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Key Findings

- Almost 80 percent of all small-scale poultry producers are in Eastern, Nyanza, Rift Valley, and Western provinces, comprising the key ones to target for HPAI prevention and surveillance.
- Small-scale poultry producers have diversified income portfolios and derive very small proportions of their household income from poultry (2 percent). They are likely to be resilient against HPAI shocks.
- Households who keep “larger” small-scale flocks are wealthier and more educated and therefore may be better placed to adopt HPAI mitigation strategies. The greater HPAI spread risk may lie with households who keep “smaller” small-scale poultry flocks.
- “Larger” small-scale poultry producers stand to lose significant proportions of their livestock income and wealth as a result HPAI shocks. Households in the high HPAI risk areas (Western, Nyanza, and parts of Eastern provinces) are most vulnerable to HPAI and should be encouraged to adopt HPAI control and mitigation measures.

Controlling Avian Flu and Protecting People’s Livelihoods in Africa and Indonesia

HPAI Research Brief | No. 11 – Year: 2009

The Role of Poultry in Kenyan Livelihoods and the Ex Ante Impact Assessment of HPAI on Livelihood Outcomes

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AS in other African countries, poultry production in Kenya is an important livelihoods activity. Eighty percent of the national poultry population is managed in small-scale, non- or semi-commercial, village, or backyard poultry systems (MOLFD 2007). These systems are characterized as low-input and low-output, mainly involving rural or peri-urban households that generally keep indigenous breeds. The few studies on the role of poultry in Kenyan livelihoods suggest that poultry plays an important role in the livelihoods of small-scale poultry producers, contributing to their incomes, wealth, insurance against shocks, diet quality, culture, religion, and tradition (Njenga 2005; Kimani et al. 2006).

Kenya is highly susceptible to the introduction and spread of the highly pathogenic avian influenza (HPAI) due to its location along the migratory route of wild birds and the presence of the virus in neighboring Sudan (Omiti and Okuthe 2008). Limited biosecurity measures combined with close and frequent contact between birds and humans also increase the risk of HPAI introduction and spread. The possibility of HPAI in Kenya raises much concern given the generally poor and inadequate human and animal health services, a large backyard poultry population, and lack of resources to control the disease (Geerlings, 2007).

Though Kenya has not had an HPAI outbreak, there were two scares in 2005 and 2006, and they had adverse impacts on poultry production and trade. Kimani et al. (2006) assessed the demand and supply shocks caused by the 2005 scare and found them to be highly significant: 25 percent of farmers panic-culled their birds prematurely, and all farmers interviewed reduced their flock sizes between 2 to 39 percent due to various reasons

related to the scare (e.g., premature selling, postponement or cancellation of day-old-chicks, and unavailability of new chicks as hatcheries reduced production). The scare also resulted in depressed poultry and poultry product prices. The overall financial losses associated with the HPAI scare are estimated to be Ksh2.3 billion (US\$30.7 million).

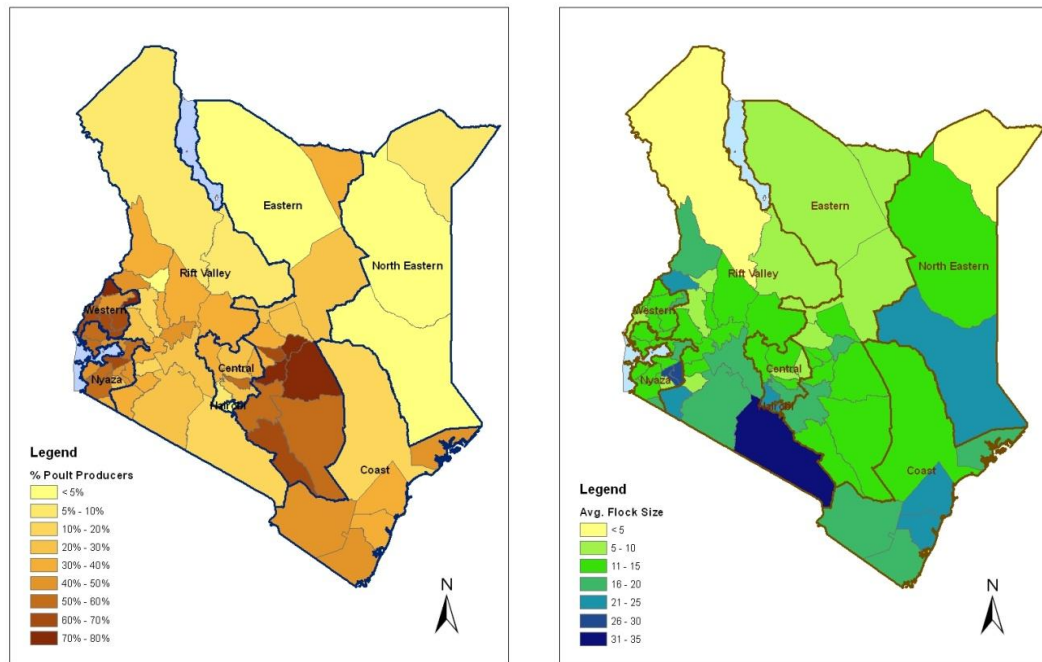
Despite the potentially devastating impact of an HPAI outbreak that can be inferred based on what happened during these scares, rigorous research assessing the potential impact of an HPAI outbreak on Kenyan households' livelihoods is lacking. Knowledge regarding the role of poultry in the livelihoods of small-scale poultry producing households and the livelihoods impacts of HPAI is critical for the design of control and mitigation strategies. This study aims to fill this gap by using the nationally representative Kenya Integrated Household Budget Survey (KIHBS, 2005-2006) data and employing quantitative methods to (i) predict and profile those households most likely to be poultry producers and those most likely to keep larger flocks to understand who would be most affected in case of an HPAI outbreak, and (ii) to assess the impact of a potential HPAI outbreak on livelihood outcomes, including income and wealth (value of assets). Such information is expected to assist in the design of efficient, effective, and equitable interventions for mitigation and control of HPAI.

