

Sharing burdens, increasing impact with robust vaccine cold chains

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Minaxmi Sarkar, supported farmer under the Feed
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Vaccination is one of the most effective tools for preventing infectious diseases in both humans and animals. Safe and effective vaccines reduce mortality, improve productivity and protect communities from zoonotic diseases that can cross species barriers. However, the success of vaccination programs depends not only on the quality of vaccines produced but also on how they are stored, transported and handled. When vaccines are exposed to temperatures outside their recommended range, their potency can decline, leading to a failure to generate adequate immune protection. Such failures can erode public trust when vaccinated individuals, both human or animal, still fall ill with the targeted disease.

Maintaining vaccines within the correct temperature range from the point of manufacture to administration is therefore critical. The temperature-controlled system that preserves vaccine potency along the travel route is known as the **cold chain**. A robust cold chain ensures that vaccines remain active and efficacious until their expiry date, forming the backbone of successful immunisation and vaccination programs.

Public health systems worldwide devote substantial resources to building and maintaining cold chain infrastructure. An effective cold chain requires three key elements. First, personnel: trained staff to manage vaccine storage and distribution at every point in the system, ensuring that handling protocols are consistently applied. Second, equipment: reliable refrigeration and transport equipment capable of maintaining required temperatures, together with temperature-monitoring devices that allow real-time oversight. Third, procedures: standardised protocols that guide proper equipment use, temperature monitoring, and the safe transport and storage of vaccines.

When any of these components fail, whether due to lack of training, power outages or equipment breakdowns, the integrity of vaccines can be compromised. For this

reason, continuous investment in cold chain systems is not optional but essential for sustaining vaccine confidence and effectiveness.

While public health vaccination programs often receive strong institutional and financial support, animal health services in many low- and middle-income countries **remain under-resourced**. The consequences are significant: inadequate cold chain capacity can lead to unreliable vaccine supplies, loss of potency and high mortality from diseases that are otherwise preventable.

These weaknesses in animal health systems have several important wider implications. Livestock owners who experience disease outbreaks following vaccination may lose confidence both in vaccines and in veterinary health care services. High animal mortality can make it difficult to detect outbreaks early, diminishing the sensitivity of surveillance systems. Poor disease surveillance allows zoonotic pathogens — that is, those that can infect both animals and humans — to circulate unnoticed in animal populations, potentially spilling over into human communities. Finally, these outbreaks may have serious negative impacts on household livelihoods and national economics.

As a consequence, inadequate investment in animal health cold chains not only affects livestock productivity but also undermines public health security and food systems.

Encouraging progress has been made in Bangladesh, where a community-based One Health initiative funded by the **USAID Feed the Future Bangladesh Livestock and Nutrition Activity** and **UK Research and Innovation-funded One Health Poultry Hub** has highlighted the benefits of shared responsibility across sectors. A farmer survey conducted under the Bangladesh Livestock and Nutrition Activity revealed very low levels of vaccination coverage. This finding was presented at a national meeting that brought together public health, animal health and environmental health officials, along with local government representatives, reflecting the essence of the One Health approach, which seeks to balance and optimise the health of people, animals and ecosystems through cross-sectoral collaboration.

Public health officials were surprised to learn about the low coverage of livestock vaccination for two key reasons. Firstly, in rural districts facing high child undernutrition, improving access to nutrient-rich animal-source foods is seen as vital. Second, frequent high mortality in animals reduces surveillance sensitivity and timely disease outbreak reporting. Rather than attributing blame to veterinary services, they expressed readiness to support joint action. Proposed areas of collaboration included cold chain training, shared maintenance responsibilities and coordinated monitoring of livestock vaccination coverage. They further

recommended that animal vaccination data, particularly for zoonotic and high-priority diseases, be routinely shared with District Public Health Nutrition Committees. This integration would help raise awareness of challenges in veterinary health systems and strengthen links between animal health and human nutrition initiatives.

Importantly, discussions also explored the potential for shared cold chain infrastructure. Public health facilities in Bangladesh now possess well maintained refrigeration units, backup power generators and trained personnel. Public health officers felt that, with proper coordination, these existing structures could benefit veterinary vaccination programs — and were keen to take this idea forward. (While the World Health Organization prohibits human and animal vaccines from being stored in the same refrigerator, this barrier can be overcome by installing separate storage units powered by a unified electricity source and shared backup systems.)

This example from Bangladesh illustrates the value of the One Health approach in addressing common logistical challenges. In many contexts, animal health and public health services operate in parallel, each maintaining their own infrastructure, staff and supply systems. However, greater efficiency and resilience can be achieved through integrated planning and resource sharing. Beyond Bangladesh, this idea is also being considered in the four countries participating in the [West African One Health project](#) — Sierra Leone, Guinea, Liberia and Nigeria — which aims to strengthen the mitigation and prevention of outbreaks and address sectoral inequities through increased multisectoral collaboration.

In fact, the Guinean National Health Security Agency is currently coordinating with the National Directorate of Veterinary Services regarding the storage and distribution of dog rabies vaccine. In Guinea, rabies vaccines are distributed through a tiered system to maintain cold chain integrity. Vaccines are first stored at four regional veterinary laboratories, then transferred to refrigerators within the Prefectural Directorates of Livestock, and subsequently to human health centres at the sub-prefectural level. Transport is conducted using coolers with regularly-replaced ice packs. Most health centres are equipped with solar-powered refrigerators. Coordination between the Expanded Vaccination and Primary Health Care Program and the National Directorate of Veterinary Services ensures effective management and safety of animal vaccinations.

Access to potent vaccines, safe food and effective disease control underpins both human and animal health. Yet sustaining these systems requires collaboration across sectors that have traditionally worked in isolation. The One Health approach offers a pragmatic and equitable framework for doing so. By sharing cold chain resources — equipment, expertise and maintenance systems — countries can

strengthen both public and veterinary health services while maximising the impact of limited resources. In short, investing together means saving together: protecting livestock, safeguarding people and securing the health of the ecosystems we all depend on.

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