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A Qualitative Investigation on Gender-Based Obstacles to Livestock Vaccine Adoption and its Impact on the Control of Rift Valley Fever

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Abstract

A transboundary zoonotic viral illness endemic to Africa, Rift Valley Fever (RVF) was brought to the attention of the world in 2016 due to reports of human mortality and animal miscarriages caused by the disease. The worldwide extent and possible repercussions of this viral danger are highlighted by the World Health Organization (WHO), which has reported instances not in Africa but also in China (2016) and France (2019). To provide vital facts on RVF in this position along with insights those are important for disaster planning in light of its possible spread. Address the Indian context, recognizing the need to maintain a global perspective and the need for increased awareness and readiness. Gender-based barriers to the uptake of livestock vaccines and their consequences for RVF management are the main topics of a qualitative study that is presented. Effective disease control techniques depend critically on an understanding of the sociocultural elements influencing vaccination acceptance. With this study, nations bordering impacted areas will be better prepared to take preventative action by gaining essential information. This paper strengthens awareness of the issues raised by RVF and highlights the significance of international collaboration in the fight against emerging infectious diseases by taking into the viewpoint of India and addressing barriers to vaccine use based on gender.

Keywords: *Rift Valley Fever (RVF), World Health Organization (WHO), Transboundary Zoonotic Viral, Disease*

1. Introduction

Animals are one of the main ways that Ugandans make a living, and 60% of smallholder farmers raise animals to sell or eat themselves. In 2018, the GDP (gross domestic product) included 4% of animal products. In the Karamojasub region, which is home to Uganda's biggest livestock herd, animals have important symbolic meanings (Acosta *et al.,* 2022). Women who raise animals usually have more small ruminants and chickens than big animals. Large ruminants are hard for women in poor countries to raise and graze because they don't have legal access to land for it. Smaller animals are also easier to physically restrain, informal ownership is possible, and they need less care (Gannaway *et al.,* 2022). Livestock are an important part of local, cultural, and economic life in rural places where poverty is common because they use resources that wouldn't be used otherwise. Goats have a relative edge because they give birth quickly and have more than one baby (Kyotos *et al.,* 2022). The effects of development projects will be better if we know more about how men and women interact in the home and what part livestock plays in rural households. Seventy to eighty percent of farm workers in Uganda are women, but at least a third of these women live in total poverty (Tukahirwa *et al.,* 2022). Kenya's poultry farming and production brings in 1.3 billion eggs and 25,000 tons of chicken meat each year, which are worth a total of KES 28.6 billion and make up 8% of the value of the country's agriculture business. In Kenya, many poor people make money and pass the time by raising chickens. It gives people nutrition from animals and money. Indigenous chickens can be found wherever people live, and their economic strength comes from how cheap they are to raise (Abdirahman *et al.,* 2023). Infectious diseases have killed more people than anything else throughout history. Even though the death rate from pandemics dropped by 0.8% per year the 20th century saw an over, 400% increase in the emergence of novel infectious illnesses such as Covid-19, Sars, and HIV/AIDS (Kohnert 2021). Gender studies of livestock value chains have helped us learn more about the roles and interactions of women and men in different livestock farming systems in low- and middle-income countries. Even though women's successes are important, studies show that society hides them and doesn't accept them. Tend to be involved in the profitable and well-connected activities and places (Serra *et al.,* 2022). Animals can help to save money, make money, and eat well. Women's control over cattle, especially small animals like small ruminants and fowl, has been shown to help women make a living, give them more power, and improve the nutrition of their families. So, helping women take care of their animals through interventions can make them more powerful and close gaps in equality (Omondi *et al.,* 2022).

2. Disease epidemiology

The infectious agent is a virus belonging to the Bunyaviridae family, specifically the genus Phlebovirus. RVF virus exhibits morphological and physicochemical features typical of bunya viruses, including a single serotype and a genome that is single-stranded negative-sense RNA. The RNA-dependent RNA polymerase is encoded by the large segment (L) of this tripartite molecule. The medium segment (M) is responsible for encoding a non-structural protein called NSM as well as two important envelope glycoproteins called GN and GC (Wichgers Schreur *et al.,* 2021). In order to encode a protein called nucleocapsid in addition to the interferon antagonist NSs, the S-segment employs an ambisense approach. Eastern Africa, Saudi Arabia, Western Africa, Northern Africa, Southern Africa, and Yemen are all areas where the illness is endemic. It was reported that the virus and serologic clues were isolated seldom in several Middle and South African nations. It is believed that livestock may multiply human illnesses or store them for later use. In this manner, diseases that start in animals on farms might spread to people are shown in Figure 1. From January 2019 to August 2019, a total of 129 RVF cases were recorded in Mayotte, France, affecting both humans and animals (Nielsen *et al.,* 2020). While the documented death rates for human cases are typically modest, they may reach 20% to 40%.

