necessary safety measures for passengers.
- Develop business continuity plan for lack of pilots and critical ground staff

**VII. Telecommunication**

***Central Government agencies:*** Ministry of Information and Communication (ICT, BICMA) (lead)

***Other agencies:*** Bhutan Telecom, Tashi Cell, Media

***Critical Interdependencies:***

Transport (for movement of supplies, personnel, patients and deceased bodies), Health (for staff safety), Energy (power supply for telecommunication), Essential Supply

***Roles and Responsibilities:***

***Ministry of Information and Communication***

- Ensure policies for uninterrupted essential communication services across the country.
- Establish appropriate communication and coordination system with communication

- sector institutions
- Maintain business/operational continuity among telecommunication companies
- Coordinate with private communication and media providers on facilitation of dissemination of awareness and public information resources.
- Develop and establish emergency telecommunication plan for the sector.

***Telecommunication companies***

- Ensure continuity and timely restoration of provision telecommunication services to critical services, such as hospitals, emergency, infrastructure and communication sectors, and general public.
- Strengthen internal resilience towards potential disruption of communication services.

***Media***

- Provide support to national authorities on provision and dissemination of accurate, unbiased and timely public messages.
- Ensure safety and security of media staff.

**VIII. Education**

***Central Government agencies:*** Ministry of Education (lead)

***Other agencies:*** Thromde and Dzongkhag Education, Schools

***Critical Interdependencies:***

Transport (for movement of supplies, teachers and students), Telecommunication (for emergency and surveillance), Energy (power supply to schools), Water (healthcare and hygiene), Food and essential commodity supply

***Roles and Responsibilities:***

***Ministry of Education***

- Coordinate the response for education sector among schools and institutions
- Organize public awareness campaign in the schools with support from MoH
- Draw up a plan of action on pandemics, particularly on risk communication, surveillance and communication to relevant health authorities
- Advice on closure of schools to local administration and authority
- Develop alternative home-based learning methods, in case of school closures
- Provide psycho-social counseling and support to children in need
- Instruct mobilization of teachers and students for certain activities/programmes

***Schools***

- Immediately inform local health authorities on possible symptoms of influenza pandemic
- Consult with local authorities on closure of schools
- Develop plan of action on measures to be taken at school level
- Restrict unnecessary social activities to reduce human to human contact

**IX. Water and Sanitation**

***Central Government agencies:*** Ministry of Works and Human Settlements (lead)

***Other agencies:*** Municipality and Local Administration, Ministry of Health

***Critical Interdependencies:***

Transport (for movement of supplies, personnel, patients and deceased bodies), Telecommunication (for patient care and emergency), Energy (power supply, clinical, mortuary and security systems), Education (public awareness), Healthcare and mortuary

***Roles and Responsibilities:***

***Ministry of Works and Human Settlements***

- Ensure adequate legal and regulatory framework is in place to allow for water rationing and distribution during pandemic, giving priority to health facilities

***Municipal and Dzongkhag Authority***

- Stockpile essential materials and supplies to ensure safe water provision during the initial and subsequent waves of influenza pandemic.
- Review equipment maintenance schedule and operational continuity.
- Review water treatment protocols to ensure that chlorination practices are appropriate.
- Maintain appropriate storage and delivery of water in case of pandemics
- Maintain appropriate drainage and waste water removal procedures

***Ministry of Health (Public Health Education Department)***

- Create awareness on water and hygiene safety during influenza pandemic

**X. Private Sector**

***Central Government agencies:*** Bhutan Chamber of Commerce and Industry (lead)

***Other agencies:*** Ministry of Economic Affairs, Ministry of Labour and Human Resources, Ministry of Health, Private sector companies

***Critical Interdependencies:***

Transport (for movement of supplies, personnel and goods), Telecommunication (for operation and emergency), Energy (power supply for industrial and service purposes), Health (healthcare services and facilities), Finance and Insurance (Ensure procurement and trade), Law and Order (safety of businesses), Water and Sanitation (health in workplace)

***Roles and Responsibilities:***

***Bhutan Chamber of Commerce and Industry***

- Consult with national authorities on measures to be taken on workplace to ensure safety among employees
- Consult with national authorities on measures impacting economy and business activities, such as border control, trade restriction due to movement, shortage of supply and discuss on potential facilitation on businesses.
- Raise awareness among the private sector on business continuity during pandemic outbreaks and what measures to take on workplace

***Private Companies***

- Large companies to develop their business continuity plans to ensure operational continuity with limited staff and resources.
- Put in place measures to ensure safety and security of employees.

### **2.3. International Organizations**

Specialized international agencies and donor institutions play important role in terms of technical and financial support in strengthening national capacity and implementation of the Plan. In the past, WHO, World Bank, FAO, UNICEF and UN Agencies in Bhutan played essential roles in preparedness and response.

#### **WHO Health Organization (WHO)**

WHO provides technical assistance to the country in terms of preparation and implementation of the National Influenza Preparedness and Response Plan and Health Emergency Plans and for prevention and control activities of HPAI and influenza pandemic. WHO is a global body to trigger and announce the pandemic Phase system. MoH has mandate to report outbreak cases to WHO through International Health Regulations (IHR) mandates. WHO provided a support in supply of medical equipment, rapid test kits, antiviral, vaccine and PPE kits.

#### **Food and Agricultural Organization (FAO)**

FAO has Assistant Representative Office in Bhutan. FAO provides technical assistance and funding support during HPAI outbreaks including other support of mobilization of funds from other international, bilateral sources. FAO has initially funded the HPAI risk assessment study in Bhutan.

#### **World Organization for Animal Health (OIE)**

Bhutan is a member of OIE and as such it is obligatory to report any notifiable or significant pests and diseases outbreaks to the OIE. The OIE provide technical assistance to the MoAF and timely dissemination of information on HPAI outbreaks.

#### **World Bank (WB)**

World Bank supported development and establishment of the strong national strategy, capacity in human and animal health sectors through capacity building, laboratory upgrade, communication and funding activities under the National Influenza Preparedness and Response (NIPR) project in 2008-2010.

#### **UN Children's Fund (UNICEF)**

UNICEF supports in developing national communication strategies, behavior and social change and developing toolkits and manuals. In Bhutan, UNICEF initiated development of the risk communication strategy in 2007 and supported in production and dissemination of IEC materials.

#### **Other United Nation (UN) Agencies**

UN agencies like UNDP, UNICEF and WFP could support in terms of technical and financial assistance.

### **III. HUMAN HEALTH: INFLUENZA PANDEMIC PLANNING**

The six pandemic phases are categorized into two broad phases i.e. preparedness phase and response phase. Phases 1–3 correlate with preparedness, including capacity development and response planning activities, while phases 4–6 clearly signal the need for response and mitigation efforts. Accordingly, the preparedness and response actions are grouped by pandemic phases which are further categorized into four components as follows:

1. Planning preparedness, coordination and other general measures
2. Surveillance and monitoring
3. Health care capacity planning
4. Public Health measures

The goal of **planning and coordination** efforts is to provide leadership and coordination during the time of response to pandemic outbreak.

The goal of **surveillance and monitoring** is to carry out routine monitoring of influenza circulation in local communities to provide baseline data to establish seasonal trends and detect unusual clusters of influenza-like illness, and to rapidly investigate and evaluate outbreaks.

**Health care capacity planning:** Influenza illness may be managed in three settings, depending on the volume and severity of illness. Severe illness must be managed in hospital settings to the extent possible. Excessive cases of less severe illness can be managed in secondary health care sites (schools, etc.), while mild illness should be managed through home health care. Planning for an emergency increase in the number of health care settings is necessary in anticipation of a possible highly virulent novel virus.

The goal of **Public Health Measures** is to reduce the spread of disease and its impact. In the absence of vaccination, there are essentially two measures to reduce transmission and morbidity/mortality due to influenza virus. These are social distancing and the use of antiviral medications. Social distancing requires public health education to effect behavioural changes and regulatory authority while the use of antiviral medication requires health care facilities, especially for the treatment of seriously ill patients. Health systems will need to provide health care services during a pandemic and plan for a surge capacity to manage the additional patient load

#### **3.1. Objective**

1. To strengthen surveillance and early warning system and response to influenza pandemic,
2. To prevent influenza pandemic infection in human and to rapidly control and contain the spread of influenza pandemic virus,
3. To minimize morbidity, mortality and social disruption due to influenza pandemic,
4. To monitor and evaluate the response capacity by human health sector.

The following key strategies and activities of the health sector shall be implemented for prevention of infection during the pre-pandemic phase and response during the pandemic outbreak to minimize the scale of outbreak and socio-economic disruption.

For future pandemic planning for health sector, three general scenarios are considered. In each case, it is clear that the risk of acquiring a new pandemic virus is not homogeneous across the general population.

### **3.2. Pandemic Preparedness Strategies – Preparedness Phase**

During pandemic planning phases 1-3, preparedness is similar regardless of the scenarios described above.

#### **3.2.1 Planning, coordination and general measures**

This plan is developed to ensure that all the required resources, expertise and services can be mobilized and deployed rapidly to reduce the morbidity, mortality and social disruption to the minimum. In addition, establishment and strengthening of core capacities to preempt and control the next pandemic would also be useful in dealing with other infectious disease epidemics and public health emergencies of international concern as required under IHR (2005).

As the government needs to be very clear in its preparedness and response plans when pandemic strikes, an explicit chain of command and incident command structures for influenza pandemic and HPAI outbreak in animal is developed including their roles and responsibilities. The standard operating procedures (SOPs) have also been developed for rapid response teams for responding to influenza pandemic and HPAI outbreak in animals respectively so that there is no room for confusion and disagreement in times of crisis, and every agency and individual involved in crisis management are fully trained and equipped to initiate their actions immediately.

For proper planning and coordination, a systematic institutional arrangement has been drawn for the implementation of this NIPPP consisting of different high level committees with representatives from all the stakeholders as described in section II above.

During pre-pandemic phases (When there is no outbreak in the country)<sup>9</sup>, a Technical Committee will be formed to monitor influenza outbreaks. This committee will provide day-to-day technical advice, direction, feedbacks and technical backstopping to the National Steering Committee and the Executive Committee.

During pandemic phase (during outbreak time)<sup>10</sup>, this committee members shall join either National Incident Command Center or Incident Operation Center (Rapid Response Teams) as appropriate.

Members

- AI Technical Focal Person, JDWNRH
- Med. Superintendent, JDWNRH
- Medical Specialist, JDWNRH, MoH
- CPO, CDD, DoPH, MoH
- AI Focal Person, BAFRA, MoAF
- Program Director/AI Focal Person, NCAH, DoL, MoAF
- Head, Public Health Laboratory, MoH
- CPO, DVED, DMS

---

<sup>9</sup> WHO Phases 1-3

<sup>10</sup> WHO Phases 4-6

- PO, IHR, DoPH
- Head, ICB, MoH

#### Roles and responsibilities

- Develop guidelines, protocols and procedures for implementing the NIPPP;
- Support rapid response and systematic management of outbreaks of H1N1/H5N1 infection and other influenza pandemics
- Provide day-to-day scientific advice, direction, feedbacks and technical backstopping to the National Steering Committee, the Executive Committee, the Rapid Response Teams at field level and the Program
- Provide a scientific basis for risk communication and other relevant information dissemination
- Analyze and provide expert clinical, virology, and epidemiology advice/opinion.

A clear cut Command-and-Control system is established for smooth flow of information and rapid response teams have been formed for imminent pandemic as follows:

#### **3.2.1.1. Incident Command Structure for Influenza Pandemic Response**

The incident command structure for influenza pandemic has been adopted for proper coordination of the key stakeholders during the operation. The incident command structure will allow smooth flow of information from the centre to the incident area and vice versa. The incident command structure also incorporates the Department of Disaster Management (DDM) and the Dzongkhag Disaster Management Committee (DDMC). This would facilitate coordination of the response activities carried out at the incident site.

The national incident command structure for influenza pandemic response is described in the Figure 4. The chain of command and flow of information should be carried out as indicated by respective arrows in the incident command structure. The composition of the team, roles and responsibilities and their modus operandi are described under respective heading.



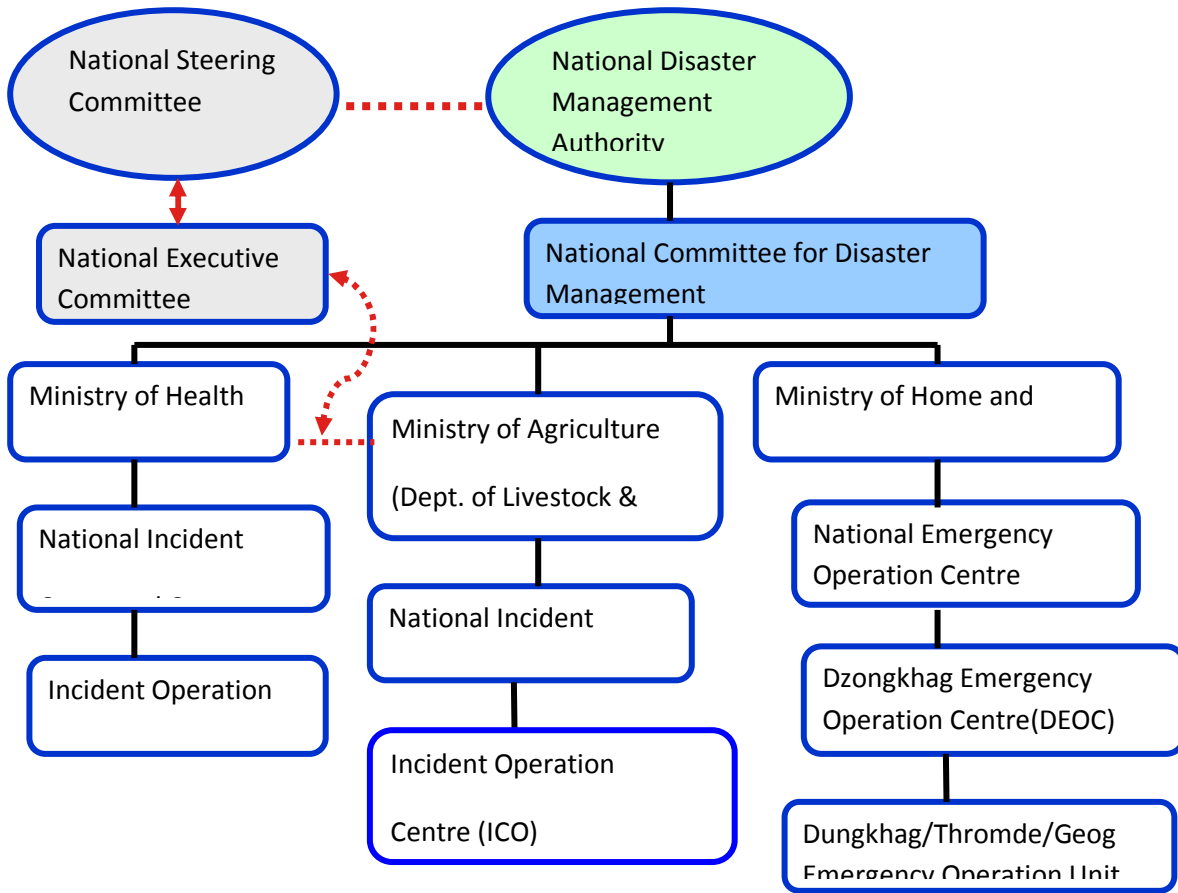


Figure 3: Incident command structures for response to influenza pandemic and HPAI and linkages with National Disaster Management Framework.

### 3.2.1.2. Plan Operability

In addition to the national pandemic plan, district should develop district specific pandemic preparedness and response plan with clear strategies for district level preparedness and response to influenza pandemic. A model guideline for development of district pandemic plan would be developed at the national level. Three regional workshops would be conducted for District Medical Officers and District Health Officers to help them develop their own district plan. The budget for implementation of district pandemic plan will be met and incorporated into the district yearly budget proposal.

These plans will be monitored and evaluated to assess their operability and quality at national as well as at district levels. It will be tested through periodic table top and field simulation exercises at least twice a year and accordingly it will be updated.

### 3.2.2. Surveillance, Early Warning and Monitoring

Surveillance can provide us early warning system, tells us where the virus is coming from and how to control the virus. Routine monitoring of influenza circulation in local communities

provides baseline data to establish seasonal trends and detect unusual clusters of influenza-like illness.

### ***3.2.2.1. Laboratory diagnostic capacity***

A public health laboratory equipped to deal with different types/strains of influenza needs a full set of components comprising well trained technical laboratory personnel, infrastructure, equipment, PPE, testing protocols, diagnostic kits & reagents etc. to meet the minimum standards. In addition, the laboratory facility needs to be able to handle hazardous materials safely and protect its staff and the environment.

The PHL and the two Regional Referral Hospital labs would be upgraded to test samples for influenza. Currently, the PHL is equipped with RT-PCR machine for testing influenza samples and some staffs trained on the PCR procedure to test influenza samples. The district hospital labs are equipped to collect and send the samples to PHL or the labs of two Regional Referral Hospitals. PHL has been serving as the reference public health laboratory for the country, carry out influenza tests and provide support to the Regional and district laboratories. PHL would send the influenza virus A isolates to the WHO Collaborating Centre or the WHO Reference Labs for molecular characterization of virus and confirmation.

Presently, the Public Health Laboratory has established and maintained Influenza-Like Illness (ILI) surveillance at 11 health care facilities as sentinel sites of the country. The PHL will continue to maintain the ILI surveillance to monitor influenza circulation in the country to establish seasonal influenza trends and to detect outbreaks of influenza like illness in the country. Together with the ILI surveillance, Severe Acute Respiratory Infection (SARI) surveillance has been also established in all the ILI sentinel sites.

### **3.2.2.2. Rapid Response Team**

To ensure early detection, control and containment of the disease, Rapid Response Teams would be formed at national, regional and district levels. The national RRT will be composed of relevant officials and experts from Ministry of Health and JDWNR hospital and this team will also function as western region RRT. The relevant experts from national RRT will provide technical backup to the other regional RRTs as and when required. The two regional RRTs for the Eastern and Central regions will be composed of experts from Regional Referral Hospitals at Monggar and Gelephu respectively. The regional RRTs will provide technical backup to the district RRT during the disease outbreaks and pandemics as and when requested by the districts within their regional jurisdiction. During the initial phase of the disease outbreak the district RRT will be deployed to the incident area for initial investigation, assessment and verification, and based on the information collected from the incident area concerned regional RRT and national RRT will be mobilized for additional support for the control and containment of the disease outbreak.

The Rapid Response Team will ideally consist of the following experts:

- District Health Officer (Team Leader)

- Epidemiologist or medical officer
- Chief medical officer at hospital
- Chief Nurse of hospital
- Laboratory technologist/technician
- BHU In-Charge, incident area/district

Other expanded members during pandemic phase 3 and above for rapid containment:

- Administrative officer
- Officer Commander, RBP
- District MSTF Secretary
- Communication Officer

During the incident of influenza pandemic outbreak, there will be ideally five sub team of Rapid Response Teams as shown in figure no. 4. They are Disease Investigation and Surveillance Team, Medical and Quarantine Team, Logistic Team, Information and Communication Team, and Law and Order Team consisting relevant members from national, regional and district levels (including BHUs). All these RRT members would be trained yearly on their roles and responsibilities as per the SoPs and guidelines.

Plans would be prepared to mobilize the national and regional Rapid Response Team to support districts to investigate unusual clusters of influenza-like respiratory illness or deaths and assess for human-to-human transmission. This RRT would be mobilized to assess and investigate the ILI outbreaks in the districts.

### **3.2.3. Health Care Capacity Planning**

Influenza illness may be managed in three settings, depending on the volume and severity of illness. Severe illness would be managed in hospital settings to the extent possible. Excessive cases of less severe illness can be managed in secondary health care sites (schools, etc.), while mild illness would be managed through home health care.

To manage excessive cases of less severe illness during large scale pandemic, secondary health care settings like schools and municipal buildings should be identified by all the districts. These structures would have basic hygiene facilities like toilets/bathrooms, water tap, soap and delivery of water, food and other basic needs for both patients and health care providers in the secondary sites.

The logistics support for supply of basic needs in the secondary sites will be done through the hospital administration using the budget for disease outbreak under the district health sector budget or district emergency contingency fund. Therefore, all districts should have yearly earmarked budget for disease outbreak containment operation. Additional financial resources and supplies will also be supported by the central program.

For proper and efficient management of hospital services during large scale pandemic, hospitals and BHU – I should develop a comprehensive hospital contingency plan emphasizing following detailed interventions at the hospital:

- Plan to discharge all but severely ill patients if surge capacity is needed for acutely ill patients with SARI due to a pandemic strain.
- Maintain a small inventory of antiviral (oseltamivir) medication for treating persons with SARI due to influenza virus. Develop mechanisms and procedures to distribute, and deliver antiviral in secondary health care settings based on national priorities and resources.
- Plan for the increased need for antibiotics, antipyretics, hydration, oxygen, and ventilation support within the context of national clinical management strategies.
  - Identify potential sources for obtaining needed supplies and equipment.
  - Maintain a census of acute care beds and ventilators
- Establish and maintain a small inventory of basic needs for delivering health care in secondary sites, e.g., cots, mats or pallets for the floor, basic hygiene supplies (soap, toilet paper).
- Maintain a small supply of PPE to provide to additional health care workers when they are mobilized. Limited supplies of PPE should be reserved for health care workers caring for seriously ill patients.
  - Disposal of used PPE from hospital or secondary health care sites should follow established infection control and waste management guidelines.
- Maintain a census of active health care workers, e.g., physicians, nurses, lab technicians, etc.

### **3.2.3.1 Surge Capacity – health workers and other health care facilities and supplies**

During large scale influenza pandemic, there will be increased demand of additional health care workers, isolation ward, ICU, and other health care facilities and supplies. All efforts should be made to continue essential services during the pandemic influenza period. The operational capacity of hospital may diminish due to staff illness (at least 20%) and absences and, therefore, it is critical to identify first- and second-line staff to ensure continuation of essential services. It is also important for hospitals to identify critical functions that will need to continue during the pandemic (for at least 4–6 weeks) and those who will perform them and non-essential functions that will be temporarily halted. Therefore, roster of health workers should be established and maintained within the hospital, within the district, at the regional level and also roster of retired or inactive health workers.

At the hospital and district level, the concerned DMOs and DHOs should maintain the roster of health workers for mobilization during the pandemic and at the regional level the Department of Medical Services would maintain in accordance to the Health Sector Emergency Contingency

Plan. List of retired health workers will be maintained at Bhutan Health and Medical Council who would be mobilized through the ministry to the incident district hospital.

### **3.2.3.2 Health Workers' capacity development**

It is essential that all health workers and laboratory personnel should be trained on AI/H1N1/pandemic influenza prevention, control, rapid response, investigation and containment, clinical management and infection control, and also on different laboratory aspects like bio-safety, and safe handling of specimen (collection, storage and transportation). They would be updated on the current knowledge of HPAI/AI and new pandemic influenza and its situation around the world. They would also be trained on proper use of PPE and infection control. The laboratory staffs would be regularly trained on sample collection, storage and transportation, and other diagnostic tests including rapid test, IFA and RT-PCR techniques.

The hospital support staffs like ward boy/girl, sweepers, and drivers should also be given regular trainings or at least once in a year on basic infection control, PPE use, disinfection and decontamination, handling of sick person and dead bodies. It is also very important to train this category of staff on proper waste disposal, especially used PPE.

For the training of health workers and hospital support staff, guidelines and standard operating procedures have been developed on different aspects of avian influenza and other influenza pandemics which will be periodically reviewed and updated as per the new information available on the new pandemic influenza. Following guidelines are already developed:

1. Clinical management and treatment guideline
2. Investigation and surveillance guideline
3. Infection control guideline
4. Guideline for use of personal protective equipment (PPE)
5. SOPs for specimen collection, storage and transportation

It would be prudent to train all categories of health workers at all levels so that they will have knowledge and skills to respond when ministry requires to mobilizing them from one health facility to another during influenza pandemic. The trainings will be done yearly at regional and district levels.

It is also very important to ensure awareness of influenza case definitions among health care providers. Therefore, the central program would update the case definition of new influenza pandemic as and when required and circulate to all health care facilities.

As part of the training to hospital staff, all district hospitals will carry out hospital level simulation exercise at least once in a year to assess health system capacity to detect and contain outbreaks of human influenza pandemic in hospital settings.

### **3.2.3.3. Multi-Sectoral Task Force**

At the district level, the existing Multi-Sectoral Task Force (MSTF) can be re-enforced and maintained so that the MSTF can be used for prevention and control of pandemic influenza at the community level. The active MSTF members can be trained on different aspects of pandemic influenza like community mobilization during pandemic, preventive measures, control strategies and also in providing basic non-health care to the less severe ill patients in the secondary health care sites. They can also render support during rapid containment operation in terms of logistic supplies and risk communication activities. Therefore, MSTF manual for pandemic preparedness and response would be developed by the program (DoPH) on which MSTF members can be trained.

Other local volunteer or non-governmental organizations would be also identified and trained who can provide assistance during a large scale pandemic in terms of providing home care, delivering food, or providing other social needs to families in self-imposed isolation or quarantine.

### **3.2.3.4. Stockpile of Antiviral drugs and Personal Protective Equipment**

#### **3.2.3.4.1. Antiviral**

Ministry of Health would arrange a basic stock pile of Tamiflu capsules in the country at Drug, Vaccine and Equipment Division (DVED) as national stockpile. Regional stockpile of Tamiflu in the regional referral hospitals would also be made. In addition, all district hospitals and BHU-I would also be supplied with a limited stock of antiviral Tamiflu. In case of emergency requirement of additional Tamiflu in district during influenza outbreak/pandemic, the regional referral hospital will make temporary supply to the district as per the requirement by the district which will be later replenished by DVED from the national stockpile. Additional antiviral shall be requested from the WHO regional stockpile through WHO country Office during the outbreak as per the official arrangement made by the Ministry of Health.

#### **3.2.3.4.2. Personal Protective Equipment (PPE) and masks**

The Ministry of Health is responsible for supplying and stockpiling PPEs at national and regional level and also in district hospitals and BHU-I. If additional PPE is required by district during influenza pandemic outbreak, it will be mobilized from the regional and national stockpile by the central program and DVED as per the request by the IOC/RRT at the incident site or District hospital.

PPEs have been procured in two batches with the support from National Influenza Preparedness and Response Project supported through World Bank and it has been distributed to all district hospitals and BHU-Is. In addition to this, at least five sets of PPEs like gloves, N95 mask and goggles should be supplied to all the BHUs since they might be the first ones to suspect and handle the early pandemic influenza cases. The distribution of the PPEs and antiviral Tamiflu will be done by the DVED upon request from the district hospitals or regional hospitals and DoPH during influenza outbreaks and during the pandemic preparedness phase.

During the influenza outbreak, if the situation demands additional supplies, DVED would make direct procurement as per the approval from the ministry to procure necessary equipments and supplies like gloves, face mask, laboratory reagents, disinfectants, medicine etc from the eligible suppliers. For the increased need of antibiotics, antipyretics, ventilation and hydration during pandemic, the ministry will stockpile it at DVED.

### 3.2.3.4.3 Treatment of AI cases

Tamiflu is used to treat those with flu symptoms as well as to reduce the chances of getting the flu if there is a flu outbreak. All suspected cases of influenza will be treated in the local hospitals and therefore all hospitals should identify rooms for treatment of cases in isolation.

In patients with flu like symptoms suspected of having pandemic influenza, Tamiflu should be administered in a dose of two 75mg capsules a day (dose for adults is 150mg/day) for 5 days. For maximum effect, the drug should be started within 48 hours of onset of symptoms. During a pandemic situation, the possibility to test individual patients for influenza infection will be limited and therefore treatment should be given immediately if possible.

With regard to post exposure treatment, during a wide spread pandemic it will not be feasible to give post exposure treatment to non-ill contacts. For most people it will not be known if they were “exposed” to the pandemic influenza and moreover, in most situations, it is expected that Tamiflu will be used to treat persons with symptoms.

### 3.2.3.4.4 Prophylaxis

#### Chemoprophylaxis: Preventive therapy of close contacts (Post exposure)

Irrational and overuse of antiviral agents can lead to the emergence of resistant viruses, raising another critical barrier in the fight against pandemic. Only post exposure cases merits chemoprophylaxis

Three groups have been defined, based on the risk profile, which are usually considered as candidates for chemoprophylaxis. The dose of chemoprophylactic agents is half that used for therapeutic purposes. A brief description of the risk groups and indications for chemoprophylaxis are given in the table below.

**Table 3: Chemoprophylaxis against pandemic influenza**

Level of risk	Risk groups	Chemoprophylaxis
High risk	Sharing household with or caring for a Patient. Unprotected close contact (<1 meter) with patient.	Oseltamivir in dose of 75 mg/day to continue for 7-10 days after last exposure.
Moderate risk	Persons handling sick animals or decontaminating environment without PPE. Direct exposure to sick/dead animals Infected with H5N1.	May be provided the same chemoprophylaxis as with high-risk group.

	Health-care worker in direct contact with patient without complete PPE. Laboratory personnel who might have an unprotected exposure.	
Low Risk	Health-care worker with PPE or contact >1 meter with a patient. Cullers of non-infected animals. Persons with PPE handling sick/dead birds or contaminated environment.	Probably no Chemoprophylaxis needed.

\* Prophylactic Tamiflu has to be given as a supervised medication

Refer RC protocol for prophylaxis in different zones

For persons going to handle sick or dead birds or work in a contaminated environment with improper Personal Protective Equipment (PPE) and health workers working in close contact with confirmed pandemic influenza patient, chemoprophylaxis should be provided.

### 3.2.4. Public Health Measures

Certain public health measures should be routinely reinforced as part of general preparedness for either seasonal influenza or a new, novel pandemic strain. In public health education programs, e.g., in schools, public gatherings, etc., hand washing and respiratory hygiene should be emphasized as on-going personal health protection measures. The public and the community would be sensitized at all levels by BHU and district health officials on public health measures as on-going activity so that people are frequently reminded on the prevention and control measures. One of the important objectives during the pandemic phases 1-3 is to prevent human influenza infection from animals by reducing infection risk in those involved in handling animals and its products and in responding to animal disease outbreaks. Continued education and training regarding the potential risk of transmission and correct use of Personal Protective Equipment is essential. Measures to reduce human contact like use of gloves and mask while handling potentially infected animals should be emphasized as part of public health education program.

At the individual and household level, hand and respiratory hygiene should be promoted routinely. A guideline on infection control for household settings would be developed in order to prevent spread of influenza infection within the household members.

Also, development of guideline on home based management and guideline to provide necessary support for ill persons isolated at home and their household contacts would be useful. During large scale pandemic, moderately severe ill persons may be managed and isolated at home with proper home based management procedure. In such cases, basic necessary support like food and other logistics to the household will be supplied as per the national disaster management framework/plan.

Protocols and guidelines would be developed to suspend classes in the event of severe pandemic which will guide school authority and health officials in school closure. Promoting reduction of unnecessary travel within and out of the country and overcrowding of mass transport systems would be also considered as this will help in delaying the spread of influenza infection. Therefore, framework to facilitate decision-making for cancellation or restriction of mass gatherings at the time of pandemic would be developed. Public mass gatherings like celebration, entertainment programs (theatre movie, reality shows, disco theque , games and sports) would be



differed or cancelled during the influenza pandemic as per the directives from the Chairman of National Steering Committee.

#### **3.2.4.1. Communication**

The goal of **communications** before and during a pandemic is to provide and exchange relevant information with the public, partners, and stakeholders to allow them to make well informed decisions and take appropriate actions to protect health and safety. Effective communication about the risks related to pandemic influenza is critical at every stage of preparedness and response and is a fundamental part of effective risk management.

A national pandemic communication plan detailing the communication strategies and standard operating procedures would be developed for effective communication about risk related to influenza pandemics. The communication plan would be initiated and implemented by Information and Communication Bureau under Department of Public Health with the support from the program.

The communication plan would cover the following aspects:

- Establishment of communication team/committee
- Standard Operating Procedure for dissemination of communication products
- Advocacy and awareness program for high level officials and leaders regarding global and national pandemic influenza risk
- Development of effective communication strategies and messages to inform, educate, and communicate with individuals and families
- Initiation of public health education campaigns in coordination with other relevant authorities on individual level infection control measures
- Increase public awareness of measures that may be available to reduce the spread of pandemic influenza

### 3.3. Pandemic Response Strategies - Response phase

Three scenarios have been described below as the operational responses when the new, novel virus arrives in Bhutan. It will vary depending on the nature of these scenarios.

#### 3.3.1. Scenario 1: Low overall population attack rate.

Table 1

Pop. Attack Rate	# of Infections	% Serious Illness	# cases of serious illness
1%	6,700	1%	67
		10%	670
		20%	1,340

Assuming a 10% mortality rate among seriously ill persons, the expected number of deaths would range from 6 or 7 to 134.

This scenario with a very low attack rate (i.e., low transmissibility) is relatively unlikely. It would **not** represent an extraordinary burden of illness for the population or the health care system, even when the virulence of the virus might be high, e.g., generating 1,340 seriously ill persons.

The main objective during such scenario would be basic response consisting of early case detection and investigation, comprehensive assessment, and very close monitoring of the situation.

#### 3.3.1.1. Planning, coordination and general measures

Documentation of the information on global pandemic evolution including geographical spread, trends, and impact from the reliable sources like WHO and CDC websites would be done.

At this stage, strict rapid pandemic containment activities would be initiated and coordinated instantly as per the rapid containment protocol in collaboration with WHO to limit the spread of human infection. To do so, National Steering Committee and national incident command mechanism would be activated for proper control and coordination of rapid containment operations as described below.

##### 3.3.1.1.1. Incident Command Structure for MoH (Response phase)

A clear cut Command-and-Control system is established for smooth flow of information and rapid response teams have been formed for imminent pandemic.

The incident command structure for influenza pandemic has been adopted for proper coordination of the key stakeholders during the operation. The incident command structure will allow smooth flow of information from the centre to the incident area and vice versa. The incident command structure also incorporates the Department of Disaster Management and the Dzongkhag Disaster Management Committee. This would facilitate coordination of the response activities carried out at the incident site.

The national incident command structure for influenza pandemic response is described in the Figure below. The chain of command and flow of information should be carried out as indicated by respective arrows in the incident command structure. The composition of the team, roles and responsibilities and their modus operandi are described under respective heading.

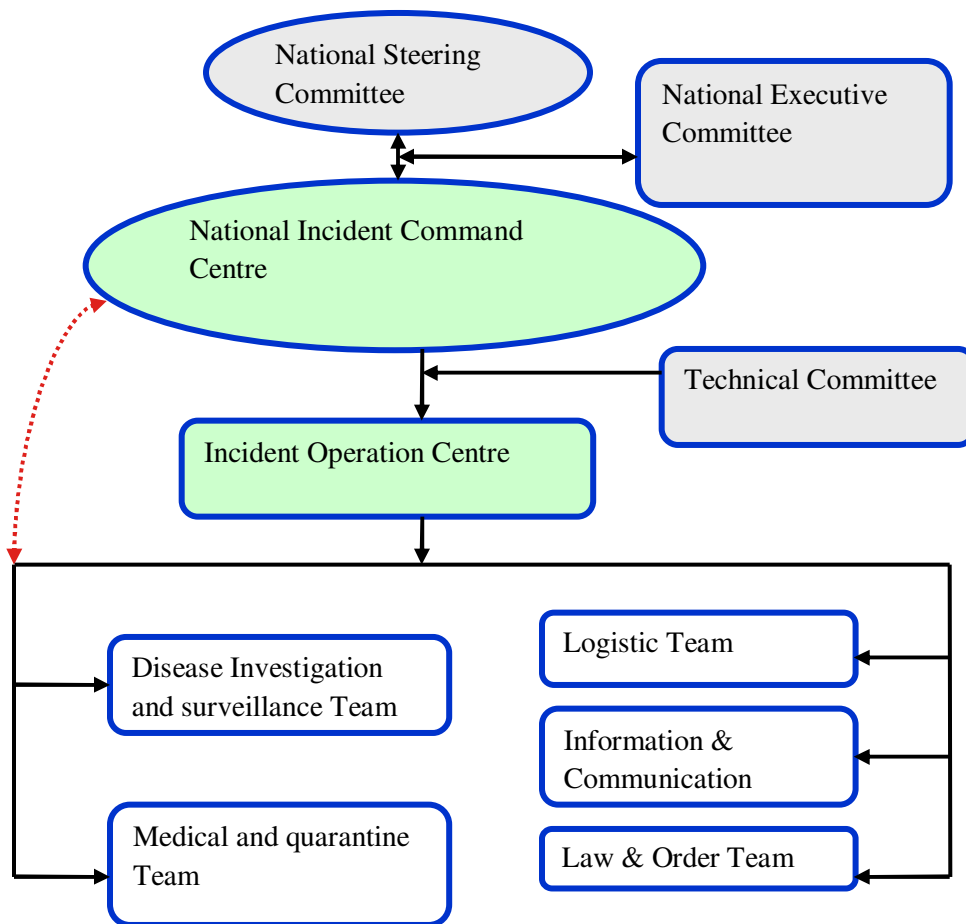


Figure 4: The national incident command structure for influenza pandemic response.

### 3.3.1.1.2. National Incident Command Centre (NICC)

The National Incident Command Centre (NICC) will be the highest technical decision making body for influenza pandemic response. The NICC will be operated by a team of relevant members from key stakeholders. The centre will be activated when the Disease Outbreak Investigation Team recommends to the DoPH of a case meeting the case definition of pandemic Influenza and after convening an emergency meeting with the relevant experts.

The NICC team constitutes following members:

- Secretary, Ministry of Health – Chairman/Head,
- Department of Public Health, Ministry of Health (Member Secretary)
- Head, Department of Medical Services
- Head, Department of Livestock, Ministry of Agriculture

- Head, Bhutan Agriculture and Regulatory Authority, Ministry of Agriculture
- Head, Department of Disaster Management, Ministry of Home and Cultural Affairs
- Head, Department of Law and Order, MoHCA
- Medical Superintendent, JDWNRH, Thimphu
- Technical Focal Person for influenza pandemic, JDWNRH
- CPO (Epidemiologist), CDD, Department of Public Health, MoH
- Head, Public Health Laboratory, DoPH, MoH
- Program Officer, IHR, DoPH, Ministry of Health

The NICC meeting shall be convened within 12 hours of receiving a report from the routine investigation team.

### **Roles and Responsibilities:**

- Declare an outbreak of avian influenza or other influenza pandemic in the country and issue official notification for implementation of rapid containment strategy in consultation with the national technical experts and WHO;
- Authorize issuance of notice to the WHO;
- Activate Incident Operation Centre (IOC) and rapid response teams;
- Provide policy direction for response activities;
- Issue executive orders for enforcement of response activities;
- Facilitate and mobilize fund and logistics required for the Rapid Response Teams;
- Ensure that appropriate risk communication activities are conducted
- Maintain liaison with other relevant national and international organization;
- Provide updates to National Steering Committee (NSC) and to the department of disaster management.

#### **3.3.1.1.3. Incident Operation Centre (IOC)**

The Incident Operation Centre is the field level coordination and implementation unit for rapid response and control measures. The IOC will be identified and designated by the district at the incident area and the unit will be responsible for providing field level information and updates on the disease status, progress and control activities to the NICC. The members of the IOC will consist of the team leaders of different teams under national, regional and district Rapid Response Teams (RRT). They will ensure basic infrastructure and essential services to the RRT members.

