PREVENTION AND CONTROL OF AVIAN AND HUMAN PANDEMIC INFLUENZA IN MYANMAR (PHASE II)

INDEPENDENT COMPLETION REPORT

OSRO/MYA/601/AUL

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AID ACTIVITY SUMMARY

Aid Activity Name	Phase 2: Prevention and Control of Avian and Human Pandemic Influenza
AidWorks initiative number	OSRO/MYA/601/AUL
Commencement date	June 2009
Completion date	February 2012
Total Australian $	WHO 1,000,000 USD FAO 1,015,994 USD
Delivery organisation(s)	World Health Organization Food and Agriculture Organisation
Implementing Partner(s)	Department of Health, Ministry of Health, Government of the Union of Myanmar Livestock Breeding and Veterinary Department, Ministry of Livestock and Fisheries, Government of the Union of Myanmar
Country/Region	Myanmar/ASEAN
Primary Sector	Human Health Rural Development (Livestock)

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ACRONYMS AND ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
AHI	Avian and Human Influenza
AHNPP	Animal Health National Priority Plan 2011 – 2015
ASEAN	Association of South-East Asian Nations
AusAID	Australian Agency for International Development
CAHWs	Community Animal Health Workers
CEU	Central Epidemiology Unit
CPF	Country Priority Framework
CTL	Country Team Leader
DMC	Department of Medical Care
ECTAD	Emergency Centre for Tran boundary Animal Diseases
FAO	Food and Agriculture Organisation of the United Nations
FETP	Field Epidemiology Training Programme
FETPV	Field Epidemiology Training Programme for Veterinarians
GoMy	Government of Myanmar
H5N1 HPAI	H5N1 Highly Pathogenic Avian Influenza
HPAI	Highly Pathogenic Avian Influenza
MLF	Ministry of Livestock and Fisheries
NCD	Newcastle Disease
NGO	Non-Government Organisation
NIC	National Influenza Center
NHL	National Health Laboratory

ODA	Official Donor Assistance
OIE	Office International des Epizooties (World Organisation for Animal Health)
PVS	Performance of Veterinary Services
RAP	FAO Regional Office for Asia and the Pacific, Bangkok
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
UVS	University of Veterinary Science
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

PROJECT BACKGROUND

Highly pathogenic avian influenza (HPAI) H5N1 continues to be a threat to poultry and human health in the South and South East Asia region, including Myanmar. The country is at risk of virus introduction through cross border movements of poultry as the virus is endemic in two of its neighbouring countries, China and Bangladesh. Since its first event in May 2006, Myanmar has experienced 6 waves of H5N1 outbreaks distributed across both Upper and Lower Myanmar ranging in farm poultry, backyard chickens and local birds. To date there has been one human case of H5N1 which was treated successfully (2007).

The sporadic occurrence of this disease is typical of some countries where the virus is not endemically circulating in poultry but is occasionally introduced. For this reason Myanmar has been challenged to develop a cost-effective and sustainable strategic approach to manage the sporadic introduction of the virus and prevent amplification into larger and more entrenched foci of the disease with increased risk of transmission to humans.

With each outbreak wave the Government of Myanmar (GoMy) has demonstrated its commitment through improved control measures. The Phase 1 of the Prevention and Control of Avian and Human Pandemic Influenza Project funded by AusAID (September 2006 to March 2008) contributed significantly to this improved response through development of a National Strategic Plan, training of joint animal and human Rapid Response Teams at state, division and district levels, development of a National Influenza Centre, ability to detect H5N1 in humans and animals, and strengthened coordination mechanisms between human and animal health sectors.

Phase 1 provided important lessons learned but gaps still remained. The focus of the Phase II of the project was to address these gaps as well as supporting new activities based on lessons learned and to ensure the program is addressing more medium to longer term capacity that is sustainable rather than dependence on emergency funds. Phase II activities focused on, but were not limited to further strengthening human laboratory diagnostics, infection control and case management in humans, border health in line with the International Health Regulations (IHR), risk reduction in production and market chains, reduction of socio-economic impact of AI, and stronger joint institutional human and animal sector coordination.

The project had 5 objectives covering both human health and animal health sectors. Within each sector activities spanned 4 discrete components that were implemented between June 2009 and February 2012. The human health component was implemented by the WHO Myanmar Office in partnership with its counterpart organization, Myanmar's Department of Health (DoH) in the Ministry of Health. The animal health component was implemented by FAO in partnership with its counterpart organization for AI, the Livestock Breeding and Veterinary Department in the Ministry of Livestock and Fisheries.

As part of the Phase II project outputs, an end of project evaluation was conducted by two independent consultants, one for the human health sector and on for the animal health sector. The findings and recommendations of the joint evaluation are presented in this report.

KEY RESULTS

Overall the Phase II project met most of its objectives. Key findings are listed below:

Objective 1 - Planning, surveillance, outbreak investigation, rapid response and containment systems are adequate and operational to be able to control avian influenza in humans and animals.

Human Health Sector

- national epidemiological capacity has been strengthened as evidenced by the outbreak investigations and uptake of risk management approaches to disease control
- both animal and human health staff are using principles learned in FETP training

- joint SRRT working groups have been established at the local level but has not been active at the central level
- all townships are reporting on 17 communicable diseases

Animal Health Sector

- large scale surveillance for H5N1 in ducks showed that about 40% of duck flocks and 15% of ducks had been infected with H5N1, indicating that ducks were a potential conduit of the infection for chickens
- surveillance and outbreak investigations so far have not pinpointed evidence of the route of infection for chickens
- the GoMy disease control activities have to date been successful in controlling H5N1 disease in chickens and preventing the establishment of endemic disease in the commercial poultry sector

Objective 2 - Diagnostic systems are adequate and operational to support surveillance, investigation and response activities on AHI – laboratory support.

Human Health Sector

- although 3 labs of potential to diagnose HPAI, only the NIC is charged with diagnostic responsibility
- quality assurance system has been established
- staff have been trained in RT-PCR, but skills transfer to additional staff has not taken place and there are not enough skilled staff to respond to surge capacity in case of pandemic
- regional linkages for technical staff have not been fully realized

Animal Health Sector

- the central laboratory has been able to successfully process large numbers of samples collected from the duck surveillance programme and disease outbreaks in a timely manner
- the central laboratory has been able to participate successfully in laboratory proficiency testing run by an international reference laboratory
- the central laboratory was able to quickly adapt the programme facilities to establish laboratory testing for a new livestock disease

Objective 3 - Case management and infection control within the health system can manage patients affected with AHI at a base level and that planning is in place for surge capacity in the case of a pandemic.

- 24 hospitals have been upgraded with essential infection control and case management equipment and supplies
- trainings have taken place but guidelines in infection control and case management are still needed for staff to refer to
- transfer of severe cases is still a challenge because of weak ambulatory system

Objective 4 - Functional strategy analysis is in place for AHI.

- a national steering committee approach was used to engage with policy makers and ensure results were brought to the attention of decision makers
- supply chain analysis carried out and used by LBVD in risk assessments for cross-border introductions and market chain spread of HPAI

- gender analysis of poultry production carried out and recommendations for training provided to GoMy

Objective 5 - The Project is effectively managed in a context of good intra and inter-sectoral coordination in the AHI programme.

- the project was effectively and efficiently managed despite several mitigating circumstances during the Project period
- H1N1 experience in 2009 demonstrated strong coordination by two UN agencies, GoMy and international community to deal with outbreak threats, however, coordination outside of outbreaks wanes and doesn't allow for mid-term and long-term planning
- establishment of zoonoses program took more time than expected, but initiative was met through holding of national workshop in March 2012 bringing hope of sustainability of HPAI capacity through established coordination program
- information sharing between animal and human health sector is inconsistent across different levels of implementation and there were differing opinions on its strength, particularly outside outbreak situations

CONCLUSIONS AND RECOMMENDATIONS

The AusAID contribution to the Avian Influenza Integrated Program in Myanmar was well targeted as it filled identified gaps and added flexibility to the programme delivery. The Government of Myanmar (GoMy) has demonstrated remarkable commitment in responding to HPAI at all levels as control measures have improved with each outbreak. The second phase of the Project maintained the momentum from Phase I and built considerably on the gains made, compounding the achievement in capacity building.

The Phase II Project has demonstrated "good quality" implementation with a rating above 5 for both the animal and human health sectors. The planning of resources and activities was based on thoughtful analysis and learning targeted to identified gaps and lessons learned from Phase I of the Project. In addition, the Project was highly relevant to the donor and regional priorities and met the needed gaps for the country while contributing to strengthening the systems beyond just the HPAI response.

Most of the objective targets were met for both sectors although a few opportunities for closer linkages between the animal health and public health sectors were missed. The Project demonstrated strong management despite a number of environmental constraints and there was evidence of efficient use of resources, with the Project adapting to changing needs and accomplishing significant gains with relatively small investments. There is concern regarding the continuity of capacity as future funding has not been identified for FETP, laboratory diagnostics training and stocks for human diagnostics, and scale up of trainings particularly to the township level in surveillance and response, and infection control and management.

The two areas of weakness, particularly for the human health sector, were monitoring and evaluation and gender equality, both of which are required to be integrated in the project cycle to ensure effective implementation.

General conclusions and recommendations are highlighted below:

i. *Continued high level political support is critical to maintain commitment and momentum. Without the high level representation on the Steering Committee, continued buy in by the GoMy will be a challenge.*

ii. *Future support to the WHO for HPAI activities should consider a component to ensure continued collaboration with the animal health sector, as well as coordination of zoonotic disease control initiatives. Focus is needed to ensure consistent coordination that allows for mid-term and long-term planning, not just ad hoc outbreak based collaboration that focuses on response.*

iii. *Cross-border collaboration needs strengthening, particularly establishing linkages with China, India, Bangladesh and Laos focusing on information sharing and patient referral at border*

iv. *Media training should be ongoing and more integrated to focused on their role in general emergency and pandemic preparedness and response*

v. T*he dependency on funding can be offset by integrating HPAI applicable skills in pre-service trainings. FETP and FETPV should be considered as part of national curriculum priority in surveillance and response that is funded by the GoMy.*

vi. *Concerted effort is needed to develop an integrated M&E plan for the HPAI program using regional guidance such as the USAID funded M&E guide for Southeast Asia.*

vii. *Support to FAO to maintain a presence in the country paid good dividends in respect of capacity building in the government, good governance of programme implementation, the ability of the programme to respond quickly to new situations and the outcome of the national workshop on zoonotic diseases.*

viii. *The approach of combining the epidemiology of the disease, an analysis of the production system and a capacity building focus on the institution involved in disease control, linked to risk management evaluations appears to be one that has resulted in fruitful engagement with the GoMy counterpart and a sustainable approach to capacity building*

ix. *LBVD and FAO should develop a strategy to ensure that the platform established for capacity building and technical support to the livestock sector is maintained and further utilised in future official development assistance programmes*

x. *LBVD and FAO must develop a strategy to ensure longer term support for the activities of the diagnostic laboratory that is performing well in support GoMy animal disease control programmes*

xi. *If funding is limited, future trainings in surveillance and response as well as infection control and case management should focus on township level staff in remote area, border areas, and former "special regions" that have now opened up*

xii. *Plan to integrate gender equality in all aspects of HPAI response, again using available regional guidance such as that developed by WPRO.*

xiii. *Laboratory human diagnostics training should focus on increasing the number of staff skilled in RT-PCR as well as integrating IATA curriculum for specimen transport into training. More effort should be placed on skills transfer from fully trained staff to other staff to ensure sustainability regardless of funding situation. Future funding should ensure that both managerial and technical staff presence at regional workshops to facilitate continued learning.*

xiv. *More focus on establishing written guidelines, protocols and SOPs in the human health sector HPAI program to further ensure continuity and sustainability of skills and knowledge.*

EVALUATION CRITERIA RATINGS

Evaluation Criteria	Rating (1-6)		
	Animal Sector	Human Sector	Overall
Relevance	5	5.5	
Effectiveness	5.5	5.0	

Evaluation Criteria	Rating (1-6)		
	Animal Sector	Human Sector	Overall
Efficiency	5.5	5.5	
Sustainability	4.5	4	
Gender Equality	4	2.5	
Monitoring & Evaluation	4.5	3.5	
Analysis & Learning	5	5.5	
Rating scale Satisfactory Less than satisfactory	 6 Very high quality 5 Good quality 4 Adequate quality 3 Less than adequate 2 Poor quality 1 Very poor quality		

1. BACKGROUND

1.1 COUNTRY CONTEXT

Highly pathogenic avian influenza (HPAI) H5N1 virus first emerged as an epidemic in poultry in late 2003, with significant numbers of human cases occurring once the virus spread outside China. The H5N1 virus continues to circulate in poultry and probably wild bird populations in across countries in South, South-East and East Asia and is considered endemic in China, Bangladesh, Indonesia and Viet Nam. A number of other countries in the region, including Cambodia, Lao PDR, Thailand, India, and Myanmar, are sporadically infected by introduction of the virus from endemic sources.

Myanmar is at particular risk as it borders two endemic countries, with cross border trade in poultry being common with China, and potential for entry of diseased birds from the border with Bangladesh. In addition, Myanmar has a number of wetlands that are important overwintering sites for migratory water birds that arrive from China and the Arctic breeding grounds. While it is not possible to prevent the infection of virus in migratory water birds, it is crucial to devise strategy and policy approaches to deal with incursion of the virus through this and other routes as well as the risk of its spread in both animal and humans.

1.1.1 OUTBREAK HISTORY

The first outbreak of H5N1 Highly Pathogenic Avian Influenza (HPAI) occurred in Myanmar in the two states of Sagaing and Mandalay during March and April of 2006. The second wave of outbreaks occurred in February/March 2007 in Yangon city and its vicinity affecting seven small and medium scale commercial farms. Additional outbreaks were recorded in a number of nearby locations in May, June, July and September. The relationship between these outbreaks was not established, although it was assumed they all represented different foci of some common source epidemic.

The third outbreak occurred in November and December 2007 among backyard chickens in Kyaing Tong and later Mongphyit (Eastern Shan State). It is likely that these outbreaks were related to some cross-border movement of poultry from China. To date this outbreak is the only one where a human case of H5N1 infection was detected through active case finding and fever surveillance and confirmed through laboratory diagnostics in country and through the National Institute of Health in Thailand as well as the WHO Collaborating Centre for Reference and Research on Influenza in Japan. The case was a 7 year old girl from Kyaingtong Township in East Shan State who was hospitalized within 7 days of symptoms and ultimately treated.