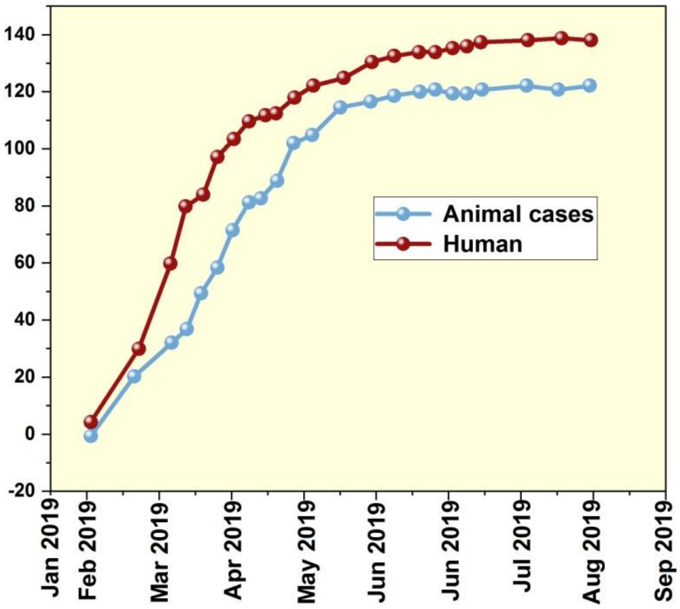

Figure 1: Range-wise RVF affected Animals and Human cases

(**Source**: https://core.ac.uk/download/pdf/333605189.pdf)

In August 2016, the World Health Organisation (WHO) received complaints of unrecognized human fatalities, as well as cattle deaths and abortions in the northwestern regions of Niger, which border Mali. The RVF illness reports in people and animals from 2010 to 2020 additionally, four instances of RVF in humans were recorded in South Africa in 2018 (Jansen van Vuren *et al.,* 2018). The region is inhabited by nomadic stockbreeders. Farmers and animal breeders tend to be male. During the same period, there was an epidemic in the same region affecting small ruminants and cattle, leading to miscarriages and fatalities. It is impossible to stop the virus from spreading an epidemic form along migratory routes in Niger and the surrounding nations. A possible expansion of the virus to the Americas and Europe was a major worry when outbreaks occurred outside of Africa. The transhumance patterns and densely inhabited places by animals enhance the likelihood of global dissemination. Pakistan and India's riverine delta systems might be RVF expansion zones, although they're not as vulnerable as the aforementioned locations due to their distance from enzootic zones, dominant wind current, and animal commerce. Table 1 shows the RVF cases and deaths in African countries.

Table 1: *RVF cases and deaths*

(**Source**: Author)

Wilaya (Region)	**Deaths**	**Confirmed RVF Cases**
Hodh El Gharbi	7	13
Hodh Echargui	4	12
Adrar	3	9

Assaba	2	4
Tagant	2	3
Nouakchott Nord	2	2
Nouakchott Ouest	1	2
Dakhlet Nouadhibou	1	1
Nouakchott Sud	1	1
Total	23	47

3. Infected Animals

Among many animal species impacted by RVF, camels, goats, cattle, and sheep have the highest prevalence. When contrasted with their European counterparts, native African cow breeds have much higher resistance to RVF. Although antibodies to RVF have been discovered, the Asian water buffalo, Bubalusbubalis, appears to be quite resilient. A much-reduced frequency of abortions occurs in buffalo herds that interact with cattle that have high rates of abortion induced by RVF (Vlasova *et al.,* 2020). The RVF infection in horses is not immediately noticeable. Antibodies are produced during a brief period of viremia. Neither pigs nor birds will be impacted. Although pigs are not particularly vulnerable, they may develop viremia after a parenteral injection of RVF at a high titer. Even though it's lower than small ruminants, the fact that 9.8% of horses in Nigeria tested positive for RVFV antibodies raises the possibility that horses play a role in the virus's transmission cycle. Table 2 shows the infected RVF animals.

