Document of
The World Bank

Report No: ICR2029

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IDA-H2680)

ON A

GRANT

IN THE INITIAL AMOUNT OF SDR12.1 MILLION
(US$18.2 MILLION EQUIVALENT)

A RESTRUCTURED AMOUNT OF SDR 10.6 MILLION
(US$ 17.0 MILLION EQUIVALENT)

TO

NEPAL

FOR AN

AVIAN INFLUENZA CONTROL PROJECT (AICP)

UNDER THE

GLOBAL PROGRAM FOR AVIAN INFLUENZA AND HUMAN PANDEMIC PREPAREDNESS AND RESPONSE (GPAI)

January 30, 2012

Sustainable Development Department (SASSD)
Human Development Department (SASHD)
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective July 21, 2011)

Currency Unit = Nepali Rupee
NRS 71 = US$1
US$ 1.00 = SDR 1.59

FISCAL YEAR

July 15 – July 14

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AICP	Avian Influenza Control Project
AI	Avian Influenza
APL	Adaptable Program Loan
ARD	Acute Respiratory Disease
BSL2	Bio-safety Level 2 Laboratory
BSL3	Bio-safety Level 3 Laboratory
CB-SEP	Community Based School Education Program
CCT	Core Coordination Team
CSO	Civil Society Organization
CVL	Central Veterinary Laboratory
DfID	U.K. Department for International Development
DLS	Department of Livestock Services
DOHS	Department of Health Services
EDCD	Epidemiology and Disease control Division
EDIT	Emergency Surveillance and Disease Diagnosis Team
EMP	Environmental Management Plan
ERL	Emergency Recovery Loan
ERR	Economic Rate of Return
EU	European Union
EWARS	Early Warning and Reporting System
FAO	Food and Agriculture Organization of the United Nations
FMD	Foot and Mouth Disease
FY	Fiscal Year
GAR	Gross Attack Rate
GAFSP	Global Agriculture and Food Security Program
GDP	Gross Domestic Product
GIS	Geographic Information System
GON	Government of Nepal
GPAI	Global Program for Avian Influenza Control and Human Pandemic Preparedness and Response
GPS	Global Positioning System
HNP	Health Nutrition and Population
HPAI	Highly Pathogenic Avian Influenza
ICR	Implementation Completion and Results Report
IDA	International Development Association (World Bank Group)
ILI	Influenza-like Illness
IPD	Immunization Preventable Disease
ISN	Interim Strategy Note

KAP	Knowledge, Attitude and Practice
M&E	Monitoring and Evaluation
MOAC	Ministry of Agriculture and Cooperatives
MOHP	Ministry of Health and Population
NADIL	National Avian Disease Investigation Laboratory
NHEICC	National Health Education Information Communication Center
NPHL	National Public Health Laboratory
NPV	Net Present Value
OIE	Office International des Epizooties (World Organization for Animal Health)
PAD	Project Appraisal Document
PDO	Project Development Objective
PPE	Personal Protective Equipment
RRT	Rapid Response Team
SOP	Standard Operating Procedure
STIDH	Shukraraj Tropical Infectious Disease Hospital
TA	Technical Annex
TADs	Trans-boundary Animal Diseases
TSCAI	Technical Sub-committee on Avian Influenza
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VDC	Village Development Committee
WHO	World Health Organization of the United Nations

Vice President:	Isabel M. Guerrero
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Contents

A. Basic Information			
Country:	Nepal	Project Name:	Avian Influenza Control Project (AICP)
Project ID:	P100342	L/C/TF Number(s):	IDA-H2680
ICR Date:	01/30/2012	ICR Type:	Core ICR
Lending Instrument:	ERL	Borrower:	GOVERNMENT OF NEPAL (GON)
Original Total Commitment:	XDR 12.10 million	Disbursed Amount:	XDR 10.14 million
Revised Amount:	XDR 10.64 million		
Environmental Category: B			
Implementing Agencies: Department of Health Services (DOHS) Department of Livestock Services (DLS)			

B. Key Dates				
Process	**Date**	**Process**	**Original Date**	**Revised / Actual Date(s)**
Concept Review:	03/13/2006	Effectiveness:	03/27/2007	03/27/2007
Appraisal:	11/27/2006	Restructuring(s):		03/05/2010 01/24/2011
Approval:	01/19/2007	Mid-term Review:		07/23/2009
		Closing:	07/31/2011	07/31/2011

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes:	Moderately Satisfactory
Risk to Development Outcome:	Moderate
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Moderately Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)

Bank	Ratings	Borrower	Ratings
Quality at Entry:	Moderately Satisfactory	Government:	Satisfactory
Quality of Supervision:	Moderately Satisfactory	Implementing Agency/Agencies:	Moderately Satisfactory
Overall Bank Performance:	Moderately Satisfactory	**Overall Borrower Performance:**	Moderately Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators			
Implementation Performance	**Indicators**	**QAG Assessments[1]**	**Rating**
Potential Problem Project at any time (Yes/No):	Yes	Quality at Entry (QEA):	Moderately Satisfactory
Problem Project at any time (Yes/No):	Yes	Quality of Supervision (QSA):	Moderately Unsatisfactory
DO rating before Closing/Inactive status:	Satisfactory		

D. Sector and Theme Codes		
	Original	**Actual**
Sector Code (as % of total Bank financing)		
Agricultural extension and research	16	16
Animal production	2	2
General public administration sector	60	60
Health	21	21
Solid waste management	1	1
Theme Code (as % of total Bank financing)		
Health system performance	13	13
Natural disaster management	25	25
Other communicable diseases	25	25
Pollution management and environmental health	13	13
Rural services and infrastructure	24	24

E. Bank Staff		
Positions	**At ICR**	**At Approval**
Vice President:	Isabel M. Guerrero	Praful C. Patel
Country Director:	Ellen A. Goldstein	Kenichi Ohashi
Sector Manager:	Simeon Kacou Ehui, Julie McLaughlin	Gajanand Pathmanathan, Anabela Abreu
Project Team Leader:	Norman Bentley Piccioni	Daniel M. Sullen
ICR Team Leader:	Norman Bentley Piccioni	
ICR Primary Author:	Miki Terasawa	

[1] Second Quality Assessment of the Lending Portfolio (QALP-2), August 2010

F. Results Framework Analysis

Project Development Objectives (from Project Appraisal Document)

The overall objectives of the Project are to *minimize the threat in Nepal posed to humans by highly pathogenic avian influenza (HPAI) infection and other zoonotic diseases by controlling such infections among domestic poultry and to prepare for, control, and respond to an influenza epidemic and other related infectious disease emergencies in humans.* These objectives were to be achieved in three types of interventions: (i) prevention; (ii) preparedness and planning; and (iii) response and containment. If these goals were achieved, the Project would reduce the burden of disease, the consequent economic losses, the risk of human infection and the loss of productivity attributable to human infections in Nepal and limit the spread to other countries as well.

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Positive behavior change related to avian influenza (AI) among three groups: (i) poultry farmers, (ii) health workers, and (iii) general population.			
Value quantitative or Qualitative)	61 percent	80 percent	(i) Poultry farmers 80 percent; (ii) health workers 80 percent; and (iii) general population 80 percent	82 percent
Date achieved	07/31/2009	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	The project improved the awareness rate by 21 percent and exceeded the target by 2 percent. Breakdown by target group was not available at end-line.			
Indicator 2 :	Continued absence of HPAI in poultry and effective containment of HPAI infection in poultry in case of outbreaks			
Value quantitative or Qualitative)	No HPAI in poultry	Yes	No HPAI in poultry	No HPAI in poultry
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	AICP contained 10 HPAI outbreaks in poultry during the project period, and there was no transmission to humans.			

(b) Intermediate Outcome Indicator(s)

There were 18 intermediate outcome indicators, of which 15 were revised, clarified, or dropped at March 5, 2010 restructuring (details are provided in Annex 2).

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Animal Health: Complete national monitoring of domestic poultry through statistically sound sampling methods - (i) commercial poultry			
Value (quantitative or Qualitative)	25 percent	80 percent	100 percent	95 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	01/31/2011
Comments (incl. % achievement)	The indicator target referred to 12 high-risk districts, but results reported on were carried out in all 26 high-risk districts. Consequently, not only was the target exceeded in the 12 target districts (119%) but the coverage more than doubled.			
Indicator 2 :	Animal Health: Complete national monitoring of domestic poultry through statistically sound sampling methods - (ii) backyard farms			
Value (quantitative or Qualitative)	0 percent	15 percent	Unchanged	25 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	01/31/2011
Comments (incl. % achievement)	The indicator target referred to 12 high-risk districts, but results reported on were carried out in all 26 high-risk districts. The project not only exceeded the target by 67 percent but more than doubled the coverage.			
Indicator 3 :	Animal Health: Percent of active focused surveillance teams effectively operating in 12 high-risk districts[2]			
Value (quantitative or Qualitative)	0 percent	24 check posts; 8 teams	100 percent	100 percent at all 26 high-risk districts
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2009
Comments (incl. % achievement)	Revised at restructuring to focus surveillance on commercial poultry farms. Not only was the target met in the 12 target districts, but the coverage more than doubled by operating in all 26 high-risk districts. The target was achieved by July 2009 and was maintained at that level until closing.			
Indicator 4 :	Animal Health: Percent of rapid test results fully consistent with industry standards for HPAI testing using rapid test kits			
Value (quantitative or Qualitative)	0 percent	90 percent	Unchanged	90 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2009
Comments (incl. % achievement)	The target was achieved by July 2009 and was maintained at that level until closing.			
Indicator 5 :	Animal Health: Percent of AI outbreaks (if any) are controlled, contained, and stamped out			
Value (quantitative or Qualitative)	No outbreak	100 percent	Unchanged	100 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)				

[2] The original indicator was "24 fully functional check posts where avian influenza is accurately monitored and 8 patrolling teams active across international borders, as verified by site visits"

Indicator 6 :	Animal Health: Percent of farmers receiving the promised compensation no later than (i) five days from the culling (for backyard flocks) and (ii) 35 days from the culling (for commercial farms)			
Value (quantitative or Qualitative)	No outbreak	100 percent	Unchanged	100 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	There was a delay in payment during the first HPAI outbreak in 2009 (detailed in para 2.2.1). Other payments were made on time.			
Indicator 7 :	Human Health: Percent of surveillance sites that submit reports to Epidemiology and Disease Control Division (EDCD)/DOHS when required (immediate, weekly, or monthly)			
Value (quantitative or Qualitative)	0 percent	80 percent	Unchanged	86 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	The project exceeded the target by 6 points or by 8percent.			
Indicator 8 :	Human Health: Percent of quality control tests at National Public Health Laboratory (NPHL) that are correct			
Value (quantitative or Qualitative)	0 percent	90 percent	Unchanged	100 percent - fully consistent with World Health Organization (WHO) collaborating center lab
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	AICP exceeded the target by 10 points or by 11 percent.			
Indicator 9 :	Human Health: 90 percent of animal and human health workers in high risk districts vaccinated against seasonal influenza each year			
Value (quantitative or Qualitative)	0 percent	90 percent	Dropped	
Date achieved	03/31/2007	07/31/2011	03/05/2010	
Comments (incl. % achievement)	The indicator was dropped at MTR, as this was captured by the Indicator 10.			
Indicator 10 :	Human Health: Percent of targeted animal and human health workers in high risk districts having available personal protective equipment, anti-viral, and seasonal vaccines			
Value (quantitative or Qualitative)	0 percent	100 percent	Unchanged	100 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)				
Indicator 11 :	Human Health: Tribhuvan international airport (Kathmandu) and seven border entry points (land routes) have functional minimum acceptable quarantine facilities			
Value (quantitative or Qualitative)	0 quarantine facilities	Quarantine facilities available at 8 border entry points	Dropped	
Date achieved	03/31/2007	07/31/2011	03/05/2010	
Comments (incl. % achievement)	12 travel advisory health desks were established at major airports and border crossings during H1N1 pandemic in October 2009 and closed once the community transmission was established. The indicator was dropped at MTR, as temporary travel advisory desks were more cost effective.			

Indicator 12 :	Human Health: Percent of health care workers in publicly-financed health care facilities in the 12 high-risk districts have adequate knowledge			
Value (quantitative or Qualitative)	0 percent	80 percent	Unchanged	80 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)				
Indicator 13 :	Human Health: At least 80 percent of district public health offices have avian influenza epidemic preparedness and response plans completed			
Value (quantitative or Qualitative)	0 percent	80 percent	Dropped	
Date achieved	03/31/2007	07/31/2011	03/05/2010	
Comments (incl. % achievement)	Non-pharmaceutical intervention plans were distributed to all districts. This indicator was dropped at MTR as the USAID-supported Humanitarian Pandemic Preparedness (H2P) project picked up these activities.			
Indicator 14 :	Human Health: Establishment of a national referral hospital (NRH)			
Value (quantitative or Qualitative)	Not established	STIDH[3] fully functional as NRH	Unchanged	Isolation wards at referral hospitals were completed and validated.
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	Physical work was completed and operation and maintenance (O&M) manuals were provided, but the training was incomplete, because staff was not yet assigned to these facilities.			
Indicator 15 :	Communication: Comprehensive communication program launched			
Value (quantitative or Qualitative)	No	Yes	Unchanged	Yes
Date achieved	03/31/2007	07/31/2011	03/05/2010	03/31/2008
Comments (incl. % achievement)				
Indicator 16 :	Communication: Percent of target group populations showing evidence of high level awareness of program messages			
Value (quantitative or Qualitative)	61 percent	80 percent	Unchanged	82 percent
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)				
Indicator 17 :	Project Coordination: Timely conduct of planned activities (measured by percent activities delayed beyond one month from the planned completion date)			
Value (quantitative or Qualitative)	N/A	100 percent	0 percent delay	Overall 30 percent delay
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	Revised at restructuring, March 5, 2010.[4]			

[3] Shukraraj Tropical Infectious Diseases Hospital (STIDH, known as Teku Hospital) in Kathmandu was identified by the government to be enhanced as a national reference hospital (NRH).

[4] The original indicator was "timely implementation of procurement as planned (measured by % procurement not delayed beyond one month from the planned completion date)".

Indicator 18 :	Project Coordination: Annual financial audit and trimester reports (IPRs) prepared and submitted in a timely manner			
Value (quantitative or Qualitative)	N/A	100 percent	100 percent compliance	Overall 40 percent compliance
Date achieved	03/31/2007	07/31/2011	03/05/2010	07/31/2011
Comments (incl. % achievement)	Revised at restructuring, March 5, 2010.			

