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# Animal and Pandemic Influenza: A Framework for Sustaining Momentum

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on  
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## Structure and Objectives of this Paper

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This document offers a Framework for sustaining the momentum to control H5N1 highly pathogenic avian influenza (HPAI), to strengthen capacities to respond to influenza pandemics and to ensure that detection and response systems can deal with the full range of disease threats (including influenza) that can emerge at the animal-human-ecosystem interface.

The Framework consists of three streams of work that need sustained attention. For each stream the Framework proposes two expected outcomes and details the actions that could be taken to achieve the expected outcomes. It identifies the incentives needed to ensure motivation and encourage adequate performance, highlights the mechanisms for monitoring progress, and spells out investment priorities – particularly to support institutions and systems in the least developed countries.

## Contents

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1.0	Introduction .....	4
2.0	Preventing and Controlling H5N1 Highly Pathogenic Avian Influenza .....	5
2.1	Current Situation .....	5
2.2	Achievements to Date and Future Challenges .....	9
2.3	Expected Outcomes .....	9
2.4	Key Actions to Achieve Expected Outcomes 1 and 2 .....	10
2.5	Sustaining Momentum .....	11
3.0	Ensuring that Control and Response Systems can Tackle a Broad Range of Emerging and Existing Disease Threats through Operating a One Health Approach .....	12
3.1	Current Situation .....	12
3.2	Achievements and Challenges .....	13
3.3	Expected Outcomes .....	14
3.4	Key Actions to Achieve Expected Outcomes 3 and 4 .....	14
3.5	Sustaining Momentum .....	16
4.0	Being Ready to Detect, Assess and Respond to Influenza Pandemics .....	17
4.1	Current Situation .....	17
4.2	Achievements and Challenges .....	17
4.3	Expected Outcomes .....	18
4.4	Key Actions to Achieve Expected Outcomes 5 and 6 .....	18
4.5	Sustaining Momentum .....	19
5.0	Incentives .....	21
6.0	Measuring Progress .....	23
7.0	International Financial and Technical Assistance .....	24
8.0	Synopsis of Conclusions and Recommendations .....	28
9.0	The Way Forward: A Framework for Sustaining Momentum for Animal and Pandemic Influenza .....	33
10.0	Appendices .....	34

## 1.0 Introduction

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The starting point for this Framework is the achievements that have occurred over the past five years in addressing H5N1 HPAI, preparing governments and communities to be able to respond to an influenza pandemic and bringing sectors together to work more effectively on reducing disease risks that arise at the animal-human-ecosystem interface.

At the same time, H5N1 HPAI remains a significant threat to animal and human health and livelihoods in a number of countries. Pandemic Influenza A (H1N1) 2009 remains the dominant influenza virus affecting humans throughout the world and the frequency of disease threats emerging at the animal-human interface is likely to increase into the future given our changing environment and expanding domestic animal and human populations.

**The challenge is to find means for taking this work forward in the face of competing priorities.**

Sustaining momentum will require a strategic use of resources and a move away from emergency response driven projects and special, single focus initiatives, to longer term capacity-building programmes. Incorporating capacities within existing programmes and mainstreaming skills are important to moving this work forward and maintaining momentum. Finding and using the right incentives will be critical.

This Framework suggests means for sustaining momentum through the strategic use of resources and the transitioning of initial, emergency-focused programmes into sustainable, integrated areas of work. These must be supported by the appropriate institutional arrangements, resources and monitoring processes to ensure continued work towards reducing the threats posed by animal and pandemic influenzas as well as other diseases, known and unknown, arising at the animal-human-ecosystem interface.

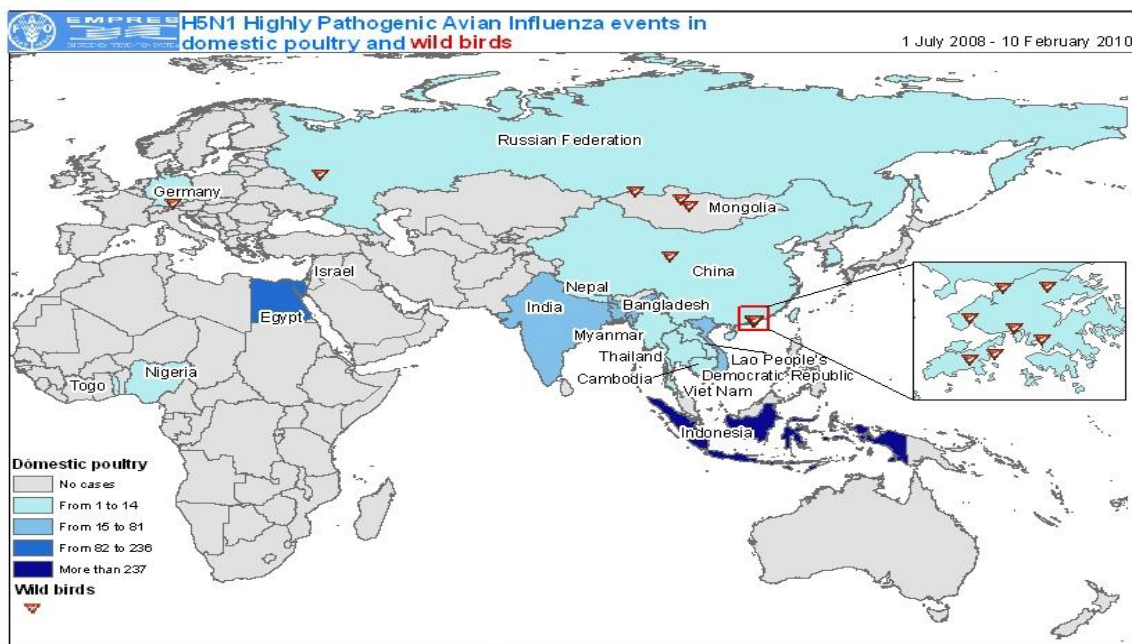
## 2.0 Preventing and Controlling H5N1 Highly Pathogenic Avian Influenza<sup>1</sup>

### 2.1 Current Situation

#### *Domestic animals*

The number of countries reporting outbreaks of H5N1 HPAI in poultry or other species has declined significantly since the peak in 2006 when over 60 countries reported outbreaks. For the past three years poultry outbreaks have been reported on average from around 12 countries with five of these accounting for the majority of reports. However, control of H5N1 HPAI continues to be extremely challenging and it remains entrenched in domestic poultry in many parts of Bangladesh, China, Egypt, Indonesia and Vietnam. In these countries outbreaks are regularly reported that place a heavy toll on animal and human health, and impact on livelihoods and trading opportunities. Other countries that continue to report sporadic outbreaks include Cambodia, Lao PDR, India, Nepal and Myanmar (See Figure 1).

**Figure 1: H5N1 HPAI in Domestic Poultry and Wild Birds.**



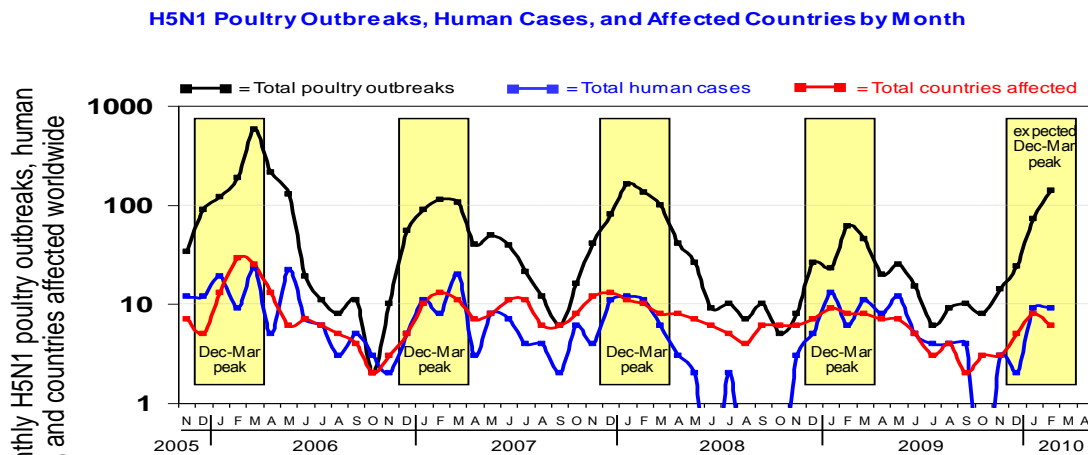
(Source: FAO EMPRES-i)

<sup>1</sup> See Annex 1: Summary Conclusions: Animal and Pandemic influenza viruses of concern – overview of the current situation and international support efforts; Also see Annex 2. Summary Conclusions: H5N1 Highly Pathogenic Avian Influenza: ensuring an appropriate and sustainable response.

**Seasonality**

Marked seasonality of the outbreaks has occurred over the past five years with a surge in activity occurring each year between December and March. The magnitude of the peaks has been somewhat similar in each of the past three seasons (See Figure 2).

**Figure 2: H5N1 HPAI Poultry Outbreaks, Human Cases and Affected Countries by Month**



Source: OIE, WHO, FAO reports through 3/5/10 (data from Egypt contain active surveillance since 2009). Note: poultry outbreak totals do not include data from Indonesia (after Sep 2006), but Indonesia is included in the number of countries affected. Figure developed by USAID

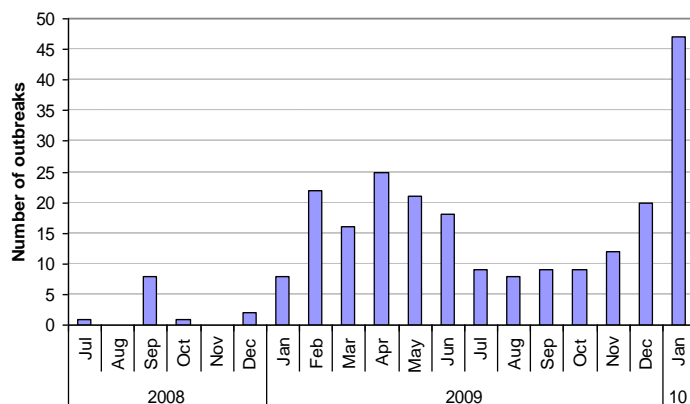
For the majority of the highly impacted countries, the overall number of reports of outbreaks in 2009 was similar to that recorded in 2008. However an increase in the overall number of outbreaks was reported by Egypt in 2009 and, unlike most other affected countries, the level of activity in Egypt in 2009 remained relatively high throughout the year (Figure 3).

**Wild Birds**

Encouragingly, a reduced number of wild bird outbreaks was reported in 2009, though transmission of the disease from wild birds to poultry or to other animal host species remains a concern.

