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A Contingent Valuation Study on Indonesian Farmers' Willingness to Accept Compensation for Poultry

Yorbol Yakhshilikov, Ekin Birol, Marites Tiongco, Clare Narrod, and Jed Friedman

Key Findings

- Poultry-keeping households in Indonesia are willing to accept half as much compensation for sick birds than for healthy birds, revealing the economic cost of HPAI borne by these households.
- Poultry producers are willing to accept higher compensation for male birds than female ones.
- Those households whose poultry had Newcastle disease in the past are willing to accept lower compensation rates than those households who had no history of New Castle disease.
- Households with smaller and more uniform flocks are willing to accept lower compensation rates than households with larger and diverse flocks.
- The level of knowledge, attitudes, and perceptions of HPAI has little or insignificant impact on farmers' willingness to accept compensation for sick, risky, or healthy birds.

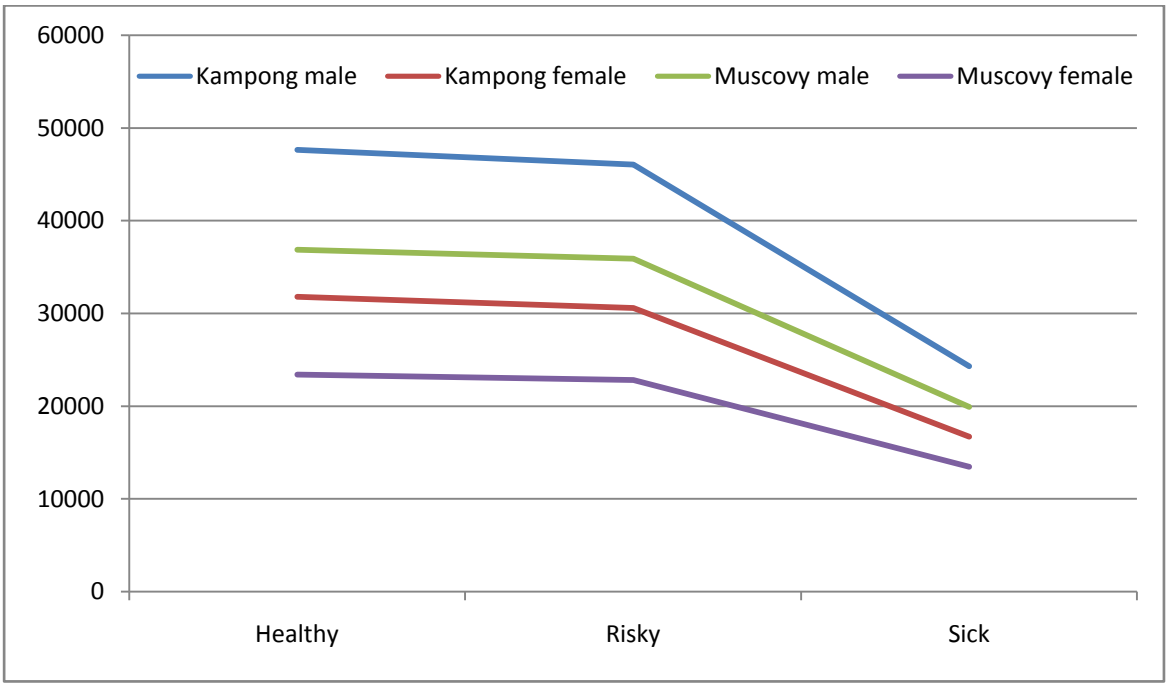
In the absence of market data on the price of poultry before and after the outbreak of highly pathogenic avian influenza (HPAI), one method of capturing the costs of HPAI on farmers' income is the use of non-market valuation techniques, such as the contingent valuation (CV) method (Whitehead 2006). This brief presents the results of a CV study that aimed at capturing farmers' willingness to accept (WTA) compensation for birds with three different health statuses due to an HPAI outbreak—1) healthy, 2) risky, or 3) sick. The differences among farmers' willingness to accept compensation for these three types of birds could indicate the extent of the economic costs that may be borne by farmers in the case of an HPAI outbreak. Moreover, the WTA compensation levels could be used to inform the design of efficient, effective, and equitable compensation schemes. This study also investigated that the impact of farmers' knowledge, attitudes, and perceptions (KAP) of HPAI as well as their poultry-production and household-level characteristics on their WTA compensation (i.e., the HPAI costs that they would bear).