During 2008 and 2009 there were no outbreaks of H5N1 reported. Two new outbreak waves occurred in 2010 and 2011. The 6th outbreak wave occurred during the time of this evaluation in February 2012. It is important to note that the strain of the virus found in outbreaks in poultry in Myanmar has changed three times from the first outbreak to now. The strains are consistent with the predominant strains present in China, but the principle route of introduction is open to speculation, and it is very likely that different routes have been responsible for some of the outbreaks. Table 1 summarizes all 6 waves of outbreaks.

TABLE 1: HPAI OUTBREAKS IN MYANMAR

WAVES	LOCATIONS	TIME FRAME	POULTRY DIED OR CULLED	HUMAN CASE
1st	Sagaing Division Mandalay Division	March/April 2006	650,000	none
2nd	Yangon Division	Feb/March 2007	66,000	none
	Yangon Insein Township	May 2007	2,000	none

	Bago Division Bago Township	June 2007	960	none
	Mong State Thankphyuzayat Township	July 2007	950	none
	Bago Division Lapantan Township	July 2007	7,500	none
	Bago Division Thanatpin Township	Sept 2007	43,000	none
3rd	Shan State East Kyaingtong	Nov 2007	34,000	1
	Shan State East Mongphyat	Dec 2007	1,056	none
4th	Yangon Division Mayangone	March 2010	2455	none
	Yangon Division Mingalardon	Feb 2010	126	none
	Sagaing Division Monywa	March 2010	2900	none
5th	Rakhine State Sittwe	Jan 2011	53,496	none
	Saigaing Division Shwebo	Feb/March 2011	7045	none
6th	Saigang Division Monywa	Feb 2012	999	none
	Bago East Division	March 2012	1,831	none

1.1.2 FUNDING FOR HPAI ACTIVITIES

Since 2008, total contributions from donors to HPAI activities in Myanmar have been US$7.1 million. For the animal health sector, approximately US$4.4 million from AusAID (27%), USAID (35%) and the World Bank (38%) has focused on controlling the disease spread and strengthening capacity in veterinary services. For the human health sector a total of US$2.7million from AusAID (37%) focused on strengthened surveillance and response, diagnostics capabilities, and case management and control of the disease, USAID (11%) focused on surveillance and laboratory, and European Community (52%) focused on hospital capacity, laboratory, and surveillance.

The AusAID funded Phase II project period contributed Au$1 million to FAO (animal health sector) and Au$1 million to WHO (human health sector). It is important to note that the USD exchange rate changed considerably during the project period, the impact of which is dealt with in the findings.[1]

[1] At the time of proposal draft the estimated exchange rate cited was 0.65 US$ per Au$. With the increased value of the Au$, the average exchange rate at which Australian contributions were converted to US$ by FAO was 0.84. At the commencement of the project in June 2009 the exchange rate was 0.8 US$ per Au$.

1.1.3 IMPLEMENTATION OF HPAI ACTIVITIES

The two key Government agencies responsible for HPAI activities are the Livestock Breeding and Veterinary Department (LBVD), which sits under the umbrella of the Ministry of Livestock and Fisheries and the Department of Health which sits under the Ministry of Health. Two key international partners, the Food and Drug Organization (FAO), and the World Health Organization (WHO) have collaborated closely with the GoMy respective counterparts. Both the animal and human health sectors have progressed in their implementation of HPAI activities since its onset in 2006. Much of this progress was experienced during the Phase 1 of the AusAID funded project (September 2006 - March 2008), which contributed US$397,501.

In January 2006 the National Strategic Plan for the Prevention and Control of Avian Influenza and Human Influenza Pandemic Preparedness and response was finalized. Considered a living document, this strategy harnessed the impetus to form an inter-sectoral National Steering Committee chaired by the Minister of Health. This committee is the cornerstone of GoMy commitment for both human and animal health sector response to HPAI. In 2006, with FAO and WHO support, an operational work plan of the National Strategy was developed which covered the period from June 2006 to December 2007 and was revised to cover January 2008 to December 2010. Further progress and current status of HPAI activities is described below for each sector.

Human health sector - within the Department of Health, three main units play key roles in the control of HPAI. These include the Central Epidemiology Unit, charged with the surveillance and response activities, the National Influenza Center, which sits under the National Health Laboratory and is responsible for the diagnostic activities, and the Department of Medical Care, which covers case management and infection control.

During the project period decentralization took place which created semi-autonomous administrative units at the state or divisional level, which are responsible for the planning, coordinating, supervision and monitoring of the health departments at district and township levels. The township level, headed by a township medical officer, is responsible for implementation of health services covering a population of 100,000 to 200,000.

Beyond the development of the National Strategy, the Phase I project accomplished trainings for the Rapid Response Teams at all administrative levels, training of key staff in the Field Epidemiology Training Program abroad as well as establishment of FETP in Myanmar, strengthening of laboratory diagnostic capacity of HPAI and establishment of the national Influenza Center, improved infection control (IC) through training of health care workers, stockpiling of IC supplies, and upgrading of two hospitals, support of International Health Regulations (IHR) meeting to address cross-border issues. HPAI surveillance started in 2006 having been integrated with the robust Acute Flaccid Paralysis (AFP) surveillance system, which has been in effect since 1999 to monitor polio.

Animal health sector - to manage the activities for HPAI in Myanmar, FAO developed the Integrated Programme on Avian Influenza in close collaboration with LBVD. Within Myanmar's national disease management framework infection of poultry has two manifestations – severe, rapidly spreading, high mortality disease in domestic chickens and in farmed quail, and silent sub-clinical infections in domestic ducks. The disease control strategy employed to date was to detect and respond to outbreaks in chickens with rapid stamping out in a control area and strict prevention of poultry movement from the control zone. The disease situation in poultry suggests that through this strategy so far the authorities have been able to prevent the virus from becoming endemic in backyard poultry. The strategy developed for infection in ducks is not to intervene with direct control measures, but to minimise the contact between duck flocks and chickens in the production and marketing segments of the production chain.

The total poultry population in the country is about 151 million, comprising 138 million chickens and 13 million ducks.[2] About 92% of the chickens are in very small commercial farms or "backyard" production systems, while the commercial operations are concentrated around Yangon, Mandalay and

[2] LBVD data quoted in Livestock Supply Chain study

in Shan State. Most of the ducks are concentrated in three areas: Bago, Ayeyarwaddy and Yangon where there is relatively more water year around. There is an important duck raising industry in Mon state that appears in large part to be based on movement of ducks from the former three areas to this area. There are also some duck raising areas in the vicinity of Inle Lake that are of particular interest because of contact with migratory birds.

At the start up of the Phase II program, a livestock sector strategy had not yet been developed. However, a number of achievements were experienced during Phase I of the project, including ability of the National Laboratory to conduct confirmatory diagnostics, training of veterinarians in surveillance and response and FETP, establishment of the HPAI project office to coordinate HPAI control activities.

1.1.3 LESSONS LEARNED FROM PHASE 1

As seen through progress in the Phase I of the project, the Government of Myanmar (GoMy) has shown considerable commitment to strengthening the country capacities to ensure quick and effective control and response to HPAI. There have been significant lessons learned from Phase I which fed into to the objectives and planned activities described in the logical framework for Phase II. These include the following:

- *High level Government commitment and coordination is essential* - maintenance of and active National Steering Committee was a priority for Phase II. In addition, high level coordination mechanisms both by GoMy and the international partners FAO and WHO was a key focus.
- *Preparedness is a key factor of success* - Phase II was aimed to go beyond the National Strategy and operational plan, to ensure both human and animal health sectors had the systems in place for preparedness. A joint Surveillance Rapid Response Team (SRRT) working group was to serve as the mechanism for coordination of this priority.
- *A phase-based strategy is required* - this was to form the basis of a jointly developed Contingency Plan.
- *A compensation/relief framework is required* - this was to build on the World Bank supported efforts through functional strategy analysis
- *Strong coordination mechanisms and collaborative working arrangements between human and animal health sector* - this is covered by its own objective (see Section 1.2). Strengthened collaboration was expected at all levels with the following mechanisms to facilitate:
    - establishment of Inter-Agency AI Coordination Group, co-chaired by WHO/FAO
    - establishment of joint SRRT working group
    - strengthened capacity through FETP program
    - joint approach to zoonoses control following recent WHO/FAO/OIE global guidance

This evaluation assesses the extent to which the Phase II efforts addressed the priorities from these lessons learned.

1.2 PROJECT OBJECTIVES

The Phase II project has 5 distinct objectives which cover the main elements of a robust and comprehensive AI program (Table 2). Within each objective there are specific components for either human or animal health sector or both. Objectives 1 and 5 are essentially joint objectives for the animal and human health sectors. Objective 1 requires collaboration between the two sectors on the strategy, training and implementation of surveillance and response, particularly with regards to the Rapid Response Teams (RRT) who conduct the field investigations. Objective 5, focuses on coordinated management of the response between the two sectors and in particular, strategy development and ultimate implementation of zoonoses control. Objective 2, which requires on strengthening of laboratory systems to ensure diagnostic capabilities, applies to both sectors. Objective 3 focuses on case management and infection control in patients and ability of health system

to scale up these services in emergency and hence concerns only the human health sector Objective 4 is centered on using evidence generated from socio-economic and supply chain studies and analysis to improve control practices and policies as well as minimize adverse impact on stakeholders in poultry production and marketing.

TABLE 2. PROJECT OBJECTIVES AND COMPONENTS

Objectives		Human Health Sector Components		Animal Health Sector	
Objective 1	Planning, surveillance, outbreak investigation, rapid response and containment systems are adequate and operational to be able to control avian influenza in humans and animals.	Component H1	AHI surveillance, outbreak investigation, rapid response, and containment, and IHF implementation	Component A1	Surveillance, extension, outbreak investigation, rapid response
Objective 2	Diagnostic systems are adequate and operational to support surveillance, investigation and response activities on AHI.	Component H2	Laboratory support	Component A2	Laboratory support
Objective 3	Case management and infection control within the health system can manage patients affected with AHI at a base level and that planning is in place for surge capacity in the case of a pandemic.	Component H3	Case management and infection control		
Objective 4	Functional strategy analysis is in place for AHI.			Component A3	Strategy analysis and development
Objective 5	The project is effectively managed in a context of good intra and intersectoral coordination in the AHI programme.	Component H4	Project management and coordination	Component A4	Project management and coordination

The objectives form the basis for the logical framework by which outputs and outcomes were developed for the Phase II project (Annex 3). Each of the two sectors has a list of outcomes, outputs and targets for which progress was measure

1.3 EVALUATION OBJECTIVES

While the objectives of the evaluation were not explicitly stated in the terms of reference, after discussion with the donor and the two implementing agencies, the evaluation was guided by the following objectives:

1. *To assess the inputs, outputs, and the outcomes against the evaluation criteria developed by AusAID*
2. *To assess the progress of the project against the log-frame described in the Phase II proposal*
3. *To assess the technical quality of the inputs, outputs, and the outcomes of the project activity*

The questions for the evaluation were primarily based on the template provided in AusAID document #153 – Standard Evaluation Questions. Table 3 describes the specific line of questioning. In addition specific questions the human health sector and coordination aspects were drawn from Global and Regional Guidance.[3,4,5,6]

TABLE 3. EVALUATION QUESTIONS AND APPROACH

AusAID Question	Evaluation Approach
Relevance	The evaluation addresses whether the objectives were appropriate and in line with priorities of AusAID, Myanmar government, WHO and FAO as partners in the global effort to control HPAI, and if they also met the needs of the beneficiaries of the program.
Effectiveness	The evaluation answers whether the objectives described in the Phase II proposal were met and how the activities contributed to achievement of these objectives.
Efficiency	The evaluation explores areas of financial and implementation efficiency, including variations and delays in spending.
Sustainability	Principally the issue examined was whether the beneficiaries and/or partner country stakeholders have sufficient ownership, capacity and resources to maintain the activity outcomes after Australian Government funding has ceased.

[3] Zoonotic diseases: a guide to establishing collaboration between animal and human health sectors at the country level. World Health Organization, 2008.
[4] Asia and Pacific Strategy for Emerging Infectious Diseases 2011-2015. World Health Organization Western Pacific Regional Office, 2008.
[5] WHO Programme on Highly Pathogenic, Emerging and Re-emerging Diseases. World Health Organization, 2011.
[6] Centers for Disease Control and Prevention. National inventory of core capabilities for pandemic influenza preparedness and response. Atlanta: U.S. Department of Health and Human Services; 2010.

Gender Equality	The evaluation looked at the promotion of gender issues by the project, the extent that it developed capacity in the government to promote gender equality and the gender balance among beneficiaries of the project.
Monitoring and evaluation	The evaluation sought evidence about monitoring and evaluation (M&E) practices and to what extent M&E was used to adjust activities to meet the objectives. The process included requests for sex-disaggregated data and any information on cross-cutting issues identified.
Analysis and Learning	This was examined from the perspective of how well the programme adjusted to lessons learned from implementation.
Lessons	The evaluation has provided some conclusions to assist with any further design that FAO or GoMy might be involved with. However as there will not be further support to the programme from AusAID there are no recommendations concerning activities for a Phase III project.

Impact was not assessed as it was beyond the scope of the ToR for this evaluation and not set out in the Phase II project proposal. However, the program recognizes some of the likely impacts, which are described in section 2.2 on effectiveness.

In addition to the evaluation questions outlined by AusAID, the evaluation was also cognisant that some aspects of the Paris Declaration and the Accra Action Agenda were relevant to the implementation this programme in Myanmar. The principles of ownership, alignment and managing for results were directly applicable as well as the activity working through partner systems, the division of labour in the sector and the effectiveness of approaches to capacity building and technical assistance.

For the purpose of this evaluation the beneficiaries of the project are defined as the professionals who are most involved in the control of and response to HPAI outbreaks, both in the animal health and human health sectors. These include but are not limited to government staff (LBVD, MoH, township authorities, etc.), non-governmental staff (NGOs, private sector) who collaborate in HPAI activities, and international organizations (WHO, FAO). In addition, poultry farmers and their networks and people most vulnerable to HPAI infection in Myanmar are also considered beneficiaries.