#### **Members of the Incident Operation Centre**

<b>S/N</b>	<b>Task/Roles</b>	<b>Members</b>	<b>Agency</b>
1	Incident Commander/Team Leader <ul style="list-style-type: none"> <li>• Presents available information</li> <li>• Outlines investigation plans</li> <li>• Assigns roles and responsibilities</li> <li>• Oversees team member roles</li> </ul>	Chief Medical Officer / Medical Superintendent, RRH Or DHO, concerned district	Concerned RR hospital, concerned district

	<ul style="list-style-type: none"> <li>• Reports to NICC</li> </ul>		
2	<p>Epidemiological Surveillance</p> <ul style="list-style-type: none"> <li>• Verifies the outbreak</li> <li>• Establishes a case definition</li> <li>• Conducts case finding and identifies risk factors</li> <li>• Identify and coordinate control measures</li> <li>• Supervises data collection and data analyses</li> </ul>	<p>Medical Epidemiologist, Medical officer (trained)</p>	<p>MoH, Concerned RRH/district</p>
3	<p>Lab surveillance and diagnosis</p> <ul style="list-style-type: none"> <li>• Advise and assure proper specimen collection, transportation, and storage</li> <li>• Verify proper laboratory diagnosis to help refine a case definition</li> </ul>	<p>Focal person, Influenza Surveillance, Head, Laboratory service, RRH/District hospital</p>	<p>PHL, Concerned RRH and concerned district hospital</p>
4	<p>Risk communication to public (at the site)</p> <ul style="list-style-type: none"> <li>• Establish and maintain contact with local &amp; national media on dissemination of appropriate messages</li> <li>• House to house advocacy on prevention and control measures at incident area</li> </ul>	<p>DHO, Communication Officer, ICB</p>	<p>ICB, MoH, concerned District</p>
5	<p>Case management, isolation and quarantine</p> <ul style="list-style-type: none"> <li>• Advises and assists in managing patients</li> <li>• Educates, implements, and supervises infection control measures</li> </ul>	<p>Medical Specialist/Officer (trained) /Medical Specialist/Officer (trained)</p>	<p>JDWNRH and concerned RRH</p>

	<ul style="list-style-type: none"> <li>Knows hospital bed capacity and medical capability</li> </ul>		
6	<p>Dzongkhag and local level logistics support (as Chief Disaster/ Emergency Coordinator)</p> <ul style="list-style-type: none"> <li>Manage logistic supplies (PPE, antiviral, food, water)</li> <li>Coordinate with RBP in law enforcement</li> <li>Monitor finances</li> <li>Arrange transportation</li> </ul>	Dzongdag, concerned Dzongkhag / Adm. Officer, concerned district hospital	Concerned district administration and hospital
7	<ul style="list-style-type: none"> <li>Ensure law and order</li> </ul>	SP or OC RBP	Concerned Dzongkhag

The incident commander would be from the field/district who has good technical knowledge of the disease and he would be the over all coordinator of the IOC and its functions. He would also be the spokesperson during the pandemic.

Functions of the Incident Operation Centre are:

- Activation of Incident Operation Centre as per the directives from NICC;
- Conduct meeting and debriefing of the team at the end of each day;
- Provide Logistic support to the RRT
- Coordinate and monitor the activities of various teams under RRT;
- Provide daily updates to the NICC

### **Modus Operandi**

Upon receiving executive order from the NICC, the IOC will be activated within 6 hours. The IOC will convene meeting daily and provide updated information to NICC. The Chairman of the Dzongkhag Disaster Management Committee (Dzongda) will facilitate in providing logistical support to the RRTs during the operation.

#### **3.3.1.1.4. Rapid Response Teams**

During the incident of influenza pandemic outbreak, there will be ideally five sub team of Rapid Response Teams as shown in figure no. 5. They are Disease Investigation and Surveillance Team, Medical and Quarantine Team, Logistic Team, Information and Communication Team, and Law and Order Team consisting relevant members from national, regional and district levels (including BHUs). All these RRT members would be trained yearly on their roles and responsibilities as per the SoPs and guidelines.

#### **Roles and responsibilities of RRT:**

1. **Disease Investigation and Surveillance Team** will carry out disease investigation and surveillance. The team is responsible to initiate local investigation and start standard

- control measures to prevent further transmission. The team shall also be involved in carrying out surveillance activities and laboratory diagnostic services as per the SoPs and guidelines annexed herewith.
2. **Medical and Quarantine Team** shall be responsible for antiviral prophylaxis, diagnosis and management of influenza cases. For detailed ToR refer SOP for case management and SOP for specimen collection, testing, storage and transport. The team will also ensure quarantining of the contacts, monitoring the person quarantined and ensuring that they comply with the rules. (As per the SOP)
  3. **Logistic team** shall ensure basic infrastructure and essential supplies (All logistic supports) for the RRT members.
  4. **Information and Communication Team** shall carry out risk communication to the public informing about the health risks and the measures being taken by the authorities. The team will also inform the public about Do's and Dont's to protect them during the emergency.
  5. **Law and Order Team** shall ensure the compliance and smooth implementation of the disease control and containment measures.

All these RRTs would be deployed to the incident area to instantly initiate the rapid containment operation.

In addition, plans and procedures to access and mobilize additional human and material resources would also be activated. Simultaneously, regular update on evolving situation would be provided to WHO through IHR to facilitate coordination of response activities. If required, antiviral drugs and technical expertise would also be requested from WHO.

#### **3.3.1.2. Surveillance and Monitoring**

The Influenza Like Illness (ILI) surveillance at all levels will be intensified and all health care facilities will be notified to be extra vigilant with ILI and ARI cases visiting the hospital/BHUs. The health facilities would be required to record and analyze the ILI/ARI cases everyday and they should notify the Director, DoPH of any unusual increase in number of cases.

The Public Health Laboratory should ensure to acquire the necessary reagents as soon as possible to identify the new, novel virus. A comprehensive assessment of the earliest cases of the new, novel virus, including documenting epidemiological changes and clinical characteristics for possible revision of the national case definition would be undertaken. The investigation and surveillance team will initiate active surveillance by making house to house visit at the incident area to find out any suspect cases as per the SoP for disease outbreak investigation and surveillance.

#### **3.3.1.2.1. Rapid Containment**

Rapid containment operation will be initiated during the influenza pandemic outbreak as per the Rapid Containment protocol in close consultation with WHO. Pharmaceutical and non-pharmaceutical interventions will be applied in potentially large population to stop the spread of an emerging pandemic virus.

## **Containment strategy**

Initial case (Index Cluster) would be identified as early as possible and geographically defined containment zone would be created around the cases where widespread pharmaceutical and non-pharmaceutical interventions would be used.

The Containment Zone would be the largest possible area that can be created and feasibly maintained and must be large enough to surround all known persons infected by pandemic influenza and as many of the people in frequent contact with them. While a circular Containment Zone is conceptually the simplest, the actual size and shape of the Containment Zone and the Buffer Zone is expected to be influenced by pragmatic considerations such as:

- known movements and geographical distribution of cases and contacts;
- Important local or national administrative boundaries as well as important natural boundaries that may limit the movement of people;
- infrastructure and essential services (e.g. power, water, sanitation, food supply, communications) considerations that may substantially affect the safety and health of people within the Containment or Buffer Zones

A Buffer Zone will be defined surrounding the Containment Zone. The Buffer Zone is an area where active and complete surveillance would be initiated to detect any possible cases of pandemic influenza.

Follow-up of persons who have moved outside the Containment Zone: All possible measures should be taken to follow up persons who have left the containment zone before or after the start of the operation and who possibly could have come in contact with a person infected with AI (H5N1).

Once the Containment Zone and Buffer Zone have been identified rapid containment activities would be initiated as per the RC protocol.

### **3.3.1.3. Health Care Capacity Response**

All hospitals would activate and implement hospital contingency plan and provide medical care and support to the patients as per the clinical case management guideline. The hospitals would initiate triage, isolation and cohort of probable cases in the hospital and secondary sites as per their contingency plan. Additional human resource will be mobilized from other health facilities within the effected district and from non-effected district as well, as per the roster prepared.

The district MSTF members and non-governmental agency volunteers would provide non-medical support for patient contacts in households and secondary sites, if needed. Good hand hygiene, isolation of ill persons, and the use of personal protective equipment are important measures when caring for persons with influenza to decrease viral transmission. The guideline for home based and community based interventions during influenza pandemic would be used in the community. Any persons with severe illness would be provided with Tamiflu medication as early as possible following the onset of symptoms without waiting for laboratory results.



### 3.3.1.4. Public Health Measures

IEC activities in both affected and non-affected districts would be intensified and extensively carried out on advising people with acute respiratory illness to stay at home and to minimize their contact with household members and others. This would be done at all levels using both national and local media as per the communication plan.

The household contacts would be also advised to minimize their level of interaction outside the home and to isolate themselves at the first sign of any symptoms of influenza. They would be also advised on the individual infection control measures like cough etiquette, hand and respiratory hygiene, use of face mask, and disposal of sputum as per the guideline for home based and community based interventions during influenza pandemic.

To reduce further risk of people getting infected and transmitting the disease to healthy individuals, social distancing measures like closure of schools, cancellation of mass gatherings and public events (market closure included), closing workplaces or having non-essential workers stay at home and minimizing public transport would be applied through the executive order from National Steering Committee of NIPPP.

Both pharmaceutical and non-pharmaceutical interventions will be implemented as per the rapid containment protocol. All persons in the containment zone who are ill or not ill would be given anti-viral prophylaxis for 20 days and person presenting with ILI will be treated with antiviral treatment for 5 days as per the clinical management guideline. All ill persons would be isolated and persons who had close contact with the confirmed case would be quarantined in a designated place to prevent infection to healthy individuals.

**3.3.2. Scenario 2:** Moderate overall population attack rate. Table 2 illustrates possible outcomes of this scenario.

**Table 2.**

<b>Pop. Attack Rate</b>	<b># of Infections</b>	<b>% Serious Illness</b>	<b># cases of serious illness</b>
10%	67,000	1%	670
		10%	6,700
		20%	13,400

Assuming a 10% mortality rate among seriously ill persons, the expected number of deaths would range from 67 to 1,340.

This scenario does not pose an extraordinary level of mortality. With low virulence, there might be considerable transmission of the virus, but the number of seriously ill persons would not pose an excess burden on the health care system. However, with considerable transmission and the highest level of virulence, the potential number of seriously ill persons would stress the current health care system. The objective of the response is to minimize transmission as much as possible to reduce the burden on the health care system and to provide health care for seriously ill patients. Most of the recommendations for scenario #1 would be applicable in this case.

#### 3.3.2.1. Response action for low virulence:

- Same as for scenario #1.

### **3.3.2.2. Response action for high virulence:**

**3.3.2.2.1. General Measures** – Aggressive containment and control measures would be applied through IOC and rapid response teams to minimize transmission as much as possible to reduce the burden on the health care system and to provide health care for seriously ill patients.

Documentation of the evolving pandemic including geographical spread, trends, and impact would be continued.

#### **3.3.2.2.2. Surveillance and Monitoring**

The Influenza Like Illness (ILI) surveillance at all levels will be intensified and all health care facilities will be notified to be extra vigilant with ILI and ARI cases visiting the hospital/BHUs. The health facilities would be required to record and analyze the ILI/ARI cases everyday and they should notify the Director, DoPH of any unusual increase in number of cases. Continuous monitoring of SARI surveillance in all district hospitals would be done.

The Public Health Laboratory should ensure to acquire the necessary reagents as soon as possible to identify the new, novel virus especially in patients with SARI. A comprehensive assessment of the earliest cases of the new, novel virus, including documenting epidemiological changes and clinical characteristics for possible revision of the national case definition would be undertaken. The investigation and surveillance team will initiate active surveillance by making house to house visit at the incident area to find out any suspect cases as per the SoP for disease outbreak investigation.

#### **3.3.2.2.3. Health Care Capacity Response**

Where necessary, hospitals would institute triage and set up secondary health care sites when hospital capacity is exceeded as per the hospital contingency plan and district pandemic plan. At this stage it would be essential to ensure awareness of influenza case definitions among health care providers at all levels. All the hospitals should ensure that the PPE is available at hospitals and secondary health care sites.

- Mobilize potential sources for obtaining needed supplies and equipment, e.g., antibiotics, antipyretics, hydration, oxygen, and ventilation support.
- Mobilize retired or inactive health care workers from roster.
- Mobilize trained local volunteer or non-governmental organizations that could provide assistance, e.g. supporting secondary health care sites and home health care.
- Discharge all but severely ill patients to create beds for patients who are acutely ill with SARI due to the pandemic strain.
- Provide medical and non-medical support for patients and their contacts in households, if needed. Good hand hygiene, isolation of ill persons, and the use of personal protective equipment are important measures when caring for persons with influenza to decrease viral transmission.
- Provide Tamiflu medication for any persons with severe illness as early as possible following the onset of symptoms without waiting for laboratory results.
- Follow strict infection control measures in the health facilities as per national guidelines.

### 3.3.2.1.4. Public Health Measures

With a highly virulent virus, the objective would be to minimize transmission as much as possible to reduce the burden on the health care system. At this stage it would be very important to start implementing social distancing measures as per the guideline on social distancing. Closure of schools would be considered as per the criteria and guideline on reducing transmission of pandemic influenza virus in schools.

Following preventive measures would be aggressively emphasized through various means of media and also through house to house visit:

- Advise people with acute respiratory illness to stay at home and to minimize their contact with household members and others.
- Advise household contacts to minimize their level of interaction outside the home and to isolate themselves at the first sign of any symptoms of influenza.
- Promote hand and respiratory hygiene.
- If possible, identify a separate room in the house for care of sick family members. Consider designating a single person as the main caregiver for anyone who gets sick.
- Encourage reduction in travel and crowding of the mass transport system.

**3.3.3. Scenario 3:** High overall population attack rate. Table 3 illustrates possible outcomes of this scenario.

**Table 3.**

<b>Pop. Attack Rate</b>	<b># of Infections</b>	<b>% Serious Illness</b>	<b># cases of serious illness</b>
20%	134,000	1%	1,340
		10%	13,400
		20%	26,800

Assuming a 10% mortality rate among seriously ill persons, the expected number of deaths would range from 134 to 2,680. In this scenario, even a moderately virulent virus would create serious stress in the health care system. A highly virulent virus, such as H5N1, would create a serious crisis. With a relatively high attack rate, all measures to reduce transmission and care for seriously ill patients would be employed. As in scenario #2, the objective of the response is to minimize transmission as much as possible to reduce the burden on the health care system and to provide health care for seriously ill patients. Most of the response action for scenarios #1 and #2 would be applied in this case.

### 3.3.3.1. Response action for very high virulence virus:

**3.3.3.1.1. General Measures** – Very aggressive measures are needed to minimize transmission as much as possible to reduce the burden on the health care system and to provide health care for seriously ill patients. Other response measures would be similar to the scenario #2

#### **3.3.3.1.2. Surveillance and Monitoring**

- Continue ILI surveillance.
- Monitor ARDS surveillance in all district hospitals.
- Ensure that the reference laboratory acquires the necessary reagents as soon as possible to identify the new, novel virus, especially in patients with ARDS.
- Mobilize the regional RRT to investigate unusual clusters of influenza-like respiratory illness or deaths.

#### **3.3.3.1.3. Health Care Capacity Response –**

- Full mobilization of the health care sector will be required, including opening secondary health care sites when hospital capacity is exceeded.
- Ensure awareness of influenza case definitions among health care providers.
- Ensure PPE is available at hospitals and secondary health care sites.
- Mobilize potential sources for obtaining needed supplies and equipment, e.g., antibiotics, antipyretics, hydration, oxygen, and ventilation support.
- Mobilize retired or inactive health care workers from roster.
- Mobilize trained local volunteer or non-governmental organizations that could provide assistance, e.g. supporting secondary health care sites and home health care.
- Discharge all but severely ill patients to create beds for patients who are acutely ill with ARDS due to the pandemic strain.
- Provide medical and non-medical support for patients and their contacts in households, if needed. Good hand hygiene, isolation of ill persons, and the use of personal protective equipment are important measures when caring for persons with influenza to decrease viral transmission.
- Provide Tamiflu medication for any persons with severe illness as early as possible following the onset of symptoms without waiting for laboratory results.
- Identify all contacts of ill persons and consider liberal use of Tamiflu for prophylaxis in all health care workers and contacts.
- Follow strict infection control measures in the health facilities.

#### **3.3.3.1.4. Public Health Measures –** With a highly virulent virus, the objective should be to minimize transmission as much as possible to reduce the burden on the health care system.

- Implement social distancing measures (see Annex 4).
- Preemptive school closure should be considered as per criteria suggested in Annex 3.
- Advise people with acute respiratory illness to stay at home and to minimize their contact with household members and others.
- Advise household contacts to minimize their level of interaction outside the home and to isolate themselves at the first sign of any symptoms of influenza.
- Promote hand and respiratory hygiene aggressively.
- If possible, identify a separate room in the house for care of sick family members. Consider designating a single person as the main caregiver for anyone who gets sick.
- Encourage reduction in travel and crowding of the mass transport system.
- Consider cancellation or postponement of mass gatherings.

## **IV. ANIMAL HEALTH: CONTROLLING THE DISEASE IN ANIMALS AND PREVENTING DISEASE SPREAD IN HUMANS**

### **4.1. Objective**

The objectives of the Veterinary Response Plan for HPAI are:

- To prevent any incursion of notifiable avian influenza into the country through effective surveillance system and import regulations;
- To rapidly control disease outbreaks following any incursions of virus and regain HPAI freedom status;
- To reduce the opportunities for human infection;
- To minimize morbidity, mortality and social disruption.

### **Veterinary Response to HPAI Strategies**

#### **4.2. Phase 1: Keeping Bhutan Free of Avian Influenza**

The objective of phase 1 is to prevent any incursion of notifiable avian influenza into the country through an effective surveillance and biosecurity system and maintain country's freedom from infection.

##### **4.2.1. Surveillance for early detection of incursion of HPAI**

Highly Pathogenic Avian Influenza (HPAI) is listed under the Livestock Rules and Regulations of Bhutan 2008 as a notifiable disease in the country. Therefore, all individuals are all bound by the law to report any suspected case of the disease to a relevant authorities (DoL and BAFRA).

##### **i) Clinical and laboratory surveillance of chicken population**

Clinical surveillance is aimed at detection of clinical signs of HPAI at the flock level. Surveillance based on clinical inspection is particularly relevant for HPAI because the infection is characterized by very high mortality rate in terrestrial poultry. Monitoring of production parameters, such as increased mortality, reduced feed and water consumption, presence of clinical signs of a respiratory disease or a drop in egg production, is important for the early detection of infection. In case of low pathogenic avian influenza (LPAI) infection the only indication may be a drop in feed consumption or egg production.

Surveillance activities, both clinical and laboratory testing shall be carried out on a regular basis. Although clinical surveillance should be a daily farm routine, purposive sampling and laboratory testing is expected to be carried out at least once in every six months. HPAI may be suspected if the following trigger signs are observed:

\* In semi-commercial farms, such as the Wangchutaba Poultry Farm, Wangchutaba, Bama Poultry Farm at Genekha and the Government poultry breeding farms at Paro, Lingmethang, Gelephu where bio-security is medium and day old chicks are imported, authorities should be alerted for investigation if the daily mortality rate is  $>2\%$  for 2 consecutive days;

\* In village-based smallholder and backyard farms, authorities should be alerted for investigation if daily mortality rate is  $\geq 5\%$  for 2 consecutive days in a village,

Poultry or birds showing signs and symptoms similar to HPAI should be examined clinically and necropsied. Appropriate samples from sick and dead birds shall be collected and subjected to laboratory testing.

ii) Surveillance in domestic waterfowls

Certain aquatic birds such as domestic ducks can act as reservoirs of infection for HPAI and shall be serologically screened to assess whether these birds have been exposed to H5, H7 or H9 virus. The duck populations in the southern Dzongkhags, comprising approximately 10% of poultry population and those kept as pets shall be sampled and tested in sufficient numbers to give a 95% probability of detecting at least one sero-positive bird if infection is present above 20% (e.g. for a flock of 500 birds 14 random samples should be collected, assuming a test sensitivity of 100%).

If seropositive, sufficient samples shall be collected for virus isolation from cloacal or tracheal swabs (pools of 5 swabs per sample bottle) to give 95% probability of detecting at least one virus positive bird if 2% of the birds are excreting virus (e.g. 100 swabs for flocks of 500 birds).

iii) Surveillance in wild birds

Investigation of unusual mortalities or die-backs in wild birds, and especially black-necked cranes in the Phobjikha and Bomdeling valleys, ruddy shell duck throughout Bhutan, egrets, black storks, fish eagles, white and grey bellied herons and, cormorants in southern parts of the country<sup>11</sup>, and crows and pigeons throughout, Bhutan shall be carried out as all these species could conceivably be involved in spread of the virus. The investigations should conform to the protocols set out in the FAO manual “Wild Bird HPAI Surveillance”<sup>12</sup>. The Nature Conservation Division of the Department of Forests and an NGO concerned with wild birds (RSPN) shall be involved in joint surveillance and monitoring of wild birds, including the migratory water birds in the country.

There is a need to construct digital maps showing spatial and temporal distributions of migratory water birds, indigenous birds and their overlap with domestic poultry for developing risk-based surveillance of wild birds. It was estimated that about 40 species of birds migrate to Bhutan from various places.

The roles and responsibilities of various institutions under the Department of Livestock for surveillance of avian influenza and monitoring are outlined in Table 4.

**Table 4: Responsibilities of focal persons /institutions**

	Level	Responsible Agency/ focal persons	Responsibilities
--	-------	-----------------------------------	------------------

<sup>11</sup> Risk areas include around Phuentsholing in Chhukha, Khakhola and around Gelephu in Sarpang, Tingtibi and Manas National Park, and around Dalim in Samdrup Jongkhar.

<sup>12</sup> ISBN 92-5-000000-0

	Level	Responsible Agency/ focal persons	Responsibilities
1	Geog	Geog Extension Centre /RNR-EC	<p>Carry out clinical surveillance in the existing poultry population in the geog</p> <p>Flash report any suspected cases to DLO/ RVL or NCAH through fastest means of communication facilities available, e.g. WT/fax/telephone/e-mail etc..</p> <p>Restriction on movement of poultry and poultry products from the affected/suspected villages and adjoining villages in collaboration with BAFRA.</p> <p>Create awareness among farmers based on national guidelines.</p> <p>In collaboration with the laboratory collect samples from suspected cases, dead birds. Also take samples from purposively selected apparently normal birds in the locality for sero-surveillance purposes.</p> <p>Provide weekly follow up reports on any outbreak (suspected or confirmed) till further order.</p>
2	Dzongkhag	Dzongkhag Livestock Sector	<p>Conduct investigation so as to confirm or validate the suspicion reported from geog centre and flash report to RVL or NCAH.</p> <p>Issue ban order on movement of poultry birds, their products including manure, egg tray, and poultry feed etc from the affected zones.</p> <p>Contact RVL or NCAH for further investigation of the suspected case(s) if required.</p> <p>Create awareness among geog extension staff and local village institutions such as GYT etc.</p> <p>Inform the District Medical Officer</p> <p>Provide logistic support and assistance to the Geog extension centre and investigation team</p> <p>Monitor affected Geogs and provide weekly follow-up reports to the RVL or NCAH, whichever is more appropriate</p>
3	Regional	Regional Veterinary Laboratory	<p>As soon as suspected cases are reported, conduct a thorough investigation of the reported outbreak.</p> <p>Carry out rapid diagnostic tests for prompt diagnosis.</p> <p>Provide appropriate technical recommendations.</p> <p>Submit investigation report and refer samples to NCAH for strain identification.</p> <p>Constantly monitor affected Dzongkhags and Geogs.</p> <p>Provide weekly follow-up reports on affected Dzongkhags and Geogs.</p> <p>Create awareness among DLOs and EAs.</p> <p>Provide necessary logistic support and assistance to affected Dzongkhags.</p>

	Level	Responsible Agency/ focal persons	Responsibilities
4	National	NCAH	<p>Same as RVL's responsibilities.</p> <p>Laboratory testing of samples from suspected cases for strain identification.</p> <p>Conduct regular surveillance in collaboration with RVLs and Dzongkhags.</p> <p>Refer samples to reference laboratories for further analysis and confirmation if required.</p> <p>Liaise with relevant international organizations and inter-governmental agencies.</p> <p>Overall coordination of the emergency preparedness plan implementation in the country.</p> <p>Submit follow up reports and appraise DoL on latest situation/development in the country on a regular basis.</p> <p>Generate extension materials for field staff.</p> <p>Create awareness through mass media.</p> <p>Provide logistic support to RVLs and Dzongkhags.</p> <p>Procurement of diagnostic kits and other essential laboratory items.</p> <p>Procurement of vaccines if appropriate.</p>

#### 4.2.2. Upgradation of Laboratory Diagnostic Capacity

A well-equipped and well-functioning veterinary diagnostic laboratory is a most vital component of the NIPPP. Laboratory diagnosis together with effective surveillance at international borders and high risk locations is critical for pre-empting any incursion of virus into the country. A veterinary laboratory equipped to deal with avian influenza needs a full set of components comprising well trained technical laboratory personnel (veterinary virologist, technicians, etc.), infrastructure, equipment, PPE, testing protocols, diagnostic kits & reagents etc. to meet the minimum standards for BSL-II plus criteria with a BSL-III hood available for use when required. In addition, the laboratory facility needs to be able to handle hazardous materials safely and protect its staff and the environment.

The objective of strengthening laboratory capacity is to build a laboratory with capability with following diagnostic capacities for carrying out effective surveillance and diagnosis of HPAI:

- Rapid Ag detection kit or IFAT
- ELISA
- Virus isolation with HA typing for H5, H7, H9
- Serology for H5 by HI
- RT-PCR or RRT-PCR
- Post mortem facilities and PPE

The laboratory shall also have capacity for rapid collection and transport of samples from suspect cases of avian influenza to a laboratory for HPAI diagnosis as described in the OIE Terrestrial Manual, and/or for sample referral abroad to the regional/world reference laboratories.



Identification of suspect flocks is vital to the identification of sources of HPAI and to enable the molecular, antigenic and other biological characteristics of the virus to be determined. It is essential that HPAI isolates are regularly sent to the regional or world Reference Laboratories for genetic and antigenic characterization.

Currently all animal diseases diagnostic facilities to varying degree are provided by following laboratories in the country:

i) Laboratory Services Unit at NCAH

The Laboratory Services Unit (LSU) of the National Centre for Animal Health (NCAH) located at Serbithang which is the national referral laboratory for animal diseases diagnosis has been designated as a national focal laboratory for diagnosis of avian Influenza. The LSU has an ELISA kit for antibody detection and rapid tests for antigen detection for HA only. Up-gradation of present facilities is essential since H5N1 is a highly infectious zoonotic disease requiring at least Bio-containment level II (P2) and practice of bio-containment level III. It is imperative that at least a Bio-containment level II (P2) with a BSL III hood available for use when required be established at NCAH. Hazardous material cannot be handled safely without such a facility and it is also required to prevent escape of the virus from the laboratory to the environment. Construction of or renovation of an existing laboratory to P2 level laboratory facility will require bio-containment laboratory experts and bio-engineers, neither of which are available in the country.

ii) Regional Laboratories at RLDCs

The four regional laboratories are also required to have facilities for conducting post mortem examinations and be equipped with rapid antigen detection tests, such as direct antigen detection kits, and/or IFAT, and PPE for the safety of personnel. ELISA antibody detection should also be available at these laboratories. Facilities for safe and proper collection of samples and their preservation for submitting to NACH or to WRL shall be made available at these laboratories. In addition at least one BSL Class II Safety cabinet and an autoclave or incinerator for safety purposes should also be made available in these laboratories.

#### **4.2.3. Veterinary Vigilance Team**

The Veterinary Vigilance Team (VVT) shall be established by the Department of Livestock for monitoring and maintaining vigilance when there is outbreak of the disease in the neighbouring countries which poses a significant threat to our country. The team will be deployed in the high risk areas. The main role of a team is for carrying out surveillance for early detection of the disease so that a disease response and control measures can be implemented in time in order to prevent its spread to wider areas and minimize socio-economic impact.

The team will be also responsible for coordinating reporting of their activities to the Department of Livestock HQ on weekly basis.

Team composition:

RVO/DCVO from RVL or veterinarian from NCAH

- Lab technician from NCAH or RVL
- Dzongkhag livestock staff

Roles and responsibilities:

- Carry out clinical and laboratory surveillance as per the protocol;
- Report any suspected case of HPAI to DOL HQ and NCAH instantly;
- Provide weekly surveillance reports to the DOL HQ and NCAH;
- Provide weekly briefing to the Dzongda concerned;

- Carry out awareness, sensitization and advocacy on avian influenza to all relevant stakeholders including door to door campaigns in terms of high risk situation;
- Liaise with wild life personnel for wild bird surveillance;
- Coordinate with BAFRA staff in information exchange and support to each other;
- Keep close watch on the HPAI outbreak related events in the immediate border areas and report to the DOL HQ, NCAH, BAFRA and other stakeholders on any unusual events being observed.

#### **4.2.4. Import Ban of Poultry and Poultry Products from HPAI affected Countries**

The Government shall impose bans on imports of poultry and poultry products from HPAI affected countries based on risk assessment. BAFRA and DoL shall be both involved in risk assessments of farms from which poultry or poultry products are sourced and draw up import health requirements. Import risk analysis for poultry and poultry products need to be carried out from time to time and at short notice based on changing disease situations in trading partners in order to develop contingency and risk management strategies for minimising the risk of introduction of HPAI virus into the country.

The list of HPAI affected countries shall be regularly updated from OIE, WHO and other sources and ban on import of poultry and poultry products shall update accordingly. Similarly, ban shall also be lifted upon declarations of freedom from the disease based on OIE and national requirements. Recognition of regionalization, compartmentalization of Bird Flu affected or free for trading shall be determined by a technical committee comprising of relevant technical members and policy makers from DOL, BAFRA, and MoH. All actions and responses to be taken, including lifting of bans must be based on scientific justification.

BAFRA should ensure that all regulatory measures, including the import regulations, monitoring, and enforcement of ban impositions within the country can be put in place immediately as and when need arises. BAFRA shall enforce import ban on poultry and poultry products originating from HPAI affected countries and shall include all items that are in transit at the time the ban is declared. BAFRA shall also implement inspection of all the imports of poultry and poultry products including other risk goods for any trigger sign effectively to prevent the virus incursions.

A review of the national policies on veterinary services and regulations should be carried out to determine the adequacy of existing legislation and to make recommendations for updating regulations to reflect current needs.

#### **4.2.5. Border Control**

Bhutan is dependent heavily on import of poultry and poultry products including poultry feeds on India. As India has experienced multiple outbreaks of HPAI, particularly in West Bengal and Assam states bordering Bhutan, trade in poultry and poultry products constitute a serious threat for the virus incursion.

Thus border control shall focus on:

- Maintaining stringent border vigilance and surveillance;
- Enforcement of strict import requirements and quarantine measures for imported poultry and poultry products including pet and game birds;
- All transport vehicles carrying poultry at border check posts shall be inspected for sick or dead poultry. If sick or dead birds are detected, cloacal or tracheal swabs shall be collected and submitted to laboratories for testing. In addition, few dead carcasses must also be submitted to laboratory for necropsy. Strict quarantine measures must be applied.
- Effective targeted surveillance must be maintained at commercial and government poultry breeding farms including backyard village chickens that import live bird;

- Livestock inspectors in the country shall be regularly updated with the latest information about avian influenza and shall be kept on high alert so that the entry points are manned with extra diligence to ensure that no unauthorized imports of poultry and poultry products are allowed into the country.

#### **4.2.6. Training of veterinary staff on prevention and response to HPAI Outbreak**

It is essential for all veterinarian, para-veterinarian, laboratory officials, and regulatory officials be trained on prevention and response for HPAI outbreaks and on their roles and responsibilities outlined on NIPPP. They should be updated on the current knowledge on HPAI and its situation around the world. In addition, they should be trained on how to carry out surveillance on avian influenza. They should also be trained properly on use of PPE, and other equipment for for controlling AI outbreaks. The laboratory staff needs to be trained on the test kits and other diagnostic tests including RT-PCR technique (staff of LSU).

#### **4.2.7. Upgrading of Biosecurity of Poultry Farms**

Bio-security in all poultry farms, particularly those importing live poultry shall be upgraded to at least Sector 2 and preferably Sector 1 biosecurity standards. All government and major private poultry farms should be out of bounds for any unauthorized personnel and should have proper boundary fencing to avoid unauthorized entry of people and vehicles and also to prevent contact with wild or domestic water birds. All entry and exit points should be well guarded, foot-dips shall be made available for daily workers, and effective zoo-sanitary and other control measures must be put in place. In high risk areas, backyard poultry should not be allowed to graze in surrounding areas and as far as possible should be kept inside the pen.

#### **4.2.8. Strengthen Disease Reporting System**

Reporting of any suspicious cases of HPAI should be done within 24 hours by the fastest means of communication. The Ministry of Agriculture and Forests maintains two toll free hotlines; 124 for reporting any suspected cases of avian influenza and enquiries about the disease and 155 for enquiry and reporting of illegal trade of poultry and poultry products.

All poultry owners are mandated to report any suspected cases of HPAI. In addition, village *Tshogpa/choepon* are identified as focal person to report any suspected cases of avian influenza. All poultry/animal farms are mandated to send a monthly report and as and when required to their RLDCs or NCAH. Regulatory authorities are expected to report any suspected cases/trigger signs of avian influenza to the animal health authorities (NCAH/RLDCs) for immediate investigation and response. Weekly reports for the whole country are posted on the Bird Flu website of MoAF ([www.moa.gov.bt/birdflu](http://www.moa.gov.bt/birdflu)).

The Ministry of Health should be informed of all suspected outbreaks and this sharing of outbreak information shall take place at all administration levels; RNR Centres will share the information with the local BHU, district staff of Department of Livestock will share information with the District Medical officer and the Department of Livestock and BAFRA will share information with the Department of Public Health.

#### **4.2.9. Awareness Campaigns**

Public education and education of field staff on HPAI and its risk are essential components of the NIPPP. The general public shall be sensitized and educated about the disease in order to obtain their full cooperation for prevention, early detection and effective response for HPAI outbreaks. Similarly, field extension agents and regulatory inspectors of BAFRA, meat vendors and poultry farmers shall be made conversant with the disease. The Dzongkhags should take responsibility for organizing local education campaigns and use resource personnel from NCAH or RLDCs and medical doctors from hospitals.

Television and radio programmes, leaflets, brochures, pamphlets and the likes should be used for public awareness. Spokespersons from the MoAF and MoH shall be identified and given responsibility for timely releases of news/messages to update on the status of the disease and what precautions are required to prevent introduction of the virus into the country. Their responsibilities shall also include dispelling the occasional unfounded rumours which could create panic among the public.

#### **4.3. Phase 2: Veterinary Response to HPAI Outbreak**

The Department of Livestock will immediately investigate all suspected clinical signs of HPAI reported by the public and any incidents notified by para-veterinary staff or veterinary vigilance team. This service should operate 24 hours a day, every day of the year. If a suspect case is notified to a RLDC then the RLDC must immediately notify the NCAH who in turn will notify BAFRA.

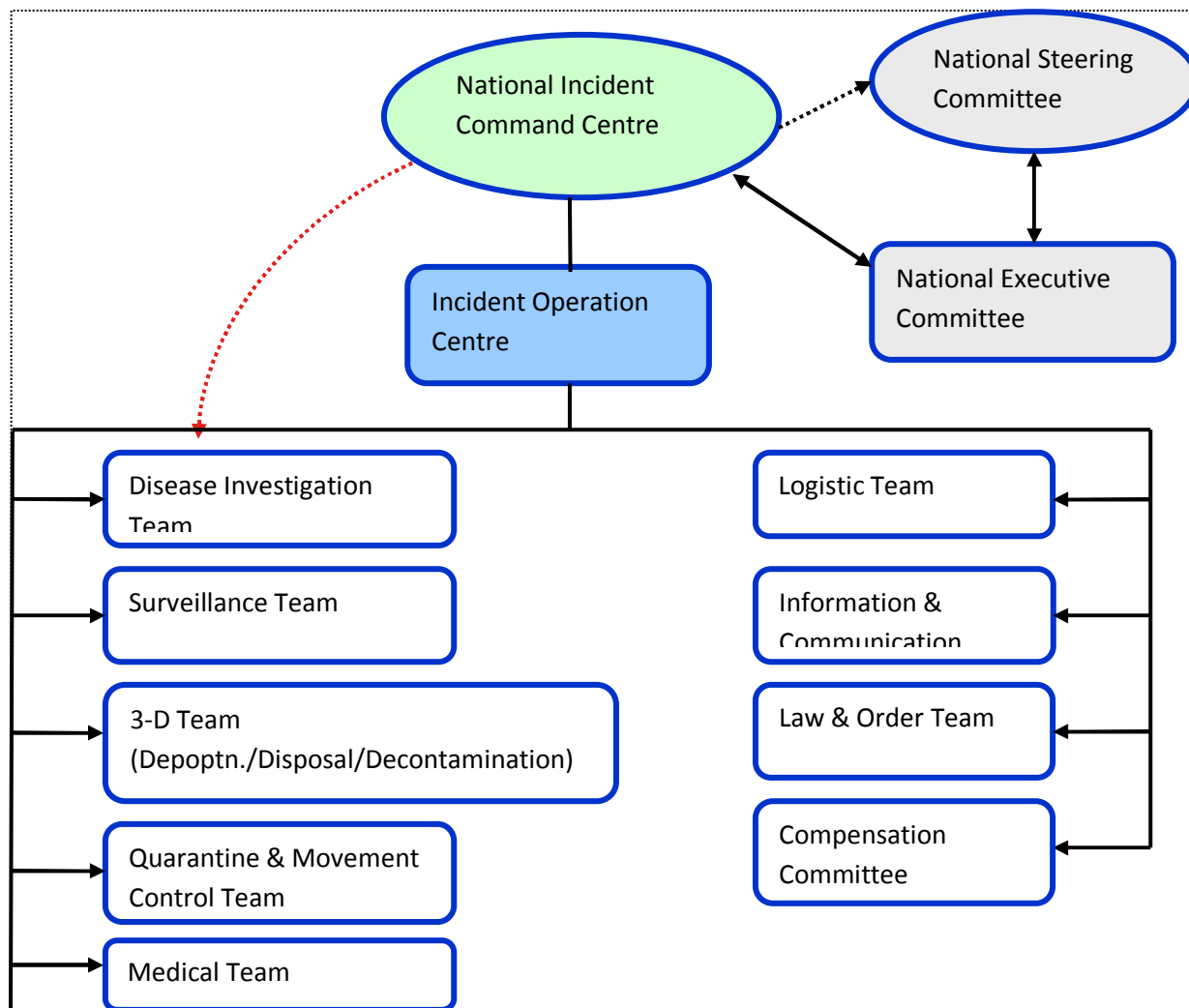
The RLDC and/or NCAH will send a Disease Outbreak Investigation Team to investigate the suspected case immediately. This team will undertake a comprehensive epidemiologic assessment and conduct rapid direct antigen test in the field to confirm the disease as well as collect appropriate samples.

The Department of Livestock will confirm the clinical diagnosis by subsequent laboratory tests at NCAH and refer samples to reference laboratories abroad for further confirmation and typing of virus.

##### **4.3.1. Incident Command Structure for HPAI Response**

The Incident Command Structure for veterinary response to Highly Pathogenic Avian Influenza (HPAI) outbreak has been developed keeping in view of the requirement of highly technical and sector-based response for HPAI outbreak. While the veterinary incident command structure is independent, the head of the Department of Disaster Management and respective Dzongda have been included as a member of the National Incident Command Centre and Incident Operation Centre respectively for smooth implementation of the response activities. The flow of information and updates on the disease outbreak status will be maintained.

The National Incident Command Structure for HPAI outbreak response is described in the Figure 5. The chain of command and flow of information should be carried out as indicated by respective arrows in the incident command structure. The team composition, roles and responsibilities and their modus operandi are described under respective heading.



**Figure 5: The national incident command structure for HPAI response.**

#### 4.3.1.1. National Incident Command Centre (NICC)

The National Incident Command Centre (NICC) is the highest decision making body for responding to HPAI outbreak and it should be activated immediately following the recommendations of Disease Investigation Team.

The NICC constitutes following members:

- Secretary, Ministry of Agriculture and Forests - Chairman
- Head, Department of Livestock, Ministry of Agriculture and Forests (Member Secretary)
- Head, Bhutan Agriculture and Regulatory Authority, Ministry of Agriculture and Forests
- Head, Department of Public Health, Ministry of Health
- Head, Department of Disaster Management, Ministry of Home and Cultural Affairs
- Chief of Police, Royal Bhutan Police
- Head, National Centre for Animal Health
- Focal Veterinarian, BAFRA

- Head, LHD, DoL
- Veterinary Epidemiologist
- Veterinary microbiologist/pathologist

The NICC meeting shall be convened within 12 hours of receiving a report of the outbreak upon recommendation by the Diseases Outbreak Investigation Team.