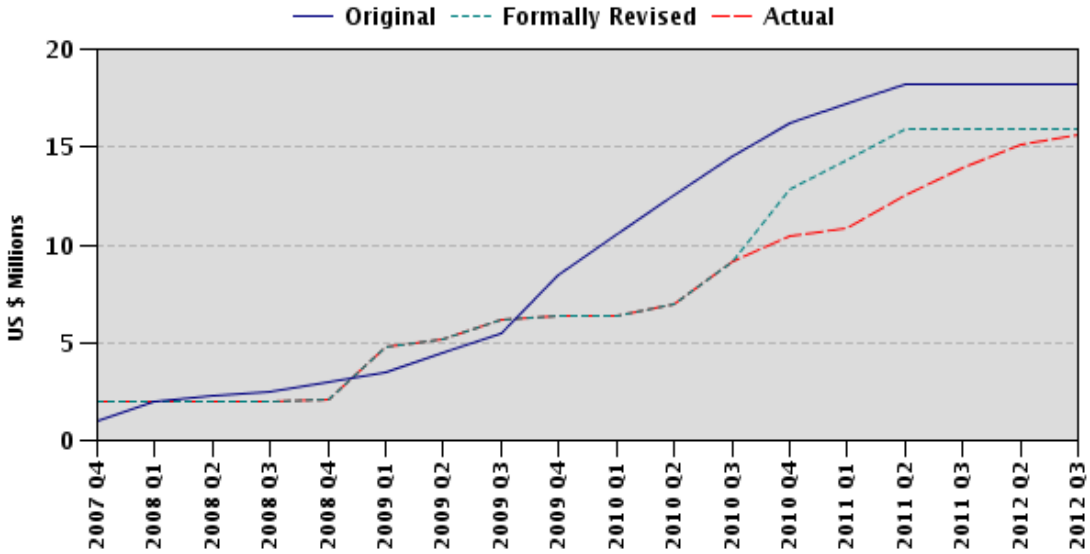
G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
1	06/03/2007	Moderately Satisfactory	Moderately Satisfactory	1.00
2	11/30/2007	Moderately Satisfactory	Moderately Unsatisfactory	2.00
3	04/04/2008	Moderately Satisfactory	Moderately Satisfactory	2.06
4	08/13/2008	Moderately Satisfactory	Moderately Satisfactory	2.68
5	02/16/2009	Satisfactory	Moderately Satisfactory	5.14
6	06/02/2009	Moderately Satisfactory	Moderately Satisfactory	6.32
7	11/25/2009	Moderately Satisfactory	Moderately Unsatisfactory	6.92
8	04/03/2010	Moderately Satisfactory	Moderately Satisfactory	9.14
9	05/20/2010	Moderately Satisfactory	Moderately Satisfactory	9.14
10	07/29/2010	Satisfactory	Moderately Satisfactory	10.63
11	02/05/2011	Satisfactory	Moderately Satisfactory	12.46
12	03/27/2011	Satisfactory	Moderately Satisfactory	13.92
13	11/28/2011	Satisfactory	Moderately Satisfactory	14.03

H. Restructuring (if any)

Restructuring Date(s)	Board Approved PDO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in USD millions	Reason for Restructuring & Key Changes Made
		DO	IP		
03/05/2010	N	MS	MU	9.14	Partial cancellation of US$ 2.28 million, related to the cancellation of construction of two bio-security laboratories level 3 (BSL3)
01/24/2011	N	S	MS	12.46	Reallocation of proceeds between categories

I. Disbursement Profile



1. Project Context, Development Objectives and Design

1.1 Context at Appraisal

1.1.1 Nepal is a landlocked Himalayan country of 24 million people, bordering India and China. In 2006, Nepal was at high risk of avian influenza (AI) outbreaks in poultry, because of reported AI outbreaks in wild birds in China and poultry in India.[5] The border controls with these countries were limited on the flow of both animals and humans. In addition, Nepal is on two routes for migratory birds. Out of all 75 districts in Nepal, 26 districts bordering India were at high-risk, and another 18 districts were at medium-risk. The ability to detect AI in the country was severely handicapped due to lack of physical access, related to Nepal's rugged terrain and widespread security problems.

1.1.2 Poultry is an important sub-sector of agriculture in Nepal. In 2006, there were an estimated 22 million poultry and 408,000 ducks in Nepal. The poultry industry employed approximately 400,000 people, and provided livelihoods to millions of rural households. Approximately 45 percent of these poultry were hybrid and found in a few large commercial farms located in peri-urban areas. On the other hand, about 55 percent were indigenous fowls and kept in backyard units by around 50 percent of rural households across Nepal. Most of the commercial farms had some bio-security arrangements in place, but the rest of the supply chain was unorganized. Birds were transported in traditional baskets and butchered in the open air with no standard safe disposal mechanism for waste material.

1.1.3 Animal health. The Department of Livestock Services (DLS), under the Ministry of Agriculture and Cooperatives (MOAC), had a well-knit veterinary service delivery infrastructure, supported by a central veterinary hospital, 75 district livestock service offices, and 999 livestock service centers at the village level. DLS had and still has 132 livestock officers, 178 veterinary officers, 1,000 para-vets, and 6,000 village animal health workers.[6] There were eight veterinary laboratories in Nepal, three at the central and five at the regional levels[7]. DLS also had nine Animal Quarantine Offices[8] supported by 24 Animal Quarantine Check Posts at borders.

1.1.4 Human health. A public health service delivery system was reasonably well established in Nepal with the Ministry of Health and Population (MOHP) at the center, five regional health directorates, regional and zonal hospitals, and district level hospitals. All 75 districts had public health offices and district hospitals with an outreach network of 188 primary health care centers,

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[5] Source: World Organization for Animal Health (OIE). The first outbreak in China was reported in 2005. In 2006, India reported first outbreaks in mid-west (Maharashtra, Madhya Pradesh, and Gujarat).

[6] In addition, there were approximately 500 private veterinarians and 10,000 private para-vets. They were either attached to the private commercial entities, such as commercial poultry firms or farm stores.

[7] The three laboratories are: Central Veterinary Laboratory (CVL), National Avian Disease Investigation Laboratory (NADIL), and Foot and Mouth Disease/Trans-boundary Animal Diseases (FMD/TADs) Laboratory. The Five Regional Veterinary Laboratories are located in every region: eastern (Biratnagar), central (Janakpur), western (Pokhara), mid-western (Surkhet) and far-western (Dhangadhi).

[8] One is at the central level, and the remaining eight are at the regional level (each quarantine office is responsible for two to three border districts.

698 village health posts and 3,219 sub-health posts. However, the health system was constrained by quality of care and access, which was being addressed by the Nepal Health Sector Program (NHSP I, a SWAp supported by IDA, DFID and other partners).

1.1.5 Coordination. The Government of Nepal (GON) set up an inter-sectoral task force under the chairmanship of the Director-General of Health Services. In early-2006, MOAC and MOHP jointly prepared a National Avian Influenza and Influenza Pandemic Preparedness and Response Plan (NAIIPPRP), with assistance from the World Health Organization (WHO) and the Food and Agriculture Organization (FAO). This Plan was formally endorsed by the GON and was later supplemented by an operational plan. The coordination function was shifted to the Technical Sub-committee on Avian Influenza (TSCAI) under the Central National Disaster Relief Committee. TSCAI was jointly chaired by the Secretaries of MOAC and MOHP.

1.2 Original Project Development Objectives (PDO) and Key Indicators

1.2.1 The overall objectives of the Project were to *minimize the threat in Nepal posed to humans by highly pathogenic avian influenza (HPAI) infection and other zoonotic diseases by controlling such infections among domestic poultry and to prepare for, control, and respond to an influenza epidemic and other related infectious disease emergencies in humans.* These objectives were to be achieved in three types of interventions: (i) prevention; (ii) preparedness and planning; and (iii) response and containment. As a result, AICP was to reduce the burden of disease, the consequent economic losses, the risk of human infection, and the loss of productivity attributable to human infections in Nepal. It was also to limit the spread of the disease to other countries. The PDO indicators were as follows:

(a) Positive behavior change related to avian influenza among three groups: (i) poultry farmers, (ii) health workers, and (iii) general population
(b) Continued absence of HPAI in poultry and effective containment of HPAI infection in poultry in case of outbreaks

1.3 Revised PDO and Key Indicators, and reasons/justification

1.3.1 The PDO and key indicators remained unchanged. However, 15 of the 18 intermediate outcome indicators were revised, clarified, or dropped at restructuring approved on March 5, 2010. Substantial changes were made to the following two intermediate results indicators (the details are provided in Annex 2).

	Original	Revised/clarified
Indicator 3	24 fully functional check posts where AI is accurately monitored and 8 patrolling teams active across international borders, as verified by site visits	Percent of active focused surveillance teams effectively operating in 12 high-risk districts
Indicator 4	90 percent of bio-security level 3 (BSL3)Office laboratory results fully consistent with International des epizooties (OIE, also known as World Organization for Animal Health) reference laboratory results	Percent of rapid test results fully consistent with industry standards for HPAI testing using rapid test kits

1.4 Main Beneficiaries

1.4.1 The project was intended to benefit 24 million people in Nepal, by reducing (i) the burden of disease in poultry and the consequent economic losses; and (ii) the risk of human infection and the loss of productivity attributable to human infections through increased awareness of AI prevention. Specifically, the project was intended to benefit the following target groups:

(a) Poultry farmers (both commercial and backyard), who would benefit from increased awareness about preventive measures against AI, improved bio-security, and compensation, in case of outbreaks;
(b) Veterinary networks, laboratories, disease surveillance systems, and hospitals that would benefit from improved facilities, equipments, reagents, antiviral drugs, and training;
(c) The participating ministries (MOAC and MOHP) which would benefit from training and capacity building as well as provision of transportation and equipment thereby making them better prepared to deal with outbreaks of AI and other zoonoses and infectious diseases; and
(d) Consumers and other stakeholders who would benefit from being better informed and aware of the risks to human health.

1.5 Original Components

1.5.1 The project consisted of four components: (a) animal health, (b) human health, (c) communication, and (d) project management. The original total project cost was US$18.2 million, including physical and price contingencies of US$2.37 million[9]. The base project cost was US$15.83 million.

1.5.2 **Component A. Animal Health** (US$6.12 million, 38.7 percent of the base project cost) to support national prevention and control strategies by the following five subcomponents. This component was implemented by DLS, with technical support from FAO:

- **Sub-component A.1: Surveillance** to develop and strengthen: (a) surveillance and epidemiological investigation; (b) participatory disease intelligence; (c) capacity building of veterinary and wildlife professionals and poultry entrepreneurs; and (d) Geographic Information System (GIS)-based animal disease surveillance and information system.
- **Sub-component A.2: Prevention and containment** to strengthen animal quarantine infrastructure, including provision of transportation.
- **Sub-component A.3: Laboratory capacity** to upgrade FMD)/TAD laboratory to BSL3 and other seven veterinary laboratories (two central and five regional) to bio-security level 2 (BSL2).
- **Sub-component A.4: Field Veterinary Services** to establish rapid response teams (RRTs) in all 75 districts for containment and sero-surveillance and to provide equipment.
- **Sub-component A.5: Compensation fund** to set up rates and mechanism for affected backyard as well as commercial farmers.

[9] Physical contingencies were 5 percent of the total base project costs of US$15.83 million, which was US$0.79 million. Likewise, price contingencies were 10 percent of the total base costs and were US$1.58 million.

1.5.3 **Component B. Human Health** (US$6.34 million, 40 percent of the base project cost) to prevent a human influenza epidemic caused by HPAI and other communicable diseases by the following three subcomponents. The component was implemented by DOHS, under MOHP, with support from WHO.

- **Sub-component B.1: Surveillance and Laboratory Strengthening** by (a) training district and regional RRTs in surveillance and diagnosis; (b) improving influenza-like-illness (ILI) reporting through the Early Warning and reporting System (EWARS) network; (c) enhancing human AI and viral pneumonia surveillance through the WHO/Immunization Preventable Diseases (IPD) system; (d) upgrading the National Public Health Laboratory (NPHL) to BSL3; and (e) establishing the Laboratory Information Management System.
- **Sub-component B.2: Prevention and containment** to support: (a) prevention of avian and seasonal influenza in high-risk occupational settings, (b) prevention of transmission in high-risk contacts of persons diagnosed with AI, (c) planning for acquisition and use of pandemic influenza vaccine, (d) development of a quarantine network for Nepal (later substituted by the establishment of travel advisory during pandemic), (e) legal and regulatory review, and (f) planning for non-pharmacologic interventions to contain human avian and pandemic influenza.
- **Sub-component B.3: Health care delivery system preparedness and response.** This sub-component was to (a) develop an acute respiratory disease (ARD) triage and referral system, (b) support planning for the primary care system in meeting health care needs during an influenza pandemic; and (c) establishment of negative pressure isolation wards at referral hospitals and validation with O&M manuals.

1.5.4 **Component C. Communication** (US$1.65 million, 10.4 percent of the base project cost) to reduce the negative social impact and threat to human health posed by AI outbreaks in poultry through advocacy, behavioral change communication, and social mobilization. This component was implemented jointly by DLS and the National Health Education Information Communication Center (NHEICC), under MOHP. The United Nations Children's Fund (UNICEF) provided technical support and implemented the Community Based School Education Program (CB-SEP) in eight districts. [10]

1.5.5 **Component D. Project management** (US$1.72 million, 10.9 percent of the base project cost) to support project management, including financial management (FM), procurement, safeguards and monitoring and evaluation (M&E), as well as operational costs for both DLS and DOHS.

1.6 Revised Components

1.6.1 The four components remained unchanged throughout the project implementation, with one exception. There were changes in the laboratory capacity sub-components in both animal and human health, because of the cancellation of construction of two BSL3 laboratories. Instead

[10] The funds are allocated through DLS (animal health related activities) and DOHS (human health related activities). DLS was accountable for the UNICEF allocation. The AICP financed CB-SEP in five districts.

of upgrading two laboratories to BSL3 (one veterinary and one public health) and seven veterinary laboratories to BSL2, the project upgraded all nine laboratories to BSL2.

1.7 Other significant changes

1.7.1 The project was restructured twice: partial cancellation of US$2.28 million in March 2010 and reallocation between categories in January 2011. The partial cancellation was related mostly to cancellation of budgetary allocation for two BSL3 laboratories. AICP, instead, upgraded these two laboratories to BSL2. It also changed the veterinary surveillance to focus on commercial farms in 12 selected high-risk districts (out of all 26 high-risk districts) from border patrol. Quarantine and bio-security were to be improved by trans-border workshops and training. As a result of these changes, the total project cost was reduced to US$17 million, and 15 of 18 intermediate outcome indicators were revised or clarified (details are provided in Annex 2).

1.7.2 The reallocation between categories dealt with the unallocated US$ 684,752[11] that was made available for the animal health component. This filled a financing gap in the animal health component that was created by an outbreak response in October 2010 and the Bank positively responded to request from the GON.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

2.1.1 The project design contained both emergency response and longer-term institutional capacity building to prevent and control HPAI and other zoonotic diseases. It adopted the Global Program for Avian Influenza (GPAI)[12] and incorporated lessons learned from the on-going HPAI projects in Asia and other Bank-supported projects in Nepal. These lessons included establishment of a compensation fund at flat rate to enable rapid reimbursement and strengthening weak procurement and M&E capacities at DLS and DOHS by hiring consultants. Due to outbreaks in neighboring India and China in 2006, the original AICP emphasized poultry surveillance at border crossing and quarantine.

2.1.2 In strengthening diagnostic capacities, the pros and cons of constructing two BSL3 laboratories in veterinary and public health were discussed extensively with GON stakeholders and UN counterparts (FAO and WHO). The Bank team flagged its concerns at pre-appraisal about the substantial investment and operating cost requirements of BSL3, particularly staffing demands. Although HPAI diagnosis would be possible by BSL2, other stakeholders argued that the construction of two BSL3 laboratories was justified to strengthen system capacity beyond HPAI and to enable rapid in-country confirmation. The Government was concerned that

[11] Because of XDR appreciation in conversion at partial cancellation, the balance was placed as unallocated.

[12] GPAI was endorsed by the Bank's Board of Directors in January 2006, as a horizontal adaptable program loan (APL) with a global envelope of $500 million. GPAI was developed in 2005, at the height of the H5N1 spread in humans in several Asian countries. As AI virus constantly evolves with unpredictable results, the risk of a human pandemic was considered highly likely. Because of the multi-sectoral nature, involving health, agriculture, economics, finance, planning, and others, the Bank was considered the best suited institution to effectively coordinate UN and other specialized agencies, including FAO, WHO, and UNICEF.

depending on an external reference laboratory would delay confirmation of AI, which in turn could delay AI containment by three weeks.[13]

2.2 Implementation

2.2.1 The implementation progress was rated moderately satisfactory. Although the project was a time sensitive emergency operation, the implementation had a slow start, largely due to delayed procurement of UN partners and staffing of key positions at both DLS and DOHS on a full-time basis. FAO and WHO were to provide turnkey technical support to DLS and DOHS, respectively, in designing BSL3, developing surveillance programs, providing technical training, and procuring personal protective equipment (PPE) and anti-virals. Likewise, UNICEF was to support DLS and NHEICC in developing a communication program and messages and to implement a Community Based School Education Program (CB-SEP). About one year after project effectiveness, the three UN agencies (FAO, WHO and UNICEF) were contracted under blanket agreements,[14] and the implementation started picking up around mid-2008. The communication program was launched in March 2008, and DLS and DOHS developed Standard Operating Procedures (SOPs) in containment and compensation, surveillance, laboratory protocol, case management, and communication. The SOPs were translated into Nepali and tested during the first HPAI outbreaks in Jhapa district in early-2009[15] and the H1N1 pandemic in end-2009[16]. In Jhapa, 164 birds died with infection, and 27,724 birds were culled. 164 commercial farmers and around 1,200 backyard farmers were affected. There was a delay in providing compensation, because the rates were not accepted by these farmers (detailed in Annex 2). Despite the successful containment and case management, both DLS and DOHS had difficulty in building institutional capacities in prevention and preparedness, such as strengthening surveillance and diagnostics. By the Mid-term Review (MTR) in July 2009, only 34 percent of the grant was disbursed.