1.4 EVALUATION METHODS

The evaluation was conducted by two consultants separately for each of the sector specific objectives, outputs and activities. For the overlapping objectives, the consultants worked together to compare findings and ensure consistency. The findings are presented in this report jointly for both sectors, and separately where findings pertain specifically to one of the sectors.

The in country evaluation was conducted for the human health sector between February 27th and March 2nd under the supervision of WHO and between February 4th and February 14th for the animal health sector under the supervision of FAO. For the animal health sector a follow-up meeting was held at the FAO Regional Office in Bangkok on February 15th to discuss some of the operational aspects of the programme. The two consultants took a similar two-pronged approach to assess each sector, including desk review based on a series of relevant documents and interviews with both government and partner key focal points involved in the HPAI response. The list of people met can be found in Annex 1. The reference documents and interview findings provided the background and evidence to determine progress towards reaching the outputs, outcomes, and objectives described in the log frame. They also provided the foundation to answer the main evaluation questions listed in Table 3.

The findings were written up separately by each consultant with the human health consultant integrating the two into one evaluation report.

Because of the level of financial input to the project, it did not warrant a more a complex evaluation process. The terms of reference for the two consultants were determined through consultation between the donor and implementing partners and are included in Annex 2.

1.4.1 HUMAN HEALTH SECTOR

The Emerging Disease Surveillance and Response Unit (ESR) in WHO Myanmar organized the logistics for the evaluation, setting up meetings and interviews with the key focal points in the AHI response. The ESR unit also provided the relevant project documents for desk review, including project progress reports, consultant reports, activity reports, guidelines and SOPs, minutes of meetings, training schedules and procurement and financial reports.

Two sets of questionnaires for one to one interviews with key focal points were developed by the consultant. One set was focused on the general evaluation questions per AUSAID guidelines and specific outputs for each of the human health sector components of the project as delineated in the Phase II proposal. Another set of questions was focused on areas of core competencies for each of the relevant human health subsectors (Laboratory, Surveillance and Rapid Response, Infection control and Case Management, and Coordination) based on a number of Global Guidelines for these subsectors, including for Pandemic (listed in section 1.3 Evaluation Questions). This second set provided a more comprehensive picture of progress in reaching outcomes, sustainability, and remaining gaps in the program. In addition, the same questions were asked of both international agency focal points and government focal points and any inconsistencies were further pursued for clarification.

There were two events that allowed the opportunity to assess quality of the program activities and outputs and how these contributed to overall outcomes. The first was the H1N1 outbreak that took place in 2009 and 2010, which essentially served as a "simulation" for H5N1 response. The consultant was able to extrapolate the results and lessons learned of that experience to inform the program's effectiveness (particularly for case management and infection control which require human cases). The second event was an actual H5N1 outbreak, which took place during the WHO consultant's in country work. This allowed for real time assessment of outcomes as the consultant was able to assess strengthened capacity as well as gaps through detailed interviews with key focal points and their discussion of the response as it was happening. The findings for both events are presented under the Effectiveness and Sustainability sections.

1.4.2 ANIMAL HEALTH SECTOR

The office for the FAO Integrated Programme on Avian Influenza in Myanmar provided the relevant project documents for examination, including project progress reports, consultant reports, activity reports and guidelines prepared for project technical activities. To gather first hand impressions and viewpoints the consultant met with the LBVD management group and visited the epidemiology and laboratory unit established by the programme in Phase I and supported in Phase II. The consultant received a briefing from the AusAID country office and an extensive technical briefing from the ECTAD Country Team Leader. A field visit was undertaken to a township near Yangon to assess some of the project activities and to conduct some interviews with farmers. This field visit was probably not as informative as a visit to the area where more intensive project activities had been carried out, but there were apparently some constraints to arranging a further distant field visit in the time available.

While the project was not aimed to be a technical delivery project, many of the activities carried out were focused on strengthening technical capacity and therefore some assessment of the quality of the outputs was attempted. This was especially true of the large investment into the animal sector serological surveillance and active surveillance. For example, one point of interest was to determine the degree to which participatory processes are used to facilitate training interactions both with township veterinarians and farmers. However, based on desk review of key reports the standard of delivery was evident and this was considered to be replicated across the project.

1.4.3 CHALLENGES

A number of challenges presented themselves during the evaluation. One major challenge was the short time frame for which to plan and conduct a comprehensive integrated evaluation. This coupled with language barriers for the two independent consultants meant that it was not always possible to fully verify some aspects of the project performance. The limited time also meant not all information and focal points were available during in country work and follow-up remotely was required.

Another challenge was that the FAO and WHO consultants did their in country field work at different times which did not overlap, and hence the evaluation was conducted separately for animal and human sectors. Ideally the country work would have been conducted at the same time to facilitate the joint approach to the evaluation, however conflicting schedules and short time frame to complete the report did not allow for this arrangement. For this reason the methodological approach and focus slightly differed between the two consultants. Even though the two consultants did manage to work remotely to merge the findings and complimentary inputs, with the animal health sector component written first and then integrated into the human health sector, the differences in approach is evident between the two sectors in terms of how the information is summarized, particularly for section 2.2 Effectiveness.

Another methodological challenge for the evaluation was identifying where the project inputs were placed into the broader HPAI efforts in the country and to be able to identify the specific outcomes and link these to AusAID funded Phase II part of the program. For the animal health sector, this was partially mitigated because they developed a series of linked spread sheets with the personnel and financial inputs from each of the contributing sources clearly delineated.

For the human health sector, a major challenge was presented by the existence of only 1 H5N1 human case, making it difficult to assess quality and effectiveness of certain aspects of the program. This was partially mitigated through the discussion of the H1N1 outbreak (mentioned above), for which many of the same processes and capacities are expected and could serve as a proxy for the response to H5N1.

1.5 EVALUATION TEAM

As the evaluation required integrated review of both animal and human health sectors, two consultants were commissioned, one hired by FAO to focus on animal health sector, and another hired by WHO to focus on human health sector. The FAO consultant has experience in animal health programmes, global avian influenza effort at the regional and country level, worked for FAO in a regional capacity on HPAI and was familiar with the early FAO activities in Myanmar.

The WHO consultant is a trained field Epidemiologist with extensive monitoring and evaluation experience. She has worked with WHO in Myanmar previously in an evaluative context as well as evaluating the Asia Pacific Regional Strategy on Emerging Infectious Diseases. Neither consultants had any involvement in the design or implementation of this project and hence present no conflict of interest.

2. EVALUATION FINDINGS

The evaluation findings are presented as guided by the questions provided in the AusAID document 153 – Standard Evaluation Questions. Results of the evaluation are for the most part presented jointly for the animal and human health sectors, the exception being section 2.2 Effectiveness due to the consultants' differing approaches to collating the findings.

2.1 RELEVANCE

HPA1 is a zoonotic disease and as such poses a threat to both animal and human health. The Phase II Project was initiated as an emergency response under a regional programme on Emerging Infectious Diseases. The objectives under the Phase II Project were relevant to the priorities described for AusAID's donor program, in line with three of AusAID's thematic strategies that fall under health and economic development. In addition, the Project was in line with GoMy priorities and the needs of beneficiaries most affected by HPAI and most involved in its control/response.

2.1.1 DONOR PRIORITIES

1. Health thematic strategies

- *Pandemic and Emerging Infectious Diseases* – in the regional HPAI control context Myanmar is an important link country as it lies amongst China, South Asia and South-East Asia. The original weaknesses identified in the animal health services ability to respond to a serious outbreak of HPAI was of considerable concern to international and regional organisations and so it was necessary to support Myanmar to strengthen its capacity to respond and reduce a significant gap in the regional and global defence against the pandemic. Also by developing a greater understanding of the epidemiology of the disease in the country, the project added useful knowledge to the regional understanding aligning to the broader objectives of the regional EID programme and the interests of FAO, WHO, ASEAN and Australia in regional disease control.
- *Strengthening national health systems* – through training of health workers, provision of essential infection control and laboratory equipment and supplies, and improved service delivery with stronger case management there is carryover of skills and capacity to the overall health system Several examples of this are cited in the findings. Further, it was expected that the populations most affected would be the poor with least access to and utilization of medical services and efforts to improve service delivery in the context of HPAI would benefit overall health service delivery to populations in need.

2. Sustainable economic development

- Food security –there was a significant humanitarian element to the response given that HPAI had considerable potential to cause severe livelihood and food security impacts on the poor if an epidemic in poultry gained any traction in the country, and if human cases became prevalent. These elements also fitted well to the objectives of the AusAID portfolio at the time. The secondary inputs to capacity building in the government animal health services system was not a high priority alignment to the objectives of the AusAID country programme at the time with the focus on humanitarian assistance, but were necessary for effective programme delivery. The case studies of the livelihoods outcomes of this disease outbreak demonstrated that it was a humanitarian emergency due to its impact on poor farming families.

2.1.2 COUNTRY PRIORITIES

Government - in 2006 both the national Public Health and the Animal Health Sectors were not well prepared to deal with a major new epidemic in either humans or animals and by 2009 there were still critical gaps. The Project addressed these gaps by strengthening overall response capacity through sensitization to all stakeholders, required infrastructure,

knowledge and skills building of both animal and human as well as other relevant sectors, and bolstering coordination.

With respect to the GoMy agencies LBVD and MoH, the project was highly relevant as activities to strengthen HPAI response also strengthened response to overall human and animal disease outbreaks which are aligned to the respective agencies long term priorities. The GoMy was highly concerned about the potential of HPAI to cause severe losses to poultry production with associated price spikes and social hardship and hence outputs related to strategy and policy formulation were directly relevant.

Beneficiaries - for government staff, from laboratory technicians to veterinarians to clinical managers, the inputs to strengthen their knowledge and skills as well as provide the needed equipment and supplies were very relevant to personal development of staff as well as to overall institutional strengthening.

The Project was highly relevant to vulnerable populations who are most susceptible to HPAI infections, including poultry farmers, families with backyard chickens, transporters, border control staff, market workers, health care workers, etc. and in severe outbreaks the population in general. There were major efforts to control outbreaks through quick response and infection control practice and to treat the infected through improved clinical management, susceptible populations benefit. This became clear during the H1N1 outbreak, where efforts to strengthen control and response for H5N1, were realized in GoMy's handling of H1N1.

Poultry are an important livestock commodity in Myanmar, and although the evaluation did not review data about the economic outputs from this commodity, it was still relevant to poultry sector stakeholders at various levels. The activities had the ultimate goal of safeguarding this commodity and the flow-on mitigation of the risk of disease outbreaks. The few interviews conducted with farmers revealed that the activities implemented in improving bio-security at the farm level were highly appreciated and deemed relevant.

2.2 EFFECTIVENESS

Determining the effectiveness of the Phase II project activities is the primary focus of this evaluation. For each objective, outcome and output described in the logical framework for both the animal and human health sectors, targets were set for achievement by the end of the project period (Annex 3). In this evaluation, effectiveness is determined by whether the inputs reached the expected outputs and outcomes. Further, as the purpose of the Phase II funding was to strengthen medium and long term capacity and sustainability, for the human health sector, a rapid assessment of overall strengthened capacity as based on global/regional standards is also summarized and taken into consideration for overall effectiveness.

Overall, a quick review of the progress of targets reveals that by the end of December 2012 most of the projects objectives were met. Within each objective achievement of specific outcome and output targets varied depending on the component and these are described in more detail below. Key stakeholder interviews pointed to a significant strengthening of capacity since the first outbreak in 2006, with changes being slower during Phase I funding and picking up during Phase II funding. Improvements were not limited to HPAI control and response but extend to other outbreaks, particularly in humans and zoonoses.

Key findings from the evaluation are highlighted for both animal health and human health sector components separately. Only objective 5 is presented jointly for both human and animal health sectors. For the human health sector the findings are organized by objectives and the targets within each objective as describe in the log frame. In addition, a section on overall capacity strengthening

from a health systems strengthening perspective is also presented.[7] For the animal health sector necessary findings are presented by technical activities and trainings and overall effectiveness.

TABLE 4: TARGETS MET DURING PROJECT CYCLE

LOGICAL FRAMEWORK	**TARGETS MET**
Objectives	All objectives were met or almost met for both animal and human health sectors.
Outcomes	
Human health sector	100%
Animal health sector	100%
Outputs - human health sector	
H1	87.5% met
H2	75% met
H3	75% met
H4	100% met
Outputs - animal health sector	
A1	87.5% met
A2	100% met
A3	100% met
A4	100% met

2.2.1 HUMAN HEALTH SECTOR

Project targets

- ***Objective 1 - Planning, surveillance, outbreak investigation, rapid response and containment systems are adequate and operational to be able to control avian influenza in humans and animals.***

Component H1 falls under this objective. The focus of the activities under this objective was to further strengthen surveillance and response through a series of general and HPAI trainings. In addition, improved control of HPAI measures through a national health sector contingency plan as well as cross-border collaborations. As indicated in Table 4 most of the targets in the log frame were reached.

[7] This differential presentation for human and animal health sectors is due to the different methodological approaches to the evaluation summary (see Methods section).

