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Surveillance and Control of Highly Pathogenic Avian Influenza (HPAI) in Ethiopia – An assessment of institutions and actors

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Preface

Since its re-emergence, HPAI H5N1 has attracted considerable public and media attention because the viruses involved have been shown to be capable of producing fatal disease in humans. While there is fear that the virus may mutate into a strain capable of sustained human-to-human transmission, the greatest impact to date has been on the highly diverse poultry industries in affected countries. In response to this, HPAI control measures have so far focused on implementing prevention and eradication measures in poultry populations, with more than 175 million birds culled in Southeast Asia alone.

Until now, significantly less emphasis has been placed on assessing the efficacy of risk reduction measures, including their effects on the livelihoods of smallholder farmers and their families. In order to improve local and global capacity for evidence-based decision making on the control of HPAI (and other diseases with epidemic potential), which inevitably has major social and economic impacts, the UK Department for International Development (DFID) has agreed to fund a collaborative, multidisciplinary HPAI research project for Southeast Asia and Africa.

The specific purpose of the project is to aid decision makers in developing evidence-based, pro-poor HPAI control measures at national and international levels. These control measures should not only be cost-effective and efficient in reducing disease risk, but also protect and enhance livelihoods, particularly those of smallholder producers in developing countries, who are and will remain the majority of livestock producers in these countries for some time to come.

<http://www.hpai-research.net/index.html>.

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Disclaimer

The views expressed in this report are those of the author) and are not necessarily endorsed by or representative of IFPRI, or of the cosponsoring or supporting organizations. This report is intended for discussion. It has not yet undergone editing.

More information

For more information about the project please refer to www.hpai-research.net.

Summary

How does information about a suspected outbreak of avian influenza on the farm level reach the respective authorities? How and through which actors is the response to a confirmed outbreak implemented on the ground? These were the guiding questions for representatives of the Ministry of Food and Agriculture, poultry producers and traders and the research sector, to map out the information and response networks concerning Highly Pathogenic Avian Influenza in Ethiopia. This report shows the resulting network maps drawn, indicating the actors involved, their different kinds of linkages and the influence that these actors have on making sure that the information about suspected outbreaks on the farm or market level reaches the national authorities and that appropriate and timely response is implemented. While Ethiopia has not experienced a confirmed outbreak of HPAI yet, the participants drew from the experience of two past outbreaks of the Gumboro disease that were mistaken for HPAI and thus the HPAI response was set into action. These cases occurred in a government run multiplication centre, thus the network map drawn is a combination from this experience and an extrapolation to the possibilities of an outbreak on the respective farm levels. While participants generally saw the response as effective and efficient they also highlighted that outbreaks on commercial farms or backyard farms might pose different challenges, e.g. in terms of enforcement. The participants pointed out a number of challenges that either call for more research (knowledge gaps) or changes in institutional set-ups and the actual way that things are done on the ground:

- Overly complex co-ordination structure for the response. There is a number of co-ordinating bodies, with different reach and bureaucratic requirements, which might delay the necessary action.
- Logistical problems: Shortage of all materials (disinfectants, rubber gloves etc.) needed for action due to economic situation and market restriction, laboratories fill the gap with their supplies, however, this would not be sufficient in case of a more severe, bigger scale outbreak.
- Whether or not the information about an outbreak in the rural areas reaches the national level in a timely manner, depends on who the farmer chooses to contact first, as some rural actors (traditional and modern animal healers) do not tend to report problems to officials
- The wet market (where live animals are sold) is not as integrated into the information and response system as the different kinds of farms are. An outbreak on the wet market would rarely get reported, as traders have little information and little incentives (no compensation) to do so.

1. Objective

The objective of this research was to identify the institutions and their relative influence associated with surveillance and control of HPAI in Ethiopia, the flow of information for disease reporting among institutions, and the institutional responses to disease occurrence. The questions were: Who is involved? How do they communicate about suspected outbreaks? How do they respond to confirmed outbreaks? How influential are they in terms of impacting on information flow and response? What are the remaining bottlenecks?