2.2.2 There was a substantial delay in designing the veterinary and public health BSL3 laboratories, due to later-than-expected contracting of FAO and WHO and global high demand for limited technical expertise for this purpose. At MTR in July 2009, the Bank and the Government had extensive discussions and agreed on cancelling the funds allocated for the construction of the BSL3 laboratories, because (a) there was about 84 percent increase in needed investments compared to the estimate at appraisal, which could not be financed within the project envelope;[17] (b) recurrent costs were estimated at approximately US$300,000 per year for the two laboratories, that would not break-even at expected future operating levels;[18] and (c) civil

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[13] Second pre-appraisal mission Aide Memoire (July 3-13, 2006)

[14] There was no prior agreement on the scope of the United Nations (UN) involvement and financial terms. The blanket agreements amounted to US$2.39 million with FAO, US$2.20 million with WHO, and US$ 360,000 with UNICEF.

[15] Two outbreaks were contained in January and February 2009 in Jhapa district in the southeast, bordering West Bengal, India.

[16] There were 174 cases in Nepal, plus 3 deaths. See http://www.searo.who.int/EN/Section10/Section2562_15047.htm (accessed in December 2011)

[17] The construction cost for two BSL3 laboratories was estimated at US$1.85 million at appraisal. However, the revised cost was US$3.4 million at MTR.

[18] This consists of normal recurrent cost of US$200,000 and auxiliary generator operation of US$96,000. The reference laboratory in the United Kingdom (UK) charges approximately US$15 per sample, and its continued use

work would not be completed by the time the project closed. While the confirmation of positives by a local BSL3 would be faster, the saving in time would make little difference to containment practices, as the adopted SOPs call for a positive diagnosis based on the rapid test to trigger an immediate outbreak response in the field. By mid-2009, AICP improved the diagnostic capacity at CVL, which became 90 percent consistent with the OIE reference laboratory.

2.2.3 Instead of building two BSL3 laboratories, the project focused on upgrading nine laboratories (eight veterinary and one public health) to BSL2. With support from FAO, AICP also revised poultry surveillance at MTR to focus on commercial farms in 12 selected high-risk districts (out of all 26 high-risk districts), in particular, cross-border trade routes, rather than surveillance at the border crossing. In complementing DLS capacities in quarantine and communication, trans-border quarantine workshops were also included. These changes were translated into a new implementation plan, with a net cost savings of US$ 2.28 million (about 13 percent of the original project cost). While the agreement in restructuring was reached at the right time (at MTR in July 2009), it took almost eight months for the restructuring package to be approved (on March 5, 2010). This was, however, less than the 12- month average for Nepal.

2.2.4 The restructuring included a partial cancellation of the above savings. In early-2010, there were eight HPAI outbreaks[19], and AICP culled 29,347 birds[20] and destroyed 4,512 eggs, 114 kg of bird feed, and 149 kg of poultry meat. The compensation amounted to NRS 2,912,260 (approximately, US$ 41,000) and was paid on time to both backyard and commercial farmers. By mid-2010, disbursement improved from 38 to 62 percent. In June 2010, GON made a request for an additional US$ 1.6million to enhance veterinary response capacity,[21] to be financed by AHIF. The Bank team indicated its willingness to support the AHIF application, provided that project implementation accelerated and IDA disbursement improved to 75 percent by September 2010.[22] This, however, was not achieved, thus, no additional financing was sought.

2.2.5 In 2011, the disbursement was steady but lagging, because of delayed consolidation of regional and district level expenditures at both DLS and DOHS (detailed in paragraph 2.4.2). By project closure, AICP completed implementation of the planned activities, including upgrading the nine laboratories to BSL2. However, the BSL2 at NPHL (designated as the National Influenza Center), and the isolation wards at Shukraraj Tropical Infectious Diseases Hospital (designated as the National Referral Hospital), were not yet fully operational. The O&M training

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would be more cost effective. According to the cost benefit analysis, BSL3 would need to process an average of 8,000 samples per year to break even, representing 100 times the number of samples tested during the outbreaks recorded todate in 2009 for the next 25 years. This implies a 20-fold increase of the likely figure of five outbreaks per year, while the current figure of 80 samples per year as recorded in the outbreaks of 2009 would translate into a prohibitive average of US$3,700 per sample.

[19] Seven HPAI outbreaks occurred in Kaski, Chitwan, Rupandehi, Dang, Banke, and Kailali districts between January and March 2010. There was one outbreak in Chitwan in October 2010. Except for Kaski in Central Nepal, these districts bordering India.

[20] This includes 28,115 poultry, 886 ducks and 346 pigeons. These were mostly backyard, but there were a few commercial Muscovy ducks in Kaski and 11,437 commercial layers in Chitwan.

[21] The proposal was to finance warehouse construction, quarantine office renovation, laboratory upgrading, additional transportation, and SMS gateway.

[22] The team estimated that this would have given sufficient time to satisfactorily implement the planned activities under the Trust Fund (TF) by the IDA project closure date.

was not undertaken, because relevant technical staff was not yet appointed by MOHP. Surveillance activities carried out under the project actually exceeded original plans, as the surveillance was carried out in all 26 high risk districts, rather than the planned 12 districts.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

2.3.1 The project M&E is rated modest. The M&E framework was designed by adopting the GPAI results framework. However, the project framework could have been better structured to capture all aspects of PDOs by upgrading a few intermediate results indicators related to prevention and institutional preparedness.

2.3.2 Although there were some improvements during implementation, both DLS and DOHS were weak in data collection and reporting. Initially, only a few outputs were reported to the Bank, such as number of samples collected in poultry surveillance. Neither DLS nor DOHS was able to report on PDO or intermediate outcome indicators until after MTR. The March 5, 2010 restructuring revised or clarified most intermediate outcome indicators, and made those more relevant in measuring focused surveillance in high-risk districts and diagnostic capacity development. This helped both DLS and DOHS report project outputs and progress towards the results framework to the Bank. The communication activities were well-monitored by UNICEF by three Knowledge, Attitude, and Practice (KAP) surveys.[23] While general awareness was captured by these surveys, the project did not obtain AI awareness data among poultry farmers and health workers (PDO indicator) separately. It would have been useful to have an M&E consultant to ensure that the data collection was segregated by target group and/or gender, reporting on the results framework, and utilizing all M&E data for planning and reporting. It would have also helped to properly document good practices in more quantitative and qualitative terms, for example, on in-kind compensation and Civil Society Organization (CSO) mobilization in stamping-out operations.

2.4 Safeguard and Fiduciary Compliance

2.4.1 **Safeguards.** AICP was assessed as a Category B project in environmental safeguards. DLS prepared the Environment Management Plan (EMP), including waste management (safe disposal of carcasses) in July 2006. Additional protocols were also developed on safe handling of chemicals and development and management of burial pits. DOHS applied the health care waste management plan developed in June 2006 for the Nepal Health Sector Program (SWAp supported by IDA and other partners).

2.4.2 Outbreak containment was managed by the District Avian Influenza Technical Committee (DAITEC), composed of a Chief District Officer, municipalities, District Development Committee (DDC), District DLS, and District DOHS. DAITEC was to identify the disposal pit location and maintain its safety, including groundwater quality. During the outbreak in Pokhara (Kaski district) in early-2010, DAITEC promised a community nearby the disposal pit to rehabilitate their main access road. This was not completed by the project closure, and DLS

[23] Baseline was financed by the Government of Japan, and AICP financed two other surveys. UNICEF also undertook mini-KAP surveys annually.

is following up with DAITEC. A groundwater quality test was not undertaken during project implementation. However, DLS is also committed to undertake this task as a part of GON's annual program.

2.4.3 **Financial management (FM).** FM was rated moderately unsatisfactory. The capacity was strengthened over time at both DLS and DOHS, but it remained weak due to limited staff capacity and frequent staff turnover, which was affected by the overall weak country FM environment. Although the March 5, 2010 restructuring improved implementation and disbursement, a mismatch between expenditure and disbursement developed, because of delays in reconciliation at the central level. This was a challenge, particularly for DLS, which had 84 cost centers at the central, district, and municipal levels[24] (DOHS had only seven centers in 5 regions and Kathmandu). FM information systems were developed at both DLS and DOHS, but the system was not operational at DOHS. The submission of trimester FM reports and audit reports were delayed most of the time due to weak capacity as well as slow reconciliation of the accounts with various cost centers. In 2009, disbursement had to be suspended for both Departments due to delayed submission of audited accounts.

2.4.4 **Procurement.** Procurement was rated moderately unsatisfactory. Capacity was built at both DLS and DOHS over time, although limited. Despite weak capacities at both Departments, the procurement plan was frontloaded, in enhancing emergency response. USAID and FAO provided procurement support to DOHS and DLS, respectively, and staff was trained at the Nepal Administrative Staff College. However, both DLS and DOHS received complaints from bidders, one of which dealt with the veterinary BSL2 equipment package (worth US$ 850,000), which had to be investigated by the Bank's Department of Institutional Integrity (INT) as well as the GON Commission for the Investigation of Abuse of Authority. The case was cleared, but a new tender had to be issued with less detailed specifications (such as brand names). This delayed commissioning of veterinary BSL2 at the central and regional levels.

2.5 Post-completion Operation

2.5.1 Given the history of HPAI outbreaks in Nepal, it is critical to continue effective surveillance for prevention and control. GON is committed to sustain the key prevention and control activities and has made the following budgetary allocation for the FY 2011/12: NRS60 million (approximately US$800,000) for DLS, NRS13 million (approximately US$160,000) for DOHS, and NRS400,000 (about US$5,000) for NHEICC (under MOHP). To ensure rapid containment of HPAI outbreaks and disease surveillance in high-risk districts, DLS is maintaining the AICP structure to construct a warehouse with their own resources. DLS, with the AICP structure, rapidly responded to HPAI outbreak in Bhaktapur in November 2011, several months after project closing. The human health investments in surveillance and diagnostics would be sustained by DOHS epidemiology and disease control division and NIC with support from WHO and the Government's Second HNP and HIV/AIDS Program. In addition, the AHIF-financed South Asia Regional Training Program in Epidemiology and Bio-security would also

[24] 49 centers were under MOAC (in Kathmandu and districts), while 35 were at District Development Committees under the Ministry of Local Development (MOLD).

strengthen in-country as well as regional epidemiology capacities in veterinary and public health.[25]

2.5.2 Building on AICP investments, additional support[26] to further strengthen DLS and DOHS capacities to prevent and control infectious diseases that transmit between animals and humans (zoonoses) is proposed. This would be financed by AHIF and would complement the on-going Poverty Alleviation Fund activities at community level, as well as two projects under preparation: the Agriculture and Food Security Project (to be financed by the Global Agriculture and Food Security Program - GAFSP)[27] and the Resilience to Climate Related Hazards Project (to be financed by the Pilot Program for Climate Resilience, PPCR). In addition to enhancing surveillance, diagnostics, climate sensitive disease risk mitigation, and communication, the proposed AHIF support would strengthen bio-security and food safety throughout the poultry or meat product value chains by piloting establishment of model live bird/meat markets. The pilot would be a replication of good practice in the Bank's HPAI projects in Vietnam and Nigeria.[28]

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

3.1.1 AICP's relevance to objectives, design, and implementation were high. The objectives remained relevant to the Nepal Interim Strategy Note (ISN) (FY08-FY09[29] and FY10-FY11). AICP supported pillar III "promoting access to better quality services" by improving public health service delivery in preventing and managing HPAI and other communicable diseases. While Nepal did not have any HPAI case in humans, the institutional mechanism was tested during the H1N1 outbreaks in 2009. The project also strengthened veterinary service delivery in prevention and response to HPAI outbreaks in the poultry sector, which supports rural livelihoods and nutrition for vulnerable groups (see Section 3.5).

3.1.2 The project design remained relevant in addressing both emergency and longer-term institutional capacity building to prepare for, prevent, and control HPAI outbreaks. The design adopted the GPAI framework, but the key activities such as surveillance and diagnostics were adjusted at the March 5, 2010 restructuring on the basis of HPAI status in Nepal and cost benefit analysis of constructing and operating two BSL3 laboratories (see Section 2.2). Also, the project implementation was consistent with Nepal's development priorities. The project successfully contained 10 HPAI outbreaks in poultry and strengthened DLS and DOHS capacities in

[25] The Regional Training Program in Epidemiology and Bio-security trained 70 veterinarians and medical doctors from seven countries in South Asia to obtain master's degree in epidemiology. Five students are participating from Nepal (two veterinarians and three medical doctors). The program will also set up centers of excellence in epidemiology by strengthening existing epidemiology institutions and developing national and regional networks. The total cost of the program is US$7.7 million.

[26] The proposed follow-on project would seek approximately US$10 million from AHIF to support (a) surveillance and diagnostics, (b) bio-security and quarantine, (c) model live bird/meat market, (d) climate sensitive disease risk mitigation, (e) communication, and (f) institutional strengthening.

[27] GAFSP approved the allocation of US$46.5 million for Nepal. PPCR approved US$86 million for Nepal, of which $25-30 million would be dedicated to strengthening warning systems for climate related hazards.

[28] See Nigeria AICP Implementation Completion and Results Report (ICR) (Report No: ICR00001804)

[29] The previous CAS for Nepal was discussed in November 2003.

surveillance, diagnostics, bio-safety, quarantine, response (containment or case management) and communication.

3.2 Achievement of Project Development Objectives

3.2.1 The project achieved its PDO. AICP minimized the threat posed by H5N1 to humans and the poultry industry by (a) successfully containing 10 HPAI outbreaks in poultry birds with no transmission to humans and strengthening veterinary and public health diagnostic capacities with high consistencies with reference laboratories (90-100 percent); (b) preventing HPAI or other zoonotic disease outbreaks in birds or humans by enhanced surveillance network (95 percent commercial farms surveyed in all 26 high-risk districts, and 86 percent EWARS coverage nationwide); (c) improving preparedness by reviewing relevant legal frameworks, developing and testing 11 SOPs; and (d) increasing HPAI awareness by 21 percent points (from 61 to 82 percent). Two PDO indicators were achieved, although the level of awareness was not made available by target group. All technical intermediate results indicators were achieved, with shortfalls recorded in the two project management indicators (details are in ICR datasheet). The key project achievements are summarized below (and detailed in Annex 2).