- ***H1: There is an understanding of the epidemiology of AHI in Myanmar and a capacity to control and respond to the disease*** *(MET)*- based on the targets reached as described below, there is evidence that the capacity to control and respond to the disease has been strengthened. All focal points interviewed had a strong understanding of the AHI epidemiological situation in Myanmar. Furthermore, during the evaluation an outbreak of HPAI was taking place and it was possible to assess the response (textbox). Overall, evidence points to a strong capacity of the GoMy to respond to the disease and the measures needed to control the spread. The local authorities were able to make decisions without directives from the central level. In addition, the culling of chickens by farmers was more accepted than in the past due to improved public awareness and understanding of HPAI.
- ***H1.1: Joint SRRT working group established and operating (MET)*** - at the sub-national level these working groups have been established in every division and during the project phase in some townships. Membership includes the secretary of state who is the chairperson, the regional director, veterinary focal point, and the state medical officer. In discussions with the CEU staff it was clear that these working groups are mainly active during actual outbreaks, for both HPAI as well as other outbreaks such as measles or other zoonotic diseases. At the National central level this working group has been less active and only met once in October of 2010 under leadership of WHO and FAO.
- ***H1.2: SRRT teams surveying and responding to AHI incidents (MET)*** - as of the end of the project cycle 100% of districts (65) have two functioning rapid response teams (RRT) which comprise one medical officer (physician/paediatrician), one veterinarian, one pathologist/microbiologist, one health administration officer, and one epidemiologist. The team manages all aspects of an outbreak including epidemiology, case management, specimen collection, health education, risk communication, and symptom monitoring. As of the end of 2009, 130 of these RRTs at the district level and 17 at the state level had been fully trained through a joint animal and human health curriculum developed in country by FAO and WHO focal points who had been themselves been trained regionally. In addition, certain high risk townships in border and remote areas have been trained for in RRT. Since January 2010 these trained RRTs have conducted a total of 65 investigations/responses. RRTs typically respond within 24 hours, but for remote areas it may take up to 48 hours which meets Global requirements. The response time for the one case in 2007 took 2 days from time of reporting of chicken deaths to local authorities to time of identifying potential case and collecting her specimen. As there has been no human case since, it was not possible to determine improvement in response time. However, response time appears much faster for HPAI than other outbreaks, like diarrhoea, where it sometimes takes more than a week to respond.
- ***H1.3: Field staff and basic health workers, health assistants and general practitioners detecting and reporting 17 other diseases under national surveillance including Acute Respiratory Infection (MET)*** - every month 17 diseases are routinely reported to the Department of Health Planning who is in charge of the overall HIS. The reporting to the central level is a weekly cascade system which starts from the sub-health center level where midwives/health center staff report every Monday to the

Outbreak of H5N1 in Myanmar - February 2012

On the 22nd of February 2012 some chickens died in a farm in Monywa, Saigong Division. Over the next two days some more chickens died in 3 poultry farms. Local animal authorities were informed of these deaths on February 24th and contacted human authorities same day. On February 25th there was a meeting to assess the situation, and it was decided to cull about 1000 chickens without compensation. The central CEU and LBVD were also informed. On the 26th the RRT went to collect samples. A rapid test was conducted showing positive for H5N1, with confirmation at the animal laboratory the next day. The RRT did symptomatic checking in handles and also contacted the local hospitals. At the state level, the disease control unit started fever and other symptom surveillance. The CEU and LBVD directors went to the outbreak site to assess the situation on March 1. Daily updates were provided to the CEU and will continue until 27 days from initial observed deaths. No human cases were identified.

referral health center which follows a stepwise reporting from township to district to state and finally to the central level by Friday. Outbreaks follow an accelerated process. There are also 31 sentinel townships reporting weekly for polio, measles & neonatal tetanus which comes directly from township to CEU. In addition, zoonotic data is reported from the animal sector on a weekly basis. In 2011 the surveillance system detected 300 events ranging for measles, meningitis, HPAI, and others. Training on surveillance vary in focus from RRT, IHR, and EPI. However, all participants have been trained for immediate and weekly reporting of integrated disease surveillance (VPD and ARI) as well as monthly reporting (DUNS - 17 diseases) at all trainings regardless of focus. Further, physicians are trained in DUNS reporting during pre-service training. There were no trainings focused on only data management and reporting, however these competencies are part of the needed capacities for this output.

- ***H1.4: CEU staff conducting disease surveillance and response using principles learned in FETP training (MET)*** - FETP training has been two-fold process with both international and national trainings taking place and targeting both human and animal health sector staff. As of the end of the project cycle 8 out of the 9 medical officers (MO) at CEU and 3 veterinary officers (VO) at LBVD have been trained internationally. During interviews both CEU and LBVD staff indicated that the FETP trainings have been vital as before only the specialist control unit could take care of S&R activities.
    - Once MOs had been trained, they conducted 4 yearly FETP trainings within Myanmar using an abbreviated 2 week curriculum with a section on HPAI to a total of 163 staff (88 MOs, 55 nurses/health assistants, and 20 VOs) from states and divisions during the project cycle. In addition about 40% to 50% of township level staff have been trained, but not necessarily under this project funding. It was agreed that the 6 month trainings conducted by central staff is more effective, and the cascaded training is usually integrated with other trainings and much of the FETP focus is diluted.
- ***H1.5: A contingency plan for the health sector (NOT MET)*** - a series of workshops was to take place to develop a health sector contingency plan was to be developed to compliment that of the animal sector to create a comprehensive joint contingency plan with follow up trainings to staff on its implementation. However, these activities could not be verified, and in interviews with the CEU focal points, even though reference was made to a contingency plan developed in 2006, it became clear they were referring to the National Strategy. The CEU management staff indicated that several resource meetings had taken place in the past couple of years to develop a "proper" contingency plan, but this process had not yet been finalized. Some staff referred to the "yellow book" which provides a breakdown of the different WHO pandemic phases (1 through 6), and the detailed activities and sector wide responsibilities including that of the Steering Committee for each of these phases. There was no English translation of the "yellow book" for the consultant to verify if it was an actual contingency plan. The general contents was briefly communicated by WHO staff and indicated the document encourages coordination and cooperation with other ministries and partners. The only contingency plan for pandemic that could be verified was that developed by Myanmar's United Nations Country Team (UNCT) which had been updated in 2009.
- ***H1.6: Cross-border disease control improved through IHR implementation (MET)*** - originally cross border collaboration meetings were created under the Polio program. However, currently there are annual cross-border meetings taking place for HPAI in conjunction with malaria, TB, and HIV with the Thai border. These meetings focus on joint surveillance, joint IEC materials, and joint cross border information sharing and include key staff from DoH, border area health staff including the TMOs, seaport/airport staff and the IHR focal point at MoH.
- ***H1.7 & H1.8: International and national epidemiologist in place (MET)*** - technical assistance to the national program was provided by an international consultant for just over 2 who was providing support for the entire HPAI project. A national epidemiologist was also providing technical assistance for a period of 2 years focused on surveillance, hospital

assessments and working closely with government counterparts on different aspects of the HPAI project.

- ***Objective 2 - Diagnostic systems are adequate and operational to support surveillance, investigation and response activities on AHI***

Objective 2 was focused on strengthening laboratory capacities to diagnose HPAI quickly and with a high degree of confidence during outbreaks. Most of the systems establishment and basic capacity strengthening took place in the Phase I part of the project, with the Phase II mainly focused on strengthening specialized capacity such as RT-PCR and virus isolation and maintaining laboratory stock supplies and reagents. As seen in table 4, 80% of targets were met.

- ***H2: Myanmar can identify AHI viruses affecting humans and diagnose infection at 3 referral laboratories at NIC, DMR, Public Health Laboratory (MET)*** - By the end of the Project phase, NIC and Department of Medical Research (DMR) have proven capacity to diagnose HPAI, however the Public Health Laboratory (PHL) in Mandalay has theoretical capacity. The National Health Laboratory (NHL) is globally accredited as the National Influenza Center (NIC) with Bio-safety Level 2+ (BSL). The NIC is currently the only lab actively diagnosing H5N1 in humans and has on average tested 20 to 30 samples per H5N1 outbreak. There are no private sector laboratories conducting confirmatory testing and instead these are sent to WHO H5N1 reference center in Tokyo.
    - The role of role of the DMR is to conduct research on influenza. DMR has the capacity to conduct RT-PCR and has been supported by WHO with reagents, laboratory upgrading and quality assessment. However, DMR is not charged with role of HPAI routine detection and rather serves as backup laboratory or one that could respond to surge capacity if needed.
    - The Mandalay PHL is technically under the NIC but administratively under the local authority. PHK has never and is not currently conducting HPAI diagnostics, and hence it was not possible to assess their actual capacity. The PHL recently obtained an RT-PCR machine and have trained 1 staff in this regard. However, there hasn't been consensus on whether PHL is ready to take on diagnostic responsibilities mainly because their HR capacity is still seen as too low. For this reason supporting reagents have mainly been channelled to NIC, although the PHL is also supported by the Japanese government, but still progress has been slow.
    - Most of the capacity strengthening has been in quality control and PCR technique, but the number of laboratories with necessary knowledge and skills is scarce, which is partly due to the government HR set up, where there are not enough staff for each unit. Overall, laboratory staff have been able to manage outbreaks, but the general sentiment amongst key focal points was that capacity increases were not as great as expected, particularly with regards to number of staff who have the skills. The time from specimen collection to diagnoses is still highly dependent on where the outbreak is and how the specimen will be transported. Sometimes there are flights and sometimes it requires overland. However, once the sample is received in the lab it is analysed straight away day or night.
    - Although there haven't been any major stock outs, ability to manage outbreaks is precarious due to overall availability of reagents and supplies which are procured every 6 months, based on number of samples received from previous year plus reserve.
- ***H2.1: Staff have more capacity and better regional linkages through regional networking activities (NOT MET)*** – the target was for NIC staff to attend 5 regional meeting during the project period. According to the latest progress report and information from WHO, three regional meetings were attended by 3 lab personnel from state and division level. Annex 3 provides details of these meetings and who attended. Through interviews it was clear that NIC

staff don't attend most of the regional meetings, such as the bi-regional meeting in Laos, due to budget constraints which only cover management of NHL. The few regional meetings attended by NIC technical staff have been highly beneficial for getting updates on latest diagnostics techniques and brainstorming on technical challenges. For example, the NIC head indicated they were able to learn from a regional meeting that WHO had changed a critical strategy on HPAI virus isolation, in that they recommend PCR on the sample first and only if the PCR is positive do they isolate the virus. This was crucial information as the former process was very slow and expensive.

  - Regional linkages include a continued close relationship with the National Institute of Health in Thailand, and also two WHO influenza collaborating center in Japan and the H5N1 reference laboratory in Hong Kong. With regards to networks, NIC is linked into the laboratory focus of WHO's Global Influenza Surveillance and Response System (GISRS).

- ***H2.2: Lab personnel can diagnose AHI and send samples internationally, through international and in-country trainings (MET)*** - with regards to diagnostics, 4 staff were sent to NIH Thailand in 2009 for training in RT PCR of HPAI, H1N1 and other influenza subtypes. Overall, 3 staff (1 senior & 2 junior technicians) are trained in RT-PCR at NHL, 2 are at the NIC and 1 at the laboratory in Mandalay. Currently the number of staff trained is low, particularly with respect to rotation policy of government staff . With regards to specimen dispatching, 3 NHL ongoing trainings exist for specimen collection for AI and influenza disease as part of the general lab curriculum (pre-service training), and for those who are in RRTs, however no staff in Myanmar has been trained in IATA which is required for international shipping. It is important to note that discussions with NHL and NIC staff highlighted their concern for surge capacity in the case of an actual pandemic due to the low number of staff trained in diagnosing HPAI, particularly RT-PCR. Although people have been trained well for general laboratory practice, they have not been trained specifically for AI, PPE, etc. Ideally, every year at least 1 to 2 new staff should be trained.
- ***H2.3: Quality assurance system is in place at labs as a result of missions from NIH Thailand laboratory experts (MET)*** – During the Project period the NIH Thailand visited the NIC in Myanmar three times for training to staff in quality assurance. A total of 65 staff were trained from the States/Divisions including NHL, Mandalay, and the four regional laboratories, Sittwe, Mawlamyaing, Myitkyina, and Kyaing Tone. In addition laboratories have now established internal quality control (IQC) and external quality control (EQC). For general IQC, laboratories around the country send in samples and results to NHL for assessment. For HPAI, negative samples are not sent for confirmation anymore, because can manage through IQC practice which uses control primers and control samples. For EQC, NIC sends samples twice per year to the WHO H5N1 reference laboratory in Hong Kong.
- ***H2.4: Regional laboratories can manage transport and store AHI specimen, using supplied equipment and consumables (MET)*** – by the end of the Project period it was expected that 4 regional laboratories would have been trained in specimen collection, storage and transport. These trainings take place during the RRT trainings, where laboratory personnel are present, as well as during the curriculum of Grade 1 Medical Technologist. Annex 4 provides the list of equipment and supplies provided to each of the 4 regional laboratories as well as the NHL. However, in discussions with NIC, although regional labs have been upgraded to get samples to send to NIC, this is only done during outbreaks, not routinely. Part of the reason for this is the difficulty in terms of cost and logistics with actual specimen transportation. Samples are typically sent by bus or airplane, but this is not feasible for routine sampling.

➢ ***Objective 3 - Case management and infection control within the health system can manage patients affected with AHI at a base level and that planning is in place for surge capacity in the case of a pandemic***

Activities towards this objective fall under component H3. Effective case management and infection control will ensure that the propagation of HPAI in humans is not caused by the health system itself and that health service delivery can manage transfer and treatment of cases during an outbreak. Overall, this component still has substantial gaps as only 60% of targets were met for this objective (Annex 3).

- ***H3: Mortality amongst AHI cases is reduced, and spread within hospital environment is prevented (MET) –*** Reduction in mortality due to HPAI cannot be assessed in Myanmar since there has only been 1 case to date (who survived). In conjunction with the specific outputs for the project, in the absence of actual HPAI cases, the current status of the infection control and case management system was assessed to determine if Myanmar healthcare facilities have the capacity to minimize the spread and mortality of HPAI. Before the medical care staff didn't usually think about epidemiology and surveillance of diseases and how they linked with case management and the role of health providers in risk and control. However, this improved greatly over the Project phases, partly because of HPAI exposure, but also because of the concerted efforts to sensitize and train health care providers.

- *Infrastructure* - at the minimum, hospitals need basic ICU equipment in order to control infection and manage infected people. During the Phase 1 project period, WHO assessed the 17 state/division hospitals to determine where the gaps were in terms of equipment and supplies for infection control and case management in order to ensure effective procurement and distribution. In Phase I, 20 state/division hospitals including those covering border regions had been upgraded with ICU equipment, ventilators, patient monitors, portable X-ray machines, etc., and another 4 were similarly supported in Phase II. Overall the state/regional and the majority of the 65 district hospitals are now fairly well equipped. Township hospitals are highly variable in readiness with many in critical condition..

- *Supply chain* - The equipment/supply tracking system is led by the Central Medical Stores in conjunction with the Medical Care Unit (MCU), but due to limited human resources, cannot assess on a yearly basis. The distribution system has limitations in that it is not able to reach remote areas equitably which is problematic for high risk border areas. For example, the remote Chin district level hospital only had a few of the needed IC equipment because of difficulty accessing. To date there have not been major issues with stock outs, if a hospital is in need and makes a request consumables like PPE are quite easy to obtain from national level and there currently there is sufficient amount (50,000 sets). It can, however, take a long time to get equipment fixed due to lack of human and financial resources.