2. Methods

This report presents Net-Maps elaborated by a group of HPAI stakeholders from governmental agencies, farmer organisations, traders and the research sector (see Appendix for complete list) during a multi-stakeholder workshop of the “Pro-Poor HPAI Risk Reduction Strategies Project” in Ethiopia.

Net-Map is a research tool that aims at making implicit knowledge about networks explicit and allowing members of a group to share their knowledge and opinions. Participants gathered the names of actors involved in HPAI communication and defence and mapped, on paper, the flow of information about suspected outbreaks, and the responses to HPAI. In addition, participants identified influential institutions and constrains in relation to the flow of information and responses to the disease. More information on the Net-Map method and its use is available at: <http://netmap.wordpress.com/> and see Schiffer and Waale 2008.

3. Results

The participants were asked to identify all individuals, groups and organisations what could influence that information about suspected outbreaks of HPAI reaches the responsible authorities and that appropriate action is taken.

3.1 The Actors

The actors mentioned included the producers, traders, input-suppliers, government agencies, local level individuals and international organisations (see Appendix for complete list):

They mentioned the different kinds of facilities where chicken and eggs are produced:

- Rural Backyard farms (1-20 chickens)
- Small town or urban backyard farms (1-100 chickens)
- Small town small commercial farms (100-1000 chickens)
- Large scale commercial farms (>1000 chickens)
- Multiplication Centres (government run, produce day-old-chicks for small farmers)

Different units of the Ministry of Agriculture on various levels:

- Laboratories on the national and regional level
- Veterinary services on the national and regional level
- Veterinary Health Posts and Clinics on Woreda and Regional level
- Bureaus of Agriculture on the Regional and (sub-regional) Woreda level
- The Extension Services
- Department of Wildlife Conservation

Other governmental agencies:

- Ministry of Health with its national, regional and Woreda level officials
- Police

Local level groups and individuals:

- Peasant association
- Animal healers (traditional and modern)
- Traditional leaders in pastoral areas
- Community based health workers
- Individual finding dead wild birds

Private sector actors (apart from farmers):

- Licensed private veterinarians and pharmacists
- Live bird traders

International Organisations:

- FAO
- OIE
- EU
- World Reference Lab for HPAI
- WHO

Research institutions:

- Ethiopian Health and Nutrition Research Institute
- National Veterinary Institute

Coordinating bodies:

- National Technical Committee on HPAI
- National Coordination Committee on HPAI

Media

3.2. Disease Reporting Network

After identifying a list of 41 actors (see Appendix), the next question the participants answered was:

If there is a suspected outbreak of HPAI, how is the information about the outbreak transferred to the respective authorities?

Participants drew the flow of information for potential outbreaks on the different levels of farms, in the government run multiplication centres, on the wet market and in case of suspicious dead wild birds. Further the group was asked:

How strongly can these actors influence that the information actually reaches the respective authorities?

The result is depicted in Map 1. The size of the nodes indicates the influence that actors have on the flow of information about outbreaks. For easier visual structuring of the data, those places where the information *originates from* have been indicated by using dark dots.

The information about suspected outbreaks basically needs to be transmitted from the site of outbreak to the Federal Veterinary Services, by route of National Reference Lab, World Reference Lab and OIE, as the Federal Veterinary Services will coordinate the task force that intervenes in case the outbreak is confirmed.

When looking more closely at the different pathways for reaching these national and international actors, it becomes apparent that these ways differ for the different sources and that each source (black dot on the map) has two to eight different possible first points of contact. Note that this first point of contact can be crucial for answering the question of whether and how fast the information reaches the Federal Veterinary Services.

