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## Key Findings

- Two-thirds of all poultry producers in Nigeria are in the North (North Central, North East and North West) and more than a quarter are in the South East. These are key zones to target for HPAI control and surveillance.
- Small-scale poultry producers have diversified income portfolios and therefore are likely to be resilient against HPAI shocks.
- Because small-scale poultry producing households have high numbers of women and children, HPAI shocks may have significant impacts on intra-household gender equality and nutrition.
- HPAI shocks may have significant impacts on the livelihoods outcomes of households with “larger” small-scale flocks, especially those located in the medium HPAI risk areas. These households should be encouraged to adopt HPAI control and mitigation measures.

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

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## Investigating the Potential Impact of HPAI on Livelihoods in Nigeria

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**Small**-scale poultry production is an integral part of livelihoods in Nigeria, contributing to households’ income, food and nutrition security, and gender equality (Kushi et al. 1998; Houndonougbo 2005; Obi et al. 2008). Almost 60 percent of Nigeria’s 150 million poultry population is managed by household level poultry producers, in semi-commercial and non-commercial, small-scale, backyard, or village extensive production systems (Obi et al. 2008). The small-scale poultry production system is often defined as keeping up to 500 birds, managed mainly by family labor, and having minimal inputs and minimal to no biosecurity (Obi et al. 2008).

The Nigerian poultry subsector has been widely affected by the highly pathogenic avian influenza (HPAI). Numerous outbreaks between January 2006 and July 2008 have rendered the HPAI disease status in this country as endemic. The outbreaks occurred in all poultry production systems, including backyard/village extensive ones (Obi et al. 2008). According to the records of the World Bank-funded Avian Influenza Control Program, between February 2007 and January 2008, ₦623,077,880 (US\$4,215,683) has been paid to compensate farmers whose birds were culled. No information is available on the costs of culling, diagnostic testing of samples, cleaning and disinfection, and other administrative costs (Obi et al. 2008).

Studies on the economic costs of these outbreaks show evidence of detrimental impacts including significantly reduced demand for poultry and poultry products resulting in steep declines in sales, up to 100 percent loss in poultry incomes of

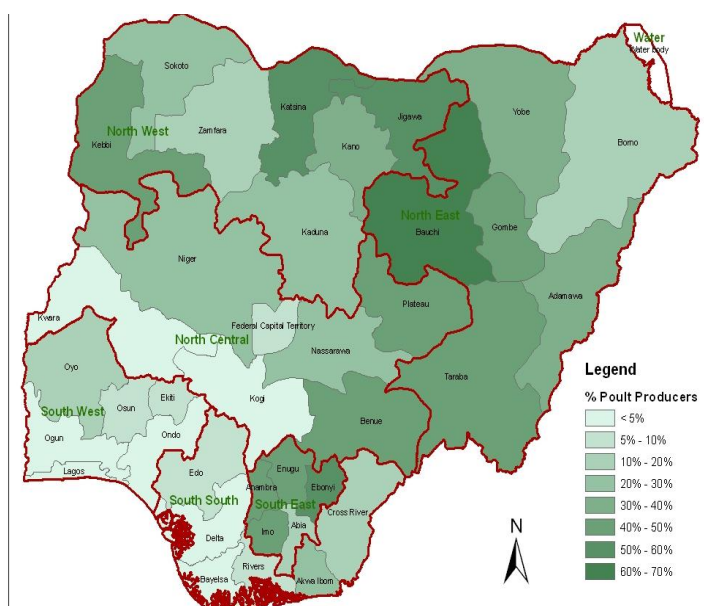
producers (UNDP 2006; Obi et al. 2008), and substantial employment losses in the poultry sector (UNICEF/AED 2008)

While these data help provide insight into impacts of HPAI on local livelihoods, these studies were limited to a regional focus based on data collected from targeted areas. The dearth of countrywide quantitative econometric studies on the role of poultry in Nigerian livelihoods limits the ability to assess the impact of an HPAI outbreak to make informed policy decisions (Obi et al. 2008).

This brief aims to fill this research gap by using nationally representative Nigeria Living Standards Survey data (NLSS 2003-2004) and econometric models to assess the livelihood impacts of HPAI by (i) investigating factors that affect participation in small-scale poultry production and profiling those households most likely to be poultry producers and those most likely to keep larger flocks, and (ii) assessing the potential impact of HPAI supply and demand shocks on various livelihood outcomes.

