THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
Popular article
June, 2026 Vol.6(6), 1820-1825

From Farm To Fever: The Hantavirus Risk To Farmers

***Kimneineng Vaiphei[1], Kevineinuo Kiewhuo[2], Iarisa Umdor[3]**
[1] M.V.Sc Scholar, Department of Veterinary Pathology, C.V.Sc & A.H, Kamdhenu University, Junagadh, Gujarat.
[2] M.V.Sc Scholar, Department of Veterinary Physiology and Biochemistry, C.V.Sc & A.H, Central Agriculture University, Selesih, Aizawl.
[3] M.V.Sc Scholar, Department of Veterinary Public Health and Epidemiology, C.V.Sc & A.H, Assam Veterinary and Fishery University, Khanapara, Assam.
*Corresponding author's mail: ***Kimneinengvaiphei669@gmail.com***
https://doi.org/10.5281/zenodo.21261318

Abstract

Farmers play a vital role in food production but are frequently exposed to zoonotic diseases, including Hantavirus infection, an emerging rodent-borne disease of growing public health concern. Hantaviruses persist in wild rodents and are transmitted mainly through inhalation of aerosolised particles contaminated with rodent urine, droppings, or saliva. Farming activities such as cleaning barns, handling stored grain, working in livestock facilities, and operating in rodent-infested environments increase the risk of exposure. Environmental and climatic changes that affect rodent populations may further promote disease transmission. Prevention relies on effective rodent control, environmental sanitation, safe cleaning practices, the use of personal protective equipment, and increased awareness among high-risk groups. A One Health approach involving the veterinary, environmental, and public health sectors is essential to protect farming communities from this emerging zoonotic threat.

Introduction

Diseases that spread naturally from animals to humans, known as zoonoses, continue to threaten global health and account for a large proportion of existing and emerging infectious diseases worldwide (Jones *et al.*, 2008). Hantaviruses are a group of zoonotic pathogens primarily carried by rodents. They first came to scientific attention during the Korean War (1950–1953), when thousands of soldiers developed a serious illness characterised by fever and kidney damage. Later in 1976, Korean virologist Lee Ho Wang identified the causative virus in striped field mice near the Hantan River, leading to the discovery of the Hantaan virus and the naming of the Hantavirus family (Lee *et al*., 1978).

Hantaviruses are enveloped, negative-stranded RNA genome (Vaheri *et al*., 2013). They belong to the genus Orthohantavirus within the family Hantaviridae and the order Bunyavirales (Laenen *et al*., 2019). Although rodents are the primary natural reservoirs, certain Hantavirus species have also been detected in shrews and bats. The family Hantaviridae comprises seven genera and more than 50 recognised species. These viruses are widely distributed across Asia (Hantaan virus, Seoul virus), Europe (Puumala and Dobrava-Belgrade), Africa (Sangassou virus), North America (Sin Nombre virus), and South America (Andes virus), causing an estimated 10,000–100,000 human infections each year.

How Hantavirus Spreads: Understanding the Routes of Infection

Humans contract Hantavirus when they come into contact with environments contaminated by infected rodents. Activities such as sweeping rodent-infested barns, cleaning storage sheds, working in fields or forests, and participating in military or outdoor activities in endemic regions can increase the risk of exposure. The virus is most commonly acquired by inhaling tiny airborne particles generated by contaminated rodent urine, droppings, or saliva. Direct contact with rodents through bites or scratches can facilitate