If a **rural backyard farmer** detects the sudden death of her birds, she can contact traditional healers, unofficial healers using modern medicine, Peasant Association, Development Agents, Veterinary Health Post, traditional leaders, or the National Reference Lab directly. The first two actors (traditional and modern unofficial healers) are “dead ends” in the network, thus the information would not go beyond these two actors. On the other hand, contacting the National Reference Lab directly would be a considerable “short cut” that requires a high level of access and would speed up the normal and formal procedure. The normal and formal procedure involves that the farmer contacts the development agent, peasant association, animal health worker or the veterinary health post. These actors report a possible outbreak to the Woreda Agricultural office who move up to the regional level and finally the national level, potentially involving veterinary services, agricultural administration and laboratories and clinics on the respective levels. The traditional leaders play a more important role in the pastoral areas, where they may report an outbreak to the authorities.

The **small urban producers (1-100)** have a less dense network with local non-official actors than the rural backyard farmers. They tend to have more direct access to national actors, as some can contact the national reference lab directly. However, the formal procedure involves the farmer reporting to the Woreda veterinary clinic, which is only at the town / Woreda level, which will communicate with the regional labs. Another flow of information is between the small urban farmers and their pharmacist or a private veterinarian. While pharmacists were not seen as reporting cases to the authorities, the licensed vets who see high mortality will communicate to the Woreda veterinary clinic. The Woreda Bureau of Agriculture reports directly to the regional labs and federal vet service.

The **large commercial farmers** often talk directly to the national labs and the national veterinary service. Some large farms have their own part-time veterinarians, which they may share with another farm, who would do the diagnosis. Commercial farmers (small and big) have easier (more direct) access to the regional and national level actors, which might translate into more efficient reporting of incidents from these levels.

If a person finds a **dead wild bird** they will often report it to the Ministry of Health, Department of Wildlife, or to NAHDIC (National Animal Health Research Centre) for diagnosis who in turn would go to the Federal Veterinary Services.

In all these cases the samples will go from the regional labs to the national lab. The national labs will then send the sample for confirmation to the world reference lab. The world reference lab will then report back to the CVO and NAHDIC. The CVO reports to the OIE. An outbreak will not be published unless the CVO gives the official report.

An **outbreak on the wet market** poses a special challenge: If a seller on the live bird market detects the unexpected death of his birds, he would contact the veterinary pharmacist for help/drugs and the live bird trader who has sold him these birds to demand for a reduction of the price. However, while both actors are able to collect information about the bird health situation, they are not connected to any actor who is part of the response network and thus there is not obvious way how an outbreak on the wet market would be communicated to the respective authorities.

The above example shows that the number of direct links alone does not determine whether a source of outbreak is able to communicate the information quickly and efficiently to the respective authorities. It is crucial to understand, how the direct links are connected to the rest of the network and how fast one actor can reach out to the whole rest of the network, not only to his or her direct neighbours. The measure of closeness centrality describes, how many steps one actor has to take to reach everybody else in the network (see table 2, Appendix). A low closeness value indicates that an actor is not very close to the other actors in the network, thus has to go through many intermediaries to reach everyone. It becomes apparent that of the defined sources of outbreak, the market sellers have by far the lowest closeness centrality, followed by the rural backyard farmers, multiplication centres, small commercial farmers, urban backyard farmers, large commercial farmers and individuals finding dead birds. It seems as if the level of urbanisation of the farm enterprise increases the ability of farmers to reach out to all parts of the network.