**FIGURE 3; H5N1 HPAI OUTBREAKS IN EGYPT**

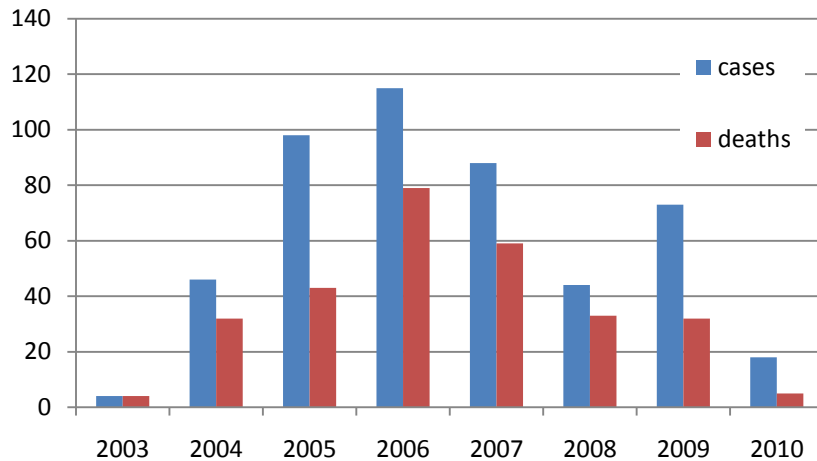
(SOURCE: FAO EMPRES-I)



**Human cases**

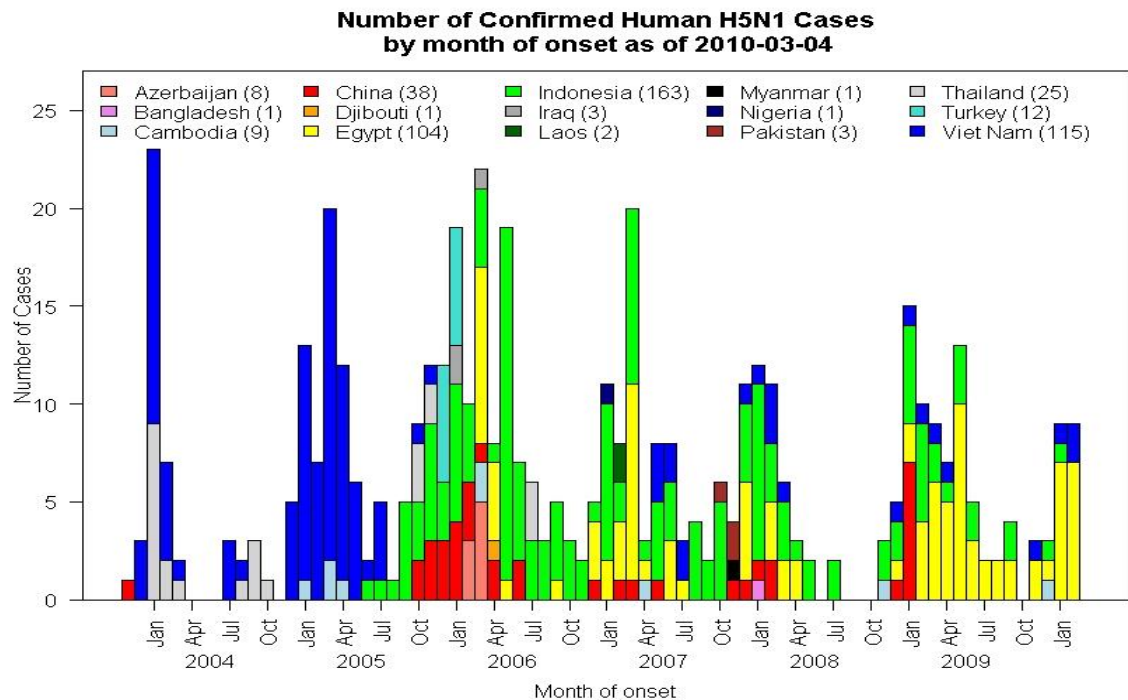
Although 2007 and 2008 saw a steady decline in the number of human cases reported globally, a significant rise in numbers occurred in 2009, with the majority of the new cases in 2009 reported by Egypt (Figure 4). All human cases occurred in countries with ongoing circulation or reintroduction of H5N1 HPAI viruses in poultry and there is a close correlation between seasonal occurrences of H5N1 HPAI in poultry and the incidence of human cases (Figure 2 and Figures 5 & 6).

**Figure 4: Number of Confirmed H5N1 AI Human Cases since 2003.**



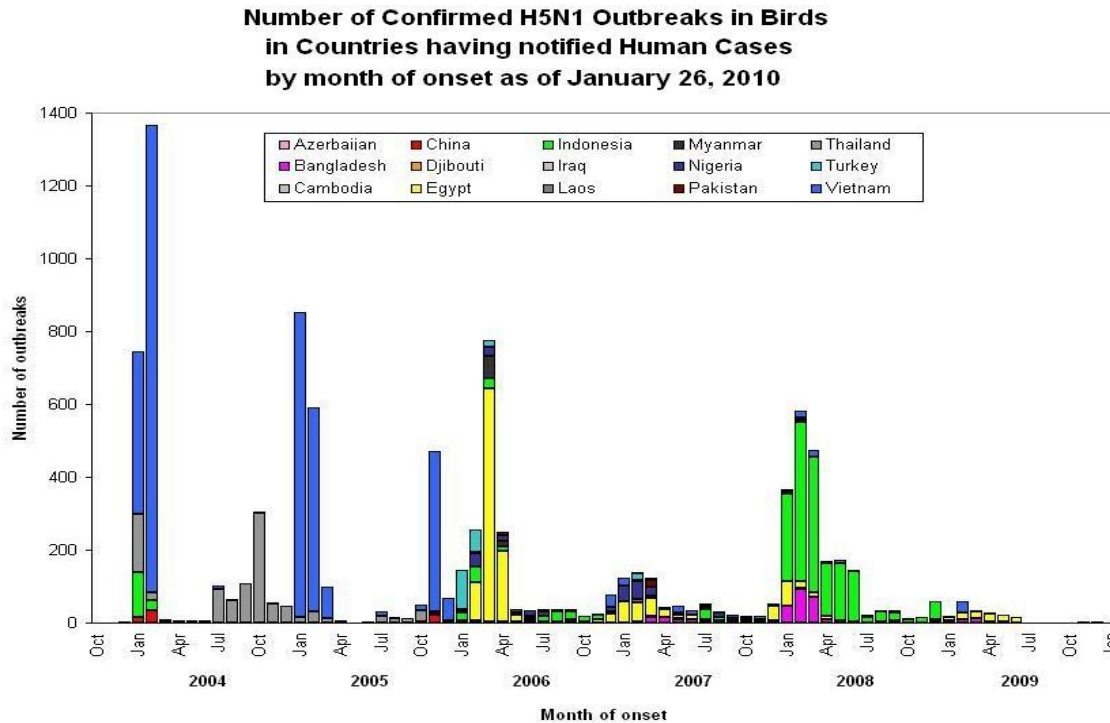
Source: WHO

**Figure 5: Number of Confirmed Human H5N1 AI Cases By Country to 4 March 2010**



Source: WHO

**Figure 6: Number of Confirmed H5N1 HPAI Outbreaks in Birds in Countries having Notified Human Cases by Month since the Onset of the Epizootic and up to January 2010**



Note: No information by outbreak on H5N1 in birds was provided by Indonesia in the first half of 2007

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Source: OIE

The survival rate from H5N1 AI infection in humans remains low. Globally over 40% of people who are reported as infected with H5N1 AI will die and this rate has remained stubbornly high since the outset of the global outbreak. In some areas, fatality rates for women are significantly higher than other groups with up to three quarters of all infected women dying. Encouragingly though, survival rates in Egypt over the past three years have averaged at around 90%, but there are indications that the fatality rate might be rising again. Rapid access to antivirals and appropriate medical treatment, coupled with early health seeking behaviours by the public, are likely to have significantly contributed to the lowering of the case fatality rate in Egypt.

At present H5N1 HPAI remains an avian virus that has not demonstrated a facility for effective transmission from human to human. Three family clusters with no evidence of sustained human-to-human transmission were documented in 2009.

### ***Other influenza viruses of concern***

Pandemic (H1N1) 2009 emerged in April 2009 and has since spread throughout the world. The final impact of the pandemic has yet to be assessed but the emergence of this virus provides a timely reminder of the need for constant vigilance and preparedness. Other influenza viruses of animals with subtype H2, H5, H6, H7 and H9 viruses have sporadically infected humans and are considered to have pandemic potential. No significant outbreaks in animals or humans from these subtypes were reported in 2009 though the risk of mutation or reassortment of influenza A viruses remains a concern.

## 2.2 Achievements to Date and Future Challenges

Despite the continued presence of H5N1 HPAI in domestic poultry in some parts of the world, there have been significant **achievements** with the control and response of H5N1 HPAI since 2006. The increased collaboration between animal and human health sectors at international, regional, national and local levels has led to improvements in early detection of disease in animals and the streamlining of responses to outbreaks. Heightened vigilance and rapid response to incursions by national authorities around the world have helped to prevent wider entrenchment of the virus occurring. And increased awareness of the risk factors is likely to have contributed to limiting the number of human infections that have occurred to date.

Recently a better understanding of the social, cultural, gender and economic consequences as well as stronger integration of communities in the decision-making process have led to more effective and flexible approaches to disease prevention and control than those adopted at the onset of the response. Promotion of healthy poultry production and a focus on improving livelihoods has resulted in higher levels of community engagement with progressive control programmes. And finally, the response to H5N1 HPAI provides a paradigm for international coordinated action to promote adoption of One Health approaches.

Many **challenges** though remain, including the fact that H5N1 HPAI remains enzootic in birds in several countries. H5N1 HPAI disproportionately affects the poor – and especially women - as they are heavily dependent on incomes from, and consumption of, poultry. Controlling outbreaks effectively, without negatively impacting communities and the poor, remains a challenge in many areas. As strong public engagement is critical for the success of containment efforts, community-based initiatives that promote dialogue and ensure feedback need to be strengthened in order to build trust among the public, and the affected stakeholders in particular. The international community needs to sustain vigilance for possible changes in the behaviour of this virus and other animal influenza viruses of concern – which may present an increasing challenge as interest wanes and highly visible outbreaks that serve as a reminder of the importance of vigilance become less apparent.

## 2.3 Expected Outcomes

There are two expected outcomes for countries and the international community that derive from the need to build on the achievements of the last few years and overcome challenges. Pursuit of these outcomes would lower the risk that H5N1 HPAI poses to communities, countries and the world:

- **Expected outcome 1: Progressive control of H5N1 HPAI – with the aim of eventual elimination in domestic poultry production**
- **Expected outcome 2: Maintaining vigilance for H5N1 HPAI and other influenza viruses that have pathogenic potential in humans**

## 2.4 Key Actions to Achieve Expected Outcomes 1 and 2

Key actions to achieve these outcomes include the promotion of healthy poultry production, rapid response to outbreaks in poultry, early warning and early treatments, effective communications to assist adoption of protective practices, and applied research.

### *National Goal Setting - particularly for highly impacted countries*

In light of experience and increased knowledge, we recommend setting short-, medium- and long-term goals that are aligned with the global expected outcomes. Goal setting is likely to be most effective if it is undertaken as a cross-government partnership with the private sector, civil society and affected communities. It will often be appropriate to aim for objectives such as progressive control of H5N1 HPAI, the development of healthy, sustainable poultry production, and improving the resilience of livestock-dependent livelihoods. Strategies can build on specific interests of stakeholders (such as the reduced risk of disease, expanded opportunities for trade, etc.). Actions to limit transmission can be implemented in a manner that minimizes the economic and nutritional impact on the affected community. The facility to ensure adequate and timely compensation for culled animals as part of disease-control measures is also an important component.

### *Maintaining and Strengthening Vigilance and Detection Systems – in all countries*

Vigilance for human infections, for incursions into previously unaffected poultry flocks and for significant changes in the behaviour of H5N1 HPAI or other influenza viruses is critical. It is important to maintain investment and continual improvements in surveillance systems and laboratory capacity, coupled with timely information sharing between sectors and a high level of awareness - and willingness to report - amongst human and animal health practitioners and those working and living with poultry. Availability of timely and adequate compensation is essential in promoting willingness to report outbreaks.

### *Promoting Healthy Poultry Production – in all countries*

Biosecurity throughout the full production chain, from farm to fork, is key for healthy poultry production. It prevents the introduction of H5N1 HPAI and other pathogens and reduces the risk of transmission from one area to another, and from poultry to humans. Integrating strong biosecurity across the production chain is likely to assist in developing sustainable trade and to improve the livelihoods of those living and working with poultry.

Because the success of disease control and prevention programmes depends critically on the behaviour of farmers and others, it is important to strengthen community engagement and effective communication capacity. Clear linkages need to be built between stimulating healthy poultry production, rural and urban planning, and trade and economic development sectors. Multidisciplinary research is also useful, particularly if it includes local researchers, to enhance understanding of the ecological, socio-cultural, political, economic and communication aspects needed to support healthy poultry production in different settings.

