

# **PUBLIC HEALTH INTERVENTIONS for PREVENTION and CONTROL of AVIAN INFLUENZA**

**A Manual for Improving Biosecurity  
in the Food Supply Chain:  
Focusing on Live Animal Markets**

**March 2006**



**World Health  
Organization**

Regional Office for South-East Asia  
New Delhi



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“The main health risk currently is to people who are in close contact with infected poultry, such as families with backyard flocks and poultry workers in wet markets or live animal markets. Globally, the evidence demonstrates that there is no risk of infection when birds and eggs are well-cooked, as this kills the virus. Poultry products are important sources of protein throughout the world.” LEE Jong-wook , M.D., Dr P.H., Director General, World Health Organisation.

“In addition to drugs and vaccine, certain public health interventions must be included in the AI preparedness plans. We should help educate people to protect their own health, through information and communication. We should develop educational messages that are easily understood by lay people, addressing the need for improved hygiene, sanitation and food safety. These messages should be translated into local languages, and disseminated widely.”

Samlee Plianbangchang, M.D., Dr P.H., Regional Director, World Health Organization, Regional Office for South East Asia.

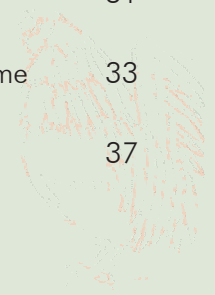
## Acknowledgments

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# 1 Introduction

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This Manual has been developed to help strengthen the capacity of Member States in implementing effective public health interventions to prevent and control the spread of Avian Influenza (AI) at source.

The Manual attempts to provide simple, yet valuable, public health related measures that will not only improve and enhance biosecurity at critical stages of the food supply chain (production, transportation, marketing and consumption), but also ensure that the potential transmission of Avian Influenza virus from animals to humans is considerably reduced.

Biosecurity includes the management of all biological and environmental health risks associated with food. In the context of this Manual, biosecurity consists of a set of management practices which, when followed, collectively reduces the potential for the transmission / spread of disease-causing organisms - such as the Avian Influenza virus - onto and between sites, animals and humans.

Effective implementation of these simple public health measures would mean that the concept of healthy food markets could be established in practice and that potential heavy loss of human lives could also be avoided.

This Manual is addressed specifically to people who handle poultry and its products, whether at its stages of production; transportation; handling and processing at live animal markets; or closer to homes, while preparing the food.

The document therefore, seeks to draw close the attention at those handling poultry and its by-products, all along the food supply chain. That includes, but is not restricted to, managers of poultry production units, transporters, marketplace managers, municipal authorities, health workers, food inspectors, veterinarians, vendors, food handlers and consumers.

# 2 What is Avian Influenza?

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Outbreaks of Avian Influenza in poultry, when caused by highly pathogenic viruses of the H5 or H7 subtypes, are of great concern for the agricultural sector and can have considerable economic consequences. Such outbreaks are also of concern to human health. WHO, therefore recommends, for certain Avian Influenza viruses, a series of protective measures aimed at preventing human infections in persons at high risk of exposure.

For several reasons, the highly pathogenic H5N1 virus the greatest concern at present. Of all Avian Influenza viruses known to infect humans, H5N1 has caused the greatest number of cases of very severe disease and the largest number of deaths. Moreover, H5N1 has the potential to trigger an influenza pandemic. The virus has also proved to be particularly difficult to control in poultry populations and is now considered endemic in parts of South-East Asia<sup>1</sup>.

## 2.1 Affected species and natural hosts

Chickens, ducks, geese, turkeys, guinea fowl, quail, pigeons and numerous wild

birds may all be affected by influenza viruses. Depending on the virus or on the host, some birds will be resistant, others will get infected and may or may not show clinical signs.

Ducks are known to be resistant to the viruses and thus act as a "silent reservoir" that perpetuates transmission. In recent months, evidence has mounted that at least some species of migratory birds are directly spreading the virus, in its highly pathogenic form, H5N1, to parts of Central Asia and Europe. In addition to this, birds that survive infection may excrete the virus up to 10 days, orally and in faeces, facilitating further spread.

## 2.2 Humans at risk

Though Avian Influenza viruses normally infect only birds and, unusually, pigs, some strains of the virus have also crossed the species barrier since 1959 to infect humans on 10 occasions<sup>2</sup>. While most Avian Influenza viruses affecting humans have caused mild respiratory symptoms

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<sup>1</sup> [http://www.who.int/csr/disease/avian\\_influenza/guidelines/firstoutbreak/en/print.html](http://www.who.int/csr/disease/avian_influenza/guidelines/firstoutbreak/en/print.html)

<sup>2</sup> INFOSAN Draft Note 2, November 2005- Highly pathogenic H5N1 avian influenza outbreaks in poultry and in humans: Food Safety implications. [http://www.who.int/foodsafety/fs\\_management/No\\_07\\_AI\\_Nov05\\_en.pdf](http://www.who.int/foodsafety/fs_management/No_07_AI_Nov05_en.pdf)

or conjunctivitis, the Highly Pathogenic Avian Influenza (HPAI)<sup>3</sup> resulted in severe disease outbreaks with high fatality rates in 1997, 2003, and in the ongoing outbreak, caused by the strain H5N1, that began in South-East Asian countries in early 2004. The disease caused by H5N1 follows an unusually aggressive clinical course, with primary viral pneumonia and multi-organ failure being common. From December 2003 to 1<sup>st</sup> of March 2006, 174 human cases have been reported, of which 94 were fatal<sup>4</sup>.

The H5N1 virus has the potential to cause catastrophic human pandemics if it mutates into a form that transmits rapidly between humans. Although several mutations in the virus have been detected during 2005, the significance of these mutations in terms of virulence and transmissibility in humans, is not fully understood yet.

### 2.3 Characteristics of the Avian Influenza virus

The H5N1 virus can survive in faeces for at least 35 days at low temperature (4°C); at 37°C, viruses could survive for six days in stability tests on faecal samples (in studies using H5N1 viruses circulating during 2004). Avian Influenza viruses can also survive on other surfaces, such as those within the poultry house environment, for several days. In general, low temperatures maintain the stability of the viruses.

Due to these survival properties, food preservation processes such as freezing and refrigeration will not reduce the concentration or virulence of these viruses in contaminated meat. Normal cooking (temperatures at or above 70°C in all parts of the product) will inactivate the virus.

**To date, there is no epidemiological evidence showing that people get infected following consumption of contaminated poultry meat that was properly cooked.**

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<sup>3</sup> A Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza (HPAI),FAO/OIE/WHO, November 2005; <http://www.fao.org/ag/againfo/subjects/documents/ai/HPAIGlobalStrategy31Oct05.pdf>

<sup>4</sup> Lab confirmed cases reported to WHO. [http://www.who.int/csr/disease/avian\\_influenza/country/cases\\_table\\_2006\\_03\\_01/en/index.html](http://www.who.int/csr/disease/avian_influenza/country/cases_table_2006_03_01/en/index.html)

# 3 Direct and indirect factors facilitating the spread of the Avian Influenza virus

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## 3.1. Primary production farming systems in rural or urban settings

Based on farm biosecurity and the system used to market products, FAO has broadly defined the following primary production sectors<sup>5</sup>:

**Sector 1:** Industrial integrated system with high level of biosecurity and birds/products marketed commercially (e.g. farms that are part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for biosecurity).

**Sector 2:** Commercial poultry production system with moderate to high biosecurity and birds/products usually marketed commercially (e.g. farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife).

**Sector 3:** Commercial poultry production system with low to minimal biosecurity and birds/products usually enter live bird markets (e.g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the

shed; a farm producing chickens and waterfowl).

**Sector 4:** Village, peri-urban or urban backyard production with minimal biosecurity and birds/products consumed locally. This sector includes low income households wherein people live with poultry and other animals; and / or carry out unhygienic slaughtering within household premises.

The probability of infection is higher in production sectors 3 and 4 than in sectors 1 and 2. However, if the virus does enter farms in sectors 1 and 2, infection may have a greater impact due to the concentration of susceptible poultry in these farms.

