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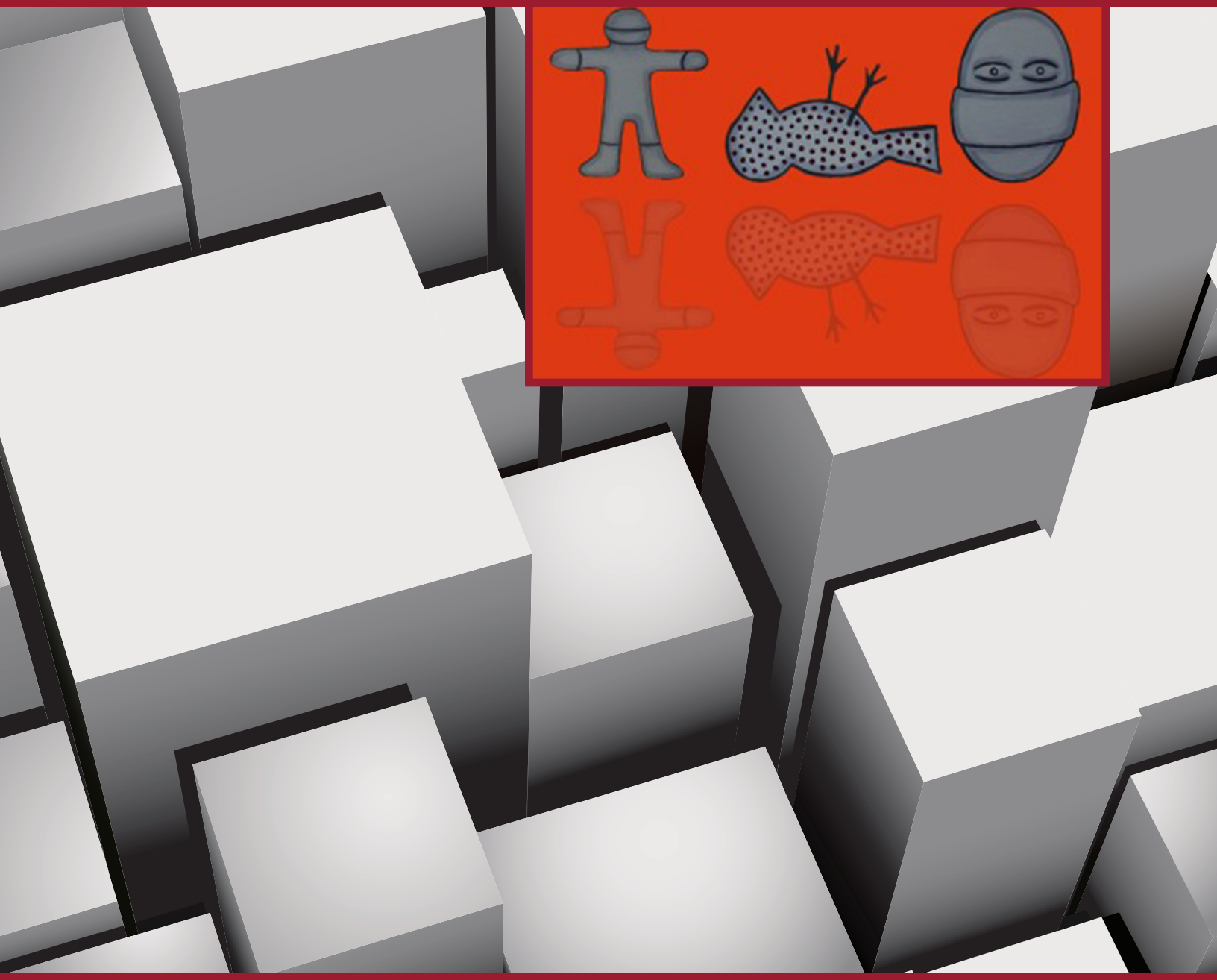
HEALTH

Responding to Global Public Bads

LEARNING FROM EVALUATION OF THE WORLD BANK EXPERIENCE WITH AVIAN INFLUENZA 2006–13



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Contents

Abbreviations and Acronyms

AHIF	Avian and Human Influenza Facility
APL	Adaptable Program Loan
ARD	Agriculture and Rural Development
FAO	Food and Agriculture Organization of the United Nations
GPAI	Global Program on Avian Influenza Control and Human Pandemic Preparedness and Response
HNP	Health, Nutrition and Population
HPAI	Highly Pathogenic Avian Influenza
IBRD	International Bank of Reconstruction and Development
IDA	International Development Association
IEG	Independent Evaluation Group
M&E	Monitoring and Evaluation
OIE	World Animal Health Organisation
PHRD	Policy and Human Resources Development
UN	United Nations
UNSIC	United Nations System Influenza Coordination
WHO	World Health Organization

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Preface

This report is an IEG learning product. The goal of the product is to distill and synthesize useful operational and strategic learning from IEG project evaluations, while adding in new sources of evidence and additional analysis, and retaining an independent approach. The learning product series is designed to complement existing series of project and thematic evaluations that combine accountability and learning goals.

This product is aimed at multiple audiences. Some of the material is focused on avian influenza and is primarily of interest to those interested in zoonotic diseases, but the broader lessons from the World Bank's experience with avian influenza serve as a useful example of how the Bank responds to crises, how it grapples with disaster risk management, how it deals with the measurement of avoided 'bads', how it works across sectors, and on the difficulties of providing sustained support for global public goods.

The report is not a full evaluation of the Global Program on Avian Influenza and Human Pandemic Response; it does not assess the overall impact of the program, and does not have the scope of or follow the evaluative methodology of IEG's Global Program Reviews.

Overview

Global public goods pose a key challenge to international development, as it is difficult to convince countries to undertake sufficient action when many of the benefits will accrue to the rest of the world. Working effectively across sectors is also an important challenge to development agencies and governments alike, as institutional incentives are seldom aligned to promote this type of collaboration. It is furthermore difficult for agencies like the Bank (which have the size to combat large-scale problems) to move quickly to respond to emerging crises, especially in areas in which they lack technical expertise and experience. The threat posed by avian influenza and the potential for an influenza pandemic contains elements of all of these challenges, and the efforts of the World Bank to respond to this threat offers useful lessons for a wide range of other issues that face these challenges.

Outbreaks of highly pathogenic avian influenza that spread rapidly in poultry were observed in several countries in Asia in 2003-4, and in following years spread to South Asia, Central Asia, West Asia, Africa, and Europe. The international community recognized these outbreaks as an unfolding crisis. The virus could mutate into a form transmissible between humans, triggering an influenza pandemic with severe health and economic consequences. The most effective means of preventing a pandemic was by controlling and eradicating the disease in birds and by rapidly identifying, isolating and treating infected humans - but weaknesses in veterinary services and livestock agencies meant that many countries lacked the capacity to undertake this. Filling these capacity gaps was thus a critical global public good, as reducing the risk of disease spread in one country would serve to reduce the risk in others.

Along with governments and other international agencies, the World Bank moved rapidly to provide support through policies and analytical work, through mobilizing donor finance, and through preparing and implementing a Global Program on Avian Influenza Control and Human Pandemic Preparedness and Response (GPAI). Under the GPAI the Bank financed 83 operations (across 63 countries) which addressed avian influenza, zoonotic diseases, or pandemic preparedness or response. The GPAI was the first global investment program supported by the Bank, and adopted two key innovations: a design template for projects and an expedited approval process. The template established a core set of activities to be supported under the emergency response projects, and the expedited approval process allowed projects to be approved by Bank management, rather than by the Board. Avian influenza projects were prepared quickly, with a median time of 4 months from concept note to approval. However, rapid preparation may have led to some weaknesses in quality at entry, and the projects were prepared no quicker than those for other emergency interventions. Still, the template system allowed a large number of emergency projects to be prepared in a relatively short period in an area in which the Bank lacked prior experience. There were inherent tensions between use of an emergency instrument with a short project life and attempts to build long term capacity through complex civil works and institutional changes.

Combatting avian influenza requires effective collaboration between animal health and human health experts. There was a significant degree of cooperation and coordination across sectors within the Bank and in country agencies at the strategic level. However, cooperation sometimes broke down at the project implementation level, in part because of a lack of incentives for inter-sectoral collaboration within the Bank. Little operational learning and knowledge sharing occurred between Bank staff across projects during implementation, except in regions where some staff worked on multiple projects. At the country level, animal health agencies often demonstrated higher commitment and interest than human health agencies, in part because they saw avian influenza as more central to their core business.

As the Bank lacked specific experience and technical expertise in animal health and pandemic preparedness, it worked closely with other international agencies, particularly the World Organisation for Animal Health (OIE), the Food and Agriculture Organization (FAO), and the World Health Organization (WHO). The Bank provided financing, coordination at the country and global levels, and project supervision, while other agencies primarily provided technical support, including significant operational support from FAO and WHO. There were some tensions between the Bank and some staff in technical agencies over this division of responsibility, but it is difficult to imagine an alternative to Bank leadership, as no other agency had the capacity to finance and manage investment projects at the necessary scale. Organizational and operational coordination challenges sometimes led to implementation delays, but the overall level of cooperation between the Bank and international agencies was unprecedented, and the partnership was viewed as successful by the participants. The Bank played a key role in getting agencies to work together and in getting governments to recognize the need for action.

Despite these achievements in preparing the GPAI, support for zoonotic disease control and pandemic preparedness has not been sustained. The Bank stopped tracking and reporting on its portfolio of avian influenza projects in 2010, and new financing for operations has largely ceased. Interest in these agendas has waned in the Bank, in client countries, in donor countries, and in other development agencies. As avian influenza and the 2009 influenza pandemic have been perceived as less serious than feared, donor priorities shifted following the global food crisis, financial crisis, and economic downturn. Yet serious risks remain, as can be seen following outbreaks of H7N9 avian influenza in China in 2013, persistence of H5N1 avian flu in about a dozen countries, and outbreaks of the Middle East Respiratory Syndrome (MERS) novel coronavirus since 2012. Political support for pandemic risk reduction and preparedness may be difficult to obtain without further serious outbreaks. These goals could be supported by linking them to other agendas, such as One Health, Health in All Policies, wider livestock sector interventions, and national level disaster risk management, but any of these approaches would require commitment from World Bank management and additional funding. Pandemic preparedness could benefit from following the example of the Bank's successful shift in approach to natural disasters, moving from a responsive approach using emergency instruments to one that favors preemptive risk reduction and risk management through regular country programs and operations.

The Bank's experience with avian influenza at the project level offers technical lessons for project design and implementation. Monitoring and evaluation systems could be made more

useful by shifting from a focus on tracking outputs to an approach that tracks the performance of intermediate outcomes in biosecurity, surveillance, diagnosis, and outbreak response. Future projects could be more efficient in the long term if they moved beyond support for avian influenza response to build systems capacity to manage zoonotic diseases in a more integrated fashion. More could be done to improve biosecurity on farms, in transport systems, and in live bird markets, though efforts to support large scale changes to smallholder or backyard poultry systems proved impractical, unnecessary, or uneconomic. Future interventions could conduct greater outbreak with the private sector. Attempts to control avian influenza at borders by supporting quarantine agencies often had no discernible impact.

Surveillance systems were improved in many countries, but may prove difficult to sustain in the absence of donor funds. Compensation mechanisms for culled birds have proved to be a critical element in encouraging farmers to report outbreaks and allow their birds to be culled, rather than trying to sell their sick birds and spreading disease. These mechanisms should incorporate systems for regular review of compensation rates, as otherwise the value of compensation and its effectiveness may be eroded by inflation. While many projects supported significant increases in disease diagnostic capacity, there was a tendency for projects to focus too much on investing in laboratory infrastructure and equipment rather than systems development and human capacity. Particular care is required when deciding whether to support investment in Biosecurity Level 3 laboratories, which have high maintenance costs and require significant technical capacity. The need for these facilities should be considered at a regional level, and more could be done to encourage countries to share samples, facilities, and data.

There continues to be a serious risk of influenza pandemics, but progress on managing these risks has stalled. Pandemic risk is a specific issue that requires sustained high level support and commitment to avoid being overrun by short-term priorities.

1. Introduction and Outline

The World Bank's efforts to combat avian influenza and help countries to build capacity to prevent and mitigate pandemics offers a useful example in understanding how the agency can contribute to the provision of global public goods. This review aims to inform the provision of these goods by offering lessons from evaluation of the avian influenza experience. The experience also offers an example of the Bank playing a key role in the international response to an unfolding international crisis in a technical area with which it was largely unfamiliar. And provides a case study on how the Bank struggles to work effectively across sectors, both within the institution itself and in the client countries it operates in.

Outbreaks of H5N1 highly pathogenic avian influenza that spread rapidly in poultry were first observed in Hong Kong in 1997 and then reemerged in several countries in South East Asia in late 2003 and early 2004. In the following years the disease was detected in poultry in many countries in South Asia, Asia Minor, Africa, and Europe. While highly pathogenic avian influenza poses significant risks to poultry sectors, especially the poor, and can cause direct infection of humans, the main fear has been that the virus could mutate into a form that is transmissible between humans, triggering an influenza pandemic.

The international community recognized that these risks represented an emerging crisis. Countries were already on edge because of their recent experience with Severe Acute Respiratory Syndrome (SARS), a zoonotic respiratory disease which had caused 8,422 known cases and 916 deaths across 30 countries (WHO 2003) but had caused economic damage of $54 billion primarily from declines in consumer demand due to fear of infection and loss of confidence (Lee and McKibbin 2004). Many saw the lack of a coherent coordinated global response to SARS as one factor behind the disproportionate economic costs.

The potential losses from a serious influenza pandemic could be even more serious. In the 20th century, influenza pandemics occurred in 1918, 1957, and 1968, and the 1918-19 pandemic is thought to have killed at least 50 million people. Even with modern medical advances a pandemic could still have high mortality, and could be spread much more quickly through international air travel routes, with severe consequences for human health and the global economy (see Annex B1). For example, a catastrophic pandemic could cause economic damage as high as 10% of global GDP (McKibbin and Siderenko 2006).

The most effective means of reducing the risk of an avian influenza pandemic are to control the disease at the source in poultry and to rapidly identify, isolate, and treat infected humans. The accumulation of mutations in the virus population is a function of

the number of animal hosts infected, and so reducing disease spread in poultry would reduce the likelihood of the virus mutating into a form transmissible between humans. Isolating and treating any human cases of avian influenza would also serve to reduce the likelihood of this event. However, veterinary services institutions were weak in many developing countries, with little ability to detect or control outbreaks, and public health systems were often strained by existing health issues, and had little preparedness for an influenza pandemic. Improving veterinary and public health systems in developing countries would thus be a global public good, reducing the disease risks faced by the world as a whole. Providing this god is difficult, because it requires that countries and communities make upfront expenditures for future benefits that are uncertain and appear remote because of the low probability that a pandemic will start in any given year.