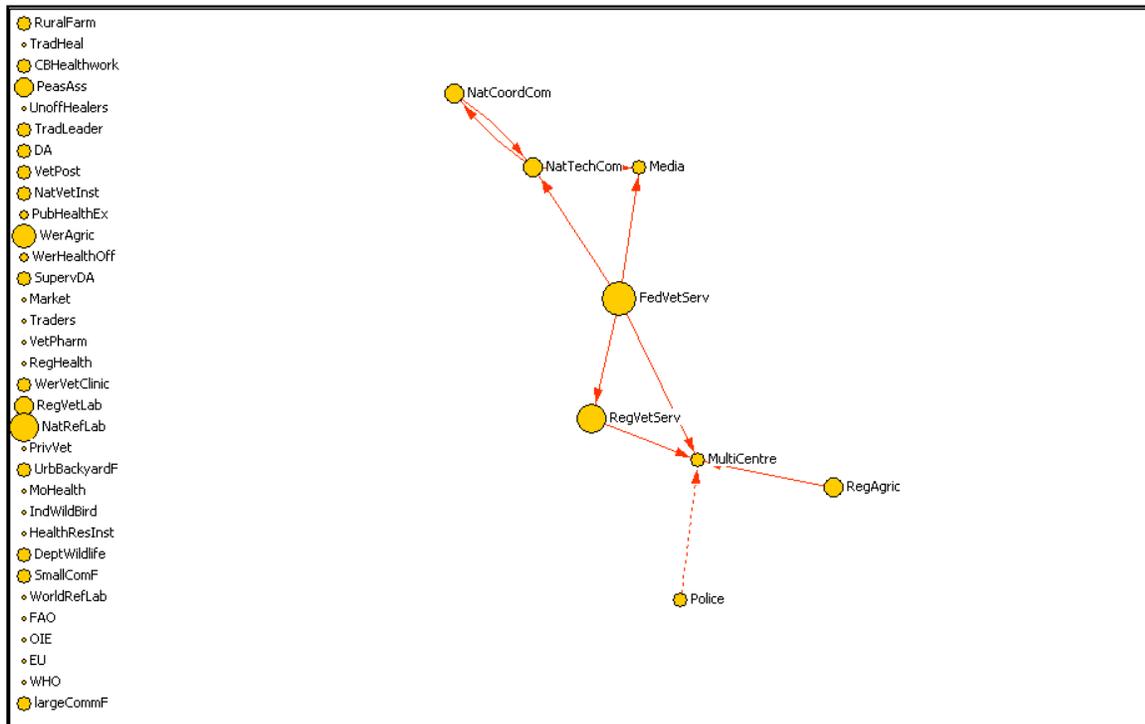
Concerning the communication of suspected cases, the group members reported a number of bottlenecks:

- Missing links for the communication of cases on the wet market and a lack of communication of HPAI information to the traders
- Lack of market inspections

3.3. Response Network

Ethiopia has not had a confirmed outbreak yet. However, there have been two cases of Gumboro disease, which were initially thought to be HPAI; and in 2007 there was a suspected case of HPAI in Assossa in one of the Government poultry multiplication centres, which led to the culling of all the birds at the multiplication centre. Subsequently isolation of the cause identified that it was two strains of Newcastle Disease. HPAI received specific attention following the death of an infant, which was initially thought to be caused by HPAI.

As the reaction to a case in a government run facility might strongly differ from the interventions on small and large farms, the group was asked to draw the response in two different colours, red for the actual case (of Gumboro at the multiplication centre) and blue for the planned intervention in case of outbreaks on individually owned farm. See map 2 (actual intervention) and 3 (action plan). The leading question was:



Map 2: Actual Intervention: Gumboro mistaken for HPAI at governmental poultry production centre; size of node = influence of actor on effective response

“If the outbreak of HPAI is confirmed, how are different actors involved in the response to the outbreak?”

