Journal of Veterinary Science & Medical Diagnosis

Review Article A SCITECHNOL JOURNAL

Review on Socio Economic Impact of Rift Valley Fever

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Received date: December 09, 2021; **Accepted date:** December 23, 2021; **Published date:** December 30, 2021

Abstract

The livestock sub-sector plays a vital role in national economy of many developed and developing countries. Rift valley fever is acute or per-acute arthropod born zoonotic disease of domestic ruminants. The disease predominantly confined to Africa and belongs to genus Phlebovirus, in family of Bunyaviridae. It a seasonal disease with higher occurrence during heavy rainfall seasons, which allows the vector population to breed and its appearance correlated with vectors density. For endemic area, diagnosis depends on epidemiology, clinical sign and microscopic lesion but confirmation of diagnosis made in the laboratory by using virus isolation or immunological tests are needed. RVF has a dramatic impact on producers and livestock industries, affecting public and animal health, food security and the livelihood of the pastoralist communities. RVF also has an impact on international trade and other agro-industries. The risk of introducing RVF into disease-free countries via the importation of an infected animal or mosquito is real, and the consequent restriction of access to export markets may induce dramatic economic consequences for national and local economies. Economic impacts of the ban are likely to be massive. Many of these outbreaks have been devastating to farming economies due to associated livestock losses and prohibited trade, especially in the pastoral areas where livestock are the major source of food and income. With high numbers of vector species present in disease-free regions, the intensification of international trade and effects of climate change, rift valley fever is now considered a major challenge in global zoonotic disease control. Therefore, epidemiological study to know the extent of the disease and provision of pre-exposure vaccine for highly risk groups as well as pre-export animal inspections are important control measures to be practiced.

Keywords: Socio-economic impact; Livestock; Rift Valley Fever

Introduction

The livestock sub-sector plays a vital role in national economy of many developed and developing countries. It profits the national gross domestic economy through benefits from cattle rearing, exporting of live animals and hide as well as skin; which all those earn huge amount of money for that country. However, many countries are not self-sufficient in livestock productions while livestock still remains an integral part of their national economy. The most important contribution and value of livestock's are: source of food, drought power, social and cultural assets, source of income and means of transportation. The proportion of livestock in Ethiopia remained the largest figure in Africa until recent time but levels of production are one of the lowest. Rift Valley Fever (RVF), also known as an enzootic hepatitis, is an acute febrile arthropod-borne disease of sheep, goats, cattle and humans present in most countries of sub-Saharan Africa. This disease is characterized by high mortality rates in young animals and abortion in pregnant ruminants. With the current threat of bioterrorism, it could appear in other part of the world. RVF is caused by a virus of genus Phlebovirus and of the family Bunyaviridae. More recent data indicate Aedes mosquito of sub-genera Aedimorphus and Neomelaniconion are the principal vectors [1].

Rift Valley Fever Virus (RVFV) was initially reported in rift valley of Kenya in 1931 but now exists and as epizootics throughout sub-Saharan Africa with recent extensions into Egypt and Madagascar, Mauritania and most recently extension to the Arabian Peninsula. Outbreak of the disease tend to occur unpredictably in eastern and southern Africa at interval of five or more years and are associated abnormally heavy rains a dramatic rise in vector population. In Ethiopia, during the same period, the heavy rain and the attendant flooding affected Southern and South Eastern parts of the country bordering Somalia and Kenya. Veterinary field investigation carried in Somali region, Afar region and Borena zone in February 1998 observed high level of unusual abortion among livestock. Out of the samples collected, two sera from small ruminants from Mustahil, just near the border with Somalia were found IgM positive to RVF. The presence of conducive ecological conditions in Ethiopia similar to that of the rest of the Horn of Africa would favor the establishment and spread of the virus and the occurrence of RVF epidemic in the lowland parts of the country (MOARD, 2008).In the Horn of Africa, pastoralism plays an important role in national economies. In particular, the export of livestock from the pastoral communities to the Middle East is of vital economic importance as millions of animals are imported each year, particularly during the religious festival periods. Export incomes can represent up to $300 million USD. Export orientation allowed for and was spurred by the turning of a subsistence transhumant system into a market-integrated ranch activity. Thus, pastoral wealth became the main national wealth. The livestock sector as a whole appears in these pastoralist countries as a major driver of macroeconomic variables, a source of considerable employment and foreign currency [2]. Depending upon the importance of the livestock sector, the socio-economic impacts of RVF can be considerable. One could expect these impacts to involve actors far beyond the strict livestock production sector. Due to the multiplicity of actors and the intricacy of the cultural, social and economic importance of the livestock sector, these impacts are also expected to be multidimensional in nature. Nevertheless, public policy tends to concentrate primarily on financial losses incurred by livestock producers and neglects downstream impacts and redistributive effects (e.g. overall loss of activity for butchers and slaughterhouses, especially for actors inside quarantine areas). Socio-economic impacts of a disease may include impacts of disease occurrence and of its management (control, prevention, surveillance). Such impacts can be related either to health resource mobilization (e.g. animal morbidity and/or mortality, disposal of carcasses, healthcare costs) or to non-health resources (e.g. reduction in butchers' activity due to reduction in meat market volumes) observed at different time scales and horizons as well as on different economic scales. The term 'impact' is

used here as it relates to a broader concept than costs. It also includes redistributive and structural effects on socio-economics, which may not be considered as costs (e.g. when players are forced out of the business by the disease or its control (or forced to diversify) and the market is later taken up by competitors). Considering the current zoonotic threat of RVF and the increasing risk of spread to a disease-free continent, there is a need for better understanding of the socio-economic impact of RVF to integrate it within the disease management and policy decision process.