Table 2: *RVF-infected animals*

(**Source**: Author)

Species	**No negative**	**Percentage positive**	**No positive**	**Total tested**
African buffalo	202	15.8	38	240
Black rhino	30	32.7	15	50
Warthog	80	2.6	3	82
Elephant	79	6.6	6	85
Giraffe	82	1	1	83

Common zebra	110	1.3	2	120
Eland	9	1	1	9
Kongomi	11	1	1	11
Lion	35	1	1	35
Leopard	2	1	1	2
Thomson's gazelle	2	87.6	8	9
Impala	4	62.6	6	9
Lesser kudu	6	50	6	11
Waterbuck	9	20.1	3	11
Total	661	295.2	91	757

4. RVF Virus infection in human

In humans, an RVFV infection resolves on its own. Tragically, it may progress to a life-threatening hemorrhage. Infected pregnant women are at increased risk for obstetric problems and infections in their newborns. It is possible to handle RVFV in a biosafety level-3 laboratory since the virus has the potential to produce illnesses that might be fatal. Possible difficulties with diagnosis and transmission may arise due to the lack of such infrastructure in endemic locations. Loop-mediated isothermal amplification (LAMP) enzyme-linked immunosorbent assay (ELISA) Routine RT-PCR, and next-generation sequencing (NGS) of clinical specimens may be used to diagnose RVF in people, according to the WHO (Ortiz-Prado *et al.,* 2019). Fever, headache, and arthritis were the most prevalent symptoms among those who tested positive for the virus.

Infected mosquito bites may transmit RVFV to humans, alongside other insects that bite whose mouthparts are infected with viruses can also infect people, albeit less often. Direct contact with diseased animals' blood, bodily fluids, or tissues during slaughter or treatment may infect humans. The laboratory has been infected with the RVF virus by aerosol transmission. There has been no evidence of transfer from humans to humans. When it comes to mosquitoes, the RVF virus is transmitted by Culex and Aedes species. The cycles of RVFV transmission are affected by the prevalent mosquito species, which differs by area. It seems that environmental conditions, particularly rainfall, provide a substantial danger for epidemics, also known as epizootics are shown in Figure 2. There have been reports of human breakouts in locations that had excessive rainfall or flooding. Vertical transmission of the RVF virus from a mother mosquito to her eggs allows the virus to survive for several years in dry environments. Intense precipitation increases the likelihood of mosquito egg hatching, which in turn increases the likelihood of virus transmission to both people and other animals. Epizootics raise the stakes for those who come into contact with infectious diseases.