More detailed information on primary production farming systems in rural and/or urban settings and the relationships to Avian Influenza can be found at the websites of the Food and Agriculture Organisation (<http://www.fao.org/>) and of the World Organisation for Animal Health (<http://www.oie.int/>)

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<sup>5</sup> FAO Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia September 2004 <http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/27septrecomm.pdf>

## High-risk farming practices<sup>6</sup>

Some of the salient high-risk farming practices prevalent in South-East Asia and possibly contributing to the spread of Avian Influenza are:

- ◆ Farming of multiple species of animals - e.g. raising ducks and chickens together wherein ducks are "silent natural carriers" of the virus and can infect chickens; raising pigs and poultry together wherein pigs can act as a "mixing vessel" for virus to adapt to a more lethal form for humans.
- ◆ Free-range poultry raising whereby poultry move in a contaminated environment to feed themselves.
- ◆ Free-ranging poultry in densely populated, rural or peri-urban settings
- ◆ Use of untreated chicken faeces as fertilizer or livestock feed - The virus can survive in manure for three months in cool temperatures<sup>6</sup>. The droppings of infected wild birds too can infect poultry.
- ◆ Contaminated equipment, cages, vehicles, clothing and shoes - Poor hygiene, cleaning and disinfection.
- ◆ Poor ventilation of poultry sheds - The virus can spread by air if birds are kept closely together with poor ventilation.
- ◆ Inappropriate disposal of dying and dead birds.

- ◆ Lack of adoption of 'all-in, all-out' husbandry systems.

### All-in, all-out

This refers to rearing chickens of the same age. Once birds are sent to the abattoir or market, workers can clean and disinfect the premises before the arrival of a new flock. Thus, the flock is protected against the entry of new, possibly diseased, birds.

## 3.2 Unsafe transport



Tricycle used for transportation of poultry without removal of faecal matter, cleaning or disinfection (A. Bhatiasevi, 2006)

- ◆ Re-usage of dirty vehicles including motorcycles and cycles without removal of faecal matter, cleaning and disinfection is risky. The H5N1 virus can survive in faeces and other surfaces for several weeks and hence cleaning and disinfecting of transport

<sup>6</sup> Let us stop the killer virus at source! - preventive measures to stop the spread of Bird Flu (Draft), WHO/FAO/OIE November 2005. As from March 2006, final version available at: [www.wpro.who.int/avian](http://www.wpro.who.int/avian)

vehicles is essential to prevent the Avian Influenza virus from spreading. This is crucial when moving to and from poultry farms and in and around wet markets.



Continous re-usage of dirty wooden cages, littered with faecal matter, feathers and dirty water (WHO, 2006)

- ◆ Re-usage of dirty cages for transportation of poultry without cleaning and disinfection This is a potential hazard as Avian Influenza viruses can be introduced into the markets from contaminated crates. Therefore, material of the cage should be such that it can be easily cleaned and disinfected e.g. plastic. Avoid wood as that cannot be cleaned effectively.

- ◆ Stacking of cages on top of the other without waste trays underneath the cages - This is a potential hazard as the faecal droppings of any infected birds can infect the other birds as well as contaminate the cages and the vehicle.
- ◆ Transportation of birds from one farm to another; or from one collection centre to another; or from the market back to the farm / collection centre - The movement of birds, crates, or vehicles and personnel from a contaminated market can spread the virus back to other farms, collection centres and markets.
- ◆ Caging of birds in excess of capacity or over stacking on a two-wheeler. This causes the birds to get distressed and defecate, which contaminates the feathers with faeces.



Some poultry broiler suppliers do not hesitate to stack up to 100 birds at one time on a two-wheeler (WHO, 2006)

### 3.3. Live animal market (wet market)



Examples of wet market scenes in Asia (WHO, 2006)

A live animal market or "wet market" is a place where members of the public go to buy small animals and birds that are:

- ◆ live and slaughtered there
- ◆ live and taken home to be slaughtered, or
- ◆ already slaughtered and sold as meat.

#### 3.3.1 'Wet markets whet viruses'

The live animal markets or wet markets provide optimal conditions for the zoonotic transfer and evolution of infectious disease agents. Traditional Asian wet markets provide major contact points for people and live animal mixing, making them important potential sources of viral amplification and infection<sup>7</sup>. The traditional local demand for "warm meat" or freshly slaughtered meat sustains the wet markets.



Wet markets can provide ideal conditions for zoonotic transfer and evolution of infectious disease agents (WHO, 2006)

<sup>7</sup> Fielding R, Lam WWT, Ho EYY, Lam TH, Hedley AJ, Leung GM. Avian influenza risk perception, Hong Kong, University of Hong Kong, Special Administrative Region, China, Emerging Infectious Diseases, Vol. 11, No. 5, May 2005 677. <http://www.cdc.gov/ncidod/EID/vol11no05/04-1225.htm>

In the wet markets, the live animals, particularly poultry are enclosed in small cages in numbers exceeding the capacity of cages. Although, direct hand-to-face contact is the most likely path for infection of humans, the flapping by



Caging birds beyond capacity increases the mortality rate and the risks transmission of Avian Influenza (WHO, 2006)

distressed chickens inverted during inspection by shoppers raises fecal-dust aerosols and exposes sellers, shoppers, and passers-by to any virus particles on an infected bird. Highly dense urban populations maximize opportunities for infection and transmission in any outbreak.

H5N1 viruses have been isolated from live bird markets with, and without, evidence of clinical disease<sup>8</sup>. Infection can spread from these markets to humans and to farms via the movement of contaminated people, poultry, cages and transport equipment. Egg marketing practices can also lead to the spread of AI viruses. Contaminated egg trays that are recycled without disinfection can also spread the virus.

### 3.3.2 High- risk practices in the wet market<sup>9</sup>



Slaughtering chickens in a wet market (WHO, 2006)

<sup>8</sup> FAO Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia September 2004 <http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/27septrecomm.pdf>

<sup>9</sup> FAO/OIE/WHO Consultation on avian influenza and human health: Risk reduction measures in producing, marketing and living with animals in Asia, Kuala Lumpur, Malaysia, July 2005 See at: [http://www.wpro.who.int/health\\_topics/food\\_safety/](http://www.wpro.who.int/health_topics/food_safety/)

- ◆ Poor hygiene, cleaning and disinfection of facility, equipment and personnel attire.
- ◆ Preference of 'warm meat' i.e. fresh meat processed immediately after slaughtering - The regional preference for warm meat has led to persistence of wet markets<sup>10</sup>.
- ◆ Mixed slaughtering and selling zones. Animals including poultry are frequently slaughtered at the selling / display premises, often in open, unprotected areas, which may release contaminated faeces or blood.

- ◆ Keeping multiple species together and in confined spaces.



Some bird species may be infected but do not show symptoms. Allowing different species to mix is risky (A. Bhatiasevi, 2006)



Slaughtering, processing, selling and defecating live poultry broilers - all in the same area (WHO, 2006)

- ◆ Stacking of cages on top of one another, without waste trays.



Cages used without waste trays lead to faecal matter contaminating the birds below as well as the floor (WHO, 2006)

- ◆ Holding of poultry overnight and return of unsold birds to farms.
- ◆ Lack of pre-marketing health checks of poultry birds.

<sup>10</sup> A place where members of the public go to buy small animals and birds that are: (a) live and slaughtered there (b) live and taken home to be slaughtered, or (c) already slaughtered and sold as meat.)



Stall owners and food handlers in a wet market lacking awareness about food safety and basic hygiene (WHO, 2006)

- ◆ Risky operations while defeathering



De-feathering without previous scalding not only hampers the operation per se, but also allows potential virus contamination from feathers to meat (A. Bhatiasevi, 2006)

- ◆ Lack of food safety awareness of market stall owners.
- ◆ Lack of personal protective equipment for stall owners.



- ◆ Poor disposal of carcasses and other hazardous wastes (liquid and solid).



Unsafe disposal of feathers, carcasses and other potentially hazardous wastes (WHO, 2006)

### 3.4. Unsafe food preparation

Consumers are the most vital link at the end of the food chain. All Avian Influenza preventive and control measures followed by the supply chain may be undone, on account of improper handling of food, by the consumer. Most common errors, having the potential for increasing the risks of transmission of Avian Influenza, are as under:

- **Slaughtering at home** – Due to preference for 'warm' or 'fresh' meat or on account of religious beliefs or social customs, many consumers, across regions, prefer slaughtering at home. This practice poses potential risks for transmission of the Avian Influenza virus as well as other disease-causing pathogens, as the slaughtering may not be as professionally carried out as by slaughtering experts in the wet markets.
- **Lack of hygiene** – Poor consumer knowledge of personal and kitchen hygiene and sanitation may lead to the contamination of work surfaces, equipment and utensils. This may indirectly help transmit the virus to not only the food handler but also to other people at home, particularly children and the immunocompromised or aged people.
- **Raw and cooked food together** – Potential risk of Avian Influenza transmission also stems from possibilities of cross-contamination of cooked food from raw meat if the consumer is not careful in segregating them well. Besides, use of same

knives, utensils and chopping boards for cooked and raw food without thorough cleaning and sanitation offers an indirect transmission route for the Avian Influenza virus as well as food pathogens.