**Roles and Responsibilities:**

- Declare the outbreak of HPAI and issue official notification;
- Authorized issuance of notice to the OIE and other trading partners;
- Take policy decisions on response and control measures based on the advice and recommendation of the technical members of the NICC;
- Command establishment of Incident Operation Centre (IOC) and rapid response teams;
- Provide policy direction for response activities;
- Issue executive orders on enforcement of all response activities;
- Facilitate and mobilize all the logistics required for responding to control HPAI outbreaks;
- Designate a media spokesperson for providing disease status update, response policies and strategies, press release, etc;
- Ensure the adequacy, timeliness and relevance of communications activities;
- Maintain liaison with relevant sectors like MoEA, MoF, MoFA, GNHC, BCCI, MoE, International organizations, non-governmental organizations, etc;
- Provide updates to National Steering Committee (NSC).

**4.3.1.2. Incident Operation Centre (IOC)**

The Incident Operation Centre is the field level coordination and implementation unit for rapid response and control measures. The unit will be responsible for providing field level information and updates on the disease status, progress on response and control activities to the NICC. In addition, it will ensure that all policy decisions and directions for response and control activities are conveyed to different Rapid Response Teams (RRTs).

Since the disease response operation demands multi-sectoral approach, the IOC members shall be composed of *inter alia* all team leaders of the RRTs and include following:

**Table 5. Members of the Incident Operation Centre**

No	Member	Agency	Main Tasks
1	Program Director	NCAH, DoL	Incident Commander
2	Chief Veterinary Officer	LHD, DoL	Logistics officer
3	Veterinary Epidemiologist (s)	NCAH, DoL	Epidemiological Surveillance
4	Veterinary Microbiologist/ Pathologist	NCAH, DoL	Lab surveillance/diagnostic
5	Regional Veterinary Officer	Concerned RVL, DoL	Surveillance and logistics
6	Chief Regulatory and Quarantine Officer, BAFRA	BAFRA, MoAF	Oversee enforcement of Regulatory measures
7	Medical Specialist/Officer (relevant)	MoH	Vaccine/drug medication and health check up of the front line workers, screening of suspects

8	District Veterinary Officer/DLO	Concerned Dzongkhag	Logistic, surveillance, support regulatory staff
9	Communication Officer	Appropriate nominee	Coordination of reporting to higher on field activities from the Local ICC
10	Dzongdag	Concerned Dzongkhag (s)	Dzongkhag level logistics support (as Chief Disaster/ Emergency Coordinator); Chair of the DCCC
11	SP or OC	RBP concerned Dzongkhag	Law and Order

#### Roles and Responsibilities:

The roles and responsibilities of the Incident Operation Centre are as follow:

- Identify and set up Incident Operation Centre upon direction from the NICC;
- Convene the meeting to decide on the operation and ensure that all required manpower, materials and equipment including transport, fooding facilities are ready for disease control operations;
- Mobilize ad hoc emergency fund requirement during the operation;
- Facilitate and mobilize logistics for RRTs such as manpower, PPE, transportation, foods, facilities, etc;
- Provide direction to RRTs to implement the respective activities;
- Oversee and ensure implementation of disease response and control measures by the respective RRTs;
- Ensure the close coordination amongst different RRTs for smooth, effective and efficient operations.
- Coordinate and provide daily feedback and information updates to NICC;
- Provide specific risk communication including limited selected press releases;

#### Modus Operandi

Upon receiving executive order from the NICC, the RRT will be activated within 6 hours and start implementing the control measures.

The IOC will convene one to twice daily meeting as deemed appropriate and accordingly update the information to the NICC.

The Dzongda as the Chairman of the Dzongkhag Emergency Operation Centre of the National Disaster Management will provide necessary logistics and other supports.

#### Simultaneous Second Outbreak

In case of simultaneous outbreaks beyond the reach of the one Incident Operation Centre (IOC), the second IOC shall be constituted with members consisting of equivalent counterparts of the concerned region/Dzongkhag except for the technical experts from DOL and BAFRA. The DOL and BAFRA shall identify and mobilize appropriate technical experts to the second or more as given hereunder.

**Table 6. The tentative members of the Second Incident Operation Centre**

No	Member	Agency	Main Tasks
----	--------	--------	------------

1	Vety. Epidemiologist (s)	NCAH/RVL, DoL	Incident Commander
2	Vety. Microbiologist/Pathologist	NCAH/RVL DoL	Lab surveillance/diagnostic
3	RVO/DCVO of RVL	Concerned RVL, DoL or nearby RVL	Surveillance and logistics
4	Regulatory and Quarantine Officer, BAFRA	BAFRA, MoAF	Oversee enforcement of Regulatory measures
5	Medical Specialist/Officer (relevant)	MoH	Vaccine/drug medication and health check up of the front line staff
6	Communication Officer	appropriate	Coordination of reporting to higher authorities and media, risk communication
7	Dzongdag/Dungpa/Dzongrab	Concerned Dzongkhag	Dzongkhag level logistics support Chair of the DCC
8	SP or OC or representative	RBP of concerned Dzongkhag	Law and Order

#### 4.3.1.3. Rapid Response Teams -Livestock

The RRTs will be divided into different groups as per the mandates of respective technical sectors involved for the disease control measures. The Department of Livestock will be mainly involved in the disease outbreak investigation, surveillance, logistic supply; BAFRA will be involved in culling and disposal, decontamination, quarantine and movement control; Ministry of Health shall be involved in providing prophylactic and first aid services; RBP will be involved in the maintenance and of Law and order and providing support for different operations; Dzongkhag Disaster Management.

#### 4.3.1.4. Disease Investigation Team

The Disease Investigation Team (DIT) shall be involved in disease investigation and confirming the HPAI outbreak. They shall also be involved in identification and establishment of infected premises, dangerous contact premises, suspected premises, protected and surveillance zones.

Team composition:

Epidemiologist and/ or Regional Veterinary Officer (Team Leader).

Veterinary Pathologist

Senior laboratory technician

Field para-veterinarians

#### 4.3.1.5. Surveillance Team

The surveillance team shall be involved in carrying out all necessary surveillance activities both in protected and surveillance zones.

The detailed SOP and guidelines for carrying out surveillance are provided in the SOP for surveillance given in Appendix 13.

Team composition:



- Veterinary Epidemiologist and/or RVOs of RLDCs (Supervisor);
- Veterinary Officers from NCAH, RLDCs, DVLs under DoL and BAFRA;
- Laboratory technicians;
- Field staff.

#### **4.3.1.6. Three-D Team**

##### a) Culling and Disposal Team

The culling and disposal team shall be involved in carrying out culling and disposal of birds in the infected premises, suspect and susceptible birds in the protected zones as per the SOP provided in Appendix 29.

Team composition:

- Team leader: Dy. Chief Regulatory and Quarantine Officer, BAFRA
- Technical Assistants: BAFRA Livestock Inspectors (two each in each culling group). One of them in each group shall act as animal welfare Inspector
- Record keeper: BAFRA Livestock Inspector (one each in each culling group)
- Cullers:
- Hired and trained personnel for neck dislocation (2 in each culling group).
- Bird catchers (2 each in each culling group).
- Gas operators: One BAFRA Inspector in each culling group will be appointed as gas operator in case of CO2 gassing.
- Disposal labourers: Two hired and trained labourers for disposal in each culling group
- Hired labourer for digging burial pit: 5 labourers at each disposal site.

##### b) Decontamination Team

The decontamination team shall be involved in carrying out cleaning and disinfection of infected premises, suspect and susceptible birds in the protected zones and all other infected or potentially infected materials and equipment as per the SOP provided in Annexure 8.

Team composition:

- Supervisor: Regulatory and Quarantine Officer (Veterinarian).
- Assistants: BAFRA Livestock Inspectors (two in each decontamination group).
- Hired and trained personnel for cleaning and disinfection = 2 in each decontamination group.

#### **4.3.1.7. Quarantine and Movement Control Team**

The Quarantine and Movement Control Team shall be involved in enforcement of quarantine and movement control at protected and surveillance zones to control and prevent the spread of the HPAI disease and to regain the disease freedom status as soon as possible. The detailed on enforcement of quarantine and movement control measures are provided in the SOP provided in Appendix 16.

Team Composition:

- Team leader: Chief Regulatory and Quarantine Officer, BAFRA.
- Technical Assistants: BAFRA Livestock Inspectors (number to be determined based on the place and size of outbreaks and entry and exit points in the protected and surveillance zones).
- Record keepers: BAFRA Livestock Inspector (one each in all entry and exit points of protected and surveillance zone).
- Hired labourer for spraying and disinfection: 2 labourers each at all entry and exit points in the protected and surveillance zones.

#### **4.3.1.8. Medical Team**

The medical team will be involved in providing all prophylactic treatment for all personnel involved in disease control operation and first aid services including monitoring of health of personnel involved in the disease control operation for signs of Avian Influenza. In addition, they shall also be involved in monitoring of any suspect patients for human case of HPAI virus. The SOP for providing these medical facilities is given in the SOP in Appendix 7.

Team Composition:

- Medical officer
- Health Assistant and nurses

#### **4.3.1.9. Logistic Team**

The main roles and responsibilities of Logistic team is to ensure that all necessary logistics are supplied to all RRTs such as PPE, materials and equipment, foods, transport, and reinforce all essential supplies.

Team Composition:

- Incident Commander
- Chief Veterinary Office
- Dasho Dzungda
- Procurement Officer
- Finance Officer/Accountant

#### **4.3.1.10. Information and Communication Team**

The IC team will carry out risk communication to the public. They will prepare materials for media briefings to update the general public on HPAI disease situations and progress of control measures being implemented. They will inform the public about the emergent health risk and the measures being taken by the authorities. The team will also inform the public about Do's and Dont's to protect them during the emergency.

Team composition:

- Incident Commander (Team Leader)
- ICS Focal Officer
- Field Staff

#### **4.3.1.11. Law and Order Team**

The main roles and responsibilities of law and order team are to ensure the compliance and smooth operation of all disease control measures. They shall support all technical RRTs involved in disease control measures, such as compliance from farmers, traffic regulations, compliance for culling, decontamination, and quarantine and movement control.

Team Composition:

- SP/OIC
- Police personnel

#### 4.3.1.12. Compensation Committee

The main roles and responsibilities of the Compensation Committee is to ensure provision of compensation in a fair, transparent and timely manner to all eligible owners/farmers. The committee shall strictly adhere to compensation guideline.

Team Composition:

- The Dzungda as the chairman.
- *Dzongkhag* livestock officer – member secretary
- The *Gup* or the *Mangmi* of the *Geog* – member
- BAFRA livestock in-charge in the *Dzongkhag* – member
- SP or OIC or representative of RBP - member
- Representative from the PIU – member (for project period)

#### 4.3.2. Case Definition for HPAI

HPAI should be suspected whenever sudden bird deaths occur with severe depression, loss of appetite, nervous signs, watery diarrhoea, severe respiratory signs and/or a drastic drop in egg production, with production of abnormal eggs. The likelihood of AI is increased by the presence of facial subcutaneous oedema, swollen and cyanotic combs and wattles, and petechial haemorrhages on the internal membrane surfaces. Young chickens, or those dying from the peracute form of the disease, may not show any lesion.

Outbreaks of contagious disease characterized by sudden death should be reported as outbreaks of rapid mortality in poultry clinically consistent with HPAI. This sudden death may include any of the above symptoms, which further increases suspicion. In intensive production systems high mortality rates per flock will be observed, but in small back-yard production systems high mortality may be less obvious.

A combination of symptoms consistent with the clinical case definition for HPAI and a positive rapid test in affected birds is considered a confirmed detection of HPAI and warrants an immediate emergency disease control response.<sup>13</sup>

The above case definition is considered suitable for Bhutan given the current laboratory diagnostic capability and the need for a rapid response to this highly contagious disease. A more precise HPAI case definition for the index case that might be applied when laboratory capability is upgraded would be consistent with the following criteria:

- Clinical signs and pathologic lesions consistent with HPAI; and
- Virus is isolated and/or viral RNA specific for Influenza A is detected by rapid test or PCR; and
- H5/H7 subtype confirmed by molecular methods; and
- Basic amino acid motif at the cleavage site consistent with that reported for other HPAI viruses.

However, the need to respond quickly should always be an over-riding principle when dealing with outbreaks of HPAI. The BAFRA and DoL will quarantine suspect places and initiate response action under direction from NICC while awaiting H5 or H7 laboratory confirmation.

---

<sup>13</sup> Note: It is the outbreak in the flock that must meet the criteria, not individual animals.

#### **4.3.3. Low Pathogenicity Avian Influenza (LPAI)**

The DoL will identify non-specific reactors (operationally referred to as non negatives) through active surveillance for influenza virus type A in poultry, other captive birds or wild birds in the absence of clinical signs. LPAI may also result from a suspect HPAI disease investigation.

The DoL will apply the following LPAI case definition to the index case:

- Virus is isolated or
- Viral RNA specific for Influenza A is detected by a rapid test or PCR, and there is epidemiologically-significant serological evidence of actively circulating virus, and
- H5/H7 subtype confirmed by molecular methods or using isolated virus, and the amino acid motif is not consistent with that reported for HPAI viruses.

The intent of this definition is to have a high degree of scientific confidence of the presence of active infection.

The DoL will have initial case(s) of LPAI typed according to international standards which may include OIE Reference Laboratories.

#### **4.3.4. Differential Diagnosis**

Avian influenza and Newcastle disease (ND) of chickens and turkeys with various levels of pathogenicity are frequently indistinguishable on clinical and postmortem examination from:

Mycoplasmosis;

- Fowl cholera;
- Escherichia coli cellulitis of the head;
- Acute pasteurellosis;
- Infectious laryngotracheitis;
- Infectious coryza;
- Turkey rhinotracheitis
- Acute poisoning; or
- Misadventure causing high mortality (e.g. smothering, heat stress, dehydration).

The plan of action during an outbreak will generally follow the recommendations outlined in the Incident Command Structure of Veterinary Response to HPAI outbreak and as per specific SOPs.

#### **4.3.5. Infected and Suspect Infected Place Procedures**

Field staff must ensure that infection cannot spread from an Infected Place. Investigating team vehicles must be left outside the Infected Place and at a distance from the entrance to the premises. The investigating team should take a pre-prepared kit with them. At least two of these kits should be kept in readiness at all times at each RLDC and at NCAH.

#### 4.3.5.1. Declaration of Provisional Protection Zone

When HPAI is suspected, the RVO, RLDC or the qualified regulatory officer of BAFRA shall inform the NCAH and together will immediately quarantine the Suspect Infected Place<sup>14</sup> (farm or hatchery premises or a village) and declare a surrounding area (usually with a radius of about 3 km which conforms to the EU standard, or actual boundary to be demarcated based on epidemiological assessment of risk)) from the point of suspected infected place as a Provisional Protection Zone<sup>15</sup>.

The Rapid Response Team should be informed immediately. The geographical limits of the Provisional Protection Zone should be determined after due consideration of the epidemiologic risk and natural geographical settings. All places with poultry within the Provisional Protection Zone shall be considered at-risk and visited to establish their infection status.

#### 4.3.5.2. Detention of suspected birds/flock in the provisional protection zone

Following orders for the detention of the suspected birds, avian products and in-contact materials within the declared Provisional Protection Zone through a movement control ban,

- Quarantine all birds, avian products and such materials in the suspected Infected Place while awaiting a confirmatory diagnosis,
- Withdraw the movement control ban and declaration of free area upon the receipt of a negative confirmatory diagnosis from the laboratory.

#### 4.3.5.3. Declaration of Protection Zone

If the case definition for HPAI is met, then a Protection Zone within a radius of about 3 km from the point of outbreak will be declared. Stamping out procedures, (a) depopulation by slaughter; (b) disinfection and (c) sanitary measures, should be carried out on properties which have had direct and indirect contact with the Infected Place or Places and strict surveillance and movement control should be maintained on all other properties within the Protection Zone. It may not be necessary to use blanket stamping out on all properties within the Protection Zone.

#### 4.3.5.4. Declaration of Surveillance Zone

The limits are usually set to act as a buffer around the Protection Zone at about the EU standard distance of 10 km radius from the Infected Place. Inspection, movement control, surveillance, screening and sanitary measures will be the main tasks in the Surveillance Zone.

---

<sup>14</sup> **Infected Place** - The place will have the disease status of Suspect Infected Place (IP) when reports and investigations indicate that HPAI may be present and disease status of Infected Place once the appropriate case definition for HPAI has been met.

<sup>15</sup> **Protection Zone** is the largest area in which current evidence and analysis of transmission risks suggests Infected Places may be present.

#### 4.3.6. Stamping for Control of HPAI Outbreak

Containment and eradication procedures will be implemented promptly following confirmation of a diagnosis of HPAI. A mobile disinfection unit should be positioned at the single point of entrance/ exit to the Infected Place. The number of vehicles and staff involved in depopulation should be kept to a minimum. Any persons who have been inside the Infected Place may only leave after a complete change in clothing and if possible a shower. Staff involved in the depopulation of the farm must not have any contacts with susceptible species for at least three days after the last contact with the Infected Place.

These general principles apply to the 3-D Team (depopulation, disposal and decontamination), vehicles for transportation of dead animals and disinfection crews.

##### a) 3-D (Depopulation, Disposal and Decontamination) Operation

All birds, including those at high risk of infection, should be promptly culled and destroyed by incineration or burial following detection of any disease positive birds in a village/farm. BAFRA will enforce the implementation of 3-D operation and movement control measures once the outbreak has been confirmed.

Humane killing should be conducted with due consideration to religious sentiment and social obligations. Disinfectants must be used carefully with due regard to the nature of the material being used and possible adverse effects from environmental contamination.

##### b) Disposal of Birds

###### i. Burial

Burial may be the best means of disposal under certain conditions and a pit should be prepared as soon as the diagnosis is confirmed. The size of the pit must be at least two meters wide by two meters deep for disposal of 300 birds (medium weight 1.8 kg) per 1.3 meters of surface. The number of birds can be doubled for each metre increase in depth of the pit (3-6 meters). All non-disinfectable, biodegradable material, e.g. wood and cardboard, must be buried along with the animals. Carcasses should ideally be covered with a layer of calcium hydroxide, and then with a layer of earth (at least 40 cm). The detailed description of disposal procedure is given in the SOP of 3-D operation.

The general factors to be considered are:

- The nature and amount of material for disposal;
- Availability of sites suitable for burial, incineration or burning adjacent to the destruction site;
- Access to the disposal site with heavy transport vehicles;
- The nature of soil/rock formation in the available area;
- The level of the water-table;
- Proximity to water catchments areas, bores and wells;
- Presence of underground services, e.g. water, gas, electricity, telephone lines, drainage,
- Sewerage, other improvements and structures, including overhead lines;
- Proximity to built up areas and dwellings (particularly for burning);
- Fire restrictions,
- Hazards (in the case of burning);
- Weather conditions including prevailing winds; it may be easier to burn in excessively wet conditions;
- Availability of equipment for burial;
- Availability of supplies of suitable fuel for burning;
- Plans for subsequent use of the area, e.g. the soil may be unstable where burial pits are placed.

Disposal of animal carcasses and other infectious material may involve some adverse environmental consequences. It is important for the environmental aspects of proposed disposal activities to be properly considered, with advice from environmental agencies where possible, so as to ensure that the impacts of any adverse consequences are minimized.

ii. Incineration

Incineration may be used for the disposal of carcasses if a facility for incineration is available.

c) Disposal / Destruction of Infected Materials

All waste, organic and other materials that cannot be disinfected present on the farm must be destroyed. All eggs, egg products, hay, animal feedstuffs, feathers and egg trays must be destroyed too. Litter and straw, depending on the amount present and on the characteristic of the farm, can be either buried in a pit with the carcasses or piled in heaps and covered with a resistant sheet of plastic to compost to temperatures sufficient to kill the virus. Infected litter should not be moved from the infected farm prior to composting. Composting should be maintained for at least 42 days, and for this reason, incineration or burning may be more desirable.

i. Eggs and egg products

May be buried in the pit with the animal carcasses or rendered.

ii. Animal feed

Animal feed on the site must be decontaminated by fumigation followed by incineration.

d) Disinfection of Infected Premises Checklist

All units which are physically or functionally connected to the establishment (i.e. hatchery, egg storage rooms, packaging rooms, egg trolleys, egg product plants); vehicles, used for transporting live animals, eggs and animal feed should be disinfected with appropriate disinfectants;

Washing and disinfection of walls, floors and ceilings of the infected establishments must be performed to remove all organic material before disinfection;

Metal structures such as cages may be decontaminated by heat treatment;

All equipment inside the house such as drinkers and food hoppers must be washed and treated with a disinfectant for at least 48 hours;

Water reservoirs must be emptied, washed and disinfected;

Feed tanks (silos) need to be emptied, washed with a hot water-pressure pump and subsequently fumigated;

After washing and disinfecting, all units must be fumigated twice with at least two weeks between fumigations.

A list of disinfectants which are active against avian influenza virus, their concentration and recommended use is presented below:

Virkon S (di potassium peroxy disulphate) for all purpose except on open skin/eyes.

Sodium hypochlorite: 2% active chlorine solution for disinfection of equipment.

Quaternary ammonium salts: 4% solution for treatment of walls, floors, ceilings and equipment.

Calcium Hydroxide: 3% solution for treatment of walls and floors.

Cresolic acid 2.2% solution for treatment of floors.

Synthetic phenols 2% solution for treatment of floors.

Formalin and permanganate for fumigation

### **Withdrawal of the Declaration of Infected Place and Protection Zone and the movement control ban**

Bans should be lifted 6 weeks after the last stamping out date and satisfactory completion of sanitary measures and upgrading of biosecurity. Restocking should be undertaken by introducing a small number of

poultry first, and monitoring these daily for signs of disease. Strict surveillance for at least 3 weeks is recommended after restocking, after which full repopulation can occur.

#### **4.3.7. Strategic vaccination during outbreak**

Vaccination provides protection against clinical disease and also reduces shedding of the virus in vaccinated flocks. However, vaccination will not be considered as a preventive or control strategy for the general poultry population because of the scattered nature of the poultry in the villages and also because the country doesn't have the capacity to produce its own vaccine.

Vaccination with OIE approved HPAI vaccines may be advocated in certain situations, such as when a particular threatened bird species is at risk or in areas where destruction is impossible. However, any vaccination strategy would also depend on the feasibility of rapid procurement of an appropriate vaccine when the need arises.

#### **4.3.8. Enhanced bio-security at poultry farms and associated premises**

As part of the implementation of routine bio-security measures on Infected Places, associated premises, and Protection and Surveillance zones, movement control from and into these zones will be strictly enforced by BAFRA. A sanitation policy for rearing of ducks is also to be enforced to prohibit grazing of domestic ducks in areas with nearby wild sanctuaries. Protection of ducks from wild birds using providing wire mesh or cyclone wire barriers should also be explored.

#### **4.3.9. Compensation for culled birds, eggs, feed, etc**

A compensation scheme has been incorporated in the HPAI control policy to encourage timely and positive reporting of any cases and also to compensate for losses due to disease or culling. The Livestock Act of Bhutan 2001, under sub-para 9.3, clearly states that the government has the authority to compulsorily destroy animals, animal products or feed that it considers to be risky and pay compensation as prescribed by the Ministry of Agriculture and Forests. A small Compensation Fund for the same shall be kept. A small amount of compensation fund has been kept under the World Bank funded NIPR project for Bhutan. A detailed compensation guidelines has been developed under the National Influenza Pandemic Preparedness and Response Project World Bank Project, under the Implementation Manual (December 2007).

A detailed compensation plan "Policy guidelines for the Management of compensation scheme in the event of an HPAI outbreak in Bhutan" has been developed separately and covers policy and management of the plan.

#### **Eligibility for Compensation**

Compensation payments will be made only:

- . if mandatory culling measures have been announced and put into effect by the Government;
- . for poultry culled, eggs, feed and feed materials disposed under the supervision of compensation committees based on completion of all required documentation;
- . after identifying those eligible for compensation payment and ensuring that there are no multiple claims.

Compensation will not be paid for poultry that have died as a result of any disease other than HPAI. State-owned enterprises are not eligible for compensation payments. Compensation payments for the



village/backyard farms may be delegated to District Culling and Compensation Committees (DCCC) which have been approved by the NSC for each district.

#### **4.3.10. Personnel Safety**

Personnel engaged in disease control and eradication activities should be treated with antiviral prophylaxis for the duration of their exposure and for seven days after their last exposure or may be vaccinated if available. They must also be protected from infection by PPE. PPE should be worn at all times in infected or while handling diseased birds.

Personnel should be rotated off site if the exposure period (culling and cleanup) is prolonged. Personnel may also be asked to take part in monitoring involving the collection of blood samples by the medical authorities to determine if they have been infected. Persons who do not agree to preventive and monitoring measures should not be engaged in activities resulting in contact with infected birds/materials.

## **V. Risk Communication and Public Information Management Strategy**

### **5.1. Background**

Starting from 2004, several communication materials have been produced including leaflets and posters on HPAI and Bio-security measures in the poultry farms. Avian Flu fact sheets have been developed and circulated to all districts for further distribution to health facilities for compliance. Sensitization and awareness workshops have also been conducted in four Southern Dzongkhags on the disease situation and on the need for support from all the sectors. More recently, in November 2006, a sensitization workshop was conducted on Clinical Management of Avian Influenza cases and its preventive control measures at the national level.

With outbreak of 2009 H1N1, public messages, posters, pamphlets and brochures were developed, produced and disseminated to the public. A number of communication channels, such as mass media (radio, print, TV), information kits, advocacy tools and focal group trainings were conducted to ensure

### **5.2. Risk Communication Strategy**

#### **General Objectives of the communication strategy**

##### ***Pre-Pandemic (Avian influenza control)***

- 1) Contribute to reducing the risk of animal to animal transmission of AI

##### ***Pandemic Alert (Intensive hygiene and containment)***

- 2) Contribute to reducing the risk of animal to human transmission
- 3) Contribute to improving hygiene to limit spread of seasonal human influenza

##### ***Pandemic (Containment and survival)***

- 4) Contribute towards containing an emerging human (pandemic) virus
- 5) Contribute towards surviving a pandemic

The above objectives will be achieved through a communication framework that will include the following strategies:

1. Advocacy to raise resources and political leadership commitment, targeting decision and policy makers,
2. Social mobilization to ensure wider participation and ownership through building coalitions/partnerships that facilitate community action/participation,
3. Behavior change communication to bring about changes in knowledge, attitudes and practices by consulting and empowering communities and specific groups through the use of research, monitoring and evaluation, training, interpersonal communication, social advertising and “edutainment” programs.

### **5.3. Public Information Management Strategy**

Public information management is part of an integrated strategy to provide leadership for the public, the health sector and other sectors during a pandemic and complement the Ministry of Health and wider sector pandemic response.

The Public Information Management Strategy allows the national authorities to explain what it is doing and to advise the public as the pandemic progresses. It is designed to avoid confusion and maintain accuracy, clarity and consistency of message.

The overarching principles of the strategy are to:

- build trust,
- announce early,
- be transparent,
- respect public concerns,
- plan in advance.

This strategy recognizes that information is essential to the effective management of a pandemic response, and that in a pandemic one of the most critical roles of the National Executive Committee will be to provide leadership and co-ordination in communications.

Materials produced by the Ministry of Health and Ministry of Agriculture and Forests will be used and, as required, customized by other national and local agencies in their responses. For example, DHBs and their providers can take national resources, add in local details on how the public can obtain advice and treatment, and disseminate this material through local community networks and media.

The National Executive Committee (NEC) and the National Incident Command Center (NICC) provide mechanisms for communicating with the sector, operational groups and other agencies. Although every organization will be largely responsible for communications with its own audiences, this strategy provides leadership, consistency and co-ordination. Other organizations should base their communications on material produced by the NEC.

The NEC is responsible to designate sectoral media spokespersons for risk communication, one each from MoH and MoAF. In case of public emergency, consult with the National Steering Committee and the Cabinet Secretariat to appoint a Spokesperson. The NEC is also responsible to endorse press releases and briefings prepared by each concerned Ministries (in case of avian influenza – MoAF and in case of human influenza - MoH) for dissemination to the public.

The Public Information Management Strategy is an evolving strategy that is designed to be revised as more is learnt about a pandemic and its characteristics.

MoH and MoAF in its public information management function within the NEC will:

- lead all communications on human health and avian influenza
- ensure the appointment of a public information management manager with the ability to carry out the necessary responsibilities supported by an adequate team of communications staff throughout the phases of a pandemic
- resource the production of informative materials, public awareness campaigns and so on, appropriate to the phase and level of risk
- support the liaison team in the NEC to provide guidance and advice to other Government agencies taking responsibility for devising key messages appropriate to their agency or sector
- support the operations team in the NEC to develop detailed drop-down plans for specific activities and audiences in operational areas (for example border control, primary health care and recovery).

#### **5.4. Communications objectives**

The provision of information on influenza pandemic needs to be timely, deliberate, accurate, authoritative, planned and sustained, with the aim of establishing and maintaining mutual understanding between those managing the response and between agencies and the public.

Key objectives are to:

- maintain public confidence in the response and in agencies' competence and capability
- be proactive and provide information before people know they need it

- be flexible enough to respond to unforeseen or changing circumstances
- ensure those who need information and advice, including external and international agencies and non-governmental organizations get accurate, consistent and timely information and advice on which to base their own communications and responses
- create a level of public awareness and a sense of urgency appropriate for the level of risk without creating alarm or panic
- be open and honest in raising awareness of the potential consequences of an influenza pandemic
- discuss all potential threats and ensure audiences are aware of them
- ensure the public and overseas visitors have clear and simple information about how to prepare themselves and their families for a pandemic, and where to get help
- ensure the public receives clear and frequent information about the steps to take to protect themselves and others (e.g, health and hygiene messages such as the importance of hand-washing, cough etiquette, social distancing and self-care).

Discrete initiatives and key messages will be developed for specific audiences and different phases. Draft templates for specific public information should be produced in advance of Pandemic Phases.

## References

Tshering, P; Chamling, SB; NCAH, Department of Livestock, “Risk Assessment of Avian Flu in Bhutan”, March 2004.

National Technical Committee on AI, “National Influenza Pandemic Preparedness Plan”, November 2005.

FAO experts, “Guiding principles for surveillance and diagnostic networks in Asia”, Bangkok, 21-23 July 2004.

FAO Recommendations on the prevention, control and eradication of avian influenza in Asia, September 2004.

Guiding principles for highly pathogenic avian influenza surveillance and diagnostic networks in Asian countries, <http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/Guiding%20principles.pdf>.

Global strategy for the progressive control of Highly Pathogenic Avian Influenza, <http://www.fao.org/ag/againfo/subjects/documents/ai/GlobalStrategy31Oct05.pdf>

OIE manual for diagnostic tests and vaccines for terrestrial animals. [http://www.oie.int/eng/norms/mmanual/A\\_summary.htm](http://www.oie.int/eng/norms/mmanual/A_summary.htm).

OIE guidelines for surveillance.

FAO Manual Wild Bird HPAI Surveillance, sample collection from healthy, sick and dead birds, 2006. ISBN 92-5-000000-0.

Laboratory Biosafety Manual, 2<sup>nd</sup> edition (revised) WHO Geneva, 2003. WHO/CDS/CSR/LYO/2003.4.

FAO Manual: Preparing for Highly Pathogenic Avian Influenza, ISSN- 1810-1119.

Department of Livestock Contingency Manual for Highly Pathogenic Avian Influenza, Version 1.2, 2007.

National Influenza Pandemic Preparedness and Response Project. World Bank Project Implementation Manual, December 2007.

OIE Quality standard and Guidelines of Veterinary Laboratories: Infectious Diseases. ISBN 978-92-9044-706-1.

NCAH, Prevention and Control of Avian flu in small scale poultry. A guide for veterinary paraprofessionals in Bhutan, 2006.

“Pandemic Influenza Preparedness and Response” A WHO Guidance Document - 2009  
Draft Action Plan: Pandemic Preparedness and Response for Managing Novel Influenza A H1N1. Directorate General of Health Services, Ministry of Health of India, Nirman Bhawan, New Delhi, 2009

New Zealand Influenza Pandemic Plan: A framework for action. Wellington: Ministry of Health, 2010  
Pandemic Influenza Preparedness, Action Plan, of the Japanese Government, Inter-ministerial Avian Influenza Committee, Revised October, 2007

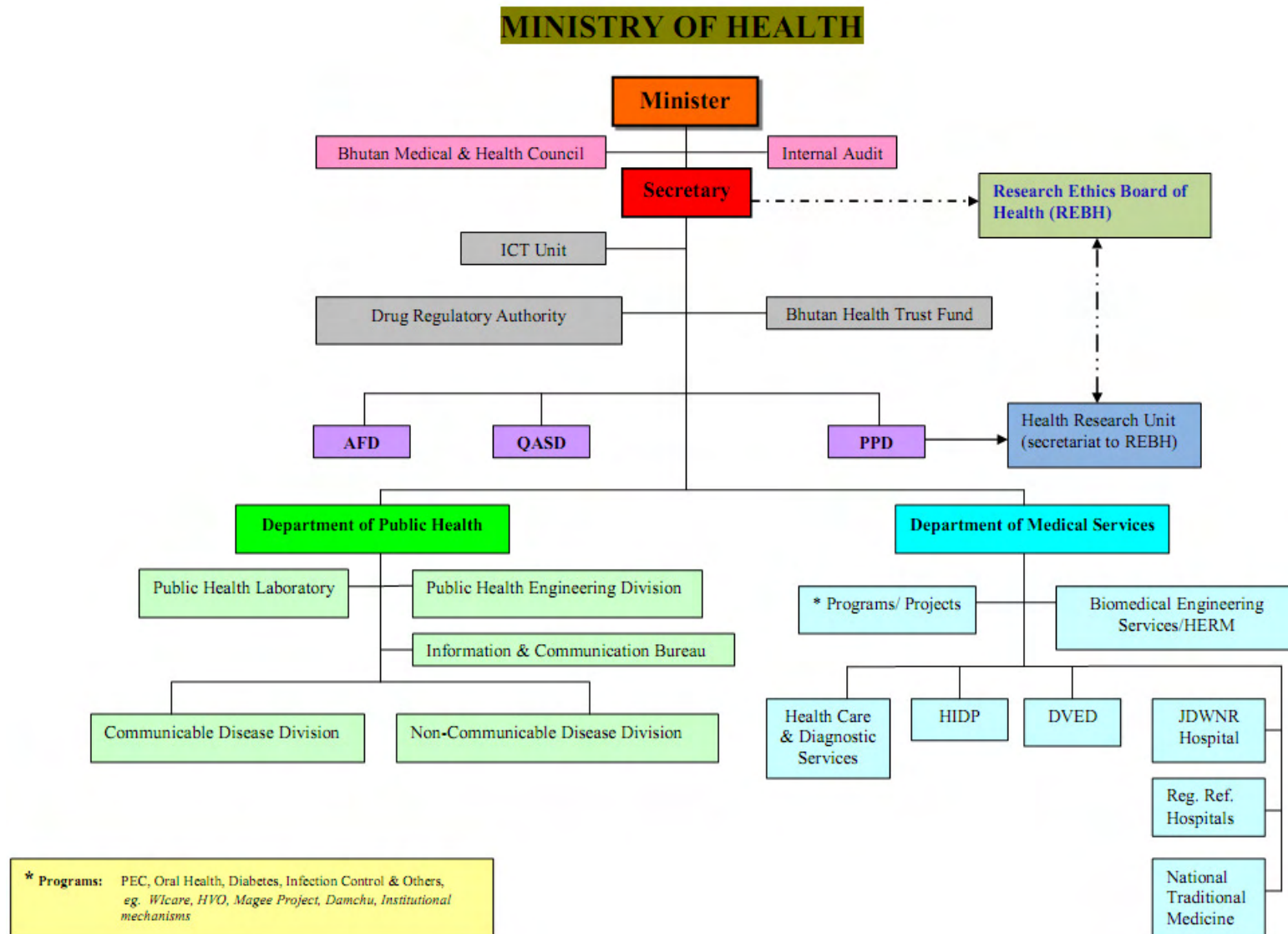
## List of Appendixes

- A1. WHO Pandemic Phase Descriptions and Main Actions by Phase
- A2. Organogram of the Ministry of Health
- A3. Organogram of the Animal Health Administration of the Ministry of Agriculture and Forests
- A4. Contact list of Departments and Officials
- A5. SOP-Avian Influenza Surveillance in Humans
- A6. Contact Tracing Form
- A7. SOP-Clinical Management Guidelines
- A8. SOP-Infection Control Guideline
- A9. SOP-Quarantine Guideline for Avian Influenza
- A10. SOP-Rapid Containment Operation Protocol
- A11. SOP-PPE Use Guideline for PI
- A12. Laboratory Form for PI
- A13. SOP-HPAI Surveillance for AI
- A14. SOP-AI Disease Outbreak Investigation
- A15. SOP-AI Decontamination
- A16. SOP-AI Movement and Quarantine Control
- A17. SOP-Collection of Swab Samples
- A18. SOP-Collection of Blood Samples
- A19. SOP-Necropsy Samples
- A20. SOP-AI Sample Preparation, Preservation and Storage
- A21. SOP-AI Sample Transportation
- A22. SOP-Diagnostic kits for Rapid Antigen Detection Test
- A23. SOP-Diagnostic Test for Virus Isolation
- A24. SOP-Diagnostic Kits for HA/HI Test
- A25. SOP-Diagnostic Kits for PCR
- A26. SOP- Use of PPE for AI
- A27. Laboratory Sample Datasheet for AI
- A28. Laboratory Sample Datasheet for AI - wild birds/animals
- A29. SOP-Culling and Disposal
- A30. Guideline on social distancing
- A31. Tool Kit for Schools on prevention of influenza pandemic infection

Appendix 1. WHO Pandemic Phase Descriptions and Main Actions by Phase

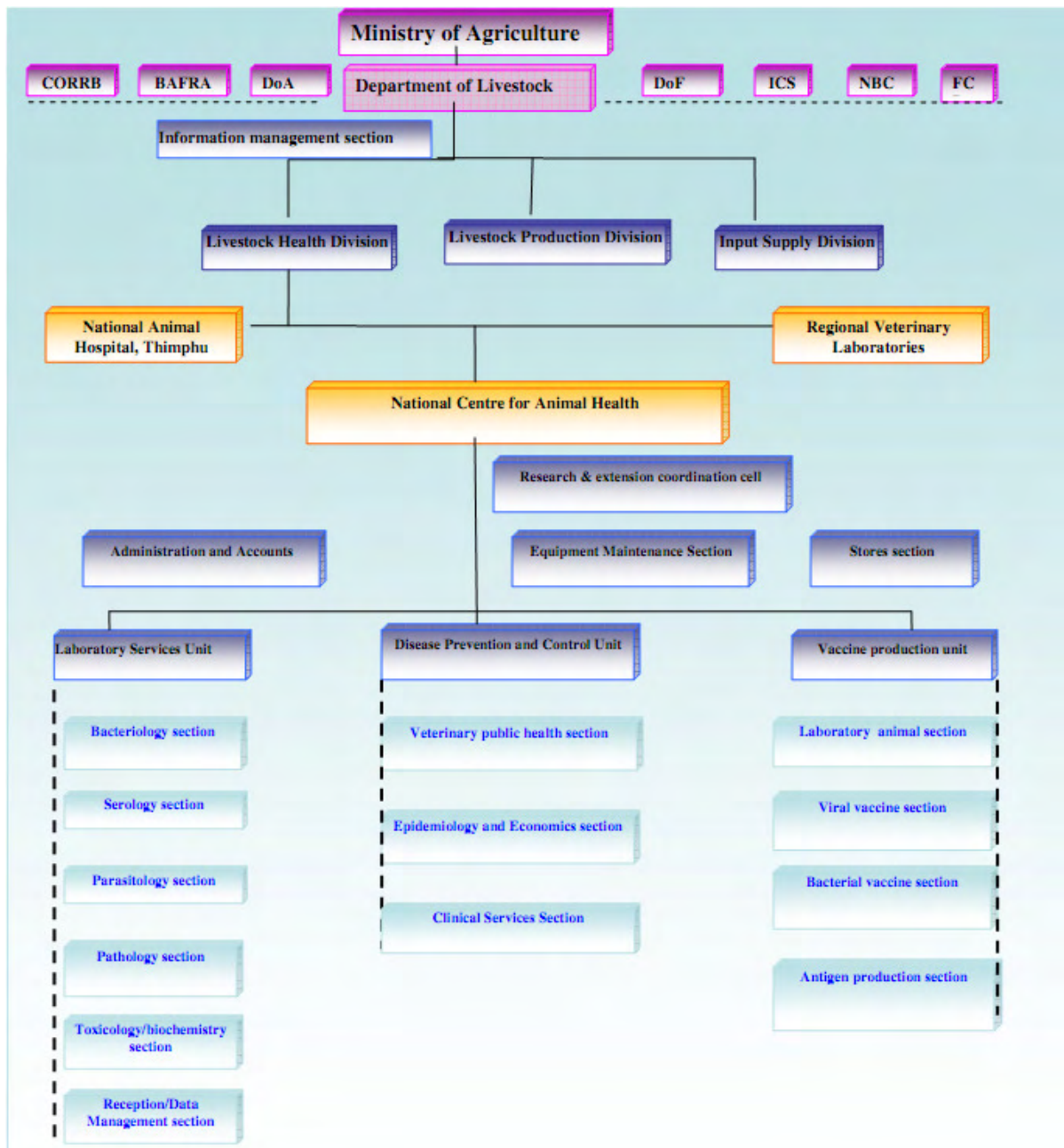
WHO PANDEMIC PHASE DESCRIPTIONS AND MAIN ACTIONS BY PHASE						
PHASE	DESCRIPTION	MAIN ACTIONS				
		PLANNING AND COORDINATION	SITUATION MONITORING AND ASSESSMENT	COMMUNICATIONS	REDUCING THE SPREAD OF DISEASE	CONTINUITY OF HEALTH CARE PROVISION
PHASE 1	No animal influenza virus circulating among animals have been reported to cause infection in humans.					
PHASE 2	An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a specific potential pandemic threat.	Develop, exercise, and periodically revise national influenza pandemic preparedness and response plans.	Develop robust national surveillance systems in collaboration with national animal health authorities, and other relevant sectors.	Complete communications planning and initiate communications activities to communicate real and potential risks.	Promote beneficial behaviours in individuals for self protection. Plan for use of pharmaceuticals and vaccines.	Prepare the health system to scale up.
PHASE 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.					
PHASE 4	Human to human transmission of an animal or human-animal influenza reassortant virus able to sustain community-level outbreaks has been verified.					
PHASE 5	The same identified virus has caused sustained community level outbreaks in two or more countries in one WHO region.	Direct and coordinate rapid pandemic containment activities in collaboration with WHO to limit or delay the spread of infections.	Increase surveillance. Monitor containment operations. Share findings with WHO and the international community.	Promote and communicate recommended interventions to prevent and reduce population and individual risk.	Implement rapid pandemic containment operations and other activities; collaborate with WHO and the international community as necessary.	Activate contingency plans.
PHASE 6	In addition to the criteria defined in Phase 5, the same virus has caused sustained community level outbreaks in at least one other country in another WHO region.	Provide leadership and coordination to multilateral resources to mitigate the societal and economic impacts.	Actively monitor and assess the evolving pandemic and its impacts and mitigation measures.	Continue providing updates to general public and all stakeholders on the state of pandemic and measures to mitigate risk.	Implement individual, societal, and pharmaceutical measures.	Implement contingency plans for health systems at all levels.
POST PEAK PERIOD	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels.	Plan and coordinate for additional resources and capacities during possible future waves.	Continue surveillance to detect subsequent waves.	Regularly update the public and other stakeholders on any changes to the status of the pandemic.	Evaluate the effectiveness of the measures used to update guidelines, protocols, and algorithms.	Rest, restock resources, revise plans, and rebuild essential services.
POST PANDEMIC PERIOD	Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance.	Review lessons learned and share experiences with the international community. Replenish resources.	Evaluate the pandemic characteristics and situation monitoring and assessment tools for the next pandemic and other public health emergencies.	Publicly acknowledge contributions of all communities and sectors and communicate the lessons learned; incorporate lessons learned into communications activities and planning for the next major public health crisis.	Conduct a thorough evaluation of all interventions implemented.	Evaluate the response of the health system to the pandemic and share the lessons learned.