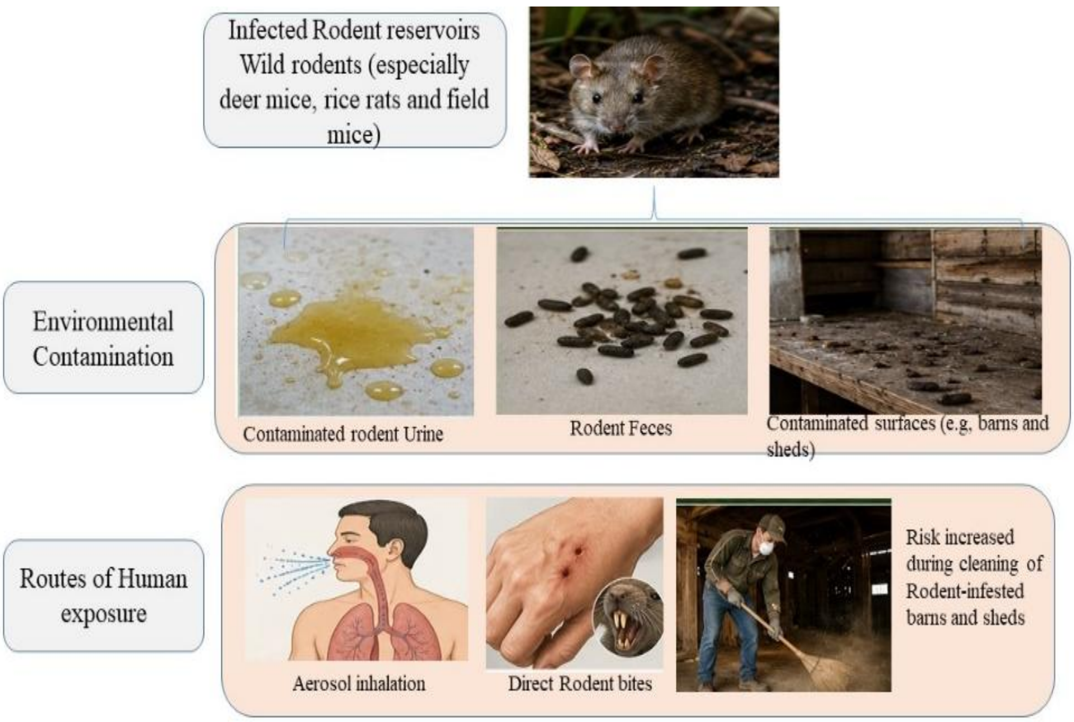

Figure 1. Major routes of Hantavirus transmission from infected rodent reservoirs to humans

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 30/06/2026

the spread of viruses to humans. Contact with contaminated surfaces may also contribute to infection. Fortunately, person-to-person transmission is exceedingly rare and has only been reliably reported with the Andes virus in South America.

When Infection Strikes: Signs and Symptoms of Hantavirus Disease

Human Hantavirus infections are primarily associated with two major disease syndromes:

- Hantavirus Pulmonary Syndrome (HPS), also known as Hantavirus Cardiopulmonary Syndrome (HCPS). It is characterised by widespread capillary leakage affecting the lungs and cardiovascular system. Patients typically develop fever, followed by cough, shortness of breath, pulmonary oedema and, in severe cases, circulatory shock. Despite advances in supportive treatment, HPS remains a serious disease, with reported fatality rates of approximately 30–60%.
- Haemorrhagic Fever with Renal Syndrome (HFRS). HFRS primarily affects the kidneys and is characterised by manifestations such as acute kidney injury, reduced urine output, protein loss in urine, thrombocytopenia, and increased vascular permeability. Disease severity and mortality vary among Hantavirus species, with fatality rates generally ranging from less than 1% to 5–15%.

Despite causing distinct disease syndromes, both HPS and HFRS usually begin with a similar incubation period of 1 to 8 weeks and flu-like symptoms such as fever, chills, headache, muscle pain, and digestive upset. As the infection advances, the disease affects different organs. HPS primarily targets the lungs, often leading to severe breathing difficulties and fluid accumulation, whereas HFRS mainly damages the kidneys, resulting in reduced renal function. Blood tests commonly reveal low platelet counts and evidence of fluid imbalance. Severe cases require intensive medical care, ranging from dialysis for kidney failure in HFRS to ventilatory support.

Why Farmers Are at Risk: Hantavirus in the Workplace

Rodents infected with Hantaviruses shed the virus through their urine, saliva, and faeces, contaminating environments such as feed stores, barns, grain silos, bedding materials, and poorly ventilated livestock housing. People whose work or traditional practices bring them into close contact with rodents face a greater risk of exposure. In Tamil Nadu, a survey of 99 asymptomatic Irula tribal rat catchers found antibodies against Hantaviruses, indicating previous exposure and underscoring the need for improved surveillance and awareness among vulnerable communities.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

Published 30/06/2026

People working in agriculture, animal husbandry and forestry are more likely to be exposed to Hantaviruses than the general population. A meta-analysis of 42 studies found that farmers and forestry workers were 2–3 times more likely to have Hantavirus antibodies, with a seroprevalence of approximately 3.7–3.8%. Higher exposure rates have been reported in specific occupational groups, including farm and abattoir workers in Trinidad and Tobago (11.4%), farm workers and veterinarians in South Africa (11.6%), and wildlife farmers in Vietnam (8.7%) who regularly handle animals such as bamboo rats, bats, civets, and wild boar. Overall, seroprevalence among workers in high-risk environments generally ranges from 3% to 12%, highlighting the increased risk where human activities overlap with rodent habitats.