- **Poorly cooked** – Though there is no concrete evidence of the transmission of the Avian Influenza virus to humans through the food consumption mode, the possibility of the same cannot be ignored as the AI virus is killed only after thorough cooking wherein the core temperature is above 70 °C.
- **Poor waste management, scavengers** – Improper disposal of hazardous waste like meat trimmings, skin, feathers, blood, bones etc. outside the homes and in the open areas offers potential risks not only to the ill-informed consumer but also the people in the neighbourhood. In addition, such a practice attracts domestic pets, street cats and other scavengers and may result in the virus to go across species and also mutate in animals like pigs, which act as mixing vessels for the Avian Influenza virus.



Cat scavenging on a dead chicken in a wet market (WHO, 2006)



# 4 What is biosecurity?

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The Avian Influenza virus is best transmitted via direct contact with sick and/or dead birds. Most human cases of AI have been related to such close contacts.

Biosecurity includes the management of all biological and environmental health risks associated with food. In the context of this Manual, biosecurity consists of a set of management practices which, when followed, collectively reduces the potential for the transmission / spread of disease-causing organisms - such as the Avian Influenza virus - onto and between sites, animals and humans.

Biosecurity comprises two main elements<sup>11</sup> - bio-containment and bio-exclusion. Bio containment refers to prevention of spread of the virus from infected premises and bio-exclusion refers to measures to

exclude infectious agents from uninfected ones.

**Biosecurity has three major components<sup>12</sup>:**

- **Isolation:** refers to the confinement of live animals within a controlled environment.
- **Traffic Control:** includes both the human traffic as well as the vehicular traffic within the controlled environment.
- **Sanitation:** addresses the cleanliness and disinfection of materials, people and equipment entering the controlled environment.

In simple words, biosecurity is the normal way to avoid unnecessary contact between animals and microbes, infected animals and healthy ones<sup>13</sup>. Biosecurity also applies to public health measures that will reduce the contact between animals and humans.

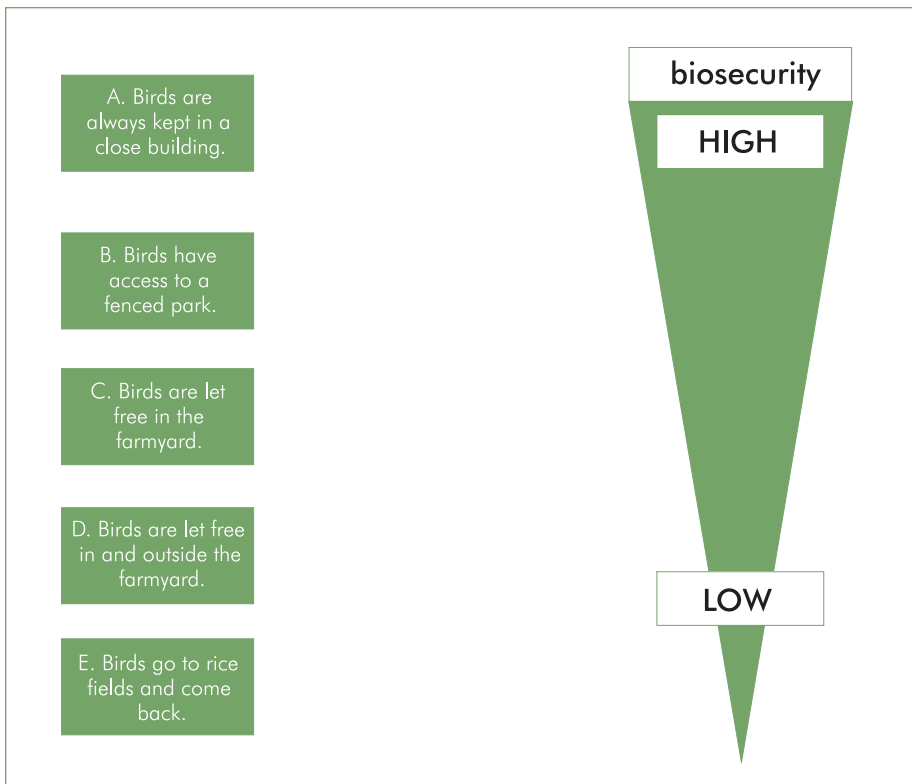
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<sup>11</sup> FAO Recommendations on the Prevention, Control and Eradication of Highly Pathogenic Avian Influenza (HPAI) in Asia September 2004.  
<http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/27septrecomm.pdf>

<sup>12</sup> Poultry fact sheet no. 26, Cooperative Extension, University of California, March 1997.  
<http://animalscience.ucdavis.edu/avian/pfs26.htm>

<sup>13</sup> Prevention and control of avian flu in small scale poultry, A guide for veterinary paraprofessionals in Cambodia, FAO, 2005.  
<http://www.fao.org/ag/againfo/subjects/documents/ai/AI-paravets-guide.pdf>

Example: Biosecurity levels for rural/ urban husbandry practices<sup>11</sup>.



# 5 Taking action to enhance biosecurity all along the food chain

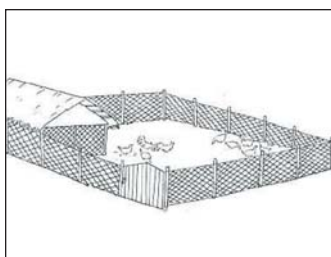
## 5.1. Secured primary production farming systems<sup>14</sup>

While there is a need to reinforce biosecurity measures in sectors 1 and 2 farms, priority must be given to sectors 3 and 4 farms and associated communities where humans live in close proximity to the animals being raised by them or other community members<sup>15</sup>. The key biosecurity measures recommended include the following:

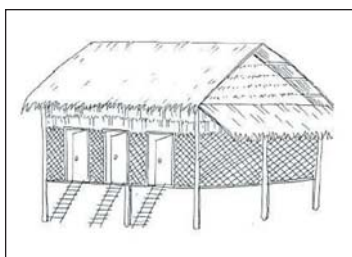
- ◆ **Keep the wild birds away** – It is important to keep wild birds and ducks, natural reservoirs of the virus, off farms. Many species can be infected but will not show any signs of disease. They can excrete the virus for

30 days and contaminate feed, and shared water sources e.g. ponds. Therefore, poultry should be kept in a protected place<sup>16</sup>: a fenced park, under the house protected by a fishing net or better, a secured poultry pen. They must also have access to clean water and feed.

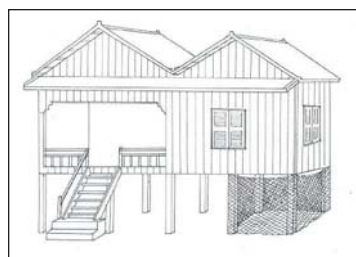
**Ensure All-in, all-out i.e.** ensuring that all birds from a shed / pen are sent to the abattoir or market. Workers should then clean and disinfect the premises / shed / pen effectively (no visible feathers or faeces remaining) before the arrival of a new flock. This practice would contribute immensely



Fenced park



Poultry pen



Poultry kept under the House, behind a fishing net

<sup>14</sup> Let us stop the killer virus at source! - Preventive measures to stop the spread of Bird Flu (Draft), WHO/FAO/OIE November 2005. [www.wpro.who.int/avian](http://www.wpro.who.int/avian)

<sup>15</sup> FAO/OIE/WHO Consultation on avian influenza and human health: Risk reduction measures in producing, marketing and living with animals in Asia, Kuala Lumpur, Malaysia, 2005. [http://www.wpro.who.int/health\\_topics/food\\_safety/](http://www.wpro.who.int/health_topics/food_safety/)

<sup>16</sup> Prevention and control of avian flu in small scale poultry. A guide for veterinary paraprofessionals in Cambodia, FAO, 2005. <http://www.fao.org/ag/againfo/subjects/documents/ai/AI-paravets-guide.pdf>

in the containment of the avian flu. Unsold birds should not be returned to the farm, but be slaughtered and sold as processed meat.