## Appendix 2. Organogram of the Ministry of Health





**Appendix 3. Organogram of the Animal Health Administration of the Ministry of Agriculture and Forests**



## **Appendix 1. Contact Lists of Government Departments and Officers during outbreak of pandemic flu.**

### **Ministry of Home and Cultural Affairs**

**Mr. Namgay Wangchuk**  
Director, Department of Disaster Management  
Tel: +975-2-327098/334944

**Ms. Lhachey Dema**  
Programme Officer  
Department of Disaster Management  
Tel: +975-2-322945

### **Ministry of Health**

**Dr. Ugyen Dophu**  
Director, Department of Public Health  
Tel: +975-2-326454  
Fax: +975-2-326038  
Mobile: +975-17681528  
Email: [drugyendophu@health.gov.bt](mailto:drugyendophu@health.gov.bt)

**Mr. Tshewang Dorji**  
Communication Officer  
Information and Communication Bureau  
Department of Public Health  
Tel: +975-2-332540  
Fax: +975-2-324663  
Mobile: +975-17602585

**Ms. Roma Karki**  
IHR  
Department of Public Health  
Tel: +975-2-321842 (ext. 243)

### **Ministry of Agriculture**

#### ***Toll Free Hotlines:***

**124** - (NCAH): For reporting suspected cases of Bird Flu and enquiry on disease.  
**155** - (BAFRA): For reporting illegal trade of poultry/poultry products and enquiry on other movement of poultry and poultry products.

#### ***Other contacts:***

**Regional Veterinary Laboratory, Chhukha**  
E-mail: [rvlgedu@druknet.bt](mailto:rvlgedu@druknet.bt)  
Phone: 05-478779/478778  
Fax: 05-478773

**Regional Veterinary Laboratory, Gelephu**  
E-mail: [rvlgelephu@druknet.bt](mailto:rvlgelephu@druknet.bt)

Phone: 06-251472/251156  
Fax: 06-251741

**Regional Veterinary Laboratory, Bumthang**

E-mail: gurungrb2002@yahoo.co.uk  
Phone: 03-631169/1745  
Fax: 03-631169

**Regional Veterinary Laboratory, Khaling**

E-mail: rvorvbk@druknet.bt  
Phone: 04-581102/581112/581103  
Fax: 04-581176

**National Centre for Animal Health, Serbithang, Thimphu.**

E-mail: rvec@druknet.bt  
Phone :02-351083/093/568  
Mobile nos. 17603668/17705325/17607948  
Fax: 02-351095

**Department of Livestock, Thimphu.**

Phone: 322418; 322795; 322384; Fax: 322094

**Bhutan Agriculture and Food Regulatory Authority (BAFRA), HQ, Thimphu.**

Phone: 327031; 325790; 325993; Fax:  
City Service Office: Phone: 334148; Fax: 328353

**Information and Communication services, Thimphu.**

Phone: 323765; 321142; 321311; Fax: 324520

*You can also contact the nearest:*

1. Hospitals and Basic Health Units
2. Livestock Offices/ RNR Offices
3. Any Government Offices or Police personnel.

# **Avian Influenza Surveillance in Humans**

**Department of Public Health  
Ministry of Health  
August 2010**

## **Introduction**

Surveillance is continuous and systematic process of collection, analysis, interpretation and dissemination of descriptive information for monitoring health problems.

“Surveillance is the continuing scrutiny of all aspects of occurrence and spread of a disease that are pertinent for its effective control.” In simpler language, it means keeping a close watch on the disease”.

Surveillance is a key component in the emergency preparedness against this exotic disease, and plays a major role in an early warning system in case of its introduction to Bhutan.

### **Rationale/Purpose:**

- The installation of an early detection/early warning system for influenza/AI
- To strengthen capacity in research in avian influenza in preparation for potential outbreaks of avian influenza and influenza.
- To develop disease prevention and control systems to prevent wide spread of the disease and rapidly contain the outbreak.

### **Existing surveillance provision in Bhutan**

The statutory provisions and the health structure for AI surveillance in Bhutan comprise the following:

- AI is a notifiable disease in Bhutan. All the health facilities in the country are mandated to report all cases of ARI to DOPH through respective DHO using standard reporting format on weekly basis.
- Ministry of Health has a formal system of detecting the disease through a network of one National Referral Hospital, two Regional Referral Hospitals, 26 General Hospitals, 176 Basic Health Units and one National Public Health Laboratory.
- Public Health Laboratory in Thimphu has PCR diagnostic facility
- Surveillance and investigation data on influenza are maintained at Public Health Laboratory

### **Scope:**

This document provides a framework and approach for the Ministry of Health officials at all levels to plan for and conduct surveillance of human influenza cases; H5N1 or other novel influenza viruses of pandemic potential.

### **User/Target:**

- Medical doctors, paramedicals, public health officials and laboratory professionals.

### **Surveillance Team composition:**

- Medical Epidemiologist/ Public Health Officers from DoPH.

- Medical Officers
- HA/ACOs
- Laboratory personnel.

### **Materials and Equipment**

- Questionnaires/ survey forms
- Note pad and pen
- Mobility
- Communication facilities-mobile and hand set
- Sampling kits – swabs, needle, syringes, permanent marker pen, sample submission forms, Eppendorf tubes, transport media, cotton, antiseptics, face mask, gloves, soap, apron.
- Diagnostic kits – rapid antigen diagnostic kits, HA/HI test kits and other advance diagnostic test kits.
- GPS
- Village and geog coordinates.
- Human population figures.
- Laptop with relevant statistical packages.
- Extension gears – tent, sleeping gears, rain coat./ umbrella, cap, torch, walking boot etc.
- Fund
- Guidelines and SOPs

### **Surveillance strategies:**

#### **1. Surveillance during the prevention phase**

Surveillance during preventive phase comprises of clinical and laboratory surveillance in all the Dzongkhags. Any patient meeting the case definition for Avian Influenza should be sampled for the purpose of laboratory surveillance.

#### **1.1 Clinical surveillance**

All the Health Care facilities in the country should submit weekly Acute Respiratory Infection (ARI) reports to DoPH using the standard format given in *annex 1*. The DOPH should see the trend of ARI on monthly basis and if there is sudden increase in trend, the outbreak investigation team should be deployed for field investigation if deemed necessary. The team will follow the outbreak investigation guideline.

#### ***Case definition for ARI***

Patient presenting with fever or history of fever with sore throat, cough, generalized body pain and headache

## **1.2 Laboratory surveillance:**

There is a need to expand the current laboratory based ILI surveillance system for continued monitoring to identify any change in the virus characteristics.

Any patient meeting the case definition for ARI should be sampled as per the SOP given in annex.... The samples collected should be sent to the laboratory for analysis. All the tests should be conducted in the respective laboratories as per the SOPs for respective tests. The detail on laboratory surveillance can be referred to “Sentinel Human surveillance for influenza in Bhutan (version1, date 17 February 2009) given in annex 2.

## **2. Surveillance during outbreak**

In addition to routine surveillance the health workers should carry out enhanced surveillance in at risk population such as poultry farmers, veterinary professionals and those individuals involved directly or indirectly with the infected birds. Besides, target surveillance needs to be carried out in family members of the case and those individuals involved directly or indirectly with the confirmed human AI patient.

### **2.1 Targeted surveillance (enhanced surveillance during the HPAI outbreak in birds)**

Surveillance team should undertake enhanced surveillance of the community, cullers, veterinary personnel involved directly or indirectly with the infected poultry; and those taking care of any suspected human case of avian influenza in the outbreak areas

The following activities need to be undertaken:

- House-to-house surveillance on a daily/regular basis.
- Active surveillance of the groups that may be at a higher occupational risk of exposure viz. poultry workers, animal health workers, cullers and their family members etc.
- Active surveillance of communities in the infected and surveillance zones declared by veterinary disease investigation team.
- Daily monitoring of any suspected or confirmed case of avian influenza
- Active surveillance in hospitals, particularly targeting patients having flu-like illness attending OPD and emergency departments in the outbreak areas.
- Any suspected case of avian influenza, if observed should be investigated and reported

### **2.2 Surveillance following confirmed human AI cases**

Surveillance team should also undertake enhanced surveillance of the community, family members and those individuals who had direct and indirect exposure to the AI case.

- House to house surveillance on regular basis with various communication means

- Active surveillance of family members and individuals who are involved in taking care of suspected human cases.
- Active surveillance of the groups that may be at a higher occupational risk of exposure viz. poultry workers, health care workers, cullers and their family members etc.
- Active surveillance in hospitals, particularly targeting patients having flu-like illness attending OPD and emergency departments in the outbreak areas.
- Daily monitoring of any suspected or confirmed case of avian influenza or seasonal influenza.

### **3. Surveillance during rapid containment (RC operation).**

Containment and surveillance zone (buffer zone) should be declared by the disease investigation team from index cluster based on epidemiological risk assessment and geographical settings. Intensive surveillance should be carried out to rapidly contain the disease and to prevent further spread of the disease from the index cluster.

#### **3.1 Surveillance in the Containment Zone**

Surveillance in the Containment Zone is needed to identify suspect cases of pandemic influenza. This information will be critical to:

1. laboratory confirm or exclude persons as cases of pandemic influenza;
2. monitor the evolution of the outbreak;
3. Evaluate the effectiveness of the containment operation;
4. Help guide decisions to modify, continue or end the containment operation.

A surveillance system that actively seeks potential cases is strongly preferable to one that is passive. To achieve as complete ascertainment of cases as possible, surveillance should be instituted in hospitals (including patients and health-care workers), formal outpatient health care structures (e.g. physician practices, outpatient clinics, pharmacies, laboratories, and other pre-existing health networks) If the number of influenza-like illness cases becomes overwhelming, it may be necessary to use a combination of active and passive surveillance approaches. After antiviral prophylaxis in the Containment Zone has ended, active surveillance should be continued to achieve complete case ascertainment. Laboratory testing will be necessary to detect and confirm any possible remaining cases.

Laboratory testing of all suspect cases is preferable, but may not be possible if there are large numbers of persons with an influenza-like illness. As patient numbers increase, it may be necessary to develop a sampling scheme. For example, every “n<sup>th</sup>” hospitalized patient with suspect influenza could be tested with consideration for geographical, gender and age representative.



### **3.2 Surveillance in the buffer zone**

In the buffer zone complete and active surveillance should be carried out which will help to detect new cases of AI that are likely to appear if the Rapid Containment operation is not effective, modify the boundaries of the zones .

### **3.3 Contact tracing of persons who have moved outside the Containment Zone**

Every effort should be made to trace the individuals who had moved out of containment zone before and after establishment of containment zone

## REFERENCES

1. Anonymous, Health care workers manual for Avian Influenza, National Institute of Communicable Diseases, Directorate General of Health Services, Delhi – 110 054.
2. World Health Organization (WHO), WHO Interim Protocol: Rapid operations to contain the initial emergence of pandemic influenza, October 2007.
3. Ministry of Health and Ministry of Agriculture, National Influenza Pandemic Preparedness Plan (NIPPP), version 7, 2007.
4. Anonymous, The Second National Strategic Plan for Prevention and Control of Avian Influenza and Preparedness for Influenza Pandemic, Thailand, 2008.



## Avian Influenza (H5N1)

### CONTACT TRACING & FOLLOW-UP FORM

#### 1. Case Information

1. Name of patient: ..... 2. Age/Sex..... 3. Address: .....  
 4. Date of onset of illness: .....(dd/mm/yy). 5. Date when case reported the illness: .....

SL #	Name	Age	Sex	Contact Type	Relation with case	Address/ Contacts No.	Date of first contact with case	S/F/N	1	2	3	4	5	6	7	8	9	10	

**Contact Type:** A: Close Contact less than one meter, B: Household contact but more than one meter C: Health Care Worker contact – protected.  
**Status:** S: Seen and healthy F: Influenza Like Illness, notify N: Not Seen

# **Clinical Management guideline**

**Department of Public Health  
Ministry of Health  
August 2010**

## **Introduction**

Avian Influenza (AI), also known as Bird Flu, is an infection caused by type A influenza viruses that primarily infects avian species, but infection with these viruses can occur in humans. Highly pathogenic avian influenza viruses have caused outbreaks in poultry in many countries. In addition to spreading geographically, the virus is gradually expanding the host range (domestic, wild and migratory birds, and animals such as pigs, cats and tigers) and jumping to the humans occasionally.

Although the virus is yet to acquire the ability for efficient human-to-human transmission, this may happen soon due to continuous human exposure in many countries. If this happens, the next influenza pandemic may start with serious consequences on health resulting in major social, economic and political disruption.

To deliver medical care efficiently to the patients infected with AI during pandemic, MoH has drafted guidelines on different aspects of AI so that the health care provider can manage the patients as per the standard procedure both clinically and logistically. The guideline was drafted by a group of technical people from JDWNRH in coordination with DoPH.

## **Case management (hospital)**

### **Epidemiology**

To date most of the cases of Human Avian Influenza are attributed to direct contact with infected poultry or poultry products. So far transmission of bird flu from human-to-human has not been efficient. However, influenza viruses are highly unstable and have the ability to mutate rapidly. This means that changes in the virus could lead to easier spread between people leading to a pandemic influenza. This can result in a serious and prolonged outbreak affecting all aspects of society.

### **Transmission**

- Direct contact with poultry and its product and secretion, especially feces
- Contact with contaminated feed, water, equipment and clothing
- Human-to-human transmission: This form of transmission is possible but currently the risk is low. Human-to-human Avian influenza transmission is by droplet infection, aerosols and indirectly through contaminated items.

### **Incubation period/Infectious period**

The time from presumed exposure to onset of illness ranges from two to eight days, the median being 4 days. For field investigations and monitoring purposes WHO recommends the use of incubation period of 7 days. An adult is considered infectious 7 days after resolution of fever. In case of children the infectious period is 21 days. All ages and both sexes are said to be equally susceptible.

## Clinical presentation of human cases of Avian Influenza and diagnosis

The clinical presentations of human cases of AI are very similar to seasonal influenza. Majority of patients present with fever, cough and difficulty in breathing and diarrhea (an uncommon feature in seasonal influenza). However, features that may differ from normal seasonal influenza include:

1. Longer incubation period
2. Early onset of pneumonia
3. Rapid progression to ARDS
4. High Case Fatality Rate(CFR)

The blood picture usually shows consistent lymphopenia and moderate thrombocytopenia and deranged liver function tests. Other findings may include abnormal chest radiographs. Patients may run a fulminant course developing Acute Respiratory distress Syndrome (ARDS) and develop multi organ failure.

## Clinical diagnosis

To diagnose a human case of avian influenza in primary health –care setting during the pandemic alert phase, both clinical and epidemiological criteria are to be met. The clinical criteria are for case management where as the epidemiological criteria are primarily for case identification, referral and reporting purposes.

## Clinical criteria

The most consistent clinical features include fever >38 degrees centigrade, cough, shortness of breath or breathing difficulty

Common features	Infrequent features	Rare
Onset after 2-8 days of exposure to sick/dying poultry	vomiting	Encephalopathy
Onset similar to seasonal influenza	Abdominal pain	
Fever >38 deg C	Chest pain	
Cough	Bleeding from nose and/or gums	
Difficulty in breathing after 5-7 days of onset	-	
Diarrhoea		
Myalgia		
Primary viral pneumonia		
Rapid deterioration to ARDS and multi organ failure		

## *Epidemiological criteria*

*For epidemiologically linking a suspected case to a known AI case, one or more of the following exposure categories are used, in the 7 days prior to symptom onset*

- Close contact ( within one meter) with a person (e.g. caring for, speaking with or touching) who is a suspected, probable or confirmed H5N1 case
- Sustained exposure (e.g. handling, slaughtering, plucking, butchering or preparing for consumption) to poultry or wild birds or their remains or environments contaminated by their faeces in an area where H5N1 infection in animals or humans have been suspected or confirmed in the last one month.
- Consumption of raw or undercooked poultry products in an area where H5N1 infections in animals or humans have been suspected or confirmed in the last month
- Close contact with a confirmed H5N1 infected animal other than poultry or wild birds (e.g. cat or pig)
- Handling samples (animal or human) suspected of containing H5N1 virus in a laboratory or other setting.
- Touching birds ( well appearing, sick or dead), poultry faeces or surfaces contaminated with faeces.
- Consuming uncooked poultry products (including blood) in an affected area
- Close contact with a person from infected area with confirmed or suspected AI case

Any case fulfilling the clinical and epidemiological criteria should be treated as a **suspected case** of H5N1. The health-care provider should also remember that a case may turn up in an area not reporting avian influenza. A recent visit to or having come from an area affected by highly pathogenic avian influenza A and fulfilling the above clinical and epidemiological criteria qualify the patient to be classified as a suspected case and needs to be investigated for AI or otherwise.

### **Case definition of a human case of avian influenza (WHO)**

Human influenza cases may be classified as suspected, probable or confirmed. Although the full knowledge of the three categories may be helpful for the attending clinicians at the primary health care level, it will only be possible to diagnose suspected or probable cases,

#### **Suspected H5N1 case (BHU and district hospital will notify DHO and DHO notify DoPH)**

A person presenting with unexplained acute lower respiratory tract illness with fever (>38.0 C) and cough, shortness of breath or difficulty in breathing AND **one or more** modes of exposures, seven days prior to the onset of the symptom:

- (a) Close contact (within 1 meter) with a person (e.g. caring for, speaking with or touching) who is a suspected, probable, or confirmed H5N1 case;
- (b) Exposure (e.g. handling, slaughtering, plucking, butchering, preparing for consumption) to poultry or wild birds or their remains or to environments contaminated by their faeces in an area where H5N1 infections in animals or humans have been suspected or confirmed in the last month;
- (c) Consumption of raw or undercooked poultry products in an area where H5N1 infections in animals or humans have been suspected or confirmed in the last month;



- (d) *Close contact with a confirmed H5N1 infected animal other than poultry or wild birds (e.g. cat or pig);*
- (e) *Handling samples (animal or human) suspected of containing H5N1 virus in a laboratory or other setting.*

***Probable H5N1 case (BHU and district hospital will notify DHO and DHO will notify DoPH)***

***Probable definition 1:*** *A person meeting the criteria for a suspected case AND One of the following additional criteria:*

- (a) *Infiltrates or evidence of an acute pneumonia on chest radiograph plus evidence of respiratory failure (Hypoxemia, severe tachypnea);*
- OR***
- (b) *Positive laboratory confirmation of an influenza A infection but insufficient laboratory evidence for H5N1 infection.*

***Probable definition 2:*** *A person dying of an unexplained acute respiratory illness who is considered to be epidemiologically linked by time place, and exposure to a probable or confirmed H5N1 case.*

***Confirmed H5N1 case (BHU and district hospital will notify DHO and DHO will notify WHO)***

*A person meeting the criteria for a suspected or probable case AND a positive standard test conducted in Public Health Laboratory using RT-PCR.*

### ***Diagnostic Procedures***

- *Rapid antigen detection: Results can be obtained within 15 to 30 mins*
- *RT-PCR – Specific for influenza A virus. Results can be available within a few hours from clinical swab.*

*Any case fulfilling the clinical and epidemiological criteria should be treated as a **suspected case** of H5N1 and reported to the DoPH. It is pertinent to remember that a case may turn up in an area not reporting avian influenza. A recent visit to or having come from an area affected by highly pathogenic avian influenza A and fulfilling the above clinical and epidemiological criteria qualify the patient to be classified as a suspected case*

*If a case meeting the criteria for a suspected case has evidence of an acute pneumonia and signs and symptoms of respiratory failure (hypoxemia, severe tachypnea), it qualifies as a **probable case**. A person dying of an unexplained acute respiratory illness who is considered to be epidemiologically linked by time, place and exposure to a probable or confirmed H5N1 case is also diagnosed as a probable case. **(Effort to collect and preserve nasal or throat swab should be made for testing).***

Public Health Laboratory now has RT-PCR diagnostic facility. Therefore, doctors and health workers should know the case definition, collect samples from the cases and send to PHL for testing.

A person meeting the criteria of suspected or probable case is classified as a confirmed case when the RT-PCR result is positive..

### **Case Management**

A triage protocol will be helpful to:

- a) Identify persons who might have pandemic influenza,
- b) Separate them from others to reduce the risk of disease transmission, and
- c) Identify the type of care they require (i.e., home care or hospitalization).

A step by step approach will be followed to manage the suspect and probable cases meeting clinical and epidemiological criteria.

### **Step-by-step approach to case management**

#### **Triage room**

- Follow standard infection control precautions, including respiratory hygiene/cough etiquette while handling the patients
- If the patient meets the clinical and epidemiological criteria for a suspected case of H5N1 infection, notify relevant authority (doctor)

Admit to pre-designated isolation facility taking appropriate precautions (PPE, universal infection control procedures) during transfer of patients.

#### **In the isolation ward**

- History and examination of patient
- Make arrangement to carry out relevant tests
  - Collection of clinical specimens and biochemical tests
  - Other investigation: X-ray chest
- Supportive care and treatment depending on condition of patient and laboratory/X-ray results

#### **Admission criteria**

Based on pandemic situation, existing bed, and staff capacity, admission criteria should be reviewed regularly and decision taken for inpatient (isolation room) or out patient management.

- Admission priority should be given to serious patients having signs of pneumonia and ARDS

- Patients having ARDS may need ventilator support and should be treated in an ICU
- In case of a major pandemic when hospitals are overwhelmed with patients, home care may be considered as an option.

**Treatment**

**Antiviral**

Antiviral drugs are the mainstay of the treatment. To be effective, antiviral drugs should be administered within 24-48 hours after exposure. If the case meets the clinical and epidemiological criteria, then treatment with antiviral should be started immediately without waiting for the laboratory confirmation.

Even if a case is detected late by the physician, antiviral therapy is still warranted. And even if the laboratory reports are negative, a strong epidemiological link is an indication to continue treatment.

The antiviral drug currently available in the country is oseltamivir (Tamiflu)

**Dose and duration of treatment with oseltamivir (Tamiflu)**

Available in blister packing of 10 capsules, each capsule contains 75 mg of oseltamivir. The oral suspension contains 12 mg/ml.

The recommended dose avian influenza infection is:

**Children (over 1 year):**

- Under 16 kg body weight : 30 mg twice daily for 5 days
- 16-23 kg body weight : 45 mg twice daily for 5 days
- 24-40 kg body weight : 60 mg twice daily for 5 days
- Over 40 kg body weight : 75 mg twice daily for 5 days

Dosing recommendation for antiviral treatment of children younger than 1 year using oseltamivir

Age	Recommended treatment dose for 5 days
< 3 months	12 mg twice daily
3 – 5 months	20 mg twice daily
6 – 11 months	25 mg twice daily

Adults and adolescents (13 years or older): 75mg twice daily. Normal recommended duration of treatment is five days. However, the treating physician can decide the duration and dosage of tamiflu in case of severe illness.

**Adverse reactions**

In terms of safety and adverse effects, evidence from the trials in seasonal influenza shows that although oseltamivir is generally well tolerated, gastro intestinal side effects (transient nausea,

vomiting) may increase with increasing doses, particularly above 300 mg per day. Occasionally it may cause bronchitis, insomnia and vertigo. Less commonly, angina, pseudo-membranous colitis and peritonsillar abscess have also been reported. There have been occasional reports of anaphylaxis and skin rashes.

In children, the most frequently reported side effect is vomiting. Infrequently abdominal pain, epistaxis, bronchitis, otitis media, dermatitis and conjunctivitis have also been observed.

### **Precautions**

Self medication in the absence of appropriate clinical diagnosis is discouraged.

Oseltamivir dosage should be reduced in patients with renal impairment, if GFR is less than 30% the dose should be reduced to 75 mg once daily.

Adequate data is not available in pregnant women. Decisions to use oseltamivir in pregnant women should be made on a case by case basis where the potential benefit to the mother justifies the potential risk to the fetus

There is no recommendation for dose reduction for patients with hepatic disease

### **Antibacterial drugs**

Antibacterial agents should be administered, if required, following points are to be considered.

- Suspected human cases of H5N1, if not having pneumonia, do not require antibiotic therapy.
- Patients with community-acquired pneumonia should receive antibacterial therapy.
- Stop antibiotic treatment if initial bacteriological studies are negative and H5N1 is confirmed.
- Patients on mechanical ventilation should be administered antibacterial drugs to prevent ventilator associated pneumonia (VAP)
- Secondary bacterial infection requires appropriate anti biotic therapy

### **Symptomatic treatment**

- Paracetamol or ibuprofen is prescribed for fever, myalgias and headache.
- The patient is advised to drink plenty of fluids.
- Smokers - advised to avoid smoking.
- For sore throat, a short course of topical decongestants, saline nasal drops, throat lozenges and steam inhalation may be beneficial.

### **Other pharmaceutical interventions**

- High-dose corticosteroids in particular have no evidence of benefit and there is potential risk.

- Low-dose corticosteroids (hydrocortisone 200-400 mg/day) may be useful in persistent septic shock(SBP < 90 mmHg).
- Salicylate is strictly contra-indicated in any suspected/ confirmed patients of avian influenza due to its potential to cause Reye's syndrome.

### **Other important considerations**

#### **Respiratory support**

Patients may report to a primary health care facility with ARDS or pneumonia that rapidly progresses to ARDS. Patients with signs of tachypnea, dyspnea, respiratory distress and oxygen saturation less than 90 percent should be supplemented with oxygen therapy. Patients with severe pneumonia and acute respiratory failure (SpO<sub>2</sub> < 90% and PaO<sub>2</sub> <60 mmHg with oxygen therapy) must be supported with mechanical ventilation.

#### **Transportation to hospital**

If clinical findings or epidemiological link establish a human case of avian influenza, the patient may be referred from other health facilities in the district. The ambulance should have basic facilities like oxygen therapy and resuscitation equipments. Critically ill patients having tachypnea, respiratory distress, septic shock altered mental status, who are unlikely to withstand the journey should not be referred. Instead, the treating doctor should contact the medical specialist at JDWNR hospital/ RR Hospital and seek advice on the treatment of the patient. The patient should be accompanied by a trained health care provider.. Aerosol-generating procedures should be avoided during transport unless life-saving.

If patient is not in respiratory distress, then the mouth and nose should be covered by ordinary surgical mask to contain droplets expelled during coughing. Drivers and health personnel should use standard droplet precautions if accompanying or handling a suspected or confirmed AI case during transport. The doctor on duty should be informed of the patient's arrival in advance. After the patient is admitted to the hospital, the patient cabin of the ambulance and reusable patient-care equipment should be sanitized using phenolic disinfectants or quaternary ammonia compounds or sodium hypochlorite.

During transportation of the patient the ambulance shall not stop enroute unless unavoidable. This is to ensure that the infection does not spread to the community.

#### **Chemoprophylaxis: Preventive therapy of close contacts (Post exposure)**

Irrational and overuse of antiviral agents can lead to the emergence of resistant viruses, raising another critical barrier in the fight against pandemic. Only post exposure cases merits chemoprophylaxis

Three groups have been defined, based on the risk profile, which are usually considered as candidates for chemoprophylaxis. The dose of chemoprophylactic agent is half that used for therapeutic purposes. A brief description of the risk groups and indications for chemoprophylaxis are given in the table below.

**Table 1: Chemoprophylaxis against avian influenza**

<b>Level of risk</b>	<b>Risk groups</b>	<b>Chemoprophylaxis</b>
High risk	Sharing household with or caring for a Patient.  Unprotected close contact (<1 meter) with patient.	Oseltamivir in dose of 75 mg/day to continue for 7-10 days after last exposure.
Moderate risk	Persons handling sick animals or decontaminating environment without PPE.  Direct exposure to sick/dead animals Infected with H5N1.  Health-care worker in direct contact with patient without complete PPE.  Laboratory personnel who might have an unprotected exposure.	May be provided the same chemoprophylaxis as with high-risk group.
Low Risk	Health-care worker with PPE or contact >1 metre with a patient.  Cullers of non-infected animals.  Persons with PPE handling sick/dead birds and dead human body or contaminated environment.	Probably no Chemoprophylaxis needed.

It must be remembered that the protection offered by chemoprophylaxis is short duration.

Dosing recommendation for antiviral chemoprophylaxis of children younger than 1 year using oseltamivir

Age	Recommended prophylaxis dose for 10 days
< 3 months	Not recommended
3 – 5 months	20 mg once daily
6 – 11 months	25 mg once daily

## **Infection control measures**

### **General considerations**

- Non-compliance with the basic level of infection control precautions, such as hand hygiene, appropriate use of facial protection (nose, mouth and eye protection) masking, cough etiquettes, cleaning and disinfection of contaminated equipments and surfaces, have resulted in nosocomial infections putting health care workers and others at risk. The following generic principles should be applied:
- Initiate infection control precautions promptly when AI infection is suspected

- Standard contact and droplet precautions should be the minimum to be used in all healthcare facilities when providing care for a suspected or confirmed AI-infected patient.
- Respiratory hygiene and cough etiquette should be used by all patients with respiratory symptoms to prevent the transmission of pathogens.
- Perform hand hygiene practices before and after any patient contact and after contact with contaminated items, regardless of whether gloves are worn or not.
- HCWs who collect or transport clinical specimens should adhere to recommended infection control precautions in order to minimize the possibility of exposure to infection.
- Standard precautions are to be followed while transporting the patient to a health-care facility. Aerosol-generating procedures should be avoided as far as possible during transit.
- AI virus can survive in the environment over different periods of time ranging from a few hours to several days. Therefore, cleaning followed by disinfection should be carried out for contaminated surfaces and equipment.

### **Use of PPE**

All HCWs providing care for suspected or confirmed AI patients should use PPE. The following steps are reemphasized:

- Perform hand hygiene, preferably with an alcohol-based hand rub or soap and water.
- Put on a fluid-resistant gown.
- Put on disposable particulate respirator.
- Perform user seal check of particulate respirator.
- Put on hair cover
- Use face shield or goggles.
- Put on gloves (make sure gloves cover cuffs of gown sleeves).
- Shut the door after entering / leaving.

After performing the procedure, leave the isolation room/area or the ante room and observe the following steps:

- Remove gloves and discard in biomedical waste bin (gloves may be peeled from hands when gown is removed).
- Perform hand hygiene, preferably with an alcohol-based hand rub or soap and water.
- Remove hair cover and discard in biomedical waste bin Remove protective eyewear and discard in biomedical waste bin.
- Remove medical mask or particulate respirator by grasping elastic band; do not touch front of particulate respirator (fronts of masks may be contaminated) and discard in biomedical waste bin.
- Perform hand hygiene preferably with an alcohol-based hand rub or soap and water.

## **Role of parents/relatives in infection control**

Parents/legal guardians of paediatric patients should be strongly supported to accompany the patient throughout the hospitalization period. They should also be educated to use surgical masks, hand hygiene and respiratory etiquette and may even assist in providing care to AI-infected patients in special situations (e.g. lack of resources). Family members who accompany suspected AI-infected patients to the health-care facility can be assumed to potentially have been exposed to AI and should be assessed accordingly. Visitors should be restricted to those necessary for the patient's well-being and care. During home care, the members of the family should be educated in respiratory etiquette and made aware of the need to keep at least one meter distance from the patient.

## **Duration of infection control precautions**

If the primary health-care facilities have the capacity to manage uncomplicated human cases of H5N1, the infection control precautions recommended above should be implemented during the time the patient is infectious. Until further evidence is available, infection control precautions should continue in an adult patient for 7 days after resolution of fever and 21 days after onset of illness for children younger than 12 years because of the longer period of viral shedding in children. If the patient insists on returning home following resolution of fever, it may be considered, provided the patient and household members follow infection control measures at home. The cases could be monitored by the health-care workers in the community.

## **Specimen collection and transport to designated laboratories**

The clinical specimens should be collected following laboratory standard operating procedures. Health-care workers who collect specimens from AI-infected patients should wear PPE. Specimens should be transported following the SOP for sample transportation. Specimens should be delivered by hand wherever possible. The laboratory must be notified by telephone when the specimen is on its way.

## **Discharge Policy**

In adults the virus shedding takes place up to 7 days and in children 21 days after resolution of fever. So the patient and the family must be made aware of it and educated on it. Ideally patient needs isolation till they become non-infectious. Health care worker attending the patient needs to practice infection control measures till the prescribed period as above.

## **Visitor's Register**

A register should be kept outside the isolation/quarantine units which will record the name and contact numbers of the people visiting the patients. This helps the health facilities for contact tracing in case the visitors fall sick.



# **Infection control Guideline**

**Department of Public Health  
Ministry of Health  
August 2010**

## **1. Standard infection control precautions for all health-care facilities**

### **Standard precautions include:**

- a) Hand hygiene:
  - Before and after any patient contact.
  - After removing gloves or any other PPE item.
  - Routine hand hygiene is performed either by using an alcohol-based hand rub (preferably) or by washing hands with soap and water and using a single-use towel for drying hands.
  - If hands are visibly dirty or soiled with blood or other body fluids or if broken skin might have been exposed to potentially infectious material, hands should be washed thoroughly with soap and water. Hands should also be washed after using the lavatory.
- b) PPE based on risk assessment and to avoid contact with blood, body fluids, excretions, and secretions.
- c) Appropriate handling of patient-care equipment and soiled linen.
- d) Prevention of needle stick/sharp injuries.
- e) Appropriate environmental cleaning and spills-management.
- f) Appropriate handling of waste.

### **Respiratory hygiene/cough etiquette for all health-care facilities**

- a) Persons with respiratory infection should be educated to:
  - cover their mouth and nose with a tissue when coughing and dispose of used tissue in waste containers;
  - use a mask if coughing, when a mask is available and can be tolerated
  - perform hand hygiene (use an alcohol-based hand rub or wash hands with soap and water) after contact with respiratory secretions; and
  - stand or sit at least 1 meter (3 feet) from other persons, if possible
  - The distance between beds should be at least 1 meter. Increasing spatial distance between patients may theoretically be helpful in preventing transmission of droplet transmitted diseases
  - All HCWs providing care for patients with acute febrile respiratory illness or suspected or confirmed AI infection should use PPE

### **Family member/visitor recommendations**

Visitors should be strictly limited to those necessary for the patient's well-being and care. They should be advised about the possible risk of AI transmission.

- Visitors should be provided with PPE and should be instructed how to use them and in hand hygiene practices prior to entry into the patient isolation room/area.
- Parents/legal guardians of pediatric patients should be strongly supported to accompany the patient throughout the hospitalization.
- Parents/relatives/legal guardians may assist in providing care to AI-infected patients in special situations (e.g. lack of resources, pediatric patients, etc.) if adequate training and supervision of PPE use and hand hygiene is ensured.

- Because family members may have been exposed to AI via the patient or similar environmental exposures, all family members and visitors should be screened for symptoms of respiratory illness at entry to the facility.
- Family members and visitors with symptoms should be considered as possible AI cases and should be evaluated for AI infection.

### **Patient transport within health-care facilities**

- The movement and transport of patients out of the isolation room/area should be for essential purposes only. The receiving area should be informed as soon as possible prior to the patient's arrival of the patient's diagnosis and of the precautions that are indicated.
- Surgical and procedure masks are appropriate for use by AI-infected patients to contain respiratory droplets and should be worn by suspected or confirmed AI-infected patients during transport or when care is necessary outside of the isolation room/area.
- Patients should perform hand hygiene after contact with respiratory secretions.
- If a mask cannot be tolerated (e.g. due to the patient's age or deteriorating respiratory status) instruct patient to cover nose/mouth with tissue during coughing/sneezing or use the most practical alternative to contain respiratory
- Secretions followed by hand hygiene after respiratory hygiene.
- If there is patient contact with surfaces, these surfaces should be cleaned and disinfected afterwards.
- HCWs transporting masked AI-infected patients should use a gown and gloves, followed by hand hygiene.

### **Waste disposal**

- All waste generated in the isolation room/area should be removed from the room/area in suitable containers or bags that do not allow for spillage or leakage of contents.
- One layer of packing is adequate providing the used equipment and soiled linen and waste can be placed in the bag without contaminating the outside of the bag. Double bagging is unnecessary.
- When transporting waste outside the isolation room/area, use gloves followed by hand hygiene.
- Although the risk of transmission of AI infection via human faeces is unknown, faeces of AI-infected patients should be handled with caution and possible aerosolization should be avoided.
- Liquid waste such as urine or faeces can be flushed. Close toilet cover when flushing faeces.

### **Dishes and eating utensils**

Use standard precautions for handling dishes and eating utensils used by suspected or confirmed AI-infected patients outside of the isolation room/area.

- When possible, wash reusable items in a dishwasher with detergent at the recommended water temperature. If dishwashers are not available, detergent and

water should be used to wash items. Rubber gloves should be used if washing items by hand.

- Disposable items should be discarded with other general waste

### **Linen and laundry**

The use of standard precautions is recommended for handling linen and other laundry that may be contaminated with blood, body fluids, secretions, or excretions from suspected or confirmed AI-infected patients.

