

Research Application Summary

Knowledge, attitudes and practices of indigenous chicken value chain actors in relation to infectious bursal disease transmission in Kenya

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**Abstract**

Infectious bursal disease (IBD) is a highly contagious and economically devastating viral disease of chicken that has been linked to relatively higher mortalities in indigenous chicken compared to in exotic ones. Since it is not clear what indigenous chicken value chain actors know on IBD transmission, a cross sectional study using structured questionnaire was conducted to assess knowledge, attitudes and practices among 132 indigenous chicken value chain actors (farmers, traders, slaughter-personnel and animal health providers) with respect to IBD transmission. The collected data were analysed using R statistical software version 3.3.1. The main value chain actors knowledge, attitude and practices that promoted transmission of IBD among indigenous chicken were found to include: sourcing birds from other farmers and traders with no vaccination or disease history (100% farmers and 61.5% traders), no disinfection between farms (89.7% traders; 57.1% animal health providers); low use of vaccines against IBD (8.5% farmers); feeding dogs on sick and dead birds (farmer 25.3%; traders 35.9%; slaughter personnel 12.8%); direct mixing of new and unsold birds from the market with home flocks (55.3% farmers) and mixed rearing of different species of birds together by farmers (38.3%). There was a significant association ( $p < 0.05$ ) between traders sourcing of chickens from local farmers ( $p = 0.0107$ ), feeding sick and dead birds to dogs by farmers ( $OR = 2.75$ ), low IBD vaccine use by farmers ( $OR = 3.07$ ) and transmission of IBD. Identification of factors promoting IBD transmission will contribute towards designing of a policy document on how the disease should be managed and controlled both at local and national level. Control of IBD will increase productivity of indigenous chicken; subsequently help in poverty alleviation and ensure food and nutrition security for the majority of the people living in rural areas who rear these birds as integral part of family livelihood.

Key words: Disease transmission, indigenous chicken, Infectious bursal disease, Kenya

**Résumé**

La bursite infectieuse (IBD) est une maladie virale très contagieuse et économiquement dévastatrice du poulet qui a été associée à des mortalités relativement plus élevées chez les poulets indigènes que chez les exotiques. Puisqu'il n'est pas clair ce que les acteurs de la chaîne de valeur du poulet indigène savent sur la transmission des MII, une étude transversale utilisant un questionnaire structuré a été menée pour évaluer les connaissances, les attitudes et les pratiques parmi 132 acteurs de la chaîne de valeur du poulet indigène (agriculteurs, commerçants, personnel d'abattage et santé animale,

fournisseurs) en ce qui concerne la transmission IBD. Les données collectées ont été analysées à l'aide du logiciel statistique R version 3.3.1. Les connaissances, attitudes et pratiques des principaux acteurs de la chaîne de valeur qui ont favorisé la transmission des MII parmi les poulets indigènes comprenait: l'approvisionnement en oiseaux d'autres agriculteurs et commerçants sans antécédents de vaccination ou de maladie (100% agriculteurs et 61,5% commerçants), pas de désinfection entre les fermes (89,7% de commerçants; 57,1% de prestataires de santé animale); faible utilisation des vaccins contre les MII (8,5% d'agriculteurs); nourrir les chiens avec des oiseaux malades et morts (éleveur 25,3%; commerçants 35,9%; personnel d'abattage 12,8%); mélange direct d'oiseaux nouveaux et invendus du marché avec des troupeaux domestiques (55,3% d'agriculteurs) et élevage mixte de diverses espèces d'oiseaux par les agriculteurs (38,3%). Il y avait une association significative ( $p = 0,05$ ) entre les commerçants s'approvisionnant en poulets auprès des agriculteurs locaux ( $p = 0,0107$ ), nourrir les oiseaux malades et morts aux chiens par les agriculteurs ( $OR = 2,75$ ), faible utilisation du vaccin contre les MII par les agriculteurs ( $OR = 3,07$ ) et la transmission des MII. L'identification des facteurs favorisant la transmission des MII contribuera à la conception d'un document de politique sur la manière dont la maladie doit être gérée et contrôlée tant au niveau local que national. La lutte contre les MII augmentera la productivité du poulet indigène ; contribuer ensuite à la réduction de la pauvreté et assurer la sécurité alimentaire et nutritionnelle de la majorité des habitants des zones rurales qui élèvent ces oiseaux dans le cadre des moyens de subsistance de la famille.

