THE FACTORS CONTRIBUTING TO UTILIZATION OF INFORMATION COMMUNICATION TECHNOLOGIES (ICTS), IN MANAGEMENT OF TRANSBOUNDARY ANIMAL DISEASES (TADS). THE CASE OF UASIN GISHU, KAJIADO, NANDI AND TRANS NZOIA COUNTIES OF KENYA

Author: Titus Wanjala, *tituswanjala@yahoo.com*
Editors: 1. Dr. Fred I. Mugivane - Department of Agricultural Economics, University of Nairobi
2. Dr. John Demesi Mande, Department of Clinical Studies, University of Nairobi
3. Prof Joseph Kiplang'at, Information and Communication Management Specialist, Kenya Technical University
4. Dr. George Gitao, Animal Disease Specialist, University of Nairobi

Summary

Research has established that nearly two-thirds of human pathogens are zoonotic and, of greater concern, nearly three-quarters of emerging and re-emerging diseases of human beings are zoonoses (Woolhouse and Gowtage 2005). Common examples of emerging diseases include Avian Influenza (AI), severe acute respiratory syndrome (SARS), West Nile virus, Nipah virus, and bovine spongiform encephalopathy (BSE). However, Kenya and Eastern Africa, faces the threat of common TADs such as Rift Valley Fever (RVF), *Peste des Petits Ruminants* (PPR), Rabies and H5N1 all of which are considered a risk to both humans and livestock, notwithstanding the destruction to fragile livelihoods. There is inadequate level of awareness and information disseminated across local communities and general public on the risk TADs pause to local communities in Kenya. On the other hand, technologies and information for control of TADs are confined to service providers, researchers and change agents.

The purpose of this study was to assess the factors which favor utilization of Information Communication Technologies (ICTs) for management of Transboundary Animal Diseases (TADs). The study targeted livestock keepers and community based stakeholder across Uasin Gishu, Kajiado, Nandi and Trans Nzoia counties of Kenya.

Literature Review

In examining recent research work associated with animal diseases, it is argued that new infectious diseases emerge because of a complex set of multifactorial circumstances that include population growth, changes in nutritional, agricultural, and trade practices, and shifts in land use including accelerated urbanization, deforestation, and encroach¬ment on wildlife (Wolfe *et al.,* 2007). Kenya and Eastern Africa have witnessed these factors at play across their national economies. The ancient zoonotic diseases such as rabies, anthrax, brucellosis, bovine tuberculosis, zoonotic trypanosomiasis, and disorders associated with tapeworm infections are re-emerging due to a combination of similar factors. These include transmission of pathogens from wildlife to domestic reservoir species (Chomel *et al*., 2007).Research has established that increased complexity in food chains and different systems of food production and preparation are also leading to rising importance of food-borne zoonoses such as salmonella, campylobacter, and Escherichia coli infections, which are all linked to livestock production and processing systems (Rushton, 2009).

Despite the profound animal, human health and economic consequences of zoonotic diseases, until recently these have tended to be neglected by governments and stakeholders. In his research, Shaw identified four (4) reasons for this neglect; first, veterinary services had been given responsibility for control of these diseases, but had neither the farm-level economic incentives nor the societal resource allocation to fulfill this role. Second, zoonoses in both human beings and animals are generally under diagnosed. Third, zoonoses tend to affect rural, often poor, people with poor access to health services. Fourth, mechanisms to control and to restrict food-borne diseases are difficult and complex (Shaw, 2009). Researchers submit that most human diseases, old and new, are caused by multi-host pathogens. In a review of 1,407 species of human pathogenic organisms, 816 (58%) were broadly classified as zoonotic (Woolhouse and Gowtage-Sequeria 2005). This was a term used by Virchow, and defined by World Health Organization in 1959 to describe "those diseases and infections (the agents of) which are naturally transmitted between (other) vertebrate animals and man" (Mantovani, 2001).

However, ICTs have been singled out as playing a greater role in livestock disease control, dairy herd management, livestock production and for marketing of livestock and livestock produce (Meena and Singh, 2013).Adopting Information management approaches amongst farming communities is widely acknowledged as one of the critical factors for efficient and effective agricultural decision-making (Cash 2001, Galloway and Mochrie 2005). Sasidhar and Sharma (2006) emphasized that use of ICT tools has potential to change the economy of livestock, agriculture, and rural artisans in India. Tiwari *et al*., (2010) argue that the livestock sector should develop need based, location specific and local language contents in the form of computer software's and other electronic material. These are viewed as requisite for livestock disease control, dairy herd management, livestock production and marketing of livestock and livestock products.