Poultry Producing Households in Kenya

According to the nationally representative KIHBS data, 43 percent of all Kenyan households keep poultry. These households represent 50 percent of Kenya's entire population. Poultry production is mainly a rural phenomenon as 95 percent of all poultry producers are in rural areas. About 80 percent of all poultry producers are in four provinces: Eastern (23 percent), Nyanza (20 percent), Rift Valley (19 percent), and Western (18 percent). Less than one percent of all Kenyan poultry producers are in Nairobi and North Eastern provinces. Within provinces, Western supports the highest percentage of households that keep poultry with 66.4 percent, followed by Eastern and Nyanza (53 percent). The provinces with the smallest proportion of poultry producing households are Nairobi (1.3 percent) and North Eastern (2.1 percent). The first map in Figure 1 presents the proportion of households that keep poultry across districts of Kenya.

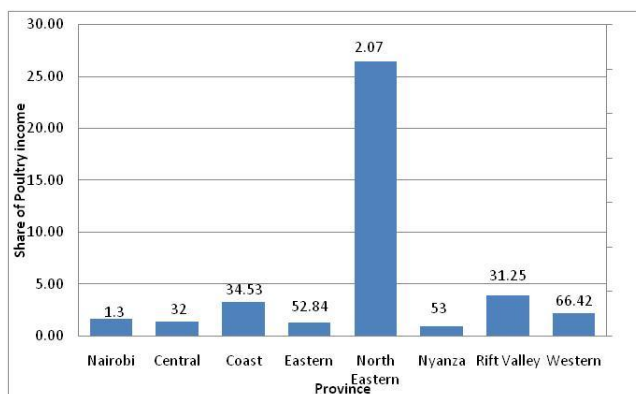
Poultry producing households manage an average flock size of 18 birds. The few poultry producing households in Nairobi manage the largest flocks in the country with an average of 158 birds, suggesting that distance to the markets is an important determinant of flock size. This is followed by Coast province with 31 birds, and Central and Nyanza provinces, each with an average flock size of about 19 birds. Poultry producing households in the North Eastern province manage the smallest flocks with 6 birds. However, flock sizes vary significantly within each province, with some districts having only a few poultry producing households but with very large flocks. The second map in Figure 1 presents the distribution of average poultry flock sizes in each district.

Figure 1. Participation in small-scale poultry production (left) and flock size (right), by district (from KIHBS, 2005-2006)



The contribution of poultry (live bird) and egg sales to the total annual household incomes of poultry producing households is portrayed in Figure 2. The figures on the columns represent the proportion of households that keep poultry in that province. In this study, total annual household income includes annual salaries from the employment of the household members in various industries, income from livestock and crop sales, and income from remittances, rent, and other sources. On average, poultry contributes 2 percent to the poultry producers’ total annual household income. This

Figure 2. Proportion of poultry income in household income



Source: KIHBS (2005-2006)

a few “larger” small-scale poultry producing households who are more commercially oriented.

Two probabilistic models were used to determine the household, agro-ecological, farm, and market level factors that affect (i) household’s decision to engage in poultry production as a livelihoods strategy, and (ii) household’s decision regarding the size of flock to manage.

