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## Key Findings

- The risk of re-introduction of HPAI H5N1 virus from Côte d'Ivoire ranged from negligible to medium with high uncertainty
- The risk of re-introduction of HPAI H5N1 virus from Burkina Faso ranged from negligible to low with high uncertainty
- The risk of re-introduction of HPAI H5N1 virus from Togo ranged from negligible to very low with high uncertainty
- The high level of uncertainty associated with the risk estimates point to significant gaps in the knowledge of the epidemiology of HPAI in West Africa.

## Controlling Avian Flu and Protecting People's Livelihoods in Africa and Indonesia

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### Qualitative Release Assessment for the Re-Introduction of HPAI H5N1 Virus from Neighboring Countries into Ghana

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By December 2007, there was a continuum of Highly Pathogenic Avian Influenza (HPAI) H5N1 affected countries along the West African coast from Côte d'Ivoire to Cameroon. Eight West African countries (Nigeria, Niger, Cameroon, Burkina Faso, Côte d'Ivoire, Ghana, Togo and Benin) have all reported outbreaks. Benin, Nigeria and Togo reported new outbreaks on May 1, 2008, July 25, 2008, and November 13, 2008, respectively (OIE 2008). The risk of virus circulation and re-infection/re-introduction is high in the sub-region. There is constant movement of people and goods and thus trade between them. Recently, a new virus strain was isolated in Nigeria, raising more concerns in the sub-region (OIE 2008). In November 2008, a risk assessment stakeholder workshop was held in Accra for Ghanaian participants. Participants identified re-introduction of the virus into Ghana as a major risk.

The Veterinary Services Directorate (VSD 2007) gives an overview of the risk for HPAI introduction into Ghana: "Ghana borders Togo to the east, Burkina Faso to the north and Côte d'Ivoire to the west. All these four countries have recorded outbreaks of the HPAI H5N1 virus in their respective countries, starting in April 2006 in Burkina Faso and Côte d'Ivoire and in April 2007 and June 2007 in Ghana and Togo, respectively. There are approved entry points between the countries and there exists a very high level of movement of both goods, including live animals and animal products, and people of the four countries. There are also unapproved routes, involving the illegal movement of animals and animal products across the sub-region. These unapproved routes can act as channels for the introduction of trans-boundary animal diseases into any of the four countries.

Uncontrolled movement of live poultry and poultry products across the borders poses a serious threat to the animal health, especially [via] avian influenza, of any of the countries in the sub-region. Due to the artificial boundaries and the mix of socio-cultural ties of citizens of these countries, it is always very difficult to enforce quarantine measures in the event of outbreaks of trans-boundary animal diseases in any of the above countries.”

## Methods

This risk assessment (RA) follows the OIE framework for release assessment (OIE 2004). The emphasis was placed on the risk of re-introduction (release assessment), as the VSD identified this as a major concern. In contrast, exposure and consequence assessments were not undertaken because the VSD has mitigation processes and procedures in place as a result of the outbreaks in 2007. The RA was conducted as a qualitative assessment because a quantitative approach would have required detailed epidemiological information that is currently not available for HPAI H5N1 in the countries involved.

The risk question posed was “What is the risk of re-introduction of HPAI H5N1 virus into Ghana from neighboring countries (Burkina Faso, Côte d’Ivoire and Togo) via cross-border trade and movements involving live birds, poultry products, people and fomites?”

Three release risk pathways involving Côte d’Ivoire, Burkina Faso, and Togo were developed. Data were collected from a review of currently available country reports and literature and through a questionnaire administered to identified experts. Credible information was received from Côte d’Ivoire and Burkina Faso. There was no response from Togo.

Probability categories were estimated for each step of the risk pathways, on a scale ranging from negligible to very high, as well as a level of uncertainty. Details on the methodology can be found in a brief by Métras et al. (2009).

The assessment was conducted between November 2008 and March 2009. During this period there was no reported outbreak of HPAI H5N1 in Ghana, Côte d’Ivoire or Burkina Faso. Togo, however, reported an outbreak in November 2008 which was contained.