3.2.2 **Response and containment.** AICP successfully contained 10 HPAI outbreaks in poultry, ducks, and pigeons, with no transmission to humans. Compensation was established at an acceptable rate for poultry (detailed in Annex 2) and paid to affected farmers on time (except for those affected by the first HPAI outbreak in 2009). The package also included in-kind hybrid chicks for backyard farmers and optional credit for re-stocking for commercial farmers. As a result, affected backyard farmers doubled their income following the HPAI outbreak from sales of eggs and meat of the hybrid poultry.[30] Despite the 10 outbreaks, there was an increase in the number of poultry birds in Nepal by about 11 percent (24.5 million). The population of ducks, however, declined by about 7 percent (380,000).[31] The rapid response capacity was enhanced due to improved diagnostic capacity: rapid test results at CVL were 90 percent consistent with those at OIE reference laboratory, and quality control tests at NPHL were 100 percent consistent with WHO's reference laboratory. While construction of two BSL3 laboratories was cancelled, nine laboratories, including CVL and NPHL, were upgraded to BSL2. NPHL, however, was not fully operational, due to inadequate staffing. With support from WHO, AICP provided 2,500 personal protective equipment[32] and 6,300 courses of anti-virals, which fully covered the needs for targeted animal and human health workers in all 26 high-risk districts. During the H1N1 pandemic, DOHS set up 12 travel advisory health desks for international and domestic travelers and reduced the H1N1 transmission by identifying 39 suspected cases[33].

3.2.3 **Prevention.** The active and focused poultry surveillance was operational in all 26 high-risk districts, monitoring 95 percent commercial and 25 percent backyard farmers. During implementation, AICP doubled district coverage to monitor all 26 high-risk districts (as compared to 12 originally planned districts) and exceeded the backyard surveillance target by 10

[30] This was confirmed by a field visit by the Bank team in June 2011 during the final supervision/ICR mission.
[31] Compared to the appraisal in 2006. Pathak, P., "Control and Containment of HPAI in Nepal (Lessons Learned)", presentation at the Stakeholder Workshop in June 2011
[32] In addition, 2,250 PPEs were provided in-kind by USAID.
[33] Out of a total of 337,563 travelers screened during the period

percent points. Eight pick-ups and 22 motorcycles were provided to enhance surveillance capacity in high-risk districts. The GIS-based, Global Positioning System (GPS) centric animal disease information system (e.g., TADinfo) was also established, linking nine institutions, including DLS and five regional veterinary laboratories. Eighty eight (88) percent of the EWARS surveillance sites regularly submitted reports to DOHS, which exceeded the 80 percent target.

3.2.4 **Preparedness and planning.** AICP developed 11 SOPs (five by DLS and six by DOHS), including surveillance, quarantine, response (containment, home/community based-care, clinical case management, and infection control), laboratory, environment management, and risk communication. DLS also reviewed three legal frameworks, including Bird Flu Control Order, to enable containment activities, and DOHS prepared the Communicable Disease Control Act. SOPs were tested and refined by responding to 10 HPAI outbreaks and H1N1 pandemic. DLS undertook eight simulation exercises in collaboration with USAID and FAO. In enhancing district planning, DOHS distributed non-pharmaceutical intervention plans to all 75 districts, 18 of which (24 percent) prepared their own plan with USAID support.[34]

3.2.5 **AI awareness.** A comprehensive HPAI communication program was launched in 2008 and increased the HPAI awareness by 21 percent from baseline. The end-line KAP survey also indicates that there was a 60 percent points increase in knowledge on AI preventive measures among adult family members who are likely to handle their backyard poultry (detailed in Section 3.6). This was enabled by media and training outreach implemented in coordination among DLS, NHEICC, and UNICEF, in particular, UNICEF's CB-SEP. In 8 selected high-risk districts (out of 26 high-risk districts), UNICEF trained 183,000 students and teachers on HPAI and its prevention practices and also built capacities of 64 CSOs in developing district level risk communication networks.[35] The media awareness campaign covered at least 50 percent of the population in 26 high-risk districts.[36] AICP also trained 750 media spokespersons on HPAI, and 1,703 security personnel, traders, and farmers on bio-security and quarantine.

3.3 Efficiency

3.3.1 The project's efficiency was high. The economic analysis (detailed in Annex 3) related the project costs to the benefits derived from the economic value stream of losses, which were avoided from project activities in the poultry industry. This was expressed as the expected value of the economic loss avoided from outbreaks in a seven-year period (2008-2014). Project benefits are assumed to remain realizable over this period and beyond, attributable to the project expenditures on laboratories, equipment, awareness programs, and increase in human capital from the projects training activities. Under the "without project" scenario, it was assumed that after the 2009-2010 outbreaks - with about 17 percent of the poultry population being lost (as in

[34] Humanitarian Pandemic Preparedness (H2P) financed by USAID

[35] AICP financed the implementation in five districts. UNICEF mobilized 64 CSOs of women, micro-credit, local ethnic groups, para-legal and/or youth (eight organizations per district) and formed DDCs. Eight hundred (800) committee members were trained on hand-washing, AI prevention, and risk communication.

[36] Messages were aired on one national television and 26 local FM radio stations. The April 2006 Aide Memoire indicates that the access to radio is estimated at 50 percent for rural population and 62 percent for urban but access to television estimated at 1 percent for rural and 20 percent for urban.

the case of Vietnam during the 2003-2004 outbreaks) - the GON would have immediately implemented AICP to contain further outbreaks. Consequently, by 2014, after its completion the "with" and "without" situation would become the same in terms of preparedness, control, and results. The costs, benefits, and results of the economic analysis were based on the above assumptions and parameters for the avoided losses in the poultry sector. The results are very robust, with a 311 percent economic rate of return (ERR) and a net present value (NPV) of US$34.8 million.

3.3.2 A sensitivity analysis concerning the Gross Attack Rate (GAR) in the poultry sector in the "without project" situation during the 2009-2010 outbreaks was also undertaken. Even under highly conservative parameters (1 percent of GAR under the 2009-10 outbreaks) that severely underestimate the benefit estimations the economic returns to the AICP yielded 29 percent ERR and an NPV of US$2.8 million. It confirms that from an economic point of view the project was worth undertaking.

3.4 Justification of Overall Outcome Rating

Rating: Moderately Satisfactory

3.4.1 Despite frequent implementation delays and disbursement lags, the project still achieved its PDOs. There was a strong commitment on part of the GON and willingness to resolve critical issues related to implementation. Overall outcomes are, thus, rated moderately satisfactory.

3.5 Overarching Themes, Other Outcomes and Impacts

(a) Poverty Impacts, Gender Aspects, and Social Development

3.5.1 Although the project did not specifically focus on alleviating poverty, it generated positive social impacts by reducing the threat to human health, raising HPAI awareness and prevention practices, limiting poultry losses, and compensating for culled birds. Approximately 50 percent of rural households in Nepal have poultry in their backyard, and 30 percent of these households belong to Dalits and Janajati, which are the most disadvantaged social groups in Nepal.[37] Moreover, backyard poultry is cared for primarily by women and children. Because nine of 10 outbreaks affected backyard farmers,[38] the project's prevention and control activities, such as surveillance, compensation, and communication, directly supported these vulnerable households in safeguarding their livelihoods and source of protein. Women were involved in verification of culled poultry during compensation. More than 18,805 farmers and animal health workers in 26 high-risk districts were trained on participatory disease surveillance at village level. UNICEF's outreach to school children substantially contributed to increasing HPAI and general influenza awareness and prevention at the household level.

[37] Fifty five (55) percent of poultry holders are Magar, while 15 percent of them are Brahman/Chhetri.
[38] The October 2010 outbreak in Chitwan affected commercial farms only.

(b) Institutional Change/Strengthening

3.5.2 AICP built institutional capacities at DLS and DOHS in preventing and controlling HPAI and other zoonotic disease outbreaks, such as H1N1. The project strengthened surveillance and disease detection, diagnosis, response (containment or case management), quarantine, bio-security, and communication. DLS still maintains the AICP structure to continue key prevention activities, in particular, surveillance, and rapid response to HPAI outbreaks, which helped contain the recent outbreak in November 2011. DLS also mainstreamed communication into the Directorate of Extension Services and Training.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

3.6.1 **Beneficiary survey.** The end-line KAP surveys were undertaken by UNICEF in five CB-SEP districts. The highlights of these surveys are as follows but also detailed in Annex 5:

- General HPAI awareness increased by 21 percent points to reach 82 percent (baseline was 61 percent). This exceeded the target of 80 percent.
- Almost 40 percent points more now children wash hands after touching birds (94 percent of respondents, compared to 55 percent at baseline).
- There was a 60 percent increase in knowledge on preventive measures in handling sick birds among adult family members.[39]

3.6.2 **Stakeholder workshop.** AICP organized a stakeholder workshop in June 2011. Key lessons learned were as follows but also detailed in Annex 6:

- **Communication is critical in preventing and controlling the spread of AI outbreaks.** The project developed a communication package targeting the poultry farmers. In sustaining, DLS mainstreamed the communication activities under the Directorate of Extension and Training.
- **Rapid response was facilitated by cross-sectoral cooperation at the district level.** During containment, AICP enabled a high level of cooperation among media, local governments, CSOs (such as local political parties and youth associations), and the public health sector. The partnership with media was important to ensure transparency in providing the correct information to the general public.
- **Compensation in cash and in-kind enhanced livelihoods of backyard farmers.** The affected backyard farmers promptly received cash and later hybrid birds. However, the commercial farmers have not yet fully regained their stock. They took cash but not in-kind compensation or optional credit.
- **The project had high-level support and ownership by MOAC.** Throughout its implementation, the project had a high-level of ownership and support frm DLS as well as MOAC.

[39] There was a 56 percent points increase in reporting sick birds to veterinary office (80 percent at end-line, 24 percent at baseline), 58 percent points increase in separating sick and healthy birds (75 percent at end-line, 17 percent at baseline), and 71 percent points increase in not borrowing birds from infected areas (91 percent at end-line, 20 percent at baseline).

4. Assessment of Risk to Development Outcome

Rating: Moderate

4.1 The institutional capacities built to prepare for, prevent, and control HPAI and other zoonotic diseases are expected to be maintained by DLS and DOHS, which was demonstrated by the additional budget allocation by the Government. DLS has a high level of commitment in maintaining the AICP structure. GON is also highly committed, as reflected in the FY11/12 budgetary allocations to maintain key HPAI activities, such as surveillance and communication. Although there is a concern whether DLS could maintain the same level of active and focused surveillance in 26 high-risk districts, an effective surveillance model for HPAI and other emerging zoonotic diseases would be developed by the proposed follow-on AHIF support. There is also a risk whether the public health BSL2 laboratory at NPHL as well as isolation wards at the NRH would be made fully operational in light of inadequate staffing. This, however, would be followed up by the Nepal Health Sector Program (NHSP II, SWAp supported by IDA and other partners).

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: Moderately Satisfactory

5.1.1 The project design followed the GPAI, including the results framework and partnership with UN agencies. Lessons learned from the on-going Bank-supported HPAI projects or those in Nepal were incorporated, in particular, procurement and M&E. However, project design would have been stronger if planned laboratory investments had been better aligned with local financial and human resource capacities (i.e., if the scope of works was limited to BSL2 laboratories rather than including two BSL3 laboratories). The results framework could have better captured all aspects of the PDOs, and dedicated support for M&E activities during implementation would have been desirable.

(b) Quality of Supervision

Rating: Moderately Satisfactory

5.1.2 AICP had a slow start-up. Much needed hand holding support in FM, procurement, and safeguards was provided regularly by the Kathmandu-based Bank team throughout implementation. The Bank team maintained a cross-sectoral technical team, including a Kathmandu-based Public Health Specialist (for majority of the project life) and an animal health specialist based in Australia, who closely monitored implementation through weekly audio conference with DLS. However, because the Bank's implementation support until MTR in July 2009 focused heavily on the cancellation of two BSL3 laboratories, QAG felt that there was not adequate policy dialogue in long-term development of AI and zoonotic disease prevention and control mechanisms. The quality of supervision was, thus, rated as "moderately unsatisfactory"

in August 2010 by QAG. Because the GON had a strong interest in these laboratories, discussions related to cancellation of these labs created tension between GON and the Bank team. Once the GON agreed to cancellation, the Bank team was able to intensify its focus on strengthening poultry surveillance in all 26 high-risk districts and upgrading nine key national and regional laboratories to BSL2. In the last 6 months of the project, with the departure of the Kathmandu-based Public Health Specialist in end-2010, the Bank team ensured that sustainability would be addressed in the Government's Second HPN and HIV/AIDS Program. The Bank team worked closely and effectively with other partners during implementation (WHO, FAO, UNICEF, and USAID), and adopted a joint approach to supervision discussions. This inclusive approach to program oversight facilitated project restructuring at mid-term.

(c) Justification of Rating for Overall Bank Performance

Rating: Moderately Satisfactory

5.1.3 The overall Bank performance was moderately satisfactory. The discussions between GON and the Bank team related to the construction of two BSL3 laboratories were time-consuming but ultimately resulted in a desirable outcome from a cost-benefit perspective. Although sustainability of BSL3 was flagged during the appraisal, cost benefit should have been considered during the project design. However, as this was an emergency project that was developed on the assumption of a potential global HPAI pandemic, cost benefit estimates at appraisal might not have been relevant during implementation.

5.2 Recipient Performance

(a) Government Performance
Rating: Satisfactory

5.2.1 The GON set up an inter-sectoral task force. By early-2006, a National Avian Influenza and Influenza Pandemic Preparedness and Response Plan was prepared, and GON gave its endorsement. Because HPAI became mildly endemic in Nepal, GON maintained a high level of ownership and commitment in HPAI prevention and control, which was demonstrated by the specific budget allocation for DLS, DOHS, and NHEICC for the current fiscal year.

(b) Implementing Agency or Agencies Performance
Rating: Moderately Satisfactory

5.2.2 DLS had a high level of ownership in AICP. The Project Coordinator changed only once, and the latest coordinator still remains in AICP's structure that is maintained by DLS. DOHS, on the other hand, had frequent turnover of the Project Coordinator but retained the Deputy Project Coordinator throughout implementation. Although DLS and DOHS slowly built capacities in project management, FM, procurement, and M&E, implementation was delayed frequently, in particular, procurement, and procurement-related agreed actions were often not undertaken on a timely basis. There was a high level of coordination among DLS, NHEICC, and UNICEF in implementation of the communication component starting with the project launch. Such coordination was also observed at the district level in responding to outbreaks, which engaged

both district DLS and DOHS in the DAITEC. At the national level, however, the primary responsibility for coordination was with DLS and DOHS.

(c) Justification of Rating for Overall Recipient Performance
Rating: Moderately Satisfactory

5.2.3 AICP successfully contained 10 HPAI outbreaks, and the institutional mechanisms were built to prevent and control HPAI and other zoonotic disease outbreaks at DLS and DOHS. DLS is highly committed to maintain these mechanisms, which enabled rapid response to the recent HPAI outbreak in November 2011. However, implementation of this emergency operation was overall slower than expected, and the public health BSL2 and isolation wards at NRH were not fully operational by time the project closed.

6. Lessons Learned

6.1 Key lessons learned from AICP are as follows:

- **Investment in BSL3 should have been carefully considered at appraisal.** Despite GON having a high interest in constructing two BSL3 laboratories, their sustainability, including cost benefit, should have been more carefully analyzed at appraisal. Such analysis should be undertaken when considering investment in highly sensitive as well as sophisticated infrastructure.
- **Effective risk communication enabled rapid response.** In containing HPAI outbreaks, AICP mobilized local CSOs, such as youth or political groups, to ensure transparency among backyard poultry farmers on culling and compensation. The project also managed media through local and national daily briefings during containment. This was also supported by training for media spokespersons. DLS highly values communication activities in enabling communication and prevention and has mainstreamed these activities in the Directorate of Extension Services and Training.
- **High level of cooperation among DLS, NHEICC, and UNICEF ensured satisfactory implementation of the communication component.** The three agencies set up a communication task force soon after the project became effective and worked closely in developing common prevention messages and focusing their delivery in 26 high-risk districts. As a result, HPAI awareness rate has increased from 61 to 82 percent.
- **The KAP survey could be a strategic M&E tool.** UNICEF undertook three KAP surveys during project implementation, which were complemented by annual mini-surveys. Although these surveys were centered on the CB-SEP, it was a good practice to regularly obtain feedback from target populations.
- **Close collaboration with UN and donor technical agencies strengthened the institutional capacities in disease prevention and control.** The project worked closely with technical agencies (including FAO, WHO, UNICEF), and with other development partners (USAID) in developing a response plan, enhancing preparedness, and building capacities in disease surveillance, diagnosis, response (containment or case management), and communication. Joint supervision with USAID enhanced coordination of planned project activities between the IDA-supported AICP and the USAID-supported H2P.
- **Engagement of UN agencies should have been facilitated prior to GPAI implementation.** Even though it took only two weeks to declare the project effectiveness, it took about a year to contract UN partners since then. This led to delay in

initial start-up and implementation of key activities. Issues such as overhead cost, audit requirement, and contracting processes should have been addressed between the Bank and these agencies at headquarter levels, prior to the GPAI implementation at the level of individual countries. This should be noted for future projects with heavy UN agency involvement.