Therefore, the objectives of this seminar paper are:-

- To review epidemiology and management of rift valley fever,
- To review socio-economic impacts of rift valley fever, and
- To highlight zoonotic importance of rift valley fever.

Socio-Economic Importance of Rift Valley Fever

Globally, the livestock sector plays an important role in the economies of many developing countries). About 800 million to 1 billion of the world's poor & landless derive their livelihoods from livestock activities (LID, 1999). Although livestock production plays important role in the economies of most nations, livestock remains vulnerable to disease. This disease sometimes results in outbreaks that vary in severity & magnitude of economic impact. Immediate impacts of a disease outbreak include a reduction in productive capacity of the animal & a subsequent reduction in in the supply of meat & meat products. According to MacInerney, the economic costs of a disease comprise two components: losses & expenditures. During a disease outbreak producers incur extra costs in mitigating the outbreak. Costs of an outbreak are generated mainly from three sources; surveillance, control, & eradication, losses of production, & loss of access to export markets. In addition to this there may be non-market impacts & costs to consider [3]. Hence, the economic impact of the disease can be categorized in to direct & indirect losses. Indirect losses include control costs, & loss of markets, as well as loss of production potential, i.e. production that could have been achieved had the rift valley fever outbreak not occurred. Direct impacts of animal disease at the farm level include increased mortality & morbidity, as well as reduced feed efficiency & lower average daily gain.

Impact of RVF on producers' livelihoods

The first reported direct socio-economic impact of RVF was on livestock producers due to high levels of mortality (between 50% and 100%) which affect their feed security and future income due to loss of future stock as a result of morbidity (e.g. abortions in 90–100% of cases) in animals. This represents an important loss of stock, especially in young ruminants In addition, the disturbance on herd dynamics could result in production losses lasting several years or even several animal generations (long-term effects). These effects are perceived over the long term and are subject to the combined influence of other economic mechanisms besides the strict herd dynamics. If the household economy is diversified enough, that is, if there are other activities or opportunities to generate income, the direct impact of RVF on livestock losses can be partly mitigated. Pastoral communities relying on a livestock economy are highly vulnerable to the threat of disease to their livestock such as RVF.The pastoralists become inability to achieve their daily demands, inability to obtain protein leading to malnutrition and monetary loss at individual level during control of the disease. Moreover, in the context of the Horn of Africa, pastoralists who represent 15–20 million people in Djibouti, Eritrea, Ethiopia, Kenya, Somalia and Sudan have turned to a market-integration and international trade orientation. This has led to new development opportunities but also to new economic threats, by increasing interdependence with the international economy. The livestock household that were affected by RVF in 2006–07 faced psychological distress associated with the disease. The psychological distress included loss of living confidence (fear of death), possibility of contracting the disease, possibility of losing animals as they depended on them, fear of eating meat and loss of livestock market due to legal restriction of livestock markets in and outside the country [4]. During focus group discussion, it was reported that, not only the diseased families who appeared to experience psychological problems, but many individuals which included livestock and non-livestock keepers. Psychological distress was reported during questionnaire survey to be more severe in families that had RVF in their households.

Impact of RVF on livestock industry

The impact of RVF on producers will have repercussions along the livestock value chain (production and market activities) and its ancillary services. Cumulatively, the impact on other service providers within the livestock supply chain and other parts of the larger economy can be greater than the impact of RVF at the farm level. The impacts may be short (<1 year) or long term (over 1 year) and qualitative (value chain restructuring) and/or quantitative (performances and socio-economic values). These impacts are partially due to changes in the value and quantity of animals on the market. RVF outbreaks may result in the enforcement of embargoes on the exportation of live animals and animal products, as imposed by international sanitary policies. Where the banned export sector has an important economic weight in national trade balance, the ban may significantly affect the national economy. Hence, the successive RVF related trade bans could impact the public treasury, the exchange rate of national currency and the price of imported goods. Beyond the livestock value chain, there may be spillover effects on other agricultural value chains (e.g. the importation of other agricultural products may be banned from the infected countries) as well as non-agricultural sectors, such as transportation or tourism.