The timeframe considered for this release assessment was the year 2007. When data were not available for 2007, the year used as reference was specified.

## Findings

The risk pathways for release involving various commodities in each of the three neighboring countries were identified during the stakeholders’ workshop, from which scenario trees were developed and used for risk estimations.

Figure 1. Scenario tree for release pathways for Côte d'Ivoire

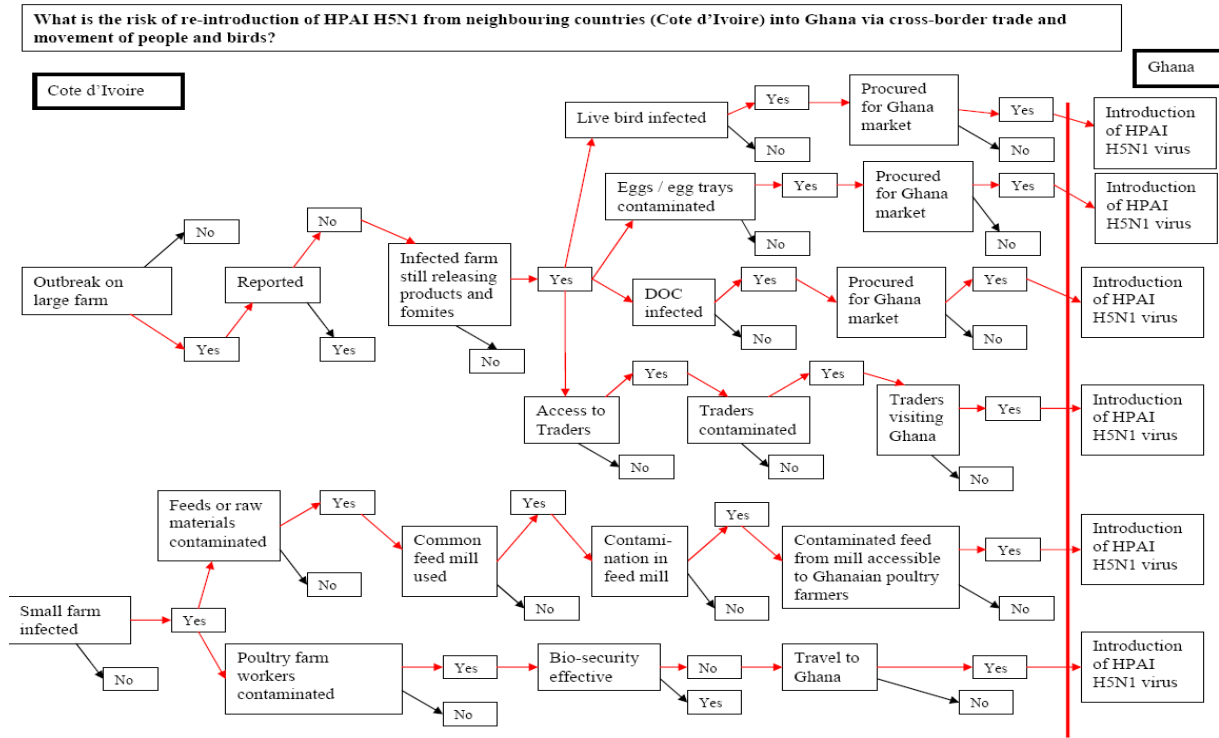
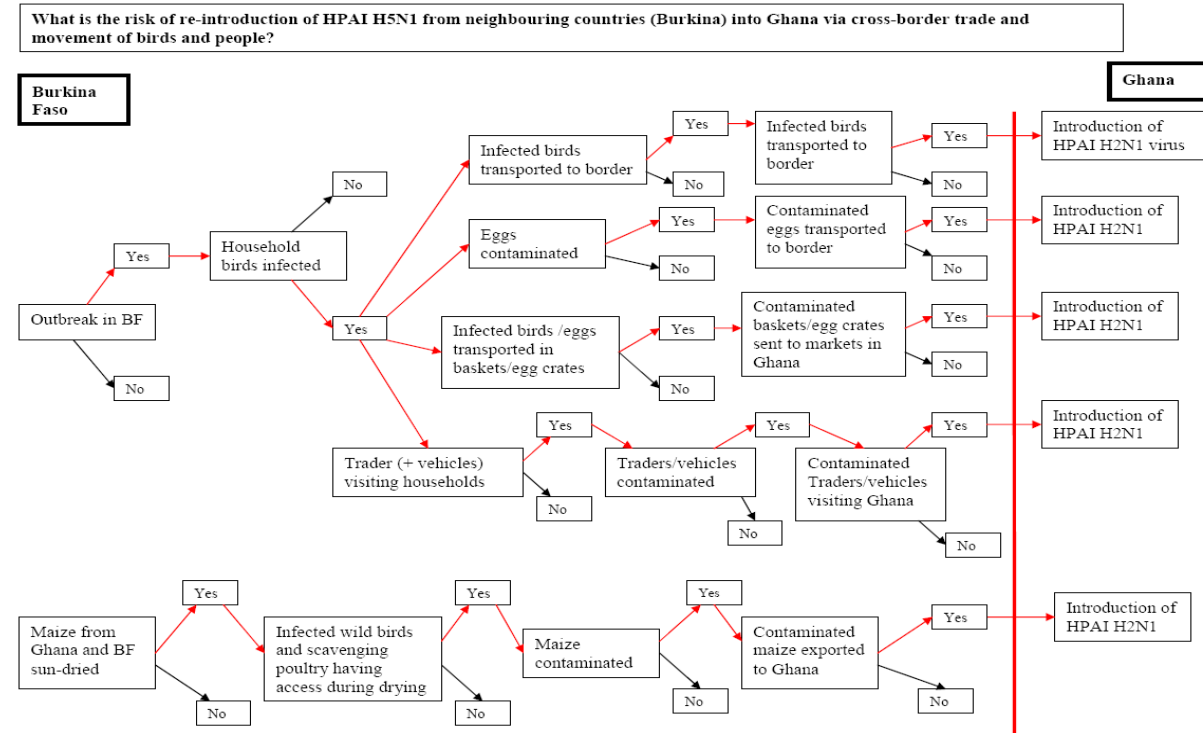
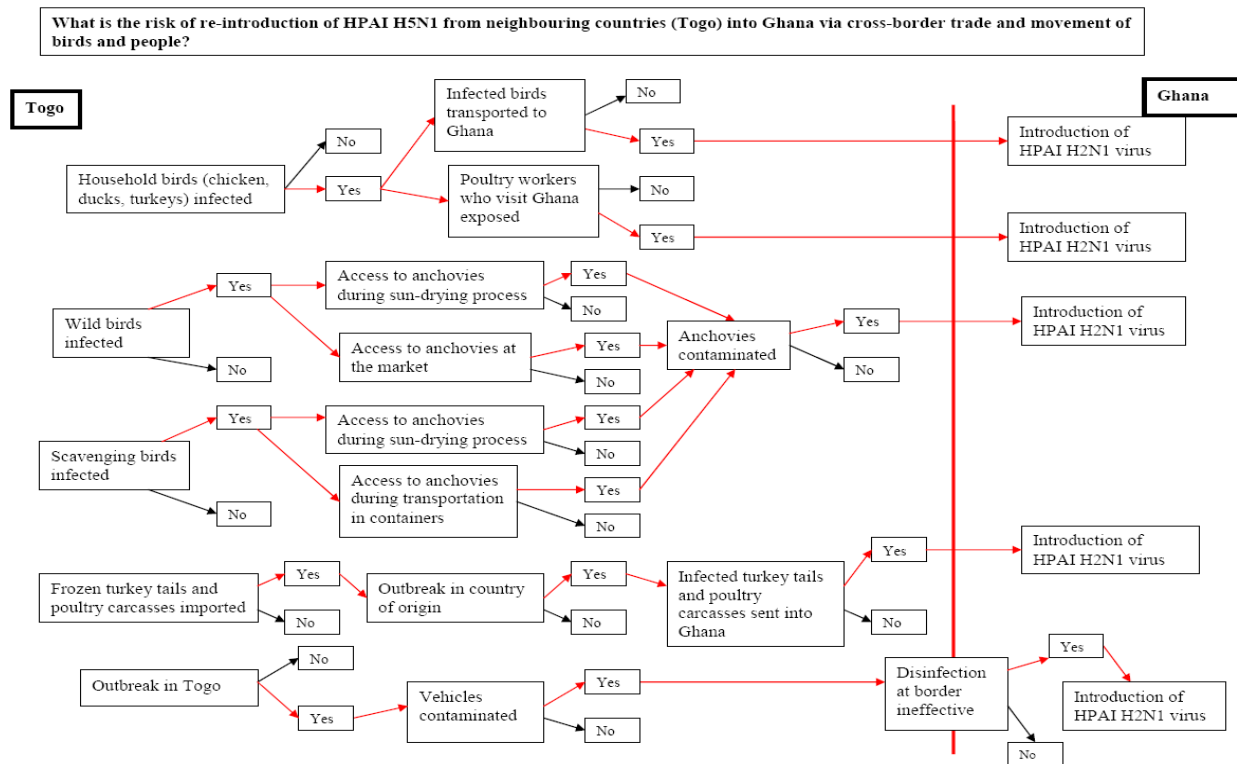