7. Comments on Issues Raised by Recipient/Implementing Agencies/Partners

7.1 The Bank distributed the draft ICR to the GON as well as concerned partners based in Nepal. The comments that were received indicated that the draft ICR was acceptable and there were no specific comments. Overall, as far as the contribution of this project is concerned, the response of the recipient, implementing agencies and partners was positive and favorable. With the support of this project, GON officials felt that they were not only able to control 10 HPAI outbreaks but were also able to strengthen institutional capacity. The Recipient was more generous with its ratings for both the Recipient as well as the Bank and rated their performances as satisfactory. GON was very keen to finance two BSL-3 laboratories in Nepal through this project but was unable to achieve this goal. Given the complexity, long time involved and substantial resources needed, authorities did realize that this project was not in a position to finance the establishment of two BSL-3 laboratories before the project closed. The Recipient is pleased that there is a good possibility for Bank financing a follow-up project that will focus on zoonotic disease prevention and control, which would be financed through a grant from the Trust Fund dealing with HPAI.

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in US$ Million equivalent)

Components	Appraisal Estimate (US$ millions)	Actual/Latest Estimate (US$ millions)	Percentage of Appraisal
A. Animal Health	6.12	5.26	
B. Human Health	6.34	4.93	
C. Communication	1.65	1.54	
D. Project Management	1.72	2.24	
Total Baseline Cost	15.83	15.64*	98.80
Physical Contingencies (5%)	0.79	0.00	0.00
Price Contingencies (10%)	1.58	0.00	0.00
Total Project Costs	18.20	15.64	85.93
Front-end fee PPF	0.00	0.00	0.00
Front-end fee IBRD	0.00	0.00	0.00
Total Financing Required	18.20	15.64	85.93

* This is the final AICP expenditure. However, the breakdown by component is as of January 10, 2012 (final breakdown is not yet available).

(b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (US$ millions)	Actual/Latest Estimate (US$ millions)	Percentage of Appraisal
Recipient		0.00	0.00	0.00
IDA Grant		18.20	15.64	85.93

Annex 2. Outputs by Component

Of the 18 intermediate outcome indicators, 15 were revised, clarified, or dropped at the March 5, 2010 project restructuring. All changes are detailed in the following table:

	Original	Revised/clarified
Animal Health		
Indicator 1	Percent of commercial poultry farms monitored for HPAI through statistically sound sampling methods	Complete national monitoring of domestic poultry through statistically sound sampling methods - (i) commercial poultry
Indicator 2	Percentage of backyard poultry farms monitored for HPAI through statistically sound sampling methods	Complete national monitoring of domestic poultry through statistically sound sampling methods - (ii) backyard farms
Indicator 3	24 fully functional check posts where AI accurately monitored and 8 patrolling teams active across international borders, as verified by site visits	Percentage of active focused surveillance teams effectively operating in 12 high risk districts
Indicator 4	90 percent of BSL3 laboratory results fully consistent with OIE reference laboratory results	Percentage of rapid test results fully consistent with industry standards for HPAI testing using rapid test kits
Indicator 5	100 percent of AI outbreaks (if any) are controlled, contained, and stamped out	Percentage of AI outbreaks (if any) are controlled, contained, and stamped out
Indicator 6	100 percent of farmers receiving the promised compensation amount within two days from the culling (for backyard farmers) and within 35 days (for commercial farmers)	Percentage of farmers receiving the promised compensation no later than (i) five days from the culling (for backyard flocks) and (ii) 35 days from the culling (for commercial farms)
Human Health		
Indicator 7	80 percent of surveillance sites EWARS, IPD, and extended, submit reports to EDCD/DOHS when required (immediate, weekly, or monthly)	Percentage of surveillance sites that submit reports to EDCD/ DOHS when required (immediate, weekly, or monthly)
Indicator 8	At least 90 percent of laboratory results at NPHL consistent with WHO reference center	Percentage of quality control tests at NPHLthat are correct
Indicator 9	90 percent of animal and human health workers in high risk districts vaccinated against seasonal influenza each year	Dropped (as this was captured by the Indicator 10)
Indicator 10	Personal protective equipment, anti-virals, and seasonal vaccines available to 100 percent of targeted high-risk occupational groups	Percentage of targeted animal and human health workers in high risk districts having available personal protective equipment, anti-viral, and seasonal vaccines
Indicator 11	Tribhuvan international airport (Kathmandu) and seven border entry points (land routes) have functional minimum acceptable quarantine facilities	Dropped (because temporary travel advisory desks were more cost effective)
Indicator 12	At least 80 percent of health care workers in all publicly-financed health care facilities have adequate knowledge	Percentage of health care workers in publicly-financed health care facilities in the 12 high-risk districts have adequate knowledge
Indicator 13	At least 80 percent of district public health offices have AI epidemic preparedness and response plans completed	Dropped (as the USAID picked up these activities)
Indicator 14	Establishment of a NRH	Unchanged

	Original	Revised/clarified
Communication		
Indicator 15	Comprehensive communication program launched	Unchanged
Indicator 16	Percentage of target group populations showing evidence of high level awareness of program messages	Unchanged
Project Coordination		
Indicator 17	Timely implementation of procurement as planned (measured by percentage procurement not delayed beyond one month from the planned completion date)	Timely conduct of planned activities (measured by percentage activities delayed beyond one month from the planned completion date)
Indicator 18	All project reports (financial monitoring, procurement, and physical progress) prepared accurately and submitted by Core Coordination Teams (CCTs) to the TSCAI every four month	Annual financial audit and trimester reports (IPRs) prepared and submitted in a timely manner

The below table summarizes the project's outputs by component. These outputs were linked to measuring intermediate outcome indicators and monitored by both DLS and DOHS.

Project Outputs	Outputs indicated in the PAD	Actual Achievements
Component A. Animal Health		
A.l Surveillance	National random sero-sampling program to collect 28,000 samples from commercial and backyard poultry farms throughout the project implementation 16,000[40] persons trained to establish participatory disease intelligence at village level 3,600[41] veterinary professionals, para-vets, poultry owners, and wildlife technicians trained on HPAI prevention and control in all 75 districts in Nepal by December 2007 Animal disease information system[42] established with a network of eight laboratories by February 2008	50,000 samples collected 18,805 persons in high-risk districts trained by May 31, 2011 5,137 veterinary professionals, para-vets, poultry owners, and wildlife technicians in all 26 high-risk districts trained on HPAI prevention and control and bio-security by July 31, 2011 Full established completed by May 31, 2011 with a network of nine institutions[43] In addition, at district level, 332 surveyors (10 surveyors each for all 26 high-risk districts and 4 surveyors each for all 18 medium-risk districts) were trained on intensive surveillance (completed by August 31, 2010). At regional level, 6 mobile surveillance supervision teams (one per region and one central) were established by September 30, 2008. The project also trained 6 Emergency Surveillance and Disease Diagnosis Teams (EDITs) at regional level by July 31, 2009[44].
A.2 Prevention and Containment	4 quarantine check-posts strengthened (physical facilities expanded) by July 2007	Instead of check posts, 9 quarantine offices[45] strengthened by July 31, 2011

[40] Four thousand participants per year x 4 years, 6,000 animal health workers and 10,000 farmers
[41] Five hundred veterinary professionals, 2,500 para-vets, 500 poultry entrepreneurs and 100 wildlife technicians
[42] GIS-based, GPS-centric
[43] The network links DLS, Directorate of Animal Health (DAH), Livestock Service Training and Extension Directorate (LSTED), Veterinary Epidemiology Center (VEC), and five regional directorates.
[44] A total of 30 team members trained. EDITs were attached to 6 regional laboratories (one team per region).
[45] The central office is located in Kathmandu. The eight regional offices are in Nepalgunj, Bhairahawa, Krishna Nagar, Biratnagar, Rani, Birjung, Sirciya, and Birgang Jeetpir.

Project Outputs	Outputs indicated in the PAD	Actual Achievements
	All 24 check posts are provided with transportation and communication equipment Transportation for 8 quarantine patrol teams 2 simulation exercises (added at restructuring) 2 trans-border quarantine workshops organized (added at restructuring)	Instead of check posts, 8 regional quarantine offices provided with equipment by December 31, 2008 Allocated at quarantine offices by December 31, 2008 8 simulation exercises undertaken, two of which were financed by AICP[46] Completed by July 31, 2011
A.3 Laboratory Capacity	BSL3 constructed and operational 7 laboratories upgraded to BSL2 (5 RVLs, NAIDL, TADs) Laboratory scientists and technicians trained 90 percent consistency in test results with OIE reference laboratory	Dropped at restructuring in March 5, 2010 8 laboratories upgraded to BSL2 by July 31, 2011. This includes CVL, which was to be upgraded to BSL3. 32 specialists trained by July 31, 2011 Completed by January 31, 2009
A.4 Field Veterinary Services	75 RRTs trained (one per district) by July 2007	Completed by December 31, 2008. Additional 150 RRTs were trained in high-risk districts on stamping-out operation.
A.5 Compensation Fund	Compensation fund established	Completed by December 31, 2008
Component B. Human Health		
B.1 Surveillance and Laboratory Strengthening	6 guidelines prepared: lab, clinical case management, surveillance, risk communication, infection control, and community/home based case management 250 RRT members in five region trained on the surveillance guideline EWARS functional at 36 sites (additional 8 sites established); 75 trained on the use of rapid diagnostic kits through NPHL NPHL upgraded to BSL2 Laboratory Information Management System (LMIS) upgraded	Completed by December 31, 2008 (revised in October 2010) 423 RRT members trained (250 by July 2009, and an additional 137 by June 30, 2011) Additional 7 sites established by December 31, 2009. 32 sites are reporting. Completed by December 2010 Completed by July 31, 2011, but due to insufficient staffing, no O&M training was undertaken. Completed by July 31, 2011
B.2 Prevention and Containment	3,000 PPEs and anti-viral procured 12 travel advisory health desks established at international airport and major border crossings Communicable Disease Control Act drafted and reviewed	4,750 PPEs (including in-kind 2,250 sets from USAID) and 4,300 courses of antivirals provided by July 2010; additional 2,000 procured to replenish the stock used during H1N1 pandemic by June 30, 2011 Established during the H1N1 pandemic for 6 months in 2009 (April-September) Draft prepared in June 2010 and review is still pending
B.3 Health Care Delivery System Preparedness and Response	380 health care workers trained on case management Isolation wards developed at 6 facilities STIDH as the NRH	377 health care workers trained on case management and infection control by June 2011 Least cost isolation wards established at 11 facilities (project financed 9). These were completed by September 2009. Additional four moderately high cost facilities developed at STIDH and three other referral hospitals by AICP by July31, 2011 Civil work completed by July 31, 2011

[46] Other 6 exercises were financed by USAID/FAO.

Project Outputs	Outputs indicated in the PAD	Actual Achievements
Component C. Communication		
C.1 Animal Health	1,820 community stakeholders trained (poultry farmers, including women) Prevention messages aired on two national level TVs and six FM stations in Nepali Communication materials (20,000 posters and brochures) printed and distributed CSOs mobilized 225 media spokesmen trained 250 security personnel, including border security officers, trained on HPAI Farmers in high risk districts trained in trans-border HPAI orientations	3,300 stakeholders trained by June 30, 2011 Messages aired on one national TV and 26 local FM stations in all 26 high-risk districts throughout the year for three years. Also, messages printed in newspaper 660 times. 400,000 posters and brochures and 1,600 communication tool kits printed and distributed by July 31, 2011 8 CSOs mobilized and trained in risk communication 750 media spokespersons trained by July 31, 2011 1,425 security personnel trained by July 31, 2011 278 traders and farmers trained by quarantine officers by July 31, 2011
C.2 Human Health	Communication strategy developed Communication guidelines and protocol developed Teachers and health workers trained CB-SEP implemented in 8 high-risk districts	(a) Finalized in June 2010. Endorsement by ministries awaited (b) Finalized in September 2010. Approved by ministries in February 2011 (c) 3,000 teachers and 3,000 peer educators trained in 8 high-risk districts (AICP financed training in 5 districts). (d) 180,000 students trained at 3,000 schools in 8 high-risk districts (AICP financed training in 5 districts)
Component D. Project Management		
D.1 Animal Health	SOP developed Legal and regulatory framework reviewed Project team trained in management	5 SOPs developed: containment, surveillance guidelines, quarantine guidelines, laboratory protocol (completed by 2008), and EMP (including waste management – completed by 2007) 3 frameworks reviewed: (i) Veterinary Council Act, (ii) Animal Health and Livestock Service Act 1998, and (iii) Bird Flu Control Order 2007 4 officers trained in procurement between 2007 and 2010.
D.2 Human Health	Project team trained in management	28 project staff had project management orientation

Component A. Animal Health

This component directly contributed to achieving PDOs by: (i) developing an institutional capacity in HPAI surveillance (prevention), (ii) developing five SOPs in stamping- out operation, surveillance, quarantine, laboratory control, and waste management, and reviewing three legal frameworks to enable prevention and control activities (preparedness and planning); and (iii) strengthening DLS capacities in diagnosis and quarantine at central and regional levels, successfully containing 10 HPAI outbreaks in poultry birds, and providing compensation to affected farmers without any delays (response and containment).

Sub-component A.1 Surveillance. This sub-component developed a national random sero-sampling program and collected 50,000 samples from both commercial and backyard poultry

farms in almost four-and-a-half years of project implementation. This was almost 80 percent more than the planned 28,000 samples. The surveillance activities were focused in all 26 high-risk districts by building institutional as well as grass-roots capacities at regional, district, and village levels. More than five thousand one hundred and thirty seven veterinary professionals, para-vets, poultry owners, and wildlife technicians were trained on HPAI prevention and control and bio-security. This exceeded the original target of 3,600 persons by 43 percent. Likewise, about 18,800 villagers were trained in participatory disease surveillance, which also exceeded the original target of 16,000 persons by 18 percent. At the district level, 332 surveyors were trained on intensive surveillance (10 surveyors per high-risk district and four surveyors per medium-risk DITs and an additional 6 mobile surveillance supervision teams. These 12 teams were attached to five regional directorates and DAH in Kathmandu.

Sub-component A.2 Prevention and Containment. Because nine out of 10 HPAI outbreaks in Nepal seemed to have originated from poultry trades with India, it was critical to strengthen quarantine offices.[47] All nine quarantine offices (one central and eight regional[48]). The project expanded physical facilities of all quarantine offices by providing 8 pick-ups, 22 motorbikes, 7 computers, 23 fridges, 2 deep freezers, 33 fumigation pumps and surveillance kits. These facilities, in particular transportation, were originally envisaged for 24 quarantine check-posts at border to strengthen decentralized surveillance and detection. However, they were kept mostly at quarantine offices or District Livestock Service Offices, particularly pick-ups and motorbikes, because of overall lack of transportation facilities at the regional and district levels.

The prevention and containment mechanism was proven successful, as the project contained 10 HPAI outbreaks in poultry birds. It was also tested by eight simulation exercises in collaboration with USAID and FAO (two exercises were financed by AICP). The project also organized two quarantine workshops in Jhapa and Kathmandu. Poultry farmers, traders, livestock officers, public health officers, and other government officers, such as customs, quarantine, and police participated in these workshops. The Indian quarantine officers also participated in the workshop in Jhapa.