- *Infection control* – the establishment of the National Infection Control Committee headed by the Deputy Minister has brought more political and public attention to infection control. Since the start of the Phase II project, the GoMy had instructed to all hospitals down to the township level to set up isolation wards for infection disease control. Although almost all hospitals have done this, the quality and useability of these wards has been inconsistent. Below the township level, staff have basic infection control knowledge, however to supplement the MCU has distributed hand wash posters down to community level. Overall, infection control has improved, particularly with regards to hand washing in health and particularly with HPAI. Ongoing sensitization and training is still needed because of high turnover of staff due to rotation policy and the lack of comprehensive pre-service training in infection control.

- *Case management* - the overall ability to manage HPAI has improved, partly due to donor efforts, but based on interview discussions mostly due to the experiences from H1N1 (see Lessons Learned). At the more central levels there are infectious disease hospitals in Yangon & Mandalay which can handle severe cases. Most of the state and region level hospitals can also manage fairly severe cases. Frontline hospitals at district & township level can provide basic care for patients with mild illness, but at the township level, diagnosis is probably not manageable as it is too specialized. The focus has been to handle mild cases and refer severe ones. Below township level staff are not trained for case management at all. Myanmar's effective transferral of cases between hospitals based on severity is quite weak, particularly at township level and at border crossing points. The ambulance system is not well established,

even in easy access areas. For example, at township level, all hospitals have ambulances, but only 40% are actually running. The situation in remote areas is even worse. Despite the shortcomings, the health system was able to respond to the one HPAI case and support intensive care. The handling of H1N1 cases proved more challenging, yet the health system was also able to cope, suggesting that Myanmar health system can prevent spread of H5N1 as well as minimize its mortality.

- ***H3.1: Five second-line hospitals are upgraded through provisions of equipment and supplies (MET)-*** during the Project period the target was met with 4 out of the targeted 5 second line hospitals having been provided all of the expected infection control equipment and supplies and 1 receiving some of these. These included the General Hospitals of Pakkoukhu, Meikhtila, Nyung Oo, and Taungoo. Annex 5 details each hospital with the equipment and supplies it received.
- ***H3.2: Health system staff refer to guidelines for HPAI case management and infection control when treating cases (MET) –*** before the Project period there was the "purple book" guidelines for WHO SEARO as well as an infection control committee from before, however hospital staff had not been properly trained until the Phase II. During the interviews, focal points indicated that national guidelines had been developed, but not yet approved by the MoH and hence not yet disseminated or part of training. These guidelines include the Hospital Management Manual, Infection Control Guidelines, and Patient Safety Manual, but were not available for viewing during the evaluation. There were existing tools such as those annexed in the UNCT action plan, but these were not known to GoMy staff interviewed and most likely not trickled down to clinicians at local level. However, several HPAI algorithms do exist provided by the MCU for case management & infection control (how to prepare isolation wards, how to care for patients separately, etc.) which are available down to the health facility level for which staff refer to in outbreak situations. These algorithms along with the regional guidance from WHO form the basis of trainings, however, not all health staff were trained as indicated in H3.3.
- ***H3.3 Staff can manage AHI cases and control infection in the hospital environment (NOT MET)*** -Myanmar does not have a national basic training in infection control for all health service providers, only what is provided in pre-service trainings and sometimes attached to other trainings. However it was clear from discussion with focal points that this pre-service exposure is not adequate for HPAI control. For hospital staff, during the Project period, trainings were supported up to the district level and provided to 337 medical officers and relevant health staff from 17 divisions and all districts in infection control and case management. These trainings are based on a curriculum developed by 3 senior clinicians and 1 WHO staff attended a training in Bangkok during the Phase I project who then conducted had 2 major training courses in Yangon & Mandalay to 70 medical superintendents, microbiologists and specialized physicians from state and region hospitals. These trained professionals then conducted ToT trainings at all 200-bed hospital medical officers and infection control nurses. The districts then trained townships, and according to interviews all township hospitals have had staff focal points trained, but not under WHO support.

  The staff trained form the basis of infection control teams at each hospital. In addition to formal trainings, when outbreaks in chickens occur in a certain locale, relevant health staff will receive localized short course training on the appropriate infection control and case management of HPAI. Related information and updates are also provided to health staff during monthly meetings.
- ***H3.4 International (short-term) and national experts in place (MET)*** - before the Phase II project, there was a specific AI focal person at WHO. However, during this Project period a national expert was in place for over 2 years at WHO (Jan 2010 to March 2012) who focused on infection control and case management. An international consultant was recruited for 12 months (Jan 2010 - March 2012) who focused on infection control and case management, monitoring of surveillance and outbreak investigation, coordination of partners as well as other activities. Currently there is no specific person working on AI only.

Overall strengthened capacity

Beyond the specific targets met for the Phase II project, there were notable improvements stemming from project activities that could be considered as health systems strengthening. These included but are not limited to:

- ***Surveillance and response***
  - although SOP has not been developed, formal process for rumour verification of all disease has been established, with rumours identified at central level and confirmed at township level
  - a FETP training that covers general field epidemiology principles and targets medical officers that are epidemiologists at all levels, public health assistants/midwives/nurses who are chiefs of townships, public health supervisor grades 1 and 2 that have main roles in public health centers and in cross border areas. Trainings have improved attitude of health staff to routinely report 17 diseases.
  - use of the regionally connected Strategic Health operation Center (SHOC). Even though the SHOC was created during NARGIS, it is now being used for HPAI and general outbreak response
  - expanded SRRT trainings, whereas before these were focused on HPAI. Since NARGIS these trainings have extended to general surveillance and response. RRTs respond to series of outbreaks including human focused (measles, meningitis, H1N1) as well as disasters, and to zoonoses such as Nipah virus
- ***Infection control and case management***
  - beyond the public sector trainings, WHO also funded infection control and case referral training for the private sector in 2009 for private general practitioners in Yangon and Nay Pi Taw
- ***General***
  - multi-sectoral approach to pandemic, which includes 43 ministries and 7 local NGOs, has bolstered inter-ministerial and private-public linkages. For example, MoH now works closely with the Ministry of Education which now has township officers that are trained for 3 days in AI and pandemic preparedness to provide IEC to teachers and community on infection control and prevention. In 2012, this approach plans to extend to include INGOs and media

2.2.2 ANIMAL HEALTH SECTOR

The evaluation considered that the Avian Influenza Animal Health programme was designed to address the problem of sporadic introduction of H5N1 infection into chickens and the subsequent threats to human health and livelihoods. Table 4 summarizes the targets met during the Project period. The approach to the problem dealt with three main elements – *i. epidemiology, ii. institutional framework and the iii. production system*. These three elements were used to understand how to improve the management of the risks for HPAI outbreaks. The evaluation concluded that this approach was practical and well embedded in the counterpart agency and utilised to formulate policy adjustments.

The *epidemiology element* focused on finding the source of infection for chickens. This involved defining the potential for the spill over of H5N1 from the duck population, expanding knowledge of the virus to track possible to routes of infection, and field investigations and follow-up of outbreaks to improve knowledge of virus ecology.

The *institutional strategy* included an emphasis on developing risk assessment approaches for LBVD, strengthening the preparedness and capability for outbreak response, establishing capacity in epidemiology to support need for investigations, strengthening of laboratory capacity for diagnosis of disease, coordination of programme activities through the role of the National Steering Committee and coordination of the zoonoses approach with WHO.

The main thrusts of the *production system element* were to conduct poultry supply chain risk assessments, bio-security assessments and strengthening at farm level and increasing knowledge of the understanding social and economic aspects of the poultry supply chains and the impacts of disease, including gender aspects.

Technical activities and findings

The technical activities can be divided into field and central technical unit inputs – in the case of this project the technical units comprise the laboratory and the epidemiology sections of LBVD. The laboratory has developed to the point of relatively reliable diagnosis of H5N1, as demonstrated by its satisfactory participation in the international proficiency testing programme conducted by an international reference laboratory. The laboratory adopted its technical capacity to provide diagnostic services for PRRS outbreaks with some initial guidance from international sources. The laboratory was able to provide the technical support to the field surveillance programme and processed in a timely manner a total of about 16000 serum samples and 4000 swab samples collected mainly from ducks. The results of this work provided key evidence about the presence and distribution of H5N1 infections in ducks.

The programme has used a number of approaches to build and then utilise epidemiology capacity within the LBVD. One has been to transfer a backlog of 8 years of field reports to a simple computerised data base structure. Another has been to support staff in the Field Epidemiology Training Programme for Veterinarians (FETPV) supported by regional FAO in Thailand, and a third to provide technical training to LBVD staff centrally and in the field. And under this project inputs were made to the central unit with geographic information systems and data handling.

Field activities funded partially or wholly by the project and carried out by LBVD or local NGOs included risk assessments for cross-border introductions of H5N1, sero-surveillance of ducks, and active surveillance of rural poultry populations for the presence of HPAI disease in association with a vertical cohort sero-surveillance of ducks. Although there was serological evidence of past infection of ducks in some limited surveys in 2007 and 2008, at the beginning of Phase II there was not a clear understanding of the infection status of the greater duck population and the role if any of rural smallholders' poultry in maintaining infection in Myanmar. The project undertook this very large cross-sectional survey of duck populations across the country to identify any areas where ducks might be exposed to H5N1 and possible act as a conduit of the virus into the chicken population. This survey required collection of samples from GPS identified locations and a large body of testing in the laboratories. The information collected indicated that silent infection of ducks is widespread in Myanmar although it was not possible to detect virus in the duck flocks during the survey. The longitudinal study was conducted over 7 months and during this time it was possible to observe the fact that ducks showed evidence of new infections without spill-over into chickens. In collaboration with international reference laboratories the programme has identified the strain of viruses and showed that a new clade of H5N1 virus has entered Myanmar. This finding is useful to the regional understanding of H5N1 epidemiology and also the risk for outbreaks in Myanmar.

A further matter that the evaluation would like to highlight has been the extensive use of detailed guidelines to manage project activity at the field level. While it is not fully clear if this was an FAO project approach or an institutional characteristic of LBVD, there were some very detailed protocols drawn up for the field operatives to follow and this has undoubtedly contributed to the robust, rigorous and timely implementation by LBVD of some complex requirements for field activities.

In the context of capacity development it is noteworthy that at the time of the first HPAI outbreak in 2006, LBVD had no epidemiology unit and no routine surveillance system in place to get early warning of an avian influenza-like incident in poultry. It is noteworthy that the first outbreak in poultry was considered typical of Newcastle Disease for some time by local authorities before it was investigated further.

Training

This project has carried out or supported various forms of training to good effect. It was not possible to directly evaluate how effective the training has been across the board but a good proxy measure is the efficiency with which large and complex surveys were carried out. This was a reflection of both the

management of the process, the detail provided in the training and also the commitment of the government partner to the process. Another example of effective training and uptake was the mapping of commercial farms with GPS, carried out effectively and efficiently after a limited training input from the programme. It appears that the approach to training involving a consistent message on the risk assessment matrix and then the analysis of risk in the field resulted in very useful outputs by LBVD in respect of documented reports.

The posters used for training was up in the Township Veterinary Office visited were in place, although the use of the poster was not explored. In developing posters it was not clear if there was field testing of the learning materials before the poster was put to print.

The layer farm visited in Hlegu had made changes to bio-security as a result of the training received from the TVO, but a sample of one is acknowledged as limited evidence. While the farmers in the group interview did have some appreciation of the technical inputs from the programme, they were much more concerned about production issues and cost squeezes they were experiencing than the threat of disease. One issue that did arise from a couple of sources was that the technical messages from some bio-security consultants to farmers were not consistent. This was ascertained to be more at the level of simple action issues but for farmers without strong technical understanding, it is the simple actions that are the ones that are most achievable and that are focused on. The CTA proposed that some review of the simple messages was required to ensure these were consistent to reduce any possible confusion in the minds of the end users.

The conclusion is that the training regimes and methods are suited to the learning environment in Myanmar where significant amounts of information have had to be delivered in a short time.

2.2.3 COORDINATION AND MANAGEMENT

Management of the project and coordination of both the project itself as well as AI program in general fall under objective 5 - *the project is effectively managed in a context of good intra and inter-sectoral coordination in the AHI programme.* This objective is covered by activities under component H4 and A4 and is focused on overall coordination as well as animal and human health coordination. Targets for this objective were complimentary between the animal and human health sectors and either focus on management or coordination, with 88% met for the human health sector and 88% for the animal health sector (Table 4).

Mitigating circumstances

It is important to mention upfront that there were a number of environmental and contextual factors that occurred during the project cycle that presented major constraints to the overall management of the project and could have potentially had very serious impacts on project delivery.

1. ***Change of government*** – in 2010 the Government of Myanmar changed from military to civilian. This turnover created much change in the GoMy structure and led to decentralization of responsibilities to state/division and district/townships levels. The affect of this was particularly salient for the human health sector ADD.
2. ***Global pandemic of H1N1 in 2009*** - although in many ways this global health emergency served as a simulation exercise for H5N1 pandemic, it also created two challenges for the project:
    a. Diverted resources and focus from H5N1 activities - the H1N1 response required considerable input from regional level of ECTAD CTL into the coordinated response of the UN system, as well as to LBVD in its role for animal health side. The same efforts were required from WHO regional and global offices.
    b. Desensitized government/public - another constraint created by H1N1 was that because the disease was mild compared to seriousness of H5N1, the community and authorities questioned the need for so much commitment to HPAI in light of so many

other disease priorities and limited resources. As a result momentum was lost and this created a bit of a setback.

3. ***Trade embargos to Myanmar*** - created obstacles in the timely procurement of supplies and equipment, particularly for laboratory. Embargoes imposed by the United States did not allow direct shipment from US to Myanmar, and required routing through other countries further delaying distribution. However, all planned supplies and equipment managed to arrive within the Phase II period.
4. ***Severe outbreak of porcine respiratory and reproduction syndrome (PRRS) disease*** – the risk management profile for the project had identified other disease emergencies as a possible cause of human resources shift in LBVD. The outbreak of PRRS had considerable political interest and was a major pre-occupation for the animal health sector, particularly LBVD, making it a higher priority than HPAI for about 6 months. However it was still possible for the programme to continue to deliver H5N1 activities during this time and project outputs were not severely affected.
5. ***Government restrictions on foreign travel within country*** - although there were concessions for major disasters (such as NARGIS), the need for travel authorization anywhere outside the capital created major challenge for both WHO and FAO to join investigations and provide direct technical assistance.

