



Preparing for the Next Pandemic: Operationalizing Outbreak Prevention

Moving from Risk Awareness to Risk Management

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Introduction

Outbreak prevention is the least visible pillar of global health security. When it works, outbreaks are contained or avoided entirely before they become crises, making it easy for leaders to neglect prevention systems until it is too late. Recent outbreaks show that despite past preparedness investments, these systems do not always seamlessly function when threats emerge.

For the purposes of this brief, outbreak prevention refers to the actions taken by health systems to reduce the likelihood that early risks, signals, or localized cases become broader outbreaks or public health emergencies. Prevention does not imply that all spillover events or first cases can be prevented. Rather, it focuses on whether systems can recognize early risk, reliably communicate it, and deploy rapid interventions to interrupt transmission. Ultimately, outbreak prevention is an operational and human challenge. Risks are only prevented when individuals, communities, institutions, and systems recognize threats, trust the information that they receive, and act decisively.

Recent events, including the Ebola outbreak and ongoing avian influenza risks, show how prevention systems can struggle to translate early warning signals into early action.

- **Early Warning Signals:** Suspected clinical cases, unusual syndromic clusters, unexplained animal die-offs, laboratory anomalies, and/or environmental data such as water or air quality indices indicating elevated risk.
- **Early Action:** Practical, frontline steps including immediate deployment of personal protective equipment, activation of localized coordination protocols, reinforcement of infection prevention and control (IPC) measures, targeted surveillance, rapid response team mobilization, risk communication, and just-in-time training for frontline health workers.

If operational readiness ensures systems can perform under pressure, outbreak prevention reduces the likelihood of that pressure building in the first place. For this to happen, it requires a

shift from static risk *awareness* towards continuous, cross-sectoral risk *management*. Prevention depends not only on identifying risks, but also on building systems that can continuously monitor, prioritize, and manage those risks before they evolve into outbreaks or wider emergencies.

While many countries have the foundation for prevention in place through the National Action Plans for Health Security (NAPHS), Antimicrobial Resistance (AMR) strategies, zoonotic disease programs, and multisectoral coordination frameworks, execution remains fragmented. When human, animal, and environmental sectors operate in parallel silos, prevention suffers from weak accountability, delayed signals, and uncoordinated responses.

Recommendations for Operationalizing Outbreak Prevention

When early warning and prevention systems generate information yet fail to consistently translate it into decisions, outbreak risks are *known* but not *contained*. Turning prevention into an operational function requires a set of practical shifts in how outbreak risk is identified, prioritized, escalated, and addressed across systems. Here are JSI's recommendations on how to make these essential shifts:

1. Make Risk Management a Continuous, Multisectoral Function

Risk assessments are widely practiced across preparedness systems, but they often remain periodic, technical, and disconnected from operational decision-making. In many settings, risks are identified, but responsibilities, escalation pathways, and operational actions are not clearly defined before outbreaks emerge.

Operationalizing prevention requires shifting from **static assessments** to **continuous risk management** that is jointly owned across sectors and linked to clear action. This means that actors from human health, animal health, agriculture, environment, emergency management, and disaster response should not only identify risks together, but also agree on what actions will be taken, who is responsible, how quickly action must occur, and how progress will be tracked. Furthermore, this approach must account for behavioral and organizational realities, such as institutional incentives, cultural norms, and decision-making barriers that influence how decisions are made under high uncertainty.

This approach is particularly important for zoonotic threats and other infectious disease risks that require coordinated action across sectors before transmission expands. While the focus of this brief is outbreak prevention, these same multisectoral coordination principles can also strengthen the broader all-hazard preparedness efforts.

Spotlight: Pakistan

In Pakistan, the JSI-supported All-Hazards Risk Assessment process demonstrated how infectious disease threats and concurrent public health risks can be systematically mapped and prioritized to guide preparedness planning, multisectoral coordination, and operational readiness investments from the outset.