Based on these real and immediate concerns, the Bank moved to provide support to client countries as part of a cooperative international response. From 2005, the Bank was involved in a series of high level international meetings addressing the crisis. The Bank played a key role in mobilizing additional finance from donors, with establishment of $130 million in new pledges for an Avian and Human Influenza Facility (AHIF) at an international pledging conference in Beijing in January 2006. The Bank also supported a range of analytical work, including an assessment of the economic consequences of a pandemic (Burns and others 2006), a design document on compensation mechanisms (World Bank 2006) and other work. And the Bank was involved in some global and regional initiatives, such as the Support Program to Integrated National Action Plans for Avian and Human Influenza.[1] But the main role of the Bank was through its regular investment lending operations, using IBRD and IDA resources. The Bank approved a Global Program on Avian Influenza Control and Human Pandemic Preparedness and Response (GPAI) in January 2006, a horizontal Adaptable Program Loan that allowed for use of up to $500 million (extended to $1 billion in June 2009) to finance national avian influenza control and human pandemic preparedness projects. The objectives of the program where to minimize the threat posed to humans by highly pathogenic avian influenza infection and other zoonoses and to prepare for, control, and respond to influenza pandemics and other infectious disease emergencies in humans.

Over 2006-2013, the Bank supported avian influenza control and pandemic preparedness through 83 operations across 62 countries. This included both through new investment projects and restructuring or additional financing of existing projects.[2] Of these 83

[1] The SPINAP-AHI financed a program led by FAO to develop multisectoral avian influenza action plans in 15 countries in Africa.

[2] 71 operations were identified based on a 2010 Bank portfolio review of avian influenza operations. IEG identified another 12 operations including avian influenza activities or pandemic preparedness and response (mostly additional financing to existing projects), including 2 avian influenza related projects after 2010.

operations, 62 standalone projects focused primarily on avian influenza, other zoonoses, or pandemic preparedness and response, and of those 62 avian influenza projects, 36 had project costs of at least $2 million. The 83 operations included $2,607 million in Bank commitments to projects with a total cost of $7,978 million[3], but this includes a number of larger health or agriculture sector projects with only modest contributions to avian influenza or pandemic preparedness. It is not possible to precisely identify Bank commitments for avian influenza and pandemic preparedness activities because commitments are generally made at the project level rather than at the component or subcomponent level. However, the total cost (including non-Bank financing) of projects and components directly related to avian influenza, other zoonotic diseases or pandemic preparedness were $842 million. [4] Bank commitments to the 62 projects focusing on avian influenza were $391 million.[5] These commitments included $126 million in trust fund grants from the (Bank managed) Avian and Human Influenza Facility (AHIF)[6] and $27 million from Japan's Policy and Human Resources Development (PHRD) technical assistance fund, with the remaining financing through IBRD loans and IDA grants and credits. Only the AHIF funds were new and additional financing.

[3] This figure includes a major Health Nutrition and Population sector project in Bangladesh, with $300 million in Bank financing for a $4,300 million project, which included some activities on avian influenza which could not easily be separated from the larger program.

[4] This is a rough figure based on IEG classification of project activities at the component level, so it includes the full cost of all projects focusing on avian influenza, and the cost of relevant activities within other projects that did not focus on avian influenza. The figure does not include an additional $538 million for Mexico (which was cancelled without disbursing) and $229 million Argentina for influenza prevention and control projects related to the 2009 influenza pandemic.

[5] This figure is a lower bound for Bank commitments for avian influenza in that it does not include commitments for avian influenza activities in larger projects. It also does not include the $491 million and $229 million for Mexico and Argentina pandemic response projects.

[6] Donor contributions to the AHIF were $126.2 million, and as of August 2013 total disbursements were $79.3 million. The 51 closed AHIF grants had disbursed $71.3 million against $96.5 million of approved grants, and 6 grants remained active. (AHIF, 2013)

Table 1: Countries Receiving Support from the World Bank under the GPAI

Africa	*East Asia & Pacific*	*Europe & Central Asia*	*Middle East & N. Africa*	*Latin America & Caribbean*	*South Asia*
Cameroon	Cambodia	Albania	Djibouti	Argentina	Afghanistan
Congo (DR)	China	Armenia	Egypt, Arab Republic of	Bolivia	Bangladesh
Congo (Rep.)	Indonesia	Azerbaijan	Iran, Isl. Rep.	Brazil	Bhutan
Liberia	Lao PDR	Bosnia-Herzegovina	Jordan	Chile	India
Malawi	Mongolia	Georgia	Syrian Arab Republic	Costa Rica	Nepal
Mauritania	Myanmar	Kosovo	Tunisia	Dominican Republic	Sri Lanka
Mozambique	Vietnam	Kyrgyz Republic	West Bank and Gaza	Haiti	
Niger		Moldova	Yemen	Honduras	
Nigeria		Romania		Mexico	
Sierra Leone		Tajikistan		Nicaragua	
Togo		Turkey		Paraguay	
Uganda		Turkmenistan		Uruguay	
Zambia		Uzbekistan			

It has turned out that, so far, avian influenza has done less damage than was feared. No pandemic of H5N1 influenza has occurred and there have been a total of 468 documented cases of H5N1 infection in humans and 268 deaths (WHO 2013). The primary impacts have been in the poultry sector, where an estimated 400 million domestic poultry have died or been culled across 63 countries. However, the number of countries with outbreaks in birds has declined over time, from 50 countries at the peak in 2006 to 9 countries as of 2012 (FAO 2012).[7] Consequently, the risks posed by avian influenza as perceived by donors, international agencies, development institutions, and borrower countries and agencies have also declined. Public attention shifted to the food crisis, the financial crisis, and the ongoing global economic downturn. The 2009-10 (non-avian) H1N1 influenza pandemic revived interest in the short term, but this pandemic also turned out to be less serious than was initially feared[8], which contributed further to declining interest in pandemic preparedness. Partly as a result of these factors, the level of activity for pandemic preparedness at the Bank has declined, and there have been few new projects since 2010.

[7] These figures for H5N1 avian influenza do not include the effects of outbreaks of H7N9 avian influenza in China in 2013, which have caused 135 confirmed human cases, and 44 deaths as of November 2013.

[8] The WHO reported 18,366 laboratory-confirmed deaths as of July 2010 (WHO 2010), and researchers from the CDC estimated global mortality after one year of 151,700 to 575,400 (Dawood and others, 2012). WHO researchers estimated direct global mortality at roughly 123,000 to 203,000 during 2009 (Simonson and others 2013), with wide variation across regions.

The purpose of this product is to present lessons and findings from independent evaluation of the World Bank's global avian influenza program. The report aims to inform the design of any future avian influenza/zoonotic disease/pandemic preparedness interventions, and also to discuss the wider strategic lessons from the intervention that are relevant to programs responding to emergencies, providing global public goods, or cooperating with external technical agencies. The report also aims to assess the current state of the pandemic preparedness agenda, and to provide guidance on possible ways forward.

An assessment of the impact of the Bank's support for avian influenza is beyond the scope of this paper. Such an assessment would be difficult to undertake because of the weaknesses in project monitoring and evaluation systems and the inherent difficulties in assessing response capacity and preparedness. Similarly, the report does not attempt to evaluate the efficiency of the program or of its various components.[9] The Bank's final progress report in 2010 concluded that there had been significant progress in improving animal health systems and that this helped to explain the decline in the number of countries affected by avian influenza (United Nations/World Bank 2010), but this evaluation does not attempt to validate that finding.

This report is based on a range of sources. Analysis was focused on the universe of 22 closed investment projects that focused specifically on avian influenza or pandemic preparedness, all of which have had desk reviews by IEG (Table 2). Full project evaluations (including field visits) were conducted over 2011-13 for 6 avian influenza control projects in Albania, Armenia, Nepal, Nigeria, Romania, and Tajikistan (Annex A). The report also draws on additional interviews with Bank staff and international agency staff, on World Bank project and program documentation and reports, on the wider literature on avian influenza, and on other documents.

[9] Inherent uncertainties in the estimating probability of outbreaks of various severity and difficulty in quantifying the efficacy of project interventions given the lack of meaningful counterfactuals make it extremely difficult to assess the economic impact of the program. However, it is plausible that the economic benefits from projects were significant.

Table 2: Closed investment projects focusing on avian influenza or pandemic preparedness

Country	Year Approved	Year Closed	Bank financing (USD $m)	Project Cost (USD $m)	Bank sector	H5N1 outbreaks in birds?	H5N1 cases in humans?	IEG case study?
Afghanistan	2007	2010	8.0	8.0	ARD	Yes		
Albania	2006	2010	5.0	6.1	ARD	Yes		
Armenia	2006	2010	6.3	9.3	ARD			Yes
Azerbaijan	2002	2010	9.5	13.4	ARD	Yes	Yes	Yes
Bangladesh	2007	2012	16.0	18.0	ARD	Yes	Yes	
Bosnia and Herzegovina	2007	2011	5.0	6.4	ARD	Yes		
Egypt	2007	2011	7.1	7.1	ARD	Yes		
Georgia	2006	2011	7.0	10.3	ARD	Yes		
Haiti	2008	2012	1.6	2.1	ARD			
Indonesia	2006	2009	10.0	15.0	ARD	Yes	Yes	
Kosovo	2007	2011	3.0	3.0	HE			
Kyrgyz Republic	2006	2011	4.0	6.4	ARD			
Lao PDR	2006	2012	4.0	13.6	ARD	Yes		
Moldova	2006	2011	8.0	10.6	ARD			
Nepal	2007	2011	18.2	18.2	ARD	Yes		Yes
Nicaragua	2009	2012	5.0	5.0	HE			
Nigeria	2006	2011	50.0	65.0	ARD	Yes	Yes	Yes
Romania	2006	2010	37.7	47.7	ARD	Yes		Yes
Tajikistan	2006	2010	5.0	6.8	ARD			Yes
Turkey	2006	2011	34.4	55.2	ARD	Yes	Yes	
Vietnam	2004	2007	5.0	6.2	ARD	Yes		
West Bank and Gaza	2006	2009	10.0	10.0	HE			

These projects represent the universe of closed investment projects focusing on avian influenza: it does not include projects with broader focus, technical assistance projects or those too small to produce a completion report, or projects still active as of January 2014. Bank sector mappings were to Agriculture and Rural Development (ARD) or Health, Nutrition, and Population (HE). Outbreaks/cases detected refers to whether or not cases of H5N1 were ever identified in that country, before, during, or after the project closed. IEG case studies refer to the 6 countries where a Project Performance Assessment Report was conducted, with field mission and direct collection of evidence.

2. Strategic Lessons for Crisis Response

The Bank's approach to avian influenza response used an innovative process for supporting rapid preparation of investment projects. The GPAI was the first global investment program supported by the Bank, through an extension of the instrument used earlier for regional programs used to combat HIV/AIDS in Latin American and the Caribbean. The horizontal Adaptable Program Loan (APL) approach included two novel features: it established a broad template for investment projects, listing specific activities that the Bank committed to finance, and it established a method for rapid project approval where the Board was not required to review each individual project prepared under this template.

A global framework for avian influenza projects

The GPAI program framework document established a common approach for avian influenza projects. Rather than preparing freestanding investment projects that would require a regular Board review process, the Bank developed a template for a global investment program, creating a program framework document for the program that had a common unified approach containing essential elements. Because of the emergency nature of the crisis, project objectives and design could not be expected to be based on existing Country Assistance Strategies, which were written before the global crisis. The framework provided a useful way of establishing clear Board support for a global response to avian influenza, and so making clear the Bank's strategy for avian influenza and pandemic preparedness.

The GPAI framework outlined a menu of activities that the Bank would support, ensuring that projects contained the necessary core activities while enabling countries (with Bank and technical agency assistance) to choose specific activities that met their national priorities. The program framework's template included animal health, human health, and public awareness and information components, and this structure was adopted for virtually all of the standalone avian influenza projects. Animal health activities included support for regulatory and policy frameworks, evaluation of veterinary service capacity, compensation mechanisms for culled birds, strategic and operational avian influenza plans, veterinary service capacity building, animal disease surveillance and information systems, diagnostic capacity, applied veterinary research, outbreak response capacity, poultry vaccination, and poultry sector biosecurity improvements. Human health activities covered public health planning and preparedness, surveillance, and response capacity, including support for vaccination and for purchase of antiviral drugs. Communication activities included support for communication capacity in government agencies and for communication efforts to be used during disease outbreaks. The activities aimed to establish sustained capacity improvements in veterinary and public

health agencies, but unlike other global programs the program itself was designed as a one-time effort with a fixed financing envelope rather than a long term institution.

Technical experts interviewed by IEG had mixed opinions on the technical quality of the framework template and project designs. One challenge was that at the time of design, while there was broad consensus on the overall approach, there were a range of opinions among technical experts and agencies on many specific issues, such as on the role for poultry vaccination, on whether projects should support isolation facilities or intensive care units[10], on the appropriate minimum requirements for antivirus and vaccine, and on whether the intervention should support the creation of new agencies or work through existing institutions. Policy differences were sometimes pronounced between animal and human health experts and between agencies. Given these differences it was difficult for the Bank to produce a detailed menu that would have universal support. Some experts argued that the Bank played a useful role in ensuring that policies were practical on the ground. The Bank then supported the design, preparation and approval of national level investment projects under this framework and provided financial and technical assistance. While the template played a useful role in setting the general structure of projects, further efforts were still needed to apply the template to the specific country context.

Some technical experts argued that national level projects were a poor way of handling transboundary animal diseases, because they ignored the degree to which diseases spread across political boundaries, to which policies in one country will affect its neighbors[11], and to which the threat can shift to unexpected areas. National projects locked investment support into specific countries, and did not allow flexibility for funds to be shifted over time as needs changed. Some experts also argued that the country-based approach also meant that financing was opportunistic, based largely on willingness to borrow and government interest rather than on a needs-based assessment of disease risk.

However, it is difficult to see a feasible alternative to national investment projects. Disease control and public health functions are handled largely through national institutions. Regional organizations typically do not have the mandate or capacity to implement major programs. As only a moderate amount of specific grant funding was available, most investments were financed through traditional World Bank lending to countries (IDA and IBRD). When national governments borrow money, the funds are

[10] Simple isolation facilities might serve to prevent an infected individual from spreading disease, but would not allow for treatment of the patients, and could lead to high death rates for isolated individuals. Intensive care units would allow for treatment and would be more generally useful for other purposes, but are more expensive.

[11] For example, if a country on one side of a border vaccinates its poultry and the other doesn't, this causes complications in disease surveillance. If one side has compensation and the other doesn't, there is a risk of encouraging transport of diseased birds to the country with compensation.

theirs, and have to be spent on their needs. Countries are not willing to borrow large sums to finance regional programs as funds might get spent elsewhere in the region. The GPAI did include some regional and global level activities, such as working to link laboratories. However, there may have been more that could have been done to encourage inter-country cooperation at the regional level, such as sharing of data, samples, and technical resources (such as advanced laboratory facilities).