- ◆ **Avoid multi-age poultry farms**<sup>17</sup> as partial sale of birds from commercial farms presents a greater biosecurity risk than the sale of the entire batch of birds as recommended under all-in, all-out production. This is primarily because birds remaining in the farm are exposed to catchers or other workers, who customarily move from farm to farm and can readily spread infection if H5N1 virus is circulating in the area.
- ◆ **Proper vaccination** of domestic poultry, which ensures that the vaccine matches the circulating strain of virus, is considered to be a useful tool as part of an overall integrated strategy for the control of H5N1. It must be implemented in accordance with existing standards and procedures for vaccination, including in backyard flocks in rural and urban settings. Poultry are usually vaccinated with a vaccine made from inactivated viruses which itself does not pose a food safety risk. Such procedures would ensure that no asymptomatic infected bird would enter the food chain. Therefore,

where there are appropriate monitoring programmes in place, vaccinated poultry can enter the food chain without particular risk to the consumer.

- ◆ **Prevent** movement of poultry from one farm to another<sup>18</sup> as H5N1 infected birds, if any, on one farm may transmit the virus to flocks on the other farm.
- ◆ **Clean** and disinfect the premises and equipment on farms - Install a disinfectant pool at entrance to each poultry shed / pen and ensure vehicles entering the farm are not contaminated.
- ◆ **Limit** the access of visitors to areas where poultry are housed and provide clean protective clothes, including boots, to people visiting the farm. This is important as clothing and footwear are important means by which the virus can spread.
- ◆ **Obtain** feed from a clean, dependable source. Store feed properly so that it is bird-proof, insect-proof, and rodent-proof. Obtain water from a clean source and ensure it is free from contamination. Drinking water, if sourced from ponds or from a doubtful source, should be chlorinated.
- ◆ **Instruct** animal health workers to guard against spreading infection

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<sup>17</sup> Poultry birds of different age are kept by farmers to spread their income and to avoid the financial risks associated with having all birds entering the market on the same date

<sup>18</sup> Costs and Benefits of regulatory Control in Wet Markets in Hong Kong , WHO (WPRO), Draft 02, 2004

accidentally from during their visits to other farms.

- ◆ **Exclude** poultry from the home; also prohibit farm workers from rearing their own poultry at home.
- ◆ **Effective management of hazardous wastes** - Proper disposal of carcasses and other hazardous waste (liquid and solid) needs to be enforced.
- All dead birds and other contaminated objects (for instance: faeces, blood, feathers) must be destroyed properly<sup>19</sup> as soon as possible throughout the day:
  - ▶ **Burying** - Dig a hole (far from the poultry sheds) put some quicklime at the bottom and on the borders of the hole; put all the birds and objects in the hole; cover with quicklime; cover with earth.
  - ▶ **Incineration**, if suitable incineration facility is available.

More detailed information on biosecurity measures for primary production farming systems in rural and/or urban settings to be found at <http://www.fao.org/> and <http://www.oie.int/>

## 5.2. Safe transport

- ◆ **Avoid transportation of people and live animals together, especially poultry, ensuring a separate enclosure for each.**

This will reduce the risks of potential AI transmission directly as well as indirectly through faecal depositions.

- ◆ **Use only clean and disinfected transport vehicles** for movement of poultry and eggs. Do not reuse dirty vehicles, littered with faecal matter, without proper cleaning and disinfection, as the H5N1 virus can survive in organic faecal matter for several days. During vehicle cleaning and disinfection, the main areas to concentrate are wheels, wheel arches, chassis and underbody, if possible; the trailer / area where poultry are transported; cages; sheeting or other covers on the vehicle
- ◆ **Do not cage birds in excess** of the cage capacity. The H5N1 virus can spread by air if birds are kept closely together as well as from faecal matter, which may contaminate the bird's feathers, on account of less space. Preferably, cage capacity should not be less than 300 cm<sup>2</sup> per kg, with a height of not less than 30 cm<sup>20</sup>.
- ◆ **Use waste trays** - If birds with cages are stacked on top of each other, use waste trays underneath the cages for collecting poultry droppings, which can then be safely disposed along with other hazardous waste by burying. The trays used should be of the same size as the cages.

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<sup>19</sup> Prevention and control of avian flu in small scale poultry, A guide for veterinary paraprofessionals in Cambodia, FAO, 2005. <http://www.fao.org/ag/againfo/subjects/documents/ai/AI-paravets-guide.pdf>

<sup>20</sup> Costs and Benefits of regulatory Control in Wet Markets in Hong Kong, WHO (WPRO), Draft 02, 2004

- ◆ **Avoid collecting and transporting birds from different farms or collection centres in the same vehicle** and avoid transportation of birds from one farm / collection centre to another or from the market back to the farm / collection center, as H5N1 infected birds from a farm or a market may transmit the virus to other healthy flocks.
- ◆ **Do not transport poultry with other birds and animals**, as this increases the likelihood that Avian Influenza viruses will enter other animal / bird populations, risking infection and reassortment with the other influenza viruses, leading to emergence of new strains of influenza viruses.
- ◆ **Give preference to non-wooden / bamboo cages:** Use cages made of materials like plastic or non-toxic metal that can be easily cleaned and disinfected.

### 5.3 Biosecurity in wet markets

- ◆ **Segregation of species** - When introducing poultry to the market, maintain the separation of species by keeping separate species in different cages.
- ◆ **Ensure all-in, all-out i.e.** bringing in and taking out a flock at one time. This would imply selling all birds on site. Avoid returning

unsold birds to the farm, as they may be infected and may carry back the virus. Prior arrangements must be made for birds that are unsold.

- ◆ **Slaughtering zones** - Strictly ensure a separate area for poultry slaughtering, processing away from the selling area. This will improve biosecurity and reduce the likelihood that products or consumers in other areas get contaminated.
- ◆ **Processing equipment and work surfaces** - Use non-toxic, impervious and easily cleanable work surfaces (e.g. chopping boards, work tables). Avoid use of wooden surfaces, wooden knives as they cannot be cleaned.
- ◆ **Processing** - Ensure proper scalding of poultry before de-feathering. Use hot, potable water for scalding and change the scalding water frequently.
- ◆ **Customer orientation** - Do not allow or permit the customers to touch and inspect live poultry before purchase; **discourage selling live poultry to customers.**
- ◆ **Cold Chain facilities** - Though the virus survives low temperatures, adherence to the cold chain is vital from the food safety perspective. Ensure chillers and chilled display cabinets are used with back-up power supply.



Separate selling area observed in some wet markets (WHO, 2006)

- **Hygiene, sanitation and waste management<sup>21</sup>:**
  - **Compulsory rest days** – The live animal markets in many areas might be working seven days a week. Having compulsory rest days periodically would facilitate emptying, cleaning and disinfecting the entire market regularly. This would improve hygiene and prevent build up of pathogens and H5N1 virus load
  - **Hygienic cages** – Cages holding poultry should not be placed below cages with other birds, to

prevent cross-contamination with faeces. If unavoidable, place waste trays under the cages. Ensure adequate ventilation and lower stacking crates so as to help reduce infection.



Use of plastic cages: easy to clean and wash (WHO, 2006)

- **Cleaning facilities** – Set up a separate area to clean and disinfect cages. Cages should be made of material easy to clean and disinfect. Hand washing basins with soap and potable water should be provided where humans and birds come into contact.
- **Clean and disinfect premises and equipment** – Following slaughtering operations, clean and disinfect premises (floors, walls, work tables, slabs, racks etc.) and equipment (knives, hooks, killing cones, de-featherer, scalding, chopping board etc.) frequently.

