

Detection of Transboundary Animal Diseases using Participatory Disease Surveillance in Plateau State, Nigeria.

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Abstract: Participatory Disease surveillance (PDS) has been used to produce more efficient and useful data in the prevention, treatment of diseases and improvement of veterinary services in the rural areas. PDS closes the gap between the veterinary public health disease investigators and the diverse livestock keepers. This study was conducted in 35 villages out of 6 local government areas of Plateau state in order to detect the Transboundary Animal Diseases (TADs) that are present in the state. Various methods that were used in data collection were semi-structured interview with key informants, simple ranking, proportional pilling, pairwise ranking, matrix scoring, seasonal calendar, mapping and transect walk. In poultry, Newcastle Disease (ND) proved to be the most important disease of poultry found in the study area and is also a transboundary animal disease. The transboundary animal disease of sheep and goats in this area is Peste de Petit Ruminant (PPR) which happens to be the most important disease of sheep and goats in Plateau state. The TADs of cattle in this area include Foot and Mouth Disease (FMD), Contagious Bovine Pleuropneumonia (CBPP) and Lumpy Skin Disease. The most important disease of cattle in this area is FMD. In pigs and dogs, the most important diseases which are also TADs in this study area are African Swine Fever (ASF) and Rabies respectively. Challenges faced by the farmers in these villages include; diseases, difficulty in getting access to veterinary services, drought during dry season, and predation of chicks by hawks. This study has indicated the presence of numerous transboundary animal diseases in Plateau state and hence the need to address the issue in order to control the entry and spread of the disease in the area.

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Key Words: Transboundary Animal Diseases, Participatory Disease Surveillance, simple ranking, proportional pilling, matrix scoring, pairwise ranking, seasonal calendar, transect walk and mapping.

1. Introduction

Transboundary Animal Diseases (TADs) are highly contagious and feared diseases of livestock in the world and their economic importance is a major constraint in international trade. Their implication on human Health and National food security cannot be over emphasized. Zoonotic disease among TAD's include diseases like West Nile Virus (WNV), Rift Valley Fever (RVF), Mad Cow disease (BSE), Bovine Tuberculosis, Rabies and Highly Pathogenic Avian Influenza (HPAI). Quite a number of developed countries are now free from these diseases and prevent introduction of the diseases to their countries by banning imports from infected developing countries.

Some of the TADs include; Foot and Mouth Disease (FMD), Contagious Bovine Pleuropneumonia (CBPP), Lumpy Skin Disease, Rabies, African Swine Fever (ASF) and Newcastle

Disease (ND). Others include emerging TADs, such as Mad Cow disease (BSE), Rift valley fever (RVF) West Nile Virus (WNV) and Highly Pathogenic Avian Influenza (HPAI).

In Nigeria the presence of TADs could be attributed to the nature of our borders which is somewhat porous. Also, there is lack of strict adherence in the methods of control and prevention of TADs.

Participatory Disease Surveillance (PDS) is the application of participatory epidemiology to disease surveillance. PDS is a method of disease surveillance where participatory approaches and methods are used to combine local veterinary knowledge with conventional methods to establish the presence or absence of a specific disease in a particular area (ILRI, 2009). PE is based on communication and transfer of knowledge, using a variety of methods. There are three main groups of

methods, (a) Informal interviewing which includes semi-structured interviews with key informants, focus-group discussions or individual livestock keepers, (b) ranking and scoring which comprises of simple ranking, pair-wise ranking, proportional piling and matrix scoring, (c) visualization which comprises of mapping, timelines, seasonal calendars and transect walks. These are complemented by Secondary information sources obtained before going to the study area and as the study is conducted, direct observation of animals, farms, villages is carried out, while in the study area Laboratory diagnostics if available, field diagnostic tests are used, complemented by sample collection and testing by a regional or national laboratory for confirmation. Data are crosschecked by probing, triangulation and laboratory diagnostics (Pretty *et al.*, 1995; Mariner and Paskin, 2000; Catley, 2005). This information can be used to design better animal health projects and delivery systems, more successful surveillance and control strategies or as new perspectives for innovative research hypotheses in ecological epidemiology (Manzoor *et al.*, 2005). PDS enables the identification and recognition of seasonal occurrences and hence the planning of intervention programmes.

This study was conducted to detect the presence or absence of transboundary animal diseases in Plateau state. The study was done in 35 villages out of 6 (Bassa, Jos North, Jos South, Jos East, Barkin Ladi and Bokkos) local government areas of Plateau state.