The targeting of Bank financed avian influenza projects was generally appropriate. The allocation of funds across countries was largely driven by client interest and availability, rather than by formal assessment of need. However, of the 48 Bank client countries where cases of avian influenza were ever identified, 28 had some support from the Bank through projects, and those that did not were largely middle income countries that did not necessarily need additional support or are not major Bank borrowers (such as Malaysia, Poland, Thailand, and Russia) or countries with mild outbreaks primarily among wild birds. Of the 15 countries where cases were detected in humans, all received Bank support except Iraq, Pakistan and Thailand. Detailed risk assessments could have slowed the emergency response process, and might have done no better in allocating funds to high need countries.

Grant finance through the AHIF and PHRD trust funds had advantages over IDA and IBRD financing. Some countries didn't perceive much threat or risk for avian influenza, or lacked interest in using their own funds to support a global public good; grant funding was useful in making support for avian influenza interventions more appealing. Many low income countries would have been unwilling to undertake projects supporting a global public good without grant funding. However, the $153 million in grant funding was modest relative to total country globally, and so many projects relying purely on grant funding were small. There were 27 projects whose cost was less than $2 million, including 16 projects with costs less than $1 million. But increasing the overall level of funding may not have been useful for some countries, particularly those with weak institutions, as additional financing may have overwhelmed absorptive capacity.

Many Bank project staff felt that small avian influenza projects did not receive sufficient budgetary support for supervision, in part because of the small size of grant financed activities, the low proportion of trust fund finance available for supervision (2%), and the lack of interest in supporting small avian influenza projects from some Bank managers within the regions or country offices. Another reason for low prioritization of avian influenza projects by Bank management was a disconnect between the country programs' priority to focus on local development benefits for the country and the global public good goals of the program.

Expedited project approval process

The Bank made a significant effort to provide a rapid response to the avian influenza crisis. The horizontal APL meant that all GPAI projects were processed using emergency project preparation rules, under Operational Policy 8.50. The GPAI also established an expedited process for Board approval. While the first avian influenza projects went through full Board review and approval, the Board issued authority for subsequent projects (up to a total envelope of $500 million, later raised to $1 billion) to be approved directly by Management, so long as the project supported only activities outlined in the GPAI framework document. Appraisal documents (usually a Technical Annex to the GPAI framework document) would be approved by Management and then circulated to the Board; no Board consideration was required unless three or more Executive Directors requested it. The Bank reports that this reduced project preparation time by up to 5 weeks. Prior to this innovation, the Bank could respond to global crises only through individual investment projects, with separate Board approval for each project.

Managers interviewed by IEG argued that the expedited Board procedures were an important procedural advance which could be replicated for other future emergencies, including natural disaster response. They noted that in addition to increasing the Bank's crisis response speed, the experience with the process built trust between the Board and management. Based on the experience with GPAI projects, the process was replicated for the response to the global food crisis.

Project preparation times were short for avian influenza projects approved under the horizontal APL and expedited approval process. For the 62 projects focusing on avian influenza, the median time between concept and approval was only 4 months, as compared to 11 months for the 314 other Agriculture and Rural Development projects approved over FY 2007-10 and 8 months for the 139 other Health projects over the same period. However, avian influenza project preparation performed no faster than the 195 other emergency projects utilizing the Emergency Recovery Loan lending instrument over this period, which had a median time of 3 months.[12] The median time for avian

[12] Standalone avian influenza projects and other emergency response projects (eg for natural disaster or other crisis response) used emergency recovery loan instruments and procedures under Operational Policy 8.50, which allows for expedited preparation procedures, including postponement of environmental assessments until after approval. Avian influenza projects might have been expected to be prepared faster even than other emergency projects, since the avian influenza projects also benefited from the GPAI design template and streamlined approval process, but on average these did not seem to achieve quicker preparation time than for other emergency projects – which required standard Board approval processes.

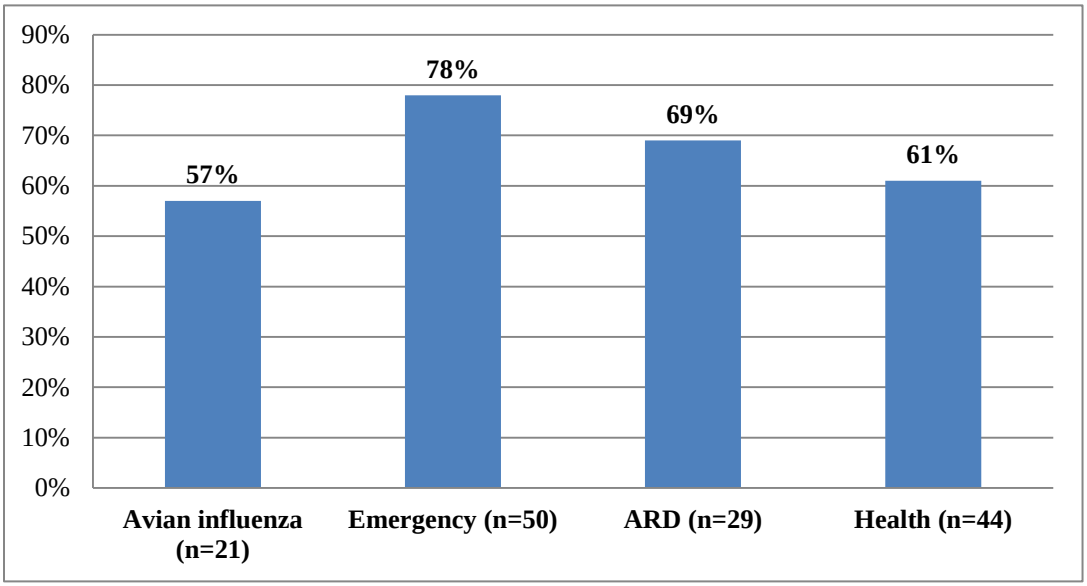
influenza projects to move from approval to project effectiveness was another 4 months.[13]

Rapid project preparation and approval may have had some disadvantages. There is weak evidence that avian influenza projects had lower quality at entry than did other comparable projects (Figure 1). However, this depends on comparing ratings for relatively small groups of projects where a few different ratings would change the result, and it is not clear whether these quality weaknesses were due to the GPAI template or the expedited processing mechanisms. The quality at entry issues most commonly cited in IEG reviews were: weaknesses in monitoring and evaluation systems (with indicators that focused on production of outputs rather than on achievement of intermediate or final outcomes); the use of an emergency instrument when the project activities did not require this; the failure to establish a single project coordinator in government responsible for implementation of the whole project (which diluted implementation accountability, delayed implementation progress, and hindered coordination between implementing agencies); vague specification of the precise activities to be supported (such as which laboratory or hospital facilities would be upgraded, and to what level, which delayed implementation); and overestimation of the capacity of implementing agencies, many of which had not previously worked with the Bank or implemented major donor financed projects. However, it is plausible that many of these issues reflected the difficulties in engaging a new and complex project type, rather than a lack of board oversight.[14] IEG project reviews concluded that the GPAI framework led to better quality at entry than might have otherwise occurred, by providing a clear and logical design template, backed by the expertise of technical agencies. In the first project in Vietnam, prepared prior to the GPAI, a lack of mechanisms for donors to work together made it difficult to coordinate activities.

[13] However, in several cases it took several additional months after formal project effectiveness before projects began to make purchases, because of delays in hiring staff for project management units, difficulty in reaching working agreements with UN agencies, and the need for additional planning and design work for some activities.

[14] Another problem with quality at entry was that in some cases (Egypt, Bangladesh) there were disconnects between project objectives (which had animal health and human health goals) and project designs (which had only animal health activities, as human health activities were being covered by other projects or donors). It is plausible that this kind of error might have been identified during Board review.

Figure 1: Percent of Closed and Evaluated Projects with Quality at Entry rated at least Moderately Satisfactory (Approval FY07-11)



Note: Quality at entry ratings are from IEG project reviews and evaluations and are for only those closed projects where IEG reviews have been completed – most investment projects from this period remain active or have not yet been reviewed by IEG and so are excluded. Avian influenza projects are for closed investment projects focusing on avian influenza. Emergency projects are those using an Emergency Response Loan instrument, excluding avian influenza projects. ARD and Health projects are those projects mapped to the Agriculture and Rural Development and Health sectors, respectively, excluding avian influenza projects.

Rapid project approval did not always lead to a fast response-time on the ground. In some countries such as Nigeria, where the project was responding to a real unfolding emergency, there was clear value in a rapid preparation and approval process. The Nigeria avian influenza control project was able to get up and running even faster by purchasing some emergency supplies with funds from other existing health and agriculture projects before formal effectiveness of the avian influenza project, and continued to purchase urgent equipment immediately after attaining effectiveness. However, in some other countries, projects were slow to start even once approval and effectiveness were reached. In Nepal, no procurement was completed until more than 8 months after project effectiveness, and core staff positions were not filled and outbreak response supplies were not purchased until roughly a year after project effectiveness. Additional time in project design and preparation phases may have saved time in the long run.

Emergency project procedures were not always necessary. For example, in Romania, the national veterinary agency already had significant emergency response capacity, and had successfully controlled outbreaks prior to project appraisal, and the human health component supported mostly longer term civil works, many of which were not completed

as of project closure even after extensions. A standard investment instrument may have been more appropriate for non-emergency capacity building.

Many project designs included complex non-emergency activities (such as laboratory equipment procurement and construction) which were difficult to complete within the standard 3 year time span of the emergency project. Of the 53 closed projects focusing on avian influenza, 42 projects were extended by an average of 14.4 months. Emergency projects are appropriate for quickly tackling needs for some surveillance, diagnosis and response capacity, but may not be very effective for major legislative or regulatory changes or sector-wide reforms. Long term capacity building activities usually benefit from longer preparation and coordination with other sector interventions.

Even in countries that did need emergency support, many projects struggled to manage the transition from emergency response to support for building sustainable capacity. The commitment and prioritization of government agencies inevitably waned in cases where no crisis occurred or once the crisis was perceived to have passed. In projects where the implementation of longer term activities was not well underway in the early stages when enthusiasm was high, then those longer term investments struggled to keep momentum, sometimes remaining incomplete as of project closure despite multiple extensions. The transition from emergency response to longer-term systemic improvements should be a consideration in project design.[15] There are inherent tensions in emergency projects between trying to act in the window of high political will and being realistic about what can be accomplished in a limited period, and between prioritizing important specialized investments that require high political will versus assets that will remain relevant and useful in non-crisis periods (such as by having a role in mitigating chronic diseases).

Working across sectors and regions

Effective control of avian influenza and pandemic preparedness requires cooperation and coordination between animal and human health sectors, both at the strategic level and in implementation. The outcomes of most serious concern are the risks to humans from a potential pandemic, but improvements in these human health outcomes come in part from actions in the animal health sector. Pandemic response planning also requires cooperation with finance ministries, a range of sectoral ministries responsible for operations of critical infrastructure, civil defense, and in some cases police or military.

Within the Bank, cooperation and coordination was required between animal health staff in the Agriculture and Rural Development (ARD) sector and human health staff in the

[15] However, even in some cases (such as Lao PDR) where this transition was considered in at the design stage, the ability to implement the transition was hampered by a lack of funding due to a decision not to proceed with a followup project.

Health, Nutrition and Population (HNP) sector. These sectors were in completely different networks in the Bank's institutional structure, and will be separate global practices under the Bank's 2014 restructuring. There was significant inter-sectoral cooperation at the strategic level, through involvement in international discussions, creation and establishment of the GPAI and AHIF, and management of the portfolio.

Cooperation however often broke down at the project implementation level. Many project task team leaders reported a frustrating inability to work effectively across sectors, based on a lack of incentives to support inter-sectoral cooperation inherent in the Bank's operational systems. Each project was mapped either to the agriculture or health sectors, and sectoral accountability for performance followed from that mapping. Sectoral managers did not encourage their staff to devote sufficient time and effort to projects not mapped to their sector, perhaps because they faced few institutional incentives to do so. These problems were exacerbated after 2010 with declining management interest in avian influenza, which hampered progress in some ongoing operations.[16] In some projects a system of co-leadership was adopted with mixed success, as in practice primary authority usually ended with whichever sector the project was mapped to. Where coordination worked, it was largely based on positive personal relationships between particular individuals rather than because of any systematic institutional support.

There was little evidence of learning across projects. Projects broadly had similar structures, but often tried different strategies in practice. This could have led to many opportunities for learning and knowledge sharing across projects. However, project staff reported that little learning and sharing of knowledge was done during implementation. While there was sometimes good coordination across projects within regions (especially in Europe and Central Asia), this occurred largely because of overlaps in staff working on multiple projects. In project documentation, references to lessons learned from other projects were usually perfunctory references to inclusion of particular activities that were already discussed in the GPAI template (the "what") rather than on any lessons learned from implementation and supervision ("the how").

Animal health agencies often appeared to be more committed than human health agencies. Veterinary services and livestock agencies have often had little large scale support from the Bank or other large donors, but they saw managing animal diseases as a part of their core business, and so exhibited high levels of commitment to project goals and were eager to receive donor funds. Human health agencies on the other hand are regular recipients of donor support, and funds from avian influenza projects were usually

[16] For example, the ICR for the operation in Lao PDR (which was mapped to the health sector) notes that the ability to draw on animal heath expertise/resources and to work effectively with the agriculture ministry was reduced as Bank management support and funding for the Bank's Avian and Human Influenza taskforce declined.

small relative to other sources of donor finance. They often considered pandemic preparedness a low priority, preferring to focus on those chronic diseases that cause ongoing mortality and morbidity rather than a pandemic that may not arise. H5N1 avian influenza has (so far) killed 268 people worldwide, while millions are affected by HIV/AIDS, malaria, tuberculosis, non-pandemic seasonal influenza, and other diseases.[17] However, in some cases such as in Lao PDR where the project was mapped to the health sector in the Bank and where the primary engagement was with the ministry of health, then human health services were the stronger partner in joint animal-human health efforts.

Activities supported under animal health components were more similar across projects, with a coherent set of support for surveillance, diagnosis, control capacity, and communication activities tightly focused on avian influenza or other zoonotic diseases. Activities under human health agencies varied more across projects; though many projects supported diagnostic and surveillance systems, specific purchases sometimes seemed to fill particular health system gaps the borrower wanted to use funds for even if these were only peripherally related to avian influenza. One reason for this may be that there was sometimes a clearer understanding of specific needs on the animal health side due to analytical work by OIE and FAO on veterinary service gaps.

In some projects, coordination across sectors was hampered by the lack of a single overall project administrator. In Nigeria and other countries, adding an overall project coordinator on top of the separate component coordinators sped up project implementation and improved coordination, which had lagged prior to this appointment. Unsurprisingly, the institutional background of the project coordinator tended to influence the overall sectoral prioritization of the project, with greater emphasis on animal health in projects coordinated by agriculture ministry staff and similarly for human health and health ministry staff.