## Poultry Producing Households in Nigeria

**Figure 1. Participation in small-scale poultry production, by state**



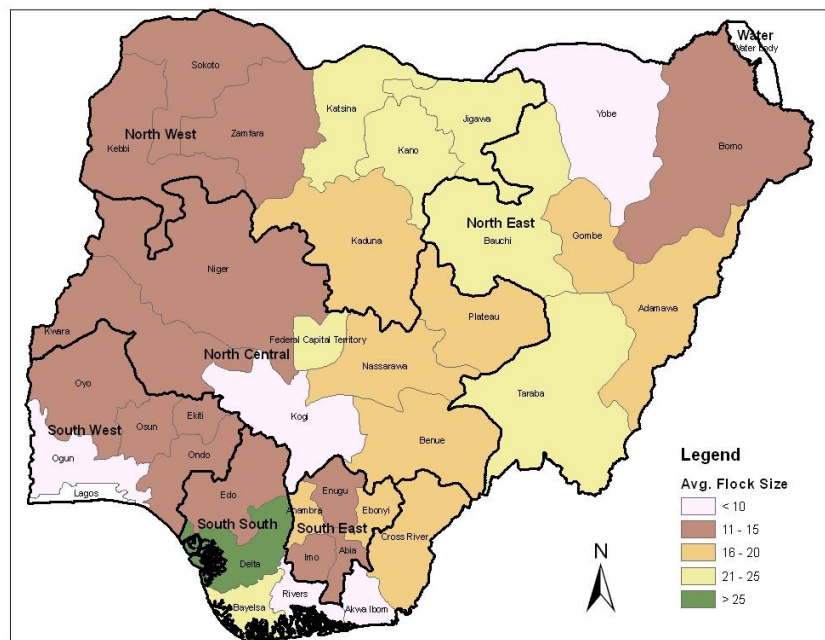
Source: NLSS

The smallest proportion of poultry producing households is in the South West (4 percent). In terms of their rural or urban location, 37 percent of rural Nigerian households keep poultry while only 6 percent of urban households keep poultry. Within geo-political zones, the North East supports the highest percentage of poultry keepers with 46 percent, followed by the South East (44 percent) and North West (43 percent). The zone with the smallest proportion of households keeping poultry is the South West with 7 percent. Figure 1 presents the proportion of households that keep poultry across states in Nigeria.

The average flock size managed by poultry producing households in the country is 17 birds, with little variation across zones. Poultry producing households in the Northern zones (West, East and Central) manage the largest flocks with an average of 18 birds in each zone. Poultry producing households in the South West manage the smallest flocks with an average of 12 birds. Figure 2 presents the distribution of average poultry flock sizes in each state, based on the NLSS data.

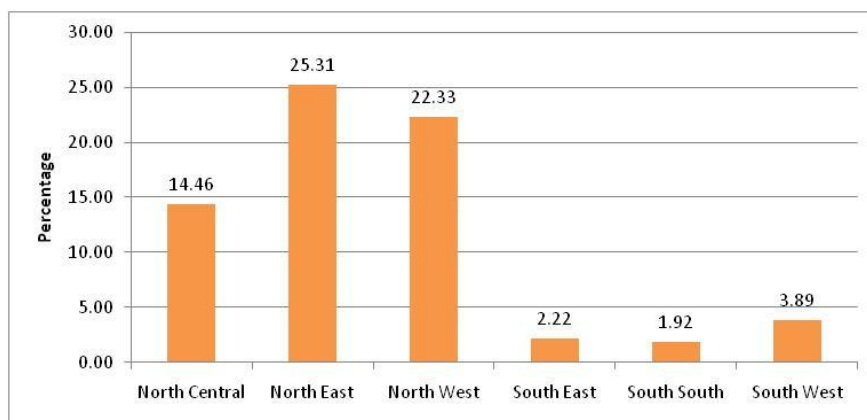
Finally, the contribution of poultry (live bird) and egg sales to the total annual household incomes of poultry producing households is portrayed in Figure 3 based on the NLSS data. In this study, total annual household income includes annual salaries from the employment of the household members in various industries (agriculture, manufacturing, and services), income from livestock and crop sales, remittances, rent income, and other reported income.

**Figure 2. Average poultry flock size, by state**



Source: NLSS

**Figure 3. Percentage of poultry income in household income, by state**



Source: NLSS

Poultry sales contribute 14.3 percent to the average poultry producing household’s total annual household income. This figure varies across zones, with households in the North East appropriating the highest proportions of their income (25.3 percent) from poultry, followed by those in the North West with 22.3 percent. Households in the Southern zones have substantially lower proportions of their income coming from poultry (all less than 4 percent). Given this disparity in shares of household incomes from poultry, HPAI shocks are likely to vary (in terms of reduced incomes) across Nigeria, with the most severe impact on poultry producing households in the North.

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, and are larger with higher numbers of women and children. In terms of asset ownership, households with higher levels of wealth (defined as durable assets) are significantly more likely to keep poultry. Although predicted poultry keepers are wealthier, they have significantly lower expenditure per capita (proxy for income). However, households more likely to keep poultry are less likely to be extremely poor (i.e., have total expenditure less than one third of the national average). This finding holds in both rural and urban areas. Although households predicted to keep poultry have fewer members with off-farm employment, they have significantly more diversified livelihoods strategies – as measured by the number of different income sources, e.g., crop, livestock, off farm income from different sectors, etc. – revealing that poultry producing households are more likely to be resilient against shocks, compared to those that are not predicted to be poultry keepers.

The results of the second model show that households likely to manage larger flocks have bigger households with more women and children. This suggests the important role of family labor, particularly of women and children, in poultry. Households predicted to have larger flocks have older and less educated household heads, implying that their income diversification options could be limited beyond certain sectors. However, these households are less likely to have incomes below the core poverty line and, as such, are unlikely to be the poorest households in the country. In terms of asset ownership, there are no significant wealth differences (value of all assets owned by the household) between poultry producing households with "larger" and "smaller" small-scale flocks.