Sub-component A.3 Laboratory Capacity. The project enhanced CVL to achieve 90 percent consistency in rapid test results with OIE reference laboratory by mid-2009. AICP also strengthened diagnostic capacities by upgrading all eight veterinary laboratories to BSL2, including CVL, which was originally to be upgraded to BSL3 (cancelled at restructuring). Thirty two laboratory specialists (15 veterinary laboratory scientists and 17 technicians) were trained.

Sub-component A.4 Field Veterinary Services. This sub-component trained one RRT per district for all 75 districts in Nepal on containment, including culling, safe disposal, and stamping out. In addition, 150 RRTs were also trained in stamping-out operations. The establishment of a vaccine

[47] During the HPAI outbreaks in Pokhara (Kaski district in Central Nepal) in January 2010, the RVL (in Pokhara) detected at least two strains: one was sub-clade 2.2, which originated in India or Bangladesh, and another was clade 2.3.2, which was transmitted by migratory birds (the same strain detected in China, Vietnam, and Japan). See the attached link for more information on clades. http://wwwnc.cdc.gov/eid/article/15/3/08-1190-f1.htm

[48] The eight regional quarantine offices are located in Nepalgunj, Bhairahawa, Krishna Nagar, Biratnagar, Rani, Birjung, Sirciya, and Birgang Jeetpir, and each office oversees two to three districts.

bank was planned but the idea was dropped in July 2009 as a result of the technical committee decision.

Sub-component A.5 Compensation fund. The SOP for compensation was developed in January 2007. The rate was set at NRS 100 per poultry (irrespective of age), NRS 0.5 per egg, and NRS 5 per kg of feed. The flat rate for all birds was to facilitate prompt payment, within five days for backyard farmers and 35 days for commercial farmers.[49] The compensation rate, however, had to be revised during the first outbreaks in Jhapa in January 2009. Although the backyard farmers accepted this rate, commercial farmers considered it too low and refused for their flocks to be culled. The rate was, therefore, revised. For the backyard farmers, the project also provided in-kind hybrid chicks. After the outbreak in Pokhara in February 2010, the flat rate had to be revised, because high-value Muscovy ducks were also affected. The farm gate price was NRS 1,050 per duck, which was 63 percent more than a layer (NRS 650 per bird) and three times more than a backyard flock (NRS 335 per bird). The revised rates were: NRS 130 per chicken (backyard or broiler), duck, or pigeon; NRS 100 per kg of poultry meat; NRS 50 per chick (backyard or broiler); NRS 10 per kg of feed; and NRS 3 per egg. Despite the Bank recommendation to increase the compensation rate for the ducks to give farmers more incentive in disease reporting, the GON maintained the flat rate to keep the compensation funds at a moderate level.

In the stamping-out operations to contain 10 HPAI outbreaks, the project destroyed 28,115 poultry, 886 Muscovy ducks, 346 pigeons, 4,512 eggs, 114 kg bird feeds, and 148.5 kg meat. The compensation amounted to NRS 2,912,260 (approximately, US$41,000). For the backyard farmers, the compensation was paid without any delay as it was mostly done by RRT immediately after culling. The affected backyard farmers benefited from the in-kind compensation of hybrid poultry, because they doubled their income from sales of eggs and meat following the HPAI outbreak. A concessional credit was to be provided to commercial farmers for restocking. However, the compensation mechanism did not have accountability measures in place such as farm registration, disclosure or grievance redressal system.

Component B. Human Health

This component directly contributed in achieving PDOs by: (i) enhancing HPAI surveillance and diagnostic capacities (prevention), (ii) developing six guidelines which were tested during the H1N1 pandemic in 2009/2010 and updated (preparedness and planning); and (iii) strengthening DOHS capacities in rapid response at the central and regional levels (response and containment).

Sub-component B.1 Surveillance and Laboratory Strengthening. This sub-component developed six guidelines on surveillance, laboratory, infection control, clinical case management, community/home based case management, and risk communication. These guidelines were tested during the H1N1 pandemic (end-2009 to early-2010)[50] and revised in October 2010. AICP set up human health RRTs, and 423 public health workers were trained on the surveillance

[49] DLS proposed to use the market rate, ranging between 50 and 100 percent of such price depending on the type of birds. The use of market rate appeared problematic in determining the date to fix the price, when the price of poultry meat and eggs continued to drop due to HPAI outbreaks in India and Pakistan in mid-2006. The flat rate follows the India model.

[50] According to WHO, about 220 people were infected by H1N1, but only two died.

guideline, which exceeded the target of 250 workers by 70 percent. Seventy five workers are also trained on the use of rapid diagnostic kits.

In collaboration with WHO, DOHS enhanced the EWARS by establishing seven additional sites (out of 8 planned). EWARS now operates at a total of 35 sites, and 32 sites regularly submit surveillance reports on ILI and Severe Acute Respiratory Illness (SARI).

The NPHL was strengthened and designated as the NIC. The test results were 100 percent consistent with the WHO reference laboratory.[51] The planned construction of public health BSL3 was cancelled at restructuring of March 5, 2010, but NPHL was upgraded to BSL2 and validated. However, due to insufficient staffing, the O&M training was not carried out during implementation. The LIMS was also upgraded.

Sub-component B.2 Prevention and Containment. This sub-component procured 3,000 PPEs and anti-viral as planned. Because these were used during the H1N1 pandemic, an additional 2,000 were procured to replenish the stock. Instead of setting up eight permanent quarantine facilities at major airport and border entry points (land routes), the project established 12 travel advisory health desks during the H1N1 pandemic. A total of 337,563 travelers were screened and 39 suspected cases were identified. It also prepared the Communicable Disease Control Act for which MOHP approval was awaited.

Sub-component B.3 Health Care Delivery System Preparedness and Response. DOHS provided non-pharmaceutical intervention plans to all 75 districts, and 18 districts (24 percent) prepared their own plans with assistance from USAID-supported Humanitarian Pandemic Preparedness (H2P) Project.

STIDH was designated as the NRH. The subcomponent supported establishment of 13 isolation wards and five intensive care units at national and regional response centers and provided equipment to strengthen response capacities. Moderately high cost isolation wards were established at STIDH and three other referral hospitals in Kathmandu (B.P. Koirala Institute of Health Sciences), Bharatpur, and Nepalganj. However, two facilities (STIDH and Nepalganj) were not made fully operational, due to inadequate staffing. The sub-component also established least-cost isolation wards at nine public health facilities in Mechi, Koshi, Janakpur, Narayani, Chitwan, Lumbini, Bheri, Seti and Mahakali districts.

Component C. Communication

This component directly contributed in achieving PDOs by: (i) increasing the level of HPAI awareness by about 30 percentage points to achieve an 82 percent awareness rate (awareness), (ii) developing an HPAI communication strategy (preparedness and planning); and (iii) developing a risk communication model during stamping-out operations (response and containment).

Sub-component C.1 Animal Health. This sub-component far exceeded the planned level of communication outreach. Because it was managed by DLS, these activities adequately supported

[51] In FY 2011/2012, NPHL will participate in the external quality assurance scheme (EQUAS).

containment at the farm level and focused on all 26 high-risk districts. The sub-component trained 3,300 community stakeholders (poultry farmers, including women), 81 percent more than originally planned. Prevention messages were aired on one national TV and 26 local FM stations in 26 high-risk districts[52] and printed in newspaper 660 times. Approximately, 400,000 posters (which far exceeded the estimate of 20,000) and brochures and 1,600 communication toolkits were printed and distributed. About 278 traders and farmers in high risk districts were also trained on quarantine and bio-security.

Based on the lessons learned in managing stamping-out operations, the subcomponent trained 750 media spokespersons on risk communication and disease prevention, which was 3.3 times more than originally planned (225 persons). Likewise, 1,425 security personnel were trained on disease prevention and bio-security, which was 5.7 times more than planned (250 officers). This ensured delivery of correct AI information and prevention messages to affected communities. Although not quantified, AICP also mobilized CSOs in facilitating rapid culling operations (including youth organizations, farmers associations, and political parties). DLS was convinced of the importance of communication, and, has mainstreamed these activities in the Directorate of Extension Services and Training (DEST).

Sub-component C.2 Human Health. This sub-component developed the HPAI communication strategy, which was endorsed by both MOAC and MOPH in June 2010. Communication guidelines and protocols were also developed in September 2010 and approved by the two ministries in February 2011. UNICEF's CB-SEP was implemented in eight high-risk districts, which were Ilam, Jhapa, Sunsari, Morang, Saptari, Chitwan, Nawalparashi, and Banke (AICP financed the program in five districts). CB-SEP trained 180,000 students at 3,000 schools in these districts. UNICEF also mobilized 64 CSOs of women, micro-credit, local ethnic groups, para-legal and/or youth (eight organizations per district) and formed DDCs. About 800 committee members were trained in hand washing, AI prevention, and risk communication.

Component D. Project Management

DLS reviewed and revised three regulatory frameworks in providing overall framework and justification in response and containment activities, including stamping out and compensation: Veterinary Council Act, Animal Health and Livestock Service Act 1998, and Bird Flu Control Order 2007. The Bird Flu Control Order was issued under the Natural Disaster Relief Act 1982 and revised to incorporate lessons learned from the first HPAI outbreak in January 2009. DLS also developed five SOPs. The EMP, including waste management, was developed in July 2006, while the other four SOPs were developed by 2008: containment (revised in 2010), surveillance guidelines (revised in 2009), quarantine guidelines, and laboratory protocol. A total of 32 project staff at DLS and DOHS was trained on project management.

[52] Nepal has 46 national radio stations, more than 75 FM radio stations (at least one per district), and approximately 17 community radio stations. The radio ownership ranges from 44 to 62 percent, and the listenership is estimated at 64 percent in urban and 50 percent in rural populations. On the other hand, the TV ownership is as low as 20 percent in urban and 1 percent in rural populations.

Annex 3. Economic and Financial Analysis

1. Several donor-supported projects were initiated in Nepal as a result of H5N1 outbreaks in the region, since late 2003 outbreaks in South East Asia, including more recently Bangladesh and India. With 24 million chickens and 0.4 million ducks, the Nepalese poultry sector today contributes nearly 3.1 percent to Gross Domestic Product (GDP) and is critical for livelihood of millions of rural households. About 70 percent of the poultry business is organized under commercial farms employing more than 65,000 persons. It constitutes a significant source of income for the rural poor in Nepal. Productivity in the backyard chicken market is very high, particularly in the Terai, Siwalik Hills and deep valleys of mid-hills.

2. Due to the risk posed over the poultry industry and especially over the public health, GON developed a strategic plan in 2006 – the NAIIPPRP – and an operational plan, based on which the US$18.2 million equivalent IDA-assisted AICP was approved. In addition to the AICP, FAO/USAID spent US$1.4 million since 2006; UNICEF spent US$550,000 on AI communications (with US$150,000 from Japan, US$100,000 from DFID and US$300,000 from Canada); and USAID spent about US$200,000 through international non-government organizations (NGOs), investing also on in-kind PPEs to support AI control on human health aspects.

3. While complemented by the achievements from other projects, AICP was instrumental in consolidating and strengthening the country's successful preparedness to contain HPAI outbreaks. This annex outlines and identifies the benefits and costs of these efforts, and presents an economic analysis relating these costs to the most direct benefits identified from project activities targeted at human health and at poultry issues (in terms of economic value loss avoidance). An economic and financial analysis of AICP was not undertaken during project preparation or restructuring of the project.

Project Costs

4. At project closure, AICP costs were about US$14 million from IDA. With parallel projects spending about US$2.2 million, total investments related to AI preparedness and control in Nepal were about US$16 million. GON incremental recurrent costs beyond 2012 were estimated at US$500,000 per year for incremental salaries, materials, and other O&M costs. These investment costs were compared with the value of some quantifiable benefits to assess if the investments were justified and the results are provided below.

Project Benefits

5. Benefits were derived from the development of the project's pandemic preparedness and continued vigilance for heath security, sustained people's livelihood, and ultimately economic development. For quantifying these benefits two scenarios were considered ("With" and "Without" Project) in order to measure, from the difference between scenarios, the loss avoidance and costs related to the damages from the disease.

6. **Poultry Sector Project Benefits.** With about 22 million poultry in Nepal in 2010 and more than 70 percent of poultry in large commercial enterprises producing meat and eggs, the

project's impact on the poultry industry was a significant decrease in the number of poultry infected and/or culled during the HPAI outbreaks and thus, the number of poultry deaths. Losses avoided included: (i) the value of poultry meat production losses avoided; and (ii) the economic value of egg production loss avoidance plus the value of the layer birds at the end of their productive life. Average value of live bird farm gate price of NRS 255 was used, multiplied by the number of broiler deaths averted, assuming that 50 percent of chicken deaths would be broilers. An average 154 eggs/bird/year, multiplied by the farm gate egg price of NRS 0.80/egg and the number of layer deaths avoided, assuming that 50 percent of deaths are layer hens, plus the meat value of a layer hen at the end of her productive life (set at 50 percent the value of a broiler) multiplied by number of layer deaths avoided (assuming that 50 percent of chicken deaths are layers) allowed for estimating the project benefits.

7. The avoidance of the cost of culling and replacement programs under both scenarios was also included resulting in an additional benefit. At the time of the 2010 outbreak, the GON compensation per bird was NRS 100 per bird for losses, which represented only 17.8 percent of the average cost for SOP application in the ten Nepalese outbreak sites occurring in 2009 and 2010. From the calculation of the ten situations with varied poultry population, the average cost of stamping out one bird was around NRS 680 and the percentage share of the different activities involved were; hired transport 11.3 percent, cost of equipment and drugs 31.2 percent, salary and wages 31.5 percent, compensation to farmers 17.8 percent and contingency 7.6 percent. Based on these costs, for the present analysis, SOP cost of US$10 was considered for the culling and associated costs. Project results based on these assumptions are presented below.

8. **Human Health Project Benefits** were not quantified although the project has also a significant impact by preventing, until now, the spread of the disease; and in the future, by potentially decreasing (or hopefully completely avoiding) the percentage of the human population infected by HPAI. Losses avoided would result in this case, from reducing the number of hospitalizations and the number of deaths attributed to HPAI[53]. Benefits could thus be also expressed in terms of loss avoidance, and include the economic value of: (i) hospitalization costs averted, (ii) avoidance of income loss from days lost due to illness, and (iii) income loss avoidance from fatal HPAI cases (average value of remaining lifetime earnings expressed as the present value of annual take-home income over an average 15 years discounted at 12 percent). Another major unquantifiable project benefit is that the program put in place - in response to the HPAI project - a strengthened country's preparedness program to respond not only to future outbreaks of HPAI outbreaks, but also of other zoonoses and highly infectious diseases, especially through the implemented communications and awareness programs, as well as the training and capacity building. This was demonstrated during the H1N1 outbreak in 2009

[53] The affected human population (Gross Attack Rate) for an outbreak of HPAI could be estimated at a percentage of the population being hospitalized and a percentage of death for those affected both under the "Without Project" and the "WithProject" scenarios. However, these parameters are difficult to estimate, and it was not possible to obtain practitioners to provide estimates because of inadequate and incomplete statistical data and information to base their estimates. For the economic analysis, the economic value of human health losses avoided was therefore not considered.

and 2010 to which the general population as well as the medical specialists reacted very calmly because the health system had the experience, information and means to cope with the situation[54].

9. **Other Possible Non-quantified Benefits** are (i) an avoidance of a decrease in GDP growth; (ii) the avoidance of an increase in foreign exchange requirements for imports of poultry meat and eggs (and possibly other substitute food products) during the crisis period; and (iii) the avoidance of economic losses to consumers because of price increases (cross-price elasticity effects) for other livestock products. These were not analyzed because of data constraints. However, the effects in terms of economic losses are likely to be very high due the importance of tourism in the Nepalese economy.