Despite these challenges, in many projects there were significant increases in cooperation and coordination between animal and human health sectors, often from a baseline where there had been no prior cooperation. It is not clear whether this cooperation will be sustained in the absence of continued efforts.

Working with international technical agencies

Responding to avian influenza required highly technical interventions in subsectors in which the Bank lacked expertise or experience. The Bank had little familiarity with

[17] The 2010 Global Burden of Disease study estimates the global impact of diseases in disability-adjusted life years; in 2010 HIV/AIDS had a burden of 81.5 million DALY, malaria of 82.7 million, tuberculosis of 49.4 million, and all sources of influenza of 19.2 million (IHME 2012).

zoonotic disease control – there were two veterinarians on staff – and pandemic preparedness required different technical knowledge than did traditional health sector interventions. The necessary expertise on these issues was primarily in international technical agencies. Thus, there was a need for close collaboration and cooperation between the Bank and the World Health Organization (WHO), Food and Agriculture Organization (FAO), and World Organisation for Animal Health (OIE). UNICEF was also involved in many projects, supporting communication activities and implementing knowledge and behavioral assessments. A number of bilateral donors, notably Australia, Canada, and the United States supported significant country-level programs as well, backed by strong technical expertise. The model that went forward was one where the Bank took the lead on preparing and financing investment projects, and where the international technical agencies and other partners provided input into the design of the overall strategy and substantial implementation support at the project level[18], while also continuing their own technical assistance support programs.

The Bank played a key convening role in bringing agencies together to jointly address an international challenge. Bank management and staff and some international agency staff argued that the Bank played a key role in bringing FAO and WHO to work together to work on avian influenza, especially over 2005-7. Prior to this period there had been little cooperation or coordination between these agencies. The enthusiasm and commitment of senior Bank officials (including the President) and the willingness to put money on the table helped demonstrate to governments that the threat was something that should be taken seriously.

There were some conflicts between the Bank and technical agencies, and between agencies. Some staff from technical agencies argued that the Bank was not the right agency to lead the response to avian influenza, given its lack of technical experience and expertise. Some tensions with and between agencies were driven in part by turf arguments over mandate and competition for limited donor funding. Some staff in these agencies resented the degree to which the Bank took leadership of the program, reporting that they had wanted Bank support rather than Bank control. There was a perception by some staff in technical agencies that they were being made implementing arms of the Bank. While the Bank worked to incorporate expert opinion from technical agencies into the design of the GPAI[19], some agency staff argued that the GPAI template was a Bank-

[18] The UN and other technical agencies were a critical partner in many Bank-financed avian influenza projects. Their work included training of veterinary and public health workers, advice on the specifications of laboratories and equipment, assessment of veterinary and laboratory services, the design of communication materials, and many others.

[19] Incorporating technical advice could be difficult, since in the early stages of the avian influenza response there were conflicting technical opinions on a number of issues, such as the scope for poultry vaccination, the need for isolation wards versus intensive care units for human cases, and others.

owned document with little feeling of ownership from other agencies.[20] The United Nations System Influenza Coordination (UNSIC) unit helped to manage conflicts and improve institutional coordination. The UN could consider replicating this approach of having a single office coordinating UN activities for future operations where the Bank needs to work with multiple agencies.

Some staff in technical agencies would have preferred direct control of funds, rather than working for governments under Bank financed projects. The UN agencies had some advantages over Bank financing. UN agency staff argued that they had the ability to work in some countries that the Bank could not, including countries that were not Bank clients, or where severe governance risks or arrears on loan payments prevented the Bank from operating.[21] UN agencies could be faster than the Bank when spending their own resources directly, without the preparation time of the Bank or the more strict rules on procurement and hiring of consultants. Agencies could also be more effective than the Bank in technical training, strategy design, and human and institutional capacity building, because they could directly bring to bear their technical expertise and broad engagement in these areas.

However, it is difficult to see a realistic alternative to Bank leadership and the use of Bank processes in investment projects. Most experts agreed that UN agencies lacked the financial wherewithal to respond at the necessary scale, and the operational, project supervision, financial management, and procurement capacity necessary to implement large investment projects. The AHIF was deliberately set up as a Bank managed trust fund (following Bank procedures), as some donors worried that the funds might otherwise be used on international consultants, rather than going to the countries. The majority of financing for country level support were from IDA and IBRD, and so it was somewhat inevitable that country projects would follow regular Bank operational procedures.

While UN agencies can be faster by not working through government budgets and implementation agencies, this comes at the cost of not building government institutional and project management capacity. Some project experiences demonstrated the tradeoffs between Bank and UN agency implementation models. In Tajikistan public awareness activities were largely outsourced to UNICEF, which left government agencies with little ownership of activities once the project ended, weakening sustainability (IEG 2012d).

[20] In contrast, there was excellent joint ownership of the strategic framework for the One Health approach (FAO and others 2008), which outlined a unified approach for emerging infectious diseases at the animal-human-ecosystem interface.

[21] However, separate grant financing through the AHIF could still be used in countries that could not access Bank loans.

Collaboration with the UN agencies provided a valuable source of technical expertise to Bank financed operations, but it also led to a number of implementation challenges, particularly due to differences in and a lack of understanding of the specific processes and rules of each agency. While there was a need for the technical expertise from the UN agencies, some donors were concerned about funds flowing directly to UN agencies and not to borrower countries, and many borrowers felt that technical agencies were expensive and did not always provide good value for money. There were challenges in using Bank funds to provide direct support to UN agencies.[22] There were interagency disagreements on the appropriate proportion of funds that could be used as overhead.

Working with UN agencies led to implementation delays in some cases. The desire to respond to a global emergency by approving projects rapidly meant that many of these issues were not dealt with upfront during the design stages, as there was a belief that any issues could be resolved as they arose. However, in several countries there were significant implementation delays because of difficulty in organizing the terms under which the Bank and technical agencies would cooperate. For example, in Nepal it took nearly a year after project approval to reach an operational agreement between the Bank, the government and the UN agencies, and nearly 18 months to fully mobilize operational support (IEG 2013b). These delays could potentially have been avoided had there been greater coordination upfront at a headquarters level between the Bank and the technical agencies. A memorandum of understanding or umbrella agreement that clearly specified the roles and responsibilities of agencies upfront could have prevented the same issues from needing to be relitigated at the country level. Some UN agency staff recommended establishing a specific financing pathway for implementation via UN agencies, as has been done in other contexts such as reconstruction in Iraq.

Despite these challenges, the level of cooperation between the Bank and the UN agencies was unprecedented. Bank and UN agency staff had a positive overall view of the program. UN agency staff members interviewed were grateful for the Bank's support and commitment to working with the UN, from the President to the operational staff. There is widespread agreement that the avian influenza crisis response has improved the ability of Bank and UN agencies to work together, by improving understanding of processes, procedures and legal hurdles, and by building trust.

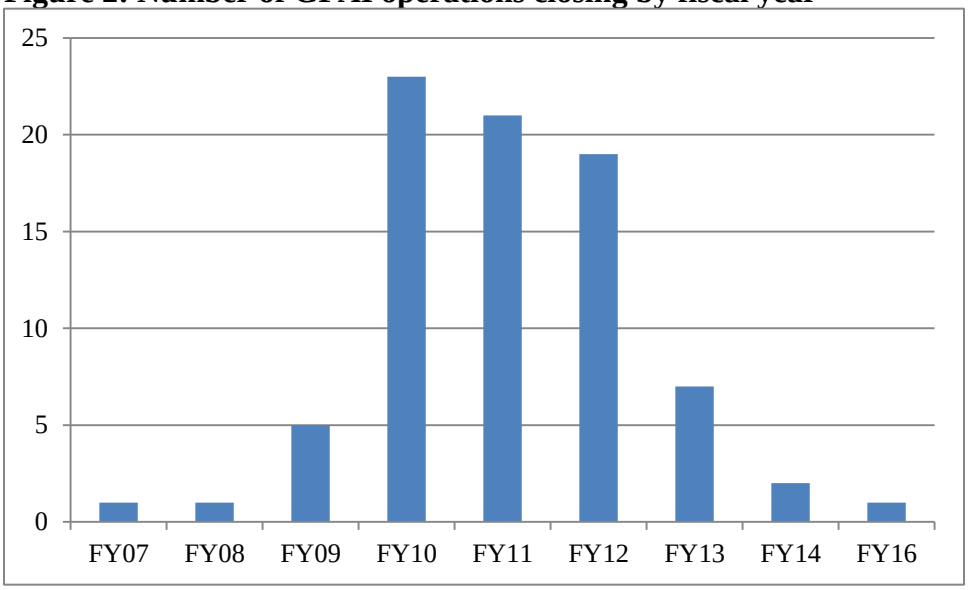
[22] In 2007, about 18 months after the launch of the GPAI, OPCS sought a procurement policy waiver, which was approved by the Managing Director OPCS to allow contracts between UN agencies and borrower implementation agencies to proceed. The waiver was necessary because UN agencies were legally unable to comply with certain provisions in the newly-revised contract forms required under the Bank's procurement rules. The experience of negotiating these issues with UN agencies for the GPAI contributed to the development of a Fiduciary Principles Accord between the Bank and the United Nations to facilitate the support from Bank-administered trust funds to UN organizations in crisis and post-crisis situations, and to projects where the emergency policy (OP 8.0 on Rapid Response to Crises and Emergencies) applies.

Follow-up and sustainability

The H5N1 avian influenza experience has turned out, so far, not to be as serious a threat to human health as feared. There has been no pandemic of H5N1, and only 468 documented sporadic H5N1 avian flu cases in humans. H5N1 appears to have been eradicated in some countries that experienced serious outbreaks, such as Nigeria and Turkey, though reinfection from wild bird populations is possible. However, as noted in the last pandemic influenza progress report produced by the Bank (United Nations/World Bank 2010), avian influenza remains a threat to both animal and human public health, economies, and communities globally because a pandemic remains a serious possibility. The threat remains significant because much needs to be done to bring veterinary and human public health services up to standard in many countries, to improve biosecurity in poultry production chains, and to increase preparedness to respond to a pandemic. H5N1 avian influenza has become endemic in 6 countries with very large human and livestock populations (Bangladesh, China, Egypt, India, Indonesia, and Vietnam; FAO 2011), outbreaks have occurred recently in Cambodia and Nepal, and more than 160 infections of humans with H7N9 avian influenza have been reported in China since 2013, 50 of them fatal. Such new strains of influenza (avian or otherwise) arise regularly and can cause another influenza pandemic. Continued support for influenza surveillance and control in livestock populations would reduce the probabilities of a severe pandemic by enabling early control of contagion. Such detection and control capacity would be a major global public good.

Yet international support for avian influenza, zoonotic diseases, and pandemic prevention and preparedness has largely ceased. The Bank stopped tracking or reporting on its portfolio of GPAI projects in 2010. IEG identifies only two new investment projects since 2010 that address avian influenza, zoonotic diseases or pandemic preparedness: a $10 million zoonotic disease project in Nepal and additional financing of $10 million for an avian and human influenza control project in Vietnam, both countries where outbreaks of avian influenza among poultry continue to occur. Both projects are due to end in 2014. A planned project in Laos was dropped. Knowledge sharing activities carried out over 2007-10 were largely absent after 2010. While it may not be useful to continue with dedicated avian influenza projects, zoonotic diseases and pandemic preparedness have not been mainstreamed into Agriculture, Health, or disaster risk management lending operations. There is some useful ongoing technical and policy work including by USAID, FAO, WHO, OIE, and others, but no large scale investment.

Figure 2: Number of GPAI operations closing by fiscal year



There are several reasons for this decline in support for the avian influenza and pandemic preparedness and prevention agenda. Support by the international community for addressing avian influenza was strong in 2005-6 and accelerated in 2007. However, then political and financial support shifted to the responses to the global food crisis, the global financial crisis, and the global economic downturn. There was a renewal in attention during the 2009-10 H1N1 influenza pandemic, but because the global death toll of up to 575,000 (Dawood and others, 2012) was less than catastrophic, attention from donors and borrower countries waned. International agencies, which had a responsibility in the early stages of response to the pandemic threat to take a precautionary approach and warn countries of the possible consequences[23], were (many believe unfairly) accused of crying wolf when the worst case scenarios failed to arise.

In development there are always limited funds and strategic prioritization decisions have to be made, and so complex agendas that do not fit neatly into the regular sector boxes can be lost. Global public goods are always difficult to finance and provide because of the need for intergovernmental cooperation in the provision of these goods and their financing. The challenge of reducing the pandemic threat is heightened by the multisectoral character of the requisite actions. The only way to continue to support such agendas within a development agency is with a high level focal point who has support from senior management. The UN system has accomplished this, with a Senior UN System Influenza Coordinator in the Secretary General's staff, though resources have become progressively tighter. However, there has been little management support within

[23] It is very difficult to accurately forecast the severity of a pandemic early on, when key epidemiological variables such as the reproductive rate of the pandemic strain are difficult to assess.

the Bank since 2010, when the responsibility for external and internal coordination of the response was transferred from a central unit (OPCS) to the Health sector network unit (HDNHE).

There are institutional reasons within the Bank for a lack of support. Because of its emergency nature and its global character, avian influenza response was not built into the regular process of country strategy development. Coordination, monitoring, and reporting functions were diminished after 2010 when overall responsibility of the program was transferred to the HNP sector, which only 20 percent of the portfolio was mapped to. Pandemic risk including avian influenza appears in the 2007 Health Sector strategy as a key persistent challenge, but since 2010 attention and interest have remained on health systems, concerns embodied in the Millennium Development Goals such as maternal and child health and HIV/AIDS, non-communicable diseases, and, most recently, expanding access and financial protection for Universal Health Coverage (UHC). None of the health sector board portfolio reviews have included avian influenza or pandemic preparedness since 2010. Work on a new sectoral strategy is ongoing, and this will be seen as an important signal of Bank commitment and priorities. In the agriculture sector there has been some continued interest from management, but it has been difficult to translate this into action when there is little demand from clients nor additional trust funds to offer grants. The Bank still has relatively few livestock or animal health specialists, and so Bank involvement in agriculture has tended to focus on crops rather than livestock.

Without sufficient ongoing support, the pandemic risk reduction and preparedness agenda will be lost, increasing the risk of and leaving the world vulnerable to the next influenza pandemic. The Bank has built significant knowledge and capabilities in staff who have worked on projects. This expertise will likely decline over time if these business lines are not pursued.

Given the lack of donor and borrower support, it is unlikely that there will be further large scale support for avian influenza or pandemic prevention and preparedness programs outside of the Bank unless there are large scale outbreaks or a pandemic. Small scale support (such as a small grants facility or support for continued training) would be useful as a way of retaining a basic level of institutional capacity and knowledge, and of keeping ties among animal health and human health practitioners. More importantly, there are ways of continuing to support zoonotic disease management and pandemic risk reduction and preparedness by explicitly and deliberately tying these goals into other relevant agendas.