## 2.5 Sustaining Momentum

### *Community and Industry Involvement*

Two measures that could help sustain momentum in community and industry involvement are (a) the adoption of appropriate institutional arrangements to ensure participation of communities, poultry workers, and the local and international private sector in designing, supporting and regularly reviewing improvements for healthy poultry production and (b) engendering effective communication to support household behaviour change and the adoption of healthy poultry raising practices. Community and industry involvement will do much to ensure continued progressive control of H5N1 HPAI, protection from infection, and sustained community-led control of H5N1 HPAI in highly impacted areas.

### *National*

In line with the approach to date, countries will be taking the lead in contributing to the international effort aimed at the goals proposed in this Framework. Country responses should, therefore, remain the main focus of external technical and financial assistance. Many countries need to strengthen animal and human health services to ensure progressive control. In addition, continued vigilance is needed, which will require continued investment, oversight and supportive institutional arrangements. Multisector collaboration across different levels of government and disciplines, and enhanced public-private partnerships are needed to support healthy poultry production, continued vigilance and progressive disease control.

### *Regional and International Organizations*

Regional and international organization should support countries through technical assistance and other advice. This support can take the form of further development and sharing of knowledge, collating and analyzing information from current regional and international research initiatives, and further strengthening technology and knowledge transfer systems. Possible areas for research could include: poultry vaccination strategies to maximize their effectiveness in different settings, practical ways to strengthen biosecurity in low-resource settings and development of low-cost means to achieve safer marketing of poultry.

International and regional organizations also play an important global role. In particular, regional and international surveillance and laboratory networks could also be further developed to ensure continued vigilance for changes in H5N1 HPAI or other animal influenza viruses of concern. Policies and regulations can help build a healthy global poultry industry able to cope with the likely increasing demands for protein-rich food without compromising safety or inadvertently increasing the risks of infectious diseases. FAO and OIE in partnership with WHO, UNICEF and global and regional development banks are well-placed to continue to provide support to countries for sustaining momentum.

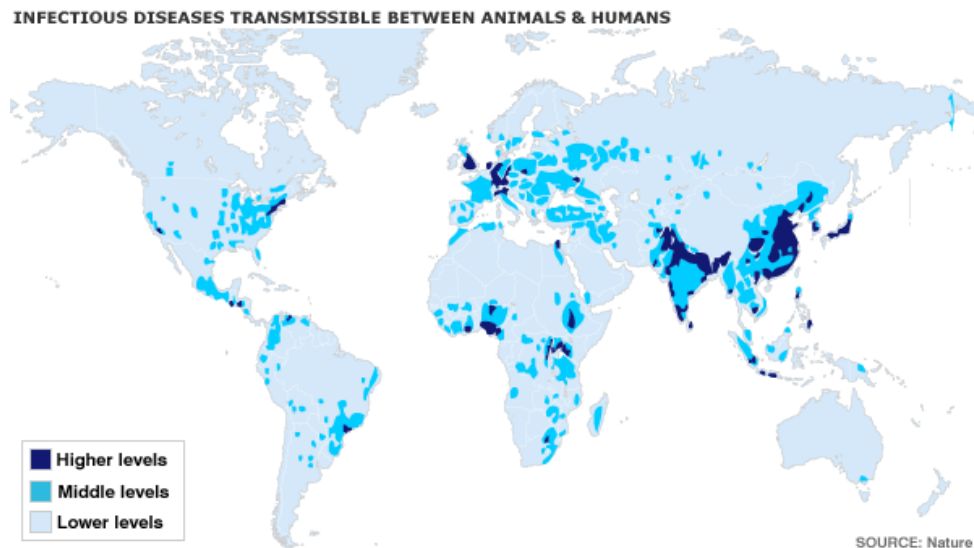
### 3.0 Ensuring that Control and Response Systems can Tackle a Broad Range of Emerging and Existing Disease Threats through Operating a One Health Approach<sup>2</sup>

#### 3.1 Current Situation

##### *The unknown*

It is predicted that new pathogens will continue to emerge within domestic and wild animal populations at the rate of at least two per year, with increased risks of emergence in specific regions of the world. 75 percent of new infectious diseases in humans have come from animals. In addition to the potential impacts on human life and health, the economic losses associated with zoonotic diseases can be significant; direct losses due to zoonoses such as SARS, bovine spongiform encephalopathy (BSE), and H5N1 HPAI over the past decade are estimated at \$10 billion, with indirect costs estimated at \$200 billion. H5N1 HPAI and Pandemic (H1N1) 2009 are just two of the many new diseases to have emerged in recent years (see figure 7).

**Figure 7:**

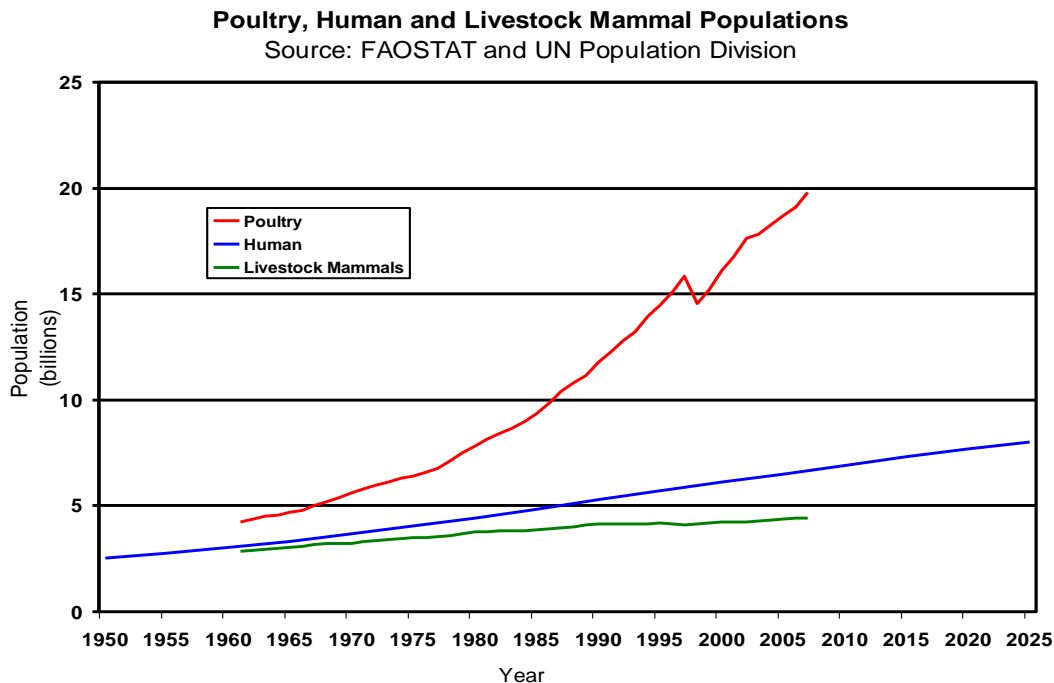


Several forces are increasing inter-species mixing and allowing greater opportunities for pathogens to move between species. These include intensified farming and concentration of animals and humans (see figure 8), encroachment of humans into previously uninhabited lands and the increasing global movement of people, animals, and animal products. These forces have combined to exert evolutionary pressures on pathogens that present an expanding array of risks.

<sup>2</sup> See Annex 3. Summary Conclusions: Understanding the potential impacts and drivers of global health threats; policy options for establishment of One Health capacities at national, regional and global levels.

These risks may, in turn, be exacerbated by increasingly complex trading patterns, migration and global warming. These drivers are likely to increase, not decrease in coming years and the likelihood of diseases emerging is therefore likely to increase, not decrease as populations grow and pressures mount.

**Figure 8: Poultry, Human and Livestock Mammal Population Growth 1950-2010**



### *The known*

A range of existing, high-impact diseases such as rabies and brucellosis occur at the animal-human interface and significantly impact, year-on-year, on animal health, human health and livelihoods, with often a disproportionate impact on the poor and most vulnerable groups. The control of these diseases could be assisted greatly by more effective interdisciplinary collaboration at the animal-human interface, particularly building on the experiences and learning from H5N1 HPAI. In addition, resources should be directed to amend, improve and strengthen existing systems to address both emerging and known disease threats. Continuing to build the capacity to control known diseases will further enhance our ability to respond to events that may arise in the future.

### **3.2 Achievements and Challenges**

Recent experiences with SARS, H5N1 HPAI and Pandemic (H1N1) 2009 have resulted in a major **achievement**. Policy-makers and experts have concluded that a coordinated approach is needed that encourages multisector, multidisciplinary working, and that optimizes the use of existing systems and skills to address the known and the unknown.

It has also been recognized that emerging disease threats arising at the animal-human-ecosystem interface will likely increase in frequency, and possibly also magnitude, over the coming decades and that their impact will probably be disproportionately felt by the poor and the most vulnerable. There has been a failure however to recognise the high burden that some existing animal-human diseases are placing on society. These so called neglected zoonotic diseases remain unfortunately mostly just that – neglected by the international community.

The many **challenges** include ensuring that the recognition of the potential threat of more and greater emerging diseases is translated into concrete action to address the diverse and multisector drivers or root causes of disease emergence. This means maintaining public interest in emerging diseases given ever-changing perceptions of global needs. It is also important to ensure that specific population groups such as children, pregnant women, indigenous, migrant and refugee populations, who are particularly vulnerable to the impact of the close interaction between human and animal populations, are adequately identified and protected. Above all though, the key challenge will be how to turn the promising beginnings of stronger cross-sector working into a program that can be institutionalized and sustained as well as holistic in its approach. Such a program will likely increase in importance as demographic pressure and its economic consequences are reflected in higher poverty rates, adverse impacts on health and nutrition of households, and increased vulnerability to emerging threats.

### 3.3 Expected Outcomes

There are two expected outcomes that merit consideration by the international community:

- **Expected outcome 3: Reducing the likelihood that infectious diseases like H1N1 cross species barriers at the animal-human-ecosystem interface through evidence-based work on drivers of disease emergence**
- **Expected outcome 4: Building systems to limit the impact of diseases arising at the animal-human-ecosystem interface: the One Health approach**

### 3.4 Key Actions to Achieve Expected Outcomes 3 and 4

The key actions needed to achieve these expected outcomes fall into two areas. First, the human, animal and environmental health foundations have to be strong, so strengthening these systems remains a priority for many countries. Second, national authorities and the international community would be well served if they moved towards adopting and promoting multisector, interdisciplinary approaches to working at the animal-human-ecosystem interface. These actions will make it possible to address the root causes of emergence, ensure strong surveillance, reduce the burden of existing diseases, and prepare for future events.

### ***Multisector Surveillance***

A comprehensive, effective and efficient national, regional and global surveillance network of systems is key to monitor the drivers of disease, to track existing diseases and to detect as early as possible emerging diseases at the animal-human-ecosystem interface. To achieve this, further and more consistent investment in these systems (animal, human and ecological) and the means of linking and sharing information is recommended, as is the development and sharing of better and easier tools to support diagnosis, information analysis and forecasting. One promising initiative is the One Flu proposal to bridge the gaps between medical and veterinary scientists, monitor virus evolution and epidemiology, and exploit investments in capacity building.

### ***Putting Prevention High in the Agenda - Multisector Approach to Addressing the Root Causes of Disease Emergence***

Depending on country circumstances, the issues to be addressed may include migration, changes in land use, pressures on food availability, changes in animal husbandry practices and climate change. These factors influence, to a greater or lesser extent, the likelihood of pathogens moving between species and emerging as new threats to animal and human health, livelihoods and development. Multisector action that is informed, notably, by broader disaster-reduction programmes, is likely to be useful along with simple and practical ways to reduce the opportunities for pathogens to move between species (particularly between wild-life, domestic animals and humans). Integrating these approaches into relevant husbandry, housing and health development projects would ensure both short and long term gains in addressing the root causes of disease emergence.

