

# The development of a four-way linking framework in Egypt: an example of the FAO, OIE and WHO joint activities to facilitate national risk assessment

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## Keywords

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Human-animal interface,  
Influenza viruses,  
Risk assessment.

## Summary

Cross-sectoral assessment of health risks arising or existing at the human-animal interface is crucial to identifying and implementing effective national disease control measures. This requires availability of information from 4 functional information 'streams' – epidemiological, laboratory, animal, and human health. The Food and Agriculture Organization of the United Nations (FAO)/ World Organisation for Animal Health (OIE)/ World Health Organization (WHO) Four-Way Linking (4WL) project promotes the establishing of a national-level joint framework for data sharing, risk assessment, and risk communication, in order to both improve communications within and among governmental public health and animal health influenza laboratories, epidemiology offices, national partners, with the aim of strengthening the national capacity to detect, report and assess risks arising from emerging influenza viruses. The project is currently being implemented in countries where H5N1 avian influenza is endemic and where human cases have been reported. The project is comprised of two main activities at country level: a 'review mission', which is the project launch in the country and has the objective to assess the existing situation; and a 'scenario based workshop', with the scope to bring together key national partners and build relationships among people working in the 4 information streams and to improve understanding of national strengths and gaps. During the workshop the delegates engaged in interactive sessions on basic risk assessment and devoted to specify the needs and roles of the 4 different streams. The participants work through a mock influenza outbreak scenario, which practically illustrates how risk assessment and communication of an emergency at the animal-human interface is more effective when there is linking of the 4 streams, collaboration, communication, and coordinated action. In 2010, Egypt was the first country where the project was successfully implemented, followed by Vietnam and Indonesia.

## ***Lo sviluppo di una struttura di collegamento a quattro vie per facilitare il processo di valutazione dei rischi a livello nazionale, in Egitto: un esempio di attività congiunta tra FAO, OIE e OMS***

### **Parole chiave**

Inter settoriale,  
Progetto di  
collegamento a quattro  
vie,  
Influenza aviaria ad alta  
patogenicità H5N1,  
Interfaccia  
uomo-animale,  
Valutazione dei rischi,  
Virus influenzali.

### **Riassunto**

Per l'individuazione e l'attuazione di misure efficaci per il controllo delle malattie a livello nazionale è cruciale una valutazione intersettoriale dei rischi per la salute, derivanti o esistenti, a livello dell'interfaccia uomo-animale. Questa valutazione richiede l'accesso ad informazioni provenienti da quattro flussi funzionali – informazioni epidemiologiche e di laboratorio generate dai settori della sanità umana e animale. Il progetto per lo sviluppo di una struttura di collegamento a quattro vie (4WLP), elaborato in collaborazione da FAO, OIE e OMS, ha due principali obiettivi a livello nazionale: promuove l'istituzione di una piattaforma per la condivisione di dati e per la valutazione e comunicazione dei rischi in maniera da migliorare la comunicazione all'interno e tra i laboratori e i centri epidemiologici che si occupano di influenza sia nel settore della sanità umana che animale, inclusi altri partner; rinforzare la capacità di individuare, valutare e comunicare i rischi derivanti da virus influenzali emergenti. Il progetto è in corso di realizzazione nei paesi in cui l'influenza aviaria di tipo H5N1 è endemica negli animali e dove sono stati notificati casi nell'uomo. Due attività, una missione per analizzare la situazione esistente nel Paese e un workshop, hanno lo scopo di promuovere nei paesi destinatari all'interno di strutture governamentali già esistenti un meccanismo di collegamento a quattro vie. Durante il workshop i partecipanti sono impegnati in sessioni interattive finalizzate alla comprensione degli strumenti di base per realizzare una valutazione dei rischi e ad una maggiore conoscenza dei bisogni e dei ruoli dei quattro flussi. I partecipanti lavorano su di un finto scenario che riproduce un focolaio di influenza, lo scenario serve per illustrare in maniera pratica come la valutazione e comunicazione dei rischi emergenti a livello dell'interfaccia uomo-animale, sia più efficace quando c'è un collegamento dei quattro flussi funzionali e quando le azioni e la comunicazione sono coordinate. L'Egitto, nel 2010, è stato il primo paese in cui il progetto è stato realizzato con successo, seguito da Vietnam ed Indonesia.

