

# Psychosocial effects associated with highly pathogenic avian influenza (H5N1) in Nigeria

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## Summary

Highly pathogenic avian influenza H5N1 (HPAI H5N1) infected poultry in Nigeria in 2006. The outbreaks caused significant economic losses and had serious zoonotic repercussions. The outbreaks have also had psychosocial effects on Nigerian farmers. To date, empirical data on the effect of outbreaks on humans are scarce. In this study, field data on HPAI H5N1 in Nigeria were analysed. Although only one human case leading to death was reported in Nigeria, the fact that HPAI H5N1 caused a human death created a disruption in social order and in the well-being of farmers (stress, altered livelihood and trauma) and affected the rural economy. The implication of the above on health communication, the importance of successful control measures in poultry and policy implementation are stressed. Further studies are encouraged.

## Keywords

Avian influenza, H5N1, Highly pathogenic avian influenza, Nigeria, Society, Stress, Trauma, Psychology, Virus.

## Influenza aviaria (H5N1) altamente patogena: effetti psico-sociali in Nigeria

### Riassunto

*Nel 2006, il virus dell'influenza aviaria H5N1 (HPAI H5N1), altamente patogeno, ha infettato gli allevamenti di pollo in Nigeria. Le epidemie hanno causato enormi perdite economiche con gravi implicazioni per la salute umana (zoonosi). I focolai hanno avuto effetti psico-sociali, non sufficientemente documentati, sugli agricoltori nigeriani. In questo studio sono stati analizzati i dati relativi a HPAI H5N1 in Nigeria, anche se nel Paese è stato segnalato solo un caso di decesso umano. Il virus HPAI H5N1 con i suoi effetti ha alterato il tessuto sociale e il benessere degli agricoltori (stress, traumi, parametri di vita alterati), colpendo duramente l'economia rurale. Lo studio ha evidenziato le conseguenze della comunicazione in Salute Pubblica, il successo delle misure di controllo messe in atto negli allevamenti di pollo, le strategie da intraprendere e gli ulteriori studi da compiere.*

### Parole chiave

H5N1, Influenza aviaria, Nigeria, Psicologia, Virus.

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## Introduction

Highly pathogenic avian influenza (HPAI), subtype H5N1, was recorded to be circulating in Hong Kong in the late 1990s. The virus has recently spread beyond Asia into Europe, the Middle East and Africa (26). An outbreak of HPAI H5N1 was reported in Africa, specifically in Nigeria, in February 2006, on a commercial poultry farm in Kaduna State. By the end of the initial outbreak, 42 000 cases had been reported in poultry (18). Since then, avian influenza H5N1 has been detected in over 299 instances in 26 Nigerian states (particularly in the northern and south-western areas of the country) and in the Federal Capital Territory, Abuja. The virus had also affected 10 other African countries (25).

Between May 1997 and 30 September 2009, there were 467 documented human infections with a 60.4% case-fatality rate (288/467) (24). In addition to being observed in humans, domestic poultry and waterfowl, the infected host species for H5N1 also affected wild birds, canines, felines, swine and Mustelidae (3). The far-reaching effects of H5N1 have not only adversely affected domestic birds and human population health, but also poultry industries on a global scale (16).

The outbreaks of HPAI H5N1 in poultry severely disrupted public health in several countries where human infections were recorded (24). Of additional concern is the fear that the virus may mutate into forms that may cause influenza pandemics. There is also the threat of enormous associated financial losses (6, 19) and severe societal unease caused by an atmosphere of panic (4, 9).

While the greatest concerns have related to the impact of HPAI H5N1 on public health, its socio-economic implications, disruptions of farming systems and the potential impact on wild species, the effect of the outbreaks on the physical, sociological and psychological well-being of poultry farmers (who were directly affected by the outbreaks) has largely been ignored.

An extensive Web search using all of the popular search engines and scientific databases revealed no specific peer-reviewed

publications devoted to psychosocial effects of HPAI H5N1. Relatively few non-referred materials present on the Web were concerned with the psychosocial effects in association with the potential of pandemics. Hence, we inferred that no systematic or empirical study specifically examining psychosocial aspects of HPAI H5N1 in humans had been documented in referred journals to date.