<sup>21</sup> Let us stop the killer virus at source! - Preventive measures to stop the spread of Bird Flu (Draft), WHO/FAO/OIE November 2005. As from March 2006, final version available at: [www.wpro.who.int/avian](http://www.wpro.who.int/avian)

- ▶ **Drainage system** – Ensure drains are covered, sloped well and facilitate flow of effluent in a direction opposite to the process flow (e.g. blood and scalding water from slaughtering area should not flow towards the forward process flow areas like selling area).
  - ▶ **Personal protective gear** – Ensure workers in slaughtering and selling operations wear clean, light coloured protected clothing, including clean aprons and rubber boots everyday and avoid using the same clothes and boots back home.
  - ▶ **Personal hygiene** – Ensure the workers handle live poultry and engage in slaughter only after a thorough handwash with soap and potable water. Hands should be washed frequently with soap and potable water and particularly after change of processes. Following slaughter and processing, the workers should preferably take a bath at the market personnel facilities or change into clean clothes and shoes after washing hands, arms and feet thoroughly with soap and potable water and drying with clean towel / cloth.
- **Effective management of hazardous waste** – Proper disposal of carcasses, blood and other hazardous waste (liquid and solid) disposal needs to be enforced.
- All dead birds and other contaminated objects (for instance: blood, feathers) must be destroyed properly<sup>22</sup> as soon as possible during the day through proper burying or incineration, as mentioned earlier.
- **Disease detection**
  - ▶ **Monitoring** – Poultry in the market should be continuously assessed for sickness. Collaborate to conduct regular surveillance, sampling and analysis along with market associations, local health authorities and veterinary authorities.
  - ▶ **Notification** – Report diseased or dead birds immediately to health and veterinary authorities. Appropriate action should then be taken by the authorities.
  - ▶ **Traceability** – Support efforts to ensure that the source of sick birds is traceable back along the production and marketing chain.
- **Food safety training and awareness**
  - ▶ Train the market community associations, market stall owners, workers and local health authorities

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<sup>22</sup> Prevention and control of avian flu in small scale poultry, A guide for veterinary paraprofessionals in Cambodia, FAO, 2005. <http://www.fao.org/ag/againfo/subjects/documents/ai/AI-paravets-guide.pdf>

in basic food safety aspects and measures to be taken for mitigating infection risks from Avian Influenza.

## 5.4 Consumption - Safety at Customers' and Consumers' end

- **Avoid buying live poultry/ birds and then slaughtering at home and/or in food service establishments.** Slaughtering, de-feathering and degutting poultry birds can be risky if infected.
  - Where available, buy processed, chilled and hygienically packed raw poultry meat from an established and reputed market place and preferably from an accredited Hazard Analysis Critical Control Point (HACCP) food safety systems certified company.
- **Keep Clean** – When preparing food, follow good hygiene practice. Clean and sanitize work surface, equipment and utensils and wash hands frequently.
- **Separate raw and cooked food items** – Separate raw from cooked meat and other cooked food items. Use separate equipment and utensils such as knives and chopping boards for raw foods.
- **Cook thoroughly** - To ensure the safety of cooked meat, its juices must run clear and no parts of the meat should be red or pink. Ensure thorough boiling / roasting / frying (**core temperature of food should be more than 70 C**) as this kills the virus and other pathogens too.
  - Eggs from infected birds can harbour the virus both outside and within the shell and should therefore be cooked well (with no "runny" yolks) before consumption. Raw eggs should not be used in foods that will not be further heat-treated as, for example by cooking or baking.
- **Do not prepare and consume speciality raw dishes** made from birds or poultry raw meat and blood.
- **Keep food at safe temperatures** – From the food safety perspective, eat cooked food immediately and do not leave cooked food at room temperature beyond 2 hours. Keep cooked food steaming hot (more than 60°C) prior to serving.



# 6 Protection of human beings

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## 6.1 How are people infected?

Direct contact with an infected bird, poultry, or spaces and surfaces and objects contaminated by their faeces, is presently considered the main route of human infection. As infected birds shed large quantities of virus in their faeces, opportunities for exposure to infected droppings or to environments contaminated by the virus are abundant under such conditions. Exposure is considered most likely during slaughtering, defeathering, butchering, and preparation of poultry for cooking.

### What precautions should be taken by people involved in the food chain?

#### Vaccination for public health purposes:

Health authorities may consider vaccination against seasonal influenza for persons at risk of occupational exposure to the H5N1 virus. Vaccination against seasonal influenza is a public health measure aimed at reducing opportunities for the virus to re-assort during co-infection of a human with both avian and currently circulating human influenza viruses. At least some pandemic viruses are known to have emerged following a re-assortment event. Vaccination against seasonal influenza will not protect people against infection with the H5N1 virus; no vaccine against H5N1 is presently available.

Persons who are in close contact with live animals including birds and poultry should wash their hands frequently with soap, particularly after change of a process.

Persons undertaking slaughtering and those in selling operations should wear clean, light coloured protected clothing, including clean aprons and rubber boots everyday and avoid wearing the same clothes and boots while returning home.

Following slaughter and processing, the concerned persons should preferably take a bath at the market personnel facilities or change into clean clothes and shoes after washing hands, arms and feet thoroughly with soap and potable water and drying with clean towel / cloth.

Food handlers /consumers should avoid buying live animals (poultry) and then slaughtering them at home / food service establishments.

Food handlers / consumers involved in food processing / preparation should wash their hands thoroughly with soap and warm water. They should clean and disinfect equipment and surfaces in contact with the meat products.

All concerned persons at risk, both environmentally and occupationally<sup>23</sup>, should be vaccinated with the current WHO recommended influenza vaccine as soon as possible, to avoid simultaneous infection by human influenza and Avian Influenza. This, however, does not specifically protect against H5N1.

### How do you know if you are infected?<sup>24</sup>

Be aware of the early clinical symptoms of H5N1 infection, but also know that many other common diseases - of far less concern - will show similar early symptoms.

- ◆ Most patients infected with the H5N1 virus show initial symptoms of fever (38.0 C or higher) followed by influenza-like respiratory symptoms, including cough, rhinorrhea, sore throat, and (less frequently) shortness of breath. Watery diarrhoea is often present in the early stages of illness, and may precede respiratory symptoms by up to one week. Gastrointestinal

symptoms (abdominal pain, vomiting) and headache may occur.

- ◆ Check for these signs (especially fever) each day during potential exposure and for 14 days after last exposure.
- ◆ Communicate any symptoms to a designated local physician and provide background information on history of exposure.



Children especially should be made aware of the risks involved in having close contact, or playing with birds (WHO, 2006)

<sup>23</sup> Persons at risk include poultry workers, poultry transport and slaughtering workers, cullers, veterinarians, food inspectors, local health authority personnel and other professional groups.

<sup>24</sup> [http://www.who.int/csr/disease/avian\\_influenza/guidelines/firstoutbreak/en/print.html](http://www.who.int/csr/disease/avian_influenza/guidelines/firstoutbreak/en/print.html)

# 7 Promoting Healthy Food Markets - Strategy and Plans

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## 7.1 The impending need

A recent OIE, WHO and FAO consultation on Avian Influenza and human health<sup>25</sup> recognized the major role that wet markets have played in the emergence of Avian Influenza. In 1992, live poultry markets in USA were considered the "missing link in the epidemiology of influenza". In 1997, the wet markets were identified as the source of H5N1 infections in chicken farms in Hong Kong, wherein 20 % of the chicken in wet markets were found to be infected. In 2005, it has been reported that 83% of the human H5N1 cases around the world have had exposure to infected poultry.

A joint WHO/ FAO/OIE/World Bank Conference on Avian Influenza and Human Pandemic Influenza, held at Geneva (November 2005, stressed the need to contain the Avian Influenza H5N1 at the source i.e. at poultry farms and at live animal markets or "wet markets". Subsequently, experts have urged the countries to develop integrated national plans across all sectors.

While the efforts of many agencies are rightly and predominantly aimed at containing the virus at the primary end of the food chain i.e. at the poultry farms, WHO, with its experience of developing "Healthy Marketplaces", needs to take initiatives at the intermediate i.e. the marketplaces, particularly the "wet market" and the tertiary ends of the food chain i.e. the food service establishments and food processing industry, as well as the consumers of poultry products.

Accordingly, this Manual outlines the strategy and plans of action for evolving healthy market places with the emphasis on "wet markets".

## 7.2 Strategy

- a) Obtain broad political commitment at the local level and stakeholder participation<sup>26</sup>.
- b) Assess the physical and operational environment of the market settings prioritize action and develop an action plan.

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<sup>25</sup> OIE/FAO/WHO Consultation on Avian Influenza and Human Health: Risk reduction measures in producing, marketing and living with animals in Asia, July 2005, Malaysia

<sup>26</sup> Healthy marketplaces in the Western Pacific - Guiding Future Action - Applying a settings Approach to the promotion of Health in Marketplaces, WHO (WPRO), 2004. To be purchased at: [http://www.wpro.who.int/publications/pub\\_9290611707.htm](http://www.wpro.who.int/publications/pub_9290611707.htm)

- c) Develop communication plans and materials aimed at the general public
- d) Adapt / develop a framework for monitoring and analysis of costs and benefits<sup>27</sup> of "Healthy Food Markets"

## 7.3 Implementing the strategy

### 7.3.1 Obtain broad political commitment and stakeholder participation

- a) Familiarize stakeholders with the Healthy Food Markets concept and food safety, and foster political commitment of national, provincial and local authorities for supporting Healthy Food Markets Programme to ensure support with appropriate resources.
- b) Establish a local / district / provincial Healthy Food Markets committee with representation of all stakeholders for regular monitoring of implementation of action plans.
- c) Identify priority health and safety issues (current biosecurity level) of the live animal markets and assess their potential contribution to the current outbreak of Avian Influenza.
- d) Identify the salient markets that require priority implementation and facilitate the launch of a pilot "Healthy Food Market(s)".