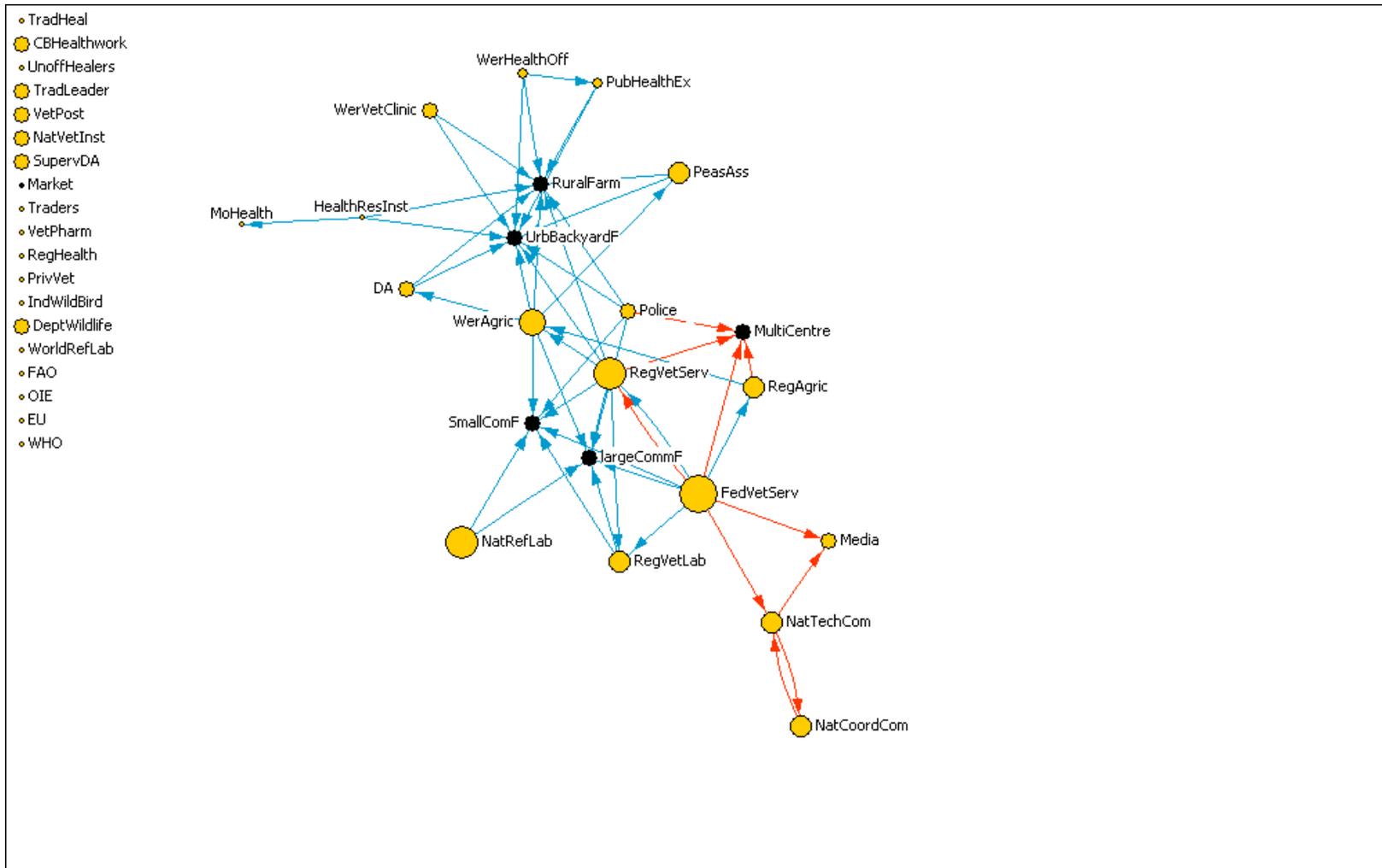
After drawing the links, the participants were asked:

“Once the outbreak is confirmed, how strongly can these actors influence that the appropriate response is implemented?”

The node size indicates the influence of actors in the successful implementation of the response.

When one reproduction centre reported unusual deaths in birds, the National Reference Lab tested positive and the Ethiopian authorities decided to take rapid action, while waiting for the confirmation of the International Reference Laboratory. The federal veterinary services, upon information from the national laboratory informed the National Technical Committee on HPAI (see Appendix for membership list) who in turn developed a plan of action and informed the National Coordinating Committee (see Appendix for membership list), which is the body that needs to approve and give the go ahead for an intervention. Both the National Technical Committee and the Federal Veterinary Services were in close contact with the Media in this process. As Ethiopia does not have private media houses, the Government has a strong say about the risk communication via media. The Federal Veterinary Services issued a restriction of movement of birds and coordinated with the Regional Veterinary Services, who undertook the actual culling. The link of the police services is only a broken line: As the government runs the multiplication centre, the police only had a limited role with regards to enforcement.