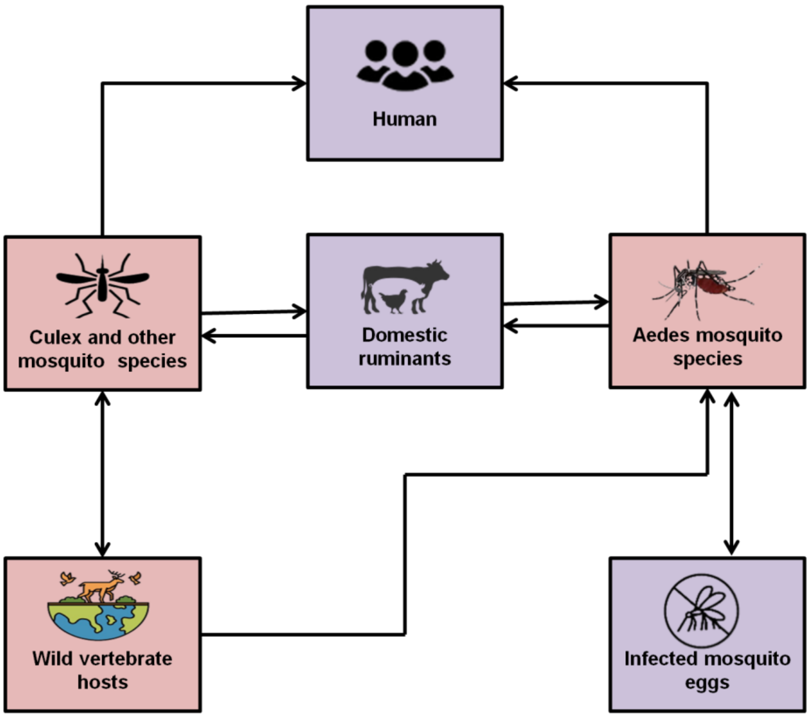

Figure 2: Lifecycle RVF

(**Source**: https://www.researchgate.net/figure/Cycle-of-Rift-Valley-fever-The-virus-can-be-maintained-in-an-enzootic-cycle-involving_fig3_267739572)

5. Symptoms of RVF-affected human

The majority of infected individuals get simple RVF. Symptoms such as headaches and body pains appear out of nowhere, within three to five days, a fever sets up. Additional systemic symptoms may manifest as nausea, vomiting, anorexia, weakness, nosebleeds, profuse perspiration, constipation, and severe muscular and joint aches. Some people get a biphasic fever. Severe headaches, back and limb joint pain, and weakness are typical symptoms of simple RVF, which may last for a week or more but are not fatal (Mohapatra *et al.,* 2023). Blood chemistry and whole blood count clinical test readings are usually in normal levels. A few weeks may pass during convalescence in some people.

Rarely do people get severe systemic illness (about 1-2 percent of all cases). Liver damage and viral replication are hallmarks of severe RVF illness in humans, as they are in animals. In addition to the usual fever and body pains associated with RVF, patients may have jaundice and potentially hemorrhagic symptoms such as blood in urine or feces, blood vomiting, a purple rash on the skin, and bleeding gums. Historically, this symptom has been primarily associated with RVF due to shared characteristics with Ebola hemorrhagic fever (Rahman *et al.,* 2023). Prolonged blood coagulation times, reduced platelets, and excessively high levels of alanine transaminase (ALT) and aspartate transaminase (AST) are symptoms of severe RVF in patients.

While some people with severe systemic RVF have headaches and delirium as part of the acute illness, significant neurological abnormalities might start days or weeks after the first symptoms go away. Potential neurological side effects in RVF patients include disorientation, vertigo, excessive salivation, weakness, and/or paralysis, as well as hallucinations (Kalyanaraman *et al.,* 2023). Individuals with hemiparesis may not fully recover many months after sickness, and pleocytosis of the cerebrospinal fluid (CSF) is prevalent. Decelerate posture is linked with individuals who ultimately die from the condition.

6. Clinical Results

It is challenging to identify particular instances of RVF in animals due to its non-specific clinical symptoms. Lambs have a 12-36-hour incubation phase during which they experience belly discomfort, unwillingness, anorexia, listlessness, and a biphasic temperature (up to 42°C). In calves, icterus is a typical sign. 90%-100% of newborn lambs and 70% of calves die, whereas mature sheep and cattle have mortality rates of 10%-30% and 5%-10%, respectively. Adult animals are incubated for 24-72 hours (Anywaine *et al.,* 2022). The majorities of clinical symptoms in adult animals are non-apparent and include abortion, dysgalactia, lacrimal discharge, fever, diarrhea, and nasal discharge. Primarily, RVF is a zoonotic illness. Since the hepatic tissue is the main location of viral replication, infected individuals either exhibit obvious mild sickness with liver abnormalities or fever. After the disease begins, most people recover in two to one week. Encephalitis, severe hepatic lesions, or ocular lesions with hemorrhages have been reported in severe instances in both people and animals. The frequent side effect of RVF is retinal inflammation, which causes irreversible vision loss in between 1% and 10% of afflicted people (Kwaśnik *et al .,* 2021).

7. RVF Diagnosis

While there are no particular symptoms of RVF, the high number of miscarriages and deaths in young animals, as well as the influenza-like illness in people, point to the disease. As discussed before, the clinical disease's severity differs among animals and age groups. Wesselsbron disease, bluetongue sheep enterotoxemia, fever on the skin, Vibriosis, Brucellosis, Trichomonas, Nairobi sheep disease Heartwater enzootic abortion in cows harmful plants, Asthma caused by bacteria, Rinderpest, Peste des petits ruminants, Anthrax, and other similar diseases should be distinguished from RVF (Petrova *et al.,* 2021). Tests for antigen identification in postmortem tissues from infected animals include ELISA and PCR, while viral isolation may be used to identify the virus in blood during the early stages of sickness. ELISA can identify RVF-specific IgM antibodies at their early, transitory stage as well as IgG antibodies at a later stage, as the latter may be detected for years. Among the tests listed in the literature for RVF diagnosis are those neutralize viruses and those impede hemoglobination (Kitandwe *et al.,* 2022).