Figure 2. Scenario tree for release pathways for Burkina Faso



**Figure 3. Scenario tree for release pathways for Togo**



### Risk estimates

Tables 1 to 3 summarize the risk estimates for re-introduction of HPAI H5N1 from the neighboring countries (Côte d’Ivoire, Burkina Faso, and Togo) into Ghana, and Table 4 summarizes overall risk estimates to Ghana originating in these three countries.

**Table 1. Summary of risk estimates for re-introduction of HPAI H5N1 from Côte d’Ivoire to Ghana**

Risk Pathway	Probability and Uncertainty Estimate
Via infected live birds originating from large farms in Côte d’Ivoire	Negligible with high uncertainty
Via contaminated eggs/egg trays originating from large farms in Côte d’Ivoire	Negligible with high uncertainty
Via infected day-old chicks originating from large farms in Côte d’Ivoire	Negligible with high uncertainty
Via contaminated traders originating from large farms in Côte d’Ivoire	Negligible with high uncertainty
Via contaminated feeds and raw materials originating from small farms in Côte d’Ivoire	Negligible with high uncertainty
Via contaminated poultry workers originating from small farms in Côte d’Ivoire	Medium with high uncertainty

**Table 2. Summary of risk estimates for re-introduction of HPAI H5N1 from Burkina Faso to Ghana**

Risk Pathway	Probability and Uncertainty Estimate
Via infected household birds in Burkina Faso	Low with high uncertainty
Via contaminated guinea fowl eggs from households in Burkina Faso	Very low with high uncertainty
Via contaminated baskets/ egg crates from households in Burkina Faso	Low with high uncertainty
Via contaminated traders visiting households in Burkina Faso	Negligible with high uncertainty
Via contaminated maize during sun drying in Burkina Faso	Negligible with high uncertainty

**Table 3. Summary of risk estimates for re-introduction of HPAI H5N1 from Togo to Ghana**

Risk Pathway	Probability and Uncertainty Estimate
Via infected household birds in Togo	Very low with high uncertainty
Via contaminated poultry workers in Togo	Very low with high uncertainty
Via contaminated anchovies in Togo	Negligible with high uncertainty
Via contaminated frozen turkey tails and poultry carcasses imported into Togo and re-exported into Ghana	Negligible with high uncertainty
Via contaminated vehicles during outbreak in Togo	Negligible with medium uncertainty

**Table 4. Summary conclusions for risk of re-introduction of HPAI H5N1 from neighboring countries into Ghana via cross-border trade and movement of birds and people**