Mots clés : transmission de maladies, poulet indigène, bursite infectieuse, Kenya

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## Introduction

Indigenous chicken are mainly raised in rural settings under free range systems (Nyaga, 2007), which exposes them to precarious conditions such as diseases, predation, inadequate feeding, poor housing and extreme weather changes (Nyaga, 2007; Olwande, 2014). These conditions lower the birds' production; subsequently lowering economy of the needy, mostly women and youth, who mainly possess these birds. Diseases have been identified as the main stumbling block for indigenous chicken production; viral diseases (including Infectious bursal disease and Newcastle disease) causing huge economic losses to the poultry industry in Kenya (Nyaga, 2007; Mutinda *et al.*, 2013; Olwande, 2014).

Infectious bursal disease is a highly contagious, acute viral disease of young chicken that can result to 100% morbidity and mortality reaching up to 100% in susceptible flock (Mutinda *et al.*, 2013). It has been linked to relatively higher mortalities in indigenous chicken compared to exotic chicken in Kenya by Mutinda *et al.* (2013). Infectious bursal disease virus (IBDV) is transmitted both directly and indirectly when diseased chicken shed the virus in faeces which contaminate water, feed, poultry house litter and other fomites (Etteradossi and Saif, 2008). The virus is resistant to many environmental changes hence it can survive for long in the environment; this facilitates the transmission (Etteradossi and Saif, 2008; Mutinda *et al.*, 2014).

Relative increase in prevalence of IBDV antibodies in indigenous chicken has been documented by Swai *et al.* (2011) and Kebede *et al.* (2017). This may be due to the poor conditions that these indigenous chicken are exposed to; production systems that favour the transmission of infectious diseases. These conditions include: inappropriate sanitary conditions, nutritional deficiencies, continuous exposure of the indigenous village poultry to wild birds, rearing of different species of bird together, absence of routine vaccination, ease of contact at local open-air markets among chickens from different areas

which are taken back to various localities, and the free range conditions that favour contact of chickens from different villages. These involve various indigenous chicken value chain actors. Therefore, for the IBD control measures to be effective, this group of actors needs to be included in the control program; the starting point being establishment of their knowledge, attitudes and practices with regard to disease transmission. This study was, therefore, carried out in Embu County, Kenya, to address this gap.

## Methodology

**Study design.** A cross-sectional study was conducted from September to November, 2016 in Embu County, Kenya. Four different types of structured questionnaires were used to collect data for assessment of knowledge, attitudes and practices of selected indigenous chicken value chain actors, with respect to IBD transmission in indigenous chicken. The different questionnaires were prepared and administered to different categories of respondents, namely indigenous chicken farmers, traders, slaughter personnel and animal health providers. Important household and flock-level data collected included: respondent's bio data, knowledge of IBD clinical presentation, knowledge, attitude and practices promoting transmission of IBD and knowledge on existence of IBD vaccine.

**Sample size.** This was determined according to Martin *et al.* (1987) using the formula:

$$n = pq [z / L]^2$$

Where: n= sample size, p= expected prevalence (50%) q= 1-p, Z= á at 95% confidence level and L= required degree of precision set at 8.7%.

A total of 132 participants were recruited and interviewed at their respective specific operations. These included: indigenous chicken farmers (47), traders (39), slaughter personnel (39) and animal health providers (7). Sampling was done conveniently based on respondents who were reachable and willing to be interviewed.