From this experience and relating to the national action plan, the participants drew networks of prospective intervention in case of an outbreak on large, small and backyard farms (Map 3 integrates the actual experience and the plans for outbreaks)



Map 3: Actual (red) and planned (blue) interventions; size of node = influence of actor on effective intervention; black nodes = outbreak points

The intervention on the farm level requires a high level of interaction and coordination between a number of different actors. As Map 3 shows, the interventions on commercial farms (small and large) follow a distinct similar structure and the interventions on backyard farms (urban and rural) do as well. The major differences are that commercial farms seem to be directly linked to national and regional actors such as the Federal Veterinary Services, National Reference Lab and Regional Lab. In the case of backyard farms the actual intervention would be undertaken by actors from the regional and Woreda level, while being coordinated from the national level.

The interventions would take the following sequence. After the case is confirmed by international reference labs and the Federal Veterinary Services have given the confirmed information to the OIE for publication, the Federal Veterinary Services coordinate the establishment and work of a task force, to implement the action plan that has been drawn by the technical committee on HPAI and approved by the national coordination committee on HPAI.

In the case of **commercial farms**, the federal and regional veterinary services and the respective Woreda bureau of agriculture coordinate the intervention, the police enforces both the movement restriction and, if necessary, the culling, and the national and regional laboratory don't only support through testing samples from the buffer zone but also by providing material necessary to put the needed hygienic measures in place. The group members underlined this role, as most materials needed are in short supply on the free market in Ethiopia.

In the case of **backyard poultry farming** the national level actors play a less pronounced and direct role: They activate and coordinate the regional and Woreda level actors. The actual implementation of measures is coordinated by the regional veterinary services in collaboration with the regional bureau of agriculture. The Woreda bureau of agriculture coordinates and enforces activities on the farm level, supported by the police if necessary. They mobilize the peasant association, which puts the movement control into place. Development agents, public health extensionists and the Woreda health office teach the communities about health risks and the Woreda veterinary clinic oversees the actual culling, supported by the development agents. The response aiming at backyard farms (urban and rural) involves a higher number of different actors than the response to outbreaks on commercial farms or government run multiplication centres (see Appendix, table 3). The highest outdegree, indicating a core role in coordinating the response, lies with the federal and regional veterinary services and the Woreda bureau of agriculture (see Appendix table 4).

Bottlenecks in the response network

Opportunity costs of coordination and bureaucratic procedures

One bottleneck that was mentioned numerous times by the working group is the high level of coordination that involved a great number of different actors and requires lengthy bureaucratic processes. There are number of multi-stakeholder coordination bodies (such as the national technical and national coordinating committees and the HPAI task force), who are supposed to coordinate activities; on top of that, some of the single stakeholder bodies (national veterinary services, regional and Woreda bureau of agriculture) have coordinating roles. In a system with numerous coordinators, it might be difficult to facilitate rapid, concerted and unanimous response. Participants added that this approach increased the number of bureaucratic hurdles and the time needed to get signatures from every representative involved would delay reaction in the field.

Challenging logistics, limited supplies

The limited supply of lab consumables, communication infrastructure, and lab capacity point towards general economic constraints that go beyond the field of avian flu response.

Limited technical capacity, delays in confirmation (past bottlenecks)

While participants mentioned the national labs mis-identified Gumboro for HPAI and that it took 2 weeks to get the confirmation test after the culling of birds at the multiplication centre, they also agreed that there has been a mayor improvement in the national lab capacity. Ethiopia was chosen as location for the regional reference lab for East Africa, which led to major investments in lab and human capacity.

Challenge for individual farmers to increase bio security

As in most low-income countries with subsistence backyard poultry farming, existing farming systems and lack of capital will make it a serious challenge for farmers to implement even basic bio security measures, such as separating fowl from human living quarters or restricting the free movement of fowls by providing pens.

While Ethiopian authorities have ample experience with other livestock diseases, the crucial test concerning HPAI is still outstanding. In case an outbreak of HPAI happens on a commercial or back yard farm in the future, it will become clear, how the authorities and farmers involved will be able to handle the challenge.