10. **The scenarios** for the analysis:

- Under the "With Project situation" the infection rate during the 2009-2010 outbreaks GAR of HPAI resulted in about 0.3 percent of the poultry population infected and/or culled because the project had been adequately implemented and a preparedness system was in place, and worked properly. On this base, this scenario assumed that GAR would affect 0.3 percent of the poultry population every year, but its spread would be contained and controlled as was the case in the 2009-2010 outbreaks[55].
- In the "Without Project scenario" it was assumed that the 2009-2010 outbreaks would have had a huge level of infection that could have resulted in an infected/culled rate of 17 percent of the poultry population with 100 percent mortality of the birds involved. These estimates are based on what actually happened during the 2003-2004 outbreaks in Vietnam - with no preparation – where about 45 million birds (17 percent of about 265 million) either died from HPAI or were culled[56]. Although not every bird culled might be infected by HPAI, the recommended practice is to slaughter all birds in a flock or village where an outbreak is confirmed. For purposes of analysis, thus, all birds culled are deemed to have been infected and killed as a result of the HPAI outbreak.

[54] The awareness campaign through TV and radio targeted high risk districts at border areas, and a Trans-border Workshop for quarantine and security officers was conducted at the Nepal-India border.

[55] The mortality rate remains 100% for the infected birds: the project did reduce the number of poultry deemed to be infected because of the improved diagnostic and detection capacity and the ability to contain outbreaks, but it may not decrease the mortality rate once a flock is infected. For now, Nepal appears to be holding bird flu at bay, but no one can assure it will stay that way. The control measures help, but illegal poultry trade poses a risk of reintroduction of the virus.

[56] There have been three main waves of outbreaks in Vietnamese poultry since late 2003, with 93 confirmed human cases and 42 deaths: (i) from December 2003-March 2004, 45 million poultry were culled and 27 human cases were reported, 16 of which were fatal. At the peak of the epidemic in early 2004, around 24 percent of Vietnam's communes and 60 percent of towns were affected, in 57 out of Vietnam's 64 provinces. Seventeen percent of the poultry population died or were culled. Scattered outbreaks and a small number of human cases continued through November 2004; (ii) from December 2004 to March 2005, 2 million poultry were culled and 64 human cases (21of which were fatal); (iii) from October to December 2005, 4 million poultry were culled and 2 human cases were reported. Around 8 million of Viet Nam's 11 million households were estimated to be engaged in poultry production prior to 2003. It is estimated that the direct economic impact of HPAI amounted to about 0.12 percent of Vietnam's GDP in 2004 alone, representing the net effect of the negative impacts on the poultry sector compensated to some extent by the increase in substitute livestock production. The total cost of the epidemic in the first two years has been estimated to be around US$630 million.

11. The "With Project" scenario estimates that 0.3 percent of the poultry population could be infected every year and would die from HPAI or be destroyed by GON order, while "Without Project" it was assumed that – as in the case of Vietnam – 17 percent of the birds would have been culled after the 2009-2010 outbreaks. It was also assumed that without the project, after the outbreaks the GON would have then reacted by implementing an AICP starting in 2010. For the analysis, the value of poultry losses avoided was calculated with the assumption that an HPAI outbreaks would occur every year from 2009 onwards, mainly due to illegal imported birds, using the above mentioned GAR and other parameters. These parameters are considered as likely during a severe outbreak of HPAI in the poultry industry, as happened in Vietnam without project in 2004-2006.

Economic Rate of Return and Sensitivity Analysis

12. The analysis related AICP costs to the benefits from the economic value stream of losses avoided from project activities in the poultry industry - expressed as the expected value of the economic loss avoided from outbreaks in a 7-year period (2008-2014). Project benefits are assumed to remain realizable over the period and beyond, attributable to the project expenditures on laboratories, equipment and awareness programs and the increase in human capital from the project's training activities. The market prices used for poultry products are considered to be economic prices, because the markets, for the most part, operate freely without production quotas and subsidies for poultry or poultry inputs. Wages and other market prices used in the analysis are also assumed to be economic prices. Under the "Without Project" scenario it was assumed that after the 2009-2010 outbreaks - with about 17 percent of the poultry population being lost - the GON would have immediately implemented an AICP to contain further outbreaks. Consequently, by 2014 after its completion the "with" and "without" situation would become the same in terms of preparedness, control and results.

13. Table 1 below presents the project's costs, benefits and results of the economic analysis based on the above assumptions and parameters for the poultry sector losses avoided. The results are highly robust, with a 311 percent ERR and NPV of US$34.8 million. The results did not quantify the human health benefits, the economic value of human health and life loss avoidance.

14. A sensitivity analysis concerning the GAR in the poultry sector in the "Without Project" situation during the 2009-2010 outbreaks was undertaken, and results are shown below. The economic returns to the AICP are highly robust, even under highly conservative parameters (1 percent of GAR under the 2009-2010 outbreaks) that severely restrict the benefit estimations. It clearly confirms that from an economic point of view, project was worth undertaking.

Table 1: Economic Returns and Sensitivity Analysis

	GAR by HPAI		AICP Returns	
	Without Project	**With Project**	**ERR**	**NPV (US$ million)**
Base Case	0.3%	17%	311%	34.8
Scenario 1	0.3%	10%	176%	18.2
Scenario 2	0.3%	5%	89%	9.4
Scenario 3	0.3%	2%	42%	4.5
Scenario 4	0.3%	1%	29%	2.8

Table 2 NEPAL: Economic Analysis of the Avian Influenza Control Project

	Unit Cost US$/unit	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15-21/22
WITH PROJECT									
Total Project Costs - US$ 000		1000	5000	5000	5000	2200	500	500	500
Other AI investments 1/		500	500	500	500	300	100	100	100
No. of Outbreaks		0	0	8	8	8	8	8	8
Birds Culled	0.3%	0	0	66.325	66.325	66.325	66.325	66.325	66.325
Cost of Culling Birds - US$ 000	10.00	0	0	663	663	663	663	663	663
Foregone Value - US$ 000									
Commercial Enterprises				**397**	**397**	**397**	**397**	**397**	**397**
Broilers (70%)	4.00	0	0	149	149	149	149	149	149
Layers (20%)	5.00	0	0	53	53	53	53	53	53
Other (10%)	1.28	0	0	7	7	7	7	7	7
Eggs (285 per layer)	0.10	0	0	189	189	189	189	189	189
Household Backyard				**66**	**66**	**66**	**66**	**66**	**66**
Broilers	4.00	0	0	27	27	27	27	27	27
Layers	8.00	0	0	11	11	11	11	11	11
Other	2.00	0	0	11	11	11	11	11	11
Eggs (70 per layer)	0.12	0	0	18	18	18	18	18	18
Costs due to HPAI WITH PROJECT - US$ 000		**1,500**	**5,500**	**6,626**	**6,626**	**3,626**	**1,726**	**1,726**	**1,726**
WITHOUT PROJECT									
Total Project Costs - US$ 000		0	0	1,000	5,000	5,000	5,000	2,200	500
Other AI investments 1/				500	500	500	500	300	100
No. of Outbreaks		0	0	50	20	10	8	8	8
Birds Culled	17%	0	0	3,074.000	220.000	100.000	66.325	66.325	66.325
Cost of Culling Birds - US$ 000	10.00			30,740	2,200	1,000	663	663	663
Foregone Value - US$ 000									
Commercial Enterprises				**18,421**	**1,318**	**599**	**397**	**397**	**397**
Broilers (70%)	4.00	0	0	6,886	493	224	149	149	149
Layers (20%)	5.00	0	0	2,459	176	80	53	53	53
Other (10%)	1.28	0	0	315	23	10	7	7	7
Eggs (285 per layer)	0.10	0	0	8,761	627	285	189	189	189
Household Backyard				**3,040**	**218**	**99**	**66**	**66**	**66**
Broilers	4.00	0	0	1,230	88	40	27	27	27
Layers	8.00	0	0	492	35	16	11	11	11
Other	2.00	0	0	492	35	16	11	11	11
Eggs (70 per layer)	0.12	0	0	826	59	27	18	18	18
Costs due to HPAI WITH PROJECT		**0**	**0**	**53,700**	**9,236**	**7,198**	**6,626**	**3,626**	**1,726**
Net Benefits		**-1,500**	**-5,500**	**47,074**	**2,610**	**3,572**	**4,900**	**1,900**	**0**

Economic Rate of Return =	**311%**
Net Present Value (12% discount rate) =	**$34,810**

Other investments include:

(i) Animal Health:	FAO	US$ 1.4 million (from USAID between 2006 and 2012)
(2) Human Health:	USAID	in-kind PPEs
(3) Communication:	UNICEF	US$ 550,000 (US$ 150,000 from Japan; US$ 100,000 from DFID; and US$ 300,000 from Canada)
	USAID	US$ 200,000 (for international NGOs)

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Kiran R. Baral	Senior Procurement Officer	SARPS	Procurement
Sundararajan Srinivasa Gopalan	Senior PHN Specialist	SASHN	Co-TTL
Hiroko Imamura	Consultant	LEGES	Legal
Lalima Maskey	Country Program Assistant	SACSA	
Bigyan B. Pradhan	Sr Financial Management Specialist	SARFM	FM
Bilal H. Rahill	Senior Manager	CESI2	
Tirtha Rana	Consultant	SASHD	
Daniel M. Sellen	Sector Leader	AFTAR	TTL
Kishor Uprety	Sr Counsel	LEGES	Legal
Ram Prakash Yadav	Agri. Economist (Consultant)	SASDA	Poultry Sector
Supervision/ICR			
Norman Bentley Piccioni	Lead Rural Development Specialist	SASDA	TTL
Purna Bahadur Chhetri	Sr Rural Development Specialist	SASDA	Safeguards
Kiran R. Baral	Senior Procurement Officer	SARPS	Procurement
Philip Beauregard	Senior Counsel	LEGAF	Legal
Drona Raj Ghimire	Environmental Specialist	SASDI	Safeguards
Sundararajan Srinivasa Gopalan	Senior PHN Specialist	SASHN	Health
Albertus Voetberg	Lead Health Specialist	SASHN	Health
Manav Bhattarai	ETC	SASHN	Public Health
Bigyan B. Pradhan	Sr Financial Management Specialist	SARFM	FM
Sushila Rai	Program Assistant	SASHD	
Tirtha Rana	Consultant	SASHD	Public Health
Shyam Sundar Ranjitkar	Consultant	SASDA	Animal Health
Nastu Prasad Sharma	Public Health Spec.	SASHN	Co-TTL
Tara Shrestha	Program Assistant	SASDO	
Miki Terasawa	Social Development Specialist	SASDS	Communication, ICR
Lilac Thomas	Program Assistant	SASDO	
Nadia Islam	Program Assistant	SASDO	
Mohinder Mudahar	Economist (Consultant)	SASDA	ICR

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	US$ '000 (including travel and consultant costs)
Lending		
FY06	11.77	59.02
FY07	17.43	115.21
Total:	29.20	174.23
Supervision/ICR		
FY07	4.40	29.03
FY08	21.62	96.42
FY09	16.98	41.49
FY10	20.01	59.53
FY11	21.18	88.27
FY12	5.92	46.74
Total:	90.11	361.48

Annex 5. Beneficiary Survey Results

1. The KAP survey was conducted in early-2011 in selected five high-risk districts (Ilam, Jhapa, Morang, Sunsari, and Chitwan), where UNICEF implemented the CB-SEP. Almost 770 families participated in a household survey, including 3,070 school children, in both intervention and non-intervention Village Development Committees (VDCs). In addition, 200 students, teachers, poultry farmers, village leaders, health workers, social workers, and political leaders participated in 20 focus group discussions at district and village levels. The survey was conducted by UNICEF, in collaboration with the NHEICC under the MOHP.

2. **School children.** Almost all children in the intervention and non-intervention VDCs reported that they washed their hands regularly (99.3 percent in non-intervention and 99.4 percent in intervention areas). While only 16.2 percent of respondents in the intervention areas washed their hands after sneezing at baseline, 93.5 percent of them did so at end of the project. In the intervention areas, more children washed hands after touching birds, from 55.4 percent at baseline to 94.2 percent at the end of the project.

3. The children in the intervention VDCs are more knowledgeable of the signs and symptoms of pandemic influenza: 86.6 percent indicated coughing; 86.6 percent indicated sore throat; and 89.1 percent indicated fever. In the non-intervention areas, 51.0 percent responded coughing, 16.3 percent did sore throat, and 83.7 percent did fever.

4. Similarly the knowledge of 4 major prevention methods of pandemic influenza is also increased among the children across the districts. The study showed that the percentage of respondents who could identify the 4 major prevention methods of pandemic influenza from the non-intervention VDCs were, covering nose and mouth while sneezing and coughing (23.2 percent), one meter distance from sick person (15.2 percent), use of mask (33.3 percent) and washing hands with soap and water (11.1 percent). The children from the intervention mentioned the 4 key preventive measures were covering nose and mouth while sneezing and coughing (92.6 percent), one meter distance from sick person (88.2 percent), use of mask (89.0 percent) and washing hands with soap and water (81.6 percent). The hand washing, use of mask, avoiding crowd and coughing messages was key massage during intervention and led to improvement in knowledge about key indicators among intervention area.

5. The survey describes the source of information on bird flu and revealed that 47.5 percent respondents from non-intervention VDC and 49.2 percent respondents from intervention VDC received information about bird flu on the radio while 66.2 percent respondents form non-intervention VDC and 78.4 percent respondents from intervention VDC received information from TV. Similarly 22.7 percent from non-intervention VDC and 29 percent from intervention VDC received information from health workers. Similarly, reading materials were also found to be a source of information for children since more than 40 percent of the children mentioned that books are also one of the major sources of information for them in both intervention and non-intervention VDCs. Further,

teachers, health worker and family members also mentioned children as a source of information. As part of the media habit, the children were also asked about language in terms of easy to read, write and understand. The majority of the children both from non-intervention and intervention VDCs mentioned Nepali (86.6 percent non-intervention and 92.7 percent in intervention VDCs) on any issues. This was followed by Maithili and Tharu, which can also be used in some parts of the districts to reach hard to reach communities.

6. **Household members.** The hand washing knowledge and practice among the farmers is 100 percent in both the non-intervention and intervention VDCs. Similarly the hand washing practice after touching poultry was also about 44.0 percent and 90.0 percent in non-intervention and intervention VDC respectively.

7. The knowledge of backyard farmer and their families on 3 key measures to prevent bird flu was high in intervention VDCs. Only about 20 percent of farmers among non-intervention VDC and 80 percent of farmers among intervention VDC report to a veterinary doctor or call them if chickens get sick. Nearly 27.1 percent of farmers from non-intervention VDC and 75 percent of farmers among intervention VDC separate sick and healthy birds. Almost 33 percent of farmers from non-intervention VDC and 91.2 percent from intervention VDC stated that bird flu can be prevented by discouraging illegal importation and movement through restriction of entry of sick birds from the infected area. The knowledge on three major sign and symptoms was also relatively low among families. Regarding the knowledge of signs and symptoms of pandemic influenza, coughing (17.8 percent), fever (31.5 percent), and sore throat (15.1 percent) were considered signs and symptoms of pandemic influenza among backyard farmer families in non-intervention VDC. However, in intervention VDC, coughing by (92.5 percent), fever (91.2 percent), and sore throat (87.5 percent) were considered signs and symptoms of pandemic influenza.

8. The majority of farmers stated that covering the face while coughing and sneezing (17.8 percent in non-intervention VDC and 84.8 percent in intervention VDC) and use of mask (45.2 percent in non-intervention VDC and 79.7 percent in intervention VDC) can prevent pandemic influenza. Regarding the social measures to control pandemic influenza, about 17.8 percent of farmers from non-intervention VDC and 82.3 percent of farmers from intervention VDC stated that by avoiding crowding can prevent epidemic of pandemic influenza. The four measures to prevent pandemic influenza must be a priority for the communication intervention to educate the families on pandemic influenza. In both intervention and non-intervention VDCs the information is inadequate for the families on pandemic influenza.