We used the CV data from the World Bank's Small Scale Avian Influenza Saturation Survey that was conducted in Jogyakarta, Indonesia in 2007 (World Bank, 2007). In the CV exercise, poultry farmers were asked the amount of money that they would be willing to accept as compensation for each culled healthy, risky, or sick bird. In the hypothetical CV scenarios, "healthy" birds were

defined as those that had not had any contact with sick birds in the village or nearby; "risky" birds were defined as those that that were healthy but may have had some contact with sick birds in the village; and "sick" birds were defined as those that appeared sick. Interviewers asked the farmers to state their WTA compensation for each type of bird by gender in an open-ended format (i.e., without presenting them with a response category). In this study, the farmers' WTA compensation for two types of poultry was investigated, namely Kampong chickens and Muscovy ducks.

The results revealed that farmers valued Kampong chickens more than Muscovy ducks, i.e, were willing to accept higher compensation rates for Kampong chickens. They also valued male birds higher than female birds. Differences between compensation rates for healthy and risky birds were minimal, revealing that in Indonesia, where HPAI is in an endemic state, farmers were risk neutral. The differences between WTA compensation for male healthy and sick birds of Kampong chicken and male healthy and sick birds of Muscovy duck were on average 23,000 and 17,000 Indonesian Rupiah, respectively (Figure 1). These differences can be used as indicators of economic cost of HPAI per bird, and can be aggregated over total flock to estimate the overall cost of HPAI on a poultry producer.

Figure 1: WTA compensation for culled birds



Method

Regression analysis was used to understand the impacts of household level poultry production, socioeconomic, and KAP characteristics that may have affected farmers' WTA compensation for Kampong chicken and Muscovy ducks. A stacked regression model was estimated by pooling farmers' answers regarding their WTA compensation for all three health statuses (healthy, risk and sick) across the two gender types. This approach was used in the analysis of CV data with multiple scenarios to take into consideration the possible correlation between the individuals' responses across scenarios (see Birol et al. 2008; Cameron and Huppert 1989). In the regression model, compensation for sick birds was considered the base (status quo) outcome. To account for the

remaining attributes, bird gender and healthy and risky statuses entered the regression analysis as dummies.

Next, the stacked regression model yielded predicted values of compensation, differences of which were compared among various household profiles. This exercise revealed whether the differences in compensation that farmers were willing to accept for Kampong chicken and Muscovy duck varied depending on farmers' poultry flock size; their KAP regarding HPAI; their market orientation in poultry; and their risk perception regarding contacting HPAI.

Overall, nine household profiles were created based on the average flock size and KAP score, and statistical tests were used to determine whether there were significant differences among the average compensation that these profiles were willing to accept.

Results and Discussions

A random effects stacked regression model was estimated in log-linear form. Results from the regression were transformed to the exponential form and are reported in Table 2. These results represent the expected percentage points of each factor in predicting the accepted compensation. The regression results suggest that households raising both Kampong chickens and Muscovy ducks expected almost twice as much compensation for healthy and risky birds compared to sick birds, and compensation for male birds was valued 44 to 49 percent higher than for female birds may be because males can also be used for betting.

Concerning production practices for Kampong chickens, larger flock size, greater number of other types of poultry in the household, and ownership of other livestock resulted in the expectation of up 2 percent higher compensation for sick birds. Households who had free-ranging Kampongs were willing to accept 4 percent lower compensation for sick birds. Households who kept poultry at home during nights wanted 4 percent higher compensation for sick birds than for those who did not keep poultry at home during nights. Those households who had a history of Newcastle disease among their poultry were willing to accept 13 percent lower compensation for Kampong chickens as compared to those households with no history of Newcastle disease in the household's poultry. None of these production characteristics was found to be significant for those households raising Muscovy ducks.

Socioeconomic attributes of households positively influenced producers' WTA compensation for sick Kampongs. Generally, female heads of households demanded higher compensation than male heads of households. Older heads of households also demanded higher compensation; however, the magnitude of this coefficient was not far from zero, though statistically significant. The only socioeconomic attribute that appeared significant for Muscovy ducks was the age of the household head.