2. Materials and methods

2.1 PDS Team

The PDS team for this study was composed of four veterinarians.

2.2 Methodology

The study was conducted in 35 villages out of six local government areas in the Northern part of Plateau state. The local governments are; Bassa, Jos North, Jos South, Jos East, Barkin Ladi and Bokko's local government areas of Plateau state. The villages were selected for effective coverage of Northern aspect of Plateau state. Pre-advocacy visits were conducted to find a suitable meeting arena in each village according to the suitability of time, place, local politics and convenience for the farmers before the commencement of PDS. All age groups of farmers were interviewed for more viable results. Materials such as Geographical Positioning System (GPS, GARMIN's eTrex Legend personal navigator), cardboards, counters, permanent markers, digital camera and others were used for the study. Each person was assigned a role before moving out. We always have our note taker, observer, tool applicator and the facilitator. In order to avoid bias, the Participatory Disease Surveillance (PDS) Team did not mention about TADs during the interview process. The following tools were used during the course of the participatory disease surveillance: (a) Check list consisting of the following items: mutual introduction, identification of respondents, sources of livestock, livestock species kept, husbandry systems, problems/challenges, livestock diseases, questions and advice, (b) Scoring and Ranking: simple ranking, proportional piling, pairwise ranking, matrix scoring and (c) Visualization which includes mapping, seasonal calendar and transect walk.

2.3 Data analysis

Data was analyzed as indicated in "A Manual for Participatory Disease Surveillance Practitioners: Introduction to participatory epidemiology and its application to highly pathogenic avian influenza participatory disease surveillance".

3. Results

Table 1: List of 35 villages and their location in Plateau state where Participatory Disease surveillance was conducted.

S/NO	VILLAGES	LATITUDE N	LONGITUDE E
1	GANNA ROPP	09.50233	008.92611
2	KWANG	09.85669	008.93104
3	GURA TOPP	09.81561	008.89960
4	KWAFI	09.96368	008.84568
5	KUFANG	09.86302	008.86653
6	NAMUWA	09.88376	008.88644
7	KANGANG	09.85354	008.84689
8	SHAKA	09.87898	008.90450
9	DONG	09.88215	008.83090
10	JEBBU MIANGO	09.86555	008.76006
11	MADO	09.89505	008.85942
12	AKPA AKPA	09.93631	008.80153
13	OUTSEN KURA	09.93541	008.80213
14	SHERE EAST	09.98727	009.07218
15	SHERE EKAN	09.98407	009.04054
16	SHERE WEST	09.99610	008.99324
17	SABON KAURA	09.83157	009.06570
18	SABO FABUR	09.83187	009.06570
19	MIANGO	09.85117	008.68318
20	TARAGBE	09.86022	008.66740
21	NYAKALA	09.95669	008.73254
22	KISSAYHIP A	09.96389	008.79368
23	KIHANG	09.94242	008.74119
24	VWANG (VOM)	09.67814	008.73303
25	RAKANG	09.54717	008.88329
26	RAHWOL GASSA	09.57644	008.90443
27	KURU	09.72867	008.85019
28	POMOL	09.65011	008.89324
29	RAKAK	09.48670	008.89136
30	KYERANG	09.48140	008.88428
31	GYEL	09.79055	008.85463
32	NTV	09.43969	008.91560
33	KAMANG	09.73333	008.98001
34	MUSHU	09.28849	009.09213
35	KAWAI	09.16721	009.05241

Table 2: Ranking of livestock species based on their population in Plateau state.

SPECIE	TOTAL SCORE	RANKING
Poultry	151	1
Sheep and Goats	138	2
Dogs	71	3
Pigs	70	4
Cattle	67	5
Cats	2	6

Poultry ranked the most populous livestock specie in plateau state based on the study that was conducted in the 35 villages of Plateau state. This is followed by sheep and goats, dogs, pigs, cattle and cats respectively.

Table 3: Diseases of poultry, local names and ranking in the 35 villages where PDS was conducted in Plateau state.