**Data analysis.** Data were entered in Microsoft Excel and analysed in R version 3.3.1. The results were described in percentages. Fisher's and Chi-square tests were used to test the association between suspected factors and IBD transmission. Odds ratio greater than one (OR >1) and P-values less than 0.05 (p<0.05) were taken to be statistically significant.

## Results and discussion

**Indigenous chicken value chain actors' knowledge on infectious bursal disease.** Thirty nine (83%) indigenous chicken farmers and 35 (89.74%) traders reported to know the clinical presentation of IBD. The signs they associated with IBD included: reduced feed and water consumption, whitish watery diarrhoea, matted feathers at the vent, ruffled feathers, closed eyes and tucked neck to shoulders. However the disease lacked a local name and majority of the farmers and traders associated it with "Kivuruto", the local name for Newcastle disease. Most slaughter personnel didn't recognize both the ante-mortem and post-mortem signs and lesions of IBD but 38.46% reported having observed whitish watery diarrhoea.

**Indigenous chicken value chain actors' attitudes that promoted maintenance and spread of infectious bursal disease in indigenous poultry in Embu County.** All (100%) farmers and 24 (61.5%) traders interviewed did not inquire about the vaccination and disease history of the farms from which they bought chicken. Nearly all slaughter personnel had a negative attitude towards ante-mortem inspection of the birds they purchased with 66.7% (26/390) having not carried out the inspection.

**Indigenous chicken value chain actors' practices that promoted maintenance and spread of infectious bursal disease in indigenous poultry in Embu County**

**Farmer practises.** All the forty seven (100%) indigenous village poultry farmers interviewed kept indigenous chicken and, in addition among them twelve (25.5%) kept ducks, four (8.5%) kept turkeys, and two (4.3%) kept a mixture of chicken, ducks and turkeys. Nineteen (40.4%) farmers did nothing to protect their birds against IBD. Four (8.5%) vaccinated their chicken against the disease while 15 (31.9%) relied on herbal plants consisting mainly of Aloe vera and Neem. Two (4.3%) used disinfectants and 7(14.9%) used other methods that included use of antibiotics, milk, confinement of birds and spraying of poultry houses with pesticides (Fig. 1). Five (10.6%) farmers sold their birds at the market when they suspected IBD outbreak in their farm, 32 (68.09%) treated their birds, 2 (4.3%) vaccinated them, 1 (2.1%) sold them to neighbours, 1 (2.1%) gave them away and 6 (12.8%) did nothing (maintained them in their farms) (Fig. 2).

Twenty six farmers (55.3%) disposed sick and birds that died of IBD and/or other diseases by burying, 12 (25.5%) fed them to dogs, 4 (8.5%) burned and 5 (10.6%) consumed them. Forty five farmers (95.7%) disposed their chicken manure on their farms, 1 (2.1%) sold it and 1 (2.1%) threw it away in bushes. Direct mixing of unsold birds from the market with home flocks was reported by 26 (55.3%) of trading farmers while only 1 (2.1%) reported that he separated unsold birds once they were brought back from the market. Eighteen (38.3%) left them at the market for next sale and 2 (4.3%) did not respond.

**Traders' practises.** Eighteen (46.2%) traders walked with purchased birds from one farm to another during procurement process. Fifteen (38.5%) had an isolated place where they gathered poultry from various farms and 6 (15.4%) bought the birds directly from farmers at the market place. Thirty five traders (89.7%) did not disinfect themselves when moving from farm to farm during procurement process. Thirty three traders (84.6%) sold sick birds infected by IBD and other diseases at a discount to unsuspecting farmers. Eleven (28.2%) took them home for domestic consumption, 4 (10.3%) treated them for farm re-stock and 3 (7.8%) slaughtered and sold them to consumers.

Two (5.1%) traders disinfected their premises in the local markets while 37 (94.9%) used other prevention measures such as hand cleaning using soap and putting Aloe vera in poultry drinking water. Sixteen (41.0%) buried birds that died at the market centre either from IBD or any other disease, fourteen (35.9%) fed them to stray dogs and six (15.4%) took them home for domestic consumption (Fig. 3).