8. Monitoring and Treatment

Symptomatic and supportive care is advised in the absence of a particular therapy for RVF. Controlling the flow of infected animals is an important step in halting the disease's spread, as are the precautions taken at slaughterhouses, such as keeping mosquito populations down. In the midst of an epidemic, however, hygienic prophylaxis and vector control may not be enough. Live-attenuated mutant vaccinations, inactivated viruses, or attenuated viruses are the options for animal vaccinations (Waqar *et al.,* 2023). Research and development of the vaccine for human usage is ongoing. Veterinarians and public health officials in charge of human and animal populations must be vigilant in their search for RVF cases to provide early warnings and be ready for emergencies.

9. Vaccine for RVF

The majorities of RVF instances in humans are minor, short-lived, and may even heal on their own. However, for more severe cases, it is recommended to undergo general supportive care. To safeguard laboratory personnel and domesticated animals that are particularly vulnerable to RVF exposure, a recently produced inactivated viral vaccine is being sought after for licensing and commercialization. In order to prevent RVF in Uganda, the first vaccination was created using an isolated mosquito strain called NDBR103 Entebbe, which had been inactivated using formalin. It is common practice to inactivate RVF vaccines for veterinary usage using formalin or ethyleneamine (Alkan *et al.,* 2023). Using Ugandan Eretmapodites spp., the most popular and long-running live-attenuated Smithburn vaccine started in 1944. Due to its several drawbacks, live attenuated vaccinations are not allowed in areas where the virus is not present or in pregnant women. Therefore, no vaccination is permitted for human use in the European Union. The United States Army Medical Research Institute of Infectious Diseases (USAMRIID) developed a new formalin-inactivated vaccination called TSI-GSD200. The USAMRIID produced an additional live attenuated MP-12 that can defend against RVF by generating enough antibodies for both human and animal usage. It may help pregnant animals by shielding the baby from harm. Subunit protein, DNA, and additional vaccination types that use cutting-edge technology include virus-like particles, genetically engineered live vaccines, virus-replicon particles, and virus vectored immunizations.

11. Managing Risks

"Focusing the sampling on high-risk populations in which specific, known risk factor exists" should be the goal of targeted surveillance system development. In addition, studying epidemiological data, early warning systems for animal illnesses, and keeping an eye on mosquitoes and other natural reservoirs might all contribute to disease monitoring. One potential use for sentinel animal monitoring is as a kind of early warning system. Distinct from the target species are sentinel species. The first order of business is to locate areas that were previously free of a disease or its vector, and then to identify any reemergence of the illness. Active surveillance may be carried out using the innovative technique of satellite remote sensing. Preventing the introduction of a disease is easier and more cost-effective than controlling and eliminating an existing infection (Javelle *et al.,* 2020). The Livestock Importation Act of 1898, as revised in 2001, and the World Trade Organization's (WTO, 1994) Sanitary and Phytosanitary Standards provide the procedures via which the introduction of foreign animal illnesses into India is confirmed by Animal Quarantine and Certification Services (AQCS). It was determined that there was no danger of transmission of RVF obtained at a hospital during the research. Factors that should be considered when assessing risk include geographical distribution, wind velocity, knowledge about diseases in neighboring countries, introgression history inside the nation, and protocol for quarantine. Predicting RVFs and risk profiling would be made simpler before animals are permitted to travel to India, illness testing should be integrated into animal quarantine stations through regional research on vector prevalence and risk assessment.