Despite these constraints, overall the project was not severely affected by these events, which suggests the necessary modalities are in place to ensure project delivery and at the same time management is flexible enough to respond to competing priorities. This further suggests a certain level of sustainability in the program (see section 2.5).

Management

The project was managed separately for each sector, with FAO managing animal health and WHO managing human health. Overall, in light of the constraints highlighted at the beginning, management was effective to ensure that most of the project activities and targets were met.

- ***Animal health sector*** - the project was well integrated into the overall programme approach with the inputs delivered to fill specific requirements in the technical project cycle. FAO's systems of operational management, while at times seemingly laborious, were rigorous, transparent and accountable. At the local level there was a useful system in place to track financial and human resource inputs, including consultants, to the program, which facilitated the evaluator to determine the activities linked to Phase II.

  Assignment reports were required as part of contracts and, by and large, with a couple of exceptions, were of sufficient detail to enable the consultant to judge the quality of the inputs. In some cases the reports were characterised by a lack of detailed information on the training materials used. Generally the management of the project by FAO has been effective in that it has resulted in delivery of the project within the project timeline. There was a hiatus in the re-appointment of the CTA due to a shift within FAO from using consultants to appointing key individuals to staff positions leading to a gap of 2.5 months in CTA input to the programme.
- ***Human health sector*** - the project was under the WHO CSR unit primarily managed by the international professional epidemiologist who had joint responsibilities with Expanded Program in Immunization. The international staff supervised the national consultant and administrative staff who were dedicated to the project implementation. With regards to the operational and financial system, the consultant did not have access, and relied on basic summary tables produced from the WHO project staff and hence could not assess the system being used to manage the project. Although, WHO has regular planning meetings with CEU, through the interviews with country counterparts it was clear that there is a need for stronger dissemination of WHO publications, technical updates and relevant regional and global meeting reports.

Inter-sectoral coordination

Inter-sectoral coordination in the AHI programme is predominantly focused on the relationship between the animal and human health sectors for the two lead UN agencies FAO and WHO as well as the GoMy counterparts. This evaluation took the position that effective coordination meant efforts of the UN agencies to strengthen AHI prevention and control in the two sectors would be aligned to the systems already in place, rather than creating parallel systems and focused on joint approach to strengthening zoonoses.

Beyond assessing the output targets, most of which were met, coordination proved a more difficult component to evaluate, since specific output achievements didn't necessarily correlate with overall improvements in this area, which for the most part were deemed significant by focal points who were interviewed. In addition, perspectives on progress in this area differed substantially between the two sectors and across different implementation levels and areas of work.

- ***GoMy*** - the DoH and LBVD counterparts indicated that as far back as 2004, there was a national plan in place to meet the threat of AHI that set the process for the two sectors to coordinate. Overall, the Project saw a marked improvement in coordination between animal and human sectors at both the local and central implementation levels, whereas before FAO and WHO had to do a bit of "hand holding" to bring the two government sectors together. The H1N1 experience further supports there has been improved coordination across agencies, both government as well as partners (UN, INGO, NGO, Livestock Federation, Forest Department, City Development Committee, etc.). For example, for the transport of specimens, the GoMy found the aviation department to be very cooperative and the MoH has collaborated with Department of Education and other ministries for pandemic planning. Coordinated implementation to outbreaks is quite strong, with joint investigations at two levels, central and township. This established system was experienced for the zoonotic outbreaks of rabies, leptospirosis and plague in 2009. Joint FETP trainings are run by MoH and co-funded by both WHO and FAO and include veterinarians/animal sector both as students and as trainers.
- ***WHO/FAO Coordination*** - the two UN agencies facilitate the joint approach in the government through technical and financial support. While the WHO support is more direct, the FAO input comes through the training provided for key animal health officers in the high risk areas. In this regard coordination between the two agencies, markedly improved since before the Project phase was mainly visible during outbreaks and during reporting. A good example of the more outbreak and technically focused coordination occurred with the 2011 outbreak in Sittwe where project officers from both FAO and WHO travelled to the outbreak site and participated in the outbreak investigations and control assessments with local counterparts.

  The UN Humanitarian Grouping holds monthly meetings to brief the UN, diplomatic community and INGOs on various issues including health related matters. In this context FAO and WHO coordinate to produce a report as appropriate. In particular the two agencies collaborated strongly to keep both these stakeholders and also the Government briefed on the situation with respect to the emerging global pandemic of H1N1. This was a particularly strong demonstration of the coordination of the two agencies and an important output from the project.

- ***Inter-sectoral joint meetings*** - one important coordination milestone was the establishment of the National Steering Committee during Phase 1 for which both the LBVD and the DoH have a senior representative and membership extended to other sectors and partners. The committee met 5 times every 6 months during the Phase II cycle. These meetings provided a venue for information exchange for the two sectors. Attendance was high for FAO (100%) with LBVD and MoH attending 4 of the meetings. WHO, however only attended one of the meetings, which was an expressed concern by counterparts, and suggests less inputs from the human health sector.

  > *"Before, in the first 2006 outbreak, we didn't know what to do, we were fighting with the animal people because they wanted to protect food security, they had a different agenda. Now we have a common goal - One world, one health"*
  >
  > *- Director, CEU*

  Even though the number of coordination meetings exceeded the expected target, the meetings did not necessarily cover their planned purpose. For example, a total of 8 meetings took place, 5 being

Steering Committee meetings and 3 focused on zoonoses. The ultimate outcome of successful management and coordination between animal and human health sectors and sing of sustainability is a strong zoonoses program and these meetings were help the two sectors build strategy and plan zoonoses workshop during the Project period. The workshop didn't happen, and in reviewing the three meeting minutes that were available for these meetings, one didn't actually cover any zoonoses issues, and rather served as an end of the project meeting. Minutes were not available for any of the 5 "HPAI National Steering Committee Meetings."

With regards to intra-agency coordination within each sector, the human AI committee is often more difficult to coordinate as the chairman is the Deputy Minister, however the chairman for the animal sector committee is the Director General for LBVD and hence more accessible. according to the output targets 3 meetings were to cover general animal and human health sector coordination and 3 were to focus on zoonoses.

- ***SRRT joint working group -*** even though the Joint working group on SRRT was developed at all districts, it is not active except during an outbreak in that locale. Furthermore, at the central level interagency discussions were held to provide more input to the SRRT system, after the second meeting it became clear there wasn't a demand from the GoMy side and hence the working group was never really established and no joint management plan was developed. Essentially the government felt that the respective sectors already knew what they should be doing and hence didn't really need to meet regularly. Part of the lack of momentum was due to no HPAI outbreaks between 2008 and 2009, but it was noted that the structure at the central level exists if it needs to convene.
- ***Sharing information*** - there were differing opinions on the extent of information sharing between the two sectors. Although the consensus was that information sharing had improved during the Phase I and Phase II projects, most felt there was much room for improvement outside outbreaks. During an outbreak in chickens the LBV at the local level informs all sectors and then at the central level have HPAI coordination meetings to further share data. The local human side informs the MoH which then informs the laboratory and the response team collects samples from persons if there is someone with symptoms.

  However outside outbreaks all data comes from the animal sector as information goes from the animal local level to the animal central level, and the human sector finds out only on demand or through a coordination meeting. In general communication at the local level is stronger than at intermediary and central levels. For example, the LBVD has to get approval from the higher authority to disseminate information and since confirmation of positive specimens takes time, this information can sometimes take time to reach the human health sector.
- ***Coordination with other partners/networks -*** there a number of multi-sectoral coordination mechanisms taking place that benefit HPAI work. There exists a Technical Work Group on the human health side which meets monthly or bi-monthly and is focused on SRT and involves WHO, FAO, LBVD, MoH, and INGOs. It differs from the HPAI meetings as it has less members overall but and more external partner representation.

  Before the Phase II project FAO and WHO were coordinating with other partners such as UNICEF (focused on risk communication) and INGOs such as CARE (training of veterinarians on AI control and farmers). However as they lost their funding interested to maintain and attend coordination meetings waned. There are also public/private relationships set up particularly through the Myanmar Medical Association (MMA), farmer's organizations, and the Wet Market Association.

  Regional coordination mechanisms include ASEAN network Mekong Basin Disease Surveillance (MBDS), information sharing with border countries and HPAI networks through both FAO and WHO. During the Project period there were 6 regional meetings attended either by human health sector or animal health sector focal points.

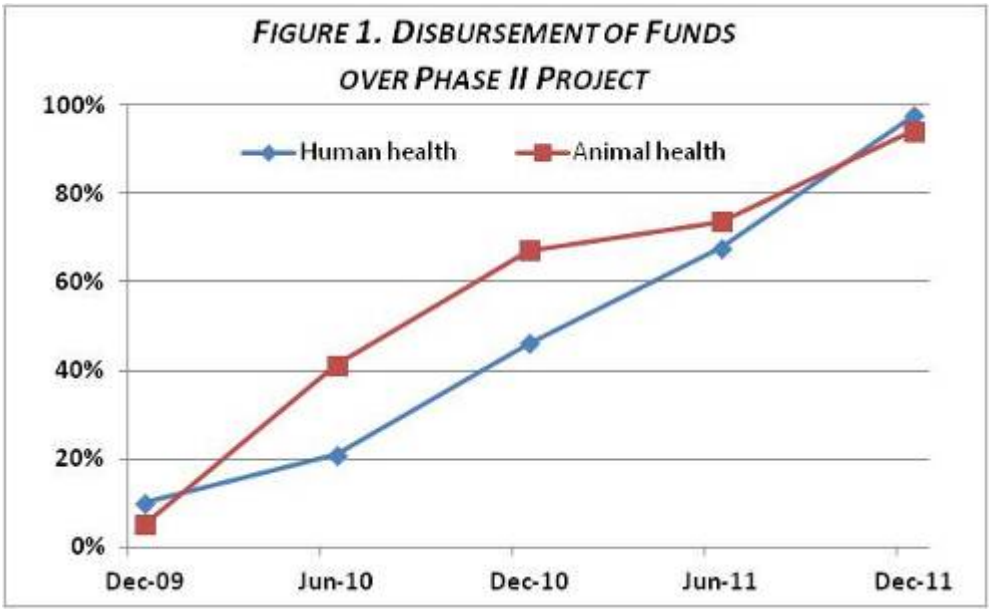
2. 4 EFFICIENCY

Efficiency looks at whether the Project made effective use of time and resources to reach the Project targets. It also looks at the management and risks that may have affected efficiency, both of which were discussed in section 2.2.3 (Mitigating circumstances and Management). Further it assesses whether funds were used to meet priority needs based on lessons learned from Phase I.

Cumulative expenditures

Efficiency implies that there are minimal delays in planned spending over the project period. Figure 1 illustrates the spending for both sectors over the project period with Annex 6 providing more detail for each sector component. The project period was originally from January 2009 to December 2011. For the animal sector the Project document was signed between FAO and the GoMy (LBVD) on April 14th 2009, with fund disbursements not taking place until June 2009. For the human health sector the Project document was signed between AusAID and WHO with funds managed by WHO and disbursements starting in June 2009.

By December 2011, 96.1% of Project budget had been spent, suggesting a strong level of absorptive capacity (Annex 6). In this regard, as the graph shows, the human health sector had a slower rate of expenditure for the first half of the Project period than then animal health sector. In the discussion with the donor some concern was expressed about "lumpy" delivery of the AusAID funding stream. While this may have been to some extent true, it was noted from a programme perspective that flexibility in the approach of the donor did in reality facilitate overall programme delivery.



Animal health - there were uneven reporting intervals until January 2011, as there was initially not a firm alignment with AusAID or FAO reporting periods, and so this is reflected in the financial returns from the project. As of January 2011 the financial reporting was aligned with the Australian financial year and there was no negative impact on the delivery of the project or flow of funds. The utilisation of the resources by the programme team was adjusted over time to manage the available human resource capacity in LBVD as well as other cyclical demands that occur due to social-cultural milestones and the annual programme of execution of government business (see textbox below). Donor flexibility allowed for such adjustments.

Human health - expenditure lagged for the human health sector during the first year of implementation. The main reason was due to politically imposed sanctions/embargoes which posed challenges for procurement of key equipment and supplies, particularly those for laboratory such as reagents. As mentioned already, even though procurement was slow (for laboratory didn't start until

the second semester, for hospital took place mainly in last 6 months of implementation) management was effective in overcoming these logistical challenges, and in this way the Project exemplified efficiency. Both components H1 (surveillance) and H2 (laboratory) were slightly overspent budget. Component H4 (coordination and management) was underspent at 88.6% of planned budget by December 2011, mainly due to Zoonoses workshop not taking place as scheduled.

Example of efficiency in Phase II

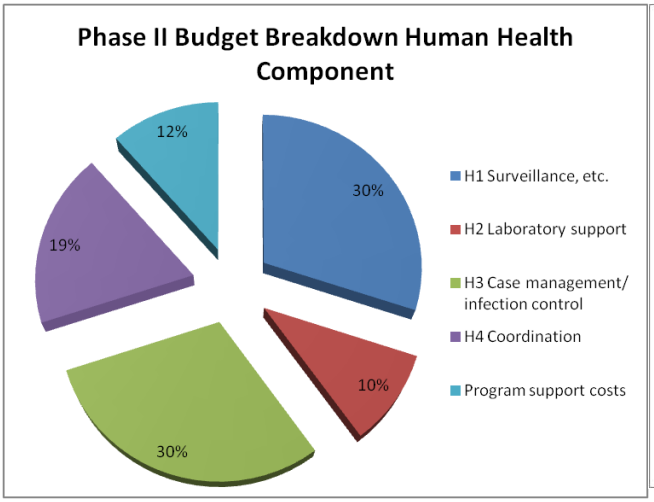
One of the expected outputs was the restructuring of poultry markets in Yangon, led by FAO bio-security experts in collaboration with the local authorities of Yangon and the human health sector under the city development committee. the market was expected to move location and the city deemed it unnecessary to make it bio-secure. In response, FAO did a risk assessment finding that if farmers had sick poultry they would not send these birds to the market. For this reason the live bird market became less of priority for the project and these funds were reallocated.