### 7.3.2 Assess the Physical and Operational Environment of the market settings, prioritize action and develop an action plan.

- a) Jointly assess the current situation: design, construction and upkeep of the physical environment of the marketplace in the context of hygiene and sanitation. Chapter 3.3 in this Manual provides hints to help evaluate the market operations.
- b) Jointly identify the gaps concerning measures, including infrastructure, aimed at protecting the health of consumers and the market community. Adapt measures outlined under Chapter 5.3, 5.4. and Chapter 6.0 in this Manual.
- c) Prioritize the most urgent and feasible actions and organize them in a time framed plan, along with budgetary needs and identification of roles that each segment of the market community should fulfill.

### 7.3.3 Develop Communication plans and materials aimed at the general public

To raise awareness on the advantages of "Healthy Food Markets", some key messages have been included in this Manual. These, and the more general "5 key food safety messages"<sup>28</sup> can be adapted to local needs, for different public segments, with reference to Avian Influenza. For example:

<sup>27</sup> Costs and Benefits of regulatory Control in Wet Markets in Hong Kong, WHO (WPRO), Draft 02, 2004

<sup>28</sup> Five Keys to Safer Food: "First adapt, then act" WHO, SEARO, 2005.

<http://w3.who.sea.org/en/Section23/Section1001/Section1110.htm> and "Let us stop the killer virus at source" - Preventive Measures to stop the spread of bird flu (Draft) WHO/FAO/OIE (2005). As from March 2006, final version available at: [www.wpro.who.int/avian](http://www.wpro.who.int/avian)

- ◆ Key food safety messages for consumers, including those for safe handling and consumption of poultry and animal products.
- ◆ Key food safety messages for the marketing community with specific reference to measures for "wet markets".
- ◆ Key food safety messages for food service establishments with specific guidance in the context of handling, slaughtering processing / cooking and serving of poultry products.

#### **7.3.4 Adapt / develop a framework for monitoring and analysis of costs and benefits of "Healthy Food Markets"**

- a) To assess the viability to replicate this initiative in other settings, develop /

adapt a framework for monitoring and analysis of the actual costs incurred by the wet market community and other contributors (local, district, provincial, national and international stakeholders). Include all cost elements viz. infrastructure, market surveillance, research, training, etc.

- b) Identify indicators to measure the benefits of Healthy Food Markets viz. enhanced public health; treatment and control expenditures avoided; economic losses avoided; preventing a pandemic; public empowerment; etc.
- c) Carry out an evaluation of the validity of Healthy Food Markets.



# 8 Key public health messages

## Key public health messages for the general public

### Avoid slaughtering live poultry and birds at home / food service establishments.

- ◆ Slaughtering, de-feathering and degutting poultry / birds can be risky if the poultry / bird are infected.
- ◆ Buy processed, chilled and hygienically packed raw poultry meat from an established and reputed market place.

### Keep Clean

- ◆ When preparing food, practice good hygiene. Clean and sanitize the work surface, equipment and utensils and wash hands frequently.

### Separate raw and cooked

- ◆ Separate raw meat from cooked meat and other cooked food. Use separate equipment and utensils such as knives and chopping boards for raw foods.

### Cook thoroughly

- ◆ For cooked meat and poultry to be safe, their juices must run clear and no parts of the meat should be red or pink.
- ◆ Ensure thorough boiling / roasting / frying (**core temperature of food should be more than 70°C**) as this kills the virus and other pathogens too.
- ◆ **Do not prepare and consume speciality raw dishes** made from birds and poultry raw meat and blood.
- ◆ Eggs can contain the virus both on the outside (shell) and the inside (whites and yolk). Eggs from areas with Avian Influenza outbreaks in poultry should not be consumed raw or partially cooked (runny yolk); uncooked eggs should not be used in foods that will not be cooked, baked or heat-treated in other ways.

## Key public health messages for the public in affected areas<sup>30</sup>

- ◆ Avoid contact with chickens, ducks or other birds unless necessary.
- ◆ Keep children away from poultry and their waste or feathers.
- ◆ Do not keep birds as pets.
- ◆ If you touch poultry or poultry faeces from affected areas, or walk on soil contaminated with faeces, wash hands with soap and water. Clean shoes outside the house. Seek medical help if you feel unwell.

## Key public health messages for professional cullers (And people handling diseased birds or decontaminating farms)

- ◆ Wear protective clothing (mask, goggles, gown, rubber boots and gloves). If unavailable, cover mouth with a cloth and hands and shoes with plastic bags, tied with string. Wash or dispose clothing.
- ◆ Dispose of diseased birds properly by burying bird carcasses and faeces at a depth of at least 1 metre. Avoid generating dust. Clean the area well with detergent.
- ◆ All persons who have been in close contact with the infected animals should wash their hands with soap and potable water and disinfect frequently.

## Key messages for Local Health Authorities

- ◆ All persons exposed to infected chickens or to farms or to live animal markets under suspicion should be under close monitoring by local health authorities.
- ◆ It is recommended that persons at specific risk of inhaling possible infected material (e.g. cullers and farmers involved in mass culling at commercial farms, workers at centralized live animal markets) receive prophylaxis with antivirals<sup>3</sup>.
- ◆ Such persons should also be vaccinated with influenza vaccine to avoid simultaneous infection by human influenza and Avian Influenza and to minimize the possibility of a re-assortment of the virus's genes.
- ◆ Persons at high risk for severe complications of influenza (e.g. immunocompromised, over 60 years old, or with known chronic heart or lung disease) should not be allowed to work in the high risk areas (e.g. culling, slaughtering).
- ◆ There should be a serological surveillance of exposed animal workers and veterinarians.

# 9 Sample questionnaire to assess practices in wet markets

(Draft WHO, FOS/WPRO, 2005)

Questionnaire to assess practices in wet markets - Page 1						
Date: _____ Period of time: _____						
Country: _____ Location: _____						
Name of Market: _____ Address of Market: _____						
Category of market: (tick one box) <input type="checkbox"/> Urban market <input type="checkbox"/> Rural market <input type="checkbox"/> Other - Describe _____						
Category of market: (tick one box) <input type="checkbox"/> Wholesale <input type="checkbox"/> Retail <input type="checkbox"/> Mixed wholesale and retail						
Live animal section: (tick one box) <input type="checkbox"/> Permanent/fixed location <input type="checkbox"/> Not permanent/fixed location <input type="checkbox"/> Mixture fixed/not <input type="checkbox"/> Fixed						
1. Origin of animals sold in the marketplace (you may tick more than one box)	Wildlife					<input type="checkbox"/>
	Animals from backyard/free-range farms					<input type="checkbox"/>
	Animals raised in pens or cages					<input type="checkbox"/>
	Origins of some animals not known					<input type="checkbox"/>
2. Total number of animals for sale in the market on the day of inspection (tick one box)	Less than 10 <input type="checkbox"/> 10-100 <input type="checkbox"/> 101-200 <input type="checkbox"/> More than 200					
3. Kinds of live animals for sale in the entire market (you may tick more than one box)	<input type="checkbox"/> Chicken	<input type="checkbox"/> Turkey	<input type="checkbox"/> Dog	<input type="checkbox"/> Civet cat	<input type="checkbox"/> .....	
	<input type="checkbox"/> Duck	<input type="checkbox"/> Wild bird	<input type="checkbox"/> Cat	<input type="checkbox"/> Raccoon dog	<input type="checkbox"/> .....	
	<input type="checkbox"/> Goose	<input type="checkbox"/> Pig	<input type="checkbox"/> Monkey	<input type="checkbox"/> Ferret-badger	<input type="checkbox"/> .....	
	<input type="checkbox"/> Quail	<input type="checkbox"/> Rabbit	<input type="checkbox"/> Turtle	<input type="checkbox"/> .....	<input type="checkbox"/> .....	
	<input type="checkbox"/> Pigeon	<input type="checkbox"/> Rodent	<input type="checkbox"/> Reptile	<input type="checkbox"/> .....	<input type="checkbox"/> .....	
4. Manner of caging of animals (you may tick more than one box)	Several animals share a cage/crate/pen					<input type="checkbox"/>
	Different kinds of animals are caged separately					<input type="checkbox"/>
	Different kinds of animals are caged together					<input type="checkbox"/>
	Cages are stacked one on top of another					<input type="checkbox"/>
	Animals are not caged					<input type="checkbox"/>
5. Types of cage material (you may tick more than one box)	<input type="checkbox"/> Steel/Wire	<input type="checkbox"/> Bamboo	<input type="checkbox"/> Wooden crate			
	<input type="checkbox"/> Plastic	<input type="checkbox"/> Basket	<input type="checkbox"/> Sack			
	<input type="checkbox"/> Other - Please describe _____					
6. Slaughtering of animals (YOU MAY TICK MORE THAN ONE BOX)	<input type="checkbox"/> Not done in the market					
	<input type="checkbox"/> Done within animal stalls					
	<input type="checkbox"/> Done in a common area					