12. Conclusion

The knowledge and cooperative approach are required to limit the effect of RVF, a worldwide danger. The importance of global preparation is highlighted by the WHO findings of RVF cases in Africa, China, and France. Taking a global view and acknowledging the virus's possible transboundary characteristics are essential as India struggles with the need for disaster preparation. A crucial component of managing RVFs is clarified by the qualitative research that addresses gender-based obstacles to livestock vaccination adoption. Effective disease control efforts must take into account the sociocultural elements that influence vaccine acceptability. This research highlights the critical role that India plays in international cooperation in the fight against new infectious diseases. Through the acquisition of critical knowledge from this study, countries especially those next to impacted areas can better equip themselves to navigate the intricacies of the RVF. The key to reducing the effects of RVF and other zoonotic illnesses is increased preparation, awareness, and proactive interventions. Countries may strengthen their resilience and support international efforts to protect public health by recognizing gender-based hurdles and encouraging inclusion in vaccination programs. This study highlights the need to take a unified stance against newly developing infectious illnesses and the vital role that international cooperation plays in preserving the security of global health.

References

Abdirahman, F.A., Wahome, R.G., Kaluwa, C., Oduma, J., Nkatha, J.J., Adhiambo, A., Kyotos, K.B., Bagnol, B., Rosenbaum, M. and Amuguni, J.H., (2023). GENDER BARRIERS AND OPPORTUNITIES ALONG THE NEWCASTLE DISEASE VACCINE VALUE CHAIN IN MACHAKOS TOWN SUB-COUNTY, KENYA. Tropical and Subtropical Agroecosystems, 26(1).

Acosta, D., Ludgate, N., McKune, S.L. and Russo, S., (2022). Who Has Access to Livestock Vaccines? Using the social-ecological model and intersectionality frameworks to identify the social barriers to Peste des Petitsruminants vaccines in Karamoja, Uganda. Frontiers in Veterinary Science, 9, p.831752.

Alkan, C., Jurado-Cobena, E. and Ikegami, T., (2023). Advancements in Rift Valley fever vaccines: a historical overview and prospects for next generation candidates. npj Vaccines, 8(1), p.171.

Anywaine, Z., Lule, S.A., Hansen, C., Warimwe, G. and Elliott, A., (2022). Clinical manifestations of Rift Valley fever in humans: Systematic review and meta-analysis. PLoS neglected tropical diseases, 16(3), p.e0010233.

EFSA Panel on Animal Health and Welfare (AHAW), Nielsen, S.S., Alvarez, J., Bicout, D.J., Calistri, P., Depner, K., Drewe, J.A., Garin-Bastuji, B., Gonzales Rojas, J.L., Gortázar Schmidt, C. and Michel, V., (2020). Rift Valley Fever: risk of persistence, spread and impact in Mayotte (France). EFSA Journal, 18(4), p.e06093.

Gannaway, T., Majyambere, D., Kabarungi, M., Mukamana, L., Niyitanga, F., Schurer, J., Miller, B. and Amuguni, H., (2022). Using outcome mapping to mobilize critical stakeholders for a gender-responsive Rift Valley Fever and Newcastle Disease Vaccine Value Chain in Rwanda. Frontiers in Global Women's Health, 3, p.732292.

Jansen van Vuren, P., Kgaladi, J., Patharoo, V., Ohaebosim, P., Msimang, V., Nyokong, B. and Paweska, J.T., (2018). Human cases of Rift Valley fever in South Africa, (2018). Vector-Borne and Zoonotic Diseases, 18(12), pp.713-715.

Javelle, E., Lesueur, A., Pommier de Santi, V., de Laval, F., Lefebvre, T., Holweck, G., Durand, G.A., Leparc-Goffart, I., Texier, G. and Simon, F., (2020). The challenging management of Rift Valley Fever in humans: literature review of the clinical disease and algorithm proposal. Annals of Clinical Microbiology and Antimicrobials, 19(1), pp.1-18.

Kalyanaraman, A., Preethi, L. and Bhukya, P.L., (2023). An Imminence to Humans and Animals: The Rift Valley Fever Virus. In Emerging Human Viral Diseases, Volume I: Respiratory and Haemorrhagic Fever (pp. 419-442). Singapore: Springer Nature Singapore.

Kitandwe, P.K., McKay, P.F., Kaleebu, P. and Shattock, R.J., (2022). An overview of Rift Valley fever vaccine development strategies. Vaccines, 10(11), p.1794.

Kohnert, D., (2021). On the socio-economic impact of pandemics in Africa-Lessons learned from COVID-19, Trypanosomiasis, HIV, Yellow Fever, and Cholera. Trypanosomiasis, HIV, Yellow Fever, and Cholera (May 6, 2021).