2. Connect Multisectoral Systems So Signals Lead to Action

Many emerging infectious diseases originate at the human-animal-environment interface, yet surveillance and prevention systems across these domains often remain disconnected in practice. This fragmentation delays the detection of zoonotic threats, weakens early containment efforts, and limits the ability of decision-makers to develop coordinated prevention and response strategies before outbreaks escalate.

Functional operational prevention requires linking these systems so that signals from livestock, wildlife, environmental changes, laboratories, health facilities, and communities are rapidly shared, interpreted, and acted upon collectively. This imperative goes beyond simple data sharing and requires interoperable systems, joint analysis, consensus decision-making processes, and clear operational protocols that define what information should trigger action, who is responsible for responding, and how coordination should occur across sectors. Equally important is ensuring that information is presented and communicated in ways that support timely decision-making, helping actors recognize, prioritize, and act on emerging risks before they escalate.

With the rapid expansion of digital systems for real-time recording and reporting of information, digital interoperability across health and non-health sectors has become increasingly feasible. Automated exchange of pre-established priority surveillance information supports continuous risk monitoring, improves situational awareness, and supports earlier preventive action before transmission accelerates.

Countries are increasingly recognizing that prevention systems must function continuously, not only during crises. In [Vietnam](#), multisectoral surveillance systems in live bird markets strengthened ongoing monitoring for avian influenza risks by integrating animal, environmental, and human health surveillance. These systems enabled earlier identification of H5 influenza threats and improved multisectoral coordination before wider transmission occurred. The key

lesson is that prevention becomes operational when surveillance systems are linked to decision-making, escalation pathways, and accountability mechanisms.

Spotlight: Bangladesh

JSI supported efforts to establish a surveillance system where live bird market workers, cleaners, market committee members, and consumers can report signs of avian influenza among market workers and the mortality of poultry, wild birds, and pet birds in and around the markets. This surveillance system then reports to human health, livestock and animal, and forestry and agricultural government departments and partners for coordinated infectious disease prevention.



3. Reduce System Vulnerabilities Before Outbreaks Amplify

Prevention is often framed as stopping external threats, but many outbreaks escalate because of vulnerabilities and failures within health systems themselves. Weak IPC, gaps in biosafety, overcrowded facilities, and the spread of [AMR](#) can all increase the risk that localized events become widespread outbreaks. Increasing evidence shows that health care-associated infections and resistant pathogens can rapidly amplify transmission during health emergencies when prevention systems are weak or inconsistently applied.

IPC, biosafety, and AMR, are too often treated as parallel technical programs rather than frontline prevention functions. Operational readiness requires [embedding](#) them into routine system performance and not only activating them during emergencies. To do so requires understanding and addressing the behavioral and organizational factors that influence whether prevention practices are adopted consistently in routine settings. This includes integrating AMR surveillance into broader outbreak detection systems, maintaining laboratory biosafety standards, training health care workers and ancillary staff, strengthening health worker protection, and ensuring IPC measures can scale rapidly during crises.

Operationalizing IPC also requires continuous hands-on mentoring, supportive supervision, and departmental leadership engagement within hospitals to ensure prevention practices are implemented consistently. Systems, workflows, and incentives must be designed to make the desired behaviors easier, more visible, and more likely to occur consistently. Strong IPC is one of the most effective approaches for reducing the spread of AMR because every infection prevented

reduces the need for antimicrobial use. It is also cost-efficient: preventing health care-associated infections reduces avoidable treatment costs, protects health workers, and lowers the burden on already strained health systems.

Spotlight: Kyrgyzstan

JSI supported the government to strengthen laboratory quality management systems, biosafety standards, and integrated diagnostic reporting systems across the tuberculosis (TB) network. These investments contributed to improved laboratory operational readiness, strengthened infection prevention practices, and supported the country's first ISO 15189-accredited TB reference laboratory in Central Asia. By embedding biosafety and quality management into routine laboratory operations, the program helped reduce vulnerabilities that can amplify outbreaks and compromise health worker safety.