### **Background**

In the last 10 years different influenza events, such as human infection with avian influenza viruses subtypes H5N1 and H7N9, emphasized the need to consider a variety of data when assessing the public health risk of influenza at the human-animal interface nationally, regionally, and globally.

Influenza viruses type A (H5N1) are a group of avian viruses that are highly infectious for a number of bird species, including most poultry species kept domestically. The viruses also cause severe disease in infected humans, with a case fatality rate among reported cases over 50% (World Health Organisation 2013). The H5N1 also remains a pandemic threat and continues to prompt huge economic losses in affected countries, particularly where the disease is endemic, given its impact on trade and animal production.

Controlling influenza at its animal source is not only essential to protecting animal health and maintaining livelihoods in affected countries, it is also the best strategy to prevent exposure and disease in humans.

Cross-sectoral assessment of health risks arising or existing at the human-animal interface is crucial to identifying and implementing effective

national disease control measures. Such an assessment requires the availability of information from at least 4 information 'streams' concerning epidemiological, laboratory, animal, and human health related data. The relevant information must also be organised on the basis of the area and the moment in time where the relevant events occurred. The four-way linking project (4WLP) (Claes and Dauphin 2011, World Health Organisation 2013) promotes the establishment of a national-level framework for data sharing, risk assessment, and risk communication. The project aims at building capacity and improve communications within and among governmental public health and animal health laboratories working on influenza, epidemiology offices, and other national partners so to strengthen the national capacity to detect, report, and assess risk from emerging or endemic influenza viruses of public health concern. Availability and linking of information and joint risk assessment are essential to understand health threats at the human-animal interface at country level. The 4WLP framework may be used to support internationally-mandated influenza capacity building such as through the International Health Regulations (IHR) provided by WHO (WHO 2014), FAO global, regional and national capacity building

(FAO 2014) and OIE Evaluation of Performance of Veterinary Services (PVS) pathway (OIE 2014). The project is currently being implemented in avian influenza H5N1-endemic countries that have reported human cases, the training is being fostered through the organisations of scenario-based training workshops. The first country where the project was successfully implemented is Egypt, followed by Vietnam, and Indonesia. This article describes implementation of the 4WLP, between December 2010 and October 2011 in Egypt as pilot country and the establishment of a 4WL framework for data sharing, risk assessment, and risk communication.

## Methods

The project is country focused and directed. It is comprised of 2 main in-country activities, a review mission and a scenario based workshop, followed by an expected establishment of a four-way linking mechanism at national level.

### The review mission

In November 2010, a review mission was conducted by FAO and WHO experts in Egypt. The mission was thus supported by the Egyptian Ministry of Health and Population (MOHP), the General Organization of Veterinary Services (GOVS), the Central Public Health Laboratory (CPHL) of MOHP, and the National Laboratory for Quality Control on Poultry Production (NLQP) of GOVS. Other key partners included the United States (US) Naval Medical Research Unit, No. 3 (NAMRU-3) and the USA Centers for Disease Control (CDC). The experts visited all institutions listed as main stakeholders in the 4WL framework (Table 1).

### Information gathering

Each stakeholder was asked to describe their sources of epidemiological and virological information on influenza H5N1 in animals and/or people, the types of information received and its form, any analyses or

syntheses produced in the institution, and onward transmission and dissemination of information and materials. Where appropriate, questions about control and policy were also addressed. From this information, a flow chart of the organisations and their linkages was produced, along with a summary of good practices, constraints, and gaps.