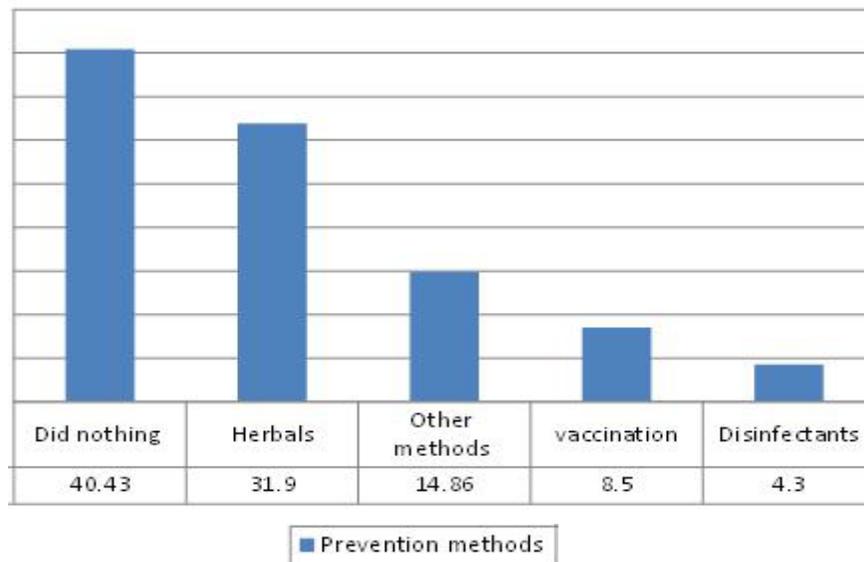


Figure 1. Control and prevention measures undertaken by indigenous chicken farmers in Embu County, Kenya

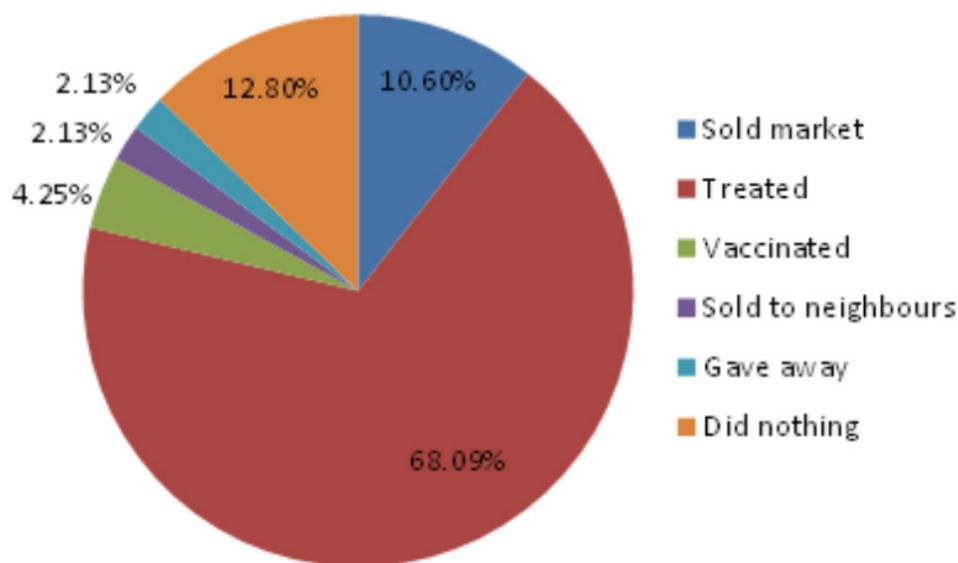
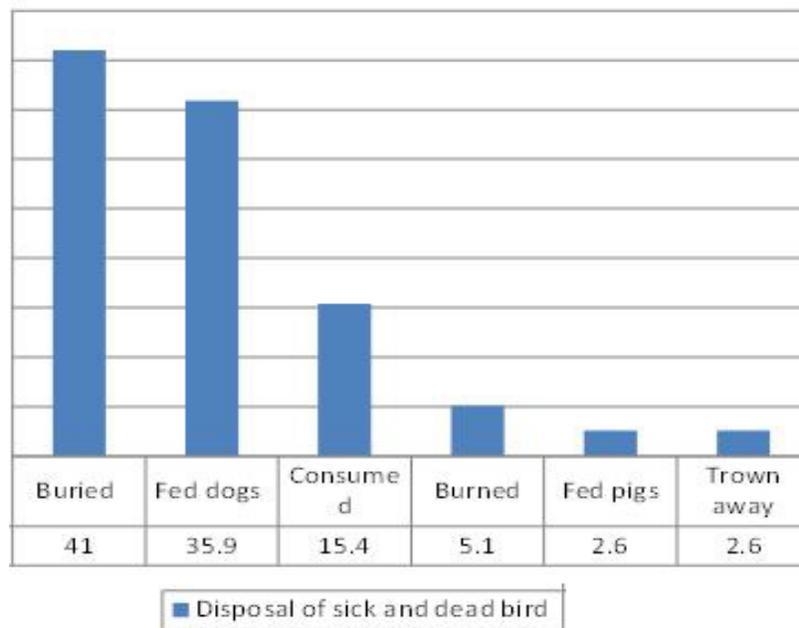