On the contrary, HPAI has been associated with enormous and tragic traumatic consequences. Nine poultry farmers committed suicide in India (9), a Japanese man and his wife both committed suicide due to social stigmatisation associated with HPAI H5N1 outbreaks supposedly caused by him (27). Panic, fear, stress, uncertainties and depression following the loss of income due to avian influenza has been linked to disease outbreaks in animals (10, 11, 15, 21). In addition, studies on the social and psychological effects of animal diseases on humans have been widely advocated (17, 21); hence, in this study, we examined the psychosocial effects of the HPAI H5N1 on farmers.

## Materials and methods

### Study design

A case control study was designed in which case groups were farmers whose farms had suffered avian influenza H5N1 outbreaks, while control groups were farmers whose farms had not been affected by an avian influenza H5N1 outbreak during the 2006-2007 epidemics in poultry. Farmers from the case and control farms were independently selected based on similar risks of infection, location, age and size of farms. Case and control farms were matched for location and risk of exposure to the virus. A case farm was taken to be a farm where signs and symptoms associated with the HPAI H5N1 in poultry were found, including the following:

- sneezing and difficulties in breathing
- general lack of appetite
- sharp reduction in feed intake and water consumption
- high morbidity

- swollen and cyanotic combs and wattles
- drooling salivation
- fluctuating and sudden drop in egg production
- greenish-white to greenish-yellow diarrhoea
- reddened shank and feet
- torticollis in some birds
- high mortality.

Samples were collected from these farms and despatched to the national reference laboratory (National Veterinary Research Institute in Vom, Nigeria) and confirmed by at least two confirmatory tests (virus isolation in embryonating chicken eggs, agar gel immunodiffusion test, haemagglutination-inhibition test and reverse transcriptase-polymerase chain reaction).

Control farms were those on which none or some of the symptoms and clinical signs listed above were present. Samples were collected and sent to the laboratory but were recorded as negative based on several confirmatory tests.

### Assessment

Farmers from the case and control farms were required to complete three self-rating questionnaires which included the following:

- The Psychosocial Index (PSI) (20), a short index tailored to busy clinical settings, which is easy to use and provides adequate individual information. This Index was largely derived from well established methods, such as Kellner's Screening List for Psychosocial Problems (14). It is a simple, self-rated test that includes 55 items for assessing four dimensions, namely: acute and chronic stress, psychological distress, abnormal illness behaviour and psychological well-being. It enables the evaluation of the psychosocial dimensions on the basis of both the answers from patients and the comments of interviewers. In our study, we used the self-reported data only.
- The Symptom Questionnaire (SQ) (13) which is a 92-item, self-rating scale that yields four scales of distress (anxiety, depression, somatisation and hostility-irritability) and four scales of well-being (relaxation, contentment, physical well-being and

friendliness). On the SQ, each symptom scale score may range from 0 to 17 and each well-being scale score from 0 to 6. In the present study, SQ well-being subscales were computed to represent the lack of these well-being dimensions (13).

- The World Health Organization *Quality of Life Questionnaire* (The WHOQOL-BREF Group) (22, 23) provided an instrument that assessed the individual's perceptions in the context of their culture and value systems, and their personal goals, standards and concerns. It comprises 26 items which measure specific broad domains, namely: physical and psychological health, social relationships and environment; the domain scores ranged between 4-20 and were scaled in a positive direction (i.e. higher scores denoted a higher quality of life).

The questionnaires were initially used among 15 randomly selected rural and urban farmers to test for clarity, understanding and lack of ambiguity, and were subsequently adjusted appropriately. Thereafter, the questionnaires were submitted to randomly selected participants (80 case farmers and 120 control farmers). A total of 68 respondents from case farms and 84 respondents from control farms returned the questionnaires, providing a response rate of 76%. To address several cases of missing data, mean item total or subscale scores were substituted for missing data when fewer than 20% of items were incomplete, as recommended by the WHOQOL-BREF manual of operations (22, 23).