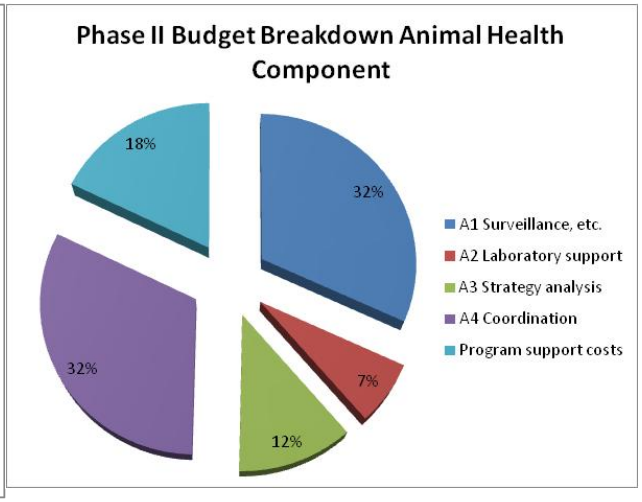
Allocation of funds

Efficiency requires an appropriate allocation of resources as informed by the needs of the program. Any variation in the original budget plan should be well justified through changing needs. The pie charts show the breakdown of budget by sub-component for both sectors. Overall the breakdowns were consistent with the priorities set out for Phase II. The majority of original funding went to surveillance activities, accounting for 31% of the total budget. Much of this funding went towards the FETP and Technical Assistance in both sectors, both of which were considered a major capacity strengthening effort needed for both HPAI and other disease priorities.

The next highest contribution was to coordination and management accounting for 25% of the total budget. Most of this funding was focused on the management support costs, paying for project salaries and office operations, without which the Project could not have been well implemented. Case management and infection control for the human health sector had the next highest burden (15%) mainly due to the high costs of procurement of equipment for upgrading the four hospitals. These costs were well justified as improvements in the control of HPAI as well as other diseases were highly reliant on the upgrading of hospitals. The program support budget also accounted for 15% to cover reporting costs, end of project evaluation, administration and technical support services. Interestingly the component with the highest risk in terms of sustainability - laboratory support - had the least amount of contributions across the two sectors, at 7% of the total budget (see below and Section 2.7).

Animal health - the distribution of expenditure across components was appropriate to the needs of the program as based on the lessons learned from Phase I. For example, the project budgeted significant funds to contribute to the engagement of a full time international technical adviser for project and programme delivery. The evaluation considered if this was a reasonable allocation of resources and concluded that the benefits of the close relationship with the GoMy counterparts and the direct support provided to the programme were a value added offset to any resource bias. Support to Component A2 was less than initially anticipated, but well targeted and delivered in a timely fashion





to fit the rest of the activities involving not only the AI programme but also inputs outside the programme to the PRRS emergency. As Annex 6 shows, monies were transferred during the second year from surveillance to other sectors, changing substantially the original surveillance budget of 42.4% of the total budget to 31.8% of the total and increasing the percentage of the other three components.

The programme undertook some very large field studies and in the opinion of the consultant there was notable efficiency in execution. To collect more than 16,000 serum samples, test them and enter all of the data into a data base then linked to a GIS system was a major undertaking. The cost involved in obtaining these samples for a major cross sectional survey of ducks was about US$ 80,000 representing good value for money. A similar exercise was undertaken to develop a data base of poultry farms in the country. The LBVD officers had no previous experience with global positioning systems (GPS) and yet after a short training were able to go to the field and record the locations of about 10,000 poultry farms and have the data entered into a data base. The exercise cost about US$ 74,000 and is a key resource for disease management into the foreseeable future, especially with the emphasis of a risk based approach to disease control that has been introduced to the LBVD by the AI Programme. For some specific tasks the uptake and translation of training to action is a form of capacity building that is in a sense hidden, but very worthwhile.

Regarding adjustment to findings, the programme had used the findings of the extensive surveillance in duck populations to advise the LBVD on the need specific time related risk communication to areas where chickens and ducks are present in large numbers. The advice also is that there is no advantage to undertaking culling of duck populations with a serum test history of prior exposure to H5N1. As the market chain studies have been carried out the risks for example associated with duck trading patterns have been elucidated and incorporated into the national risk framework for HPAI.

Human health - based on the lessons learned from Phase I, the main gaps to be addressed by Phase II were capacity strengthening in surveillance. through FETP and trainings of RRT at district and township levels, and capacity strengthening in infection control and case management through upgrading of specific hospitals and trainings of essential staff. In this regard, as discussed in section 2.3, the Project met these objectives and hence spending was efficient in focusing on these priority needs, with the two highest allocation categories focused on activities in component H1 (surveillance) and component H3 (infection control and clinical management). In addition, despite the questionable sustainability of laboratory to maintain diagnostic capacity for HPAI (see Section 2.7), the Project was efficient in reallocating funds to ensure a 1 year buffer for laboratory supplies and reagents, extending stockpiles to the end of 2012.

Overall efficiency

Overall, the evaluation concluded that generally the project and programme has been able to deliver significant outputs from relatively modest financial inputs and as such is rated as highly efficient. Both FAO and WHO commented on the efficiency of working with the GoMy systems. Both UN agencies felt there was a very efficient uptake of technical skills in trainings by GoMy officers and subsequent committed translation into on-the-ground activities. In addition, the consensus with both UN and GoMy was that through relatively modest inputs of resources it was possible to generate strong multiplier effects from these investments by providing benefits beyond HPAI.

For example, significant resources placed in surveillance extended to other diseases for both sectors. In the animal sector, the on-ground presence of the Technical Advisor played an important role in the H1N1 response, as well as in assisting LBVD with the PRRS emergency. For the human health sector, strengthening the RRT benefited the response to hurricane Nargis emergency as well as H1N1, and now the RRT is well integrated to pandemics and disaster management.

There was no indication of major risks such as misappropriation of funds or diversion of resources. For example, three very large cross-sectional and vertical surveillance activities were carried out under letters of agreement (LoA) signed with the LBVD. As experienced in other countries, such LoAs could run the risk of significant failures in governance of such agreements. However the evaluation showed a high level of accountability in the system and no observed instances of hierarchy

intervention in disbursement of Project funds. Another example is the efficiency and transparency of the supply chain for laboratory, despite the presented challenges for procurement and distribution.

2.5 GENDER EQUALITY

According to WHO, gender equality should be considered across the AI response to address issues from financial decision making and access to resources to health seeking behaviour and sex differences to biological response to pathogens such as during pregnancy.[8] Overall the evaluation found that gender equality did not fare as well as the other evaluation criteria and hence was rated lowest for both sectors. Gender was more directly addressed under the animal health sector portion of the project than in the human health sector and for this reason the rating for this evaluation criteria was less than satisfactory for human health sector (2.5).

Human Health Sector

The evaluation did not find evidence of direct efforts to address gender equality under the human health components of the project. Neither the National Strategic Plan nor any of the SOPs/guidance reviewed mention gender-sensitive measures. Interviews with focal points in case management and infection control at the DMC corroborated this lack of formal measures in the program. In discussions with the Epidemiology Unit, both the management and staff indicated that even though gender is not formalized in the program, differential risks between men and women across the AI transmission spectrum are recognized and efforts exist to collect disaggregated data for gender-based analysis.

Animal Health Sector

There were concerted efforts to address gender equality in the animal sector component per global guidelines. More specifically the following gender activities were conducted:

Study on concepts of gender and gender roles in the poultry sector – this was a discrete activity to look at Gender Roles and training needs assessment in two divisions. A total of 359 persons attended focus group discussions. Findings revealed that generally men outnumber women as workers in the chicken production zones but for duck raising equal numbers of men and women are involved. Another interesting finding was that while women did not play a predominant role in the more technical decision making (e.g. feeding, procurement of replacement stock), they have the ultimate financial decision making role for the family. Findings on gender roles have provided guidance on who to target with particular training efforts.

Gender concept training to LBVD staff – as a result of this training, staff were then able to gather data using a gender based approach in household survey studies in poultry production zones.

The consultant was able to obtain sex disaggregated data for the training conducted across the programme and by this project. There has been considerable effort to provide training to both male and female staff of the newly established animal health laboratory and epidemiology unit. In the diagnostic laboratory 5 out of the 7 scientific officers are women and in the epidemiology section 7 out of 11 officers are women. In addition one female epidemiologist is undertaking the FETPV programme in Thailand and will complete this training in 2013.

2.6 MONITORING AND EVALUATION

Monitoring and Evaluation (M&E) of the project was primarily focused on two methods, the joint bi-annual semester reports to the donor and the monitoring of the outputs and outcomes described in the project logical framework.

Monitoring of the project was focused on the joint semester reporting. All semester reports were available for reviewing. Each report had information on the progress of the project activities with

[8] Taking sex and gender into account in emerging infectious disease programs: an analytical framework. WHO WPRO, 2011.

updates to outputs and outcomes described in the logical framework. In addition, the reports presented the general expenditure against allocated funding by sector component. Each report had some discussion of analysis of achievements, challenges faced and needed planning, with the animal health section of the report providing more details in general than the human health.

There was evidence of analysis and review of the project log frame. At one point the presentation of the log frame was expanded in response to discussions with the AusAID country office. For the animal health sector, at the regional level the role of ECTAD RAP in M&E was to monitor the project's performance against the overall plan, to ensure that operational procedures used complied with FAO's rules, as well as to coordinate reporting to the donor. Overall the monitoring of the project was adequate, although FAO agreed that there is further work to be done in the area of developing robust monitoring procedures, especially to pull together overall performance both at country and regional programme level. For the human health sector, monitoring was limited to the semester reports. It was not clear how the monitoring of the project fit into the overall regional framework for HPAI. This was most likely due to the fact that WHO had planned to recruit a short-term international expert to develop an M&E plan for the project that could also be adapted to the national AI program. However, WHO was not able to find a suitable candidate.

At the national level there is no M&E framework with a set of key indicators against which progress can be measured regardless of the donor funding mechanism. Although there are some indicators such as for market surveillance that monitors unusual markdown in chicken prices, M&E indicators are not well developed for either sector especially for aggregating programme outcomes at the regional and global level. Through interviews with focal points, one of the challenges raised was the difficulty in developing meaningful quantifiable indicators for a project with such rare events in Myanmar, particularly for the human health sector. However, the consultants note that there is regional comprehensive guidance available with the USAID funded HPAI M&E guidance for Southeast Asia which both sectors can refer and adapt to the country context.[9]

Overall, M&E was not addressed to the extent needed particularly in light of the fact that lessons learned from Phase I indicated the need to establish an M&E framework and increase M&E activities in the program. This was particularly true for the human health sector and this is reflected in its rating for 3.5.

"In the past we (FAO/WHO) had to provide much more guidance on what to do when there was an outbreak, the local authorities would panic and not share information, but since the last 2 years the response to outbreaks has become automatic for the national programs and this is expected to continue."

2. 7 SUSTAINABILITY, GAPS, AND LESSONS LEARNED

The true success of the Project can be determined by whether its intended outcomes are sustainable. In this regard, the evaluation examined sustainability alongside gaps and lessons learned, as the themes across these three areas of questioning were linked. The implementation approach of the Project promoted sustainability by integrating into existing GoMy systems and structures to deliver project activities, rather than creating parallel processes exclusive to the Project. By building on existing systems, the GoMy institutions have been able to take ownership of the Project and overall integrate the objectives into their wider programs. As the textbox suggests, the investments made into HPAI helped to establish the structures, processes and relationships to sustainably and effectively respond to a pandemic. Much of the sustainability of this system stems from the strengthening of applicable skills in surveillance, laboratory and infection control and case management. There are gaps however. There is no current plan to continue this funding beyond the Project period, particularly for the animal sector, regional and other donor funding is low, and the government is not able to absorb the cost burden for many activities in light of other priorities. Even though the project has had a major effect in raising awareness for collaboration between animal and human health sectors, without funding it is not clear how easily joint efforts can continue as they were highly reliant on donor funding (eg. FETP). These gaps along with areas that are sustainable were further

[9] Guide for Monitoring and Evaluating Avian Influenza Programs in Southeast Asia. Measure Evaluation, USAID, 2008.

understood by the evaluators through looking at specific milestones such as the H1N1 experience and establishment of a zoonoses program. In addition, there was an analysis of the sustainability of specific components within each sector. These findings provided valuable lessons learned for the future success of the program.

H1N1

The H1N1 experience was essentially a simulation exercise for HPAI readiness and provided a number of lessons learned to improving the program as well as its sustainability. Overall a total of 797 human samples were tested with 194 found positive. The GoMy response to H1N1 was deemed as a prime example of the strong collaborative effort that had been built between the two sectors. The animal sector was highly involved and both sectors cited that coordination fell into place between FAO, WHO, LBVD and MoH. In addition, the needed multi-sectoral collaboration such as the border control activities highlighted in Phase II was translated into the robust collaboration with airports and seaports during H1N1.

There were also a number of valuable lessons learned that can highlight gaps and sustainability issues for the HPAI program. These include:

- *Control strategy* - strategy adapted for H1N1 followed the "containment at source" approach, which is not usually recommended for most countries. This strategy is quite strict in that identified human cases are isolated for 10 days from all parties and the family/close contacts are quarantined. It became clear from the H1N1 experience that with the 138 cases identified, this level of containment was too ambitious and in a HPAI pandemic would not be feasible. In addition, the strict GoMy adherence to isolation of cases led to a mass attempt of suicides in cases. Based on this experience it was clear that the "mitigation strategy" approach would be more appropriate for Myanmar.
- *Structure of infection control wards* - the existence of electronic plugs in the isolation rooms contributed to the mass suicide attempts of H1N1 cases during the H1N1 strict isolation practice. Based on this isolation rooms will be structured to be risk free in this regard for future pandemics
- *Overwhelmed border screening of fever* - the strict policy of screening all persons presenting with elevated temperatures at the border, led to major issues, particularly at the airports. Too many people were unnecessarily detained leading to an overload on already limited human resources. In addition, this excessive approach led to distrust of the GoMy judgement when it became clear that H1N1 was not a major threat to human health.
- *Training of media* – during H1N1, the media were not afraid of getting infected would try to enter the isolation wards to get pictures of cases. As a result they were exposed and the policy was to isolate all exposed persons. These exposed media persons felt they were being punished for doing their job and didn't fully understand the repercussions of their actions. Even though there was a training funded by UNICEF for journalists, it was clear that not all relevant media were reached and there needed to be more targeted training on their role and appropriate practice during a pandemic.
- *Improved communication and education* - the first H5N1 outbreak was considered a "teachable moment" because the public was really afraid due to the severity of the disease both in poultry and humans, and people were open to culling and strict measures by GoMy. However, when H1N1 happened the public became confused in that the disease was not serious and yet the GoMy response was extreme. The GoMy didn't respond well to this as many of its own staff were confused between H5N1 and H1N1. As a result many people lost trust in the process and the need for pandemic planning. The lesson learned was that different messages needed to be developed about the two diseases and proactive communication to both government staff and the public about the difference between the two diseases and the need to be prepared in either situation.
- *Multi-sectoral approach* - the need to extend collaboration beyond animal and human health was clearly demonstrated during H1N1. There as a countrywide shortage of surgical masks due to the fact that school were enforcing students to wear surgical masks, or they would not be able to attend class. It became clear that sensitization and training of the Ministry of Education and other

line ministries was essential. Further, the international community such as Embassies were uninformed and as a result their participation in the response was limited. It is important for the GoMy to integrate international efforts.