Diseases	Local names in Hausa language	Total score	Ranking
Newcastle Disease (ND)	Farin kasha, Farin zawo, Zawo	165	1
Fowl pox	Kuraje	98	2
Chronic Respiratory Disease (CRD)	Tari, Mura	77	3
Lousiness	Kwarkwata	45	4
Coccidiosis	Kashin jinni	29	5
Salmonellosis	-	26	6
Mareks	-	16	7
Lympholeucosis	-	6	8
Fowl typhoid	-	4	9
Helminthosis	-	4	9
Infectious coryza	-	3	10
Infectious bursal disease (IBD)	-	1	11

Table 3 above, ND is the most important poultry disease in the study areas, followed by fowl pox, Chronic Respiratory Disease (CRD), Lousiness, Coccidiosis, Salmonellosis, Mareks, Lympholeucosis, Fowl Typhoid and Helminthosis, Infectious Coryza and Infectious Bursal Disease (IBD) respectively. ND is also the TAD of poultry found within this study area.

Table 4: Diseases of sheep and goats, local names and ranking in the 35 villages of Plateau state where PDS was conducted.

Diseases	Local names in Hausa language	Total score	Ranking
Peste de Petit Ruminant (PPR)	Zawo, Mura, Zawo da majina, Atini	319	1
Fasciolosis	Hanta, Masassaku	148	2
Helminthosis	-	148	2
Foot rot	Ciwon Kafa	123	3
Mange	Makenkero	112	4
CCPP	Mura, Tari	111	5
Ectoparasitism	Kaska, Kwarkwata	73	6
Orf (Contagious Ecthyma)	-	38	7
Trypanosomosis	Samore	31	8
Rumen Impaction	-	31	8
Streptotrichosis	Kirchi	14	9
Pink eye	-	14	9
Food poisoning	-	9	10

Peste de Petit Ruminant (PPR) is the most important disease of sheep and goats in Plateau state (Table 4), this is followed by Fasciolosis, Helminthosis, Foot rot, Mange, Contagious Caprine Pleuropneumonia (CCPP), Ectoparasitism, Orf, Trypanosomosis and Rumen Impaction, Streptotrichosis and Pink eye, and Food poisoning. The TAD of sheep and goats in the study area is PPR.

Table 5: Diseases of cattle, local names and ranking in the 35 villages of Plateau state where PDS conducted.

Diseases	Local names of diseases		Total score	Ranking
	Hausa language	Fulani language		
Foot and Mouth Disease (FMD)	-	Mboru	151	1
Faciolosis	Ciwon hanta, Masassaku	-	139	2
Contagious Bovine Pleuropneumonia (CBPP)	Huhu	-	100	3
Helminthosis	Zawo	-	58	4
Dermatophylosis	-	-	57	5
Trypanosomosis	-	Samore	50	6
Lumpy skin disease	-	Mbolo	36	7
Ectoparasitism (tick infestation)	Kaska	-	19	8
Pink eye	-	-	15	9

The most important disease of cattle in Plateau state bases on the studied areas is FMD (Table 5), this is followed by Faciolosis, CBPP, Helminthosis, Dermatophylosis, Trypanosomosis, Lumpy Skin Disease, Ectoparasitism and Pink eye. The TADs in this area include FMD, CBPP and Lumpy Skin Disease (Table 5).

Table 6: Diseases of pigs, local names and ranking in 35 villages of Plateau state where PDS was carried out.

Diseases	Local names in Hausa language	Total score	Ranking
Helminthosis	Ampul, Tsusan chiki	60	1
Lousiness	Kwarkwata	40	2
African Swine Fever (ASF)	Zazzabi	38	3
Cysticercosis	-	37	4
Mange	-	12	5
Diamond skin disease	-	8	6
Transmissible gastroenteritis	-	5	7
Piglet anemia	-	4	8

Helminthosis is the most important disease of pigs in the studied area (Table 6), this is followed by Lousiness, ASF, Cysticercosis, Mange, Diamond Skin Disease, Transmissible gastroenteritis and Piglet anemia as indicated in Table 6 above. The TAD for pigs in this study area is ASF.

Table 7: Diseases of dogs, local names and ranking in the 35 villages of Plateau state where PDS was conducted.

Diseases	Local names in Hausa language	Total score	Ranking
Rabies	Huakan Kare	97	1
Helminthosis	Tsusan Chiki	63	2
Myiasis	Tsusan Jiki	53	3
Mange	-	23	4
Parvovirus enteritis	-	15	5
Ectoparasitism (lice and tick infestation)	Kwarkwata Kaska	8	6
Transmissible Veneral Tumour (TVT)	-	4	7
Canine Destemper(CD)	-	4	7

Based on the result as indicated in Table 7 above, Rabies is the most important disease of dogs in the 35 communities where PDS was conducted, this is followed by Helminthosis, Myiasis, Mange, Parvovirus enteritis, Ectoparasitism, TVT and CD (Table 7). The TAD for dogs based on the study area is rabies.