Trade sector disconnect

Note that the whole trade sector was not included in the drawn network of the avian flu response plan. The response network has a high number of isolates (actors with no links), including all trade related actors. This might reflect a general lack of attention by the agricultural agencies given to traders as a stakeholder group. As participants mentioned, there was a lack of regular market inspections and traders had a low level of knowledge about appropriate behaviour in case of a suspicious death of birds on the market.

Avian flu scare

As in Ghana, the Ethiopian poultry system suffered from an avian flu scare, increased by the media, which went so far that small poultry farmers killed their own poultry without indication of the disease as a supposedly preventive measure and poultry consumption dropped considerably out of fear of the disease. However, as the media in Ethiopia is state controlled, the respective authorities can strongly influence the reports and strategically use the media in risk communication.

Appendix:

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List of Network Actors and Actor Codes

Names	Codes
Rural backyard farm (1-20 chicken)	RuralFarm
Traditional healer	TradHeal
Community based health workers/trained farmers	CBHealthworker
Peasant Association	PeasAss
Unofficial animal healers modern medicine	UnoffHealers
Traditional leaders (pastoral areas)	TradLeader
Public health extension	PubHealthEx
Farmers' Training Centre/Development agents livestock	DA
Veterinary Health Post	VetPost
Live bird traders	Traders
Vet Pharmacist	VetPharm
Live bird market	Market
Woreda Health Office	WerHealthOff
Wereda Bureau of Agriculture	WerAgric
Supervisors of Development Agents, Animal Health Technicians	SupervDA
Veterinary Clinic Woreda Level	WerVetClinic
Licensed private veterinarians	PrivVet
Small towns/urban backyard farm (1-100 chicken)	UrbBackyardF
Regional bureau of agriculture	RegAgric
Regional Health Bureau	RegHealth
Multiplication Centres	MultiCentre
Regional Vet Laboratories	RegVetLab
Regional Veterinary Services (emergency WPAI operation centre)	RegVetServ
Police	Police
Individual finding wild birds	IndWildBird
Small town small commercial farm (100-1000 chicken)	SmallComF
FAO	FAO
OIE	OIE
EU	EU
World Reference Lab for HPAI	WorldRefLab
National Veterinary Institute	NatVetInst
National Animal Health Diagnostic and Investigation Centre (National Reference Lab)	NatRefLab
Federal Veterinary Services	FedVetServ
Ethiopian Health and Nutrition Research Institute	HealthResInst
Ministry of Health	MoHealth
Department of Wildlife Conservation (under Ministry of Agriculture)	DeptWildlife
WHO	WHO
Large commercial Farms (>1000 chicken)	LargeCommF
National Technical Committee on HPAI	NatTechCom
National Coordination Committee	NatCoordCom
Media	Media

Table 1: Degree Centrality = Number of links per actor in the risk communication network

<i>Node</i>	<i>Degree</i>	<i>InDegree</i>	<i>OutDegree</i>
RuralFarm	8	0	8
IndWildBird	8	0	8
WerAgric	11	5	6
MoHealth	6	2	4
WorldRefLab	5	1	4
UrbBackyardF	4	0	4
SmallComF	4	0	4
MultiCentre	4	0	4
DA	7	4	3
TradLeader	4	1	3
LargeCommF	3	0	3
VetPost	7	5	2
RegVetLab	7	5	2
RegVetServ	5	3	2
SupervDA	4	2	2
RegAgric	4	2	2
PubHealthEx	3	1	2
PeasAss	3	1	2
DeptWildlife	3	1	2
Market	2	0	2
NatRefLab	12	11	1
FedVetServ	10	9	1
WerVetClinic	7	6	1
PrivVet	3	2	1
NatVetInst	3	2	1
HealthResInst	3	2	1
WerHealthOff	2	1	1
RegHealth	2	1	1
CBHealthwork	2	1	1
VetPharm	2	2	0
OIE	2	2	0
WHO	1	1	0
UnoffHealers	1	1	0
TradHeal	1	1	0
Traders	1	1	0
FAO	1	1	0
EU	1	1	0
Police	0	0	0
NatTechCom	0	0	0
NatCoordCom	0	0	0
Media	0	0	0

Table 2: Closeness centrality = How close are actors to all other actors in the risk communication network?