Climate, Rodents, and Disease: The Environmental Connection

Changes in weather and climate play an important role in Hantavirus transmission by altering rodent numbers and movement patterns. Periods of heavy rainfall and warmer temperatures often create favourable conditions for rodent population growth, increasing the likelihood of contact with people. In contrast, drought or environmental disturbances may drive rodents closer to homes and farms in search of food and shelter, further increasing the risk of infection.

The 1993 Hantavirus outbreak in the United States is widely regarded as a classic example of how climatic factors can influence the emergence of zoonotic diseases. Increased rainfall after a severe, prolonged drought linked to the 1991–1992 El Niño event promoted abundant vegetation growth, providing favourable conditions for a rapid rise in deer mouse populations (Yates *et al*., 2002). The resulting increase in human–rodent interactions contributed to greater Hantavirus transmission (Engelthaler *et al.*, 1999). Similar environmental conditions have been associated with later outbreaks in South America, including Andes virus outbreaks reported in Argentina.

Stopping the Spread: Prevention through One Health Lens

Hantavax, a vaccine used in China and the Republic of Korea, protects against the Hantaan (Hantaan River) virus and Seoul virus but does not safeguard against other Hantaviruses found in Europe. No approved vaccines are available for the Andes virus or for most Hantavirus species. Multiple types of Hantavirus vaccines have been investigated under experimental laboratory conditions. The main ways to lower the risk of Hantavirus infection are:

- Controlling rodent populations and preventing their entry into buildings by sealing cracks, holes, and other access points in barns, animal housing, and storage facilities.
- Maintaining good environmental hygiene through proper waste disposal and regular cleaning of farm premises to discourage rodent infestation.
- Protecting feed and water sources by storing feed in rodent-proof containers and preventing contamination of livestock water supplies.
- Adopting safe cleaning practices. Areas contaminated with rodent urine, saliva, or droppings should be moistened with a disinfectant solution before cleaning. Dry sweeping should be avoided as it can generate infectious aerosols.
- Using personal protective equipment (PPE), including gloves and N95-equivalent respirators, when working in heavily rodent-infested environments or handling potentially contaminated materials.
- Promoting awareness and surveillance among farmers, veterinarians, and other high-risk groups to facilitate early detection and timely implementation of preventive measures.

Conclusion

Although common livestock species such as cattle, sheep, and goats are not significant reservoirs of Hantavirus, the infection remains an important occupational hazard in agricultural settings due to repeated exposure to rodent-contaminated environments. Farms, feed stores, stables, and wildlife operations create conditions conducive to rodent–human contact. Effective rodent control, environmental sanitation, secure feed storage, and appropriate personal protective measures are essential to protect agricultural workers. A coordinated One Health strategy that integrates veterinary, environmental, and public health actions is critical to mitigating this under-recognised zoonotic threat.

References:

Engelthaler, D. M., Mosley, D. G., Cheek, J. E., Levy, C. E., Komatsu, K. K., Ettestad, P., Davis, T., Tanda, D. T., Miller, L., Frampton, J. W., Porter, R., & Bryan, R. T. (1999). Climatic and environmental patterns associated with hantavirus pulmonary syndrome, Four Corners region, United States. *Emerging Infectious Diseases, 5*(1), 87–94.

Jones, K. E., Patel, N. G., Levy, M. A., Storeygard, A., Balk, D., Gittleman, J. L., & Daszak, P. (2008). Global trends in emerging infectious diseases. *Nature, 451*(7181), 990–993.

Laenen, Lies, Vergote, Valentijn, Calisher, Charles H., Klempa, Boris, Klingström, Jonas, Kuhn, Jens H., & Maes, Piet. (2019). Hantaviridae: Current classification and future perspectives. *Viruses, 11*(9), 788.

Lee, H. W., Lee, P. W., & Johnson, K. M. (1978). Isolation of the etiologic agent of Korean hemorrhagic fever. *The Journal of Infectious Diseases, 137*(3), 298–308.

Vaheri, Antti, Strandin, Tomas, Hepojoki, Jussi, Sironen, Tarja, Henttonen, Heikki, Mäkelä, Satu, & Mustonen, Jukka. (2013). *Uncovering the mysteries of hantavirus infections. Nature Reviews Microbiology*, *11*(8), 539–550.

Yates, T. L., Mills, J. N., Parmenter, C. A., Ksiazek, T. G., Parmenter, R. R., Vande Castle, J. R., Calisher, C. H., Nichol, S. T., Abbott, K. D., Young, J. C., Morrison, M. L., Beaty, B. J., Dunnum, J. L., Baker, R. J., Salazar-Bravo, J., & Peters, C. J. (2002). The ecology and evolutionary history of an emergent disease: Hantavirus pulmonary syndrome. *BioScience, 52*(11), 989–998.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

Published 30/06/2026