- Place soiled linen directly into a laundry bag in the isolation room/area.
- Contain linen in a manner that prevents the linen bag from opening or bursting during transport and while in the soiled linen holding area.
- Heavily soiled linen should be rolled or folded to contain the heaviest soil in the centre of the bundle. Large amounts of solid material (e.g. faeces) should be removed from linen with a gloved hand and toilet tissue and then placed into a toilet for disposal (close toilet lid when flushing), before linen is placed into the laundry bag.
- When transporting soiled linen and laundry outside the isolation room/area, use gloves followed by hand hygiene.
- Soiled linen and laundry should not be shaken or otherwise handled in a manner that might create an opportunity for contamination of the environment or aerosolization of virus.
- Laundry personnel should use standard precautions and perform hand hygiene after removing PPE that has been in contact with soiled linen and laundry.
- Wash and dry linen according to routine facility standards and procedures

### **Environmental cleaning and disinfection**

- Cleaning MUST precede disinfection.
- AI virus is inactivated by a range of disinfectants including:
  - phenolic disinfectants
  - quaternary ammonia compounds
  - peroxygen compounds
  - sodium hypochlorite (household bleach)
  - alcohol
  - other germicides with a tuberculocidal claim on the label
- Follow the manufacturers' recommendations for use/dilution, contact time, and handling of disinfectants.
- Patient rooms/areas should be cleaned at least daily and terminally at discharge. In addition to daily cleaning of floors and other horizontal surfaces, special attention should be given to cleaning and disinfecting frequently touched surfaces
- To avoid possible aerosolization of AI virus; damp, rather than dry dusting or sweeping should be performed whenever possible; dust horizontal surfaces by moistening a cloth with a small amount of disinfectant.
- During wet cleaning, cleaning solutions and equipment soon become contaminated; clean less heavily contaminated areas first and change cleaning solutions, cleaning cloths, and mop heads frequently.
- The double bucket method (i.e. one bucket for cleaning solution, one for rinsing) is recommended.

- Equipment used for cleaning and disinfection must be cleaned and dried after each use.
- Mop heads should be laundered daily and dried thoroughly before storage or reuse.
- Carpeted areas should not be designated for AI infected patients
- Keep areas around the patient free of unnecessary supplies and equipment to facilitate daily cleaning.
- Do not spray (i.e. fog) occupied or unoccupied rooms with disinfectant. This is a potentially dangerous practice that has no proven disease control benefit.

### **Preparation of the isolation room:**

#### **Recommendation for hospital health care worker**

- All suspected and confirmed cases should be isolated
- Isolation room/Area should be identified in advance
- Areas/rooms for isolation should be clearly segregated from other wards.
- The isolation room should be adequately ventilated
- Single isolation room is preferred; if single isolation room is not available then multi-bed rooms can be used
- The Beds should be at least 1 meter apart, no carpets should be allowed
- Doors to these isolation rooms should always be kept closed.
- Isolation rooms should have their own hand-washing sink, toilet, and bath facilities
- Infection control precautions should be indicated through appropriate signage on the door.
- Linen and PPE as needed should be stocked just outside the isolation room.
- Soap and alcohol-based hand rubs should be available in the wash area
- Biomedical waste disposal bags and touch-free bin should be placed in the isolation rooms.
- Sharp disposal container should be available inside the isolation room.
- Daily cleaning and disinfection of the isolation room/area is recommended.
- The isolation room should have an adequate stock of oseltamivir and other essential drugs.
- Non-critical patient-care equipment (e.g. stethoscope, thermometer, and sphygmomanometer) should be dedicated to the patient in the isolation room.
- Any patient-care equipment that is required for use by other patients should be thoroughly cleaned and disinfected prior to use.
- Basic life support equipment, ventilator, pulse oximeters, suction unit and portable X-ray equipment should be available in the isolation room/cohort areas.
- A checklist may be useful to ensure that all equipment is available.
- Isolation at the community level in the existing facilities for managing uncomplicated suspect/ probable cases of AI is recommended. This practice will avoid the need to shift patients over long distances

#### **Removal of the body from the isolation room/area**

- PPE should be used by the HCWs.

- The body should be fully sealed in an impermeable body bag prior to removal from the isolation room/area on prior to transfer to the mortuary.
- No leaking of body fluids should occur and the outside bag should be kept clean.
- After removing PPE, do hand washing.
- If the family of the patient wishes to touch the body, they may be allowed to do so. But if the patient died in the infectious period, the family should wear gloves and gowns and follow with hand hygiene.
- Transfer to mortuary should occur as soon as possible after death.
- Cultural sensitivity should be practiced when an AI patient dies. Dead body can be disposed in any cultural manners.

### **Safe handling of dead body**

- Mortuary staff should be informed in advance that the deceased had AI.
- If mortuary staff is handling an AI infected patient who died at home, full barrier PPE should be used while at home.
- In the mortuary, mortuary staff and the burial team should use standard precautions when caring for the body. This includes appropriate use of PPE and performance of hand hygiene to avoid unprotected contact with blood, body fluids, secretions, or excretions.
- The body in the body bag can be safely removed for storage in the mortuary, sent to the crematorium, or placed in a coffin for burial.
- If autopsy is being considered, the body may be held under refrigeration in the mortuary.
- Standard infection control precautions should be followed; there is no further risk of airborne or droplet spread of AI.
- If the family wants only to view the body and the face of the deceased, but not touch it, they may be allowed to do so. If the patient died in the infectious period, the family should wear gloves and gowns and perform hand hygiene.

# **Quarantine guidelines for avian Influenza**

**Department of Public Health  
Ministry of Health  
August 2010**

## **Introduction**

**Quarantine** refers to separation and restriction of movement of persons who have been exposed to AI cases but are not ill (or are considered to be at high risk of exposure)

The quarantine measures will depend on the disease pattern in the country. Three situations have been identified along with measures for quarantine that need to be followed:

1. Where avian influenza is suspected in birds/poultry
2. Where one or more human cases of avian influenza (as per standard case definition) have been reported;
3. Where human-to-human transmission has been established in a small cluster.

### **Quarantine where avian influenza is suspected in birds/poultry**

The following quarantine measures are recommended for human contact cases:

- Persons who had contact with dead poultry or handled poultry in the affected area should be advised to stay at home for 7 days from the date of last contact. They should be advised to monitor themselves for fever, cough and shortness of breath. They should be advised not to mix with other household members and to wash hand frequently.
- Those engaged in culling activities will be quarantined for a period of 10 days after the last culling.
- The health care providers working in the field and visiting the affected area would take necessary chemoprophylaxis before the visit. The team members would be quarantined in the defined geographical area for 10 days after the last exposure.
- Extensive IEC activities should be undertaken for proper enforcement of the above recommendations.

### **Where one or more human cases of Avian Influenza have been reported**

All action as per outbreak in birds/poultry should be undertaken in addition to the following measures.

- Place suspected cases in isolation and manage according to recommended procedures for infection control.
- Chemoprophylaxis should be given to all contacts of the cases.
- Strict adherence to infection control practices in the health setting.

### **Where human-to-human transmission has been suspected or established.**

In addition to above mentioned action the following measures should be undertaken. Some containment measures like social distancing and travel restriction should be taken.



## Health monitoring in the community during quarantine period

Most patients infected with the H5N1 virus show initial symptoms of fever (38°C or higher) followed by influenza like respiratory symptoms, including cough, running nose, sore throat and (less frequently) shortness of breath. Watery diarrhea is often present in the early stages of illness, and may precede respiratory symptoms by up to one week. Gastrointestinal symptoms (abdominal pain, vomiting) may occur and headache has also been reported.

- Check for these signs (especially fever) each day (morning and evening) during potential exposure and for 10 days after the last exposure.
- Communicate development of any symptoms to the medical officer.

### **Management of suspected cases**

- Place suspected cases in isolation and manage according to recommended procedures for infection control.
- Collect sample from suspected cases according to national guidelines and submit samples to regional or national laboratories for investigation

### **Advice about contact with poultry in an area with HPAI (*To be used in SoP for IC team on risk communication*)**

- Avoid handling (live or dead) chickens, ducks or any other poultry even if the bird looks healthy.
- Children should not be allowed to have contact with poultry or any other affected birds (live or dead).
- Avoid contact with chicken farms, duck farms or any farm where birds have been sick, killed or are thought to have bird flu.
- If a person comes into contact with an environment that has had sick/ dead chicken, ducks and other poultry products, he/she must wash hands properly. Monitor his/her temperature for minimum of seven days regularly. If he/she develops a high temperature, consult a doctor immediately.

**Rapid Containment Operation Protocol during outbreak of AI  
(H5N1)**

**Department of Public Health  
Ministry of Health  
August 2010**

## **Introduction**

Rapid containment is an extraordinary operation involving a group of activities intended to stop a potential development of Pandemic Influenza. The situation is considered extraordinary because of its global implications and also as it requires combined national and international response.

The rapid containment activities include the following:

- 1) A joint risk assessment by national authorities and WHO as to whether a local outbreak may be the first indication of an emerging influenza pandemic;
- 2) A decision by national authorities, in consultation with WHO, to begin containment measures; and
- 3) Application of both pharmaceutical and non-pharmaceutical interventions in potentially large populations to stop the spread of an emerging pandemic virus.

## **Purpose and scope**

This protocol broadly lays out "what" should be done and to a lesser extent, "how" the Containment operation would be undertaken.

## **Ethical considerations**

All measures employed during a containment operation should adhere to ethical principles set within a framework of international human rights.

## **The decision to launch a containment operation**

The decision to launch a containment operation should be under taken by the National Steering Committee based on the recommendation from National Incident Command Center.

Following factors are considered before launching the containment operation

## **Technical factors**

- *Virological*: Laboratory evidence of a novel virus will be critical. Certain aspects of such a virus, including whether it contains a mix of avian and human influenza virus genes or an increased number of mutations, may suggest newly advanced adaptation to humans.
- *Epidemiological*: Evidence of efficient and sustained human-to-human transmission (e.g. clustering of 5 or more cases closely related in time or space or two or more generations of transmission) is a second critical element. An epidemiological assessment that demonstrates sustained human-to-human transmission capable of supporting community level spread of the virus will strongly indicate the need to consider containment.

## **When to initiate containment: Key considerations**

- Novel influenza virus
- Influenza-like illness
- Sustained and efficient human-to-human transmission
- Limited spread of the novel virus
- Operational feasibility: Logistic, Security and Political
- Decision by national government with international assistance as needed

## **Conditions under which a rapid containment operation would not be initiated**

A decision to initiate a rapid pandemic containment operation might be deferred for several reasons, including the following:

- a novel influenza A virus could not be confirmed;
- it was not operationally feasible, including for security reasons, to rapidly implement pharmaceutical and non-pharmaceutical interventions at a level considered minimally acceptable;
- National authorities decide against supporting a containment operation;
- Evidence suggests that the novel influenza virus has already spread too far to make containment realistically feasible.

## **The containment strategy**

1. Identify the initial case (Index Cluster) as early as possible
2. Create a geographically defined containment zone around the cases where widespread anti-viral and non-pharmaceutical interventions should be used.

The Containment Zone should be the largest possible area that can be created and feasibly maintained and must be large enough to surround all known persons infected by pandemic influenza and as many of the people in frequent contact with them. While a circular Containment Zone is conceptually the simplest, the actual size and shape of the Containment Zone and the Buffer Zone is expected to be influenced by pragmatic considerations such as:

- known movements and geographical distribution of cases and contacts;
  - Important local or national administrative boundaries as well as important natural boundaries that may limit the movement of people;
  - infrastructure and essential services (e.g. power, water, sanitation, food supply, communications) considerations that may substantially affect the safety and health of people within the Containment or Buffer Zones
3. A Buffer Zone will be defined surrounding the Containment Zone. The Buffer Zone is an area where active and complete surveillance should be initiated to detect any possible cases of pandemic influenza.
  4. Follow-up of persons who have moved outside the Containment Zone: All possible measures should be taken to follow up persons who have left the containment zone before or after the start of the operation and who possibly could have come in contact with a person infected with AI (H5N1)

Once the Containment Zone and Buffer Zone have been identified the following Rapid Containment activities should be initiated.

#### **Activities in the Containment Zone**

1. Pharmaceutical Intervention (Anti-viral prophylaxis and treatment)
2. Perimeter control
3. Non-Pharmaceutical Intervention: a) Isolation b) Voluntary Quarantine c) Social distancing
4. Infection control measures
5. Surveillance
6. Laboratory testing
7. Assessment of the Novel virus
8. Management of contacts.

#### **Activities in the Buffer Zone**

1. Active and complete surveillance with laboratory testing of all suspect cases
2. Isolation and treatment of suspect cases
3. Antiviral prophylaxis and quarantine of contacts of suspect cases

#### **Activities in the Containment Zone**

##### **Pharmaceutical interventions**

***Antiviral prophylaxis strategy:*** All persons in the Containment Zone who are ill or not ill should be given 20 days of antiviral prophylaxis.

***Antiviral treatment:*** Cases presenting with influenza-like illness should be clinically managed by giving anti-viral for 5 days.

##### **Perimeter controls**

- All non-essential movement of persons in and out of the Containment Zone should be discouraged.
- Physical signs of the boundaries should be evident and clear.
- Clear entry and exit points should be identified.
- Exit screening procedures should be put into place at these points.

Exit screening procedures would include: ask about symptoms of influenza; close contact with someone with influenza; and received and took antiviral prophylaxis; Performing a visual screen for signs of influenza; Temperature measurement (e.g. thermal scanning or ear-temperature).

##### **Non-pharmaceutical interventions: Following measures should be implemented as part of the NPI**

1. Isolation of ill persons.
2. Voluntary quarantine of contacts.
3. Social distancing measures.

**Isolation of ill persons:** Isolation is the separation and restriction of movement or activities of ill persons to prevent disease transmission to persons who are not ill. Isolation could be done in a hospital or other designated sites.

**Voluntary quarantine of exposed persons:** Quarantine is the separation and restriction of movement or activities of persons who are not ill but have been exposed to an infectious agent to prevent further transmission of disease. It can be applied at the individual, group or community level using individual homes or designated facilities.

**Social distancing:** This measure is expected to reduce further the risk of people getting infected and transmitting the disease to healthy individuals. Some of the social distancing measures that may be considered are closing schools, cancellation of mass gatherings and public events; closing workplaces or having non-essential workers stay at home; staggering work hours or access to market places; minimizing use of public transportation.

**Infection control measures in the containment zone:** Hand Hygiene, Cough etiquette, avoiding close contacts, use of face masks, disposal of sputums, disposal of dead bodies.  
(Refer *Infection control Guideline on AI*)

### **Surveillance**

Surveillance in the Containment Zone is needed to identify suspect cases of pandemic influenza. Surveillance will include

- 1) laboratory confirmation or exclude persons as cases of pandemic influenza;
- 2) monitor the evolution of the outbreak;
- 3) evaluate the effectiveness of the containment operation; and
- 4) help guide decisions to modify, continue or end the containment operation.  
Active surveillance should be carried out and some times both active and passive surveillance system should be instituted.

### **Laboratory testing and preparedness**

Laboratory testing of all suspect cases is preferable, but may not be possible if there are large numbers of persons with an influenza-like illness. As patient numbers increase, it may be necessary to develop a sampling scheme. Once antiviral prophylaxis in the Containment Zone has ended, laboratory confirmation of any possible cases will be required.

### **Management of contacts:**

In the initial phase of RC all close contact of index case has to be identified and quarantined/Isolated. But once the Pharmaceutical and Non-pharmaceutical intervention are implemented through out the containment zone contact tracing should be discontinued. Once widespread antiviral prophylaxis in the Containment Zone has ended, contacts of any suspect cases should be traced, placed in voluntary home quarantine and given antiviral prophylaxis while laboratory testing is pending for the possible case.

## **Communication in Rapid Containment:**

The objectives of an effective communications response during rapid containment are :

- To provide the best information available in a timely and easily understood fashion;
- To promote compliance with containment measures, identify barriers and facilitating factors to compliance, and adapt approaches to the local context through a policy of transparent communication:
- Instill and maintain Public Confidence, prepare for a possible pandemic

## **Activities in the Buffer Zone:**

1. Active and complete surveillance with laboratory testing of all suspect cases
2. Isolation and treatment of suspect cases
3. Antiviral prophylaxis and quarantine of contacts of suspect cases

## **Surveillance and laboratory testing:**

The purpose of the Buffer Zone is to conduct Active and complete surveillance in a well defined area where new cases of pandemic influenza are likely to appear. It will guide about the effectiveness of the containment operation and helps to decide whether to modify, continue or end the containment operation.

## **Management of suspect cases and contacts**

Persons who develop an influenza-like illness in the Buffer Zone should be isolated pending the outcome of laboratory testing. Depending on the clinical severity of illness, such persons should be isolated at home or be admitted to a hospital. Early treatment with anti-viral should be initiated before the result of laboratory testing for the emerging virus.

## **Perimeter controls and non-pharmaceutical interventions**

Persons in the Buffer Zone would be restricted from entering the Containment Zone as described previously. However, there would be no restrictions on transit out of the Buffer Zone. Other NPIs, apart from the management of suspect cases and their contacts, would not be implemented.

## **Duration of the containment operation**

The duration of the containment operation will depend to a large extent on how quickly, comprehensively and effectively the pharmaceutical and non-pharmaceutical measures were implemented after early recognition of the Index Cluster of cases. For planning purposes a minimum of 4–5 weeks for the containment operation may be required.

- Administration of antiviral prophylaxis for a total of 20 days in the Containment Zone.
- Continuation of NPIs in the Containment Zone for an additional 7–14 days (i.e. 1–2 estimated incubation periods) after completion of antiviral prophylaxis.
- Continued maintenance of the Containment Zone perimeter will be essential until the containment operation is formally ended.

- If containment is successful, enhanced surveillance should be maintained in the Containment and Buffer Zones and probably extended beyond these geographical areas for at least a few months after the containment operation has formally ended.



# **Guideline for use of Personal Protective Equipment**

**Department of Public Health  
Ministry of Health  
August 2010**

## **Rationale**

Personal Protective Equipment consists of specialized clothing or equipment worn by health workers and personnel involved in disease control activities. It is an integral part of routine infection control practice and it is an important component of prevention and control activities. Compliance with the use of PPE and recommended infection control precautions is critical to prevent the transmission of the pathogens. This is also critical in the event of Highly Pathogenic Avian Influenza disease outbreak, in protecting personnel involved in carrying out disease control measures.

### **Scope:**

This document gives guideline to the use of PPE in an appropriate manner. In the event of a pandemic, the availability and appropriate use of PPE is critical in protecting the personnel involved. Disposable PPE should be used whenever possible, because the virus can remain infectious on garments for long periods of time and once used PPE should not be reused.

### **User:**

PPE should be used by:

- All personnel involved in active disease control measures (Outbreak Investigation Team, Field Medical Team).
- All those who are handling infected or suspected to be infected poultry and poultry products. These include cullers and animal husbandry/veterinary staff.
- All doctors, nurses and health care workers who provide direct patient care to avian influenza cases
- All support staff including medical aides, X-ray technicians, cleaners, transport staff, laundry staff
- All laboratory staff who handle specimens from suspect , probable or confirmed cases
- Family members who care for avian influenza patients
- The patient(s) should wear a mask (N95 preferable) when other people are in the isolation area.
- Contacts and travelers during home isolation/quarantine must wear a mask (N95 preferable).
- Personnel handling dead bodies infected with AI

## **Personal Protective Equipment**

The items included are:

- Respirator/Masks (N-95)
- Gloves
- Coveralls / Gowns
- Aprons (Water resistant)
- Hair Covers/Cap
- Face shield/Goggles

- Boots or shoe covers
- Disposable bag
- Alcohol rub

## How to use the PPEs

The following steps are reemphasized:

1. Put on a fluid-resistant coveralls/gown

**Coveralls:** Put on coveralls first. Step into the “feet” of the coveralls first, and pull them up. Zip up the front of the coveralls.

**Gowns:** Put on the “Sleeve” of the gown first, and pull them to back. Tie on the knot at the back. You should keep your regular clothing and shoes on under the coveralls.



1. **Shoe cover:** Put on shoe covers second. They should fit over your coverall feet, giving you another layer of protection to protect your shoes from contamination.
2. **Put on disposable particulate respirator/mask:** Put the respirator under your chin with the nosepiece up. Pull the bottom strap over your head, and place it around your neck below the ears. Then pull the top strap over your head and rest it high at the top back of your head.  
**Perform user seal check of particulate respirator:** Place your fingertips from both hands at the top of the metal nosepiece. Using two hands mold the nose area to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece.



3. **Use face shield or goggles:** Put on the face shield/Goggles and then pull coverall hood/cap/hair cover over the head, the elastic should hold it in place.



4. **Aprons:** Aprons are provided to fit over the coveralls. They are in a small packet that you will open up, place the apron over. The aprons will protect against splashes and prevent wetting your coverall.



5. Put on gloves (make sure gloves cover cuffs of gown sleeves)
6. Shut the door after entering / leaving ante room (In the health facilities)
7. After performing the procedure, leave the isolation room/area or ante room and observe the following steps:

Procedure to remove the PPE:

1. Remove gloves and discard in biomedical waste bin/bio-hazard plastic bag



2. Perform hand hygiene, preferably with an alcohol-based hand rub or soap and water
3. Remove and dispose off the apron in the waste bin/biohazard bag
4. **Gown:** Un-tie the knot at the back of the gown and remove it inside out. Dispose it off in the waste bag/bin.  
**Overall:** Unzip and roll down your coverall until it is inside-out, and then step out of it. Place the used coveralls into the biohazard bag.
5. Remove and discard the boot cover. Do hand hygiene with the alcohol rub or soap and water
6. Remove hair cover and discard in biomedical waste bin



7. Remove protective eyewear and discard in biomedical waste bin



8. Remove medical mask or particulate respirator by grasping elastic band. Do not touch front of particulate respirator (fronts of masks may be contaminated) and discard in biomedical waste bin





9. Perform hand hygiene preferably with an alcohol-based hand rub or soap and water



**Note:** Before you begin putting on your PPE, it is important to designate a clean location to put on the equipment, preferably away from anything that could be contaminated with infectious materials. Wash your hands with soap and water before you begin, and remove watches and other non-smooth jewelry like bracelets.

#### **How to Wash Your Hands Correctly**

- Wet your hands with water and apply soap. Use clean, running water.
- Rub hands together to make lather and scrub all surfaces.
- Continue rubbing hands for 20 seconds.
- Rinse hands well under running water
- Air dry your hands, or use towel.

#### **When to Wash Your Hands While Using PPE**

- Before putting on your PPE

- Before putting on your gloves or respirator again after taking a work break
- Before and after changing your respirator
- After taking off your gloves and the rest of your PPE, and placing them in the waste bag
- Any other time your ungloved hands have come into contact with potentially infected and suspected cases, equipment or surfaces.

## **Key points to remember about PPE**

- Put on the PPEs before contact with the patient, generally before entering the room
- For respirator : If you can, do a fit test to make sure no particles can get through
- Use carefully : don't spread contamination, limit surfaces and items touch
- Keep gloved hands away from face
- Avoid touching or adjusting other PPE
- Remove gloves if they become torn; perform hand hygiene before new gloves
- Remove and discard PPE carefully, either at the doorway or immediately outside patient room; remove respirator outside room
- All of the PPEs supplied are disposable and are designed for use one time only.
- None of the supplied PPEs should be reused or washed for reuse – reuse could result in infection of you or someone else.
- Do not use, or provide N-95 respirators to others, without instruction on the health risks associated with them. For example, workers with poor lung function may not be able to wear these respirators.
- N-95 respirators should not be hung around your neck when working, always wear them when working.
- A designated area for putting on PPEs should be identified and all personnel should use this area to put on their PPEs. This should ideally be in a clean area outside/away from isolation room or birds or any other potentially contaminated area and equipment.
- A designated area for removal of PPEs should be identified and all personnel should use this area to remove their PPEs.
- Use of PPEs can sometimes make the job more difficult to accomplish because they can be cumbersome, hot, or uncomfortable. However, PPEs are necessary to prevent from becoming infected or from spreading the virus.



# Avian Influenza (H5N1)

LAB. No: \_\_\_\_\_

## Laboratory Investigation Form

Name of Health facility: \_\_\_\_\_ Date: \_\_\_\_\_ (dd/mm/yy)

### 1. Patient Information

1.1. Name of Patient : \_\_\_\_\_ 1.2. Age/Sex: \_\_\_\_\_  
 1.3. Occupation : \_\_\_\_\_ 1.4. Contact # : \_\_\_\_\_ (Mobile) \_\_\_\_\_ (Phone)  
 1.5. Present Address: \_\_\_\_\_ Village/City \_\_\_\_\_ Geog. \_\_\_\_\_ Dzonkhag.  
 1.6. Permanent Address: \_\_\_\_\_ Village/City \_\_\_\_\_ Geog. \_\_\_\_\_ Dzonkhag.

### 2. Laboratory test request (tick appropriate ones)

2.1. Types of samples

Sample	√	Sample	√	Sample	√
Nasal Swab		Nasopharyngel swab		Blood/Serum	
Throat swab		Nasopharyngeal Aspirate		Others (Specify) :	

2.2. Date of sample collection: \_\_\_\_\_ (dd/mm/yy)

2.3. Laboratory test requested :

Tests	√	Test	√	Test	√
CBC		LFT		Immunofluorescent Antibody test	
DLC		RFT		Real Time RT PCR	
TLC		Rapid Test for Influenza (A &B)		Others (Specify)	

2.4. Test requested by :  
 Name: \_\_\_\_\_ Designation: \_\_\_\_\_ Contact #: \_\_\_\_\_

### 3. Laboratory test result (attach result separately if available)

3.1. Date of Tests: \_\_\_\_\_ (dd/mm/yy)

Test	Result	Test	Result	Test	Result
CBC		LFT		Immunofluorescent Antibody test	
DLC		RFT		Real Time RT PCR	
TLC		Rapid Test for Influenza (A &B)		Others (Specify)	

3.2. Sample tested by:  
 Name 1 : \_\_\_\_\_ Designation: \_\_\_\_\_ Initial: \_\_\_\_\_  
 Name 2 : \_\_\_\_\_ Designation: \_\_\_\_\_ Initial: \_\_\_\_\_

## **Title: Standard Operating Procedure for HPAI Surveillance**

Surveillance is continuous and systematic process of collection, analysis, interpretation and dissemination of descriptive information for monitoring health problems.

Surveillance is a key component in the emergency preparedness against this exotic disease, and plays a major role in an early warning system in case of its introduction to Bhutan. It also provides early information on the probable emergence of the HPAI virus in the country.

### **Purpose:**

- The installation of an early warning system (Early detection of exotic or emerging disease like HPAI)
- To understand the epidemiology and ecology of AI as well as its socioeconomic impact.
- To help design effective disease (HPAI) control programmes.
- To assess the temporal and spatial patterns and thereby to improve the effectiveness of control efforts.
- To demonstrate freedom from clinical disease and absence of infection in a country.
- To evaluate the existing disease control programmes.

### **Existing provisions and structure in Bhutan**

The statutory provisions and the veterinary structure for HPAI surveillance in Bhutan comprises the following:

- HPAI is a notifiable disease in Bhutan
- The Government Veterinary Service has a formal system of detecting the disease through a network of National Centre for Animal Health, 4 Regional Veterinary Laboratories, 3 Satellite Veterinary Laboratories, 20 Dzongkhag Veterinary Hospital and 139 Livestock Extension centers/RNR extension centers.
- NCAH has the laboratory capability to diagnose H5/H7 and is in the process of establishing virus isolation & PCR diagnostic capability
- Surveillance and investigation data on HPAI are analyzed and maintained at national level in the National Centre for Animal Health

### **Existing Reporting system**

Reporting of any suspicious cases of HPAI should be done by all poultry farm owners, LECs /RNR EC and Dzongkhag Veterinary Hospital within 24 hours by the fastest means of communication. The Ministry of Agriculture maintains two toll free hotlines; 124 for reporting any suspected cases of avian influenza and enquiries about the disease and 155 for enquiry on illegal movement of poultry and poultry products and to report illegal trade of the same.

All LECs /RNR EC and DVH are mandated to send weekly reports to their Regional Veterinary Laboratory and NCAH and any suspected cases/trigger signs in poultry requires immediate investigation and response. Weekly reports for the whole country are posted on the MoA website ([www.moa.gov.bt/birdflu](http://www.moa.gov.bt/birdflu)).

The Ministry of Health should be informed of all suspected outbreaks and this sharing of outbreak information shall take place at all administration levels; RNR Centres will share the information with the local BHU, district staff of Department of Livestock will share information with the District Medical Officer and the Department of Livestock and BAFRA will share information with the Department of Public Health. The two Ministries have already identified the focal persons at the national level for such collaboration.

**a) Geog/village level**

The livestock owners are to be made aware that even a mere suspicion of the disease should be reported. Farmer/owner reports verbally by himself or appointed messenger (legislation requirement) to the Gup/Mangmae/Choepoen (village leaders) or Extensin agents.

**b) LEC or RNR centre level**

Extension agent then reports by the fastest means; special messenger, fax, telephone, wireless, e-mail, etc in the Flash report **Form 6B** to the DLO(RVL and NCAH)

**c) Dzongkhag level**

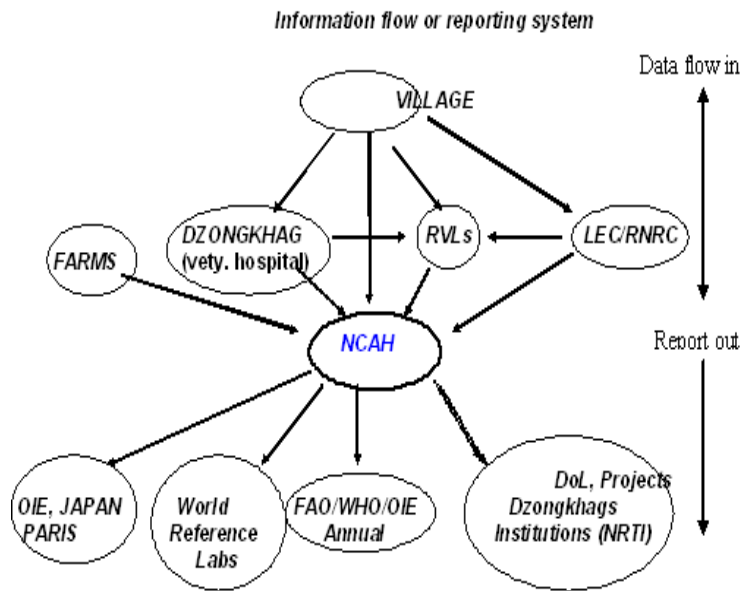
Once the report reaches District Livestock Officer or District Veterinary Officer, he/she in turn should inform RVL with copy to NCAH

**RVL level**

Compiles and analyses for the regional level and forwards to NCAH/ Department.

**d) NCAH level**

NCAH analyses the data for the national level and reports to the Department/Ministry, other stakeholders and to the International organizations. The feedback reports should be sent to the RVL, Dzongkhags and LECs.



**Scope:** This SOP covers the surveillance guidelines during preventive, outbreak and post outbreak phase

**User/Target:**

- Veterinarians, Laboratory technician and field para-vet

**Surveillance Team composition:**

- Veterinary epidemiologist and/or RVOs of RLDCs (Supervisor)
- Veterinary Officers from NCAH, RLDCs, DVLs under DoL and BAFRA; Laboratory technicians; field staff.

**Materials and Equipment**

- Questionnaires/ survey forms
- Note pad and pen
- Mobility
- Communication facilities-mobile and hand set
- Sampling kits – swabs, needle, syringes, permanent marker pen, sample submission forms, appendrop tubes, faecal vials, transport media, cotton, antiseptics, face mask, gloves, soap, apron.
- Diagnostic kits – rapid antigen diagnostic kits, HA/HI test kits.
- GPS
- Village and geog coordinates.
- Poultry population figures.
- Duck population
- Information on wild bird habitats.
- Laptop with relevant statistical packages.
- Extension gears – tent, sleeping gears, rain coat./ umbrella, cap, torch, walking boot etc.
- Fund

**Steps for surveillance:**

**I. Surveillance during the prevention phase**

Surveillance during preventive phase comprises of clinical and laboratory surveillance in the all the Dzongkhags with intensive programs in **high risk areas/Dzongkhags** and when there is imminent threat of HPAI virus incursion. The High risk Dzongkhags includes Samtse, Chukha, Sarpang, Samdrup-Jongkha; parts of Zhemgang, Pemagatshel & Dagana.

The Nationally organized program through VVT members & Field staff should carry out the surveillance.

### **1. Clinical disease surveillance:**

Clinical surveillance is aimed at detection of clinical signs of HPAI at the flock level. Surveillance based on clinical inspection is particularly relevant for HPAI because the infection is characterized by very high mortality rates in terrestrial poultry.

The following trigger points may provide guidance in suspecting an AI infection.

- Sudden deaths of birds with severe depression, loss of appetite, nervous signs, watery diarrhoea, severe respiratory signs and/or a drastic drop in egg production.
- Presence of facial subcutaneous oedema, swollen and cyanotic combs and wattles
- In organized farm if the daily mortality is  $>2\%$  for 2 consecutive days;
- In village-based smallholder and backyard farms, if daily mortality is  $\geq 5\%$  for 2 consecutive days in a village,
- A reduction of food and water consumption by 20% for three consecutive days
- Weekly reporting (early warning system): The field staff should report the clinical disease surveillance report to the RVL/NCAH on weekly basis (every Tuesday). Focal persons in each village who will also report any suspected cases to the field staff as well as act as contact point for reporting and dissemination of information to the farmers in the villages.
- Detail investigation will be carried out if there are any unusual mortality of poultry and wild birds in the farms/villages
- In any suspicious situation, it is important that not only an AI infection is ruled out but also a definite diagnosis is made of the cause of the problem.
- Any rumour or report of any suspicious death of a poultry or wild birds by the media or general public should be investigated to verify authenticity of the rumour (rumour surveillance)

### **2. Laboratory surveillance**

- Surveillance activities, both clinical and laboratory testing are to be carried out on a regular basis. Although clinical surveillance should be a daily farm routine, purposive sampling and laboratory testing is expected to be carried out at least once in every six months on regular basis.
- When the outbreak occurs in neighboring countries such as India (West Bengal, Assam, Arunachal Pradesh and Sikkim); Nepal, Bangladesh and China targeted laboratory surveillance in high risk Dzongkhags should be done on monthly basis
- Differential diagnosis should be made against the following diseases: Newcastle disease, IBD; fowl cholera; acute poisoning; or Misadventure causing high mortality (e.g. smothering, heat stress, dehydration, etc).
- Cloacal and/ or tracheal swabs from sick and dead birds should be subjected to rapid antigen detection tests in the field level. In case of positive cases on rapid antigen

detection test samples should be referred to NCAH for HA/HI tests. In case of high clinical suspicion, even the negative samples should be referred to NCAH and/ or other international reference laboratory (*refer SOPs for Rapid Antigen Detection tests*).

- Environmental samples like fecal should also be examined for presence for AI virus (refer SOP)

### 3. Targeted surveillance

Targeted surveillance is recommended in view of the cost and resources in the country. This is a minimum standard that can be exceeded by targeted sampling of premises at high risk of having HPAI virus, as opposed to randomly selecting premises for sampling.

#### 3.1 Surveillance in domestic waterfowls

Ducks play an important role in maintaining AI infection and transmitting it to other poultry species and should be serologically screened to assess whether these birds have been exposed to H5, H7 or H9 virus. Though duck farming is not popular in Bhutan, sizeable duck populations are found in the villages in Southern Dzongkhags.

<b>Locations</b>	Duck rearing areas in the Southern parts of the country.
<b>Type of bird</b>	Domestic water bird like duck, geese etc
<b>Type of sample</b>	Tracheal/Cloacal swabs/ wet droppings
<b>Collection by</b>	VVT, RLDC, NCAH
<b>Period of collection</b>	Two times a year (based on risk assessment and disease situation in the neighboring countries)
<b>Sample size</b>	Sample size will be calculated to give 95% probability of detecting infection at expected prevalence of one percent).
<b>Laboratory testing</b>	Rapid antigen detection test for the time being; Virus isolation followed by HA/HI test shall be done once laboratory facilities is established at NCAH.

#### 3.2 Backyard poultry in the vicinity of migratory bird locations

Backyard poultry reared in the vicinity of migratory bird locations can easily come in contact with exotic birds. Contaminated water reservoirs could play a vital role in transmitting the infection to local birds.

<b>Locations</b>	Areas in the vicinity of Migratory Bird locations (Phobji kha, Bumdeling, Bumthang, river basins(Chamkhar chu ;Puna Tshangchu ; Sunkosh etc)
<b>Type of bird</b>	All poultry such as chicken, duck, geese etc.
<b>Type of sample</b>	Tracheal/Cloacal swabs/ wet droppings
<b>Collection by</b>	VVT, RLDC, NCAH
<b>Period of collection</b>	During the time of bird migration
<b>Sample size</b>	Sample size will be calculated to give 95% probability of detecting infection at expected prevalence of one percent.
<b>Laboratory testing</b>	Rapid antigen detection test for the time being; Virus isolation followed by HA/HI test shall be done once laboratory facilities is established at NCAH.

#### 3.3 Surveillance of wild birds/migratory birds

The role of migratory birds in spreading AI has now become important. Currently available epidemiological data suggest that wild migratory waterfowl are most likely to play a role in the AI cycle and could be the initial source of the AI virus into a country. Surveillance shall involve collection of fecal materials, dead carcasses and investigation of dead wild birds.

<b>Locations</b>	Habitats of the migratory wild
<b>Type of bird</b>	Black necked cranes in the Phobjikha and Bomdeling valleys, ruddy shelduck throughout Bhutan, egrets, black storks, fish eagles, white and grey bellied herons and, cormorants in southern parts of the country, and crows and pigeons.
<b>Type of sample</b>	Tracheal/Cloacal swabs/ wet droppings
<b>Collection by</b>	VVT, RLDC, NCAH
<b>Period of collection</b>	During the time of bird migration
<b>Sample size</b>	Sample size will be calculated to give 95% probability of detecting infection at expected prevalence of one percent.
<b>Laboratory testing</b>	Rapid antigen detection test for the time being; Virus isolation followed by HA/HI test shall be done once laboratory facilities is established at NCAH.

*Note: Since there are about 40 species of birds migrating to Bhutan, there is a need to establish digital maps showing spatial and seasonal distributions of migratory water bird and staging patterns.*

### 3.4 Surveillance of domestic chickens in high risk places

With the outbreak of HPAI in neighboring countries (India; Nepal, Bangladesh, China etc) Bhutan's AI free status is at continuous threat. Threat is more in those Dzongkhags that shares border with Indiar in the south, west and east. As such disease surveillance should be carried out in commercial, semi-commercial, back yard farms and village chickens in these vulnerable Dzongkhags.

<b>Locations</b>	High risk Dzongkhags (Samtse, Chukha, Sarpang, Samdrup-Jongkha; parts of Zhemgang, Pemagatshel & Dagana).
<b>Type of bird</b>	Layer and broilers, pullets, chick
<b>Type of sample</b>	Tracheal, Cloacal swabs
<b>Collection by</b>	VVT, RLDC, NCAH
<b>Period of collection</b>	Two times a year (based on risk assessment and disease situation in the neighboring countries).
<b>Sample size</b>	Sample size will be calculated to give 95% probability of detecting infection at expected prevalence of one percent.
<b>Laboratory testing</b>	Rapid antigen detection test for the time being; Virus isolation followed by HA/HI test shall be done once laboratory facilities is established at NCAH.

### 3.5 Poultry breeding farms and imported stock

There are only few government run and private breeding farms in operation in the country. Though disease monitoring and surveillance are carried out effectively in these farms, the routine surveillance should be carried out regularly.

#### *Testing of breeding stock in the farm*

<b>Locations</b>	Government and private breeding farms
<b>Type of bird</b>	Parent stock, pullets, chicks etc.
<b>Type of sample</b>	Tracheal, Cloacal swabs, wet droppings
<b>Collection by</b>	VVT, RLDC, NCAH, BAFRA
<b>Period of collection</b>	Two times a year (based on risk assessment and disease situation in the neighboring countries).
<b>Sample size</b>	Sample size will be calculated to give 95% probability of detecting infection at expected prevalence of one percent.
<b>Laboratory testing</b>	Rapid antigen detection test for the time being; Virus isolation followed by HA/HI test shall be done once laboratory facilities are established at NCAH.

