

Exploring trade patterns and contact structure of poultry movement in Oromia and SNNP regions in Ethiopia to determine potential role of markets in the spread of NCD between villages

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In many of developing countries, traditional chicken production is playing an important role in household economic and in the supply of animal proteins. For Ethiopia, the last report of the Central Statistical Agency (CSA) reported for 2006 a total population of 34,000,000 chickens. 98 % of which were indigenous birds reared in rural poultry farming. Among the production constraints, diseases of chicken seem to be one of the main burdens for producers. Newcastle disease is endemic in Ethiopia and during outbreaks mortality of unvaccinated chicken can be up to 80%. The country is free of H5N1 HPAI but it is threatened by the introduction of the disease via infected neighbouring countries and migratory birds. For the dissemination of infectious diseases, trades of animals are considered as major risk factors. In Ethiopia despite the importance of backyard system for farmers' livelihood no preventive strategies are designed to prevent and control the spread of poultry diseases through animal movements.

This paper presents data on the contact structure for markets in Oromia and SNNP regions and describes network of poultry movements. 15 markets were visited and farmers living within a ten kilometre radius of each market and selected using snowball methods were interviewed. In total more than 350 persons were interviewed. Behaviour of producers were recorded showing that 84% of farmers are bringing back unsold chickens in their farms, and that most of them (69%) are not implementing any quarantine period. Typology of the main actors was determined using several characteristics as their function in the market, their frequency of activities, the number of animals bought or sold and the type of markets they were operating from. Volume of poultry flow per week between markets was estimated depending on period and type of markets. From our data, the volume of chicken sold on terminal markets during festival time are 8 times more than commonly.

To analyse the movement of poultry we used graph theory, each market place is represented by a single node and relation between them are the volume of birds which are exchanged during the time period selected. Simplex directed graphs were used to visualize and analyse links between markets. The analysis revealed a highly connected network, highlighting the role of markets in the spread of infectious diseases of poultry. Centrality measures enabled us to draw hypothesis on markets playing a central role in the spread of infection.

More data need to be collected in order take hold of the seasonal variation and vaccination coverage in order to evaluate the changes in the network structure. These results could be used to target surveillance and control and to reduce the risk of disease transmission.