Stakeholders visited during the mission were invited to a meeting on the last day, during which the findings were presented and feedback was sought. In particular, participants were asked for feedback and validation of the information flow as mapped during the review mission; for suggesting any additional perceived gaps; as well for suggesting topics for the planned workshop.

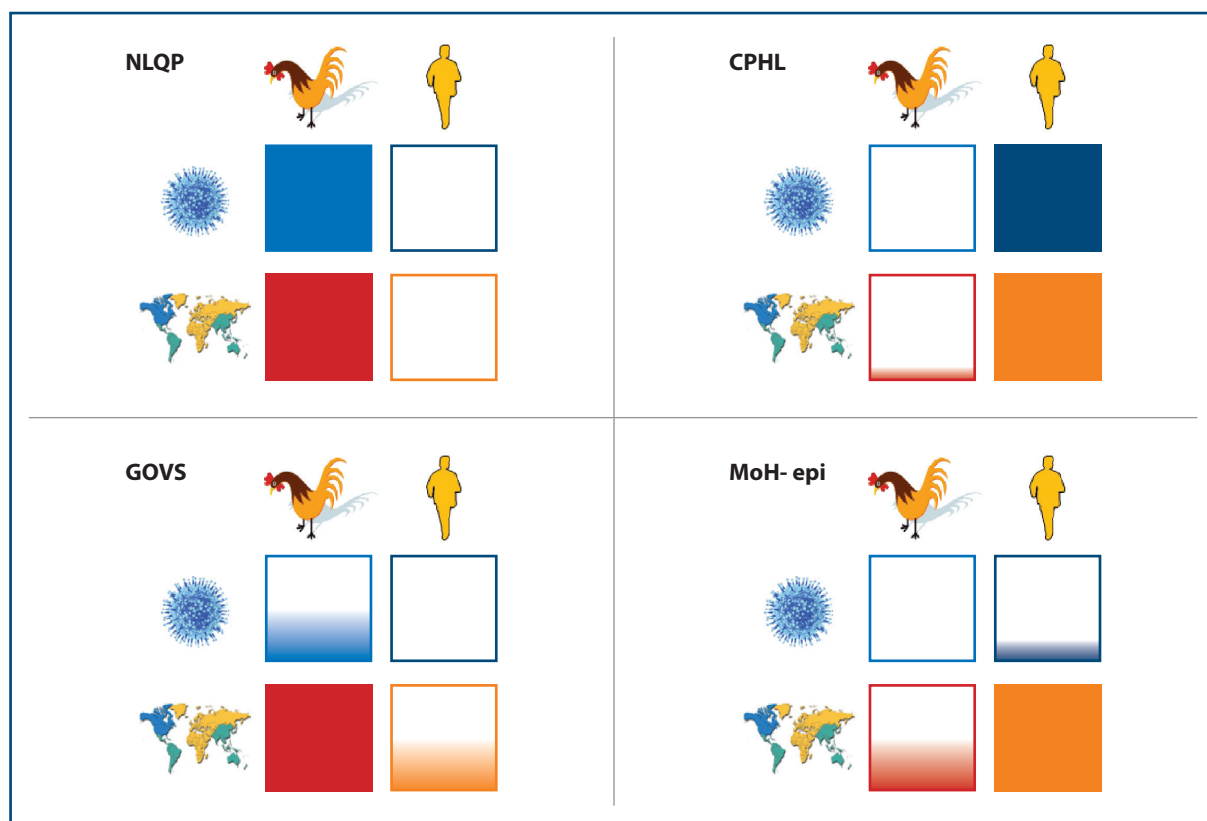
A schematic overview of where virological (🦠) and epidemiological (🌐) data were present in the animal health (🐔) and the public health sectors (👨) was designed after on the basis of the stakeholders' feedback (Figure 1). Bearing in mind that not all data must be necessarily present in each sector, the overview showed that both animal and public health national/central laboratories, NLQP and CHPL, harboured all the virological information (🦠), from animal and human side, respectively. Both NLQP and CHPL received epidemiological data from their own sector. The epidemiological units at GOVS had animal epidemiological data (🦠) and only partial animal virological and human epidemiological data; the MoH-epidemiology and surveillance unit had human epidemiological data (👨), and part of the animal epidemiological data.