Impact of the trading ban

In some countries (e.g. Somalia, Tanzania), taxation on livestock exports is the main source of government revenue. Livestock exports play a major role as a source of employment, income and foreign exchange. The export bans thus lead to decreasing livestock prices and worsening terms of trade, which further undermine pastoralist's purchasing power and livelihood. RVF outbreaks may result in the enforcement of embargoes on the exportation of live animals and animal products, as imposed by international sanitary policies. Where the banned export sector has an important economic weight in national trade balance, the ban may significantly affect the national economy. Hence, the successive RVF-related trade bans could impact the public treasury, the exchange rate of national currency and thus, the price of imported goods. The impact on livestock marketing is more severe during the major public religious feasts. During these periods, the risk of RVF infection increases because of a high density of animals and the religious practices. The cessation of exports will also lead to heavy livestock populations being kept locally, thus increasing the competition for grazing land and water resources. Oversupply of animals in the local market depresses prices and further reduces the income and purchasing power of livestock owners. With the increased

livestock herd, there will be an uncontrolled proliferation of berkads (water reservoirs) and an absence of water point management and maintenance. The proliferation of berkads resulted in increasing livestock population clustering into villages and converted the villages into all-year-round grazing areas, leading to over-grazing and environmental degradations. The lost livestock income also caused households to turn to wood-cutting and charcoal-making, accelerating the deforestation process. Many exporters were also forced out of the business while others diversified. The ban also forced more of the pastoral population into urban centers, increasing problems of urban poverty, unemployment, and destitution (human trafficking, piracy, joining armed groups and so on) particularly for those without supportive kinship networks. Expectedly, all illegal and legal livestock exports have fallen sharply as a result of the import ban in the secondary Middle Eastern markets. The ban on import by Middle Eastern countries has led to increased illegal sale of livestock through Somalia and Kenya, and to a lesser extent, through Sudan and Djibouti. This is another reason for the decline in official exports. Considerable economic loss in the marketing chain, foreign currency earnings and fiscal revenues for public local administrations resulted.

Impact of RVF on Public Health

Developing and transition countries are particularly at risk of zoonosis such as RVF. In 2006-2007 the outbreak that affected Sudan, Kenya, Somalia, and Tanzania led to over 900 human deaths in addition to substantial losses of livestock. The higher infection with RVF reported among male herders, and common risk factors were touching or disposing aborted fetuses or being exposed to mosquitoes. Other risk factors include consuming or handling products from sick animals, contact with livestock as herdsmen and handling of aborted fetuses, milking, skinning, slaughtering, sleeping with animals, touching blood, and caring for animals during birthing [5]. During a severe outbreak, a substantial number of human infections can occur inducing extensive implementation of disease treatment and control programs. Human deaths following RVF infections were first recorded during the epidemic of 1975 in South Africa when seven patients died of encephalitis and hemorrhagic fever associated with necrotic hepatitis [6]. In 1977–1978, a major RVF epidemic in Egypt resulted in 200,000 human cases and 600 fatalities. Twenty years later, a new epidemic affected over 500,000 persons in East Africa, among which 500 people died. From December 2006 to May 2007, RVF human cases were reported in Somalia (114 cases reported, 51 deaths), Kenya (684 cases reported, 155 deaths) and Tanzania (290 cases reported, 117 deaths).

Cross-sectorial costs linked to disease prevention, treatment and control measures

Control costs include the value of all resources used to manage the disease at household (treatment costs) and national level (disease prevention and control costs [7]. Several control measures are described: (i) control of livestock movements with respect to trade and export, (ii) vector control with an emphasis on larvicides in vector breeding sites or (iii) vaccination of livestock. The endemic status of the disease in countries with recurrent outbreaks may result in long-term financial investment and recurrent costs for disease control (e.g. animal vaccination and/or vector control) and surveillance, relying on sentinel herds, passive abortion reporting or mosquito trapping [8].

Conclusion and Recommendations

RVF is first recognized in Africa and has a great potential to spread to other continents and cause high lamb and calf mortality and abortion in adult animal and flue like disease in human. Besides the existing serological evidence of the disease in Ethiopia, the geographical proximity of the country to RVF endemic countries like Kenya, Sudan and Somalia, the nature of livestock movements across the international border and the ease with which infected mosquitoes can be moved longer distances by the help of wind lead to the conclusion that Ethiopia will always be vulnerable to clinical RVF during the epizootic periods in neighboring countries. RVF is economically important disease. In addition to its impact on animal health, the impact it results due to import and export restriction is significant particularly in those countries which livestock contributes great share in their economy. As rift valley fever needs insects, a mosquito, for its life cycle and transmission, its epidemics has cyclical occurrence. Immunization and vector control are the main strategies to reduce the incidence of RVF. It is considered as an occupational disease of livestock handlers, dairy farmers, abattoir workers and veterinarians.Therefore, based on the above conclusion the following recommendations are forwarded; Epidemiological study is required to know the extent of the disease. Provision of pre-exposure vaccine for highly risk groups and immunization of animals in enzootic areas should be practiced. Pre-export animal inspections should be instituted to proof absence of RVF virus activity in the areas from which animals are originated. In RVF- free countries the importation of all susceptible species should be prohibited. Barrier precautions (e.g., gloves and additional personal protective equipment) should be used whenever there is a possibility of contact with animals. Milk should be pasteurized or boiled, and all other animal tissues including blood and meat should be cooked, and not consumed raw.

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