## 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 flock	100% loss of small-scale flocks	75% loss in large-scale flock	50% reduction in price	100% loss of flock in high-risk areas	75% loss in large-scale flock in medium risk areas
Treatment group	All households without poultry	All households without poultry	Small-scale poultry keepers (1-5 birds)	Poultry keepers who sold at low prices	All households without poultry	Small-scale poultry keepers (1-5 birds)
Control group	All households with poultry	Small-scale poultry keepers (1-5 birds)	Large-scale poultry keepers (>5 birds)	Poultry keepers who sold at high prices	All households with poultry	Large-scale poultry keepers (>5 birds)
*For scenarios 5 and 6 Nigeria disease spread maps from Stevens et al. (2009) were used to allocate states into high and medium HPAI spread risk areas. According to this map, the South East is generally a high HPAI risk area while North Central, North East, North West, South South, and South West are generally considered medium risk areas.						

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 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 (among the observed ones).

## Impacts of HPAI on Poultry Producing Households’ Livelihoods

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

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

Scenarios	Livestock income	Livestock wealth
1 - All Nigeria: Lose all poultry	- <sup>a</sup>	-
2 - All Nigeria: Small flocks lose everything	-	-
3 –All Nigeria: Large flocks become small flocks	<b>-3661.7***(1256.5)</b>	-
4 – Poultry sellers : High price falls to low price	-	-
5 – High HPAI Risk: Lose all poultry	-	-
6 – Medium HPAI Risk: Large flocks become small flocks	<b>-3641.6***(1104.8)</b>	<b>-41455.7***(14409.5)</b>

<sup>a</sup> indicates insignificant estimated impact; \*\*\* Significantly different outcomes between the two groups at 1 percent significance levels

These results reveal that HPAI causes significant reductions in livestock incomes under scenarios 3 and 6. According to scenario 3, if an HPAI outbreak occurs and a household with a “larger” small-scale flock loses 75 percent of its flock, the household would lose approximately ₦3,662 (US\$25) of its total annual income from livestock, down from the pre-HPAI average annual livestock income of ₦8,699 (US\$59). This constitutes a 42 percent reduction in the annual livestock income, which translates to 7.4 percent loss in total annual household income, on average. According to scenario 6, if a household with a “larger” small-scale flock in medium HPAI spread risk areas loses 75 percent of its flock to HPAI, it would lose approximately ₦3,642 (US\$25) of its annual income from livestock, down from the pre-HPAI average annual livestock income of ₦9,440 (US\$64). This represents a reduction of 39 percent in annual livestock income, which amounts to 8 percent loss in total annual household income, on average.

In terms of wealth impact, HPAI is found to result in significant reductions in livestock wealth under scenario 6. If “larger” small-scale poultry producing households in medium HPAI spread risk areas lost 75 percent of their flock due to HPAI, their total livestock wealth would on average decrease by ₦ 41,456 (US\$282) from a pre-HPAI average of ₦201,530 (US\$1,368). This represents a 21 percent reduction of in livestock wealth, which translates to 14.8 percent loss in total wealth, on average.

## Concluding Remarks

Statistical analyses conducted on the nationally representative NLSS data reveal that 30 percent of Nigerian households engage in small-scale poultry production. A majority of the poultry keepers (70 percent) live in the Northern geo-political zones, revealing that these are the key zones to target for HPAI prevention and surveillance. Moreover, a greater proportion of rural households (37 percent) keep poultry compared to urban ones, revealing that poultry production is an important livelihoods activity in rural areas.

The results also reveal that small-scale poultry producing households are likely to be resilient against HPAI shocks and stresses because most of them have other income sources that are unlikely to be adversely affected by HPAI. However, several households (e.g., those in the Northern areas) still have greater exposure of their income stream to poultry and could be significantly affected. It was also found that households with higher numbers of children and women are more likely to keep poultry and also are more likely to keep larger flocks. An important finding that corroborates robust evidence from several other studies is that women play a key role in poultry keeping. This has implications for intra-household distributional effects and for development outcomes where incomes managed by women have been found to result in improved outcomes for family, particularly for children (for example in terms of health, nutrition, and education). In addition, children are generally responsible for letting the birds out in the morning and collecting them in the evening (Obi et al. 2008), and therefore should be educated regarding HPAI control and monitored in case of poultry-to-human transmission of the virus. Also, elimination of poultry from children's diets as a result of HPAI outbreaks could have nutritional repercussions that ultimately could have impacts on their future livelihoods (Iannotti et al. 2009). Detailed household-level livelihoods research on these topics is warranted for Nigeria.

Finally, the impact assessment of HPAI on livelihoods outcomes of poultry producers reveals that poultry producing households that manage larger flocks, especially those located in the medium risk areas, are most vulnerable to HPAI both in terms of income and wealth (asset value) loss. Given the magnitude of loss in incomes and livelihoods assets that these households stand to lose, they should be encouraged to adopt mitigation measures, and they should be considered when designing compensation schemes.

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