### Major outcomes of the review mission

Opportunities were identified for strengthening some aspects of national diagnostic capacity, implementing mechanisms for cross-sectoral data sharing, and for combining and linking information from the sectors, strengthening surveillance and improving implementation of joint investigations at governorate and local levels (including solving human resource issues). Also key strengths were identified such as good communication within sectors generally, and among sectors.

**Table 1.** List of Stakeholders at national level.

Institution	Affiliation
Central Public Health Laboratory (CPHL)	Ministry of Health (MoH) (Now called Ministry of Health & Population (MoH&P))
National Laboratory for Quality in Poultry Production (NLQP)	Ministry of Agriculture and Land Reclamation (MOALR)
General Organization of Veterinary Services (GOVS)	Ministry of Agriculture and Land Reclamation (MOALR)
Avian Influenza Emergency Management Unit (AIEMU)	Ministry of Agriculture and Land Reclamation (MOALR)
United States (US) Naval Medical Research Unit, No. 3 (NAMRU-3)	N.A.
Cairo University, Faculty of Veterinary Medicine	N.A.



**Figure 1.** Mapping of the data distribution. The coloured blocks represent the relative amount of data available to institutions of each functional stream: when data are available the block is filled, when data are absent the block is empty, the amount of filling represents the proportion of total data that are thought to be available.

## The workshop

To address the needs identified during the review mission, a scenario-based workshop was organised. A variety of small group activities and plenary discussions were conducted, including a scenario of an influenza outbreak. The workshop was held between the 26 and 28 September 2011, in Ain El-Sukhna, Suez Governorate (Figure 2). The approximately 30 participants were representatives of the 4 sectors: 4 representative of NLQP, 4 of CPHL, 7 of GOVS and 5 of MoHP. Four professors, 2 from the faculty of Human medicine and 2 from the Faculty of Veterinary medicine, also participated in the event.

### Objectives of the workshop

The specific objectives of the workshop were: to gain understanding (i) of risk assessment and how it is used; (ii) other functional sectors; (iii) of the reasons that made data collection, the linking of data, and joint risk assessment so important to the work of single institutions as well as to the overall national work. The workshop also had the objectives (iv) of drafting a template for national H5 technical committee report; (v) to develop a list of gaps related to data collection, sharing, linking, and



**Figure 2.** Participants at the workshop held in September 2011 in Ain El-Sukhna, Suez Governorate.

proposed solutions; and (vi) to identify an action plan with timeline and practical key next steps.

### Activities and outcomes of the workshop

The FAO, OIE, and WHO project staff, from the national representation and from headquarters, chaired and facilitated the workshop. For a full day, participants played the role of their own

organisation in a scenario based on an outbreak of Highly Pathogenic Avian Influenza (HPAI) H5N1 with human and animal cases.

All participants from the 4 sectors were guided through working to gather epidemiological and virological information, analyse laboratory result reports, use this information to run a cross-sectorial risk assessment and prepare a report for high-level decision makers within a given time frame, communicating the results of the risk assessment in order for them to take informed and timely decisions. Part of the exercise was done in 4 small groups, each representing a single sector, and part was done in mixed sector groups. The aim of the playrole was for participants to appreciate the positive impact that a coordinate sharing of information and of action planning has on the risk assessment and risk communication of an health emergency at the animal-human interface.

## Conclusions

During the workshop, animal and human health sectors in Egypt acknowledged the gaps in data sharing and limited communications and agreed on the importance of a four-way linking and flow of information for an informed national risk assessment. They developed an action plan and next steps, including: (a) convening a national joint task-force (members from each stream were already identified during the meeting), (b) establishing a mechanism for joint risk assessment and reporting, and (c) solving data sharing and communication issues.