Closeness Centrality (for undirected graph):

Node	Farness	Closeness
Traders	195.0	0.005
Market	160.0	0.006
TradHeal	141.0	0.007
UnoffHealers	141.0	0.007
FAO	135.0	0.007
EU	135.0	0.007
VetPharm	127.0	0.008
WerHealthOff	126.0	0.008
WHO	120.0	0.008
CBHealthwork	117.0	0.009
RegHealth	115.0	0.009
PeasAss	112.0	0.009
PrivVet	111.0	0.009
RuralFarm	106.0	0.009
OIE	104.0	0.010
MultiCentre	101.0	0.010
SmallComF	100.0	0.010
WorldRefLab	100.0	0.010
PubHealthEx	99.0	0.010
HealthResInst	99.0	0.010
UrbBackyardF	96.0	0.010
TradLeader	96.0	0.010
NatVetInst	96.0	0.010
RegVetServ	94.0	0.011
SupervDA	93.0	0.011
LargeCommF	92.0	0.011
DeptWildlife	92.0	0.011
DA	88.0	0.011
VetPost	88.0	0.011
RegAgric	87.0	0.011
RegVetLab	87.0	0.011
WerVetClinic	86.0	0.012
MoHealth	85.0	0.012
FedVetServ	81.0	0.012
IndWildBird	76.0	0.013
WerAgric	73.0	0.014
NatRefLab	72.0	0.014
Police	0.0	-1.000
NatTechCom	0.0	-1.000
Media	0.0	-1.000
NatCoordCom	0.0	-1.000

Table 3: InDegree in the response network = from how many agents do actors directly receive response?

Node	InDegree
RuralFarm	9
UrbBackyardF	9
SmallComF	6
LargeCommF	6
MultiCentre	4
WerAgric	2
NatTechCom	2
RegVetLab	2
Media	2
RegVetServ	1
RegAgric	1
PeasAss	1
PubHealthEx	1
DA	1
NatCoordCom	1
MoHealth	1

Table 4: OutDegree in response network = how many agents do actors directly give response to?

Node	OutDegree
FedVetServ	8
RegVetServ	7
WerAgric	6
Police	5
WerHealthOff	3
HealthResInst	3
NatTechCom	2
RegVetLab	2
RegAgric	2
PeasAss	2
PubHealthEx	2
DA	2
WerVetClinic	2
NatRefLab	2
NatCoordCom	1

National Technical Committee on HPAI, members:

Addis Ababa University	Ministry of Culture and Tourism
Biodiversity	Ministry of Defence
CDC-Ethiopia	Ministry of Education
Chamber of Commerce	Ministry of Finance and Economic Development
Department of Animal Health	Ministry of Information
Department of Disease Prevention and Control	Ministry of Trade and Industry
Department of Epidemiology	National Animal Health Research Center
Department of Public Health	National Veterinary Institute
Department of Wildlife Conservation	OCHA
Environmental Protection Authority	Poultry Producers Association
Ethiopia Health and Nutrition Research Institute	Public Relations
Ethiopian Wildlife and Natural History Society	UNDP
FAO	UNICEF
Integrated disease surveillance and Response	USAID/Ethiopia
ILRI	WHO
Livestock and Fishery Resource Development	

National Coordinating Committee on HPAI, members:

CDC-Ethiopia	Ministry of Finance and Economic Development
Department of Animal Health	Ministry of Health
Department of Disease Prevention and Control	Ministry of Information
Department of Wildlife and Conservation	Ministry of Justice
Deputy Prime Ministry MoRAD	Ministry of Trade and Industry
Development Cooperation of Ireland	MOH
DfID	State Ministry of MOH
Disaster Prevention and Preparedness Authority	State Ministry of MoRAD
EU	UNDO
FAO	UNICEF
Italian Embassy	USAID/Ethiopia
JICA	WHO
Ministry of Defence	World Bank
Ministry of Education	