Figure 2. Embu County farmers’ practises when they suspected infectious bursal disease outbreaks on their farms

**Slaughter personnel practices.** Slaughter personnel handled sick and dead birds by burying (33.3%), put in condemnation pits (17.9%), thrown in kitchen waste pits (10.3%) and feeding them to dogs (12.8%). Most of the slaughter personnel (92.3%) did not disinfect their slaughter houses; those who cleaned them mostly used washing powder (“omo”) and bar soap.

**Animal health provider’s practices.** Four (57.1%) of the interviewed animal health providers did not disinfect themselves when moving from one farm to another and almost all (6/7; 85.7%) did not use

protective equipment (gloves and gumboots), when attending to sick bird(s). A significant association ( $p < 0.05$ ) was found between traders sourcing of chicken from local farmers ( $p = 0.0107$ ), feeding sick and dead birds to dogs (OR=2.75) by farmers, low IBD vaccine use by farmers (OR=3.07) and maintenance of IBD in indigenous village chicken.



**Figure 3. Methods of disposal of sick and dead birds by traders in Embu County.**

## Discussion

Control of IBD is often difficult among indigenous chicken due to the free range production, virus characteristics, irregular antibody levels and low vaccine use (Mutinda *et al.*, 2014). Indigenous chicken value chain actor's attitude and low knowledge on some daily/different poultry production and farming practices lead to transmission of IBD in indigenous chicken. Many farmers and traders in Embu County recognised the clinical presentations of IBD which were compatible with the clinical form of the disease (Etteradossi and Saif, 2008). However the disease lacked a local name and majority of the farmers, traders and slaughter personnel associated it with "Kivuruto", the local name for Newcastle disease. Mutinda *et al.* (2014) and Olwande (2014) reported similar finding where the farmers associated the disease with other diseases like Newcastle disease, infectious bronchitis and coccidiosis. Lack of local name for IBD in Kenya and its association with other diseases has resulted to majority of poultry value chain actors treating and preventing the disease with wrong treatment and vaccines, leaving the virus infection to spread freely. This contributes to its continuous transmission among the indigenous chicken (Mutinda *et al.*, 2014).