Information Communication Technologies (ICTs) as the electronic means of capturing, processing, storing and disseminating information. These ICTs can be categorized to include information held as 1s and 0s, and comprises computer hardware, software & networks and intermediate technology, based largely on analogue information waves such as radio, television and telephone (Heeks, 1999). The phrase ICT is thus an umbrella term used to mean computing (software and hardware), telecommunications (mobile, fixed, Internet), and broadcasting. Research findings argue that emerging information technologies present new opportunities to reduce burden of malaria, dengue and other infectious diseases. For example, use of a data management system software package can help disease control programs to better manage and analyze their data, and thus enhances their ability to carry out continuous surveillance, monitor interventions and evaluate control programme performance (Eisen *et al*., 2011).

According to the United Nations, the Kenya ICT policy published in March 2006 was not addressing the needs of specific sectors. For example, there was no attempt to analyze the value of the agricultural sector and information needs along the chain and then develop an appropriate strategy. The need to develop sector-specific ICT strategies in Kenya was thus emphasized, since the country was by then developing an ICT master plan earmarked to support the new ICT sector (UNCEA, 2008). FAO submits that for billions of people in rural areas, where illiteracy rates are high and access to electricity, phones and internet is marginal to say the least, radio is still the most accessible, economic, and popular means of communication (FAO, 2005).

Methodology

This study was conducted in four (4) counties of Kenya, i.e Uasin Gishu, Kajiado, Nandi, Trans Nzoia counties. This study was a survey targeting selected TADs prominent in Kenya and other neighboring countries. The targeted TADs were; Rift Valley Fever (RVF), Rabies, *Pestes Des Petit Ruminants* (PPR) and Foot and Mouth Disease (FMD). A mixed-methods approach was used to obtain data. Research techniques included documentary analysis, semi-structured interviews, and structured questionnaires. Livestock keepers and community based stakeholders (n=356), were interviewed in Uasin Gishu, Kajiado, Nandi and Trans Nzoia counties. Qualitative data provided basis for investigating the role and type of communication methods used for management of TADs. Quantitative data were entered into the Statistical Package for Social Scientists (SPSS), and analyzed using descriptive statistics, correlations, tests of significance and regression.

The regression model outlined was used to investigate factors which influence acceptance of ICTS for management of TADs.

$Y = {}_{a} + B_1 X_{1} + B X_{2} + B_3 X_{3} + B_4 X_{4} + \epsilon B_5 X_{5} + \epsilon B_6 X_{6} + \epsilon B_7 X_{7} + \epsilon$

Where: Y = Dependent Variable (ICT Utilization)

β_0 = Regression coefficient

β_0 is the regression coefficient, β_1, β_2, and β_3 are the slopes of the regression equation

X_1= Cost of ICT services and equipment

X_2= Training

X_3= Access to information and technologies

X_4= Communication method

X_5= Contact with change agents

X_6= Interconnection with groups

The independent variables in this study were; cost of ICT services and equipment, training, access to information and technologies, communication methods, contact with change agents, and interconnection with groups. To quantify the strength and direction of the relationship between variables under investigation the investigator used Spearman's coefficient of correlation. The coefficient of determination (r^2) was used to establish the degree of association between the variables. The coefficient of

determination is a measure of how well a statistical model is likely to predict future outcomes.

Results and Discussion

From the results, it was evident that livestock keeping in Kenya encompass various people whose responsibilities and exposure vary significantly. The majority (73.3%) of the respondents were males compared to 26.7 % female respondents across Kajiado, Nandi, Trans Nzoia and Uasin Gishu counties. This implies that males dominated the role of household head as compared to their female counterparts. The respondents to this study were required to indicate the extent to which various demographic factors would influence their acceptance and utilization of ICTs in management of TADs within their resident counties. A scale of 1 to 5 was provided where 1= no extent, 2= little extent, 3= moderate extent, 4= great extent and 5 was to a very great extent. Figure 1 illustrates the factors as they affected study respondents.

Figure 1 Demographic factors as they affected utilization of ICTs (Wanjala *et al*., 2013)

The results demonstrated that education level attained, occupation or social status would influence acceptance and utilization of ICT for management of TADs to a moderate extent. However according to the respondents' age and gender would influence acceptance and utilization of ICTs in management of TADs to a lesser extent as given by relatively low mean scores.

Technological factors were found to have an influence on utilization of ICT in management of TADs across Kajiado, Nandi, Trans Nzoia and Uasin Gishu counties as investigated by this study. According to results on Figure 2 majority of the respondents affirmed that training and in particular demonstration on ICT applications would influence acceptance and utilization of ICT for management of TADs, as rated by a higher mean score. However, with regard to perceived advantage of ICTs, the respondents rated this as moderate in influencing their acceptance and utilization of ICTs in management of TADs.

Figure 2. Extent to which technological factors influence utilization of ICT (Wanjala *et al*., 2013)

From the study results, majority of the respondents indicated that the cost of ICT services would affect their level of acceptance and utilization to a great extent as given by a high mean score. The cost of ICT devices would influence acceptance and utilization to a great extent, while income levels were found to moderately influence acceptance and utilization of ICTs for management of TADs.