The Bank and international community had intended to sustain support for these issues through the One Health approach. This agenda aimed to address zoonotic diseases by linking animal health, human health, and ecological factors. The Bank has supported One Health at the policy level: a joint strategic framework for One Health was devised by the

Bank, UN agencies, and OIE (FAO and others 2008), and the Bank has developed its own strategy documents related to One Health (World Bank 2010, World Bank 2012). However, these have not yet translated into action plans, financing, or investment projects. Most borrower countries have not shown interest in pursuing One Health interventions through the Bank, in part because of a lack of concrete examples demonstrating the benefits from adopting the One Health lens.

Another possible avenue is through Health in All Policies. This aims to ensure that policies outside of the health sector consider their impacts on human health – and so the health risks posed by livestock systems and policies would be considered in agricultural sector interventions. Improving performance of public health services for animal and human populations, pursuing disease risk reduction as a priority in health investment programs, and attention to pandemic preparedness will contribute to the success of efforts to achieve and sustain Universal Health Coverage, as disease prevention reduces the size of the population that requires health care, resulting in savings that can increase coverage for those whose illnesses cannot be prevented.

The Bank could support animal disease issues as part of increasing attention for livestock and fisheries. Livestock sectors are likely to continue to increase in importance, with increasing global meat consumption as global incomes rise. Animal health issues including zoonotic disease would be a natural component of increasing the Bank's involvement in livestock sector. Reducing disease risks can contribute to nutrition goals (since livestock and particularly poultry and fish are an important source of protein), and can be an effective means of building resilience and supporting pro-poor growth, as livestock are an important asset for the poor in many countries and fisheries an important source of livelihood. Improving livestock biosecurity could support food safety, which would contribute to increasing market access for livestock producers. Livestock and animal disease risks could be considered as part of food security, as trade in livestock constitutes 40% of tradable agricultural products. The proposed Livestock Global Alliance offers a way of strengthening cooperative support on livestock issues in a way that includes animal health as a central pillar.[24]

Finally, the financial and economic consequences of pandemics and major disease outbreaks could be factored into efforts to improve national level disaster risk management (see below). Under any of these approaches, the Bank could have a useful role to play in financing, in policy support, and in ensuring that zoonotic diseases and

[24] The Alliance aims to link a number of global and regional institutions whose mandates include livestock (including the World Bank) in forming a shared vision and complementary programs for a global livestock agenda. It aims to support use of evidence-based best practice, addressing the negative impacts of livestock activities, and in developing programs based on learning from successes and failures.

pandemic preparedness are included in the larger agenda.

Comparisons to other emergencies: food crisis response and natural disasters

It is useful to consider the response to avian influenza in comparison to how the Bank has responded to other types of emergencies, particularly to the 2008 global food crisis and to how the Bank has responded to natural disasters.

In many ways the avian influenza response faced tougher challenges than the food crisis response. The food crisis response was built on considerable technical expertise among Bank staff[25]; on experience by the Bank in nutrition, food security and social protection; and on a considerable body of relevant agricultural analytical economic and sector work – while the avian influenza crisis response was a largely new territory for the Bank. During the food crisis, the Bank had sufficient technological knowledge internally, with interactions with UN food agencies focusing primarily on information sharing, whereas avian influenza response required direct operational involvement of outside technical agencies in Bank-financed investment projects. The food crisis response was able to scale up existing social protection programs[26], while avian influenza operations and components introduced during restructuring of ongoing projects were of a new type, often dealing with livestock agencies with which the Bank and other donors had no prior relationship. Furthermore, the food crisis response was able to build on the avian influenza model, utilizing a similar comprehensive framework document that outlined a menu of actions, and adopting similar expedited processing rules that allowed for projects under the framework to be approved by the Bank directly without formal consideration by the Board.

There were similarities between problems in the food crisis response and those in avian influenza response. An IEG evaluation of the Bank's response to the food crisis (IEG 2013d) notes some of these problems. High quality framework documents did not necessarily guarantee high quality project designs. In both cases, projects were prepared very quickly, but with incomplete designs and an expectation that these could be fine-tuned during supervision. However, once projects were in place, this turned out to be difficult and time consuming, and there was not always sufficient administrative budget for supervision to make changes.

[25] The Bank has historically had a significant lending portfolio of projects related to food, agriculture, and safety nets and there are many specialists in these areas in the Bank, while the livestock lending portfolio has been relatively modest, and the Bank has very few animal health, virology, epidemiology, or livestock specialists.

[26] Scaling up programs was a pragmatic approach, but had some weaknesses in that it relied on utilizing in-kind transfer programs.

Both interventions relied largely on traditional sources of finance (IDA for the food crisis, and both IDA and IBRD for avian influenza) as opposed to separate trust fund sources.

The food crisis response activities have also been more successfully sustained than those implemented during the avian flu response. Sustaining the food crisis activities was possible thanks to an existing foundation of long term involvement in food security and social safety net programs, and through creation of a specific crisis response window, which was used to respond to the crisis in the Horn of Africa in 2012.[27] This may have occurred in part because food security is sometimes perceived as more obviously linked to the Bank's core business of poverty alleviation, but also because it was more traditional territory for Bank staff, managers, and sectoral strategies, and because there was a clearer signal from donors, clients and Bank management that food crisis mitigation was a high priority issue.

The Bank's experience with disaster risk management offers some useful lessons. The economic consequences of public health emergencies can be at least as severe as those from cyclones, floods, droughts, or earthquakes. In the past, the Bank's attitude to disasters had been reactive and tactical, rather than proactive and strategic (IEG 2006). However, the Bank has already made progress in shifting from disaster response to disaster risk reduction and is beginning to move towards greater risk management for these threats (IEG 2012a). Most Bank-financed natural disaster risk management interventions no longer take place in emergency projects. Attention to pandemics and other major health emergencies would benefit from a similar change in practice, to move away from a paradigm grounded in crisis response, and towards incorporating risk reduction and risk management into ongoing operations. Epidemics and pandemics are rightly classified as natural disasters under the United Nations Hyogo Framework, and national legislation and other procedures for declarations of emergency should ensure that they cover these, and national disaster risk management policies should encourage preparedness and risk management for public health emergencies. Pandemic risk reduction is even more in need of global donor support than natural disaster risk reduction, as pandemic preparedness in one country provides positive spillovers to others while the benefits of disaster risk reduction are primarily local.

The Bank could work to reduce the risks from zoonotic diseases and pandemics by building support for animal health systems, human health systems, and the links between them into agriculture, livestock, and human health interventions. It could work to move away from response using emergency instruments, and toward long term capacity building in regular investment operations planned and designed in good times. Many

[27] The crisis response window built on lessons learned during the food crisis response on the need for a flexible instrument that could target funds to high need areas.

Bank staff argue that the Bank's strength is in building systems over time through long term investments rather than disaster response, and so shifting towards building systems would do more to utilize the institution's comparative advantage. Following the successful model of natural disaster risk management, the Bank could work to incorporate the risks of public health emergencies into macroeconomic risk management conversations with the Bank's country economists and national ministries of finance, rather than engaging only through agriculture and health agencies, which may find it more difficult to address low probability/high cost risks. As an intermediate step, public health emergencies including pandemics could be systematically designated as a trigger condition for the Catastrophe Deferred Drawdown Option (Cat DDO), a contingent credit line designed to give governments liquidity in the aftermath of a disaster. The Cat DDO also requires a disaster risk management program, which could include measures to increase pandemic preparedness. In the long term, the Bank could provide technical expertise to help clients access a broader range of financial risk management products. A background paper for the 2014 World Development Report (Jonas 2013) offers further useful suggestions for steps the Bank could take to engage in pandemic preparedness from a risk management perspective.

3. Technical Lessons for Project Design

There are many lessons that can be learned from the evaluations of avian influenza projects. Some lessons are relevant primarily for avian influenza or other zoonoses, but others are relevant for other emergency interventions. Many of these lessons focus on animal rather than human health activities, as there is a rich experience to draw from outbreaks in poultry in a number of countries, while few cases in humans have been detected to date. This should not be interpreted to mean that human health interventions were not important. Bank financed projects offer fewer insights than might be expected on the 2009-10 H1N1 influenza pandemic, because in most countries major project investments had not been completed by the time of the pandemic, and because the pandemic was not severe enough to warrant implementing the more serious response measures devised under pandemic response plans such as social distancing.

Avian influenza projects and monitoring and evaluation systems

Evaluation of avian influenza projects is inherently difficult due to the complex results chain (see Annex B), the difficulty in observing outcomes, the lack of a credible counterfactual, and challenges in determining attribution. Project results chains involve a sequence of elements covering disease surveillance, diagnosis, and response. If any part in the chain breaks down, then the project objectives may not be achieved. For example, if there is no effective system identifying and collecting samples from potentially infected poultry, then improvements in diagnostic capacity will be largely moot. If diagnostic tests are very slow or inaccurate, then this will undermine outbreak response efforts. The key outcomes being pursued (reductions in the risks of disease to the poultry sector and to humans) are not directly observable, and the principal outcome indicators (the number of outbreaks in animals and human cases) are incomplete proxies.[28] Most project activities aimed to increase the capacity of specific government institutions, but capacity is difficult to observe. It is difficult to assess what would have happened in the absence of projects. If no outbreaks are observed, we cannot determine whether the project prevented outbreaks, or whether no outbreaks would have occurred anyway, or whether outbreaks occurred but were not detected and reported. If outbreaks are observed, we cannot easily assess whether the severity of outbreaks would have been worse without the project, or whether they could have been milder with better project performance. Observing many

[28] The real final outcome of avian influenza risk is a probability distribution determined by the disease hazard (influenced by geography, wild bird migration paths, poultry density and species mix, etc.), by biosecurity practices, and by institutional capacity. The number of outbreaks or cases that actually occur are only a realization of this probability distribution, and provide imperfect evidence on which to judge the impact of a project in shifting the underling distribution.

outbreaks might be a sign that surveillance systems are functioning well and are detecting outbreaks, or might be a sign that disease containment is failing.

These problems contributed to weaknesses in the design and performance of M&E systems for the Bank-financed avian influenza projects.[29] Results frameworks used by projects focused on recording the completion of outputs, rather than assessing outcomes over time.[30] They were often not useful for the many countries where no outbreaks were reported during the project. In some cases the use of too many indicators overwhelmed the limited M&E capacity of project management units. Data was sometimes not collected, and when it was collected it was usually used only for reporting purposes and was not utilized for project management. Weaknesses in M&E also make it very difficult to assess the overall impact of the GPAI.

There are steps that could be taken to make these systems more useful for guiding project performance and for assessing project impact. When designing results frameworks for a disaster with an uncertain probability and magnitude of impact, the indicators need to be able to assess success in both the case when disaster strikes, and when it does not. In the latter case, many elements of disease control will not be called on, but some improvements in institutional capacity can still be assessed. Given the difficulties in assessing final outcomes directly, a more effective approach may be to focus on indicators that can assess progress made in improving intermediate outcomes, looking at each stage of the results chain in turn.

Useful indicators for improvements in biosecurity will depend on the specific structure of the poultry sector in the country in question, and on the desired strategy for improving biosecurity. They could assess both uptake of particular measures during an emergency period when outbreaks were occurring, and adoption of longer term biosecurity measures. In a country following a strategy of improving biosecurity in commercial industrial poultry production, a useful indicator could be the number or proportion of commercial

[29] Across the 20 projects focusing on avian influenza with M&E quality rated by IEG, 8 were rated Negligible, 8 were rated Modest, and 4 were rated Substantial. None were rated High. These are worse than IEG M&E ratings for other comparator groups: for other projects approved over FY07-11, 33% of emergency response projects had M&E ratings of Substantial or High, along with 30% of health projects and 29% of agriculture projects.

Monitoring problems were particularly acute for those countries where avian influenza activities were added existing projects through restructuring, as opposed to those with standalone avian influenza projects. Standalone projects at least attempted to address avian influenza, while in restructured projects where AI was a small addition, results frameworks were sometimes not substantially redesigned.

[30] One reason for this is that project results frameworks drew heavily on the M&E section of the GPAI template, which focused on outputs such as production of preparedness and response plans and strategies, existence rather than performance of surveillance and diagnostic systems, and existence rather than impacts of communication campaigns (World Bank 2005, Annex 4).

poultry produced on farms with specified features (automated feeding, controlled ventilation, etc.). To track biosecurity improvements during a crisis, an indicator could track the proportion of farms where specified emergency biosecurity measures are in place (farm access denied to unnecessary persons and vehicles; use of disinfectant for vehicles and footwear, etc.). These could be tracked as part of veterinary inspections or other reporting requirements, and should be tracked over time, rather than assuming that a biosecurity standard is maintained indefinitely once met.

To assess the effectiveness of surveillance systems in the animal health sector, an indicator could track the number of samples collected, and the proportion of cases in which the time taken between a report of animal deaths being made and a sample being collected is within a specified service standard (eg within 48 hours).[31] An indicator could track the proportion of districts having provided a new surveillance report to the central veterinary agency within the last week. To assess capacity, an indicator could track the proportion of frontline veterinary service staff trained in identifying and controlling avian influenza cases. For human health surveillance, similar indicators for the number of samples collected, the proportion of districts reporting, the accuracy of diagnostic tests, the timeliness of results, and the proportion of primary care providers trained in identifying influenza could be used.

Animal health surveillance will also depend on disease reporting by farmers, which can be affected by the payment level and performance of a compensation mechanism. An indicator could record the compensation rate paid as a percentage of the market value of birds, to help identify if the real value of compensation is adequate or is being eroded by inflation. To assess the speed of the system an indicator could record the mean elapsed time between a culling operation and the receipt of compensation payments by farmers. Furthermore, an indicator could record the proportion of outbreaks identified via self-reporting by farmers, to assess whether voluntary reporting is working.

To assess the functionality of animal and human health diagnostic systems, indicators could track the number of samples tested per month. To assess accuracy and performance, indicators could assess the percent of results confirmed as accurate by international laboratory assessments, and the average time taken between collection of a sample and issuance of a diagnostic result. An important aspect of ensuring that clinicians are willing to collect samples and submit them for diagnosis is in making sure that results are communicated back to the clinician, so an indicator could track the proportion of

[31] There are some potential problems with this, since the number of tests is partly a function of disease threat, which fluctuates over time, and number of tests being done during a crisis period will be higher, which will result in slower average test time. But this can be mitigated by looking at both number of samples and sample processing time.

cases in which reporting clinics were informed of diagnostic results within a set timeframe.

It is important to assess outbreak response capacity in the case when no outbreaks occur. Potential indicators could include the proportion of veterinary services staff who have been trained in outbreak response and have participated in field simulation exercises, or the number of beds in equipped and operational intensive care units. When outbreaks do occur, indicators on the number of outbreaks identified, the number of poultry deaths from disease and culling, and the number of human cases of avian influenza identified will provide useful evidence on outcomes. Indicators could assess the number of doses of antiviral drugs that were used for frontline workers or infected individuals, rather than the size of stockpiles.