Traders (68.1%) and farmers (100%) were reluctant to inquire about the disease or vaccination history from the source farm when buying chicken. This is similar to Nyaga (2007) finding that farmers obtained initial breeding poultry without inquiring disease history. This habit can result in transmission of virus beyond the respective farm, in case of disease outbreaks (Swai *et al.*, 2011; Kebede *et al.*, 2017). The movement from farm to farm of 89.7% of the traders and 57.1% of the animal health providers, without observing disinfection practices increased chances of IBD transmission between

farms. Infectious bursal disease virus can spread via fomites such as soles of shoes, vehicles and clothing (Etteradossi and Saif, 2008) from infected farms to others. Mixing of chicken by traders from different farms without isolation points (46.2%) as found in this study, is a biosecurity issue since infected birds can transmit IBDV to naive birds; especially since some of these birds were bought for restocking farms. The local husbandry rearing of different species of birds together in the same open range environment encourages cross infection between birds. Ducks and turkeys are mostly raised together with chicken under free range systems (Nyaga, 2007). Both are asymptomatic carriers and can be significant foci of infection to the free range indigenous chicken.

The practice of over-relying on herbal drugs (31.9%) such as Aloe vera (*Barbadensis miller*) and Neem (*Azadirachta indica*) for treatment of sick birds and not vaccinating (91.5%), contribute to maintenance of IBDV among indigenous village chicken. Okello and Gitonga (2010) in a survey conducted in Kiambu, Kilifi, Vihiga and Nakuru Counties of Kenya, found that in case there was a disease outbreak; a number of farmers gave herbal concoctions as a treatment to their indigenous birds and the most used herbs included juices made from the leaves of Aloe vera or the neem tree using water. The herbal treatments are administered irrespective of disease symptoms. Lack of appropriate vaccine use, due to lack of knowledge on the importance of vaccination for disease control, results in birds lacking immunity to IBD; which they would have acquired from direct vaccination or maternal antibodies from vaccinated mother hens. The unvaccinated birds will be susceptible to subsequent IBD outbreak(s) and will end up shedding the virus to the environment, perpetuating the infection.

Infectious bursal disease virus is shed in faeces; is very stable and survives for long periods outside the host (Etteradossi and Saif, 2008); remaining viable for at least four months. Therefore the practice of disposing poultry manure on farms done by a majority of the farmers (95.7%) promotes transmission of IBDV to the freely-scavenging indigenous village poultry.

A significant number of farmers (25.5%), traders (35.9%) and slaughter personnel (12.82%) disposed the sick and dead birds by feeding to dogs. This is similar to what Nyaga (2007) and Kebede *et al.* (2017) documented, where farmers reported feeding sick and dead birds to carnivores, mostly dogs in Kenya and Ethiopia respectively. Albert *et al.* (2004) showed that a dog fed with chicken tissues contaminated with IBDV excreted that virus in its faeces from 24 to 48 hours post ingestion. The excreted virus remained infective and maintained its unique pathogenic characteristics. Majority of dogs are kept mostly inside homesteads and near poultry facilities for security purposes. If dogs are fed dead birds that are infected with IBDV, they can play a significant role as a carrier of IBDV inside the facility, or transmit the virus from one poultry flock to another.

There was ease of contact at open-air markets between chicken from diverse areas, which are then taken back to different localities, where they are mixed with home flocks as reported by 55.3% of the farmers. This can undoubtedly facilitate the rapid transmission of IBD among indigenous chicken as suggested by others (Swai *et al.* 2011). Lack of proper biosecurity measures and vaccination to prevent IBD can lead to heavy losses as a result of morbidity and mortality rates as reported by Mutinda *et al.* (2013) and Kebede *et al.* (2017) due to IBD or other diseases that may affect the birds due to the resultant immunosuppression.

## Conclusion

Some of the poultry value chain actors' practices, which are done due to lack of knowledge on IBD and how it is transmitted, coupled with their attitude towards biosecurity measures on indigenous chicken as shown in this study, increase the possibilities for transmission of IBD in the study area. There is therefore a need for knowledge - creating campaigns and training on various aspects of IBD, for the value chain actors, as a measure towards control of the disease.

## Acknowledgements

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