Annex 6. Stakeholder Workshop Report and Results

DLS organized a Stakeholder Workshop in June 2011. About 100 people participated in the workshop, including MOAC representatives, DLS Officers, poultry associations, FAO and the World Bank. Summary of discussion, including lessons learned, was as follows:

- The participants congratulated the project's achievements in successfully containing 10 AI outbreaks in poultry.
- Communication is critical in preventing and controlling the spread of AI outbreaks. The project developed a communication package targeting poultry farmers. In controlling future outbreaks, DLS mainstreamed the communication activities under the training and extension directorate.
- Rapid response was facilitated by cross-sectoral cooperation at the district level. There was a high level of cooperation among media, local governments, CSOs (such as local political parties and youth associations), and the public health sector in stamping out operations. The partnership with media, in particular, ensured transparency by providing the correct information.
- Compensation in cash and in-kind enhanced livelihoods of backyard farmers. The affected backyard farmers promptly received cash and later hybrid birds. As a result, these farmers almost doubled their income with the sales of eggs and meat. However, the commercial farmers have not yet fully regained their stock. They took cash but not in-kind compensation.
- The project had high level support and ownership from MOAC and DLS throughout project implementation.
- It was suggested that MOAC strengthen: (i) diagnostic capacity by establishing BSL3, (ii) bio-security at commercial farms, (iii) risk communication, and (iv) epidemiology.

Annex 7. Summary of Recipient's ICR

1. With the arrival of highly pathogenic HPAI in neighboring countries, India and China in 2006, the threat to Nepal significantly increased, as the country shares a long and porous border with these countries. In early 2006 the GON endorsed NAHIPPP, which was a joint human and animal health plan providing a strategic framework to prepare for and respond to this threat. As a results, an implementation plan was developed to enhance animal and human health, and communication. The GON requested the support of the World Bank (IDA) to finance AICP to be implemented over a four-year period from FY2007/2008 to FY2010/2011 at an estimated cost of US$18.20 million or NRS 1.33 billion.

2. The overall objective of AICP was to minimize the threat posed by HPAI in Nepal by: (i) controlling such infections among birds, especially domestic poultry and (ii) preparing for, controlling, and responding to possible human infections, especially an influenza epidemic and related emergencies. AICP envisaged three types of interventions: (i) prevention, (ii) preparedness and planning, and (iii) response and containment in case of AI outbreaks. The projects closed on July 31, 2011 in all its four components: (i) Animal Health; (ii) Human Health; (iii) cross-cutting communication and (iii) Implementation Support and Monitoring and Evaluation.

3. **Implementation.** The GON also requested FAO to assist in the implementation of the animal health component of the project by providing technical assistance and equipment provision under an agreement which covered the period from August 2008 to July 2011. FAO's technical assistance focused on the following sub-sectors of AICP program:

- Design and monitoring of construction of a BSL3;
- Surveillance and epidemiological investigation;
- Strengthening of animal quarantine services;
- Strengthening of the capacity of veterinary laboratory work;
- Strengthening of veterinary field services; and
- Project management

4. Although the design for the BSL3 laboratory was produced but this component of AICP program was dropped on the recommendation of a World Bank MTR. Consequently, the project concentrated on enhancing bio-safety and technical capacity at CVL and regional laboratories. This was facilitated through an extensive program of technical assistance inputs, capacity building and specialized equipment provision. CVL is now fully capable of a wide and detailed range of HPAI diagnostic techniques, including molecular virology and virus sequencing.

5. The capability of the veterinary epidemiological centre has been expanded through the introduction of tools that facilitate animal disease data management (TAD info) and visualizing data through mapping (GIS) combined with Information Technology (IT) hardware and software provision. Risk analysis has been conducted and active surveillance for HPAI developed through a targeted disease searching process.

6. Communications have been supported through technical assistance leading to improved awareness of HPAI among poultry farmers with the aim of improving passive surveillance through reporting of disease by owners. The cross-cutting communication component was implemented by UNICEF on a tripartite agreement between the DOHS under MOHP, and DLS under MOAC is a part of the AICP in both the Human Health and Animal Health Component of the project.

7. The GON rates the project outcome satisfactory, but the risk to development outcome is significant. The Bank and GON performance was both rated satisfactory. The project achieved the following:

- AICP has been the major player in supporting GON's activities preparing for and counteracting the incursion of AI into Nepal. The Animal Health component has been actively and substantially supported by the sub-project covered by the agreement between FAO and GON.
- The processes established through AICP to develop and strengthen the capability of DLS in preventing, detecting, diagnosing, containing and eliminating HPAI should be preserved and further developed to encompass other trans-boundary diseases and emerging infectious diseases, and particularly those with zoonotic potential and thus broaden the approach to sustainable animal health systems.
- Through training and equipment provision, GON has been provided with many of the tools required to further advance epidemiology and surveillance under DOH. This has included the introduction of TAD info software package to improve DLS's ability to manage data gathered on livestock diseases more efficiently. Departmental willingness to adopt the system more widely and to integrate the system currently used for OIE data reporting could be stronger and further advocacy in this area is indicated. GIS training also emphasized integration with TAD info and VEC's capability has been strengthened through upgraded software, computer and UPS provision and the supply of a color printer, digital maps of 74 districts and 6 GPS handsets. It should be noted that, with advances in the understanding of the epidemiology of the viruses concerned, the recommended approach to HPAI surveillance has also progressed and for that reason the project has moved towards developing a scientifically based disease searching approach to active surveillance and discouraged the collection of serum samples from healthy chickens.
- FAO has fully played its part in analyzing the effectiveness of border controls to prevent entry of HPAI, and has advocated modifying the present strategy towards one which more readily accepts the realities and encourages cross-border cooperation and communication together with engagement with relevant stakeholders and traders. Although reliance on physical border control was emphasized in the project agreement with FAO, this is unrealistic and the current scientific opinion supports risk analysis and management through cross border cooperation between relevant authorities, including traders and producers, and acceptance that with a long porous and un-patrolled border alternative strategies have to be explored.

- AICP's interactions in the area of laboratory services has been massive and has resulted in increased competence and improved confidence in the diagnostic capacity of CVL and RVLs. However, more needs to be done in the areas of laboratory equipment maintenance, the management and procurement of consumables for both HPAI diagnostics and differential diagnostic needs. The regional laboratories are capable of doing more detailed diagnostic work and should be so engaged.

8. **Lessons learned.** The following summarizes key recommendations and lessons learned.

- Surveillance directed at HPAI lends itself to adaptation to the detection of other major economic and zoonotic diseases and this should be considered by DAH and VEC in order to justify the considerable cost of effective surveillance.
- Maximum advantage should be taken from the positive outcomes of AICP to demonstrate to GON decision makers, particularly and the Ministry of Finance (MOF), the importance of the livestock sector in general and the poultry sector in particular to the livelihoods of a significant proportion of the rural population and to the economic health of the country as a whole.
- AICP's activities in the field have unearthed an immense number of individuals and households who are entering small scale commercial poultry production with inadequate knowledge and experience of husbandry practices relating to housing, nutrition, management and marketing of poultry which in many cases leads to excessive losses and poor production. There is a significant pool of technical capacity in and around Chitwan district and the veterinary faculty at Rampur which could be engaged to develop and multiply a force of poultry extensionists to support and guide this expanding trend.
- The policy relating to cross border trade should be reviewed and, rather than a blanket ban, a strategy of defined entry points with minimum facilities for inspection of live birds should be considered. The entry points should be operational throughout daylight hours (at least) and manned by uniformed quarantine office staff with powers to detain birds or refuse entry, and equipped and trained to conduct rapid antigen tests for HAPI and ND and in the collection and dispatch of laboratory samples for further testing. The aim would be to work with traders and facilitate entry at those points while maintaining a prohibition elsewhere backed up by regulations. A mechanism must be in place to ensure no unauthorized charges are levied at the inspection points. The legislation banning direct cross border importation of poultry and poultry products from India should be amended to reflect this change.
- Internal movement control and inspection points need to be made effective and can operate in the same manner as described above for cross border inspection points. Signs displayed at inspection points, border or internal, should clearly indicate that charges are not to be levied and give a telephone number, ideally toll free, as in the case of the system operated by DAH bird flu monitoring cell, where contravention of this rule may be alerted.
- Passive surveillance should be encouraged. Communications should be given more emphasis within the DLS and awareness campaigns stressing the advantages

of interaction with the field service staff promoted. Field staff in turn must be encouraged to communicate effectively with poultry keepers to address their demands and needs and to diligently investigate rumors of poultry mortalities. Rapid testing at DLS labs and by surveillance teams should be considered with appropriate safeguards.

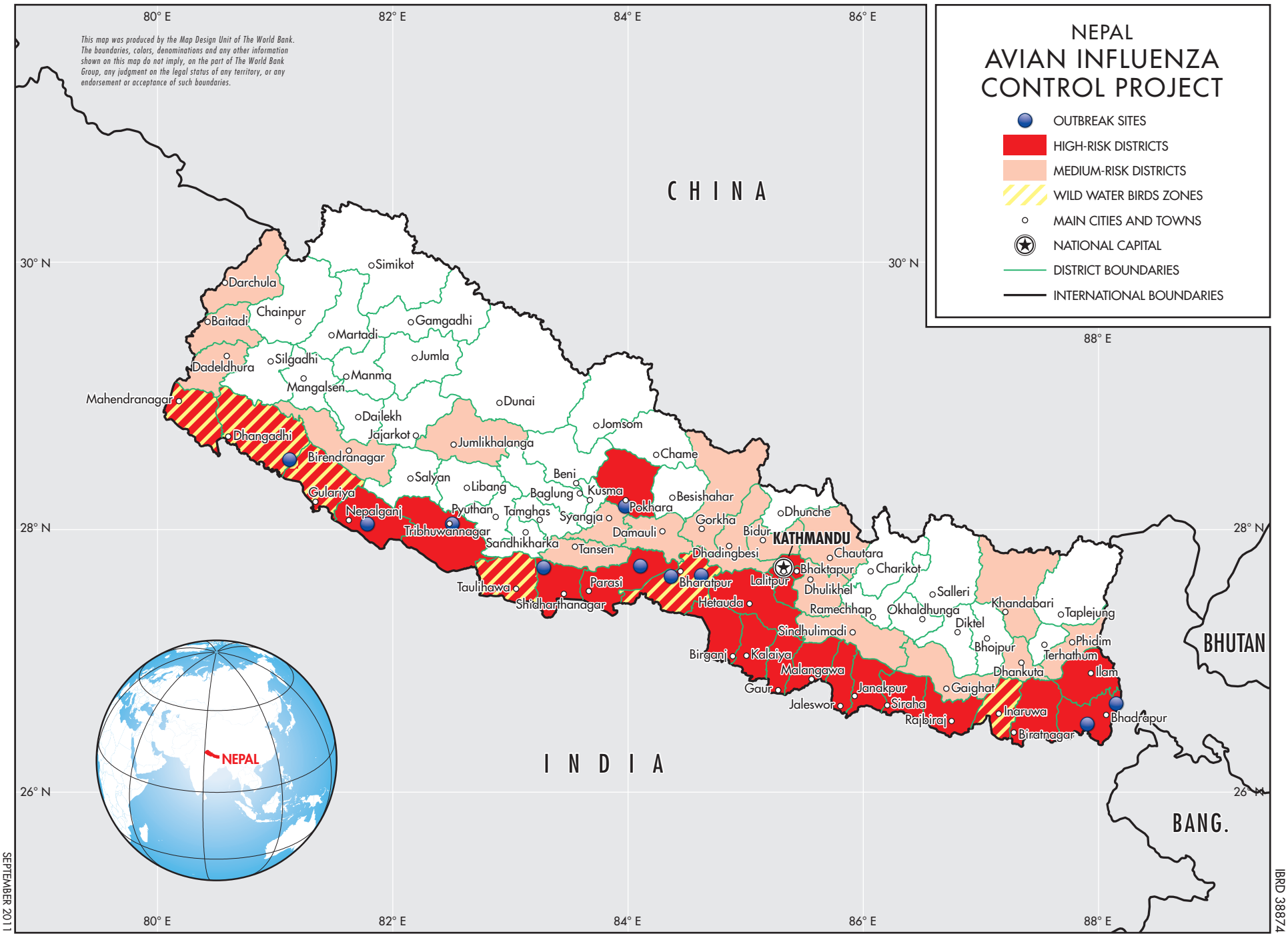
- Active surveillance must be closely targeted in order to arrive at a process that is affordable and sustainable while retaining sufficient sensitivity. The interface between field technician and farmer must be optimized through training in participatory rural communications, reinforced periodically.
- Maximum advantage should be taken of the high quality staff at RVLs to expand the range of poultry diseases which they can diagnose, always with safeguards, to ensure cases are not missed. A continuous training program for RVL officers and laboratory technicians should be developed by CVL.
- A major problem at the moment is the failure of CVL to provide those who submit of samples for diagnosis with any response. The target should be for an immediate response for HPAI and ND with an indication of what further examinations are being carried out, where these are negative, and at least initial bacteriological and pathological results within 96 hours accompanied by advice on management and treatment. Failure to provide these results discourages farmer cooperation.
- Continued training for VEC officers is recommended to maintain and expand capability in risk assessment, management and reduction and to keep them up to date with surveillance techniques.
- The DLS may benefit from greater collaboration with the private sector both in developing sustainable approaches to disease detection and containment, and to jointly lobby GON to ensure wider understanding of the value of animal health services as well as its "public good" role, so that realistic budgets are set for key activities such as surveillance and laboratory operation.
- The DLS should also seek to improve links with the public health services, agencies dealing with wildlife and other relevant agencies recognizing that under a "One Health" banner disease control programs may be more efficient and carry more weight in negotiations with GON.
- Even though there had been provision to hire a private firm for M&E, importance focused on the technical side and, as a result, AICP suffered in reporting the progress on technical implementation and evaluation the report in a timely manner.

Annex 8. Comments of Co-financiers and Other Partners/Stakeholders

The draft ICR was distributed to all the partners/stakeholders who have been actively involved in different aspects of HPAI in Nepal and have been working closely with the World Bank. They found the draft ICR report acceptable but did not provide any specific comments. Overall, partners/stakeholders were pleased that both the GON and the Bank promoted their involvement in all issues related to HPAI and recognized their valuable contribution.

Annex 9. List of Supporting Documents

- Technical Annex (Project Appraisal Document)
- Restructuring Papers
- Standard Operating Procedures – containment, surveillance guidelines, quarantine guidelines, laboratory protocols, and environment management plan (waste management)
- Communication Strategy 2010
- Progress Reports
- Aide Memoires and ISRs following supervision missions
- Management Letters
- Project Work Plans
- Nepal Interim Strategy Note (ISN) FY08-09, FY10-11
- Integrated National Avian and Pandemic Influenza Response Plan
- Program Framework Document for a Global Program for Avian Influenza Control and Human Pandemic Preparedness and Response, December 5, 2005
- OIE, "Evaluation: Performance of Veterinary Services (PVS) in Nepal", November 2008
- UNICEF, KAP Surveys at Baseline (2008) and End-of-project (2011)
- UNICEF, Annual Reports on Cross-cutting Communication Avian Influenza Control Project (2008, 2009, 2010, and 2011)
- Mount Digit Technology, "Inception Report on Socio-Economic Analysis of Stamping Out Operation", May 2011
- Mount Digit Technology. "Economic Analysis of Stamping Out Operation" (no date)
- Second Quality Assessment of the Lending Portfolio (QALP-2) Report, August 2010
- Pathak, P., "Control and Containment of HPAI in Nepal (Lessons Learned)", presented to the Bank mission in June 2011
- DLS, "Surveillance System, Laboratory Strength, and Outbreak of Avian Influenza", presented to the Bank mission in June 2010
- Government ICR (included here)



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