In assessing the impact of communications programs, surveys need to assess the extent to which key groups changed their behavior, as it is behavioral change that actually changes infection risk. In many projects, communications indicators were not very useful because they focused on assessing general awareness of avian influenza, rather than adherence to the specific behaviors that communication campaigns were promoting.

By tracking changes in indicators over time, an M&E system should provide useful feedback during the course of a project which could help to improve project implementation. If culling operations are not being carried out quickly, indicators could help to pin down whether the problem was in reporting, in sample collection, in sample transport, in diagnostic systems, or in outbreak response mechanisms. These would be more useful than the output indicators on whether a particular activity had been produced (such as the "number of laboratories upgraded to BSL 2 status"), which do not necessarily assess whether actual capacity increases have been achieved.[32]

The Bank financed project in Lao PDR offers a practical example with useful indicators. Useful intermediate outcome indicators in this project included the percent of samples reaching the laboratory within 48 hours, the percent of diagnostic tests of suspected cases done within 48 hours of receipt, the percent of provinces sending weekly surveillance reports on time, and the percent of outbreaks where response occurred within 24 hours.

[32] For example, IEG evaluations in Nigeria and Nepal found BSL 2 laboratories listed as operational under project indicators where equipment had never been unpacked or where the BSL 2 facilities were not being used.

Table 3: Suggestions for outcome-oriented indicators for avian influenza control

Intermediate outcome	Potential Indicators
Biosecurity on farms	% of farms adopting and maintaining emergency biosecurity measures (e.g. disinfectant dips) % of farms adopting and maintaining longer term biosecurity improvements (e.g. limitations on farm access) % of commercial poultry production occurring on farms with specified biosecurity features
Surveillance systems	Number of samples collected by animal/human health surveillance systems % of cases in which time elapsed between animal death report and sample collection is less than service standard (e.g. 48 hours) % of districts providing a new surveillance support within the last week % of frontline veterinary staff/primary healthcare providers trained in identifying
Compensation mechanisms	Compensation rate paid as percentage of market value of culled birds Mean time elapsed between culling and receipt of compensation payment by farmers % of animal disease outbreaks identified via self-reporting by farmers.
Diagnostic systems	% accuracy of diagnostic results as determined by international retesting Average time elapsed between collection of sample and issuance of diagnosis by veterinary/human laboratories % of cases where reporters are informed of diagnostic results within specified service standard
Outbreak response capacity	% of frontline veterinary services staff trained in outbreak response mechanisms. % of frontline veterinary services staff who have participated in field simulation exercises. Number of beds in equipped and operational ICUs Number of poultry deaths from disease and culling Number of human cases of disease identified Number of doses of antiviral drugs used prophylactically for frontline workers or clinically for infected individuals
Communication programs	% of target populations (e.g. farmers, clinicians, etc.) undertaking specified safety behaviors.

Note: the indicators for a particular project should include more specific details as appropriate for the country based on expert technical advice. E.g. biosecurity indicators should specify the most important biosecurity improvements to be adopted in that country in their initial design. Indicators with standards should not be left in general terms (e.g. "% of poultry production on farms with sufficient biosecurity") as the indicator will not be useful if it can be reinterpreted ex post to define a standard that was met.

Another reason for weaknesses in M&E implementation was the lack of M&E capacity in implementing agencies - particularly in livestock agencies, which have usually had little

support through donor-financed investment projects and so have little experience in conducting M&E. Implementing agencies were often not convinced of the value of M&E, and preferred not to spend scarce project management funds on M&E. This often led them choosing not to hire a dedicated M&E specialist and bundling this task into general project oversight responsibilities. M&E implementation and utilization was significantly worse in projects where no M&E specialist was hired.

Several projects found desktop and field simulation exercises useful as a means of training, of assessing weaknesses in emergency response systems, and in verifying capacity gains (including those in Armenia, Moldova, Nepal and Nigeria). These exercises varied in scope from major national emergency response desktop exercises including civil defense and military leaders, to small field exercises at the district level where veterinary and medical staff would go to the field and practice operating in personal protective equipment and running through the basics of a culling operation. The exercises also functioned as a useful means of transferring knowledge from those who had participated in real outbreak response operations to newly appointed staff and of knowledge sharing between experienced staff. It could be useful to report the outcomes of simulation exercises in project results frameworks.

Effective monitoring and evaluation should also go beyond the choice of indicators for results frameworks for particular projects. Some useful national level assessment tools are already available but could be used more effectively to assess improvements in capacity, such as OIE's Performance of Veterinary Services Gap Analysis tool. Similar tools could be developed to assess public health system performance, capacity, and vulnerabilities, and existing tools (such as WHO tools used to assess country capacities to implement International Health Regulations) could be used more systematically.

Disease targeting

The primary concern to the international community has been avian influenza and the risk of a pandemic, but other zoonotic diseases pose secondary but still substantial threats to people and livestock sectors. Many activities that work to build capacity to manage avian influenza could also be designed to cover other zoonoses and animal diseases. For example, an intervention that upgraded a laboratory, purchased laboratory equipment, and provided reagents and training for testing for avian influenza could also provide reagents and training for other animal diseases. However, this was not always done. An evaluation of FAO's work on HPAI concluded that the program was too focused on HPAI rather than zoonoses more broadly (FAO Office of Evaluation, 2010). This focus may have been necessary initially, but in many countries interventions have not moved beyond HPAI.

In practice, projects focused (sometimes exclusively) on avian influenza. Most avian influenza projects had formal objectives that included other zoonoses at the design stage, or were restructured to include other zoonoses in their objectives.[33] But sometimes in practice little was done for other diseases, and in several cases "other zoonoses" was applied only to other diseases in poultry, or was interpreted to mean the H1N1 influenza pandemic and not other zoonotic diseases in animals. In some countries, surveillance systems established under the project would only track avian influenza and not other animal diseases. Compensation mechanisms could often only be used for avian influenza, and not for other animal disease outbreaks.

The focus on avian influenza sometimes had clear consequences. In Bosnia and Herzegovina and in Turkey, the Bank-financed projects covered only zoonotic diseases in poultry and not in other animals. In Bosnia and Herzegovina, no cases of avian influenza were detected but outbreaks of brucellosis (a zoonotic disease) in sheep and goats led to 1,700 human infections and culling of 75,000 animals by the end of 2011, and the project was unable to assist (USDA 2012). In Turkey, the project successfully controlled major avian influenza outbreaks, but did not address outbreaks of brucellosis which caused 64,037 cases in humans, or 236 deaths from Crimean Congo Hemorrhagic Fever.

The focus on avian influenza was understandable, but the Bank should move to an approach of helping countries to build integrated systems. The major international concern was based on the threat from an influenza pandemic; no threat of this scope existed for zoonoses other than influenza. Donor interest was focused clearly on avian influenza, and in some cases donor funds were explicitly limited to support for avian influenza. However, future interventions could be more efficient by addressing animal diseases in a more integrated fashion. Single disease interventions by donors with a particular focus can lead to a patchwork system with facilities that are not well utilized or coordinated from an overall veterinary or public health perspective.

Biosecurity at farms, borders, and culling sites

A major driver of vulnerability to avian influenza is weak biosecurity (particularly on poultry farms) which makes it easy for disease to be spread between production units and along market chains. While the avian influenza projects worked to increase the ability to detect and respond to avian influenza outbreaks, most projects did little directly to reduce the probability of outbreaks occurring by increasing biosecurity.

Some efforts were made to improve biosecurity practices through communications and outreach programs to farmers. The impact of these programs is difficult to assess, as few

[33] For example, in Armenia the project objectives were broadened during implementation to allow the project to assist in responding to outbreaks of African swine fever and brucellosis.

projects monitored biosecurity in an effective way. There is some evidence that biosecurity on large commercial farms was improved during periods of major outbreaks; farms would implement access restrictions, use disinfectant including dips for vehicles and pedestrians, undertake measures to deter wild birds, and take other steps. However, it is unclear whether these procedures were likely to last beyond the crisis period where outbreaks were occurring, particularly for small to medium scale operators. Most projects did little to support long term biosecurity improvements on farms, in transport systems, and in live bird markets.

Efforts to improve biosecurity were sometimes hampered by a lack of engagement with the private sector. Projects worked through government veterinary services agencies, which often focus more on providing services to smallholder farmers, and often had little engagement with the large scale commercial poultry sector which uses private veterinarians. It was difficult for projects to undertake wide stakeholder consultation, outreach, or collaboration under emergency preparation circumstances. But animal health experts interviewed by IEG agreed that this lack of engagement with the private sector constituted a significant weakness in the program.[34] In Turkey where there was more collaboration with private producers than in many other countries, this served to make communication efforts more effective. Future efforts to address animal health could benefit from greater involvement of the private sector, and IFC engagement with private sector agribusiness could consider supporting biosecurity improvements.

Those biosecurity improvements that were attempted have often struggled. Some projects, such as those in Turkey or Armenia, initially intended to support large scale changes to small and backyard poultry systems, but decided during implementation that this was impractical, unnecessary, or uneconomic. Chickens provide an important source of food or income for many backyard farmers, and can be the principle livelihood for small commercial farmers, so cannot be eliminated without serious social and poverty impacts. Some projects experimented with small demonstration pilots of measures such as improved bird cages that reduce the risk of contact with wild birds or between different types of birds. However, these pilots were not scaled up and so had little impact. Projects found that backyard farmers are unlikely to be willing to invest in measures such as secure cages unless they have incentives to do so.[35] In Nigeria, model live bird markets were popular with poultry sellers and appeared to improve biosecurity and

[34] However, there were a number of barriers to effective cooperation with private sector operators. There was often little trust between commercial operators and government agencies. Links to the private sector might be more feasible in countries where commercial operators are more dependent on government for export certification, or in countries with well-organized industry associations that can serve as a focal point.

[35] And confining poultry to secure cages may be uneconomic, as it requires not just the cost of cages, but adds a cost of feed for birds that were previously able to forage.

revenue. But the markets required large public subsidies, and thus were not scaled up and had modest impact.

Part of the difficulty has been that sector-wide biosecurity improvements are nearly impossible to design and address within the confines of an emergency project. Emergency projects already struggle with complex designs and have limited time for stakeholder outreach. There may be more scope for addressing on-farm biosecurity through other livestock sector interventions. Public private partnerships with commercial poultry operators could make a significant impact on biosecurity, could help to reduce high chronic poultry fatality rates in some countries, and could help to build trust and data sharing between private and public practitioners. Another challenge is that governments may be unwilling to borrow to pay for investments that will have large private benefits to commercial producers – governments may see the responsibility of paying for biosecurity as that of the poultry sector.

In many projects support for border control was unlikely to have any impact. Many projects included subcomponents that tried to improve biosecurity by providing support to border control or quarantine agencies. In principle, controlling the movement of birds could serve to reduce the risk of disease spread, particularly in countries that have few and clearly defined points of entry. However, in practice, many developing countries have long and porous land borders, and border control services often have limited capacity, particularly in their ability to operate beyond a handful of fixed checkpoints. For example, in Nigeria and Nepal attempts to control avian influenza at the border through provision of vehicles and minor civil works were not effective. In Nigeria, importation of poultry was already illegal before the project began, and so any bird imports were already not legally passing through any quarantine checkpoints. In Nepal, the border with India was highly porous, and so quarantine resources might have been used more effectively at internal transport bottlenecks such as major highway junctions. Another potentially more effective step would be to communicate with border villages and inform them of the health risks of poultry importation. However, in both countries, this was not supported by the projects, and so quarantine services attempted to undertake this task but with very limited resources.

Biosecurity of outbreak response operations and laboratory facilities were covered under environmental safeguards policies. Project environmental plans usually included designs and good practice standards for managing laboratory waste and for handling disposal of culled birds. No major problems were reported. However, projects did little monitoring on whether effective practice was carried out in reality. In some cases, plans in documents proved impractical, as full protective gear could be difficult to use for hours or work in tropical temperatures, deep pits could not always be dug in areas where the water table was high, and appropriate sites for disposal could be difficult to find especially for outbreaks in urban areas, so compromises were sometimes required.

Surveillance

Many projects were successful in establishing disease surveillance systems, particularly in veterinary agencies. Best practice guidelines from FAO recommend establishing integrated disease surveillance systems, with software that can provide real time reports to central epidemiological authorities. One weakness in some projects was that they established systems that only tracked avian influenza, and not other diseases, as in Nepal. Sometimes this happened in cases where no animal health surveillance existed at all prior to the project, and so starting surveillance for avian influenza was a useful first step, but one that will need to be expanded in future to cover other diseases. A second challenge will be to improve data sharing of information generated by animal and human health surveillance systems for zoonoses.[36]

The performance of formal veterinary surveillance systems was often dependent on the degree to which local grassroots networks and producers would report animal deaths or other incidents of concern. Without this reporting, it would be difficult to know where samples should be collected. The effectiveness of the link between grassroots networks and government veterinary agencies depends on many factors, including trust, knowledge and understanding, ease of access and availability, perceived responsiveness, and economic stress. When animal health services are weak, are not perceived as providing valuable service to farmers, or are seen as heavy-handed or inequitable, then grassroots reporting is likely to be weak. This meant that in many cases investment into the formal institutional platforms was not as effective as hoped, because poor relationships with grassroots networks meant that information was not flowing into and through the surveillance system. In the absence of effective reporting, price monitoring of local markets can provide a rough alternative means of detecting possible outbreaks (as bird deaths lead to localized shortages and price spikes), as occurred Lao PDR.

Another challenge was in sustaining surveillance systems. In some countries, funds for surveillance were provided during donor-financed projects and during periods of crisis, but surveillance began to decline once projects or crises ended.[37] Without an ongoing work flow, surveillance and diagnostic systems would atrophy, and could be difficult to scale up again should another crisis occur. Some projects such as in Nigeria made efforts to sustain surveillance and diagnostic systems by locating laboratories within university

[36] The human and animal disease surveillance systems do not need to be integrated directly, but zoonotic disease data and reports should be shared between agencies. If many cases of a disease are being identified in animals in a particular area, then human health agencies need to know this. Human health data can also assist animal health agencies.

[37] In Nepal, the number of surveillance sites halved during the period between the closure of one Bank project and the effectiveness of a follow-up project.

teaching hospitals and including surveillance and diagnostic testing in the curriculum. This model served as a means of training future laboratory experts, and of maintaining surveillance systems through low cost use of graduate students, but will likely still require a steady supply of public funds to maintain.

The appropriate design of surveillance systems will depend on the particular characteristics of the virus. The prevalent strains of the H5N1 virus sicken and kill chickens so quickly that the likelihood that apparently healthy birds are infected is extremely low, and so testing serological samples from apparently health chickens is of limited use. In ducks and some wild birds, the disease has a longer incubation period and there are often asymptomatic carriers, so serological surveillance may still be useful. In Nepal, active surveillance of healthy chickens failed to detect many cases and was discontinued, focusing resources more on passive surveillance of sick or dead chickens. Future strains of avian influenza could still be very serious but less fatal to chickens, and so may need a different approach.