The first model shows that households more likely to keep poultry have older and less educated household heads, are larger with more children, and have higher adult female-to-male ratios. In

terms of asset ownership, households predicted to be poultry keepers have a higher average value of durable assets (wealth indicator). In fact, only 29 percent of households in the lowest wealth quartile are predicted to raise poultry compared to 49 percent in the third and 39 percent in the fourth wealth quartiles, respectively. Finally, households that are significantly more likely to keep poultry have more diversified livelihoods strategies, suggesting that poultry keeping is one of several livelihood strategies geared toward building their resilience against shocks.

The results of the second model show that households with older and more educated household heads are significantly more likely to manage larger flocks. Households more likely to keep larger flocks are also larger, have higher numbers of children, a higher adult female-to-male ratio, and are more likely to be female-headed. In terms of asset ownership (land, livestock, and durable assets), households more likely to keep above-average size flocks are wealthier.

HPAI Scenarios

To estimate the impact of HPAI on poultry producing households' livelihoods indicators (income and asset wealth), especially those pertaining to livestock, six artificial counterfactual scenarios were created and investigated. The method of analysis involved matching households in the treatment and control groups, for the scenarios described in Table 1.

Table 1. Description of HPAI scenarios for poultry-keeping at the household level

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5*	Scenario 6*
Description of simulated impact	100% loss of poultry flock	100% loss of small-scale poultry flocks	85% loss in large-scale poultry flock	50% reduction in poultry price	100 % loss of poultry flock in high-risk areas	85% loss in large-scale poultry flock in medium-risk areas
Treatment group	All households without poultry	All households without poultry	Small-scale poultry keepers (1 to 6 birds)	Poultry keepers who sold at low prices	All households without poultry	Small-scale poultry keepers (1 to 6 birds)
Control group	All households with poultry	Small-scale poultry keepers (1 to 6 birds)	Large-scale poultry keepers (>7 birds)	Poultry keepers who sold at high prices	All households with poultry	Large-scale poultry keepers (>7 birds)

*For scenarios 5 and 6, Kenya disease spread maps (Stevens et al. 2009) were used to allocate districts into high HPAI spread risk and medium HPAI spread risk areas. According to this map, Western and Nyanza provinces contain mainly high risk districts and Coast and Rift Valley provinces contain medium risk districts.

In each scenario, statistical methods were used to compare the livelihoods outcomes of a treatment group of households, which represents the result of the HPAI demand or supply shocks, and a control group representing the status quo (if no HPAI shocks occurred). The household groups were matched according to various household-level characteristics (e.g., household demographics, assets, regional characteristics such as location, poverty status, number of income sources, etc.) which are expected to affect a household's propensity to be in the treatment situation as well as their outcomes (livestock income and livestock wealth). According to this method of matching, the two groups should differ only in terms of their poultry ownership characteristics.

Impacts of HPAI on Poultry Producing Households' Livelihoods

Table 2 presents the results of the differences between the livelihoods outcomes of the control and treatment households.

Table 2. Estimated impact of HPAI on the livelihoods outcomes of household-level poultry producers in KSH (standard deviations)

Scenarios	Livestock income	Livestock wealth
1 – All Kenya: Lose all poultry	- ^a	-
2 – All Kenya: Lose all small flocks	-	-
3 – All Kenya: Large flocks become small flocks	-3527.4***(1204.2)	-13402.9***(2672.4)
4 – Poultry Sellers: High price falls to low price	-	-
5 – High HPAI Risk: Lose all poultry	-2352.2***(716.9)	-13105.4***(3688.3)
6 – Medium HPAI Risk: Large flocks become small flocks	-	-20688.1***(7481.3)

^a Insignificant estimated impact; ***Significantly different livelihoods outcomes between the two groups at the 1 percent significance level

These results reveal that HPAI may cause significant reductions in poultry producing households' income from livestock under scenarios 3 and 5. According to scenario 3, if an average poultry producing household that manages a "larger" small-scale flock lost 85 percent of their flock due to HPAI, their total annual livestock income would decrease by Ksh3,527 (US\$45), from its pre-HPAI average annual livestock income of KSh12,742. This represents a 28 percent reduction in livestock income on average, which translates to a 7 percent reduction in total annual household income on average. According to the results from scenario 5, if all poultry producing households in the high HPAI risk areas lost 100 percent of their flocks, on average they would lose as much as Ksh2,352 (US\$30) worth of their annual livestock income, from their pre-HPAI average annual livestock income of Ksh3,500. This translates to a 67 percent loss of their annual income from livestock on average, and an 8 percent reduction in total annual household income on average.