**Questionnaire to assess practices in wet markets - Page 2**

7. No. of days animals may remain in the stalls (you may tick more than one box)	<input type="checkbox"/> 1 day or less <input type="checkbox"/> 2 days <input type="checkbox"/> 3-7 days <input type="checkbox"/> More than 7 days <input type="checkbox"/> Other - Please describe _____		
8. Fate of animals not sold at the end of a day or longer (you may tick more than one box)	<input type="checkbox"/> Returned to farm after each day <input type="checkbox"/> Returned to farm after 1 day <input type="checkbox"/> Killed and consumed by vendor or family <input type="checkbox"/> Other - Please state _____		
9. Are animals arriving on different days, mixed together?	Yes <input type="checkbox"/> No <input type="checkbox"/>		
10. In relation to sick or dead animals (you must answer all)	Animals are accepted in the market for sale even if sick      Yes <input type="checkbox"/> No <input type="checkbox"/> Animals are accepted in the market for sale even if dead      Yes <input type="checkbox"/> No <input type="checkbox"/> Animals that die while in the market are still sold              Yes <input type="checkbox"/> No <input type="checkbox"/> Animals that become sick while in the market are still sold    Yes <input type="checkbox"/> No <input type="checkbox"/>		
11. Are animals sampled locally for testing? (you must answer all)	On all animals                                      Yes <input type="checkbox"/> No <input type="checkbox"/> On sick animals                                    Yes <input type="checkbox"/> No <input type="checkbox"/> On animals that die in the market          Yes <input type="checkbox"/> No <input type="checkbox"/> Other                                                    Yes <input type="checkbox"/> No <input type="checkbox"/> If yes please state:.....		
12. Do veterinarians inspect animals in the market? (tick one box)	<input type="checkbox"/> No	<input type="checkbox"/> Weekly	<input type="checkbox"/> On arrival of animals only
	<input type="checkbox"/> Daily	<input type="checkbox"/> Monthly	<input type="checkbox"/> Other - Please state
13. How frequently is the marketplace cleaned? (tick one box)	<input type="checkbox"/> Not cleaned <input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Other - Please state..		
14. Are all animals removed during cleaning?	Yes <input type="checkbox"/> No <input type="checkbox"/>		
15. Are animal stall holders required to clean their stalls and cages or pens? (tick one box)	<input type="checkbox"/> Not required to clean <input type="checkbox"/> Yes Daily <input type="checkbox"/> Yes Weekly <input type="checkbox"/> Yes Monthly <input type="checkbox"/> Yes Other - Please state ...		
16. Is a particular cleaning programme required and enforced for animal stalls?	Yes <input type="checkbox"/> No <input type="checkbox"/> If Yes please describe what is required .....		
17. On the day of inspection does it appear that the cleaning programme is effective	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, please describe .....		
18. Location of live animal section	<input type="checkbox"/> Separated structure from other sections <input type="checkbox"/> Mixed with other sections		

**Note: Animal refers to all mammals and birds**

**Name, function and signature of the person who administered this questionnaire:**

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# 10 Proposed steps to launch a National Healthy Food Markets Programme

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*(Extract from the report of the Expert Mission to Support Develop a National Action Plan to Prevent and Control the Spread of the Avian Influenza Virus in Wet Markets, Jakarta, Indonesia, January 2006)<sup>29</sup>*

## **STEP 1: Familiarize stakeholders with the Healthy Food Markets concept and ensure broad political commitment and active stakeholder participation**

It is envisaged to first hold a two / three day meeting / workshop of all stakeholders to familiarize them with the Healthy Food Markets concept and obtain their commitment and active support in developing a National Healthy Food Market Programme (HFMP). The participation of all key stakeholders is recommended. Actions to be taken include:

- ◆ Constitution and empowerment of a National Multisectoral HFM Task Force for initiation, coordination and monitoring of the HFMP and of Core Groups for regular oversight of respective HFM Pilot Projects;
- ◆ Costing of national HFMP and pilot HFM projects and provision of funds from the private sector and donors.

## **STEP 2: Raising public awareness for preventing and controlling Avian Influenza**

Based on WHO's advice on prevention and control of Avian Influenza, the HFMP task force to develop risk based messages in local / regional languages for different target segments viz. consumers, live or wet animal market personnel and authorities (national, provincial and local). The risk communication strategy to disseminate Avian Influenza prevention messages needs to be worked out by the Task Force, keeping in view the priorities and availability of funds.

## **STEP 3: Capacity building of Wet Market Place Stakeholders in Healthy Food Market concept**

The multisectoral HFMP Task Force, in close association with donor agencies, should organize a 'Training of Trainers' programme to familiarize stakeholders including consumer representatives / consumer associations with Healthy Food Markets concept.

## **STEP 4: Conduct local participatory situation analysis of the existing market conditions and identify gaps.**

In order to plan activities in the identified Healthy Food Market Place Projects, the

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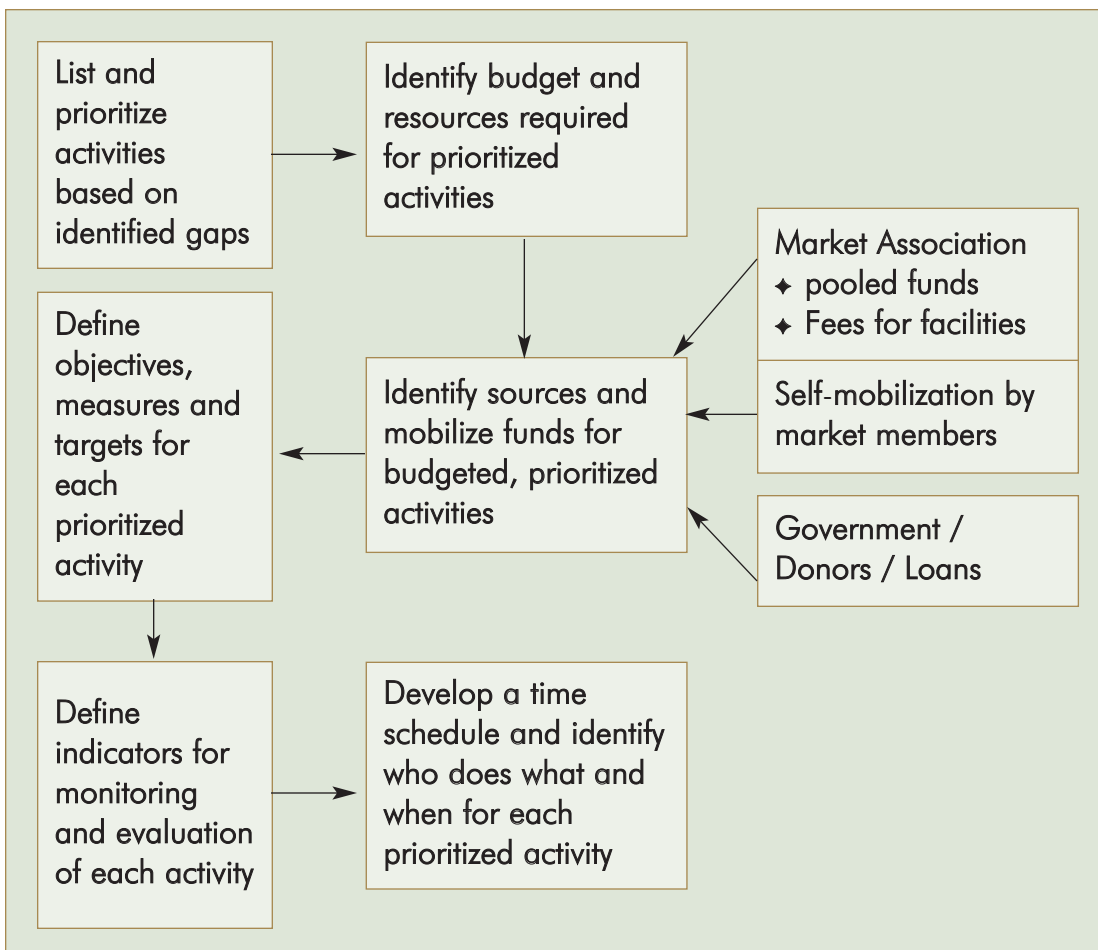
<sup>29</sup> For more information contact [Hildebranda@searo.who.int](mailto:Hildebranda@searo.who.int) at WHO SEARO