Compensation for culled birds

Effective containment of avian influenza requires that infected and potentially infected birds be culled in order to prevent the spread of disease. When birds are diagnosed with a strain of highly pathogenic avian influenza, a containment strategy will involve culling all birds at the site of the outbreak, and those within a designated radius that may also have been infected.[38] As clearly identified in the GPAI framework document (World Bank 2005), a well-designed mechanism for compensating farmers for those culled birds is essential to ensure that farmers will be willing to report disease outbreaks in their birds, and thus to assist in identifying outbreaks so that they can be controlled. Without adequate compensation farmers face strong incentives to respond to bird deaths by trying to sell their flocks immediately, which will spread the virus, rather than report and have their entire flock culled.[39] The Bank provided a high quality and detailed technical paper on designing compensation systems (World Bank 2006), but there was significant variation across countries in the practical implementation of compensation mechanisms. In some countries were unwilling to implement compensation systems, because they were

[38] The size of the zone to be culled changed over time in most countries. The initial recommended practice was a wide area culling, which required all poultry be culled within a large radius. But this practice generated significant resentment from small commercial holders, and could have been infeasible and extremely costly for outbreaks in urban or high poultry density areas. Over time, the best practice advice from animal health experts changed, and recommended that culling just at the outbreak site and potentially high risk adjacent sites was sufficient.

[39] Compensation also functions as a means of preserving livelihoods and mitigating the poverty impacts of avian influenza for small commercial farmers, who may not be able to afford to restock without compensation. Compensation for private property destroyed by government in the public interest is also a fundamental principle of societies organized under the rule of law.

concerned about the fiscal cost of these system or about the precedent that would be set if government were to compensate people for their economic losses.

The experience of avian influenza projects has provided additional evidence suggesting that compensation is a critical aspect of disease control. In Nigeria, which established a well-financed and functional compensation mechanism with a high degree of transparency, most outbreaks in the commercial sector were reported by farmers. After two years of severe outbreaks, the disease appears to have been contained, and no further outbreaks have been detected since 2008. In Lao PDR, a compensation system was established with rates that were high enough to encourage reporting by farmers; outbreaks appear to have been successfully controlled, with no new cases in poultry observed since May 2010. In Nepal, a compensation system was established, but the payment rate was low enough that many farmers were reluctant to report bird deaths directly. Outbreaks are being identified and controlled on an ongoing basis, but surveillance relies on a grassroots network of reporting, and reports may be received more slowly than they would be if farmers reported directly. In Egypt, no compensation system was adopted (though a design was created by FAO); there is almost no disease reporting by farmers and surveillance is ineffective – outbreaks are not contained and the disease has become endemic. In Indonesia, a planned compensation system was not implemented systematically, and H5N1 remains endemic. Compensation mechanisms were more difficult to apply among small holders and non-commercial producers. With commercial operations and well established producer organizations to apply political pressure compensation procedures were more likely to succeed.

One challenge for mechanism design was that it could not be known ex ante whether avian influenza outbreaks requiring culling would occur or how severe they would be, and so the amount of money needed for compensation was unknown. This meant that Bank funds allocated for use in compensation would almost inevitably fall short of or exceed the amount of money needed. The standard approach applied in most projects then was to establish a specific component or subcomponent for compensation. If outbreaks occurred, the loan could then disburse funds to cover compensation payments. However, if no outbreaks occurred, the project was left to scramble to restructure to reallocate funds slated for compensation to other purposes, or to cancel the balance of financing. This led to large cancellations of loans in a number of cases (for example, in Afghanistan $2.4 million for compensation was canceled from a $13 million project).[40] Moreover, in countries with little or no fiscal means to ensure availability of funds for compensation after the project closed, the end of the project also resulted in degradation

[40] Another reason for cancelation of funds was that compensation mechanisms were designed solely for avian influenza, and so could not be diverted to compensate for losses due to other livestock diseases without project restructuring.

of disease control capacity. Sustainable disease control capacity requires a permanent availability of resources for compensation.

One option to mitigate this would be for the Bank to provide financing to capitalize a long-term compensation fund, which could be drawn on at any stage as needed. However, Bank financial management policies did not allow for this, because any funds that are not used at the time the project closes have to be cancelled and returned to the Bank. This approach applies to all investment loans.

Another option followed by many projects was to support technical design work for compensation mechanisms but not finance them directly (or to provide only modest funds for doing so), leaving compensation as a responsibility for the government. In most projects where compensation funds were reallocated to other activities, the borrower country committed to providing compensation for any future outbreaks. In countries with significant fiscal flexibility and strong macroeconomic performance, this solution is likely to work well. However, in low income countries where budgets are often less flexible, there has been a tendency for compensation rates to be set by taking available funds and dividing by the number of bird deaths, which may lead to low compensation rates, impoverishment of affected farmers, and little farmer disease reporting.

Compensation mechanism design must set appropriate payment rates. The Bank's good practice guidelines recommend setting compensation rates based on market rates (World Bank 2006). They do not recommend a specific proportion of market price, but rather describe a range of compensation systems across the world, noting that in developed countries compensation is usually 75-100% of market value. If compensation rates are too low, there will be insufficient incentive to report; if they are too high, then there may be excess false alarm reports or deliberate spread of disease by farmers. One problem that arose in some countries was that even when compensation mechanisms established a high initial compensation rate of 70-80% of market value, the real value of compensation could be eroded rapidly by inflation if no mechanism for regular adjustments was instituted. In Nepal, adjustments in compensation rates were ad hoc and required approval by cabinet, which contributed to the real value of compensation falling significantly. Similarly in Armenia, inflation contributed to a steady decline in the effective compensation rate.

The issue of which birds are eligible for compensation is also key. In both Nigeria and Nepal, compensation payments were only made for birds actually culled by the government, and not for birds that died from disease. While this provided an incentive for farmers to report rapidly, it meant that the effective compensation rate was much lower than the notional rate; in Nigeria the number of birds recorded as dying from disease (and so not compensated) exceeded the number of birds culled at 61% of farms. In Nepal, policies requiring international diagnostic confirmation and cabinet approval before a cull

could begin meant that many birds could die before a cull occurred, and so farmers might receive compensation of only 20% of their input costs, which would be insufficient for them to be able to restock.

Compensation payment rates can be set up with varying levels of complexity. The simplest systems involve a flat rate per bird, but this can cause problems when there are wide discrepancies between market prices and the flat rate. For example, in Nepal, ducks are up to 500% more valuable than chickens, and so duck farmers were reluctant to report bird deaths and risk culling of their stock, preferring to try to sell their birds immediately. More complex systems are more difficult to administrate, but it can be done. In Nigeria, the compensation system involved adjustments for the type and age of birds.

The best approach for establishing compensation depends on the country context. In Nigeria, most birds were on medium-large commercial farms, and the size of compensation could be substantial (roughly $5 million in compensation payments were paid out during the project). Because of this, the compensation mechanism emphasized transparency, accountability, and disputes resolution mechanisms (including publication of all compensation payments in local newspapers and online). However, the mechanism compensated only registered poultry farmers, which left out small farmers with fewer than 200 birds. In Nepal, many more birds were on backyard or small commercial farms and average compensation payments were smaller, so the compensation system design emphasized speed of payment, and did not incorporate accountability or transparency measures.

Another weakness identified in several projects was that compensation systems addressed only farmers, and not the rest of the poultry value chain, including transporters and traders.

It is not enough to have a compensation system; it is important that farmers are aware of and trust the system, so mechanisms need be designed and publicized before disease outbreaks occur. In Armenia, where compensation was used for African swine fever outbreaks, compensation plans were not finalized until several weeks into the epidemic, and many farmers had hidden the incidence of sick or dead animals until the compensation decree was made.

Laboratories and diagnostic capacity

Investments in laboratory capacity sometimes focused too much on laboratory infrastructure rather than systems development and human capacity. Most avian influenza projects aimed to improve veterinary and human health diagnostic capacity through laboratory upgrades, equipment purchases, and training. Physical infrastructure

investments sometimes outstripped the actual needs for sample processing[41], and the human and financial capacity to operate and maintain the systems. Laboratory upgrades faced significant procurement challenges, and usually proved to be more complex, expensive, and time consuming than initially projected. Furthermore, upgrade plans did not always fully consider developing country challenges such as power supply insecurity, and the financial ability of laboratories to pay for ongoing consumable supplies, power, or generator fuel. Country demands for advanced facilities were sometimes partly based on a desire for prestige.

Advanced Biosecurity Level 3 (BSL 3) laboratories are not always necessary. BSL 3 labs provide a high degree of biosecurity, including air tight seals, controlled ventilation with directional air flow, and filtered air exhaust. The value of BSL 3 labs is that they would allow for more advanced confirmation testing to be conducted within the country, greatly reducing the need for samples to be sent to international laboratories for retesting, and so potentially reducing the time between sample collection and containment activities. However, these laboratories are expensive to build, maintain, and operate, and require significant and ongoing technical expertise. They are also needed only for particular procedures with dangerous pathogens (including highly pathogenic avian influenza), and should not be used for routine low hazard diagnostic work so there is a risk that they will have low utilization.

At least 13 projects planned to construct BSL 3 laboratories at appraisal[42] , but in only three cases were BSL 3 laboratories successfully completed during projects (see Table 1), and these were in large middle income or IDA/IBRD blend countries. In most cases the labs took longer to design and construct than planned, and had significantly higher costs. In Nigeria, severe delays meant that planned construction of a BSL 3 lab could not be completed during the project, despite extensions, but the government used its own funds earmarked for sustaining the project to purchase a modular laboratory after project closure. In Romania, most construction and equipment purchases were completed during

[41] There is some value in redundant processing capacity that needs to be drawn on only in the event of an actual crisis, so low utilization in countries where no outbreaks occurred is not necessarily a sign of inefficiency. However, in some cases there was no workflow of samples at all for many facilities, and so any capacity established during projects was unlikely to be sustained. For example, in Nepal 6 regional veterinary laboratories were upgraded to BSL 2 and provided with diagnostic equipment, but these facilities were largely unused, as the surveillance system used only rapid test kits at the regional level (which do not require laboratory facilities), and all samples were sent to the central laboratory for diagnostic testing. Similarly in Nigeria, capacity at the national veterinary laboratory was sufficient to handle diagnostic testing during crisis periods, and regional laboratories were not used, and faced difficulties in sustainability due to a lack of regular work flow.

[42] Appraisal documents were sometimes vague on defining the particular laboratory upgrades they intended to invest in (as design decisions may not have been made), so it is not easy to fully identify the portfolio of projects where BSL 3 labs were planned.

the project, but due to delays the laboratory could not be fully equipped and made operational during the project, and was completed only after closure. In Armenia, Georgia, and Nepal it was realized during implementation that BSL 3 laboratories would not be needed or would not be cost-effective. In Turkey, two planned laboratories were constructed and a third was added and also completed, but the decision to build a third laboratory was not sufficiently based on economic analysis, and utilization of the laboratories remains low.

Table 4: Biosecurity Level 3 Laboratories in avian influenza projects

Country	Completed during project?	Outcome
Brazil	Yes	3 of 4 labs constructed
Armenia	No	Dropped during implementation as not required
India	Yes	1 of 4 planned labs completed
Turkey	Yes	2 planned lab completed; additional unplanned (and potentially uneconomic) lab completed
Georgia	No	Dropped during implementation as not required
Nigeria	No	Completed by government after closure
Nepal	No	Dropped during implementation as uneconomic
Romania	No	Completed after closure
Vietnam	Unknown	Project still active
Bangladesh	No	Not constructed
Argentina	No	Laboratory almost completed as of project closure
Egypt	No	Not constructed
Uganda	Unknown	Project still active

Decisions on constructing BSL 3 laboratories should be based on careful economic analysis. This should include an assessment of whether there will be sufficient ongoing funds for maintenance, and an awareness that investing in these facilities may not make sense for small or low income countries. It may be better to build experience with operating and maintaining BSL 2 laboratories before advancing to the more expensive

and complex BSL 3. Real time polymerase chain reaction equipment is sufficient for most purposes, and traditional polymerase chain reaction equipment (which is slower and slightly less accurate but is easier to operate) may be sufficient for low capacity countries. The need for BSL 3 laboratories should be considered at a regional level rather than a country level, and neighboring countries should be encouraged to share samples and data rather than duplicating infrastructure.

It may be more cost-effective to focus on sample transport systems rather than increasing laboratory capacity when attempting to reduce the time taken for diagnostic tests. In Nigeria, an effective transport system was set up by engaging with transporters, setting up contracts beforehand so that transporters have confidence that they will be paid on delivery, and discussing biohazard risks openly and providing advice on appropriate safety measures. In Nepal, difficulties in contracts with international air-freight couriers meant that the number of days needed for samples to be retested internationally increased over time.[43]

Vaccination

Expert opinions on the need for poultry vaccination in avian influenza control have changed over time. Many avian influenza project designs supported mass vaccination of poultry (following the inclusion of poultry vaccination in the GPAI template), but dropped this approach during implementation based on expert advice from FAO and local veterinarians (as in Nigeria, Nepal, and Egypt). A series of recommendations were produced by staff from OIE and FAO following a conference in Verona in March 2007 (OIE, 2007), which outlined circumstances under which vaccination could be used as a complementary strategy to culling and movement restrictions. Vaccination is very expensive, requires significant capacity to administer effectively, and can make surveillance more difficult, as vaccination can mask the presence of infected birds. Poorly managed vaccination programs can also result in the emergence of variant viruses that can escape the control of the vaccine and hence increase exposure of humans coming into contact with such infected birds that may not be showing full-blown disease.

In countries where avian influenza is not endemic, then avian influenza can potentially be contained through stamping out operations, where infected and potentially infected birds are culled to prevent disease spread. The primary role for vaccination is in countries where avian influenza is endemic. In such cases, mass culling out is too costly as it would require too many birds to be killed, and is also not effective as virus is always moving ahead of the culling program. Instead, vaccination can be used to progressively reduce infection, isolate zones that are free of disease, and then contain any subsequent

[43] Tightening of International Air Transport Association regulations on hazardous substances also contributed to making international sample transport more difficult.

outbreaks within those zones through stamping out. However, vaccination is expensive, very labor intensive, and it is very difficult to implement an effective vaccination program in rural small holder communities.