#### ***Testing of day old parent/grand-parent chicks on arrival and on- farm quarantine***

In addition to surveillance in the breeding farms wet droppings have to be collected by the animal quarantine staff (BAFRA) from the imported parent/ grandparent chicks and tested for the presence AI virus.

<b>Locations</b>	Designated farm or quarantine station
<b>Type of bird</b>	Day old parent/grand-parent chicks on arrival
<b>Type of sample</b>	Wet droppings
<b>Collection by</b>	Animal quarantine staff
<b>Period of collection</b>	Two times a year (based on risk assessment and disease situation in the neighboring countries).
<b>Sample size</b>	Sample size will be calculated to give 95% probability of detecting infection at expected prevalence of one percent.
<b>Laboratory testing</b>	Rapid antigen detection test for the time being; Virus isolation followed by HA/HI test shall be done once laboratory facilities is established at NCAH.

Day old birds imported from non-infected countries where vaccination against AI is practiced will be serologically screened before they reach the age of four weeks.

#### ***Testing of specified consignments(DOCs) during on-farm quarantine***

<b>Locations</b>	Designated farm or quarantine station
<b>Type of bird</b>	Day old chicks
<b>Type of sample</b>	Wet droppings
<b>Collection by</b>	Animal quarantine staff (BAFRA)
<b>Period of collection</b>	As and when DOCs are imported
<b>Sample size</b>	Sample size will be calculated to give 95% probability of detecting infection at expected prevalence of one percent.
<b>Laboratory testing</b>	Rapid antigen detection test for the time being; Virus isolation followed by HA/HI test shall be done once laboratory facilities is established at NCAH.

### **3.6 Surveillance at poultry processing establishments (slaughter house)**

- Surveillance is to be undertaken in the entire large-scale and selected medium-scale processing establishment.



- Cloacal swab/wet droppings from broilers should be collected randomly and tested for AI virus.

### **3.7 Surveillance at border check post**

Since Bhutan share long open border with international border in the south and with free movement of people, vehicle etc; it is important to be highly vigilant at the border check post. BAFRA Border Control Team should carry out the following activities to prevent introduction of HPAI virus into the country.

- Stringent vigilance at the border by BAFRA officials;
- Inspection of all transport vehicles carrying live poultry or poultry products (if dead birds are detected, collect cloacal or tracheal swabs for laboratory testing);
- Inspection and quarantine of imported birds, pet or game birds;
- Disinfection of vehicle and people coming from suspected infected places.

### **3.8 Inspection of live bird markets**

Live bird markets play an important role in the spread of the disease. All live markets at the border towns in Bhutan have been officially banned.

- Cage swabs (swabs of fresh faecal material from cages used to hold birds in markets) should be collected and tested if live markets start up again.
- Sample from pet/game birds should be collected and screened for HPAI virus.

## **II. Surveillance Standards for Highly Pathogenic Avian Influenza (HPAI) in the Protection and Surveillance Zone (during outbreak and post outbreak phase)**

Surveillance zone should be declared within 10 km radius from infected foci based on epidemiological risk assessment and geographical settings. Intensive surveillance should be carried out to prevent further spread of the disease from infected premises and prepare for demonstration of freedom from infection.

The main goal of surveillance in the surveillance zone is to sample enough premises to produce a 95 percent certainty (confidence) that at least one positive premises will be detected in the sample population, if at least 1 percent of the premises in the surveillance area have a bird(s) shedding HPAI virus at the time of sampling (that is, 95 percent confidence at a 1 percent prevalence).

### **Purpose:**

- To assess the spread of disease from the infected premises and protected zone
- To evaluate the disease control measures in the proted zone.
- To demonstrate freedom from clinical disease and absence of infection in a country.

**Scope:** This SOP covers the surveillance guidelines during the outbreak and post outbreak phase in the surveillance zone

### **User/Target:**

- Veterinarians, Laboratory technician and field para-vets

**Surveillance Team composition:**

- Veterinary epidemiologist and/or RVOs of RLDCs (Supervisor)
- Veterinary Officers from NCAH, RLDCs, DVLs under DoL and BAFRA; Laboratory technicians; field staff.

**Materials and Equipment –refer above in section.....**

- Questionnaires/ survey forms
- Note pad and pen
- Mobility
- Communication facilities-mobile and hand set
- Sampling kits – swabs, needle, syringes, permanent marker pen, sample submission forms, appendrop tubes, faecal vials, transport media, cotton, antiseptics, face mask, gloves, soap, apron.
- Diagnostic kits – rapid antigen diagnostic kits, HA/HI test kits.
- GPS
- Village and geog coordinates.
- Poultry population figures.
- Duck population
- Information on wild bird habitats.
- Laptop with relevant statistical packages.
- Extension gears – tent, sleeping gears, rain coat./ umbrella, cap, torch, walking boot etc.
- Fund

**Steps and activities in the protection and surveillance zone after AI outbreak**

Active clinical, virological and serological surveillance should be conducted in the protection and surveillance zone to prevent further spread of the disease/infection and to maintain freedom status after the outbreak. It is appropriate to target clinical *surveillance* at particular species likely to exhibit clear clinical signs (e.g. chickens). Similarly, virological and serological testing could be targeted to species that may not show clinical signs (e.g. ducks).

Intensive surveillance should be carried out until 6 weeks of the last stamping out date and satisfactory completion of sanitary measures. In addition routine surveillance should be carried out on regular basis there on.

- 1. Formation of surveillance team and planning the response among team members**
  - Bring the team together
  - Discuss each person's roles and responsibilities
- 2. Arrangement of materials and logistics (refer materials and equipment requirement)**
- 3. Inventory of premises rearing poultry in the surveillance zone.**

- This includes name of villages/premises, total number of households owning poultry, total number of commercial, semi-commercial, backyard and village chicken and duck/geese in the premises/locality, infrastructure facilities in the premises etc.

#### **4. *Number of premises to be sampled***

- The goal of surveillance in the surveillance zone is to sample enough villages or HHs to produce a 95 percent certainty (confidence) that at least one positive premises or HHs will be detected in the sample population, if at least 1 percent of the premises or HHs in the surveillance zone have a bird(s) shedding HPAI virus at the time of sampling (that is, 95 percent confidence at a 1 percent prevalence).

#### **5. *Selection of Premises for Sampling***

- Premises at high risk of having or spreading HPAI virus should be specifically targeted for the highest level of active surveillance. Factors that contribute to a premises being considered high risk may include:
  - high likelihood, or a reported history, of birds moving onto or off of the infected premises or protection zone;
  - presence of large number of loose chickens in the village;
  - history of having sick birds, even if HPAI virus has never previously been detected
  - Premises that were previously depopulated but later repopulated etc.

#### **6. *Selecting birds for Sampling***

- The following “priority categories” of birds should be selected for sampling in the order given below. Whenever possible, at least one sample should be taken from every category of bird present on premises or from each HHs in premises.
- **Priority 1:** Sick birds – all birds on the premises should be visually examined; any birds that appear ill or lethargic should be sampled
- **Priority 2:** Other chickens
- **Priority 3:** Other poultry (doves, pigeons, ducks, geese, swans)
- **Priority 4:** Birds exposed to poultry – includes pet birds or other birds on premises where poultry is present.

When sampling birds within the above priority categories, the following “high priority types” of birds should be selected first.

- Newly introduced birds – select birds moved onto the premises most recently, especially those introduced in the last six weeks.

- Loose /free grazing birds – select loose birds prior to caged birds or other birds whose movements are restricted in some way.
- Young birds – select younger birds prior to older birds, but all age groups should be sampled to some extent.

#### **7. *Sample Collection Procedure***

- For each bird selected for sampling, a sterile swab should be used to swab the cloaca. If birds on a premises show signs of HPAI, such as severe depression, inappetence, drastic decline in egg production, facial edema with swollen and cyanotic combs and wattles petechial hemorrhages on internal membrane surfaces, sudden death, it may be prudent to forego cloacal swabbing and submit either recently dead and/or euthanized birds directly to the laboratory.

#### **8. *Testing of Surveillance Samples***

Virological *surveillance* using rapid antigen detection test (at the field level), virus isolation followed by HA/HI test and RT-PCR tests should be conducted:

- to monitor at risk populations;
- to confirm clinically suspect cases;
- to follow up positive serological results;
- to test ‘normal’ daily mortality, to ensure early detection of *infection in establishments* epidemiologically linked to an *outbreak*.

### **III. Surveillance to demonstrate freedom from HPAI virus infection**

All the member states of OIE have a responsibility to notify an outbreak of Highly Pathogenic Avian Influenza to OIE through immediate notification system. Declaration of ‘Disease Free Status’ will be after 90 days on non-occurrence of disease through intensive surveillance. In order to demonstrate absence of infection in preceding 12 months in susceptible poultry population requires the support of a *laboratory* able to undertake identification of AI infection through virus detection and antibody tests.

#### **Case definition:**

Absence of antibody and virus through antibody tests and virus detection tests.

#### **Materials and equipment required**

- Swabs (tracheal, cloacal)
- Faecal swabs
- Serum
- Lab. Submission forms
- Laboratory techniques
- Rapid Antigen Detection diagnostic kits
- HA/ HI
- ELISA

- RT-PCR
- Statistical software

**Team composition:**

- Sample collection
- Vets, paravets
- Laboratory analysis
  - Lab. Technologist at NVRL.
- Data Management
  - Epidemiology Unit
- Data analysis
  - National Epidemiologist with the help of Statistician

**Surveillance area:**

Targeted or prevalence directed sampling will be done in following areas:

- Poultry farm/birds in previously infected places
- Sentinel birds/Restocked birds
- Poultry farms/bird in the high risk areas (Samdrup Jongkhar, Sarpang, Chukha, Samtse, bordering geogs of Dagana, Pema gatshel, districts bordering India).
- Farms with poor biosecurity measures in place.
- Roosting ground of migratory birds.
- Places with high water bird population
- Farms/premises that utilize contaminated water

**Surveillance period:**

Intensive surveillance should be carried out to prevent further spread of the disease from infected premises and prepare for demonstration of freedom from infection. Declaration of ‘Disease Free Status’ will be after 90 days on non-occurrence of disease. This should be followed by an active surveillance to demonstrate freedom from infection in preceding 12 months.

**Sampling methods.**

- Multi-stage sampling
  - First sampling frame is villages (simple random sampling).
  - Second sampling frame is the household/ farms (SRS).
- Stratified random sampling of birds
  - Water fowls/ Ducks; domestic chicken; commercial flocks & wild migratory water fowls).
  - Proportion of samples for each stratum will be decided after more consultation.

**Sample size**

Sample size will be calculated to detect 1% prevalence of positive flocks at 95 % CI at 5% significance level.

**Sample type**

Cloacal/tracheal/wet droppings/serum will be collected from different species of birds in different location as described above

**Laboratory testing:**

Rapid antigen detection test in the field; Virus isolation followed by HA/HI test and RT-PCR, ELISA test shall be done to prove absence of infection.

**Report**

Reports will be submitted OIE to gain disease freedom status.

**Reference:**

Sri Lanka Exotic disease Emergency Plan (SEDEP) 2005/2006 HIGHLY PATHOGENIC AVIAN INFLUENZA CONTROL PROGRAMME

SOP Highly Pathogenic Avian Influenza (HPAI) Task Force-USDA

OIE Terrestrial Animal Health Code C H A P T E R 1 0 . 4 . A V I A N I N F L U E N Z A Article 10.4.1.

AUSTRALIAN VETERINARY EMERGENCY PLAN AUSVETPLAN Disease Strategy Avian influenza Version 3.1, 2006

## Disease Outbreak Investigation Form

<b>Reference No.:</b>		<b>Date:</b>	
<b>Name of the farm:</b>		<b>Name of farm owner:</b>	
<b>Contact telephone number:</b>			
<b>Address:</b> Village:		Geog:	Dzongkhag:
<b>Geo coordinates</b>	Longitude	Latitude	
<b>Information about the farm</b>			
<b>Type of farm:</b> Commercial [ ] ; Semi-commercial [ ] ; Backyard [ ] ; Village chicken [ ]			
<b>Number of birds:</b> Broiler:.....Layer:.....Chicks:.....Pullets:.....Duck:..... Others (specify):.....			
<b>Type of housing</b> Permanent shed with CGI roofing [ ] ; temporary shed [ ] ; coop [ ] ; Others (specify)[ ].....			
<b>Housing system:</b> Deep litter [ ] ; Others (specify) [ ].....			
<b>Farming system</b> Free ranging [ ] ; Intensive [ ] ; Semi intensive [ ] Others (specify)			
<b>Source of bird:</b> Hatchery outside Bhutan [ ] ; Hatchery within Bhutan [ ] ; Government farm [ ] ; Others (specify)[ ].....			
<b>Feed type and source</b>  <b>If any supplement is given in feed or water, give details</b>			
<b>Water source and quality</b>  <b>Any contamination by domestic or wild water fowls: Yes [ ] ; No [ ]</b>			
<b>Other animal present in the farm, give details</b>			
<b>Presence of wild birds in area, give details</b>			
<b>Presence of nearby water bodies</b> Pond [ ] ; River [ ] ; stream [ ] ; Others (specify)			

<b><i>Disposal and management of manure</i></b>			
<b><i>Bio-security arrangements in the affected farm</i></b> Disinfectant foot bath [ ]; perimeter wall/fence [ ]; Rodent and wild bird control [ ]; contact between free-ranging chickens [ ]; others (specify)			
<b><i>Topography of the outbreak areas:</i></b> Road network [ ]; market[ ]; school[ ]; BHU [ ]; RNR/LEC [ ]; Others (specify)			
<b><i>Movement of birds</i></b> Recent introduction of birds from other establishment/ places, [Yes / No]; if yes from where?  Supply/ sale of birds/ eggs/ meat to other farms/ places, [Yes / No]; if yes to where?			
<b><i>Movement of people/ vehicle</i></b> Any recent movement of people or vehicle from other farms/ places [Yes / No]; if yes from where?  Any recent movement of people or vehicle out of farm to other farm/ places [Yes / No]; if yes to where?			
<b><i>Detail of other bird population in the area</i></b> No. of households:_____ ; No. of farms:_____ ; Proportion of HH owning poultry _____ %; Average No. of birds owned: _____ ; Approximate population in the area: _____ Other animal species in the area:			
<b><i>Vaccination history of affected flock/ village</i></b>			
<b>Type of vaccine</b>	<b>Date of vaccination</b>	<b>Age of vaccination</b>	<b>Vaccine details</b>
NCD			
IBD			
Fowl Pox			
Marek			
Others(specify)			
<b><i>Information about the disease outbreak</i></b>			
<b><i>Date and time of report of outbreak from farmer to LEC/ DVH:</i></b>			
<b><i>Date and time of report from LEC/ DVH to RVL/ NCAH:</i></b>			
<b><i>Date and time of onset of clinical signs:</i></b>			
<b><i>Date and time of onset of mortality</i></b>			



<b><i>Details of birds affected:</i></b>							
Date	Type of bird	No. affected	No. died	Population at risk	No. destroyed	Remarks	
<b><i>Clinical signs observed</i></b>							
Diarrhea [   ]; Many deaths of birds over past 2-3 days [   ]; Edema of comb and/or wattles [   ]; Reduced feed and water consumption [   ]; Reduced egg production [   ]; Respiratory signs [   ]; Sneezing and sinusitis [   ]; Congestion/cyanosis of comb, wattles or shanks/hocks [   ]; Paralysis [   ]Others (specify)							
<b><i>Necropsy findings (if any)</i></b>							
<b><i>If any treatment already given in the present outbreak, give details</i></b>							
<b><i>Samples collected</i></b>							
Sample Id.	Bird type	Specimen type	No. of specimens	Laboratory referred to	Date of shipment	Test requested for	
<b>Name &amp; Designation of Investigation Team:</b>					<b>Signature</b>		

## **Title: Standard Operating Procedures for Decontamination**

### **I. Purpose**

The purpose of developing this SOP is to ensure that all decontamination procedures are carried out smoothly, effectively and successfully post disease outbreak.

Decontamination means removal or neutralization of infectious agent (H5N1 virus) through process of cleaning and disinfection. The purpose of decontamination is to ensure that live HPAI virus does not remain and re-emerge on the premises after depopulation of birds. Thus, cleaning and disinfection is a vital component of the decontamination team.

### **II. Scope**

This SOP describes guidelines and steps to be followed for effective decontamination by the team.

**III. Users/Target:** Decontamination team

### **IV. Composition of the team**

1. Supervisor: Regulatory and Quarantine Officer (Veterinarian)
2. Assistants: BAFRA Livestock Inspectors (two in each decontamination group)
3. Hired and trained personnel for cleaning and disinfection = 2 in each decontamination group.

### **V. Materials and Equipment Required**

#### ***A. Personal Protective Equipment***

Each member shall be provided with adequate protective measures from infection by means of Personal Protective Equipments (PPE) which include:

4. A coverall (Enviroguard with hood and boots)
5. An N-95 respirator
6. Goggles (chemical splash)
7. Outer gloves – (Nitrile, Size 10, 11-mil)
8. Inner gloves – (Vinyl, 4 mil)
9. Shoe covers (DuPont Proshield III)
10. A plastic apron that comes in a pouch
11. Rubber boots
12. A Respirator Fit Test Kit (with Bitrex solution)
13. Hard hat with face shield

Multiple sets of PPE will be necessary to allow for workers to take breaks

### ***B. Disinfectants***

1. Different disinfectant for various materials should be procured as provided in the Table I and II.

### ***C. Decontamination supplies***

1. Hand-operated and power sprayer (3000 PSI) used to dispense Virkon®S or other disinfectant.
2. 2 numbers of 5 meter hoses
3. Adequate number of sufficient capacity water tank (500 litre)
4. 2.5 gallon gas container
5. 1 rake lawn and 1 rake gravel
6. 1 barrier/security line tape – 50 meters.
7. 1 shovel flat-long handle
8. 1 scoop shovel
9. 3 wheel barrow
10. 2 trash containers
11. 1 roll duct tape
12. 2 10 ft. ropes
13. 2 regular brooms and 2 whisk brooms and dust pans
14. Scissors
15. 2 rolls of paper towels
16. Windex
17. 2 heavy tie down straps
18. 1 box of large and 1 box of small plastic bags
19. Plastic tie downs
20. Foot bath with tray and mat
21. Sharp's container

### ***D. Other supplies required***

1. Maintenance tools (screwdrivers flat and Phillips, hammer, adjustable wrench, crowbar, and scrapers)
2. Masking tape

### ***E. Personal cleaning and disinfection supplies***

1. A scrub brush for removing dirt and other particles before using disinfectants.
2. Four bars of soap that you can use to wash your hands and face.
3. A plastic basin that you can use to create a foot bath.

### ***F. Biohazard control materials***

1. A few alcohol pads, 70%ethanol - these are generally used to wipe your hands after removing your PPE
2. A red biohazard bag for placing your used PPE in as you remove it

3. A container with a sprayer nozzle.
4. PDI HB Sani Cloth virucidal wipe (one large, individual wipe)
5. Eye wash
6. Ice chest First Aid Kit.
7. Flash light

These items should be worn at all times when they are near the infected birds or in the infected premises.

## **V. Method - Decontamination**

Adequate cleaning and disinfection of infected premises requires planning before the depopulation occurs as well as work after depopulation to effectively remove the virus.

Particular attention should be paid to the decontamination of litter as the AI virus can survive up to 35 days at 4°C in faecal material. As such, it is necessary to quickly disinfect the surface of the litter and burnt or bury them. Contaminated fomites, such as clothing, footwear, crates, feed sacks, egg fillers and other equipment should be decontaminated, if possible, or destroyed.

People should undergo personal decontamination procedures. Decontamination should include standard insect vector and rodent control to minimize mechanical spread of the agent to nearby premises.

### ***A. General consideration***

1. This should be detailed property assessment starting with making a map and marking in the location of electrical and water lines, drains, effluent run off.
2. Identification of a decontamination site - Cleaning and disinfecting activities of infected premise should be limited to areas inhabited by or exposed to poultry. The team leader should evaluate each premise with this objective in mind and make a reasonable determination as to whether materials can be effectively cleaned and disinfected or should be discarded.
3. Materials fall into three categories:
  - Structures: Rooms and pens/cages;
  - Clutter: Items that are not structures for housing birds and require judgment as to whether they can be cleaned and disinfected effectively or must be discarded; and
  - Trash: Items that impede the cleaning process and should be discarded.
3. The following items should be discarded:

- Rotten, unglued, splintered, broken, insect (termites) infested, or otherwise unsound wood incapable of being cleaned and disinfected;
- Deteriorating chipboard or particleboard;
- Plastics and other materials that are damaged with grooves, deep gouges, cracks, split, broken, slits, or that are broken or otherwise structurally unsound;
- Tarps that are torn, shredded, contaminated with feces, or have exposed fibers;
- Porous materials that will require excessive effort to clean and disinfect;
- Other materials with surfaces those are likely to harbor contamination;
- Clutter that may be perfectly sound but cannot be effectively disinfected. Items may include cardboard, feed, and bedding material;
- Open feed bags or containers (closed bags of feed should be sprayed with disinfectant and moved from the contaminated area; and,
- Trash (anything of no value that cannot be cleaned). Examples of trash include empty bottles, milk cartons, aluminum cans, paper, etc.

## ***B. Decontamination procedures***

### ***Preparation for decontamination***

1. Identify and establish a proper site outside and close to periphery of the culling and decontamination line for putting on PPE, unloading materials and equipment required for decontamination.
2. Where the infected area is accessible by road, a decontamination crew vehicle shall be parked at this site.
3. Take off all materials and equipment from the vehicle.

### ***Before entering the infected premises***

4. Assemble the team and organize into groups as per the specific tasks to be performed in the orderly manner and distribute the materials and equipment to each member.
5. The Team Leader shall then provide necessary briefing to all decontamination groups.
6. Put on PPE as per the SOP for use of PPE before crossing the culling and decontamination line (protected zone).

7. Decontamination team shall be divided into groups – the first group should start decontamination in the infected farms and other group(s) shall start decontamination from the periphery of protected zones and move towards centre of the infected area.
8. Once personnel have entered premises, they may not cross back over the culling and decontamination line for any reason without removing and properly disposing of all PPE and proper personal disinfection.
9. Groups identified for decontamination of the infected farms shall only come out after completing their task.
10. The decontamination team should allow the culling and disposal team to complete their task and then only start their operation.
11. Prepare the select appropriate disinfectants as recommended in the Table I and II.
12. It is important to wear PPE when mixing disinfectants like Virkon®S disinfectant because it can irritate the skin and eyes.

The following steps should be taken in order and under site supervisor direction.

### ***3. Preliminary disinfection***

It is important to thoroughly clean and disinfect objects that have been soiled by blood, feathers, or any other poultry fluids, wastes or other animal parts. Avian influenza also survives well in water, so washing items with water only (and no soap or disinfectant) may spread the virus. The first consideration would be to decontaminate contaminated areas.

The preliminary disinfection is designed to quickly start and rapidly reduce the amount of virus present up to the completion of slaughter.

- Any area known or suspected to be contaminated is sprayed.

The important area, structures, materials and equipment for cleaning and disinfection *inter alia* include:

- a. Poultry sheds and around the houses and as soon as the birds removed
- b. Feed storage area
- c. Poultry carrying baskets and bags.
- d. Culling sites
- e. Disposal sites

- f. Hatcheries
  - g. Poultry processing facilities
  - h. Watering and feeding troughs including other fomites
  - i. Access roadways and path ways used for moving poultry and poultry products including other risk goods (fomites).
  - j. Vehicles
- Spraying should be repeated up to 5 times a day. Disinfection Virkon® S is treated as the best disinfectant for HPAI virus but other locally available disinfectants are also effective against it. These include the use of soaps and detergents as well as phenols, Dettol and quaternary ammonia compounds used after proper cleaning.
  - All contaminated materials and surfaces should be disinfected with appropriate disinfectant allowing sufficient recommended contact time as per the Table I and II.

#### ***4. Clean-up***

The aim is to remove, without using water, all manure, debris, feed, etc, to expose surfaces for a second round disinfection. This is very important as organic material reduces any disinfectant effectiveness.

1. All structural surfaces must be cleaned of any litter, feathers, dirt, or other contaminated materials. Roof areas must also be cleaned.
2. For pens and cages on the ground, the team will remove all contaminated material and bring the surface as close to level as possible.
3. The next step is a wash down with a low pressure sprayer using a detergent or bleaching powder.
4. In and under trees, the roost area will be trimmed and perch areas that are contaminated with feces or feathers will be cleaned.
5. Fences should be thoroughly cleaned and disinfected as the tops of fences may be used for roosting by free-roaming poultry and wild birds, fences and fencing material can be contaminated with feathers and feces.
6. If the facility has significant evidence of rodent activity, extermination should be done prior to starting the cleaning and disinfection effort.

#### ***5. Full scale disinfection***

1. Disinfectant to be sprayed in the following order – roof, walls and finally the floor.

2. Inspection must be carried out to ensure that everything has been completed-repeat clean -up and disinfection if there is doubt.
3. Another round of full disinfection 7 to 14 days later.
4. Final disinfection before restocking should be carried out.

#### ***6. Decontamination of equipment used for decontamination***

- The other consideration is the decontamination of contaminated equipment used. The primary concern would be for anything used during stamping out. This would include items like:
  - CO2 tanks,
  - Gassing containers,
  - Excavators,
  - Back hoes,
- Apply the same principles including cleaning first followed by a low pressure detergent spray, inspection then disinfection spray. Repeat the inspection and disinfectant spray.
- If any trucks, vehicles, motor cycles, egg trays are on the contaminated site they must be decontaminated before leaving the premise.
- Particular attention needs to be paid to mats under driver's feet.
- Vehicle interiors, including trunks, can be wiped down with disinfectants on cloths as required. All under parts and wheels of cars should be sprayed with water and disinfection.

#### ***7. Personal decontamination***

The following procedures will apply to **ALL** personnel before leaving an infected area any quarantined area which is grossly contaminated with the disease organism.

1. Culling and disposal team members walk to the cleaning and disinfection line and remove PPE and place in trash bag, which are to be placed in biohazard plastic bag.
2. Industrial hard hats must be scrubbed and set aside.
3. Hands must be washed in disinfectant and scrubbed.
4. Warm soapy water is recommended for washing face, hair, skin, etc. Alternatively, the pH of the washing solution can be raised (by adding sodium carbonate) or lowered (by adding citric acid) to enhance antiviral action.
5. Hair should be washed/sponged down with a shampoo.
6. Disposable gloves must be decontaminated before discarding and reusable gloves are to be decontaminated before reusing.



7. Plastic overalls - use a sponge or low pressure pump and wash the overalls from top to toe to remove gross material paying particular attention to the back, under the collar, zip and fastenings and the inside of pockets.
8. Boots and shoes should be scrubbed down, particular attention being paid to the sole.
9. The person then walks across the area, washes feet in a footbath, changes into clean overalls and street shoes and leave directly without re-exposure to contaminated areas.
10. The plastic bags containing used overalls and other articles are sealed and given a second wash down in disinfectant and then either buried/burnt or taken for cleaning. These garments should be autoclaved or treated as contaminated clothing in a hospital laundry.
11. On returning to home or lodgings, the person should have a long hot bath or shower.

### **VIII. Personal Safety**

1. All individual involved in decontamination operations should be provided with appropriate PPE and training on how to properly use them.
2. All should be treated with appropriate anti-viral drug before entering infected area.
3. It is recommended that, if possible, all people exposed to infected chickens should be monitored by local health authorities for at least 7 days.
4. If symptoms of avian influenza are detected, there should be a clear way to report this information to local health officials. This symptoms include:
  - Fever over 38°C
  - Sore throat or cough
  - Respiratory distress or failure

### **IX. Protocol for Mixing Virkon® S**

Safety or protective gear is required when mixing Virkon S. Assigned individuals must wear a face shield or safety goggles, a dust mask, and rubber gloves. Mix the solution in a separate, well ventilated room (if possible), or outside. Restrict the number of people in the mixing area. Follow the requirements for handling and storage of disinfectant.

#### ***A. Equipment and Supplies Needed for Virkon S***

1. Safety equipment needed
  - Face shield or safety goggles;
  - Rubber gloves;
  - Coveralls; and

- Dust mask.

2. Supplies needed:

- 1.0, 2.5, or 5.0 gallon plastic container with locking lid;
- Funnel; and
- Plastic measuring spoon or scoop (a scoop is included with the Virkon S).

***B. Procedure for Mixing Virkon® S***

1. Prepare a 1 percent solution (1.3 ounces of Virkon® S concentrate to 1 gallon of water).
2. Add Virkon® S powder to water and stir gently. DO NOT STIR VIGOROUSLY. The solution should be yellow in color and will have a slight citrus odor.
3. Reseal the container holding Virkon® S powder.
4. Pour Virkon® S solution into the 1.0, 2.5, or 5.0 gallon plastic container using a funnel. Close container tightly.
5. Dispose of solution after seven days or when it begins to change from yellow to clear.
6. Wash hands and any other areas where the solution or powder may have come in contact with the skin. Clean the mixing area.

***C. Procedures for Handling Virkon® S Disinfectant***

1. Store powder tightly in closed plastic container in a cool, dry place. Ensure that the area where Virkon® S is stored is secured and cannot be accessed by authorized persons.
2. Follow instructions on the label for disposal.

**Table I. Recommended Disinfectants and Concentrations**

Disinfectant	Form and final concentration	Contact time and effectiveness
1. Soaps and detergents		Leave in contact 10 minutes.
2. Oxidizing agents		
2a. Sodium hypochlorite	Liquid (conc. liquid (10-12% available chlorine), dilute to final 2-3% available chlorine (1:5)	Not good for organic materials. 10-30 minutes contact.
2b. Calcium hypochlorite	Solid or powder, dilute 2-3% available chlorine (20 g/litre powder, 30g/l solid)	Not good for organic materials. 10-30 minutes contact.
2c. Virkon®S	2% (20 g/litre)	10 minutes. Excellent disinfectant
3. Alkalis		
3a. Sodium hydroxide (caustic soda- NaOH). Do not use with aluminum and like alloys	2% (= 20 g/litre)	10 minutes. Do not use in presence of aluminum
3b. Sodium carbonate anhydrous (washing soda) (Na <sub>2</sub> CO <sub>3</sub> . 10 H <sub>2</sub> O)	4% (=40 g/litre) from powder 100 g/l from crystals	10 minutes. Recommended for use in presence of organic materials as above. 30 minutes
4. Acids		
4a. Hydrochloric	2% (20 ml/litre)	Corrosive, use only when better not available.
4b. Citric	0.2% (2 g/l)	30 minutes, safe for clothes and body decontamination
5. Formaldehyde gas	Special generation required	15-24 hrs. Toxic, only if others cannot be used.

**Table II. Recommended Disinfection**

<b>Particular</b>	<b>Disinfectant/chemical/procedure</b>
Dead birds/Carcasses	Bury or burn
Animal housing/ equipment/ cages	Any of the followings: 1. Virkon® S 2. Sodium hypochlorite 3. Calcium hypochlorite
Humans	Soaps and detergents.
Electrical equipment	Formaldehyde gas
Water tanks	Sodium hypochlorite
Ponds used by poultry/ducks	Sodium hypochlorite
Feed	Burial or burning
Effluent, manure	1. Bury or burn, 2. Acids 3. Alkalis
Human housing	1. Soaps and detergents 2. Sodium hypochlorite 3. Calcium hypochlorite 4. Virkon® S
Machinery, vehicles	1. Soaps and detergents 2. Calcium hypochlorite
Clothing	1 Soaps and detergents 2. Sodium hypochlorite 3. Calcium hypochlorite 4. Virkon® S 5. Alkalis
Aircraft	1. Soaps and detergents 2. Virkon® S
Footbath	1. Dettol

**References:**

1. STANDARD OPERATING PROCEDURES- Highly Pathogenic Avian Influenza (HPAI) Task Force.
2. AusVet AI Plan
3. Work Book for UPAZILLA AND DISTRICT OFFICERS
4. Developed for

# **Standard Operating Procedures for Quarantine and Movement Control**

## **I. Purpose**

The purpose of this SOP is to ensure that the implementation of quarantine and movement control measures in protected and surveillance zones are carried out smoothly, effectively and successfully to prevent and minimize the spread of HPAI virus from infected areas.

## **II. Scope**

This SOP describes the guidelines and steps for implementing quarantine and movement control measures following an outbreak of HPAI. This will not apply for routine movement monitoring at other entry and strategic check posts.

**III. Target/User:** Quarantine and movement control team

## **IV. Composition of the team**

1. Team leader: Chief Regulatory and Quarantine Officer, BAFRA
2. Technical Assistants: BAFRA Livestock Inspectors (number to be determined based on the place and size of outbreaks and entry and exit points in the protected and surveillance zones).
3. Record keepers: BAFRA Livestock Inspector (one each in all entry and exit points of protected and surveillance zone).
4. Hired labourer for spraying and disinfection: 2 labourers each at all entry and exit points in the protected and surveillance zones.

## **V. Materials and Equipment Required**

### ***A. Personal Protective Equipment***

Each culling member must be provided with adequate protective measures from infection by means of a set of a Personal Protective Equipments (PPE) which include:

1. A coverall (with hood and boots)
2. An N-95 respirator
3. Goggles
4. Outer glove– (Nitrile)
5. Inner gloves – (Vinyl)
6. Shoe covers
7. A plastic apron that comes in a pouch
8. A Respirator Fit Test Kit (with Bitrex solution)

### ***B. Disinfectants***

Each quarantine and movement control team should be provided with adequate quantity of following disinfectants:

1. Soaps and detergents - humans
2. Sodium hypochlorite – vehicles and machinery
3. A 5 kg container of Virkon® S disinfectant – vehicles and machinery
4. Dettol - footbath

### ***C. Personal cleaning and disinfection supplies***

1. A scrub brushes (2 each for each group) for removing dirt and other particles before using disinfectants.
2. Four bars of soap that you can use to wash your hands and face.

### ***D. Biohazard control materials***

1. A few alcohol cotton pads, 70% ethanol - these are generally used to wipe your hands after removing your PPE
2. A red biohazard bag (two numbers each) for placing your used PPE in as you remove it
3. PDI HB Sani Cloth virucidal wipe (one packets each)
4. Eye wash
5. First aid kit.
6. Flash light

### ***E. Quarantine and Movement control***

Each quarantine and movement control group should have following set of equipment:

1. Power sprayer (3000 PSI) used to dispense Virkon®S or other disinfectant.
2. 2 numbers of 5 meter hoses
3. Adequate number of sufficient capacity water tank (500 litre)
4. Continuous water supply
5. Barrier/security line tape – 5 rolls of 50 meters.
6. 1 roll duct tape
7. 2 rolls of paper towels
8. Foot bath with tray and mat
9. A large bucket that can hold approximately 20 liters – you will use this to mix the Virkon® disinfectant powder with water.
10. Heavy-duty trash bags (20 nos.);
11. Small plastic bags (50 nos.);
12. Clipboard, water-proof notebook and pen (2 sets each);

## **VI. Quarantine and Movement Control**

1. Determine all possible entry and exit points around the periphery of protected and surveillance zones based on the map of disease outbreak zones declared by Incident Operation Centre based on the disease investigation team.
2. Establish only one or two entry and exit points from the protected and surveillance zones and seal all other entry and exit points.
3. Place appropriate sign boards and notice boards to inform public about the quarantine and movement control measures in place.
4. Identify and establish a proper site outside and close to periphery of protected and surveillance zones for putting on PPE, unloading materials and equipment required for enforcing quarantine and movement control measures.
5. Where the infected area is accessible by road, a culling and disposal crew vehicle shall be parked at this site.
6. Take off all materials and equipment from the vehicle.
7. Assemble the team and divide the team into separate groups for enforcing quarantine and movement control measures in the protected zone and surveillance zone.
8. Distribute the materials and equipment to each group.
9. The Team Leader shall then provide necessary briefing to all respective groups on protocols to be followed for enforcement.
10. Put on PPE as per the SOP for use of PPE.
11. Quarantine measures will be imposed on the infected premises such that no movement of domestic animals including other risk goods from the protected zone shall be allowed.
12. Movements of manure and litter off these premises will be prohibited.
13. The access of wild birds to sheds and water supplies will be restricted. Farmers shall be advised to prevent other species of birds entering the premises. Pets will be confined.
14. Persons present on the infected premises will be encouraged to restrict their movement as far as possible and in any event will be prohibited from visiting any other premises where poultry are kept.

15. The team shall restrict the movement of vehicles and people in and out of the infected premises and divert highway traffic as far as possible within the protected and surveillance zones as directed by the National Incident Command Centre and Incident Operation Centre.
16. The team shall set up and manned continuously all entry and exit points entering the protected and surveillance zones.
17. No person, animal or vehicle shall get entry into the protected and surveillance zones without prior permission from the team leader or his representative of the Quarantine and Movement Control Team.
18. Oversee all personnel involved in disease investigation, stamping out, decontamination operation follow complete protocols for entering and exit from these zones as laid down in the respective SOPs. All people entering these zones must follow proper disinfection procedures.
19. Personnel involved in the quarantine and movement control enforcement shall as far as possible restrict their entry into infected and surveillance zones. If necessary, permission should be sought from the team leader for entry into these areas. **To be more specific.**
20. The team should only allow restocking of poultry into protected zones only upon official notification by the NICC and Incident Operation Centre and upon fulfillment of the protocol on restocking.
21. All quarantine and movement control measures shall be lifted upon declaration of freedom from the HPAI and upon receiving official notification from the NICC and/or Incident Operation Centre.
22. The detailed guidelines to be followed for quarantine and movement control measures are provided in the Table 1.

#### **IX. Steps to be followed for exiting the quarantine and movement control duty**

1. The team members should remove PPE and place them in trash bag, which are to be placed in biohazard plastic bags before exiting the area.
2. By the end of each work day, the team members shall dump all the used PPE, other potentially infectious materials including those seized ones.
3. All shall disinfect shoes, thoroughly wash hands at the wash station and sanitize your hands.
4. All tools and other equipment used shall be cleaned and disinfected at the end of day's operation.



5. All personnel must disinfect their foot by dipping them footbath before leaving the place.
6. Similarly all parts of vehicles (especially tyres) must be disinfected at culling and decontamination line.

#### **X. Personal Safety**

1. All individual involved in culling operations should be provided with appropriate PPE and training on how to properly use them.
2. All should be treated with appropriate anti-viral drug before entering infected area.
3. It is recommended that, if possible, all people exposed to infected chickens should be monitored by local health authorities for at least 7 days.
4. If symptoms of avian influenza are detected, there should be a clear way to report this information to local health officials. This symptoms include:
  - Fever over 38°C
  - Sore throat or cough
  - Respiratory distress or failure

#### ***XI. Procedures for Releasing Quarantines on IPs***

1. In order for infected premises to be eligible for release, the following conditions must be met:
  - Cleaning and disinfection must have been effective and the premises must have been empty for 30 days following the completion of cleaning and disinfection. The absence of birds on IPs should be confirmed through visual inspection of the premises.
  - If cleaning and disinfection are considered inadequate, the team will evaluate the premises to determine if further action, such as additional cleaning and disinfection or a holding period, is required. If no further action is deemed necessary, the premises can be considered eligible for release. If further action is required, the epidemiologist should also determine if the surrounding premises should be held from quarantine release pending action on the IP.
  - If cleaning and disinfection was not possible, the premises must have been empty for 60 days.

## ***XI. Procedures for Releasing Quarantines on CPs***

In order for a CP premises to be eligible for release, the following conditions must be met:

1. All infected premises and contact premises within a one kilometer zone must also be eligible for release.
2. One of the following three circumstances must apply:
  - Cleaning and disinfection must have been effective and the premises must have been empty for 30 days following the completion of cleaning and disinfection. (Premises with pet bird(s) under compliance agreement will be considered “empty” for quarantine release purposes); or
  - If cleaning and disinfection are considered inadequate, an epidemiologist will evaluate the premises to determine if further action, such as additional cleaning and disinfection or a holding period, is required. If no further action is deemed necessary, the premises can be considered eligible for release. If further action is required, the epidemiologist should also determine if the surrounding premises should be held from quarantine release pending action on the IP; or
  - If cleaning and disinfection was not possible, the premises must have been empty for 60 days.