Preventing emergence is important and to this end a range of other actions may be considered including (a) novel approaches to surveillance that predict potential disease niches through ecological mapping and determinations of factors associated with the emergence of diseases, (b) a robust and well-researched legal framework that reflects local needs and interests, (c) good communication strategies, (d) incentives for good animal husbandry, (e) properly functioning and governed veterinary services, (f) structures for the involvement of ecologists, social scientists and political economists to contribute to analysis and decision-making, and (g) well-regulated systems for livestock transfer, tracing, slaughter, processing and marketing. In addition, for sustained progress in the long term, an assessment of the emerging disease risk (as well as other disaster-related risks) should form an integral part of all planning approval for new land usage. Tools to do this need to be developed, adopted and integrated into urban and rural planning and development processes.

### ***Drawing Attention to the True Cost of Existing Diseases***

Stronger economic rationale is needed for disease prevention and control efforts for the so-called 'neglected diseases' and others that already exist at the animal-human interface. This should include analyses of the potential human, societal and financial costs of failing to invest in efforts to control these diseases. Countries and international organizations may wish to consider using the methodology that the World Bank has developed to assess the costs of brucellosis and other zoonoses in the Europe and Central Asia region. The findings of such analysis need to be communicated to decision makers throughout the public, private and civil society sectors.

### ***Learning to Work as One – Making Multisector, Multidisciplinary Work a Reality***

Experience of the response to H5N1 HPAI suggests that zoonotic disease control requires effective joint efforts among professionals and communities working and living at the animal-human-ecosystem interface. Functioning systems which provide incentives to professionals in these distinct sectors to work effectively together at all levels and engage with affected communities are key to encouraging collaboration. Strengthening institutional mechanisms to support integrated approaches and enhancing multisector expertise may also be required.

## **3.5 Sustaining Momentum**

### ***Empowering Communities***

Efforts should be made to involve communities in identifying diseases or threats of local concern, assessing the ‘total’ burden in their community and determining how best to address and monitor them. These activities need to be supported with the appropriate institutional arrangements and set in the context of achieving improvements in livelihoods and development.

### ***National Level***

Robust and well-governed public and animal health systems compliant with the WHO International Health Regulations (IHR 2005) and OIE international standards, should be gradually built in all countries. Countries and communities can explore and provide incentives for the public and the private sectors to increase their focus on risk reduction and increase their resilience to shocks from emerging health threats at the animal-human-ecosystem interface.

One Health approaches will benefit from strong inter-professional networks supported by structures and processes that facilitate information exchange, joint education programmes, joint responses and, as appropriate, shared technical and financial resources. There is also a need for multisector governance which can be achieved by bringing together at government level, biosecurity, wildlife conservation, food safety and human health concerns. The arrangements should facilitate, encourage and ensure adequacy of an agreed range of joint working practices. Such joint approaches are most likely to be effective if they engage commercial livestock production and wildlife conservation entities, other private entities engaged in both trading and retailing, as well as consumer and tourism groups.

### ***Regional and International Engagement***

Regional and international organizations should support developing countries in designing and implementing One Health approaches. There is a particular need for the international bodies (including FAO, OIE, WHO, UNICEF and the World Bank) to foster One Health approaches through information exchange forums, identification of common areas of interest and development of effective, results-focused collaborations between sectors.

International bodies should support further development of regional and international surveillance and laboratory networks to provide information for use through a One Health approach to assess disease burden; to provide early warning of emergent (or changing) pathogens; to assist with forecasting and risk analysis and to help establish good operational practice. Finally they should also promote research that enables timely and context-relevant decisions around optimal policies and practices.

## 4.0 Being Ready to Detect, Assess and Respond to Influenza Pandemics<sup>3</sup>

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### 4.1 Current Situation

A comprehensive review of how ready the world is now for the next event will only be possible over the coming months. Countries need to take stock of the lessons learnt so far from Pandemic (H1N1) 2009 and assess how much systems have been strengthened as a result of the sustained activation in response to Pandemic (H1N1) 2009. It is likely that revised matrices for stocktaking and future monitoring of progress will need to be developed to take into account what has been learnt from Pandemic (H1N1) 2009 and the likely need for increased flexibility and adaptability of systems in the future.

Experience with recent major public health threats, including Pandemic (H1N1) 2009, has though heightened awareness of the importance of preparedness including the need for all sectors to plan, the need for strong coordination mechanisms to support multisector, multicountry collaboration and the importance of effective communications.

Pandemic plans have been established by most countries and many countries now plan to revise these in light of recent experience and evaluation processes. Progress with business continuity planning for non-health sectors continues to remain relatively low, though there has been a recent upsurge in preparedness activities as a result of Pandemic (H1N1) 2009.

As noted in section 2, the threat of another pandemic from either H5N1 HPAI or indeed any one of a range of other influenza viruses has not diminished and, as highlighted in section 3, the drivers of disease emergence are increasing, not decreasing. Continued work to strengthen readiness for influenza pandemic is therefore still required.

### 4.2 Achievements and Challenges

The world was certainly much more ready for Pandemic (H1N1) 2009 than it would have been a decade ago. Sustained and intense investment and attention over the last five years as a result of interest stimulated by concerns related to H5N1 HPAI reaped many benefits – faster detection and response, more coordinated actions, greater cross sector involvement. Communication efforts have had a significant impact in building knowledge for decreasing the risks to human health from emerging diseases and pandemics. However, as the reviews over the coming months to years will likely indicate, significant areas for improvement remain, and the work to build a sustainable system ready and able to respond to the complex needs associated with pandemic influenza is most certainly not complete.

The greatest challenge though is likely to be sustaining interest in preparedness because there is a growing perception that the pandemic risk has declined in recent months as many believe that the ‘pandemic’ has happened and, to date, H5N1 HPAI remains a predominately animal disease. In addition many also believe that systems have already been developed and fared reasonably well

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<sup>3</sup> See Annex 4. Summary Conclusions: Preparedness for Global Health Threats – Where are we now and what else needs to be done?

during recent events so little more is needed at this stage. However the likelihood of a severe pandemic occurring in the future is unchanged by recent events and although much has been achieved, response capacities and capabilities are likely to decline rapidly if they are not maintained. Continued attention on maintaining and building systems is therefore still needed.

### **4.3 Expected Outcomes**

Being ready to detect, assess and respond to a pandemic requires working towards the following:

- **Expected outcome 5: Developing local, national and global capacities for responding to pandemics so that they reach standards laid out within IHR 2005 and the OIE international standards.**
- **Expected outcome 6: Incorporating capacity for multisector pandemic responses within disaster preparedness and response strategies.**

### **4.4 Key Actions to Achieve Expected Outcomes 5 and 6**

Based on the experience of the past five years including the response to date to Pandemic (H1N1) 2009, the following five areas are likely to need continued attention at national, regional and international level in the coming years in order to achieve these expected outcomes.

#### ***Optimizing Learning from Pandemic (H1N1) 2009***

The H1N1 pandemic provided a real-life test of preparedness of systems at the international, country and community levels. Learning from this experience should be based on robust science based evaluations at all levels involving all sectors, partners and the community. Results of these evaluations should inform further investments in preparedness and readiness capacities and capabilities. A useful expected outcome of the evaluations will be to revise planning assumptions and ensure that a range of scenarios are included. The revised plans should provide for the ability to adapt to meet potentially unforeseen challenges as an integral part of future preparedness.

#### ***Building Assessment Capacity to Assess and Predict Situations***

Decision makers require regular, timely information from all sectors, using diverse types of data in order to effectively assess the likely and felt impact of a pandemic or other major health event. Decision making is best served by ensuring that a ‘composite’ assessment of the health, societal and economic risks posed to the ‘whole of society’ is coupled with an understanding of different and / or disproportionate risks to specific populations. Such assessments should be made available in a timely fashion. Further development of systems that can collate information from multiple sources and analyze diverse types of data is therefore likely to be an important part of future preparedness activities.

#### ***Enhancing Cross-Sector Decision Making***

Pandemics and other major infectious disease events that affect groups of countries will, by their very nature, have an impact, in some shape or form, across all sectors of societies. Business Continuity Planning (BCP) is key to preparing essential sectors for critical functioning during severe disruptions of inter-dependent services: health, energy, transportation, food, water and

sanitation, law and order, defence, financial services and telecommunications. Strengthening the capacities at local, sub-national and national levels to prioritize (and adjust priorities) *across* and *within* sectors is recognized to be a critical competency. Private and voluntary sectors and other parts of civil society play a key role in the response to any major events. Response planning would therefore benefit from including and making transparent how all essential sectors would (or would not) be included in decision making during the response to a high-impact epidemic.

#### ***Improving Communications about Risks and Actions Needed***

Communication is critical to all aspects of a response to a major infectious disease event. Whether the event is mild or severe, the way in which the risks are framed and how the actions needed are explained can change the impact of the event dramatically. Strengthening communications capacity across the whole of society and within all sectors of the community is a critical area for further preparedness activities.

#### ***Strengthening the Response Capacity of All Systems and Integrating Pandemic Preparedness into Multi-hazard Disaster Planning***

Countries need to continue to prepare critical sectors for continuity of their essential functions and services and to avoid the disruptions caused by high staff absenteeism due to the impact of a pandemic. The failure of one or more critical service can have economic and social consequences, as well as an impact on other essential services. Although infectious disease events present some unique challenges such as the need for social distancing and potential for simultaneous multicountry or global impacts, much of the current multisector response planning could be integrated into generic efforts to reduce and respond to disasters. Developing a more multihazard approach could help to optimize investments and ensure sustainability and compatibility between command and communications systems.

### **4.5 Sustaining Momentum**

#### ***Empowering Communities***

Integrating pandemic preparedness into other community-level disaster reducing and planning programmes is likely to assist in sustaining interest and investment. Where possible, this is a sensible policy to pursue and should be accompanied by supportive processes, such as periodic testing of plans and provision of resources for the planning. Implementation of ‘bottom up’ approaches to preparedness planning for any major health event can help enhance community-level resilience.

#### ***Sustaining Effective Structures and Processes at National Level***

Processes are likely to be needed at a national and sub-national level to help governments and the public to learn from recent events, to capture lessons and to rapidly transform these lessons into implementable programmes of work.

In light of recent experience, some countries may consider reviewing current institutional arrangements and legislative frameworks to assess how well they support whole of society responses, cross-sector analysis of information and cross-government decision making. Integration of current pandemic-specific arrangements into institutional structures that support

multihazard disaster preparedness and response may be an appropriate means of achieving sustainable readiness and continual improvement.

***Regional and International Engagement***

Timely, transparent and effective processes are needed to optimize global learning through capturing lessons and translating knowledge into actionable guidance. International and regional institutions can play a valuable role in making sure that such guidance is made available to developing countries.

Given its importance, the infrastructure for early warning also needs further development. The incentives and support for countries, particularly those affected early in a pandemic, need to be made more robust so that the first affected countries can warn others without then suffering negative repercussions. There must be adequate assistance on hand to gather the critical information needed to enable rapid forecasting of the impact of the pandemic across the whole of society.

Many countries may also need continued support to strengthen core capacities and integration of relevant aspects of preparedness for infectious disease events into other multihazard disaster reduction and response programmes. The IHR and the Hyogo Framework of Action should be both used to guide international arrangements to support continued work on multisector pandemic preparedness.

## 5.0 Incentives

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Much of the public and media attention to date to address H5N1 HPAI and to prepare for pandemics has occurred as the result of fear that a severe pandemic could occur in the near future. Recognizing the importance of public sentiment as well as the objective threat from H5N1 HPAI, public policy makers devoted substantial resources to mounting a response. However H5N1 HPAI has not, to date, evolved into a virus that can easily transmit between humans and the impact of Pandemic (H1N1) 2009 has not, so far, been as severe as the extreme scenarios for which some were planning. Statistically the chances of a severe pandemic occurring in the future have not changed as a result of recent events – H5N1 HPAI could still evolve, Pandemic (H1N1) 2009 might mutate and other influenza viruses could emerge tomorrow and threaten human health as well as economic growth - around the world. But this concern – on its own - is unlikely to motivate investments in the future or provide all the incentives necessary to sustain activities and build further critical surveillance and response capacities. Other incentives will therefore need to be given greater prominence if the momentum that has been generated over the past few years is to be sustained and the investments to date optimized.