Five KAP variables developed by Yakhshilikov et al (2009) were also analyzed in the model: 1) KAP on HPAI symptoms, 2) KAP on HPAI control and prevention, 3) KAP on HPAI transmission modes, 4) KAP on practices for treating sick fowl, and 5) KAP on disposing dead fowl. Out of these five variables, three were reported to have a statistically significant impact on the farmers' WTA compensation for the Kampong chicken. More experience of households in treating sick fowl resulted in a reduced WTA compensation for sick Kampongs by 3 percent. Higher knowledge on the modes of HPAI

transmission resulted in farmers stating lower WTA values for sick Kampongs by 1 percent. Further, accurate knowledge towards the control and prevention practices of HPAI resulted in a 1 percent higher rating in farmers' WTA compensation values for sick birds. For the Muscovy ducks, only the knowledge regarding the treatment of sick birds appeared significant and resulted in lower WTA compensation rates for sick Muscovy ducks.

Finally, perception of the risk of contacting HPAI had no impact on farmers' WTA compensation for either sick Kampongs or sick Muscovy ducks. The interpretation of our current results needs caution and careful consideration. Future work is warranted to shed light on the relationship between farmers' WTA compensation and farmers' KAP regarding HPAI.

Table 2: Determinants of willingness to accept compensation

Log of willingness to accept compensation for sick bird	Kampong chicken Odds ratio (sd error)	Muscovy duck Odds ratio (sd error)
Compensation price willing to accept for healthy bird	2.034*** (0.012)	1.851*** (0.017)
Compensation price willing to accept for risky bird	1.936***(0.011)	1.796***(0.016)
Poultry gender (male ==1)	1.440***(0.007)	1.486***(0.011)
Production characteristics		
Current flock of poultry	1.002**(0.001)	1.002(0.002)
Number of types of poultry kept in household	1.016**(0.006)	1.012(0.009)
Poultry being free range (dummy)	0.964*(0.015)	0.985(0.023)
Household owns other animals (dummy)	1.023(0.015)	1.003(0.025)
Poultry sleeps in house at nights (d)	1.042*(0.020)	0.967(0.055)
History of contracting Newcastle disease in flock	0.867**(0.040)	1.026(0.093)
Sociodemographic characteristics		
Gender of head of household (female ==1)	1.032*(0.019)	0.958(0.033)
Age of head of household, years	1.001*(0.000)	1.002*(0.001)
Knowledge, attitudes, and perceptions on HPAI		
KAP on symptoms of HPAI	1.010(0.010)	1.004(0.018)
KAP on disposal of dead fowl	1.000(0.05)	1.000(0.06)
KAP on treating sick fowl	0.972***(0.008)	0.977(0.013)
KAP on transmission of HPAI	0.988**(0.004)	1.010(0.008)
KAP on control and prevention of HPAI	1.010(0.006)	1.007(0.010)
Perception of risk of contacting HPAI	0.986(0.020)	0.992(0.034)
Constant	14705.84***(0.069)	9182.00***(0.122)
Observations	14054	4609
Number of groups	2675	881
Log-likelihood	-4042.76	-1024.62
Overall R2	0.45	0.41

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Next, based on results from models in Table 2, predictions were derived for the WTA compensation for the birds according to health status and gender. Table 3 shows and compares the WTA results for Kampong chickens by different household profiles, generated by flock size (below and above average flock size), five KAP categories (no knowledge compared with knowledge), history of Newcastle disease, number of poultry types held in one household (one type compared with more than one type), and whether poultry was sold commercially (sellers compared with non-sellers).

Our findings suggest that households with a Kampong flock size of less than nine birds (sample mean) had a lower WTA compensation for all three types of birds by health status than those with a flock

size larger than nine birds. The current level of KAP among households also did not have a significant impact on households' WTA compensation, contrary to the significant regression results in Table 2. This point also warrants further investigation. Households with a history of Newcastle disease in their poultry and a greater number of types of owned poultry were willing to accept higher compensation in all six categories compared to those households with no history of Newcastle disease and only one type of poultry. Poultry-selling households were also willing to accept higher compensation than those who did not sell poultry products.