- *Reserve funding for surge capacity* – the H1N1 experience highlighted the need for reserve stocks of supplies for laboratory and infection control/case management. In addition, it was clear that continuity of trainings is essential to ensure enough human resources to respond to pandemic.

Zoonoses

Zoonoses is discussed in this section because the establishment of a strong zoonoses program was considered by both sectors as the cornerstone for sustainability of HPAI response. Through an established program whose effectiveness relies on joint efforts in research, surveillance and laboratory between animal and human health, the foundation would exist for sustainable HPAI efforts. One of the interesting findings from the interviews was that before the improved capacity to diagnose HPAI, both human and animal lab worked more closely together, particularly with regards to diagnostics. But as capacity increased, there has been more diversion and hence a zoonoses program would ensure these linkages are sustainable.

Considerable effort was made to develop a national zoonotic disease strategy as demonstrated in some of the minutes of the coordination meetings. FAO had obtained an in-principle agreement with WHO and national counterparts DoH and LBVD to conduct a national workshop which was planned for May 2010. However a number of constraints led to postponement of the process. The problem was not in planning, but rather in implementation. The change in GoMy structure and the decentralization process slowed down coordination processes between the two sectors and made it more difficult to implement zoonoses activities. In addition, there was a break in the contract of the CTL, moving the initiative down the priority list.

At the time of the evaluation, a national workshop on Zoonoses organized by WHO Myanmar Country Office, WHO SEARO, and the CEU from 14th to 15th of March 2012. This was a joint meeting between the two Ministries with strong representation from the Ministries and township development committees. The goal is to focus on structural discussion of routine zoonoses and to link the lessons learned from HPAI. In addition an Intra-dermal Rabies Vaccination pilot project was conducted in Yangon and Mandalay. It will be important to monitor progress in the joint zoonoses program as a proxy for sustainability of HPAI capacity.

Animal health sector

Although the project was well integrated into LBVD program, in some instances local NGOs had been contracted to undertake specific studies for the animal sector such as on market/value/supply chains. However these contracts were made due to limited LBVD capacity and not considered parallel to existing systems.

The gaps originally identified were not expected to be fully addressed with the resources available to the Avian Influenza Programme or the LBVD. It should be noted from the outset that GoMy fully funds the disease control efforts in the Animal Health Sector and early in the programme GoMy financed the building of the shell to be fitted out as the laboratory for HPAI diagnosis. It is indeed imperative for LBVD and FAO to find resources to continue some modest support of some key activities, so that the gains are not lost. However the evaluation is of the view that there is substantial sustainability of many of the inputs into human capacity building that has been a significant feature of the programme.

The LBVD has not undertaken any large scale surveillance activities for many years and so these exercises have built capacity in management and implementation. In addition the skills learned in developing the market chain approaches will be sustainable if used in other projects such as FMD control. There has also been significant human resource development in the area of laboratory training. This base platform of technical capacity will by and large be sustained but it is clear that in technical areas continual use of skills gained is necessary to be able to perform at a high level required by modern laboratory technologies. In summary the baseline of technical skills that has been established requires continuous application and some technical backstopping to maintain the standards. A similar comment applies to the training inputs in epidemiology. Continued application of

professional skills is required to maintain competence and confidence, and some mentoring from outside is required to maintain analytical skill levels. The LBVD has taken up the initiative of converting paper records to electronic and this has an inbuilt sustainability as it has demonstrated to LBVD the outcome of rapid and accurate compilation of disease information in response to enquiries.

The evaluation was not able to assess the level to which LBVD has progressed in overall understanding about the management of disease control activities and the transfer of skills to the field operators. One issue here is that the actual management of the outbreak response is in the hands of the local authority, and it is not clear how much influence the technical line has over decision making in the immediate response. However the policy framework has been influenced by the risk assessment approach as, for example, in the 2010 outbreak in Yangon, supplies of poultry were steered around an infected zone rather than being blocked completely. In the past there has been generally a lack of in-depth investigation of disease outbreaks and compilation of good reports that can inform about key aspects of the source of the outbreaks. The more recent investigations have been more technically sound.

With regards to beneficiaries, although there was much improved change in poultry farmer behaviour during the Phase I project, behaviour in backyard chicken farmers and wet market sellers has not improved. For example cited by UNICEF was observation that when masks and gloves were provided to wet market sellers during an H5N1 outbreak, they would not use them. In addition, the public still eat dead chickens despite concerted efforts to educate, and this is mainly due to economic reasons.

Human health sector

Overall surveillance and response can be considered the component demonstrating the most sustainability. The mechanisms are established and SRRTs are functional regardless of funding. The government can manage most of the processes, including transport of specimens. Sustainable infrastructure for infection control and case management are established in 24 hospitals and the necessary laboratory equipment is available to diagnose HPAI in at least three laboratories. There are however significant gaps to sustainability largely due to lack of funding. Although the health budget is increasing and the hope is that the GoMy will take on some of the uncovered costs, there is no reserve funding, particularly to handle surge capacity in the case of pandemic. Further, sustainability in existing capacity is threatened as there is no funding for scaling up trainings in all three areas of the response as well as the ability to ensure continued stocks of laboratory reagents and certain hospital consumables. The evaluation identified the following specific gaps and issues that need to be addressed as priority which can directly affect sustainability of what the Project has accomplished thus far:

- *Overall*
    - Rotation policy – although staff are trained in surveillance and response, laboratory techniques and infection control and case management, the mandatory rotation policy in the MoH means new people are not trained. Without funding for continued trainings, continuity and sustainability are hindered.
    - Human Resource limitations – the structure of MoH HR was set up several decades ago and has not been updated to meet the current demands of the health system. This translates into few people doing many tasks which jeopardizes the long term ability to respond effectively to pandemic threat.
- *Surveillance and response*
    - FETP is in jeopardy as it was entirely funded by AUSAID, USAID and European Community monies without plan for continuance. In this regard it needs more than just secured funding, it needs a clear road map on who should get trained, when they should get trained, how to maximize the use of trained staff, etc. to ensure sustainability of skills.
    - Scale up of trainings, particularly to township level, is not sustainable because of limited government funds.
    - Joint SRRT working group – this entity needs to be more structured and meet more regularly. When they meet during outbreak events, they only address short term issues.

But it is necessary to address medium and long term issues to ensure sustainability. More than funding, this requires increased momentum from both sectors.

- *Laboratory*
  - Supplies for diagnostics – although reserve stocks for supplies such as reagents exist until end of 2012, there is no funding past this date and the current stocks are not enough to handle surge capacity in case of pandemic
  - Quality assurance - every year samples of influenza are sent to Japan thru AUSAID funding, and this is not included in the current government budget
  - Training of staff – currently not enough laboratory staff know PCR and funding does not exist to continue training to new staff. Even though staff were able to rotate during H1N1, the actual number of samples was not as high as expected and this strategy will not sustain a larger epidemic without more trainings.
  - Extension of diagnostics to regional laboratories – currently only the NIC in Yangon is authorized to diagnose. Without expansion of this responsibility to the regional laboratories it will be difficult for Myanmar to respond effectively to a pandemic. This decentralization can also help address transport of specimens from remote areas as it reduces the cost.
  - Improved regional linkages– currently there is limited funding for technical staff to attend regional workshops. As these workshops are critical for capacity strengthening it is important that funding exist for both managerial staff and technical staff.
- *Infection control*
  - Transfer of patients – as the ambulance system is weak and procurement of new ambulances expensive for the GoMy, if there is a major outbreak, the system will not be able to handle the transfer of patients to referral hospitals
  - Training to township level – to date training at the township level has not been adequate to ensure sustainability of skills to respond to pandemic.
  - Availability of consumables – there is not an adequate supply of certain consumables such as hand sanitizer

3. EVALUATION CRITERIA RATINGS

Evaluation Criteria	Rating (1-6)		
	Animal Sector	Human Sector	Overall
Relevance	**5**	**5.5**	
Effectiveness	**5.5**	**5.0**	
Efficiency	**5.5**	**5.5**	
Sustainability	**4.5**	**4**	
Gender Equality	**4**	**2.5**	
Monitoring & Evaluation	**4.5**	**3.5**	
Analysis & Learning	**5**	**5.5**	
Rating scale Satisfactory Less than satisfactory	6 Very high quality 5 Good quality 4 Adequate quality 3 Less than adequate 2 Poor quality 1 Very poor quality		

4. CONCLUSION AND RECOMMENDATIONS

The Phase II Project has demonstrated "good quality" implementation (above 5) for both animal and human health sectors. The AusAID contribution to the Avian Influenza Integrated Program in Myanmar was well targeted as it filled identified gaps and added flexibility to the programme delivery. The planning of resources and activities was based on thoughtful analysis and learning targeted to identified gaps and lessons learned from Phase I of the Project. In addition, the Project was highly relevant to the donor and regional priorities and met the needed gaps for the country while contributing to strengthening the systems beyond just the HPAI response.

Most of the objective targets were met for both sectors although a few opportunities for closer linkages between the animal health and public health sectors were missed. Some considerable gains have been made with solidifying collaboration for zoonotic disease control and both sectors have a greater appreciation of the need to work together within a One Health framework. The real time response to the HPAI outbreak that took place during the evaluation highlighted the effectiveness of Project inputs.

The Project demonstrated strong management despite a number of environmental constraints. There was evidence of efficient use of resources, with the Project adapting to changing needs and accomplishing significant gains with relatively small investments. Both effectiveness and sustainability of the Project outcomes was evidenced through the H1N1 experience, particularly with regards to existing structures and processes and the lessons learned. There is concern regarding the continuity of capacity as future funding has not been identified for FETP, laboratory diagnostics training and stocks for human diagnostics, and scale up of trainings particularly to the township level in surveillance and response, and infection control and management. The two areas of weakness, particularly for the human health sector, were monitoring and evaluation and gender equality, both of which are required to be integrated in the project cycle to ensure effective implementation.

For the animal sector, conclusions are written in the context that AusAID has indicated it will not provide further capacity building support to the LBVD or to the animal sector side of the HPAI programme. This Project funding was the first assistance since FAO introduced Australian Newcastle Disease vaccine technology to the LBVD several years ago and hence was deemed a major contribution to the current capacities of the program. FAO and LBVD therefore share a responsibility to try to shore up the considerable technical capacity that has been built, but also that still requires mentoring to avoid regression. In the event that there is continued support to the DoH for HPAI and other infectious diseases control, then it would be helpful if there was some attention paid to maintaining some coordination mechanism with the LBVD and with FAO, if the latter is able to maintain a presence in the country.

The human health sector has experienced considerable gains from the Project inputs, not only with regards to HPAI response but also for extending to strengthening the health system in the areas of surveillance and response, infection control and laboratory capacity. Future funding for the HPAI in the human health sector is imperative in order to ensure sustainability.

General conclusions and recommendations are highlighted below:

i. *Continued high level political support is critical to maintain commitment and momentum. Without the high level representation on the Steering Committee, continued buy in by the GoMy will be a challenge.*

ii. *Future support to the WHO for HPAI activities should consider a component to ensure continued collaboration with the animal health sector, as well as coordination of zoonotic disease control initiatives. Focus is needed to ensure consistent coordination that allows for mid-term and long-term planning, not just ad hoc outbreak based collaboration that focuses on response.*

iii. *Cross-border collaboration needs strengthening, particularly establishing linkages with China, India, Bangladesh and Laos focusing on information sharing and patient referral at border*

iv. *Media training should be ongoing and more integrated to focused on their role in general emergency and pandemic preparedness and response*

v. T*he dependency on funding can be offset by integrating HPAI applicable skills in pre-service trainings. FETP and FETPV should be considered as part of national curriculum priority in surveillance and response that is funded by the GoMy.*

vi. *Concerted effort is needed to develop an integrated M&E plan for the HPAI program using regional guidance such as the USAID funded M&E guide for Southeast Asia.*

vii. *Support to FAO to maintain a presence in the country paid good dividends in respect of capacity building in the government, good governance of programme implementation, the ability of the programme to respond quickly to new situations and the outcome of the national workshop on zoonotic diseases.*

viii. *The approach of combining the epidemiology of the disease, an analysis of the production system and a capacity building focus on the institution involved in disease control, linked to risk management evaluations appears to be one that has resulted in fruitful engagement with the GoMy counterpart and a sustainable approach to capacity building*

ix. *LBVD and FAO should develop a strategy to ensure that the platform established for capacity building and technical support to the livestock sector is maintained and further utilised in future official development assistance programmes*

x. *LBVD and FAO must develop a strategy to ensure longer term support for the activities of the diagnostic laboratory that is performing well in support GoMy animal disease control programmes*

xi. *If funding is limited, future trainings in surveillance and response as well as infection control and case management should focus on township level staff in remote area, border areas, and former "special regions" that have now opened up*

xii. *Plan to integrate gender equality in all aspects of HPAI response, again using available regional guidance such as that developed by WPRO.*

xiii. *Laboratory human diagnostics training should focus on increasing the number of staff skilled in RT-PCR as well as integrating IATA curriculum for specimen transport into training. More effort should be placed on skills transfer from fully trained staff to other staff to ensure sustainability regardless of funding situation. Future funding should ensure that both managerial and technical staff presence at regional workshops to facilitate continued learning.*

xiv. *More focus on establishing written guidelines, protocols and SOPs in the human health sector HPAI program to further ensure continuity and sustainability of skills and knowledge.*