One key incentive for continued action on H5N1 HPAI in all countries is the development of sustainable, healthy poultry production as discussed in Section 2. Participation in local, national, regional and international trade can be used to motivate efforts to achieve and sustain disease-free status for H5N1 HPAI and other livestock diseases. The international standards developed under the auspices of the OIE for animal health and zoonoses are essential reference tools in the area of improving animal health and welfare worldwide through the application of science-based, democratically adopted global standards on animal diseases, including zoonoses. These standards, as well as other relevant trade, ecosystem and human health standards are powerful incentives for sustained action. Monitoring of progress towards meeting internationally agreed standards will provide both additional incentives and a means to ensure regular evaluation of progress.

The key motivator for the public, for staff and for decision makers to continue action to prepare for pandemics will most likely come from seeing capacities and capabilities being used on a day-to-day basis to treat patients and to respond to other major events. Mainstreaming of capacities into existing health system strengthening programmes and integration of planning and response preparedness into multihazard disaster planning may be useful to sustain momentum. Articulating more explicitly the significant co-lateral benefits that pandemic preparedness has delivered will help to enhance support.

A number of other specific incentives may be needed to ensure that the root causes of disease emergence are addressed and that existing diseases arising at the animal-human-ecosystem interface are afforded the right level of attention. Analysis is needed to calculate the current and likely costs of existing and emerging diseases – and this needs to be translated into effective communications to encourage multisector action. Without increased attention being drawn to these issues, some important existing diseases are likely to remain ‘neglected’ and the practical means to reduce the likelihood of disease emergence at the animal-human-ecosystem interface will not be found or implemented. Calculating and showing the true costs of these threats and

demonstrating the cost effectiveness of actions is key to motivating and sustaining future action. It is also important that incentives to report outbreaks at local, national and international levels are in place; further work is likely needed to create and align incentives and to reduce barriers and disincentives, particularly economic ones.

And finally, duty to future generations should be used to incentivize the timely and transparent capturing of learning from recent experiences. The experience of responses to Pandemic (H1N1) 2009 should be documented and assessments should be made available to all countries and preserved as a resource for generations to come. The next pandemic may be only a few years away – or it may take many decades before such an event occurs again. It is therefore important to document what civil society, countries and international bodies have learnt and to ensure that this knowledge will be available whenever another such event.

## 6.0 Measuring Progress

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### *Monitoring at the Local, National and Global Levels*

A global programme that will continue into the long term requires an adapted monitoring mechanism that is fully integrated into the regular work of the relevant national and international agencies. In light of recent experiences, it may be necessary to develop revised matrices that reflect new priority areas for capacity building. As noted above, it is proposed that pandemic preparedness (especially for non-health sectors) be mainstreamed into disaster preparedness, and regular reporting on progress at the national and global levels should take place in that context, as noted in the Hyogo Framework.

It is important that efforts to control H5N1 HPAI and One Health system initiatives are closely monitored and continuously examined. As a substantial part of this function would take place at the community and national levels, where programmes are managed and implemented, it would be important to integrate monitoring into everyday practice to ensure that the results are useable and useful at a local level. Some countries may require support to develop and integrate effective review processes in local work programmes.

At the global level, it would be appropriate for the concerned international bodies to regularly report to their governing bodies on the risks from diseases at the animal-human-ecosystem interface, and on the adequacy of actions being taken to reduce these risks. These reports could track how robust and well-governed human, animal and environmental health systems are, whether they comply with the WHO International Health Regulations (IHR 2005) and OIE international standards, and how far the development of a One Health approach is progressing. As has been the practice on other inter-sectoral issues, this effort could be best supported by an international advisory group which would establish a review mechanism based on multidisciplinary technical expertise (including health systems, ecological, economic, anthropological, sociological, organizational and political expertise) to inform the evolution of the work. Such an approach would require discussion and endorsement at the OIE World Assembly of Delegates, World Health Assembly and FAO Conference.

## 7.0 International Financial and Technical Assistance

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### **A Systematic Approach to Delivering a Global Public Good.**

Reducing the enormous risks posed by the existing, emerging and re-emerging diseases at the animal-human-ecosystem interface is an important public good. It will require, as a prerequisite, an adequate capacity to predict, prevent and to control such diseases. The vast majority of developing countries do not currently have all the institutional and system capabilities to meet this challenge.

The integrity of a global disease prevention and control capacity depends on a minimum capability of each member of the community. The ‘chain is only as strong as its weakest link’ so a collective effort is required to help developing countries make the necessary investments to strengthen their animal and human health systems and to support multisector, multidisciplinary approaches to prevention, protection, detection, preparedness and response. Estimates of what this will cost are presented below. Adequate funding will also be required to ensure the contributions of the international agencies to global efforts to predict, prevent, and control highly infectious diseases, including zoonoses.

### **Completing HPAI Control Activities**

Since late 2005, donors have provided USD3.9 billion in international assistance to avian and human influenza programmes in developing countries. Taking into account the commitments provided, the unmet funding needs (based on a three-year programme) are about \$800 million, of which about half is for countries in Sub-Saharan Africa (Resource Paper 1 provides details).

### **Estimating Costs of Enhanced Global Capacity**

The **One World, One Health** framework document presented an assessment of the costs of a global network to support One Health approaches. In its section on tailoring monitoring and control systems, the document acknowledged that ‘producing an estimate of the global financing needs to implement is an art, not a science,’ owing to the complexities of estimating costs in relation to ‘the level of risk deemed acceptable to the global community’. More detailed individual country cost studies will clearly be required but the estimates presented here give an indicative order of magnitude of resources that will be needed.

The cost estimates used in the framework document, and hence in this paper, are based on the figures for unit costs presented at the Bamako ministerial conference in 2006 (ALive 2006). Individual countries were used as the basic unit. These cost estimates are based on human health and livestock populations and distributed over the costs of developing and maintaining infrastructure. They take account of the previous investments already carried out and were calculated for each country for human, veterinary, and communication services.

The figures were adjusted for the country's income level (differentiating the funding needs between low-income, and low-middle to high-income countries; OECD countries were excluded); the economies of scale in surveillance and early response costs (with a progressive decrease in per-animal unit cost); the economies of scale in surveillance costs for wildlife disease monitoring (assuming declining financial requirements as livestock density increases); characteristics of the country with higher levels of intensity in wildlife disease monitoring if a country was considered a hot spot; and cost of completing the current campaign resulting from a considerable number (140 by September 2008) of already prepared Integrated National Action Plans.

### Total Cost Estimate

Applying these assumptions, total costs would be about \$1.3 billion annually, on average, over the next decade (Table 1). Owing to the poor state of animal and human health systems in low-income countries, funding needs in those countries are estimated to be much higher than those in middle-income countries.

*Table 1: Estimated Cost of Funding the One Health Framework to 2020 (US\$ million)*

	49 Low-Income Countries	All 139 Eligible Countries
Public health services	1,264	3,083
Veterinary services	3,286	5,476
Wildlife monitoring	1,495	2,495
Communication	583	1,167
International organizations	3,180	3,475
Research	420	420
<b>Total</b>	<b>10,228</b>	<b>16,116</b>
Average per year	852	1,343
Average per country for the period	208	116*

\* US\$65 million per country for the middle-income countries only

*Source:* Adapted from *Contributing to One World, One Health: A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal-Human-Ecosystem Interface*. 2008.[/TS]

### Breakdown of Costs Among Programmes

As shown in Table 1 above, most of the requirements – about 80 percent – are in developing countries, with the largest needs to develop health systems (public, veterinary and ecosystems). Country programmes to address these needs will have to be prepared and costed country-by-country, drawing on assessments of capacities such as Performance of Veterinary Services (PVS), PVS Gap Analysis, and analysis of ability to implement the IHR (2005), and the resulting financing needs will differ from the averages presented in Table 1. Such costed country programmes should receive a high priority in donors' assistance programmes to ensure that country needs, such as those for animal and human health system strengthening, do not remain unfunded (as was the case for some countries during the AHI response).

Because the One Health approach envisages greater collaboration among the many international organizations in coordinating the various regional and global tasks and in delivering effective assistance to countries, these organizations will need funding,<sup>4</sup> which would amount to about 20 percent of the total. As for the research agenda, some contributions would be made by the private sector, but a large part of this work needs to be in the public domain and publicly funded.

### **Funding Responsibilities**

How financial responsibilities are divided between international and national public sources requires considerable deliberation. The responsibility for funding an activity or function is in principle determined by whether the good that is provided through that activity is global, national, local or private in scope. Owing to their transboundary nature, protection from infectious zoonotic diseases with pandemic potential is a global public good. Control of these diseases clearly fulfils the criteria that are defined by the International Task Force on Global Public Goods (International Task Force on Global Public Goods 2006).<sup>5</sup> Support to countries in their efforts to control these diseases falls firmly within the mandates of international institutions; both country activities and support to them from international agencies should be eligible for funding by international sources where these activities deliver a global public good.

### **National and Local Public Goods**

The control of diseases that affect specific countries but do not represent direct threats to human health on a global scale is less likely to be eligible for international support. The control of less infectious and more local diseases such as brucellosis or bovine tuberculosis yields benefits that are mostly local public goods and private goods but in many cases there are also regional repercussions including impact on trade. The responsibility for funding may then rest with the national authorities, local levels of government and private individuals. But there is an important caveat. While neglected zoonotic diseases may fall short of being global public goods, they do have significant impacts on poverty and undermine growth, often the most in the poorest countries. These impacts have been shown to fall disproportionately and sometimes overwhelmingly upon the poor and vulnerable. Such diseases – though not in themselves objects of global action – do assume far more than local significance in terms of achieving the poverty- and health-related Millennium Development Goals—which, of course, are global public goods.

### ***Disease Coverage***

While control measures are generally disease specific, surveillance systems monitor all categories of diseases—existing, emerging, and re-emerging. These considerations are reflected in Table 2 below.

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<sup>4</sup> The distribution of tasks and funds among international and regional organizations will depend on refinements of the institutional arrangements as implementation progresses. The ‘Consolidated Action Plan for Contributions of the UN System and Partners’ provides insight into the present international agency needs for funds to fight HPAI (US\$339 million in 2008). The calculation above assumed that this amount would decrease (as HPAI is brought under control), but will be increased to address other diseases. see <http://www.undg.org/index.cfm?P=52>

<sup>5</sup> The Task Force defined global public goods as follows: ‘Issues that are broadly conceived as important to the international community, that for the most part cannot or will not be adequately addressed by individual countries acting alone and that are defined through a broad international consensus or a legitimate process of decision-making’. The benefits of controlling these diseases are not exclusive to any particular country and therefore fulfill the non-exclusion principle (e.g. everyone benefits from a streetlight). Moreover, by benefitting from the control of these diseases, one country does not diminish the benefits that other countries enjoy (this is called non-rivalry).

*Table 2: Activities for the Prevention and Control of Diseases at the Animal-Human-Ecosystem Interface and Their Status as a Public Good*

<i>Activity</i>	<i>Disease of Low Human Epidemic Potential</i>	<i>Disease of Moderate to High Human Epidemic Potential</i>
1. Preparedness		
Risk analysis	Global	Global
Preparedness plan	National/regional	Global
Animal vaccine development	Private <sup>6</sup>	Global
2. Surveillance		
Public health, veterinary and wildlife	Global	Global
Diagnostic capacity	Global	Global
Managerial and policy arrangements	National	Global
3. Outbreak control		
Rapid response teams	National / regional	National / global
Vaccination	National / regional / private	Regional / global
Cooperation among human, veterinary, and wildlife services	National	Global
Compensation schemes	National / private	Global
4. Eradication plans	National / regional / private	Global
5. Research	National / regional / private	Global

*Source: Contributing to One World, One Health: A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal-Human-Ecosystem Interface 2008.*

<sup>6</sup> This may also be a global public good depending on diseases and context.