## **XI. References:**

1. STANDARD OPERATING PROCEDURES- Highly Pathogenic Avian Influenza (HPAI) Task Force.
2. AusVet AI Plan
3. Work Book for UPAZILLA AND DISTRICT OFFICERS
4. Developed for

*This protocol was developed from excerpts from subchapter 7 – General Safety Orders, Group 9 – Compressed Gas and Air Equipment, Article 76 – Compressed Gas and Air Cylinders (ss4650)*

<b>Quarantine/movement control</b>	<b>Protected Zone</b>	<b>Surveillance zone</b>
<i>Movement out of susceptible birds</i>	Prohibited	Allowed by permit from flocks with negative serosurveillance; Waste to approved disposal. Vehicles, equipment to be disinfected.
<i>Movement in of susceptible birds</i>	Prohibited	Allowed by permit, subject to surveillance
<i>Movement out of non-susceptible species</i>	Allowed by permit, subject to disinfection	Allowed by permit, subject to disinfection
<i>Movement out of litter and manure</i>	Prohibited.	Prohibited
<i>Movement out of equipment and feed</i>	Allowed by permit, unless feed has been in contact with infected birds; subject to disinfection.	Allowed by permit, subject to disinfection.
<i>Movement in and out of people</i>	Allowed by permit, subject to disinfection.	Allowed, subject to disinfection.
<i>Movement in and out of vehicles</i>	Allowed by permit, subject to disinfection.	Allowed by permit, subject to disinfection.
<i>Movement of fertile eggs</i>	Prohibited.	Prohibited
<i>Movement of table eggs</i>	Prohibited.	Allowed by permit, subject to sanitisation. Vehicles, equipment to be disinfected.
<i>Movement of fresh/frozen meat and offal from susceptible birds</i>	Prohibited.	Prohibited
<i>Movement in of feed</i>	Prohibited	Allowed by permit. Vehicles to be disinfected
<i>Movement of abattoir waste</i>	Prohibited.	Prohibited.
<i>Movement out of dead birds</i>	Prohibited	Prohibited

<i>Movement out of horticultural and agricultural crop</i>	Allowed.	Allowed.
<i>Areas</i>	Restricted area/vaccination zone	Controlled area/vaccination zone
<i>General</i>	Premises to operate a very high level of biosecurity.	Premises to operate a high level of biosecurity.
<i>Movement out of susceptible adult birds</i>	Allowed by permit, <sup>2</sup> from flocks with negative serosurveillance; birds subject to immediate slaughter in CA under supervision at approved abattoir. Product subject to heat treatment <sup>8</sup> at approved premises. Waste to approved disposal. <sup>7</sup> Vehicles to be disinfected.	Allowed by permit, <sup>2</sup> from flocks with negative surveillance; birds subject to immediate slaughter under supervision at approved abattoir. Product subject to cooking at approved premises. <sup>9</sup> Waste to approved disposal. <sup>7</sup> Vehicles, equipment to be disinfected.
<i>Movement in and within of susceptible adult birds</i>	Allowed by permit to an abattoir for immediate slaughter. Allowed by permit for restocking.	Allowed by permit. Vehicles, equipment to be disinfected.
<i>Movement through of susceptible birds of all types</i>	Allowed by permit. Birds not to be unloaded within RA.	Allowed by permit. Birds not to be unloaded within CA.
<i>Movement out of day-old chicks</i>	Prohibited unless exceptional circumstances exist and permit is approved by CVO <sup>1</sup> (eg if eggs sourced from outside CA; destination flock subject to quarantine and surveillance).	Allowed by permit if eggs sourced from outside CA. Vehicles and equipment to be disinfected.
<i>Movement out of replacement birds (pullets, breeders)</i>	Prohibited unless exceptional circumstances exist and permit is approved by CVO. <sup>1</sup>	Allowed by permit; subject to disinfection of equipment and transport; quarantine and a high level of serosurveillance of source grower flock

<i>Movement out of litter and manure</i>	Prohibited unless exceptional circumstances exist and permit is approved by CVO. <sup>1</sup>	Allowed by permit. Vehicles to be disinfected.
<i>Movement out of feed and equipment</i>	Prohibited unless exceptional circumstances exist and permit is approved by CVO <sup>1</sup> (eg if exposed to infected birds).  Allowed by permit if not exposed to infected birds.	Allowed. Vehicles to be disinfected.
<i>Risk enterprises, eg private avian laboratories, cull hen collectors, dead bird pick-ups etc (not processing establishments)</i>	Prohibited unless exceptional circumstances exist and permit is approved by CVO. <sup>1</sup>	Allowed by permit. See restrictions on movements and disinfection of risk materials, vehicles and equipment.
<i>Sales, shows, pigeon races etc</i>	Prohibited unless exceptional circumstances exist and permit is approved by CVO. <sup>1</sup>	Prohibited unless exceptional circumstances exist and permit is approved by CVO. <sup>1</sup> Allowed by permit for non-susceptible species.
<i>To and from processing plants</i>	Prohibited unless exceptional circumstances exist and permit is approved by CVO. <sup>1</sup>  If possible, processing plants should be kept out of declared RAs.	Allowed by permit. Poultry from the CA can be processed following on-farm inspection within the previous 24 hours. Vehicles to be disinfected. Equipment to be cleaned and disinfected at the end of the day.  Poultry from outside the CA can be slaughtered subject to vehicle disinfection before leaving the CA.
<i>Movement of fresh/frozen meat, offal and waste from</i>	Allowed into or within RA. Allowed out of RA subject	Allowed into or within CA. Allowed out of CA by

<i>susceptible birds</i>	to heat treatment <sup>8</sup> at approved premises. Waste to approved disposal. <sup>7</sup> Vehicles to be disinfected. <sup>5</sup>	permit. Vehicles to be disinfected.
<i>Movement of table eggs</i>	Allowed into or within RA. Vehicles to be disinfected. Allowed out of RA by permit; subject to sanitisation. Vehicles to be disinfected.	Allowed into or within CA. Vehicles to be disinfected. Allowed out of CA by permit. Vehicles to be disinfected.
<i>Movement of fertile eggs</i>	Allowed into or within RA. Allowed out of RA by permit; subject to sanitisation of eggs, disinfection of equipment and transport, quarantine and surveillance of destination flocks.	Allowed into or within CA. Allowed out of CA by permit, subject to sanitisation of eggs, disinfection of equipment. Vehicles to be disinfected.
<i>Movement of egg pulp from plants, including on-farm plants</i>	Allowed into or within RA. Allowed out of RA by permit, subject to heat treatment. <sup>8</sup> Vehicles to be disinfected.	Allowed into or within CA. Allowed out of CA under permit. Vehicles to be disinfected.
<i>Control of domestic pets and poultry</i>	All pets and poultry to be confined.	All pets and poultry to be confined.

**Title: Standard Operating Procedure for collection of swab samples (cloacal, tracheal and environmental)**

**Purpose:**

For submission to the laboratories and to rapidly diagnose Highly Pathogenic Avian Influenza

**Scope:**

The document describes collection of swab samples from cloacae, trachea and environment either from live or dead birds. The environmental sample includes collection of swabs from fresh faeces. For collection of necropsy samples, refer to SOP on post-mortem.

**User:**

Veterinarians, para-veterinarians and laboratory personnel

**Manpower:**

Supervisor: The veterinarian / senior technician will supervise the collection of swab samples

Implementer: Veterinarian, para-veterinarians and laboratory personnel

**Materials/Equipment:**

- Gloves
- Sterile Dacron/rayon swabs
- Screw capped polysterelyne vials with transport media
- Scissors
- Self sealing plastic bags
- Lab marker/sample labels
- Sample data sheet
- Ice packs
- Cool box
- Packing tape
- PPE – requirement is either upgraded or downgraded depending upon the bird flu situation in the country

**Procedure:**

**Collection of cloacal and tracheal swabs:**

1. Restrain the bird appropriately
2. Insert the swab deep into the vent/trachea and swab the wall
3. Avoid excess solid fecal material or visible blood in cloacal swabbing.
4. Then you place the swab in the transport medium.
5. Place the specimen in the self sealing plastic bag
6. Label specimen identification

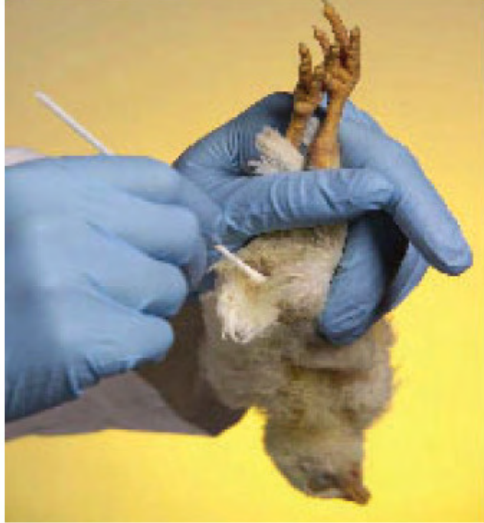


Illustration of cloacal and tracheal swabbing techniques

### **Collection of environmental swabs:**

If you are collecting samples from fecal droppings from the cages of sick poultry in bird markets or from wild birds in the field, the fecal droppings should be recent (wet). Make sure that the swab is heavily covered with feces. The swab is then placed in transport medium.

### **Annex: Transport media:**

Swab samples (oropharyngeal & cloacal swabs and fresh faeces swabs) should be placed in:

1. Isotonic phosphate buffered saline (PBS), pH 7.0–7.4 with antibiotics\* or
2. A solution containing protein and antibiotics\*.

\*Note: The antibiotics can be varied according to local conditions, but could be, for example, penicillin (2000 units/ml), streptomycin (2 mg/ml), gentamycin (50 mg/ml) and mycostatin (1000 units/ml) for tissues and oropharyngeal swabs, but at five-fold higher concentrations for faeces and cloacal swabs. It is important to readjust the pH of the solution to pH 7.0–7.4 following the addition of the antibiotics. It is recommended that a solution for transport of the swabs should contain protein to stabilize the virus (e.g. brain–heart infusion, cattle serum up to 5% [v/v] or bovine albumen – 0.5% [w/v]). Faeces and finely minced tissues should be prepared as 10–20% (w/v) suspensions in the antibiotic solution. Suspensions should be processed as soon as possible after incubation for 1–2 hours at room temperature. When immediate processing is impracticable, samples may be stored at 4°C for up to 4 days. For prolonged storage, diagnostic samples and isolates should be kept at –80°C. Repeated freezing and thawing should be avoided.



## **Title: Standard Operating Procedure for collection of blood samples**

### **Purpose:**

For submission to the laboratories for sero-surveillance of Highly Pathogenic Avian Influenza

### **Scope:**

The document describes collection of blood samples 2-3ml from live birds. The site for collection of blood is either from wing vein or directly from heart

### **User:**

Veterinarians, para-veterinarians and laboratory personnel

### **Manpower:**

Supervisor: The veterinarian / senior technician will supervise the collection of blood samples

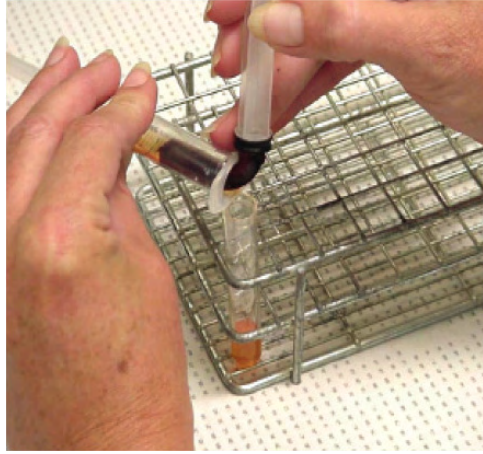
Implementer: Veterinarian, para-veterinarians and laboratory personnel

### **Materials/Equipment:**

- Gloves
- Syringes 2.5ml
- Needles – 21 gauge
- Eppendorf / cryo-vials
- Scissors
- Cotton/tissue paper
- 70% ethanol
- Self sealing plastic bags
- Lab marker/sample labels
- Sample data sheet
- Ice packs
- Cool box
- Packing tape
- PPE – requirement is either upgraded or downgraded depending upon the bird flu situation in the country

### **Procedure:**

- Restrain the bird appropriately
- Pluck the feathers near the wing vein
- Swap with 70% ethanol
- Collect the blood in the disposable plastic syringe
- Allow the blood to clot within the syringe. The syringe should be placed at 45 degree angle for better serum separation at room temperature or at 37°C for 20-30 minutes.
- Separate the serum in eppendorf tubes / cryo vials for sending to the laboratory
- Label each tube with code number corresponding to that in the sample submission data sheet
- Pack properly in the plastic bags and keep in cool box



Blood collection and separation of serum in cryo-vial

## **Title: Standard Operating Procedure for collection of dead birds and necropsy samples**

### **Purpose:**

For submission to the laboratories for viral isolation and diagnosis of Avian Influenza

### **Scope:**

The document describes collection of dead birds / tissues samples from dead domestic and wild birds for viral isolation and other diagnostic techniques.

### **User:**

Veterinarians, para-veterinarians and laboratory personnel, however, necropsy shall be conducted by veterinarians **only** under strict bio-safety conditions, i.e. minimum requirement of class II bio-safety cabinet.

### **Manpower:**

Supervisor: The veterinarian / senior technician will supervise the collection of dead birds.

Senior veterinarian will supervise necropsy procedure

Implementer: Veterinarian, para-veterinarians and laboratory personnel

### **Materials/Equipment:**

- PPE – requirement is either upgraded or downgraded depending upon the bird flu situation in the country
- Gloves
- Self sealing carcass collection bags (plastic)
- Lab marker/sample labels
- Data form
- Ice packs
- Cool box
- Packing tape

### **Procedure:**

- Before handling a dead bird, wear gloves.
- Invert a plastic bag around your gloved hand and then surround the animal with the bag so that you do not directly touch the animal.
- Seal the bag tightly (double bag if required for strength and cleanliness)
- Clearly label the bag with an Identification
- If more than one species has been affected, collect several specimens of each for diagnosis.
- When possible, fresh carcasses should be refrigerated (**NOT** frozen)
- Send the sample to veterinary laboratory for necropsy procedure in sealed cool box along with relevant sample data sheet

**Note:** Make sure you wear the appropriate level of personal protective equipment, based on the situation you are investigating. Try to minimize direct contact with dead birds and always keep animals away from your face.

In general, carcasses of birds that have been dead for less than 24 hours (fresh carcasses) are sufficiently adequate (moribund or viraemic birds are best) for diagnostic purposes. In colder climates, carcasses may last in relatively good condition for longer periods of time; in warm climates, carcasses will decompose faster. A decomposing carcass is desiccated, bloated, green, foul smelling and has feathers that pull out easily.

### **Necropsy:**

Necropsy is performed strictly by a veterinarian in the laboratory following a standard protocol, however, the necropsy will be performed wearing full set of personal protective equipment and under minimum of class II bio-safety cabinet facility.

- Tissue Samples for virus isolation: Samples to be collected from various organs should be as follows:
  - Respiratory- Lungs, trachea, air sacs (posterior)
  - Digestive- Liver, pancreas, small intestine, caeca, proventriculus, large intestine.
  - Urinary- Kidney
  - Lymphoreticular- Spleen, Bursa
  - Cardiovascular - heart
  - Reproductive – Ovary, oviduct

**Note:** Pool tissues from an organ system.  
Digestive and nervous systems- collect separately.  
Heart and spleen can be pooled.  
Lungs and spleen can be pooled  
Liver and kidney can be pooled.  
Keep tissues cold (in ice)

### **Annex: Human exposure - special considerations for HPAI virus exposure:**

Anyone who handles birds suspected of being affected with avian influenza must use their best judgment and be aware of all possible routes of infection. Influenza may infect humans via contact with any mucous membrane (e.g. the entire respiratory and gastro-intestinal tracts and the eyes). Infection could occur by accidental stab with a needle or necropsy instrument contaminated with fresh moist tissue or fluids from infected animals and conceivably through contamination of a break in the skin. Thus, in short, infection occurs only as a result of direct exposure to live virus in aerosol droplets or contaminated fluids. Trans-dermal infection (infection across intact skin) has not been described and the virus is not vector-borne. To date, with the exception of 1 case, all known human deaths resulting from H5N1 AI have been from exposure to poultry or areas where poultry are raised. Only 1 human case can be attributed to a person plucking the feathers of an infected swan. However, similar precautions should be taken when conducting a wild bird die-off investigation and depopulating a chicken farm.

**Title: Standard Operating Procedure for sample preparation, preservation and storage.**

**Purpose:**

For further diagnosis, confirmation of Avian Influenza at Regional, National and International referral laboratories

**Scope:**

The document describes laboratory preparation, preservation and storage of samples for further diagnosis, confirmation of Avian Influenza at Regional, National and International referral laboratories

**User:**

Veterinarians and laboratory personnel.

**Manpower:**

Supervisor: The veterinarian / senior technician will supervise the proper preservation of the samples

Implementer: Veterinarian and laboratory personnel

**Materials/Equipment:**

- Eppendorf tubes -2ml
- Vortex mixer
- Bio-safety cabinet class II
- Pipette
- Pipette tips
- Deep freezer (-20°C, -70°C)
- Refrigerated centrifuge
- Autoclave
- Autoclave bags
- 70% ethanol
- Mortar and pestle
- Syringe – 20ml
- Micro-filter 0.22um to 0.45um/ Gentamycin 50mg/ml
- Scissors
- Forceps
- Sterile sand
- Marker pen
- Tube rack
- Disposable autoclave bag
- Gloves (Make sure you wear the appropriate level of personal protective equipment, based on the material you are handling).

**Procedure:****Swab samples:**

- As soon as the swabs are received by the testing laboratories, the samples are prepared in the bio-safety cabinets as follows:
  - a. Label 2 ml eppendorf tubes as per the sample number
  - b. Mix the original sample pool by vortex and transfer approx. 2ml into the eppendorf tube
  - c. Centrifuge the eppendorf tubes at 1800 rpm/10 minutes at 4°C.
  - d. Transfer the supernatant to another labeled eppendorf tube containing 60ul of gentamycin sulfate (50mg/ml).
  - e. Incubate at room temperature for 30 minutes

The sample is ready for inoculation or for storage at -70°C for longer duration.

**Tissue samples:**

- Tissue samples received at 4°C in the laboratory are processed in the bio-safety cabinet as follows:
  - a. Make a 10% tissue suspension in PBS by grinding approximately 1gm tissues with sterile sand in mortar and pestle and adding 9ml of PBS.
  - b. Pipette out the suspension in centrifuge tubes.
  - c. Centrifuge the suspension at 10,000rpm for 30 minutes at 4°C.
  - d. Collect the supernatant in sterile labeled tubes by filtering through 0.45um syringe filters.
  - e. If filter is not available, add 60ul of 50mg/ml gentamycin sulfate.

The sample is ready for inoculation or for storage at -70°C for longer duration.

## **Title: Standard Operating Procedure for specimen transport**

### **Purpose:**

For further diagnosis, confirmation of Avian Influenza at National and International referral laboratories

### **Scope:**

The document describes laboratory packaging for quick and safe domestic and international transport of specimen for further laboratory investigation and confirmation.

### **User:**

Veterinarians, para-veterinarians and laboratory personnel.

### **Manpower:**

Supervisor: The veterinarian / senior technician will supervise the packaging of specimen for domestic transport and head of National Referral laboratory will supervise packaging of specimen for International transport.

Implementer: Head of National Referral laboratory, Veterinarian, para-veterinarians and laboratory personnel

### **Materials/Equipment:**

- Gloves (Make sure you wear the appropriate level of personal protective equipment, based on the material you are handling).
- Polystyrene screw capped vials
- Self sealing plastic bags
- Sealing tape
- Lab marker / sample labels
- Absorbent cotton or tissue paper
- Laboratory request form
- Ice packs
- Cool box
- Biohazard label
- IATA approved shipping containers
- Water proof envelopes
- Specimen category symbol

### **Procedure:**

#### **Domestic transport**

- Place the specimen in a primary container (polystyrene screw capped vials) with identification number that must be leak-proof unbreakable and airtight.
- After tightening the cap, apply sealing tape (para-film) over the cap and top of the container and wrap in absorbent material (e.g. absorbent cotton or tissue paper) to absorb the accidental leakage.

- The sealed specimen container with a small amount of absorbent material must be placed in a suitably sized self sealing plastic bag.
- Seal the bag. Two or more sealed specimens from the same source may be placed in a larger plastic bag and sealed. Specimen from a different source must not be placed in the same bag.
- Place the sealed bags containing the specimens inside a secondary self sealing plastic container and seal it. Specimens from several sources may be packed inside the same secondary plastic container.
- Place additional absorbent material inside the secondary container to cushion and to absorb any leakage that may occur.
- Tape the laboratory request form sealed in a plastic bag to the outside of this secondary container.
- Place the secondary bag containing the specimen in cool box containing ice/ice cubes.
- Seal the cool box properly with the help of brown tape running around full length and breadth of the box so that a plus or cross sign is made.
- Paste a biohazard label “**Bird flu sample**” outside of the cool.

### **International transport**

- Transport of specimens should comply with the WHO guidelines for the safe transport of infectious substances and diagnostic specimens (WHO, 1997).
- The receiving laboratory should be notified before shipment of specimens in order to arrange for an import license for the specimens.
- Transport of specimens within national borders should comply with the procedures detailed within each country’s regulations.
- International air transport of specimens from avian influenza infected animals must follow the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations and Consignment of Diagnostic Specimens, 2003.
- The IATA Regulations, Consignment of Diagnostic Specimens, 2003 allow specimens known or suspected to contain the avian influenza agent to be transported as UN 3373 “*diagnostic specimens*” when they are transported for diagnostic or investigational purposes.
- Specimens transported for any other purposes, and cultures (as defined in the IATA Regulations) prepared for the deliberate generation of pathogens, must be transported as UN 2814 or UN 2900, as appropriate.
- All specimens to be transported (UN 3373, UN 2900, or UN 2814) must be packaged in triple packaging consisting of three packaging layers as indicated in the Dangerous Goods Index (refer diagram at the end of the chapter).
- UN 3373, Diagnostic Specimens, shall be packed in good quality packaging, which shall be strong enough to withstand the shocks and loads normally encountered during transport. Packaging shall be constructed and closed so as to prevent any loss of contents that might be caused under normal conditions of transport, by vibration or by changes in temperature, humidity or pressure.
- Primary receptacles shall be packed in secondary packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging. Secondary packaging shall be placed in a final outer package



with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.

#### **For liquids**

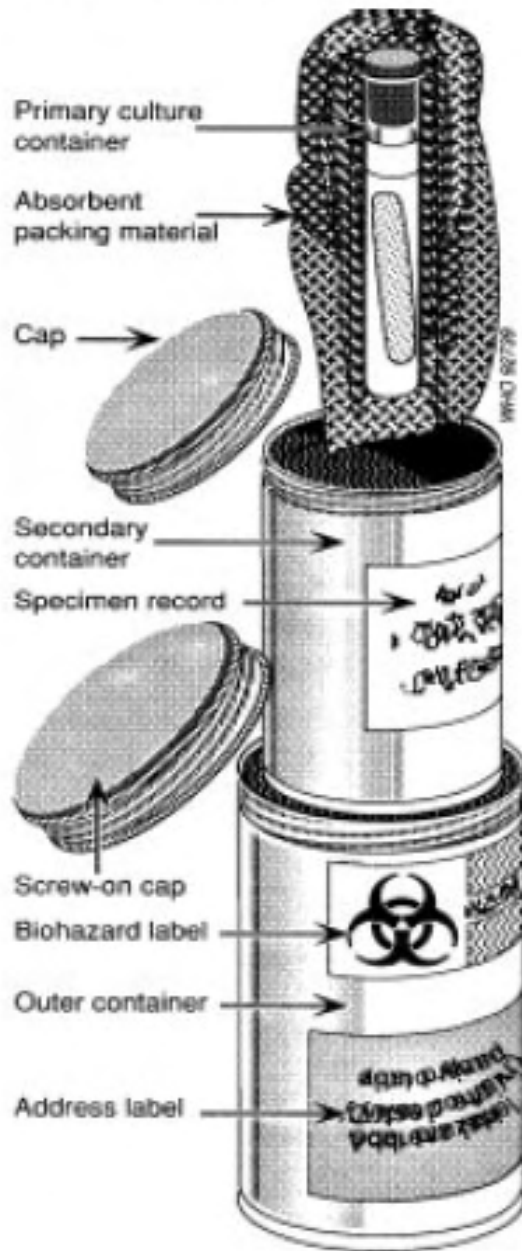
- The primary receptacle(s) shall be leak-proof and shall not contain more than 500 ml.
- There shall be absorbent material placed between the primary receptacle and the secondary packaging; if several fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them.
- The absorbent material shall be in sufficient quantity to absorb the entire contents of the primary receptacles and there shall be a secondary packaging that shall be leak-proof. The primary receptacle or the secondary packaging shall be capable of withstanding without leakage an internal pressure producing a pressure differential of not less than 95 kPa (0.95 bar). The outer packaging shall not contain more than 4 litres.

#### **For solids**

- The primary receptacle(s) shall be sift-proof and shall not contain more than 500 g. If several fragile primary receptacles are placed in a single secondary packaging, they shall be either individually wrapped or separated so as to prevent contact between them and there shall be a secondary packaging which shall be leak proof. The outer packaging shall not contain more than 4 kg.
- For air transport, the smallest overall external dimension of a completed package must be at least 10 cm.
- Packaging must conform to certain performance standards.
- For further information about definitions, packaging requirements, markings and labels, accompanying documentation, and refrigerants, please refer to the competent authority, current IATA shipping guidelines, commercial packaging suppliers, or available courier companies.

**Note:** Specimens should be collected and transported in a suitable transport medium on ice or in liquid nitrogen. Standard precautions should always be followed, and barrier protections applied whenever samples are obtained from patients. Specimens for influenza should not be stored or shipped in dry ice (solid carbon dioxide) unless they are sealed in glass or sealed, taped and double plastic-bagged. Carbon dioxide can rapidly inactivate influenza viruses if it gains access to the specimens through shrinkage of tubes during freezing

# Triple packaging system



## **Title: Standard Operating Procedure for Rapid antigen detection tests**

### **Purpose:**

To rapidly diagnose the HPAI virus that would further enable containment effectively and in the shortest possible time.

### **Scope:**

To process sample, perform test/s and provide interpretation.

### **Users:**

Veterinarians and laboratory staff of RLDCs & NCAH

### **Manpower:**

Supervisor: Veterinarian/ Laboratory Head

Implementer: Laboratory staff.

### **Materials/Equipment:**

- Rapid Antigen detection kit/s (all inclusive set)
- PPE
- Clean work-bench (in Laboratory) or clean room with a table (in field).
- Disinfectants
- Autoclave (laboratory)
- Disposable disposal plastic red bag.

### **Procedure:**

Refer kit's insert/leaflet for standard procedure and strictly follow it.

### **Annexure:**

Test steps using Flu Detect Test manufactured by Synbiotics Corporation is provided below as an example to familiarize the laboratory staff for testing tracheal & cloacal swab samples since this kit is currently used in Bhutan. However, if another kit is used, follow its instruction or guideline as per the inset.

#### **FLU DETECT TEST - STEPS TO TESTING A TRACHEAL SAMPLE**

1. All samples should be at normal "room temperature" before running the test.
2. Place 8 drops (approximately 250 µl) of Extraction Buffer in a clean test tube.
3. Place the swab containing the sample in the tube and rotate the swab 5 to 10 times in the Extraction Buffer.
4. When removing the swab from the tube, press the swab against the side of the tube repeatedly until no more liquid comes from the swab.
5. Discard the swab in a biohazard container (such as the red bio-hazard bag that comes in the Laboratory Kit).

6. If the samples will not be tested immediately, cap the tube with the provided cap and store the sample in the cooler provided in your kit.)
7. Insert the test strip into the tube up-to the mark.
8. Allow the test strip to sit inside the tube for 15 minutes.
9. After 15 minutes, remove the test strip from the tube and read the test strip results.

### **FLU DETECT TEST - STEPS TO TESTING A CLOACAL SAMPLE**

1. All samples should be at typical “room temperature” before running the test
2. Place 8 drops of BHI or Viral Transport Media into a clean test tube
3. Dip 1 cloacal swab into Brain Heart Infusion (BHI) or Viral Transport Media.
4. Place the swab containing the sample in the tube and rotate the swab 5 to 10 times in the Extraction Buffer.
5. When removing the swab from the tube, press the swab against the side of the tube repeatedly until no more liquid comes from the swab
6. Discard the swab in a biohazard container (such as the red bio-hazard bags that come in the Laboratory Kit).
7. Drop 200ul of extracted sample into a second test tube
8. Add 3 drops of Extraction Buffer into the tube and mix it thoroughly
9. If the samples will not be tested immediately, cap the tube with the provided cap and store the sample in the cooler provided in your kit.
10. Insert the test strip into the tube up-to the mark.
11. Allow the test strip to sit inside the tube for 15 minutes.
12. After 15 minutes, remove the test strip from the tube and read test strip results.

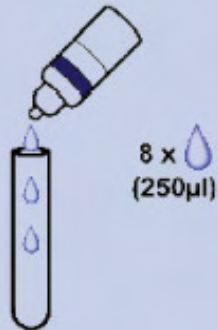
**Flu Detect Test Kit for Influenza A Diagnosis (for animals)**



## Using the Flu Detect Test Strip (for animals)

### Step 1

8 drops (~250µl) extraction buffer into test tube



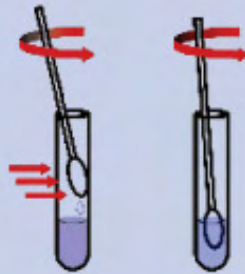
### Step 3

Insert test strip, labeled side up, so that pink pad is just submerged into extracted sample. Incubate for 15 minutes. Remove strip and read results.



### Step 2

Insert swab, rotate. Press swab against side of tube to extract liquid. Dispose of swab.



### Step 4

Reading results and validation: Control line at top, closest to handle. Absence of control line indicates invalid test.



## **Title: Standard Operating Procedure for Viral isolation by egg inoculation**

### **Purpose:**

For isolation, identification and sub-typing of Highly Pathogenic Avian Influenza virus by HA/HI, PCR and other advanced techniques.

### **Scope:**

The document describes the procedures for virus isolation by egg inoculation method. Details of bio-safety measures necessary to perform the procedure are beyond the scope of this document and should be referred to bio-safety guidelines annexure.

### **User:**

Laboratory personnel

### **Manpower:**

Supervisor: The veterinarian / senior technician will supervise the procedure

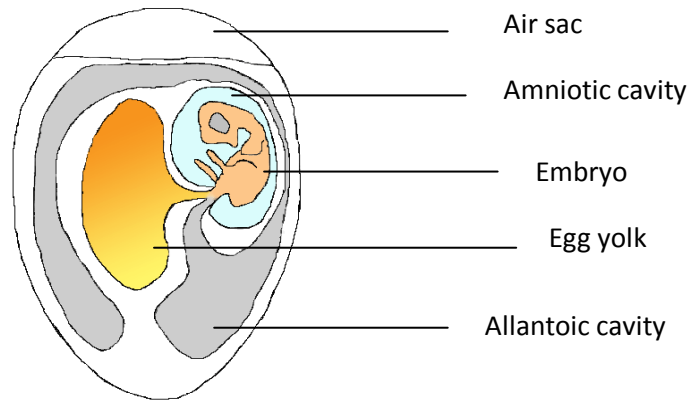
Implementer: Laboratory personnel

### **Materials/Equipment:**

- Gloves
- Mask
- Specific antigen negative (SAN) embryonated eggs
- Egg Candler
- Marker/pencil
- Bio-safety cabinet (Class II)
- Disinfectant (70% ethanol)
- Hole puncher
- 1ml disposable syringe with needle
- Sealing tape
- Vortex mixer
- Egg incubator
- Disposable autoclave bags
- Centrifuge tube
- 5-10ml syringe
- Tube rack
- Refrigerated centrifuge
- Egg chiller
- Antibiotics (penicillin, streptomycin, gentamycin)
- Deep freezer (-70°C)
- PPE – Make sure you wear the appropriate level of personal protective equipment, based on the material you are handling.

**Procedure:**

**Note:** all working steps in the procedure must be performed in a class II bio-safety cabinet. The eggs must be specific antigen negative especially for AIV and NDV.

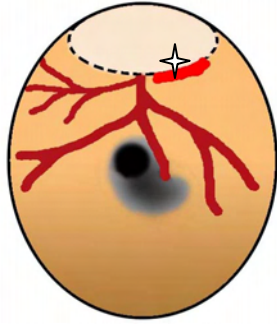


1. Candling of eggs

- a. Examine eggs with the egg candler and mark with a pencil over the air sac directly above the allantoic cavity.
- b. Place the eggs with blunt ends up into egg trays.
- c. Discard any egg that is infertile, has cracks, are underdeveloped or that appear to have porous shells.

2. Inoculation of eggs

- a. Place eggs with blunt ends up into the trays and label each egg with specific identification number (5 eggs per specimen)
- b. Wipe the tops of the eggs with 70% ethanol and punch a small hole in the shell over the air sac. Five eggs per specimen are usually inoculated.
- c. Aspirate 0.1ml of processed clinical specimen into tuberculin syringe with 22 gauges, 1.5 inch needle.
- d. Insert the needle into the hole of the egg. Using a short stabbing motion, pierce the allantoic membrane and inoculate 0.1ml (100ul) of the specimen into the allantoic cavity. Remove the needle.
- e. Inoculate four other eggs in same manner with the same syringe and needle for a total of five eggs per specimen.
- f. Discard syringe and needle into a proper safety container
- g. Seal the holes punched in the eggs with a drop of glue/cellotape
- h. Incubate the eggs at 37°C till 4days.



Inoculate the egg at the marked area by inserting needle in a slanting position

The eggs are candled everyday to check the mortality of the embryo until the fourth day. On the fourth day, all the eggs are harvested irrespective of the embryonic mortality to check for haemagglutinin.

### 3. Harvesting of inoculated chicken eggs

- a. Eggs are chilled at 4°C overnight or for 3 hours at -20°C before harvesting.
- b. Label 15ml tube for each specimen inoculated
- c. Clean off the top of eggs with 70% ethanol
- d. Using a sterile syringe, aspirate the allantoic fluid and place in labeled 15ml tubes.
- e. Pool the allantoic fluid from all five eggs per specimen in the same 15ml tube
- f. Centrifuge the harvested fluid at 3000 rpm for 5 minutes to remove blood and cells.
- g. Perform haemagglutination test. If no HA is present, passage the specimen one more time before reporting inability to recover virus from the specimen.
- h. If necessary, centrifuge the tubes at 3000rpm for 5 minutes to remove excess blood and tissues. Identify the isolate by hemagglutination inhibition test.
- i. Store the isolate at -70oC within 1 day of harvest.

### 4. Precautions:

- Never use -20°C to store avian influenza virus isolates as the virus is very unstable at this temperature.
- Be aware of contamination of clinical specimens with laboratory strains.

Proper safety procedures must be always observed when handling influenza viruses and special precautions should be observed when working with clinical specimens and laboratory-adapted influenza virus strains in the same work area.

Some laboratories prepare their own laboratory-adapted influenza virus for positive control in addition; laboratories frequently use commercially available influenza reference viruses for their quality assurance program. These viruses are selected because of their optimal growth properties. Consequently, laboratory-adapted and reference influenza virus strains are frequently source of cross contamination with clinical specimens. It is extremely important that all laboratory-adapted controls be prepared, tested and stored well in advance of the influenza season. If laboratory-adapted control viruses must be replenished during the influenza season, this should be done on



days when clinical material is not being inoculated. Likewise, quality assurance tests with commercial reference viruses should be performed outside the influenza season or on days when clinical material is not being inoculated. Acceptable laboratory practice always requires that known viruses and unknown materials must be worked in different time and in separate biosafety cabinets or rooms. Likewise, it is critical that clinical material obtained from swine or birds be processed in separate laboratories from human samples by different laboratory staff.

Identification of contamination:

Because laboratory-adapted viruses and commercial reference viruses are prepared using well-adapted strains, they usually grow to high titers. If in doubt, complete antigenic analysis by HAI using selected reference antisera and sequencing can be performed to determine if an isolate has been contaminated inadvertently.

Golden rule 1: Never process clinical specimens for virus isolation and laboratory-adapted strains at the same time

Golden rule 2: Never process clinical specimens from humans and from swine or birds in the same laboratory.

## **Title: Standard Operating Procedure for Haemagglutination-Haemagglutination Inhibition test (HA-HI)**

### **Purpose:**

For sero-surveillance against avian influenza (AI) infection as well as for antigen detection in allantoic fluid.

### **Scope:**

This test is applied for laboratory sero-surveillance to detect the past infections with AI and detection of HPAI virus after replication in embryonated eggs. Thus, this test is not only versatile but simple too.

### **Users:**

Veterinarians and laboratory staff of RLDCs & NCAH

### **Manpower:**

Supervisor: Veterinarian/ Laboratory Head

Implementer: Laboratory staff.

### **Materials/Equipment:**

- RBC from MDF chickens.
- Killed Antigens and antibodies
- Pipettes
- Microtitre plates
- Microtitre plate sealer
- Multichannel pipettes
- PBS
- Reagent trough
- Plate lay-out
- Disinfectants
- Fridge
- Syringe 5 – 10ml
- Needles
- 

### **Procedure**

**Haemagglutination (HA) test:** The HA-HI steps in flow-diagram are as follows:

Dispense 25  $\mu$ l of PBS into each well of V-bottom 96 well Microtitre plate



Place 25  $\mu$ l of antigen/sample (allantoic) into first wells



Make twofold serial dilution of 25  $\mu$ l of the samples across the plate



Add 25  $\mu$ l of 1% (v/v) chicken RBC to each well and mix gently



Allow RBCs to settle for about 30 minutes at room temperature



#### Interpretation

- ⌚ Estimate 4HAU.
- ⌚ Verify 4HAU by back titration

#### Haemagglutination Inhibition(HI) test:

Dispense 25  $\mu$ l of PBS into each well of V-bottom 96 well Microtitre plate



Place 25  $\mu$ l of serum into first wells



Make twofold serial dilution of 25  $\mu$ l of the samples across the plate



Add 4HAU of virus/antigen in 25  $\mu$ l volume to each of well and leave for a minimum of 30 minutes at room temperature or 60 minutes at 4° C.



Add 25  $\mu$ l of 1% (v/v) chicken RBC to each well and mix gently



Allow RBCs to settle for about 40 minutes at room temperature or 60 minutes at 4° C.



#### Interpretation

- ⌚ The HI titer is the highest dilution of serum causing complete inhibition of 4 HAU of antigen.
- ⌚ HI titers may be regarded as being positive if there is inhibition at a serum dilution of 1/16 ( $2^4$  or  $\log_2 4$ ) or more against 4 HAU of antigen

## **Title: Standard Operating Procedure for Conventional and Real-Time Reverse Transcriptase – Polymerase Chain Reaction (RT-PCR)**

### **Purpose:**

Diagnosis and confirmation of Avian Influenza virus by identification of viral genome, viral sub-typing, rapid viral genome identification by real time RT-PCR, characterization and sequencing.

### **Scope:**

The document describes the basic procedure for Reverse Transcriptase polymerase chain reaction using conventional as well as real time RT-PCR. Viral extraction, cDNA synthesis and PCR reaction may differ with different kits, thus specific literatures should be referred during the procedure.

### **User:**

Veterinarians and laboratory personnel.

### **Manpower:**

Supervisor: Laboratory head will supervise the procedure

Implementer: Laboratory head and laboratory technicians

### **Materials/Equipment:**

- Sterile 0.2 ml microcentrifuge tubes
- 10, 20 and 100 ul adjustable pipettes and tips
- Microcentrifuge machine
- Vortex
- Bio-safety cabinet
- Thermocycler machine
- Viral RNA extraction kit
- Ice making machine (portable)
- Deep freezers
- Cool box
- 70% ethanol
- Gel loading layout worksheet sheep
- PPE – Make sure you wear the appropriate level of personal protective equipment, based on the material you are handling.

### **Procedure:**

#### **A. Conventional RT-PCR:**

##### **a. Viral RNA extraction**

- Follow the viral RNA extraction kit insert for extraction of viral RNA
- Store the final product (RNA extract) at -20°C for short term storage or at -70°C for long term storage.