Communication

Nearly all avian influenza focused projects included support for communication and awareness components. The specific details of components varied across projects, but most contained two core elements: supporting official messaging on avian influenza through training for spokespeople and others, and encouraging behavioral change in farmers and the general public through production and dissemination of communications messages across a range of media. Many project completion reports and interviews with project team leaders and project staff emphasized the critical role of communication programs as a means of preventing public panic and enabling an orderly response to outbreaks. Some staff argued that communication had helped to avoid the kinds of confidence-related economic losses that had been experienced following the SARS crisis. However, panicked responses to outbreaks in poultry still occurred in some countries (especially where communication programs were not in place early on or were initially overly alarmist)[44], and the main reason for the lack of SARS-type panic may be that the overall number of human cases was low, and that infection of humans happened due to direct contact with chickens (which most people could avoid) rather than contact with other humans as in the case of SARS.

Communication program assessments often did not provide clear evidence on changes in behaviors and thus on risk of disease spread. These Knowledge, Attitude, and Practice surveys suggested that large increases in knowledge and awareness occurred (due to some mix of communication program messages and media coverage) but often did little to assess practice. However, many Bank and country agency staff reported they believed that communication messages had led to important changes in behavior (such as washing hands), and some projects were able to demonstrate significant increases in the knowledge of risk safe behavior.

In many countries, radio messages were a key means of information dissemination to the public, particularly in rural areas. Key communication messages could be translated into local languages and used to reach vulnerable groups who would be otherwise difficult to reach.

[44] For example, in Nigeria demand for poultry fell by 80 percent within months of outbreaks occurring, and poultry production did not return to pre-outbreak levels for four years after the initial outbreak (and two years after the last outbreak). One reason for this was that initial communication messages (before the Bank-financed project was effective) unnecessarily recommended that people avoid all poultry products.

Avian influenza projects demonstrated the need for clear and correct communication messages from the outset. Public panic over avian influenza led to a collapse in poultry prices in several countries. Though difficult to do under emergency circumstances, including key stakeholders including the private sector in the design of messages can help to avoid potentially harmful messages. In Nigeria, initially alarmist and inaccurate messages triggered a backlash from the poultry sector. The communication program was quickly adjusted, but the changes in messages led to confusion by some audiences. However, even timely and accurate messages may not be enough to prevent overreactions. In Armenia, there was widespread panic by small farmers who slaughtered their poultry because of fear of disease.

Antiviral drugs

Direct onetime purchase of antivirals may not be a high value use of scarce funds. Some avian influenza projects purchased stocks of antiviral drugs; these drugs can be used prophylactically by people at high risk of infection such as health workers, or clinically for individuals with severe cases to potentially reduce the risk of death and hasten recovery. However, Tamiflu has a shelf life of 5-7 years[45], and so there is a significant risk that doses purchased may never be used (if as is likely no epidemic occurs during that period). In some cases stocks of antivirals were purchased prior to the 2009 H1N1 pandemic but relatively few doses were actually used.[46] Rather than financing a one-time purchase of stockpile, it may be more effective to establish a system of phased purchase of doses, where some new doses are delivered each year, and establishing systems for expiring doses to be removed from shelves. Clear guidance from international technical agencies on appropriate standards could also help governments to make decisions on a rational basis and to reduce the politicization of the pandemic threat.

Procurement

A major driver of implementation delays was difficulty in procurement processes. While all projects can struggle with procurement, this has proved to be a particular challenge for avian influenza projects due to the complex and specialized nature of laboratory

[45] The WHO increased its recommendation on the shelf life of oseltamivir in 2009 from 5 years to 7 years, but only for newly purchased doses.

[46] In Nigeria, a country of 169 million people, 100,000 doses of antiviral drugs were purchased under the project. Roughly 5,000 doses were used in the 2009-10 pandemic, and most of the remaining doses expired unused, or will do so shortly (IEG 2013a).
In Bangladesh, antivirals were underutilized, with only a fraction of eligible patients receiving treatment. This may have occurred due to lack of clinician suspicion of influenza, little awareness of treatment guidelines, poor familiarity with antivirus, limited access to antivirus supplies, or lack of knowledge of the potential severity of the pandemic virus strain (Azziz-Baumgartner and others, 2012).

equipment and works and other issues. These problems contributed to serious implementation delays in many projects. A common problem was that procurement processes in project management units would be run by technical experts rather than by procurement specialists; technical experts would often issue procurement terms of reference for specific models of equipment that they had been trained on or knew were high quality, but this would unnecessarily limit the pool of bidders, and which led to complaints, INT investigations, or re-tendering of bids in multiple cases. Implementing agency staff often felt frustrated and constrained by Bank procurement rules. In Vietnam, centralized procurement processes slowed implementation and led to delays. In Nigeria, a lack of communication in procurement between the central project management unit and local facilities being upgraded led to expenditure that did not always meet local needs.

Many technical partners felt that the Bank-financed projects were slow to procure equipment and supplies as compared to other donors. This is likely a consequence of equipment being procured through the country-owned projects, whereas technical agencies and other donors often procured supplies themselves. There is a tradeoff here in terms of the need for rapid provision of supply in an emergency situation vs. use of a transparent competitive process. However, most of the emergency equipment was procured fairly quickly by Bank projects when it was needed; the slower procurement was for laboratory upgrades and equipment that were aimed at building long term capacity and were not necessarily needed so urgently.

4. Conclusions

The World Bank's experience with avian influenza offers a useful example of how the Bank grapples with supplying global public goods and responding to international crises. It shows the strengths of the Bank in its ability to use its convening power, to raise funds, to work with partners, and to rapidly prepare and supervise a global investment program, even in an unfamiliar area where the Bank lacked expertise and experience. It provides a number of technical lessons that can be used to inform design and implementation of future interventions. However, it also demonstrates how the Bank struggles to continue to support important global agendas once the spotlight has moved on, particularly for issues that do not fit neatly into existing institutional structures and strategies.

Avian influenza posed and continues to pose a significant threat to the world. The crisis posed clear challenges for the Bank: it required a quick response, while the Bank can be slow to move. It required the Bank to enter new territory in which it had little technical and operational experience. The Bank worked well to prepare and implement a major global intervention. Its role was indispensable, as no other agency had the combination of financial ability, global coverage, and willingness to act to pursue a global response at scale. The Bank formed an effective working relationship with international technical agencies. FAO, WHO, and OIE were valuable partners, able to supply technical knowledge and assistance in areas where the Bank was largely unfamiliar – though there were legal and process issues that could be improved for future interactions.

But as the perception of crisis passed in clients, donors and in the Bank, progress has stalled. Support programs did not make it beyond avian influenza to a wider program of building zoonotic disease control and pandemic preparedness into sectoral investment programs, or into ongoing assistance to build the capacity of national veterinary services agencies or public health systems. This has likely occurred largely because avian influenza has (thus far) been less serious than feared, because the 2009 pandemic was seen as relatively mild, and because other urgent agendas arose (the global food crisis, financial crisis, and economic downturn). However, institutional reasons (the difficulty in promoting cross-sectoral agendas, especially without an established staff constituency) and the strategic choices of leaders and managers have also played a role. It is instructive to contrast the relative attention, prioritization, and trajectories within the Bank of the pandemic risk reduction and preparedness agendas (which have been largely discontinued) with that of climate change mitigation and adaptation (which has been dramatically scaled up in large part due to the international community and by leadership decisions). Continued progress on pandemic preparedness and risk reduction and management will require renewed commitment and funding, including grant funding for low income countries.

The new World Bank Group strategy emphasizes a goal of breaking down sectoral silos and focusing on multi-sectoral approaches (World Bank Group 2013). The experience with avian influenza demonstrates the importance (and the difficulties) of this, and offers a guide for how to do so at a strategic level, but also of the weaknesses in existing Bank systems and incentives at the project level. To achieve effective inter-sectoral cooperation, there need to be explicit incentives to support this. Most important would be to ensure that managers are accountable for work their staff undertakes even in projects that are not mapped primarily to their sector. However, other signals from the top that cross-sectoral work is valued (awards, recognition, etc.) could also be helpful. As the Bank adopts a global practice model aimed at increasing cooperation within a sector across regions, it should take efforts to ensure that this does not further entrench sectoral silos.

Many useful and relevant activities can be bundled into other agendas, on One Health, Health in All Policies, Universal Health Coverage, food safety, and risk management. However, pandemic risk is a specific issue that requires sustained high level support and commitment to avoid being subsumed.

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Appendix A. Case Studies

This evaluation draws on six Project Performance Assessment Reports produced by IEG over 2012-13. The full text of these evaluations are available online:

Albania Avian Influenza Control and Human Pandemic Preparedness and Response Project: http://documents.worldbank.org/curated/en/2012/06/16498755/albania-avian-influenza-control-human-pandemic-preparedness-response-apl-project

Armenia Avian Influenza Preparedness Project: http://documents.worldbank.org/curated/en/2012/06/16498944/armenia-avian-influenza-preparedness-project

Nepal Avian Influenza Control Project: https://ieg.worldbankgroup.org/Data/reports/PPAR-78317-P100342-Nepal_Avian_Influenza_Control.pdf

Nigeria Avian Influenza Control and Pandemic Preparedness and Response Project: https://ieg.worldbankgroup.org/Data/reports/NIGERIAAvianInfluenza.pdf

Romania Avian Influenza Control and Human Pandemic Preparedness and Response Project: https://ieg.worldbankgroup.org/Data/reports/PPAR-78781-P100470-Romania_Avian_Influenza.pdf

Tajikistan Avian Influenza Control and Human Pandemic Preparedness and Response Project: http://documents.worldbank.org/curated/en/2012/07/16537280/tajikistan-avian-influenza-control-human-pandemic-preparedness-response-project

Appendix B. Background Information

Appendix B1: Avian Influenza

Avian Influenza (AI) is generally a disease of birds, but infection can also occur in humans (and other animals) if they come in contact with infected birds. Usually this will not lead to widespread human infections as the known existing AI virus types do not readily replicate and transmit between humans. However, the AI viruses are not genetically stable and have the potential to change to produce a new strain that is able to replicate in humans and spread easily among them. If this happens a pandemic could occur. On average, three influenza pandemics per century have been documented since the 16th century, occurring at intervals of 10-50 years. In the 20th century pandemics occurred in 1918, 1957 and 1968. The 1918 pandemic was particularly severe and caused millions of deaths. In the 21st century another influenza virus (H1N1 type) emerged in April 2009 and caused a pandemic that rapidly spread to over 120 countries within 6 weeks. Fortunately, this time the disease was not severe in most cases.

Anticipating the actual timing of an AI pandemic and its severity is difficult because it depends on whether and when a virus circulating among birds would mutate or re-assort and become capable of spreading easily from human to human. The recent concern with the disease has arisen because of the virulent nature of the H5N1 virus circulating in poultry and the high death rate among infected humans. One of the biggest worries is that conditions for mutation and re-assortment of the genetic make-up of the virus abound with birds living in close contact with humans particularly in backyard poultry production systems that are common in developing countries, including in East and South Asia and also Europe and Central Asia. In these poultry production systems farmers rear several species of animals such as chickens, ducks, pigs, and cows in their backyards, and in close proximity with human populations. Intensive agricultural practices, easy communication and trade across the globe and natural reservoirs for the virus in migratory birds have also made it easier for the virus to spread from wild birds to poultry and from infected poultry to humans. Resistance in current virus strains to one of the two classes of available antiviral drugs as demonstrated in vitro has added to anxiety about controlling a pandemic if it does occur.

Outbreaks of highly pathogenic avian influenza were detected in birds in Hong Kong in 1997. In 2003 the first cases were detected in humans, and over 2003-4 the virus had spread to several East Asian countries, and by 2006 had spread Europe, Africa, the Middle East, and other Asian countries. Since 2003, 63 countries reported the highly pathogenic H5N1 form of AI in their domestic poultry (FAO 2012). Unchecked trade and movement of infected poultry was one of the main triggers behind the spread of the lethal virus (FAO 2006) although it is thought that as well the infection of wild birds around Qinghai Lake in China resulted in the movement of the virus to several countries in Europe and Africa in 2006 (WHO 2006). The WHO reports a confirmed total of 622 cases and 371 fatalities as of March 2013, but the reported human instances of the disease from contact with infected birds understate the true number of infected people. Although disease awareness has increased, cases of H5N1 are still likely to be underreported.

Forecasting models envisage a major disease burden if a pandemic occurs, with 25-30 percent of the population falling ill and potentially enormous economic costs worldwide, especially in the poorest countries, where resources for surveillance and health care are limited and population health and nutritional status are poor (Lazzari and Stohr 2004). The potential impact on GDP across countries and the human deaths arising from the disease would be severe (Burns and others 2006). Depending on the virulence of the particular influenza strain, a pandemic could cause 1.4 million to 140 million deaths and GDP losses of $330 billion to $4.4 trillion (McKibben and Siderenko 2006). WHO estimates have suggested that, looking at the number of deaths from influenza pandemics in the last century, a relatively conservative estimate of deaths from a H5N1 pandemic would be between 2.0 and 7.4 million.

Appendix B2: Key Elements of Avian Influenza Control Projects

Most projects aimed to reduce the risk of avian influenza to the poultry sector and to humans, and to build capacity to respond to a potential influenza pandemic. Achieving the objective relies on a complex chain of interdependent activities across both animal and human health sectors.

In the animal health sector, most projects followed a standard set of interventions. Surveillance systems aimed to detect disease outbreaks among poultry, diagnostic systems aim to identify whether those diseases are highly pathogenic influenza, and if so then outbreak response systems aim to limit the spread of disease through culling operations. Communication activities aimed to reduce disease spread on farms, and along with compensation mechanisms, to encourage disease reporting. Outcomes in the animal health sector would also affect outcomes in the human sector, as successful control of disease in animals reduces the risk of direct human infection from animals and of the development of an influenza strain transmissible between humans.

In the human health sector, there was more variation across projects. However, most projects supported communication messages to change behaviors and so reduce the risk of disease transmission from bird to human or between humans, and influenza surveillance systems to detect outbreaks in humans. Isolation wards would reduce transmission from infected patients, and intensive care units could treat serious cases. Development of pandemic response planning and antivirus stockpiles could help to mitigate an epidemic or pandemic

Appendix C: List of People Consulted[47]

World Bank:
Juergen Voegele, Sector Director, Agriculture and Environmental Services
Olga Jonas, Economic Advisor, Health Nutrition & Population
Francois Le Gall, Advisor, Agriculture and Environmental Services
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Nedim Jaganjac, Senior Health Specialist

International and intergovernmental agencies:
David Nabarro, Senior UN System Coordinator for Avian and Pandemic Influenza
Alain Dehove, Coordinator, World Animal Health and Welfare Fund Organisation,, OIE
Juan Lubroth, Chief Veterinary Officer, FAO
Subhash Morzaria, Regional Manager, Emergency Centre for Transboundary Animal Diseases, FAO
Ludy Suryantoro, External Relations Advisor, Office of the Assistant Director-General for Health Security and Environment,WHO

[47] This list includes only people consulted directly as part of preparing this report; it does not include interviews conducted as part of preparing Project Performance Assessment Reports or ICR Reviews, which include project task team leaders and staff, government staff, technical experts, and other stakeholders.