Table 8: Ethno-veterinary practices in the 35 villages in Plateau state where PDS was conducted

Specie	Disease / Symptoms	Local Treatment
Poultry	Newcastle Disease	Cactus, Decoction of cactus + gautan kaji (a plant fruit in hausa language), Pepper + Balsam.
Sheep and Goats	Fowl pox	Use of palm oil on affected areas
	Peste de Petit Ruminant (PPR).	Grounded Boaboa leaves (<i>kuka</i> in Hausa language)+ Maize or guinea corn bran, orally
	Mange	Hawa (fish poison) in Hausa dialect, applying it on the affected areas.
	Contagious ecthyma	Mahogany oil + balm, rubbed on the affected area
	Cough	Lemon extract administered orally.
Cattle	Diarrhea	kuka (boaboa leaves) grounded + potash, administer orally
	Loss of appetite	Daddawan baso (Hausa dialect) made from locust bean seeds is given to increase appetite
	Lumpy Skin Disease	Branding
	Fasciolosis	Mahogany
	Trypanosomosis	Mahogany + salt + potash
Dogs	Swellings	Branding
	Rabies	Use of pia or cocoyam
	Myiasis / Helminthosis	Ogogoro (locally brewed beer) administered orally

Constraints and challenges

The problems faced by the farmers include poor roads, scarcity of water, animal diseases, high cost of feed, the need for good quality day old chicks, theft of livestock, access to veterinary services, drought during dry season, market for the sale of animal and animal products, predation of chicks by hawks, scarcity of animal feed during dry season, husbandry systems.

Husbandry systems

Animals are kept under semi-intensive and intensive management systems.

4. Discussion and conclusion

Among the livestock species kept in the 35 villages/communities where this study was conducted, poultry was found to be the most abundant livestock specie in Plateau state which is in agreement with a study carried out by Ndahi and Kwaghe, 2011. Poultry diseases seem to have a lot of adverse effect on the local chickens which are being kept under free range management system. Newcastle Disease (ND) is the most important disease that affects chickens in the study areas in agreement with the studies of Ndahi and Kwaghe, 2011 & Kwaghe *et al.*, 2012. Newcastle Disease happened to be the transboundary animal disease of poultry found in this study. Housing seems to be a major problem to these poultry farmers, and because of lack of confinement,

it exposes them to theft and attacks by wild birds such as hawks.

In small ruminants, the most important disease is Peste de petit ruminant (PPR), while the TADs are PPR and Contagious Caprine Pleuropneumonia (CCPP). In cattle the most important disease is FMD, which is similar to the findings of Manzoor *et al.*, 2005 in a study conducted in Paskistan which rated FMD as the most prevalent disease of cattle in Islamabad Capital Territory. The transboundary animal diseases of cattle found in the region of study are Foot and Mouth Disease (FMD), Lumpy skin disease, Contagious Bovine Pleuropneumonia (CBPP) and Trypanosomosis. The transboundary animal diseases which are also the most important disease of pigs and dogs are African Swine Fever (ASF) and Rabies respectively.

Poverty still poses challenges in the use of veterinary drugs and services by the farmers in these communities, hence the need for government to make these services affordable for these people. Ethno veterinary medicine is still in practice in almost all the villages. There is need to include a botanist in the PDS team for easy identification of some of the trees and plants which are being used for ethno veterinary medicine due to the fact that these plants used by the rural dwellers are named in their local dialect.

In conclusion, the presence of transboundary animal diseases across species of livestock in Plateau state indicates the need to strict adherence in the

control and eradication of transboundary animal diseases within the country. There is need for improvement of veterinary services in the rural areas for improved livestock productivity. There is also need for community enlightenment programs for the farmers on livestock production which will also aid in better animal production. This participatory disease surveillance (PDS) has really provided insight on the difficulties the rural communities are facing in terms of poultry and other livestock production. There is need to curtail transboundary livestock movement by fortifying of our surveillance points making it more active and also quarantine those animals being taken in and out of the country for the eradication of these TADs to be possible. Active surveillance should be continuously carried out at the borders. Also there is need to check livestock movement from one region to another within the country due to the presence of TADs.

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