respective core group of pilot projects should conduct a detailed situational analysis to identify the needs of the partners. The core group should conduct a survey among the 'wet market' community members, consumers and live animal suppliers to identify health and safety concerns and possible solutions from their point of view. Complete the list of concerns and solutions based on the elements from the tables below. Based on the survey, the core group is required to identify the gaps in

the physical and operational environment of the market setting.

**STEP 5: Prioritize the actions and develop work plans with budgets for respective pilot projects.**

Based on the identified gaps, the respective core groups to prioritize actions based on risk and develop work plans in association with the HFMP task force. The key processes involved in developing the work plan are depicted as under:



### **STEP 6: Implement the workplans**

Keeping in view the priorities, the workplans should be implemented by the empowered core groups for the respective pilot project in a participatory way. Before and during the implementation process it is essential that the ownership of the stakeholders is ensured. The wet market community and live animal suppliers should be actively involved throughout all stages of the planning process, as many changes and improvements in the market's physical and operational environment will require their cooperation as well as resources.

Relocation decisions, if necessitated, should be taken only with the involvement of the market community.

### **STEP 7: Monitor implementation and conduct periodic evaluation**

With a view to make the Healthy Food Market projects successful and sustainable, it is imperative that regular monitoring and periodic evaluation is undertaken. Therefore,

it is important that the HFMP task force and core group together establish milestones to be achieved in the short, medium and long run. Consequently, it is also important that appropriate and measurable indicators are identified and incorporated in the workplans.

The marketplace managers need to be empowered to monitor the implementation of all controls and to take corrective action as necessary. Corrective action needs to be developed for each control in conjunction with the person undertaking the control.

### **STEP 8: Draw from lessons learnt**

The evaluation process comprising collation of data and analysis would reveal the milestones achieved and the shortfalls. It is important to find out which activities did not succeed and why so that the lessons learnt can be incorporated into the National Healthy Food Market Programme. This would facilitate timely, effective and efficient replication of the project.



# 11 Web Resources

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## 1. World Health Organisation - WHO

WHO | Influenza pandemic threat: current situation

[http://www.who.int/csr/disease/avian\\_influenza/pandemic/en/index.html](http://www.who.int/csr/disease/avian_influenza/pandemic/en/index.html)

Avian Influenza: guidelines, recommendations, descriptions

[http://www.who.int/csr/disease/avian\\_influenza/guidelinstopics/en/index.html](http://www.who.int/csr/disease/avian_influenza/guidelinstopics/en/index.html)

Avian Influenza ("bird flu") and the significance of its transmission to humans

[http://www.who.int/mediacentre/factsheets/avian\\_influenza/en/index.html](http://www.who.int/mediacentre/factsheets/avian_influenza/en/index.html)

Avian Influenza Frequently Asked Questions FAQs

[http://www.who.int/csr/disease/avian\\_influenza/avian\\_faqs/en/index.html](http://www.who.int/csr/disease/avian_influenza/avian_faqs/en/index.html)

WHO guidelines for the use of seasonal influenza vaccine in humans at risk of AI infection

[http://www.who.int/csr/disease/avian\\_influenza/guidelines/seasonal\\_vaccine/en/](http://www.who.int/csr/disease/avian_influenza/guidelines/seasonal_vaccine/en/)

WHO interim recommendations for the protection of persons involved in the mass slaughter of animals potentially infected with highly pathogenic Avian Influenza viruses

[http://www.who.int/csr/disease/avian\\_influenza/guidelines/en/Avian%20Influenza.pdf](http://www.who.int/csr/disease/avian_influenza/guidelines/en/Avian%20Influenza.pdf)

WHO recommendations relating to travellers coming from and going to countries experiencing outbreaks of highly pathogenic H5N1 Avian Influenza.

[http://www.who.int/csr/disease/avian\\_influenza/travel2005\\_11\\_3/en/index.html](http://www.who.int/csr/disease/avian_influenza/travel2005_11_3/en/index.html)

Non-pharmaceutical interventions: their role in reducing transmission and spread

[http://www.who.int/csr/disease/avian\\_influenza/pharmaintervention2005\\_11\\_3/en/index.html](http://www.who.int/csr/disease/avian_influenza/pharmaintervention2005_11_3/en/index.html)

Food Safety Issues

[http://www.who.int/csr/disease/avian\\_influenza/foodrisk2005\\_11\\_03/en/index.html](http://www.who.int/csr/disease/avian_influenza/foodrisk2005_11_03/en/index.html)

Tips that can help you avoid Avian Influenza, WHO Regional Office for South East Asia

<http://w3.who.sea.org/EN/Section10/section1027/Section2208.htm>

## 2. Food and Agriculture Organisation - FAO

FAO: Animal Health Avian Influenza

[http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special\\_avian.html](http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/special_avian.html)

FAO Information Resources

[http://www.fao.org/ag/againfo/subjects/en/health/diseasescards/avian\\_recomm.html](http://www.fao.org/ag/againfo/subjects/en/health/diseasescards/avian_recomm.html)

AI Disease card

<http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian.html>

FAO/OIE/WHO Consultation on Avian Influenza and human health: risk reduction measures in producing, marketing, and living with animals in Asia [Kuala Lumpur Report]

<http://www.fao.org/ag/againfo/subjects/documents/ai/concmlaysia.pdf>

Prevention and Control of Avian Flu in Small-scale Poultry: A guide for veterinary paraprofessionals in Vietnam.

[http://www.fao.org/ag/againfo/subjects/documents/ai/AIManual\\_VN2005\(en\).pdf](http://www.fao.org/ag/againfo/subjects/documents/ai/AIManual_VN2005(en).pdf)

Prevention and Control of Avian Flu in Small-scale Poultry: A guide for veterinary paraprofessionals in Cambodia.

<http://www.fao.org/ag/againfo/subjects/documents/ai/AI-paravets-guide.pdf>

Avian Influenza - Safety Measures

[http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian\\_safety.html](http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/avian_safety.html)

Economic and social impacts on Avian Influenza outbreaks

<http://www.fao.org/ag/againfo/subjects/en/health/diseases-cards/cd/documents/Economic-and-social-impacts-of-avian-influenza-Geneva.pdf>

### **3. World Organisation for animal Health - OIE**

OIE : Avian Influenza

[http://www.oie.int/eng/AVIAN\\_INFLUENZA/home.htm](http://www.oie.int/eng/AVIAN_INFLUENZA/home.htm)

OIE Guidelines for control of the disease in Asia

[http://www.oie.int/eng/AVIAN\\_INFLUENZA/guidelines.htm](http://www.oie.int/eng/AVIAN_INFLUENZA/guidelines.htm)

Zoning and compartmentalisation

[http://www.oie.int/eng/AVIAN\\_INFLUENZA/zoning\\_2005.pdf](http://www.oie.int/eng/AVIAN_INFLUENZA/zoning_2005.pdf)

AI Disease card

[http://www.oie.int/eng/AVIAN\\_INFLUENZA/Disease%20card.pdf](http://www.oie.int/eng/AVIAN_INFLUENZA/Disease%20card.pdf)

### **4. Other**

Biosecurity - General Information and guidelines - University of Minnesota

<http://www.ansci.umn.edu/poultry/resources/biosecurity.htm#general>

"Avian Influenza risk perception" , Fielding R, Lam WWT, Ho EYY, Lam TH, Hedley AJ, Leung GM., Hong Kong, University of Hong Kong, Special Administrative Region, China Emerging Infectious Diseases, Vol. 11, No. 5, May 2005

<http://www.cdc.gov/eid>