## 8.0 Synopsis of Conclusions and Recommendations

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### ***H5N1 Highly Pathogenic Influenza (HPAI)***

1 Despite an intensive effort to control the spread of H5N1 HPAI that has generally been successful, the virus continues to circulate and is entrenched in domestic poultry in parts of Bangladesh, China, Egypt, Indonesia and Vietnam. Other countries continue to be affected sporadically with outbreaks reported recently from Bhutan, Cambodia, Lao PDR, India, Myanmar and Nepal. Since 2003, there have been over 476 confirmed human cases, and 284 deaths, reported in 15 countries. All human cases have occurred in countries where the H5N1 HPAI viruses are circulating in poultry, and there is a close correlation between seasonal occurrences of H5N1 HPAI in poultry and incidence of human cases. While the overall number of reported outbreaks and countries affected has declined dramatically since 2006, the number of confirmed human cases has doubled since 2008.

2 There has been significant progress with efforts to improve bio-security in poultry production systems and vigilance for disease outbreaks within animal health systems. This explains the decline in the number of affected countries since 2006. Most countries have improved surveillance capacity and countries have reported significant animal health events promptly to the OIE World Animal Health Information System (WAHIS). The sharing of information between FAO/OIE laboratories, namely through the OIE/FAO Network of Expertise on Animal Influenza (OFFLU) has continued to improve, along with early warning systems and the implementation of the International Health Regulations 2005. This has led to better capacity for detection, assessment, notification and response to public health threats.

3 Despite these achievements, much needs to be done to bring veterinary services up to standard in many countries and to improve bio-security in poultry production chains. Animal health legislation is often outdated and inadequate, and too little funding is available for laboratory diagnostics. The quality of communication to the general public about the risks associated with H5N1 HPAI and other diseases with pandemic potential is highly variable, and needs sustained investment within countries and at the regional level. If investments in animal health systems are not sufficient, the risk of further disease outbreaks will greatly increase. A standardized indicator-based system for the quantitative analysis of progress is urgently needed.

4 H5N1 HPAI remains a threat to both animal and public health. It impedes healthy poultry production, which in turns impacts the livelihoods of millions of people. It is a disease that – though rare, has a high case fatality rate in humans. Along with other animal influenza viruses (with subtype H2, H5, H6, H7 and H9) it is a potential pandemic influenza threat. A network of systems to ensure improved surveillance, and ongoing analysis of threats posed by influenza and other emerging viruses, are both essential for limiting the national and global risks posed by these threats.

5 Policy makers increasingly recognize that a high proportion of infectious diseases in humans come from animals, that these zoonotic diseases have high economic costs (especially for countries that export livestock and meat products), and that outbreaks that do occur – such as SARS, H5N1 HPAI and pandemic (H1N1) 2009 – have major political consequences. They appreciate that the threats are likely to increase in frequency and magnitude over the coming decades. During the past three years<sup>7</sup> they have called for trans-sectoral and multidisciplinary working to address any such disease threats that emerge at the animal-human-ecosystem interface. During the last two years several countries have started to implement such One Health approaches.

6 The key challenge – now – is to turn promising beginnings of stronger cross-sector working into institutionalized, sustained and holistic approaches. Most countries have still to develop in-country institutional frameworks to tackle the root causes of disease emergence, to respond to diseases as they emerge, and to maintain public and political interest in the face of ever-changing perceptions and needs.

### ***Pandemic Preparedness***

7 The response to pandemic influenza A (H1N1) 2009 has revealed substantial world-wide progress with pandemic preparedness between 2005 and the present day, as reported at previous International Ministerial Conferences. Most countries have recently developed and / or updated pandemic preparedness plans. The expansion and strengthening of international partnerships for pandemic preparedness has continued, new partnerships have been established, with civil society, private entities, militaries, research groups and different sectors of government increasingly involved in enhancing awareness of disease spread and preparedness for future outbreaks. These partnerships have had a significant impact on hygiene and continuity planning within service providers, schools, community centres and residential institutions. They have underlined the value of effective trans-sector, multicountry and coordinated working, based on trust and supported by effective communications.

8 Continued global vigilance for infectious disease outbreaks and pandemics is of critical importance for health security and well-being. To this end, disease surveillance systems have been strengthened and in many countries integrated across the human and animal health sectors. Increased emphasis is being given to reliable and rapid forecasting, with surveillance and early warning systems that predict disease emergence through a better understanding of drivers. Some countries seek ways to mainstream and strengthen pandemic preparedness by integrating it within multi-hazard disaster planning and the Hyogo Framework for Action (2005).

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<sup>7</sup> Including at the International Ministerial Conferences on Avian and Pandemic Influenza in New Delhi (2007) and Sharm el-Sheikh (2008)

9 The best preparedness plans involve a range of sectors and services and collaboration with civil society organizations and the private sector, and ensure that the needs and interests of vulnerable groups, such as refugees and migrants, are adequately covered. Regular simulation exercises help to strengthen readiness, tests planning assumptions and establish resource needs.

### ***International Financing of Avian and Pandemic Influenza action***

10 The World Bank's analysis of contributions by bilateral and multilateral donors indicates that between 2005 and end-December 2009, \$4.3 billion in pledges was reported, against which \$3.9 billion has been committed (of which \$2.7 billion has been disbursed). Approximately 40 percent (\$1,560 million) of committed funds went directly on support for country programmes and 29 percent (\$1,140 million) supported country efforts and global functions through international organizations.

11 New commitments for countries have increased in the most recent reporting period (after a gradual decline since the peak in late 2005 / early 2006); its composition has changed with loans becoming the dominant form of assistance. There has been an increase in the proportion of funds contributing to human public health systems and pandemic preparedness, with a reduction in the proportion directed to avian influenza and other animal health issues. This reflects the international response to challenges posed by the influenza A (H1N1) 2009 pandemic.

12 Long-term funding for the strengthening of animal health services and combating the drivers of emerging animal diseases with pandemic potential is still of vital importance.

### ***Sustaining the Momentum and Incentives for Continued Action***

13 This report demonstrates the strong worldwide momentum behind the effort to tackle H5N1 HPAI, to strengthen capacity to fight disease threats at the animal-human-ecosystem interface and to prepare for pandemics. Governments, international organizations, private enterprises and civil society increasingly appreciate the challenge of sustaining the momentum particularly given the confusion resulting from the so-far moderate health impact of the influenza A (H1N1) 2009 pandemic.

14 There is a continuing need – within all countries - to engage community groups, work closely with private entities, establish public-private partnerships, and ensure that animal and human health services are compliant with IHR and OIE standards. The institutional arrangements and legislative frameworks that support these efforts must be kept under continuous review to ensure (a) whole of society trans-sectoral action, and (b) integration of pandemic specific actions into multihazard disaster planning.

15 The support provided to national entities through regional political groups (e.g. ASEAN, APEC and the African Union) and international agencies, through research networks and results-focused collaborations, continues to be invaluable.

16 This report proposes a framework for sustaining momentum. It draws on achievements and experiences of the past five years. It offers three streams of work that need sustained attention by national, regional and global authorities despite the inevitable waning of public interest in pandemic-related issues. To realize these goals, policy-makers are moving away from tackling avian and pandemic influenza through emergency projects or special initiatives. Instead they aim for longer term capacity building through pursuit of effective strategies within existing programmes, and the mainstreaming of pandemic readiness skills. The right incentives to achieve this transformation need to be identified and used, backed with strategic political and financial support, novel institutional arrangements, and easily applied monitoring systems.

17 The three work streams (Section 9.0) are (a) prevention and control of HPAI, (b) adoption of One Health approaches, and (c) readiness for response to influenza pandemics. For each, the framework envisages two expected outcomes and identifies the actions which contribute to these expected outcomes. It identifies the incentives and institutional arrangements needed to sustain momentum, highlights systems for monitoring progress, and spells out investment priorities – particularly to support institutions and systems in the least developed countries.

18 The expected outcome areas and associated activities are as follows:

### **Stream 1: Prevent and Control H5N1 Highly Pathogenic Avian Influenza**

- **Expected outcome 1:** Progressive control of H5N1 HPAI – with the goal of eventual elimination from domestic poultry populations
- **Expected outcome 2:** Maintain vigilance for H5N1 HPAI and other influenza viruses that have pathogenic potential in humans

#### **Actions:**

National goal setting - particularly in highly impacted countries

Maintaining and strengthening vigilance and detection systems – in all countries

Promoting healthy poultry production – in all countries

### **Stream 2: Ensure that control and response systems can tackle a broad range of emerging and existing disease threats through operating a One Health approach**

- **Expected outcome 3:** Reduce the likelihood that infectious diseases like H1N1 cross species barriers at the animal-human-ecosystem interface through evidence-based work on drivers of disease emergence
- **Expected outcome 4:** Build systems to limit the impact of diseases emerging at the animal-human-ecosystem interface: the One Health approach

#### **Actions:**

Developing multisector surveillance, through multidisciplinary collaboration

Putting prevention high on the agenda and taking a trans-sector approach to addressing the root causes of disease emergence

Drawing attention to the true cost of existing diseases

Learning to work as one – making trans-sector, multidisciplinary work a reality

### **Stream 3: Being ready to detect, assess and respond to influenza pandemics**

- **Expected outcome 5:** Develop local, national and global capacities for responding to pandemics to reach IHR 2005 standards
- **Expected outcome 6:** Incorporate capacity for multisector pandemic responses within disaster preparedness and response strategies

#### **Actions:**

Optimizing learning from pandemic (H1N1) 2009

Building capacity to assess and predict situations and enhancing cross-sector decision making

Improving communications about risks and actions needed

Strengthening the response capacity of all systems

## 9.0 The Way Forward: A Framework for Sustaining Momentum for Animal and Pandemic Influenza

Expected Outcomes	Key Areas for Action	Reviewing Progress and Needs
<b>Stream 1: Prevent and Control H5N1 Highly Pathogenic Avian Influenza</b>		
<p><b>Expected outcome 1:</b> Progressive control of H5N1 HPAI – with the goal of eventual elimination from domestic animal populations</p> <p><b>Expected outcome 2:</b> Maintain vigilance for H5N1 HPAI and other influenza viruses that have pathogenic potential in humans</p>	<ul style="list-style-type: none"> <li>● National goal setting - particularly in highly impacted countries</li> <li>● Maintaining and strengthening vigilance and detection systems – in all countries</li> <li>● Promoting healthy poultry production – in all countries</li> </ul>	<p>Using and developing further as needed the indicators based on OIE standards</p> <p>Establish a broader set of indicators in partnership with the private sector to assess progress and evaluate biosecurity levels for sustainable, healthy poultry production in an expanding and diversifying industry setting</p>
<b>Stream 2: Ensure that control and response systems can tackle a broad range of emerging and existing disease threats through operating a One Health approach</b>		
<p><b>Expected outcome 3:</b> Reduce the likelihood that infectious diseases like H1N1 emerge at the animal-human-ecosystem interface through evidence-based work on drivers of disease emergence</p> <p><b>Expected outcome 4:</b> Build systems to limit the impact of diseases emerging at the animal-human-ecosystem interface: the One Health approach</p>	<ul style="list-style-type: none"> <li>● Developing multisector surveillance</li> <li>● Putting prevention high on the agenda and taking a multisector approach to addressing the root causes of disease emergence</li> <li>● Drawing attention to the true cost of existing diseases</li> <li>● Promoting multisectoral solutions to amend, improve and strengthen the systems already in place for existing diseases</li> <li>● Learning to work as one – making multisector, multidisciplinary work a reality</li> </ul>	<p>Develop core indicators of progress for governance, inter-sectoral collaboration and community engagement to assist with tracking of progress and regular identification of priority areas for additional action</p>
<b>Stream 3: Being ready to detect, assess and respond to influenza pandemics</b>		
<p><b>Expected outcome 5:</b> Develop local, national and global capacities for responding to pandemics to reach IHR 2005 standards</p> <p><b>Expected outcome 6:</b> Incorporate capacity for multisector pandemic responses within disaster preparedness and response strategies</p>	<ul style="list-style-type: none"> <li>● Optimizing learning from pandemic (H1N1) 2009</li> <li>● Building capacity to assess and predict situations and enhancing cross-sector decision making</li> <li>● Improving communications about risks and actions needed</li> <li>● Strengthening the response capacity of all systems</li> </ul>	<p>Monitor core requirements of the IHR and Hyogo Framework for Action</p> <p>Establish a composite or new set of matrices, based on lessons learnt, to allow tracking of progress and review of critical areas into the future</p>

## 10.0 Appendices

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### **Annex 1:**

#### **Summary Conclusions: Current Animal and Pandemic Influenza Situation and Pandemic Preparedness Activities Since 2008**

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This summary provides an overview of the current animal and pandemic influenza situation as well as a brief summary of the major activities that have been undertaken globally to strengthening pandemic preparedness in 2008 and 2009.