In terms of its impact on wealth, HPAI is found to result in significant reductions in livestock wealth under scenarios 3, 5 and 6. According to scenario 3, if an average poultry producing household that manages a "larger" small-scale flock lost 85 percent of its flock due to HPAI, its total livestock wealth would decrease by Ksh13,403 (US\$171). This represents a 31 percent reduction to its pre-HPAI livestock wealth of Ksh43,989 and a 5.9 percent reduction in its total household wealth on average. According to scenario 5, if all poultry producing households in the high HPAI risk areas lost 100 percent of their flocks, on average they would lose as much as Ksh13,105 (US\$167) worth of their livestock wealth, representing a 46 percent reduction of their pre-HPAI livestock wealth of Ksh28,370 and a 4.1 percent reduction of their total household wealth on average. Finally, according to scenario 6, if "larger" small-scale poultry producers in medium HPAI risk areas lost 85 percent of their flock due to HPAI, their total livestock wealth would decrease by Ksh20,688 (US\$264), from the pre-HPAI average livestock wealth of KSh50,119. This represents a 41 percent decrease in wealth from livestock and a 9.4 percent decrease in total household wealth on average.

Concluding Remarks

Statistical analyses conducted on the nationally representative KIHBS (2005/06) data reveal that about 80 percent of all households that keep small-scale poultry flocks in Kenya are in Eastern, Nyanza, Rift Valley and Western provinces. The results also disclose that households predicted to keep "larger" small-scale flocks are more wealthy and educated than those predicted to manage

smaller ones. The relatively high human capital and wealth among the poultry producing households with "larger" small-scale flocks (i.e., more than seven birds) suggests that these households may have the capacity to adopt HPAI mitigation and control strategies. The greater risk of HPAI spread therefore may lie with those households that keep smaller poultry flocks.

The results also disclosed that households predicted to keep poultry and those predicted to manage larger flocks have higher female-to-male ratios and higher numbers of children. These results support previous studies which found that in Kenya, small-scale poultry production is a livelihoods activity mainly undertaken by women and children of the household (Omiti and Okuthe 2008). These findings reveal the importance of poultry in intra-household gender equality, as well as the potential impacts HPAI may have on children's health and nutrition outcomes. Finally, the analysis reveals that poultry producers have diversified income sources and on average derive only a small proportion of their total annual household income from poultry (2 percent). Therefore, average poultry producing households are likely to be resilient against various shocks and stresses which may be caused by HPAI though some households with greater dependence on poultry, such as a few in the North Eastern province, could be more vulnerable.

The impact assessment of HPAI on livelihoods outcomes of poultry producers reveals that households with "larger" small-scale flocks, as well as those located in the high risk areas (Western, Nyanza and parts of Eastern provinces) are vulnerable to HPAI both in terms of livestock income and wealth (asset value) loss. Given the magnitude of loss in total asset value (4.1-9.4 percent, depending on the scenario) and total annual household income (7-8 percent, depending on the scenario), that the "larger" scale poultry producing households and the households in high HPAI risk areas stand to lose, they should be encouraged to adopt HPAI mitigation measures.

References

- Geerlings, E. 2007. Highly pathogenic avian influenza: A rapid assessment of the socio-economic impact on vulnerable households in Egypt. Food and Agriculture Organization of the United Nations, Rome.
- Kenya Integrated Household Budget Survey (KIHBS)2005-2006) Central Bureau of Statistics (CBS) Ministry of Planning and National Development, Nairobi, Kenya
- Kimani, T., M. Obwayo and L., Muthui. 2006. "Avian Flu Threat: Socio-Economic Assessment of the Impacts on Poultry-Related Livelihoods in Selected Districts in Kenya." Pan-African Program for the Control of Epizoonotics (PACE), Nairobi.
- Ministry of Livestock and Fisheries Development (MOLFD). 2007. Animal Production Annual Report, Nairobi, Kenya.
- Njenga, S. K. 2005. "Productivity and Social – Cultural Aspects of Local Poultry Phenotypes in Coastal Kenya." MSc Thesis, Danish Institute of Agricultural Sciences, Research Centre, Foulum.
- Omiti, J.O and S.O. Okuthe. 2008. "An Overview of the Poultry Sector and Status of Highly Pathogenic Avian Influenza (HPAI) in Kenya – Background Paper." Collaborative research on pro-poor HPAI risk reduction, Africa/Indonesia Team Working Paper No. 4, Washington, DC, USA.
- Stevens, K.B., S. Costard, R. Métras and D.U. Pfeiffer. 2009. "Mapping the Likelihood of Introduction and Spread of Highly Pathogenic Avian Influenza Virus H5N1 in Africa, Ghana, Ethiopia, Kenya and Nigeria using Multicriteria Decision Modelling." Collaborative research on pro-poor HPAI risk reduction, Africa/Indonesia Team (Unpublished manuscript).

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