Considering that there were a lot of missing answers, the sample size was downsized to prevent the introduction of bias/error into the analyses; only the individuals of known age and sex, who answered all questionnaires were considered. It is highly likely that the conditions of the farmers following infection of their farms with HPAI H5N1 and the volume of questions (55 + 92 + 26 items) may have prevented many farmers from completing the questionnaires. Since all the uncompleted questionnaires were eliminated from the study, a total of 42 responses from case farmers and 62 responses from control farmers were entered for statistical analyses.

## Sample

The sample analysed consisted of 104 individuals, as follows:

- 42 farmers whose farms had suffered avian influenza H5N1 outbreaks (case group)
- 62 farmers whose farms did not experience avian influenza H5N1 outbreaks during the 2006-2007 epidemics in poultry (control group).

The case group included 31 men (73.8%) and 11 women (26.2%) between the ages of 19 and 64 years (mean  $31.17 \pm 8.10$ ); the control group included 32 men (51.6%) and 30 women (48.4%) between the ages of 17 and 56 years (mean  $33.08 \pm 9.47$ ).

## Statistical analysis

Variables were reported as the number observed and percentages or means  $\pm$  standard deviation (SD). Differences in socio-demographic variables between the two groups were assessed using the  $\chi^2$  test and t-test for independent samples.

Differences in WHOQOL-BREF, SQ and PSI mean scores between case and control subjects

were analysed using analysis of variance (ANOVA). For all tests performed, the significance level was set at 0.05 (two-tailed).

## Results

The t-test for independent samples showed no significant differences in ages between the two groups ( $t_{(102)} = -1.07$ ;  $p = 0.29$ ), while, as expected, there was a significant difference in gender variable ( $\chi^2_{(1)} = 5.17$ ;  $p = 0.02$ ).

Case groups had significantly higher levels of all SQ scores ( $p < 0.001$ ) and significantly lower scores on WHOQOL-BREF scales of physical ( $p < 0.001$ ) and psychological health ( $p < 0.001$ ), social relationships ( $p < 0.001$ ) and environment ( $p = 0.003$ ), compared to the controls. In regard to PSI domains, the only significant aspects were stress ( $p < 0.001$ ) and abnormal behaviour ( $p = 0.005$ ), while there were no differences in regard to well-being and psychological distress. Details of the results are presented in Table I.

Table I  
World Health Organization Quality of Life-BREF, symptom questionnaire and psychosocial index mean scores across clinical and control groups (23)

Scales	Case ( <i>n</i> = 42) (mean $\pm$ standard deviation)	Control ( <i>n</i> = 62) (mean $\pm$ standard deviation)	<i>p</i> *
World Health Organization quality of life-BREF scales			
Physical health	13.19 $\pm$ 1.95	14.85 $\pm$ 0.85	0.000
Psychological	14.00 $\pm$ 2.20	15.61 $\pm$ 1.81	0.000
Social relationships	13.29 $\pm$ 3.32	16.16 $\pm$ 2.27	0.000
Environment	13.19 $\pm$ 2.74	14.63 $\pm$ 1.99	0.003
Symptom questionnaire scales			
Total anxiety	6.74 $\pm$ 4.79	3.05 $\pm$ 1.49	0.000
Total depression	6.10 $\pm$ 5.23	0.85 $\pm$ 1.73	0.000
Total physical symptoms	6.64 $\pm$ 4.57	1.92 $\pm$ 1.79	0.000
Total hostility	6.43 $\pm$ 4.93	2.42 $\pm$ 2.66	0.000
Psychosocial index scales			
Stress	5.21 $\pm$ 3.15	2.52 $\pm$ 2.39	0.000
Well-being	7.21 $\pm$ 1.73	7.74 $\pm$ 1.30	0.080
Psychological distress	8.55 $\pm$ 9.98	9.68 $\pm$ 3.83	0.420
Abnormal illness behaviour	1.43 $\pm$ 2.60	2.56 $\pm$ 1.37	0.005

\* from analysis of variance

## Discussion

Our results show that HPAI H5N1 is not just a problem that affects animals. In most nations, research and policies are focused on the zoonotic, public health and epidemiological aspects of the disease. However, since human health in its totality is a state of physical, psychological and social well-being, this study on the psychosocial aspects of the disease is considered relevant. The outbreak of HPAI H5N1 in poultry in Nigeria was linked to only one human infection and one fatality (5). Whilst the authorities may want to see the outbreaks mainly from the 'animal problem' viewpoint with a single infection in humans, the human aspects of psychosocial stress, altered livelihood and severe trauma associated with the disease are clearly of major concern for human health.