Spearman's Coefficient of Correlation

This study used Spearman's correlation coefficient to establish the degree of correlation or association between ICT utilization and six (6) independent variables. Spearman's correlation coefficient is best applied in identifying and test the strength of a relationship between two (2) sets of data.

From the results, there was a negative correlation between ICT utilization and cost of equipment. This had a correlation figure of -0.206. There was a positive correlation between the ICT utilization and interconnection with social groups as shown by a correlation figure of 0.156. There was a positive correlation between ICT utilization and; training, access to information and communication technologies, communication methods, and contact with change agents.

Conclusions and Recommendations

This study recommends that public administrators, elders (council of elder), politicians and religious

leaders are included in training and information dissemination programs on management of TADs for Kenyan counties. Since these respondent categories frequently use ICTs within their households as established by this study, the study recommends that training programs and technologies on management of TADs is disseminated to these categories.

The study recommends that training and demonstration sessions on utilization of ICTs on management of TADs to similarly target livestock keepers and public service (civil servants), trade/business and self-employed persons within Kenyan counties. The study concluded the radio as highly utilized ICT by livestock keeping households and other stakeholders across Kajiado, Uasin Gishu, Trans Nzoia and Nandi counties. This study recommends to Kenya government and development partners to prioritize use of radio, mobile phone, CD ROM and television (T.V) as suitable ICTs for communication on management of TADs amongst livestock keepers. This study concluded that cost of ICT services and devices would affect to a great extent the level of acceptance and utilization ICTs in management of TADs. However income levels were found to moderately influence acceptance and utilization of ICTs for management of TADs. This study recommends that Kenya government and other partners involved in costing ICTs services and equipment to consider lowering current prices.

References

Cash, D.W., (2001). In Order to Aid in Diffusing Useful and Practical Information: Agricultural Extension and Boundary Organizations. Science Technology and Human Values 26 (4): 431-453.

Chomel, B.B., Belotto A., Meslin, F. (2007). Wildlife, exotic pets, and emerging zoonoses. Emerging Infectious Diseases ; 13: 6–11.

Eisen, L., Coleman, M., Lozano-Fuentes, S., McEachen, N., and Orlans, M.(2011). Multi-disease data management system platform for vector-borne diseases. Journal PLoS Neglected Tropical Diseases Vol. 5 No. 3 pp. e1016. Colorado State University, Fort Collins, Colorado, USA. [Online] URL: http//www. http://www.plosntds.org/article/info%3Adoi%2F10.13.

FAO (2005). Livestock policies and poverty reduction in Africa, Asia and Latin America. Pro-poor livestock policy initiative policy brief. Rome, Italy: Food and Agriculture Organization,

Galloway, L., and Mochrie, R. (2005). The use of ICT in rural firms: a policy-orientated literature review. The Journal of Policy, Regulation and Strategy forTelecommunications 7 (1), 33-46.

Heeks, R. (1999). Information and Communication Technologies, poverty and development. Development of Informatics working paper no.5. Institute for development policy management, University of Manchester. [Online] URL: http//idpm.man.ac.uk/idpm/diwpf5.html.

H.R. Meena., and Y.P. Singh. (2013). Importance of information and communication technology tools among livestock farmers: A review. Scientific Journal of Pure and Applied Sciences. Indian Veterinary Research Institute, Izatnagar-243 122, Uttar Pradesh (India). [Online] URL: http//www.Sjournals.com.

Mantovani, A. (2001). Notes on the development of the concept of zoonoses. WHO Mediterranean Zoonoses Control Centre Information Circular 51.

Rushton, J. (2009). Preface. In: Rushton J, ed. Economics of animal health and production. Wallingford, UK: CABI.

Sasidhar, P.V.K., and Sharma, V. (2006). Cyber livestock outreach services in India: a model framework. Livestock Research for Rural Development. Volume 18, Article #2. [Online] URL http://www.lrrd.org/lrrd18/1/sasi18002.htm

Shaw, APM. (2009). Economics of zoonoses and their control. In: Rushton J, ed. Economics of animal health and production. Wallingford, UK: CABI,: 161–68.

Tiwari, R., Phand, S., and Sharma, M.C., (2010). Status and scope of information and communication technology for livestock and poultry production in India– A review. Indian Journal of Animal Sciences 80 (12), 1235–1242.

United Nations Economic Commission for Africa (UNECA). (2008). E-Trade and Economic growth in Africa. ICT, Science, Technology Division United Nations Economic Commission for Africa. Addis Ababa, Ethiopia [Online] URL: www.uneca.org.

Wolfe, N.D., Dunavan C,P., and Diamond, J. (2007). Origins of major human infectious diseases. *Nature*; 447: 279–83.

Woolhouse, M.E., and Gowtage–Sequoias, S. (2005). Host range and emerging

and Re-emerging pathogens. *Emerging Infectious Diseases*.11, 1842–1847.