#### **1.1 Overview of animal and human pandemic influenza**

##### **H5N1 Highly Pathogenic Avian Influenza (HPAI):**

- 62 countries have experienced disease events of H5N1 HPAI in domestic poultry and wild birds since 2003. However since 2008 only 14 countries have reported disease outbreaks and no new countries reported outbreaks in 2009-2010.
- H5N1 HPAI remains entrenched in Indonesia, Southeast Asia, China, the Ganges River Delta and Egypt.
- Since 2003 there have been 476 human H5N1 AI confirmed cases, and 284 deaths reported in 15 countries.
- With almost double the number of confirmed human H5N1 AI cases reported in 2009 (73 confirmed cases / 32 deaths, compared with 44 confirmed cases / 33 deaths in 2008), and ongoing circulation of virus in certain poultry populations, it is clear that H5N1 HPAI remains both an animal and public health concern.
- All human cases of H5N1 AI infection have occurred in countries with ongoing circulation or reintroduction of H5N1 HPAI viruses in domestic poultry.

##### **Pandemic Influenza A (H1N1) 2009**

- On 25 April 2009, a novel influenza A (H1N1) 2009 virus emerged from Mexico and the United States. As of 28 February 2010, at least 213 countries have reported laboratory confirmed cases of Pandemic Influenza A (H1N1) 2009, including at least 16,455 deaths in 125 countries.
- Since April 2009, the Pandemic (H1N1) 2009 virus has been confirmed in commercial swine herds in 21 countries, and appears to have been introduced to swine herds by infected humans. Six different animal species have so far been infected by the virus.
- Assessment of the full impacts of Pandemic Influenza A (H1N1) 2009 on mortality and public health systems will likely take one to two years to complete.
- To date several groups have been identified as high risk for complications and death from pandemic (H1N1) 2009 including younger age groups (15 – 49 years), people with chronic illness, pregnant women, and indigenous groups. Targeted support for preventative health care services may reduce disproportionate impacts of pandemic influenza and other public health threats on vulnerable groups.
- A number of countries, particularly those in low resource settings, have experienced strains on health services.
- Initial impacts on animal health and agriculture were related to public concerns about the safety of swine products and the role of swine in transmission of pandemic H1N1 virus. However, to date swine have played a negligible role in the transmission of the virus to humans.

- Transport and tourism sectors experienced negative impacts, with flow on effects for economies in affected countries during 2009. The pandemic had limited impacts on the financial sector, though precautionary measures were taken to reduce potential impacts.
- Recent experience with Pandemic Influenza A (H1N1) 2009 reaffirms that high impact diseases can arise unexpectedly at the animal-human interface at any time and in any place.

#### **Other highly pathogenic influenzas of concern**

- Viruses emerge from the aquatic bird reservoir, adapt to humans, modify their severity and cause influenza. Other influenza viruses of animals with subtype H2, H5, H6, H7 and H9 viruses have sporadically infected humans and are considered to have pandemic potential. The importance of improved surveillance, as well as ongoing analysis of influenza and other emerging viruses remains critical to national and global risk reduction from pandemic threats.

## **1.2 Overview of progress in strengthening capacity to address animal and pandemic influenza since 2008**

### **Challenges over the past year (since IMCAPI 2008)**

- The financial downturn has placed pressure on resources and has in some countries constrained capacity building activities – particularly for preventative and preparedness type activities
- The global food crisis and ever rising human populations has placed pressures on food production. The immediacy and the scale of the urgent food needs in many countries has meant that investments in longer term capacity for biosecurity and strengthening of healthy poultry production has had to take a lower order of priority over urgent food production needs – particularly in household and back yard settings.
- Pandemic (H1N1) 2009 has provided opportunities to scale up readiness and to test systems. However, as the predominate focus of the response to pandemic (H1N1) 2009 has been within the health sector, investment in preparedness in other non-health sectors has been minimal – and in some cases resources have had to be diverted from non-health sector activities to support health services and urgent pharmaceutical needs.
- Prioritising investments in pandemic preparedness in countries with least resources is a considerable challenge in the face of pressing challenges, such as food security, access to water and other major issues. There is an ongoing lack of clarity regarding the need for holistic society-wide multisector preparedness planning beyond human and animal health sectors, to minimise the disruption in functioning of inter-dependent societal services in the event of a severe pandemic.
- The complexity and interlinked nature of global issues reflects the growing need for an interdisciplinary and systematic view of the major economic, political, societal, environmental, epidemiological and technological changes ahead. Factors predisposing to risk for Influenza A and other emerging and re-emerging diseases continue to increase. They include urbanization, population growth, increasing demand for animal protein, intensive livestock production, trade, people movement, global warming and/or variability, and environmental degradation.

### **Political Commitment and Collaboration**

- The past two years have seen ongoing engagement and collaboration through international and regional organizations towards pandemic preparedness and response. Efforts to expand and strengthen international partnerships have continued.

- New public-private partnerships have been established, and civil society engagement has increased through schools and communities to enhance awareness of disease spread and preparedness for future outbreaks. Collaborative research initiatives have also been progressing in some regions.
- Commitments to a One Health approach expressed at the IMCAPI in 2008, were further developed during a meeting 'Expert Consultation on One World One Health' in Winnipeg, March 2009.
- An unprecedented level of global collaboration has been, and still is, occurring as a result of the need for a rapid and coordinated response to pandemic (H1N1) 2009. This level of collaboration was only possible as a result of the large investment of resources and time in building networks and the international architecture over the past five years. The IHR and OIE international standards have served as an important framework to support this collaboration.
- Further collaboration is needed between the international community and governments, research communities and civil society representatives to review efforts and learn from experiences of the past few years, particularly in response to H5N1 HPAI, pandemic (H1N1) 2009 and other ongoing or emerging public health threats. This will help to identify and consolidate best practices and to mainstream successes at all levels.

### **Progress with capacity building for avian and pandemic influenza**

- Most countries have provided timely reporting of significant animal health events to the OIE World Animal Health Information System (WAHIS), and the level of networking and sharing of information across FAO / OIE laboratories, namely through OFFLU, has continued to increase.
- Early warning systems have improved and better implementation of the International Health Regulations 2005 has resulted in an enhanced capacity for detection, assessment, notification and response to public health threats.
- The response to H1N1 has made it clear that significant global progress has been achieved with pandemic preparedness through the global response to H5N1 HPAI. As a direct result of this investment the world is better prepared to respond to the current pandemic, and can continue to learn from Pandemic Influenza A (H1N1) 2009 for future preparedness.
- Despite these achievements, veterinary services remain weak in many countries, the global level of biosecurity in the poultry production chain remains low, veterinary legislation remains outdated and inadequate in many countries, and there is minimal funding available for laboratory diagnostics.
- Communication remains an area for significant improvement, and FAO in collaboration with OIE is advocating a society-wide approach to promote biosecurity along the entire production and marketing chain, as well as a societal norm to reduce risk at the animal-human interface.
- Increased attention is required for the development, standardization and utilization of indicators, to enable more quantitative analysis of progress.

### **1.3 Financial investments**

- Financial assistance to countries in terms of new commitments has increased sharply in the most recent reporting period (after a gradual decline since the peak in late 2005 / early 2006). However the composition has changed with loans becoming the dominant form of assistance.
- Donor funding allocations to specific sectors has changed over the reporting period, with the human health and pandemic preparedness receiving more than twice the support for animal health activities. Information, education and communication, as well as monitoring and evaluation elements have received decreased support over the reporting period.
- Overall, there has been an increased focus and significant budget contribution towards human health and pandemic response, and a reduced sense of urgency and funding for avian influenza and other animal

health issues. This is problematic given the ongoing need to strengthen capacity for veterinary services in many parts of the world, and the increasing need to understand the drivers for the emergence of disease at the animal-human interface in an increasingly complex and interrelated world.

## Annex 2:

### Summary Conclusions: H5N1 Highly Pathogenic Avian Influenza: Ensuring an Appropriate and Sustainable Response

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This summary reviews progress in controlling H5N1 HPAI, considers sustained progressive control and provides an analysis of barriers to achieving progressive control and areas for greater focus.

#### **Management of H5N1 HPAI: mitigation efforts in endemic countries**

- Mitigation strategies are moving from short term emergency responses to longer-term sustained approaches, and global understanding of the social, cultural, gender and economic consequences of both the disease and the interventions is improving.
- Much has been learned about vaccination strategies, and some countries are transitioning from mass vaccination of poultry to more targeted and cost effective measures based on multidisciplinary approaches. If large scale vaccination is used, strengthened epidemiological capacity is needed to ensure sound risk assessments.
- Compensation policies have progressed towards more context specific policies, with closer collaboration between legal experts, the private sector and public sector ministries, as well as harmonising policies across borders.

#### **Progress with strengthening healthy poultry production and vigilance in all countries (based on FAO November 2009 survey results)**

- Surveillance has improved in most countries, though further improvements including risk analysis (epidemiological capacity), stronger engagement with the private sector and greater levels of surveillance at the domestic poultry / wild birds interface are needed.
- Progress with laboratory capacity has been limited, largely due to restrictions in funding for laboratory maintenance in many developing countries. Good progress has been made with sub-regional and regional laboratory networks in Africa; further work is required to strengthen networks in Central Asia and Eastern European countries.
- Veterinary legislation is an essential element for surveillance, early detection and control of animal diseases, animal production food safety and certification of animals and animal products for export. In many countries veterinary legislation remains outdated and inadequate to support animal health requirements.
- Very few countries have established biosecurity measures since 2008, and the global level of biosecurity in the poultry production chain remains low. Major constraints include a lack of legal / regulatory frameworks to enforcement of biosecurity measures, limited incentives and awareness of benefits.

#### **Progressive control of H5N1 HPAI in countries**

- Key elements of sustainable progressive control include (a) taking a risk-based approach to the development of interventions i.e. assess the risk of introduction based on potential pathways for the disease introduction and subsequent transmission, and an understanding of poultry production and market chains (b) effective surveillance systems supported by competent laboratories for early detection (c) authority to manage rapid response actions – actions that are guided by community as well as expert decision making (d) siting communication and community engagement, public-private partnerships at the core of control activities and (e) strong veterinary services.
- Key actions for countries with endemic H5N1 HPAI include broader partnerships between sectors, and public-private interests, broader focus to include the entire poultry value chain – with particular

emphasis on distribution and marketing, direct involvement of local communities, decentralised prevention and control, engagement of health authorities, and medium to long-term structural change.