Table 3: Comparison of the average predicted WTA prices across different household profiles, Kampong chicken

	Kampong chicken					
Household profiles	Healthy		Risky		Sick	
	Female	Male	Female	Male	Female	Male
Flock size below average	29726	40782	28382	38889	14821	21077
Flock size above average	30193	41503	28759	39706	15224	21716
T-test between two groups	(-2.14)**	(-1.81)*	(-1.60)	(-2.77)**	(-2.45)**	(-1.34)
KAP symptoms of HPAI 0 score	29755	40755	28502	38793	14876	21104
KAP symptoms of HPAI => 1 score	29940	41128	28536	39299	14998	21370
T-test between two groups	(-0.48)	(-0.72)	(-0.09)	(-1.01)	(-0.57)	(0.-88)
KAP transmission 0 score	31873	42508	30349	40474	14556	20924
KAP transmission =>1 score	29905	41062	28526	39211	14978	21326
T-test between two groups	(0.66)	(0.35)	(0.65)	(0.32)	(-0.22)	(-0.15)
KAP disposal of dead fowl below average	30106	41316	28572	39480	15013	21364
KAP disposal of dead fowl above average	29872	41017	28522	39164	14971	21318
T-test between two groups	(0.60)	(0.57)	(0.13)	(0.62)	(0.19)	(0.15)
KAP treating sick fowl 0 score	31221	42704	29761	40515	15500	22281
KAP treating sick fowl => 1 score	29870	41012	28492	39174	14960	21293
T-test between two groups	(1.65)*	(1.52)	(1.59)	(1.22)	(1.19)	(1.56)
KAP control and prevention 0 score	29770	40263	28307	38323	14876	21016
KAP control and prevention => 1 score	29914	41095	28539	39248	14981	21338
T-test between two groups	(-0.19)	(-0.80)	(-0.32)	(-0.93)	(-0.25)	(-0.54)
No history of Newcastle disease	29982	41158	28605	39315	15013	21374
History of Newcastle disease	25734	35785	24345	33947	13023	18720
T-test between two groups	(3.90)**	(3.61)**	(4.09)**	(3.91)**	(3.26)**	(3.14)**
Number of poultry held (1 type)	29583	40588	28249	38706	14805	21093

Number of poultry held (>1 type)	30230	41546	28810	39724	15150	21560
T-test between two groups	(-2.27)**	(-2.47)**	(-2.04)**	(-2.73)**	(-2.15)**	(-2.07)**
Poultry products sellers	30206	41729	28778	39821	15125	21579
Non-sellers	29806	40835	28443	39002	14925	21236
T-test between two groups	(1.23)	(2.01)**	(1.07)	(1.92)*	(1.09)	(1.34)

Conclusions

Analysis of the CV exercise on Indonesian households' WTA compensation for poultry (Kampong chickens and Muscovy ducks) with three different health statuses (healthy, risky, and sick) produced interesting results. For Muscovy ducks, in addition to bird attributes, the only significant determinant of WTA compensation was the age of the head of household. Since a smaller percentage of poultry keepers raised Muscovy ducks, no significant relationship was observed between WTA compensation and KAP towards HPAI and other production and socioeconomic characteristics. For Kampong chickens, three groups of characteristics were identified to influence household's WTA compensation, including poultry production, socioeconomic, and KAP regarding HPAI. While results from the regression model yielded expected signs, the statistical comparison of the differences between WTA compensation for the three health categories of birds across various household profiles showed several contradictions. One of which is that there was no significant difference in the WTA compensation rate across the three health attributes of Kampong chickens in groups where households were divided according to their KAP towards HPAI. Future research will be conducted to shed light on farmers' WTA compensation (which is an indicator of economic costs that farmers bear because of HPAI) and its relationship with farmers' KAP regarding HPAI.

References

Birol, E., P. Koundouri, and Y. Kountouris. 2008. Evaluating farmers' preferences for wastewater: quantity and quality aspects *Int. J. Water* 4(1):.69–86.

Cameron, T.A., D.D. Huppert. 1989. OLS versus ML estimation of non-market resource values with payment card interval data, *Journal of Environmental Economics and Management* 17:.230–246.

Whitehead, J.C. 2006. A practitioner's primer on contingent valuation. In *Handbook on contingent valuation*, ed. A. Alberini, J. Kahn. Cheltenham, U.K.: Edward Elgar Publishing

World Bank. 2007. Small scale avian influenza saturation survey. Jogyakarta, Indonesia: World Bank.

Yakhshilikov, Y., M. Tiongco, C. Narrod, and J. Friedman, 2009. Knowledge and Practices of Indonesian rural communities and poultry farmers toward Avian Flu. HPAI Research Brief No. 17.

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