Release Risk Pathway	Probability	Uncertainty
Risk of re-introduction of HPAI H5N1 virus from Côte d'Ivoire	Negligible to medium	High
Risk of re-introduction of HPAI H5N1 virus from Burkina Faso	Negligible to low	High
Risk of re-introduction of HPAI H5N1 virus from Togo	Negligible to very low	High

## Discussion, Conclusions, and Recommendations

The high level of uncertainty associated with most of the risk estimates points to significant gaps in the current knowledge of the epidemiology of HPAI in West Africa. Therefore, the risk estimates should be interpreted with extreme caution. Targeted data collection is needed to fill some of the relevant knowledge gaps, particularly on the prevalence of HPAI in wild and scavenging birds, and on movement patterns of people, poultry, and poultry products across borders.

Certain activities were associated with higher risks for introduction of HPAI H5N1 virus into Ghana and could be targeted for preventive cross-border measures in cases of new outbreaks in neighboring countries. These include the following:

## Côte d'Ivoire

- Introduction of live birds. To control this, the ban on importation of poultry and poultry products from countries that had had outbreaks of HPAI must be strictly enforced and surveillance measures along the border must be enhanced. Families owning farms across borders also pose a risk of outbreak. However, this can be mitigated by educating these families to strictly separate activities and to adopt bio-security measures.
- Introduction of eggs and egg trays. Bans on importation of eggs and egg trays must be strictly enforced. Traders should be educated on the risks in importing these into Ghana, especially through unapproved routes.
- Introduction of day-old chicks. This can be controlled by effective surveillance of borders and education of traders and farmers on the risk of infection from such sources.
- Contamination of traders. This can be prevented within Côte d'Ivoire by institutionalizing bio-security measures and procedures on farms. However, this is beyond the control of the VSD in Ghana.
- Contamination of poultry workers on small farms. Again, the institutionalization and enforcement of bio-security measures and procedures on farms in Côte d'Ivoire will prevent workers from being contaminated, but this is beyond the control of the VSD in Ghana.

## Burkina Faso

- Introduction of live household birds. This can be controlled by effective surveillance of borders and education of people living along the borders and farmers on the risk of infection from such sources. This calls for cross-border communication strategies to disseminate information.
- Transportation of guinea fowl eggs. Bans on importation of eggs and egg trays must be enforced and traders should be educated on the risks in importing these into Ghana, especially through unapproved routes.
- Contamination and transportation of baskets and egg containers. Baskets and egg containers that cannot be disinfected should be banned from being used. This calls for enhanced surveillance at all times.
- Traders' use of vehicles to get to markets. Traders' vehicles should be disinfected at the borders and before entering markets.
- Importation of maize for use in poultry feeding in Ghana. Farmers should be educated not to use maize from unknown sources for feed formulation.

## Togo

- Introduction of live household birds. This can be controlled by effective surveillance of borders and education of people living along the borders and farmers on the risk of infection from such sources. This calls for cross-border communication strategies to disseminate information.

- Contamination of poultry workers. The institutionalization and enforcement of bio-security measures and procedures on farms in Togo will prevent workers from being contaminated. This aspect is beyond the control of VSD in Ghana.
- Use of anchovies from Togo for poultry feeding. Farmers should be educated to not use anchovies from unknown sources for feed formulation.
- Frozen turkey tails and carcasses crossing the border from Togo. Effective surveillance, seizure, and prosecution of importers of these products, which are officially banned, are needed. The continued importation in spite of the ban points to ineffective control.
- Vehicles from Togo visiting Ghana. This is beyond the purview of the VSD. However, during outbreaks, the VSD has instituted vehicle disinfection procedures at the borders.

Regional prevention and control efforts require the involvement of neighboring countries. In recognition of this, the West African CVOs Consultative meetings were established to harmonize prevention and control measures across West Africa for effective control of HPAI. There have been three meetings at Sunyani, Ghana (June 2007), Agbodrafo, Togo (November 2007), and Abidjan, Côte d'Ivoire (September 2008). Recommendations from one of the meetings elaborate on specific preventive and control measures and emphasize the need for harmonization of policies and measures for effectiveness.

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