There is a significant difference in terms of quality of life, symptoms of illnesses and psychosocial index between the affected farmers and those who were not affected. Affected farmers were severely stressed and extremely anxious, severely depressed, showing clear physical symptoms and they had a tendency to be hostile to the society (Fig. 1).

'I don't know where it came from. All I know is that another farm in the area became infected and then mine. I lost 7 000 chickens', says a dejected Plus Ilonah, 52. 'Since then, friends have been donating food and some money to my family. We don't have any savings or any other source of income and are just managing.'

Two of his children are in high school and two in university, well on their way to good jobs and a better life. Now, the dream may be over.

'We are waiting for the government to give us whatever they will give us so we can restart', he says. 'I would borrow money but the bank wants my land as collateral. I need 1 000 layers as a starting point, which would cost 800 000 naira (US\$6 000). That's a lot of money. Who is going to lend me that?'

Figure 1

Comments of a poultry farmer whose farm was affected by HPAI H5N1  
Courtesy of the Food and Agriculture Organization (8)

The above indirect effect of the HPAI H5N1 on the affected farmers may consequently increase the chances of farmers falling ill, committing suicide, disrupting social order or becoming uncooperative with the laws and policies that guide the community. For example, tax evasion and non-payment of bills have been reported. Some authors (2, 15) identified similar behaviour (altered lifestyles, trauma and recovery, loss of trust in the authority/government and in the systems of control which undermined the value of local knowledge) amongst all who witnessed the mass culling of cattle during the foot and mouth disease (FMD) outbreak in the United Kingdom in 2001.

It was not only the farmers who bore the psychosocial consequences of the Nigerian HPAI H5N1 outbreak. Although the farmers were directly involved in the crisis, suffering a loss of income, being forced into isolation and threatened family unity, the society at large was also affected since people had to pay higher costs for less qualitative protein sources and they too were fearful of becoming infected. Similarly, rural businesses and markets and downstream sectors of the poultry industry were severely affected, sometimes with people living in close proximity to disposal sites, culling staff coping with the guilt of culling animals or worrying about the risk of infection. It is therefore necessary that, in addition to this study, separate assessments of the other sectors that have been identified above and highlighted in other studies, will need to be made.

In regard to the psychosocial effects on farmers of the HPAI H5N1 infection in poultry, it should be remembered that health communication(s) as well as policy implementation will be extremely difficult to implement on account of the reluctance of those involved to work with the authorities (1, 4, 7). Ensuring the survival of and providing physical support to farmers who were directly affected should be the most important factor in policy considerations for HPAI H5N1; furthermore, stakeholders in the downstream sector of the poultry industry in Nigeria should be involved in policy-making.

Furthermore, it is important to note that compensation was paid only for culled birds, which are mostly of the exotic or industrial type, and largely reside in and around the cities and major towns. Low income farmers in the rural areas who lost all their birds due to avian influenza H5N1 and who found it hard to claim for their losses to the appropriate government agencies received no compensation. This places the poor rural communities under undue financial and emotional stress (17).

Similarly, the effect on the health and well-being of children, especially those belonging to farmers affected by the HPAI H5N1 outbreaks will need to be assessed in depth.

## Conclusions

We suggest the inclusion of a psychosocial component to all animal emergency plans for situations like HPAI since there is a strong correlation between overall well-being and adherence to public health policies. We also advocate that policy planners involve rural populations in planning and intervention strategies to prevent and combat animal disease outbreaks.

Finally, infectious disease studies in animals and humans will benefit from combined perspectives of evolutionary ecology (interaction between disease agent genotypes,

phenotypes and the environment) and social ecology (focus on the social, institutional and cultural contexts of human/environment relationships of particular relevance to public health, the behavioural sciences and medicine) (12).

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## Conflict of interest/competing interest

We declare we have no conflict of interest.

## Statement of informed consent

All respondents were fully informed that the project was being conducted for scientific purposes only, that the outcome would be published and their privacy would be secured. Permission was obtained prior to submitting the questionnaires.

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