### b. Synthesis of cDNA

- Mix and briefly centrifuge each of the following reagents before use
- Combine the following in a 0.2 ml tube

Reagents	Amount
Viral RNA	8 ul
Primer 50 ng/ul random hexamers	1 ul
10 mM dNTP mix	1 ul
Final volume	10 ul

- Incubate at 65°C for 5 minutes and then place in ice for at least 1 minute
- Prepare the following cDNA synthesis mix by adding each reagent in the indicated order

Reagent	1 Rxn	10Rxns
10x RT buffer	2 ul	20 ul
25 mM MgCl <sub>2</sub>	4 ul	40 ul
0.1 M DTT	2 ul	20 ul
RN <sub>ase</sub> OUT™ (40 U/ul)	1 ul	10 ul
SuoerScript™ III RT (200U/ul)	1 ul	10 ul

- Add 10 ul of cDNA syhthesis mix to each RNA/primer mixture, mix gently and collect by brief centrifugation. Incubate Random hexamer primer for 10 minute at 10°C followed by 50 minutes at 50°C.
- Terminate the reaction at 85°C for 5 minutes and chill in ice
- cDNA synthesized could be stored at -20°C or used for PCR immediately

### c. PCR reaction (Amplification of target cDNA)

- Prepare a PCR mixture for each control reaction by adding the following to a 0.2 ml tube sitting on ice

Component	Volume
DEPC-treated water	30 ul
Go Tag Green Master mix 2X	50 ul
Multiplex 3 primers Mix (each 20 uM)	10 ul
Target cDNA from step (b) above	10 ul
Final volume	100 ul

- Mix the contents of the tube and centrifuge and collect the reaction components
- Place reaction mixture in preheated (94°C) thermal cycler and perform initial denaturation step i.e. 94°C for 2 minutes
- Program 35-40 cycles of PCR as follows

Denature	94°C for 30 seconds
Annealing	50°C for 90 seconds
Entension	68°C for 2 minutes
Final extension	68°C for 15 minutes

- Final product is maintained at 4°C

#### **d. Agar Gel electrophoresis**

- Place 1.5% agarose gel into the electrophoresis chamber
- Remove 5 ul of PCR product from each reaction tube to a para-film sheet and mix with 1 ul of gel loading buffer
- Load 0.5 ul molecular weight marker mix with 1 ul gel loading buffer and 4.5 ul ultra water to the first well of the gel
- Pipette 6 ul of PCR reaction, each samples to wells of gel separately
- Close the lid of the gel chamber and attach the electrodes
- Run the gel at 100V for 15 minutes.

#### **e. DNA bands staining**

- Put agarose gel into 0.5 ug/ml ethidium bromide solution in water and let the gel stain for 20 minutes
- Destain the gel in water for 20 minutes
- Expose the gel to UV light between 250-310 nm wavelength to visualize the bands
- Document gel with photograph and compare the PCR fragments with the marker.

**Note:** Ethidium bromide is a planar multi-ring compound and is a mutagen. Always wear gloves while handling the gel or solutions containing the dye.

### **B. Real Time RT-PCR:**

**Note:** The protocol for real time RT-PCR is optimized by different manufacturers depending upon the kits. Therefore, manufacturer specific protocols should be followed; however the basic principles can be summarized as follows:

- Preparation of PCR mix following the kit insert guidelines
  - Master mix
  - Primers
  - Probes
  - Sample
- Program the PCR machine as instructed in the manual
- Run the samples
- Print out the results and interpret

## **Title: Standard Operating Procedure for use of Personal Protective Equipment.**

### **Purpose:**

Personal Protective Equipment consists of specialized clothing or equipment worn by personnel involved in disease control activities for protection against infectious materials. This is critical in the event of Highly Pathogenic Avian Influenza disease outbreak, in protecting personnel involved in carrying out disease control measures.

### **Scope:**

The document gives the guidelines to the use of PPE in an appropriate manner. In the event of a pandemic, the availability and appropriate use of PPE is critical in protecting the personnel involved. Disposable PPE should be used whenever possible, because the virus can remain infectious on garments for long periods of time and once used PPE should not be reused.

### **User:**

All personnel involved in active disease control measures.

### **Manpower:**

Supervisor: The Commander of Incident Operation Centre

Implementer: All personnel involved in active disease control measures.

### **Materials/Equipment:**

- Coveralls / aprons
- Shoe cover/boots
- Respirators / face masks
- Face shield/ Goggles
- Hood/cap/hair cover
- Apron
- Gloves

### **Procedure:**

Note: Before you begin putting on your PPE, it is important to designate a clean location to put on the equipment, preferably away from anything that could be contaminated with infectious materials. Wash your hands with soap and water before you begin, and remove watches and other non-smooth jewelry like bracelets.

1. **Coveralls:** Put on coveralls first. Step into the “feet” of the coveralls first, and pull them up. Zip up the front of the coveralls. You should keep your regular clothing and shoes on under the coveralls.



Putting on coveralls

2. **Shoe cover:** Put on shoe covers second. They should fit over your coverall feet, giving you another layer of protection to protect your shoes from contamination.
3. **Respirators:** Put the respirator under your chin with the nosepiece up. Pull the bottom strap over your head, and place it around your neck below the ears. Then pull the top strap over your head and rest it high at the top back of your head. Place your fingertips from both hands at the top of the metal nosepiece. Using two hands mold the nose area to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece.



Putting on respirators

4. **Goggles/Face shield:** Put on the face shield/Goggles and then pull coverall hood/cap/hair cover over the head, the elastic should hold it in place.





Wearing goggles and then pulling over the hood of the coveralls

5. **Aprons:** Aprons are provided to fit over the coveralls. They are in a small packet that you will open up, place the apron over. These aprons will protect against splashes and prevent wetting your coverall.



Putting on aprons

- 6. Gloves:** Put on the inner pair of gloves first (usually white or clear), and then the outer gloves which are usually be a different color than the inner gloves and thicker. Pull them over the inner gloves. Pull the edge of the gloves over the cuff of your coveralls or gown, if possible.





Putting on gloves

### **Procedure for Removing and disposing off PPE**

1. Open the pouch with the germicidal wipe and use it first on your outer gloves and then on your outer boots.
2. Place it in the red biohazard bag when done.



Now you are ready to enter the contaminated area

**LABORATORY SAMPLE DATA SHEET (Poultry)**

**Ministry of Agriculture  
Department of Livestock**

<b>Reference No.:</b>		<b>Submitted to: NCAH/RLDC (                      )</b>		
<b>Collection date:</b>		<b>Submission date:</b>		
<b>Submitting veterinarian:</b>				
<b>Designation:</b>				
<b>Address:</b>				
<b>Contact phone number:</b>				
<b>Farm / Owner:</b>				
<b>Address of farm/village:</b>				
<b>Contact phone number:</b>				
<b>Means of sample shipment (Lab. Staff/Paravet/Veterinarian/driver/others (                      )</b>				
<b>Species of bird</b>	<b>Type</b>	<b>Breed</b>	<b>Age</b>	
<b>No. of birds in affected flocks</b>	<b>No. affected</b>	<b>No. died</b>	<b>No. of birds sampled</b>	
			<b>Sick</b>	<b>Dead</b>
<b>History of outbreak (including date of onset):</b>				
<b>Clinical signs:</b>				
<b>Necropsy findings (if done)*:</b>				
<b>Treatment given:</b>				
<b>Preliminary diagnosis:</b>				
<b>Details of samples submitted:</b>				
<b>Specimen type</b>	<b>Specimen ID #</b>	<b>Preservative used</b>	<b>Tests requested</b>	<b>Remarks**</b>
<b>Date:</b>			<b>Signature:</b>	

\* Necropsy should be done only at designated places. Special protection must be taken if AI is suspected.

\*\* Information on pooling of sample, storage condition before dispatch, other staff or teams involved (disease investigation/RRT), concerned agencies informed etc. should be given

**LABORATORY SAMPLE DATA SHEET (Wild birds)**  
**Ministry of Agriculture**  
**Department of Livestock**

Submitter information	Incident information
Submitter's name: .....	Date of observation.....
Dept/Organization: .....	Date of report: .....
Address: .....	Location(exact location – with GPS data if possible: .....
Fax: .....	Gewog: .....
E-mail: .....	Phone: .....
Signature:	Mobile: .....

**Animal details:**

Species affected (common name, genus and species): .....

Total of each species: .....Unaffected/Normal: .....Sick:.....Dead: .....

Approximate ages of affected animals: Chick:  Juvenile:  Adult:

Sex of affected animals: Unknown:  Male:  Female:

Description of incident: .....

.....

.....

Environmental conditions: Weather, recent rainfall, changes in ground water levels, changes in domestic animal management:

.....

.....

Clinical signs in animals: .....

.....

Gross pathology findings: .....

.....

Management actions taken: .....

.....

*Please use additional pages as necessary for thorough descriptions and additional observations*

Species	Animal Identification Number	Location	Live/Dead Euthanized/Method	Carcass kept Fresh/Frozen	Serum/Plasma	Swabs collected Tracheal/Cloacal	Tissues Fresh /Fixed	Photo Yes/No	Collector
---------	------------------------------------	----------	--------------------------------	------------------------------	--------------	-------------------------------------	-------------------------	-----------------	-----------

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Specimen stored/sent where? .....

.....

.....

Names of all people present during sample collection:

**Signature**





# **Standard Operating Procedures for Culling and Disposal**

## **I. Purpose**

The purpose of this SOP is to ensure that the implementation of culling and disposal for the control of HPAI outbreak are carried out smoothly, successfully within a shortest possible time and re-establish Bhutan's HPAI-free status.

Stamping out method of the disease control strategy is to be adopted for HPAI outbreak as it the most acceptable and effective control method for eradication. This control measure needs to be accompanied by strict quarantine and control measures, decontamination of infectious material on infected premises (IPs), targeted tracing and surveillance, and enhanced biosecurity by all levels of the poultry production and processing farms.

## **II. Scope**

This SOP covers the guidelines and steps for humane culling and safe disposal of poultry, poultry products, feeds and litters including other infected materials by the culling and disposal team.

## **III. Target/User: Culling and Disposal Team**

## **IV. Composition of the team**

1. Team leader: Dy. Chief Regulatory and Quarantine Officer, BAFRA
2. Technical Assistants: BAFRA Livestock Inspectors (two each in each culling group). One of them in each group shall act as animal welfare Inspector
3. Record keeper: BAFRA Livestock Inspector (one each in each culling group)
4. Cullers:
  - a) Hired and trained personnel for neck dislocation (2 in each culling group).
  - b) Bird catchers (2 each in each culling group).
5. Gas operators: One BAFRA Inspector in each culling group will be appointed as gas operator in case of CO<sub>2</sub> gassing.
6. Disposal labourers: Two hired and trained labourers for disposal in each culling group
7. Hired labourer for digging burial pit: 5 labourers at each disposal site

## **V. Materials and Equipment Required**

### ***A. Personal Protective Equipment***

Each culling member must be provided with adequate protective measures from infection by means of a set of a Personal Protective Equipments (PPE) which include:

1. A coverall (with hood and boots)
2. An N-95 respirator
3. Goggles
4. Outer glove- (Nitrile)
5. Inner gloves - (Vinyl)
6. Shoe covers
7. A plastic apron that comes in a pouch
8. A Respirator Fit Test Kit (with Bitrex solution)

**Each person should be provided with at least two sets of PPE per day. These items should be worn at all times when they are in the infected birds or in the infected premises.**

### ***B. Disinfectants***

Each culling group should be provided with each set of following disinfectants:

1. A 5 kg container of Virkon® S disinfectant
2. Sani Cloth Disinfectant Wipes (160-count canister of PDI HB Sani Cloth) or an antiseptic wash shall be used if it is not available.

### ***C. Personal cleaning and disinfection supplies***

1. A scrub brushes (2 each for each group) for removing dirt and other particles before using disinfectants.
2. Two sprayers (10 liters capacity) meant for dispensing Virkon® S or other disinfectant
3. Four bars of soap that you can use to wash your hands and face.
4. A plastic basin each for foot bath.
5. A large bucket that can hold approximately 20 liters - you will use this to mix the Virkon® disinfectant powder with water.

### ***D. Biohazard control materials***

1. A few alcohol cotton pads, 70% ethanol - these are generally used to wipe your hands after removing your PPE
2. A red biohazard bag (two numbers each) for placing your used PPE in as you remove it
3. PDI HB Sani Cloth virucidal wipe (one packets each)
4. Eye wash
5. First aid kit.
6. Flash light

### *E. Culling equipment*

Each culling group should have following set of equipment:

1. Burdizzos (3 nos.), forceps(3 nos.), or pliers (3 nos.)
2. Portable CO2 Cylinders - need only if CO2 method is used
3. Gassing bins - need only if CO2 method is used
4. Hose(s) for CO2 (2 nos of 10 meter) - need only if CO2 method is used
5. Long handled fishing nets (1 no.);
6. Heavy-duty trash bags (20 nos.);
7. Small plastic bags (50 nos.);
8. A Roll of duct tape;
9. A Roll of black tape;
10. Roll of paper towels (2 nos.);
11. Zip lock bags (2 nos.);
12. Clipboard, water-proof notebook and pen (2 sets each);
13. Barrier tape (2 rolls of 50 meter)

### *F. Disposal materials and equipment*

The following general equipment and supplies are required:

1. Spade and Shovels (3 nos. each)
2. Calcium hydroxide (25 kg bags x 2 nos.)
3. Waste Containers bags
4. Roll of black plastic (2 rolls)
5. Heavy-duty trash bags (20 nos.);
6. Small plastic bags (50 nos.);
7. A Roll of duct tape;
8. Roll of paper towels (2 nos.);
9. Zip lock bags (2 nos.);
10. Fire extinguisher (portable size - 1 no.).
11. Barrier tape (2 rolls of 50 meter)
12. Excavator - in case of culling of large poultry population in the same locality and if the burial site is accessible

## **VI. Culling Procedures**

### ***A. General consideration***

1. All birds in the infected premises will be subjected to stamping out once a clinical disease or evidence of active HPAI virus infection is confirmed. In addition, pre-emptive culling will be done in protected zone (on high risk premises such as dangerous contact premises-DCPs, contiguous premises-CPs and suspect premises-SPs) established through epidemiological assessment.
2. Plan for culling should be established based on the information and situation of the infected premises by the team leader.
3. The culling team must be lead by the veterinarian (Dy. CRQO).
4. Determine the site for culling and disposal of poultry. To minimize the handling and reduce stress on the poultry, they should be preferably culled on the affected farm, as close as possible where they are housed.
5. Make sure that the area chosen for culling is not in the view of neighbours or other crowds, and that only individuals involved in culling operations are in the area. Clearing the culling area of unnecessary bystander not only makes the process more efficient, but also limits the number of people expose to blood, feathers, other poultry parts, and potentially contaminated equipment and surface areas.

### ***B. Culling procedure***

1. Identify and establish a proper site outside and close to periphery of culling and decontamination line for putting on PPE, unloading materials and equipment required for culling and decontamination.
2. Where the infected area is accessible by road, a culling and disposal crew vehicle shall be parked at this site.
3. Take off all materials and equipment from the vehicle.

#### ***Before entering the infected premises***

4. Assemble the team and organize into groups as per the specific tasks to be performed in the orderly manner and distribute the materials and equipment to each member.
5. The Team Leader shall then provide necessary briefing to all culling and disposal groups.
6. Put on PPE as per the SOP for use of PPE before crossing the culling, cleaning and disinfection line (protected zone).



7. Culling team shall be divided into groups - the first group should start culling in the infected farms and other group(s) shall start culling from the periphery of protected zones and move towards centre of the infected area.
8. Once personnel have entered premises, they may not cross back over the culling and decontamination line for any reason without removing and properly disposing of all PPE and proper personal disinfection.
9. Groups identified for culling the infected farms shall only come out after completing the culling and disposal.
10. In the infected premises it is preferable to cull the infected birds first followed by birds in contact with infected birds, and finally remaining birds in the flock.
11. Catching birds:
  1. Chicks are easily caught under the heaters and are killed by neck dislocation and put in the plastic garbage bins. If they are to be culled by CO<sub>2</sub> then they are to be transferred into gassing bins.

2. Broiler chickens on the ground are driven, using movable Hessian wall to the catching area where they are caught.
3. In case of caged birds remove one bird at a time and killed by neck dislocation as described earlier. If the CO2 method is to be used remove 3 or 4 birds from cages and carry them by legs to the gassing bins.

12. Culling methods - decide on the appropriate method to be used and follow the procedures described under the Section VII (A & B) below.

### ***VII. Culling Method***

The method chosen for slaughter of poultry must be safe, humane and efficient. Any of the following two methods will be used for culling of birds depending on the population size.

#### ***A. Neck Dislocation***

This method will be adopted for culling poultry in small size backyard farms and village chickens (approximately below 1000 bird)

Neck dislocation is considered a humane method of poultry euthanasia and is the most common method for killing birds. The neck dislocation can effectively carried out using hands or with burdizzos, forceps, or pliers.

Following steps to should be followed for a neck dislocation:

1. Place the bird breast-down on a flat surface (or hold the bird against your hip).
2. Use one hand to hold both wings behind the bird's back.
3. Using your other hand to hold the head between your middle and ring fingers, with the middle finger on the back of the chicken's head.
4. Sharply turn the head 90 degrees while at the same time pulling it firmly and quickly away from the body (in a motion like stretching the neck). See diagram below. You will feel the vertebra separate.
5. Hold the bird in this position until agonal flapping stops.

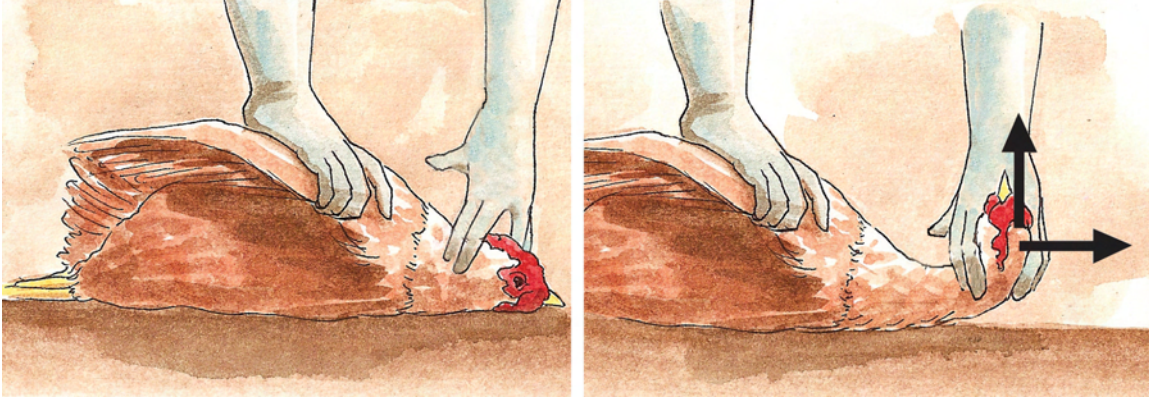


Figure 1. Demonstrates the neck dislocation method.

Others might be more comfortable using this grip:

1. Direct the bird's head toward you. Grasp the bird's head with a handshake grip.
2. Place your thumb behind the head at the base of the skull, allowing the remaining fingers to extend under the throat.
3. Hold the bird's feet with the other hand.
4. Stretch the bird until you feel the head separating from the neck vertebrae. You will probably need to bend the head back slightly while stretching the bird.
5. Be careful to stop pulling when the spine separates or the head may be pulled off.
6. The bird dies immediately when the spine separates.



Figure 2. Demonstrates another way of neck dislocation.

**Please keep in mind that the neck dislocation is preferred for water birds instead of CO<sub>2</sub>.**

## ***B. Carbon dioxide (CO2) method***

This method shall be used for culling poultry in commercial farms having more than 1000 birds where neck dislocation method will be tedious and time consuming to be performed.

Therefore the objective of adopting the CO2 method is the humane destruction of large numbers of birds in a short time. If used for small commercial operations it can be used by using appropriately designed bins made of plastic or other materials and lining a plastic sheeting over it so that it also forms a canopy over the top of the bin. Birds should be unconscious in one minute and dead within 3 to 5 minutes.

### ***Calculation of CO2 requirement***

- Determine the type and size of the euthanasia container to be used. The container used should be designed, constructed, and maintained in such a way as to avoid injury to the birds and allow them to be observed. Containers or apparatus should allow the required gas concentration to be maintained and accurately measured.
- The size of bins should be calculated based on the size and number of birds to be held in the enclosure. The following estimate may be used:

4 (4-6 pound) chickens per square foot of floor space.

- Determine the amount of CO2 required. Use 0.08 to 0.11 pounds of CO2 per cubic foot of enclosure to calculate this amount. The 0.08 figure is a minimum and does not allow any buffer for gas delivery problems. The 0.11 figure is based on filling the entire enclosure area which, in reality, is more than necessary because CO2 is heavier than air and settles to the lowest possible point. This figure provides a buffer of additional CO2.

Pounds of CO2 needed = length (feet) x width (feet) x height (feet) x 0.08  
pounds of CO2 per cubic foot.

For example, an enclosure 56 feet long, 24 feet wide, and 4 feet high will require a minimum of 430 pounds of CO2 ( $56 \times 24 \times 4 \times 0.08 = 430$ ).

- CO2 is available in 50 and 387 pound tanks (the large tanks sometimes freeze up, are hard to move and more complicated to operate). Divide the amount of CO2 needed by the tank size being used.



- In the above example, 430 pounds of CO<sub>2</sub> would be divided by 50 (if 50 pound tanks were being used). Approximately 8.5 tanks would be required (use 9 tanks). Alternative, 430 would be divided by 387 (if 387 pound tanks were being used). Use one large tank and one small tank.
- Extra CO<sub>2</sub> tanks should always be available at the site.

*Procedure:*

- A site plan is needed before beginning and should include access to birds and keeping their movement to a minimum.
- The birds are to be caught and place them either in the crate or heavy duty plastic garbage bags for transfer to bins for CO<sub>2</sub>.
- The container needs to be pre-charged with CO<sub>2</sub> for about 5 minutes before any birds are received. Each container should be supplied with a secured gas cylinder each.
- Place the gas hoses in the container, about 300 mm above the level of the birds, adjusting as the container gets filled with birds.
- CO<sub>2</sub> is pumped into the bottom of the bins, through a 2.5 cm garden hose fitted to the top of the CO<sub>2</sub> cylinders. The CO<sub>2</sub> should be released in 30-45 second bursts. Do not release the gas too quickly, or the bottles will freeze when they become about ½ empty. The concentration of carbon dioxide must be in the range of 60-70 % in the container, with the lid tightly closed (using plastic duck tape) for 1-2 minutes to properly stun and kill the birds.
- Usually, ½ of 45 kg cylinder of CO<sub>2</sub> is needed for the three cubic meter bins, and three or more cylinders are needed for the 20 cubic meter bins. Carbon dioxide should be added so that all birds are dead before others are placed on top of them. The bins should be 75% filled with birds, sealed, and transported to the disposal site. •
- Team members should ensure that there is sufficient time allowed for each batch of birds to die before subsequent ones are introduced into the container or apparatus.
- Only one layer of birds should be placed in a bin at once and inspect for death after 20 minutes.

- Additional layers of birds can be added at a time, until the bin is 70 to 90% filled.
- Seal the lids for containment and transfer to the disposal site. Care must be taken that no birds are buried alive.
- Hot water should be readily available in case the regulators freeze.
- CO2 gas has human health and safety risks and both a safety officer and First Aid should be available- SAFETY PRECUATION.



Figure 3. Demonstrates cCO2 gassing method.

### *Protocol for Compressed Gas (CO2) Cylinder Storage and Handling*

1. Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electric arc, or high temperature steam lines.
2. Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 feet from highly combustible materials such as oil or excelsior. Assigned storage spaces shall be located where cylinders will not be damaged by passing or falling objects, or subject to tampering by unauthorized persons.

NOTE: Cylinders should be stored in assigned places away from elevators, stairs, or gangways.

3. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

4. Compressed gas cylinders shall be stored or transported in a manner to prevent them from creating a hazard by tipping, falling or rolling.
5. All cylinders which are designed to accept valve protection devices shall be equipped with such devices when the cylinders are not in use or connected for use.
6. Unless cylinders are secured on a special truck or rack, regulators shall be removed and valve-protection devices, when provided for, shall be put in place before cylinders are moved.
7. Compressed gas cylinders in portable service shall be conveyed by suitable trucks to which they are securely fastened; and all gas cylinders in service shall be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.

EXCEPTION: When it is not practicable to transport cylinders by truck or to bring in racks to point of operation, cylinders may be carried in, and properly secured in an adequate manner. For short distances, cylinders may be moved by tilting and rolling them on their bottom edges.

8. Valve protection devices shall not be used for lifting cylinders.

EXCEPTION: Valve protection devices may be used for manual lifting if they were designed for that purpose.

9. Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen to the ground or otherwise fixed; the use of warm (not boiling) water is recommended.

NOTE: Valve protection devices are designed to protect cylinder valves from damage.

10. Cylinder valves shall be closed before moving cylinders.
11. Cylinder valves shall be closed when work is finished.
12. Valves of empty cylinders shall be closed.
13. Cylinders shall not be dropped or struck or permitted to strike each other violently.

14. Cylinder valves not provided with fixed hand-wheels shall have keys or handles on valve spindles or stems while cylinders are in service. In multiple cylinder installations only one key or handle is required for each manifold.
15. Leaking regulators, cylinder valves, hose, piping systems, apparatus and fittings shall not be used.

NOTE: (1) Cylinder valves shall not be tampered with nor should any attempt be made to repair them. If trouble is experienced, the supplier should be sent a report promptly indicating the character of the trouble and the cylinder's serial number. Supplier's instructions as to its disposition shall be followed.

(2) Complete removal of the stem from a diaphragm-type cylinder valve shall be avoided.

16. Cylinders shall never be used as rollers or supports, whether full or empty.
17. Cylinders must not be placed where they might form part of an electric circuit.
18. No one shall use a cylinder's contents for purposes other than those intended by the supplier.

## **VII. Disposal of Birds**

Safety, biosecurity, and compliance with environmental regulations are the primary issues to be kept in mind for disposal of large volumes of HPAI-affected material. Burial is the primary method of disposal for birds, eggs, litter, refuse from cleaning and disinfection activities, and for other potentially contaminated material.

Ideally, birds should be disposed of on site by burial. Alternatively, if no approved site is identified, they can be transported and disposed of elsewhere.

**The dead birds have to be buried within 24 hours of death.**

### ***A. General Procedures:***

1. To prevent virus spread, you must seal the containers (disposal or gassing containers) so they do not leak liquids or release debris such as feathers, feces or litter materials.

2. Carefully inspect the container for any breaches, holes, large cracks or sharp edges.
3. Avoid puncturing any plastic bags with your feet or tools. Always inspect the plastic bags to insure it is not damaged. Small plastic holes can be repaired easily with tape.
4. Plastic openings must be sealed using duck tape. Similarly container opening must be sealed with plastic and duck tape from the outside of the containers.
5. When container is full, or meets maximum weight limit, thoroughly wet the birds with Virkon® S. This will decrease virus shed and also minimize feathers from flying.

## ***B. Burial***

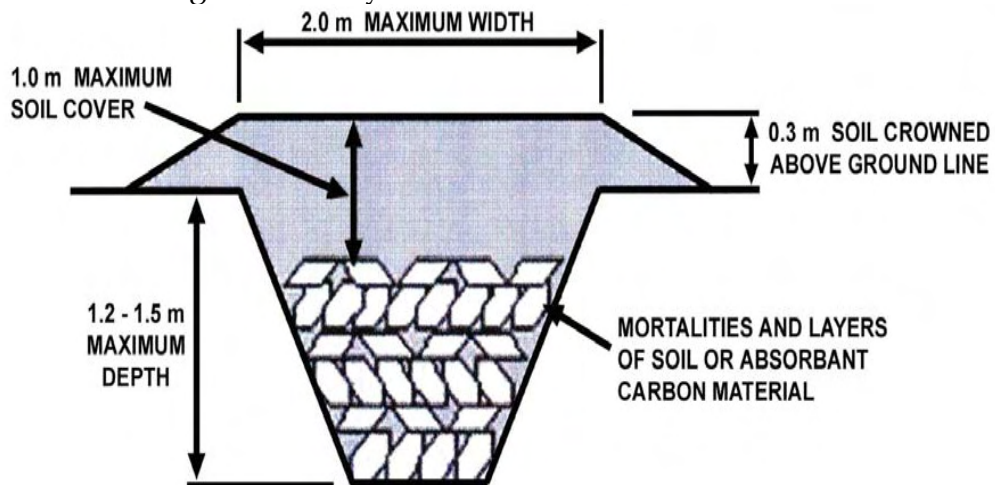
The first choice, by far, would be on-site burial. Identify the site for burial such that wild animals or dogs cannot access the birds once they are buried. Dig one or more pits to bury all the birds on the property. Considerations include the amount to bury, site availability, soil type, water table, nearby wells or ponds and digging equipment available.

### ***Burial site selection***

Important considerations for burial site selection include:

6. Access to the site - for both equipment to dig the burial pit and for the delivery of livestock, carcasses or other materials to be buried.
7. Environmental-distance to water sources, bores and wells; height of water-table; proximity to buildings, especially houses; proximity to neighbors or public lands including roads; slope of the land drainage to and from the pit; permeability of soil; sufficient space for temporary storage of overburden; and direction of prevailing wind.
8. Construction considerations-avoid rocky areas (slows digging and increases costs) but select soils with good stability capable of withstanding the weight of equipment used for construction of diversion banks if required. Similar banks should be constructed to prevent any liquids escaping from the burial site.

9. Fencing is necessary to exclude animals until the site is safe for use.



### *Burial pit construction*

1. The dimensions of the burial pit will be determined by the equipment used, site considerations and the volume of material to be buried.
2. A pit of 2 meters wide, 2 meters deep and 2 meters long would accommodate 1800 birds. If the pit is made one meter deeper the capacity would increase up to 3000 birds.

The number of birds can be doubled, each meter deeper the pit is made (3-6 meters)

3. Make sure that no bird is still alive when dropped into the burial pit. If this happens, birds must be immediately caught and humanely killed.
4. Carcasses should be covered by about 400 mm of soil and then an unbroken layer of slaked lime  $\{Ca(OH)_2\}$ . If this lime is applied directly to carcasses the decomposition process will be significantly delayed.
5. When closing the pit, surplus soil should be heaped over the pit as overfill. The weight of soil acts to stop carcasses rising out of the pit due to gas entrapment, prevents scavengers digging up carcasses, helps filter out odors and assists in absorbing the fluids of decomposition. After pit subsidence it will be necessary to replace any topsoil not utilized during pit closure.
6. Disinfectants are needed to be sprayed on equipment used and on the pathway used to take carcasses to the pit. The way to dispose off PPE,

tools and bird carcasses and bird parts may be different in each situation or location.

7. The burial pit should be located away from human and animal living areas and water—including wells, lakes, ponds or rivers.
8. The burial pit should be large enough to hold all of the dead birds and at least 0.6 meters (2 feet) of soil on top of the carcasses.

### ***C. Burning***

The second choice is burning but this may be influenced by fire restrictions, prevailing winds, a small site and the availability of cremation fuel. Burning may be quicker, cheaper and a way to avoid a high water table.

If you are burning carcasses or used PPE or other contaminated tools, keep the following in mind:

1. Carcasses may be burned on a stack with flammable liquid.
2. Arrange fuel and carcasses so that enough air can enter the fire from below and achieve the hottest fire possible in the shortest period of time.
3. After finishing piling the carcasses, pour fuel like kerosene (but not petrol/gas) on the fire bed and place rags soaked in kerosene every ten meters along the length of the fire bed.
4. Start the fire by walking into the wind and lighting the rags along the way.
5. Make sure that someone watches the fire at all times. To make sure that enough fuel is used and that any carcasses or bird parts that fall off the fire are replaced again.
6. The ashes can be buried as described in the section on burial above.

### **VIII. Disposal of Infected Material**

1. Eggs, contaminated feed shall be buried along with other infectious materials at the site.

2. Similarly manure, litter, feather and poultry feed have to be buried. Litter may also be burned if quicker decontamination is desired.
3. Equipments and items that cannot be disinfected effectively have to be collected in a disposable bag and have to be burnt/incinerated.

#### **IX. Steps to be followed after Culling and Disposal**

1. Culling and disposal team members should remove PPE and place them in trash bag, which are to be placed in biohazard plastic bags before crossing over the culling and decontamination line.
2. By the end of each work day, culling and disposal team members shall dump all the used PPE and other infectious materials.
3. All shall disinfect shoes, thoroughly wash hands at the wash station and sanitize your hands.
4. All tools and other equipment must be cleaned and disinfected before being brought across the culling and decontamination line
5. All personnel must disinfect their foot by dipping them footbath before leaving the place.
6. Similarly all parts of vehicles (especially tyres) must be disinfected at culling and decontamination line.
7. Once the personnel protective equipment has been removed, designated personnel must disinfect personal footwear.
8. Personnel may not re-enter the infected premises without following the requirement for entering the infected premises.

#### **X. Personal Safety**

1. All individual involved in culling operations should be provided with appropriate PPE and training on how to properly use them.
2. All should be treated with appropriate anti-viral drug before entering infected area.
3. It is recommended that, if possible, all people exposed to infected chickens should be monitored by local health authorities for at least 7 days.
4. If symptoms of avian influenza are detected, there should be a clear way to report this information to local health officials. This symptoms include:
  - Fever over 380C
  - Sore throat or cough
  - Respiratory distress or failure

#### **XI. References:**



1. STANDARD OPERATING PROCEDURES- Highly Pathogenic Avian Influenza (HPAI) Task Force.
2. AusVet AI Plan
3. Work Book for UPAZILLA AND DISTRICT OFFICERS
4. Developed for

*This protocol was developed from excerpts from subchapter 7 – General Safety Orders, Group 9 – Compressed Gas and Air Equipment, Article 76 – Compressed Gas and Air Cylinders (ss4650)*

## Social Distancing

Controlling outbreaks of infectious diseases often involves cooperation and collaboration by the affected community in order to achieve containment. The public health measures to control an outbreak of infectious disease are first aimed at intervening in individual cases or small clusters of disease to delay the spread of a pathogen. The objective is usually to prevent persons who are already ill from exposing others. Additional objectives include reducing the risk of illness in those who are exposed and preventing those not infected from becoming infected.

To accomplish these objectives, standard control measures include isolation of cases, identification of contacts, employing voluntary or mandatory (involuntary) isolation and quarantine, employing good infection control measures, and administering antibiotics, antivirals, and vaccines if they are available and effective.

If these approaches fail or are not available to be used (i.e., transmission cannot be contained), then community containment or mitigation measures may be required. Community measures are based on the expectation that reducing unprotected face-to-face contacts between people (e.g., increasing the physical distance between people) will reduce the likelihood of disease transmission.

It is important to distinguish between the concepts of isolation and quarantine. **Isolation** is the separation or restriction of movement of **people who are sick** with an infectious disease, in order to prevent transmission to others. **Quarantine** is a restraint upon the activities (e.g., physical separation or restriction of movement within the community/work setting) of a **person who has been exposed to an infection, and is not yet but may become ill**, to prevent the spread of disease. Many respiratory infections, including pandemic influenza, can be transmitted by a person before he or she develops symptoms of the illness. Both isolation and quarantine may be applied voluntarily or on a compulsory basis, depending on the characteristics of the pathogen and the outbreak, relevant legal authorities, and whether either of these strategies is felt to be beneficial at the time.

Community mitigation measures are not limited to isolation and quarantine. Implementation of most of the recommended community measures can be difficult because they rely on the voluntary cooperation of members of the community. These measures may include international travel restrictions, but domestic travel probably would not be restricted. Law enforcement might be called upon to enforce public health community measures.

Measures to encourage people to avoid face-to-face contact include:

- Voluntary isolation of people with confirmed or probable cases of the disease

(e.g., pandemic influenza) and treatment as appropriate. (Depending on the severity of the illness and/or the capacity of the health care infrastructure, individuals may be isolated at home or possibly in a health care setting, if they need a higher level of medical care.)

- Voluntary home quarantine of household members who have been exposed to someone with confirmed or probable disease. Quarantine may be combined with prophylactic use of medications, if effective medications are available.

Social distancing measures designed to increase the space between people and decrease the frequency of contact among them include:

- School closure (see Annex 3).
- Closing childcare programs; and reducing out-of-school social contacts among children and youth.
- Reducing contact between adults in the community and workplace (e.g., canceling large public gatherings, postponing special events, altering workplace environments and schedules, changing leave policies).
- Curtailing mass transportation.

Specific community response measures should be selected based on the severity level of a pandemic (in the case of pandemic influenza, primarily determined by case fatality ratios), and would be triggered by the phase or interval of the pandemic, e.g., the arrival and transmission of a virus in a geographic locale. The threat level a disease poses for a particular jurisdiction typically is assessed by local jurisdictions following national guidelines.

## **Tool Kit for Schools on prevention of influenza pandemic infection**

### **Background information**

Families, students, and school staff can keep from getting sick with flu in three ways:

- Practicing good hand hygiene. Students and staff members should wash their hands often with soap and water, especially after coughing or sneezing.
- Practicing respiratory etiquette. The main way that the flu spreads is from person to person in the droplets produced by coughs and sneezes, so it is important to cover your mouth and nose with a tissue when you cough or sneeze. If you don't have a tissue, cough or sneeze into your elbow or shoulder, not into your hands.
- Staying home if you're sick. Keeping sick students at home means that they keep their viruses to themselves rather than sharing them with others.

### **Recommendations:**

#### **School Action Steps**

Schools should take the following steps to help keep students and staff from getting sick with flu.

- Review and revise existing pandemic plans and focus on protecting high risk students and staff.
- Identify and establish a point of contact with the local public health officials.
- In the presence of a virulent novel virus, schools should conduct active symptom screening of students and staff upon arrival at school. Any sick students or staff should be separated from others, offered a surgical mask, and sent home.
- Encourage respiratory etiquette by providing staff and students with education and reminders about covering coughs and sneezes, and easy access to tissues and running water and soap.
- Remind staff and students to practice good hand hygiene and provide the time and supplies for students and staff to wash their hands when needed.
- Send sick students and staff home. Advise students, staff, and families that sick people should stay at home until at least 24 hours after they no longer have a fever or signs of a fever.
- Remind parents and staff how long sick students and staff should remain at home.
- Clean surfaces and items that are more likely to have frequent hand contact with cleaning agents that are usually used in these areas. Additional disinfection beyond routine cleaning is not recommended.
- If possible, move students and staff who become sick at school to a separate room until they can be sent home. Limit the number of staff who take care of the sick person and provide a surgical mask for the sick person to wear if they can tolerate it.
- If possible, schools should find ways to increase social distances (the space

between students and teachers) at school, e.g., by increasing the space between each student's study place, by holding classes outdoors, dividing classes into smaller groups, etc.

- Update student and staff contact information as well as emergency contact lists.
- Develop a plan to cover key positions, when staff stays home because they are sick.

### **Pregnant women**

Pregnant women who are working in or attending schools should follow the same guidance as the general public about staying home when sick, hand hygiene, respiratory etiquette, and routine cleaning. Pregnant women may be at higher risk of complications from flu and should seek health care as soon as they develop a flu-like illness to find out whether they should take antiviral flu medicines. In the presence of a virulent new strain, early treatment with antiviral flu medicines is recommended for pregnant women who might be infected.

### **Returning to School**

In general, students and staff with symptoms of flu should stay home for at least 24 hours after they no longer have fever or do not feel feverish, without using fever-reducing drugs. In the presence of a circulating virulent strain, the sick person should probably stay home for 7 days.

### **School Closure**

There are two kinds of school closure:

- **Reactive closure** -- School closure should be considered when many students and staff are sick and are not attending school, or many students and staff are arriving at school sick and are being sent home.
- **Preemptive closure** – In the presence of a highly virulent novel virus, closure of schools early during a flu response in a community should be considered before many students and staff become ill. In the presence of severe flu in the region, this type of closure is most effective at decreasing flu spread and burden on the healthcare system when done early in relation to the amount of flu activity in the area. The presence of the first few cases in the community should trigger this kind of closure.

The decision to close schools should be made at the community level. Local health and government officials should work closely with school officials to make sound decisions, based on local conditions. The decision should consider:

- the number and severity of cases in an outbreak (looking at national, regional, and local data),
- the risks of flu spread and benefits of closure,

- the problems that school closure can cause for families and communities, and
- different types of closure (reactive or preemptive).

The length of time that the school should be closed will vary depending on how severe the flu is and how many people are sick. When the decision is made to close a school, it should remain closed for at least 5-7 calendar days. Near the end of this period, communities should reassess the severity and impact of the flu, the benefits of keeping students home, and the consequences of doing so. Based on this reassessment, communities can decide whether to extend the school closure for another week or to reopen the school. However, if a flu outbreak is determined to be severe, a longer time period may be necessary.