- In countries with entrenched H5N1 HPAI, there is a need for a shift from emergency communication campaigns to longer-term communication approaches. This calls for investments in building communication capacities in communities and across animal and human health sectors.
- Long-term political and industry commitment needs to continue in endemic settings with ongoing assessments of risk and the implementation of flexible and customized arrangements to manage and promote society-wide awareness of risk.
- Key actions for non-endemic countries and areas that remain at risk include: market-based risk reduction strategies, and ongoing awareness, vigilance particularly at the farm level, and surveillance. This includes establishing a stronger understanding of disease drivers and long-lasting investments to maintain healthy livestock and address other important animal diseases

### **Progressive control of H5N1 HPAI – how it is different and areas for greater focus**

- Progressive control features long-term planning and sustainability, political and industry commitments supported by adequate resources, taking account of socio-economic and gender impacts, and understanding the opportunities and barriers for technical options.
- Veterinary systems are notably weak in many countries around the globe in terms of governance, surveillance and diagnostic structures, quality education, and remuneration. Animal production and marketing do not have the regulatory framework to support proper practices and hygiene in many countries, and especially in remote areas. The interface between human and veterinary medicine remains weak and is inadequately financed.
- Control of a disease at its animal source is far less costly than tackling the ensuing epidemic in humans. Supporting development of veterinary services in developing / in transition countries remains a high priority.
- There are strong disparities between the policy goals for public health, agriculture food production systems and sustainable farming approaches, and economic development, improved synergies are needed to bridge these barriers.
- Long term communication interventions are needed society-wide to promote:
  - appropriate bio-security as a professional and social *norm* along the whole production and marketing chain, to ensure safe livestock production and market practices (in commercial, semi-commercial, backyard systems)
  - community-based reporting of suspect events and active public engagement in control measures as a professional and social *norm*

This requires establishment of core communication capacity and a critical mass of communication practitioners for animal health issues.

- Comprehensive research approaches that adopt interdisciplinary, multinational and multisectoral approaches are needed to ensure that human interactions with animals, animal products, wildlife and the ecosystem are well studied through applied research that addresses the complexity and multifactorial nature of EIDs. Socio-economic and political applied research is also critical to understanding the influences on behaviour, incentives for change, risk reduction and priority-setting.

### Annex 3:

## Summary Conclusions: Understanding Potential Impacts and Drivers of Global Health Threats - Policy Options for Establishment of One Health Capacities at National, Regional and Global Levels

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This summary provides an overview of the development and continued need for One Health approaches, noting that one of the most salient changes in recent years have been (a) an increasing recognition of the threats posed by diseases that arise at the animal-human interface (b) the importance of supporting – financially and with appropriate institutional arrangements – close working between sectors and disciplines, in many cases building on the experiences and systems that have been developed in response to H5N1 HPAI (c) the need to focus on factors predisposing to disease and risk – as these drivers and pressures are likely to increase in the future. This shift will require more strategic approaches that take longer timeframes and apply multidisciplinary understanding and approaches to human, animal and ecosystem health.

### Why is a One Health approach needed?

- Emerging and re-emerging diseases are increasing incrementally, with 60 percent of these diseases being zoonotic arising at the interface between animal, human and wildlife domains within the context of the overall ecosystem. Over the last decade about 75 percent of new infectious diseases have been zoonotic in origin.
- Challenges needing resolution relate to the weakness and gaps in local disease control approaches, improving communication messages between governments and people, and shifting emphasis from pathogens to more people-centred views.
- Prevention of disease is based on broader multidisciplinary partnerships beyond the animal and human health sectors, examining broader health and economic impacts. This approach needs to involve socio-anthropologists, communication specialists, macro-economists, conservationists and legislators.

### Drivers for Disease Emergence

- Drivers can be classified into three host health domains: human living environments, food and agriculture systems, and natural ecosystems. Key drivers for the emergence of disease include increased density and mobility of animal and human populations, decreased diversity of ecosystems, intensification of agriculture, and climate change.
- A better understanding of the drivers is needed along with the development of practical means through which the root causes of disease emergence can be addressed and the risks.
- Managing the increased level of risk associated with complex combinations of drivers requires a multisectoral systems approach.

### One Health approaches for prevention and risk reduction, early detection and control, and preparedness

- Stakeholders from a range of disciplines need to be involved in One Health approaches including health, sociology, anthropology, ecology, conservation, town planning and law; beyond disciplines to skilled coordinators, communicators, monitoring and evaluation specialists, risk analysis experts, and strategic planners; major players also include local to national governments, international agencies, private sector and communities.
- Key actions for supporting adaptation of a One Health approach include: multisectoral collaboration for priority setting, novel approaches to surveillance that predict potential disease niches through ecological mapping and determination of factors associated with the emergence of diseases; revised curriculum and

education programmes; strengthened veterinary systems and public private partnerships; research investment; well regulated systems for livestock transfer, tracing, slaughter, processing and marketing.

- Key actions for early detection and control include: establishment of local, national, regional and international surveillance systems to enhance disease intelligence, surveillance and emergency response; predictive modelling and foresighting to enable rapid response to emerging disease events.
- There is a need to promote multi-sectoral solutions for existing diseases at the animal-human interface by building on experience gained from the control of emerging diseases and strengthening the systems already in place.
- Additionally there is a need for improved commitment at international and national levels for increased disease surveillance of livestock traded nationally, regionally and internationally – and identification of mechanisms / standards / agreements etc. to achieve this – linked to global frameworks for monitoring and reporting on disease.
- Given the complexity of animal and public health threats, a One Health research agenda is needed to inform, in a systematic manner, pressing policy and practice questions faced by international and regional organizations, national governments, and communities.

### **Bringing it together – institutional arrangements to support implementation of One Health approaches for prevention, management and preparedness**

- The role of governments is central for providing direction and responsibility for One Health approaches for prevention, management and preparedness strategies with diseases at the animal-human interface.
- Institutional mechanisms need to be strengthened at international, regional, national, and local levels to implement One Health approaches.
- Comprehensive disease risk analysis requires multisector expertise and insights from sources such as veterinarians, physicians, ecologists, wildlife biologists, epidemiologists, economists, anthropologists, and communication specialists.
- Despite the accomplishments so far, there is common agreement that more is needed to address diseases arising at the animal-human-ecosystem interface, and that sustained economic support is fundamentally warranted.
- The assessment of emerging disease risk (as well as other disaster-related risks) should be an integral part of all planning approval for new land usage, and tools developed, adopted and integrated into urban and rural planning and development processes.
- Strategic mechanisms at global, regional and national levels are needed to provide a repository of One Health knowledge; a strategic research framework for applied research addressing concerns at the animal-human interface; monitoring and review capacity; risk forecasting and risk assessment; global advocacy and reporting functions for international agencies, and governments.
- Governments should harness and support local government operational planning structures with One Health responsibilities, including identifying diseases of local concern and assessing and monitoring the ‘total burden’ of zoonotic and other diseases of concern.
- Ongoing and strengthened collaborative international support is needed to: promote government and private sector preparedness for emergency animal disease response; to increase resilience to shocks from emerging health threats at the animal-human-ecosystem interface; to build technical capacity, competency and leadership, and to establish a critical mass of regionally networked epidemiology, surveillance and laboratory, communication and social science specialists.

**Annex 4:**

**Summary Conclusions: Preparedness for Global Health Threats – Where Are We Now and What Else Needs to be Done?**

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This summary considers the challenges for pandemic preparedness based on the experiences from multiple major public health threats, including the recent Pandemic (H1N1) 2009.

**Challenges for pandemic preparedness – early detection and response**

- Reliable and rapid forecasting and early detection systems are needed, including approaches to surveillance and early warning systems that predict disease emergence through a better understanding of drivers.
- Surveillance and information systems are an important tool to increase the reliability and availability of information to governments, technical agencies, and communities to enable informed decision-making and strategic interventions.
- Surveillance systems have been strengthened for case detection in many countries, but may need to be strengthened further to ensure they are fit for purpose and that sharing of information between sectors is possible.
- Containment of infectious diseases is likely to become more challenging in an increasingly interconnected world. Strong decision support is required to assist with determining the most appropriate course of action when faced with an emerging threat.
- Early warning and disease response need to be coupled with a high level of readiness to allow rapid action once a new event is detected.

**Challenges for pandemic preparedness and response – mitigating impacts**

- Pandemics affect the whole of society, not just the health sector, requiring partnership and coordination of actors from all sectors and levels of society. In order to successfully mitigate the economic, humanitarian and social impacts of a pandemic, it is important to invest in pandemic preparedness beyond the human and animal health sectors, including business continuity planning for all critical public services.
- International public health events over the past two decades have demonstrated the need for clear and consistent communication among and between all involved stakeholders in the management of public health threats. Communication has a major effect on the social and economic impacts of a pandemic or major public health event. Accurate information needs to be provided in a timely way.
- The ability of pathogens to cross borders and rapidly spread globally requires highly coordinated public health responses that involve the cooperation of all levels of government in countries as well as intergovernmental cooperation at regional and international levels.
- Community level response is critical for mitigating the impact of infectious disease events. Member states and development partners should ensure sufficient preparedness to implement appropriate community level interventions at national scale. Community-based organisations have a critical role in service delivery, therefore it is critical to address policy and practical bottlenecks to community-level preparedness and resilience.
- Means of addressing the complex issues related to scarce resources and equity will require careful consideration and multi-party engagement. Global access to vaccines and antivirals remains challenging, despite significant efforts to address distribution to the least developed countries.

- Non-pharmaceutical interventions are a key part of effective preparedness for and response to pandemic threats. Governments should invest an adequate proportion of resources in non-pharmaceutical interventions. Non-pharmaceutical interventions can be low cost and achieve durable impacts.
- Education is an important sector in pandemic mitigation – because of the potential of educational facilities for successful health education and social mobilisation interventions; the potential of schools to serve as a vector of transmission; the vulnerability to infection of children; and the scope education provides to sustain knowledge and awareness within communities to prepare and respond to future threats.
- Different interventions are appropriate depending on the severity of a pandemic wave. Response activities should be differentiated based on the impact of the disease, so as to ensure a proportionate response.
- One of the major requirements for IHR implementation is to update national legislation. This is being tackled by some governments with assessments of current frameworks and plans to strengthen legislation for pandemic preparedness and emergency response.

### **Challenges for pandemic preparedness – pandemic plans and simulation exercises**

- In response to the H5N1 HPAI pandemic threat, pandemic plans for most countries are now in place, and have provided the basis for responses to the current pandemic (H1N1) 2009.
- In light of recent experiences it is likely that many countries will undertake reviews to enable varied responses to different public health threat scenarios to be incorporated into planning in the future and to take into account local economic, political and socio-cultural contexts and learning.
- The global pandemic preparedness effort has strengthened the resilience of countries worldwide to deal with a range of public health threats and other emergencies. To sustain momentum and ensure continual readiness for major events, countries should integrate pandemic preparedness into disaster risk reduction and multihazard emergency preparedness platforms at community, national and international levels. The Hyogo Framework provides a structured approach to disaster risk reduction, underscoring the need for, and identifying ways of, building the resilience of nations and communities to disasters.
- Likely areas of focus for future development include: optimizing our learning; building capacity to assess and predict a situation more accurately; enhancing cross-sector decision-making; improving communication of risks and supporting the adoption of protective behaviours, and strengthening of response capacity of all sectors.
- Likely areas for strengthened partnerships include: government / civil society and public / private sector so as to ensure that planning protects the rights, needs and interests of vulnerable groups, such as refugees, internally displaced persons, migrants, ethnic minorities, the poor, older people, the disabled and the homeless. Governments should ensure that these groups are explicitly included in national planning and response.
- Absenteeism in a severe pandemic could lead to significant economic, humanitarian and social impacts. A severe pandemic could disrupt provision of essential services to vulnerable people. Business continuity plans to mitigate the impact of absenteeism on the continuity of services are therefore important.
- For most effective operationalization of pandemic plans, regular conduct of simulation exercises helps to strengthen readiness, tests planning strategies, and resource needs.
- Regular reporting and assessment of progress with pandemic preparedness is needed at national, regional and international levels.