In 2012, despite political instability subsequent to the change in the political situation in Egypt, the Four-Way Linking Task Force (4WLTF) established at the workshop met 5 times (in February, March, May, September, and October) and twice in 2013 (April and June) to share information and technical expertise, and conduct joint risk assessments.

In particular the 4WLTF discussed, implemented or facilitated the following activities:

- training of CPHL staff on genomic sequencing at NLQP;
- building laboratory capacities particularly on gene sequencing and linkages between animal and human virus strains;

- changing the animal specimen coding system so that test results can lead to identification of disease foci;
- defining important data sets and mechanisms of information flow and communication among all parties at national and sub-national levels to identify and open sectors;
- developing a plan to facilitate cooperation between human and animal health offices centrally and at governorate and district levels;
- enhancing internal communications within the task force and creating a loop for information sharing;
- exploring the possibility of provision of H9 primers and upgrading the gene sequencing machine;
- discussion on the institutionalization of the 4WLTF in order to enable it to serve as an official technical branch of the policy-making processes for zoonotic influenza in Egypt, especially as previous structures such as the 'national supreme council' have stopped functioning since 2011.

The 4WLTF meeting on 11 April 2013 was dedicated to joint planning for the preparedness in Egypt as response to the emergence of avian influenza A(H7N9) virus in China including integrating H7N9 with on-going H5N1 influenza surveillance programs and ensuring diagnostic capacity for this specific strain. At this meeting, the Minister of Agriculture and Land Reclamation (MoLR) and Minister of Health and Population (MoHP) presented information together for the first time indicating strong trust and data sharing. This Four-Way Linking Task Force, originally convened via the FAO/OIE/WHO (also addressed as the tripartite partners) project is now self-sustaining, and is well placed to become the technical advisory body to governmental decision makers, to ensure that science-based information is available to support national policy decisions to reduce H5N1 risks – and risks of other zoonotic influenza as put in evidence by their proactive joint H7N9 response - to animal and public health in Egypt.



## References

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- Claes F. & Dauphin G. 2011. Four-way linking of epidemiological and virological information on human and animal influenza. *EMPRES Transboundary Animal Disease Bulletin*, 39, 36-39. <http://www.fao.org/docrep/015/i2530e/i2530e00.pdf>.
- Food and Agriculture Organisation of the United Nations (FAO). 2014. Capacity Development. <http://www.fao.org/oek/capacitydevelopment0/en/>.
- World Health Organisation (WHO). 2013a. Cumulative number of confirmed human cases for avian influenza A(H5N1) reported to WHO, 2003-2013. [http://www.who.int/influenza/human\\_animal\\_interface/EN\\_GIP\\_20131210CumulativeNumberH5N1cases.pdf](http://www.who.int/influenza/human_animal_interface/EN_GIP_20131210CumulativeNumberH5N1cases.pdf).
- World Health Organisation (WHO). 2013b. Influenza at the Human-Animal interface (HAI) [http://www.who.int/influenza/human\\_animal\\_interface/EN\\_GIP\\_FourWay\\_HAI\\_2013.pdf](http://www.who.int/influenza/human_animal_interface/EN_GIP_FourWay_HAI_2013.pdf).
- World Health Organisation (WHO). 2014. Alert, response, and capacity building under the International Health Regulations (IHR). <http://www.who.int/ihr/about/en/>.
- World Organisation for Animal Health (OIE). 2013. One health, OIE's involvement and Activities. [http://www.oie.int/fileadmin/Home/eng/Media\\_Center/docs/pdf/13\\_08\\_web\\_summary\\_4-way\\_linking\\_v7\\_fin\\_for\\_clearance\\_\\_3\\_.pdf](http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/13_08_web_summary_4-way_linking_v7_fin_for_clearance__3_.pdf).
- World Organisation for Animal Health (OIE). 2014. The OIE Tool for the Evaluation of Performance of Veterinary Services (OIE PVS Tool). <http://www.oie.int/en/support-to-oie-members/pvs-evaluations/>.