Kwaśnik, M., Rożek, W. and Rola, J., (2021). Rift Valley fever–a growing threat to humans and animals. Journal of veterinary research, 65(1), pp.7-14.

Kyotos, K.B., Oduma, J., Wahome, R.G., Kaluwa, C., Abdirahman, F.A., Opondoh, A., Mbobua, J.N., Muchibi, J., Bagnol, B., Stanley, M. and Rosenbaum, M., (2022). Gendered barriers and opportunities for women smallholder farmers in the contagious caprine Pleuropneumonia vaccine value chain in Kenya. Animals, 12(8), p.1026.

Mohapatra, R.K., Kutikuppala, L.V., Kandi, V., Mishra, S., Rabaan, A.A., Costa, S., Al-qaim, Z.H., Padhi, B.K. and Sah, R., (2023). Rift valley fever (RVF) viral zoonotic disease steadily circulates in the Mauritanian animals and humans: A narrative review. Health Science Reports, 6(7), p.e1384.

Omondi, I., Galiè, A., Teufel, N., Loriba, A., Kariuki, E. and Baltenweck, I., (2022). Women's Empowerment and Livestock Vaccination: Evidence from Peste des Petits Ruminants Vaccination Interventions in Northern Ghana. Animals, 12(6), p.717.

Ortiz-Prado, E., Simbaña-Rivera, K., Gómez-Barreno, L., Rubio-Neira, M., Guaman, L.P., Kyriakidis, N.C., Muslin, C., Jaramillo, A.M.G., Barba-Ostria, C., Cevallos-Robalino, D. and Sanches-SanMiguel, H., (2020). Clinical, molecular, and epidemiological characterization of the SARS-CoV-2 virus and the Coronavirus Disease 2019 (COVID-19), a comprehensive literature review. Diagnostic microbiology and infectious disease, 98(1), p.115094.

Petrova, V., Kristiansen, P., Norheim, G. and Yimer, S.A., (2020). Rift valley fever: Diagnostic challenges and investment needs for vaccine development. BMJ Global Health, 5(8).

Rahman, M.M., Islam, M.R. and Dhar, P.S., (2023). Recent re-emergence of Rift Valley fever: epidemiology, clinical characteristics, transmission, symptoms, diagnosis, prevention, and treatment. International Journal of Surgery, 109(2), pp.117-119.

Serra, R., Ludgate, N., FiorilloDowhaniuk, K., McKune, S.L. and Russo, S., (2022). Beyond the gender of the livestock holder: learnings from intersectional analyses of PPR vaccine value chains in Nepal, Senegal, and Uganda. Animals, 12(3), p.241.

Tukahirwa, L., Mugisha, A., Kyewalabye, E., Nsibirano, R., Kabahango, P., Kusiimakwe, D., Mugabi, K., Bikaako, W., Miller, B., Bagnol, B. and Yawe, A., (2022). Women smallholder farmers' engagement in the vaccine chain in Sembabule District, Uganda: Barriers and Opportunities. Development in Practice, pp.1-18.

Vlasova, A.N., Deol, P., Sircar, S., Ghosh, S., Jakab, S., Bányai, K., Dhama, K., Amimo, J.O., Saif, L.J. and Malik, Y.S., (2020). Animal rotaviruses. Animal-Origin Viral Zoonoses, pp.163-202.

Waqar, M.A., Qureshi, A., Ahsan, A., Sadaqat, S., Zulfiqar, H., Razaq, A., Sandhu, M., Ashfaq, A., Pervaiz, T. and Ilyas, D., (2023). Epidemiology, Clinical Manifestations, Treatment Approaches and Future Perspectives of Rift Valley Fever: Epidemiology of Rift Valley Fever. Pakistan Journal of Health Sciences, pp.02-08.

Wichgers Schreur, P.J., Oymans, J., Kant, J., van de Water, S., Kollár, A., Dehon, Y., Soós, P., Pénzes, Z., van Keulen, L. and Kortekaas, J., (2021). A single vaccination with four-segmented rift valley fever virus prevents vertical transmission of the wild-type virus in pregnant ewes. npj Vaccines, 6(1), p.8.

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