Lab technicians from the National Reference Laboratory process sputum samples for TB testing.

4. Move Prevention Closer to Communities

Outbreak prevention rarely begins in national coordination centers. It often begins in communities where unusual illnesses, animal deaths, environmental changes like drought or pollution, or behavioral risks like stigma that increase barriers to preventing or treating emerging infectious disease threats. Prevention systems are frequently designed around formal reporting structures, but community-level intelligence and engagement are essential for early warning.

Operational prevention therefore requires active community-based surveillance, trusted risk communication mechanisms, and engagement of frontline workers, such as community health workers, outreach vaccinators, and other community leaders. Behavioral science and human-centered design approaches can ensure these efforts are grounded in how people perceive risk, whom they trust, and what motivates them to adopt preventative behaviors or report emerging threats.

These efforts should be coupled with enabling the general population to serve as “community-level early warning informants” who are capable of transmitting unusual health signals into formal surveillance systems. Recent Mpox responses in [Nigeria](#) demonstrated the

importance of combining surveillance with targeted community engagement, risk communication, and prevention outreach in high-risk areas. Prevention systems function more effectively when populations understand risks, trust public health messaging, and participate in prevention measures before outbreaks escalate.

Spotlight: Nepal

During a measles outbreak, Nepal's Behavioural Science Center, established by the Government of Nepal in Kathmandu University with support from JSI and UNICEF, rapidly applied behavioral science approaches to understand why vulnerable populations were not being reached and what was preventing timely action. JSI-trained government and partner teams used these insights to adapt response strategies, strengthen community engagement, and improve uptake of prevention measures, helping contain transmission before the outbreak escalated. The experience highlighted the value of embedding behavioral science capacity within national systems rather than relying solely on external surge support.



A baby getting vaccinated in Nepal.
Credit: © UNICEF and U.S. CDC/
UN0666532/Laxmi Prasad Ngakhushi

5. Pressure Test Prevention Systems Before Crises Emerge

Outbreak prevention systems are rarely tested under realistic conditions, resulting in real-world breakdowns when early warning signals fail to trigger decisions, when institutions are unclear on who should act, or when multisectoral coordination mechanisms function on paper but not in real time.

Operational readiness requires testing not only response capacity, but also whether prevention systems can **recognize, escalate, and trigger action on risks early enough to interrupt transmission before outbreaks expand**. Exercises should test not only systems and processes, but also whether decision-makers are prepared to act on emerging risks before a crisis develops. This includes validating if surveillance signals reach decision-makers rapidly, if multisectoral coordination mechanisms function in practice, if operational thresholds trigger preventive action, and if authorities can mobilize financing, workforce, and containment measures quickly enough to address emerging threats before they escalate.

Scenario-based exercises should include bringing multiple sectors and partners together to bring plans to life and test their effectiveness in a safe environment. Simulations and after-action reviews of near misses allow institutions to troubleshoot coordination, decision-making, and operational readiness under realistic conditions, helping systems manage periods of chaos through structured response rather than panic-driven reactions.

Several countries have already begun incorporating simulation exercises and other operational readiness exercises into preparedness efforts. During recent avian influenza preparedness activities, countries in [Southeast Asia](#) tested cross-sector coordination between animal health, environmental surveillance, and public health authorities to assess whether zoonotic signals could trigger timely containment actions before human transmission accelerated.

Spotlight: United States

In the state of Massachusetts, JSI planned and facilitated a scenario-based tabletop exercise for 144 representatives from 44 communities to support improving their local all-hazards public health emergency response plans. Ninety-two percent of attendees agreed or strongly agreed that the exercise would improve their community's preparedness.



Conclusion

Collectively these five recommendations reflect a broader shift from regarding outbreak prevention as a concept to outbreak prevention as an operational capability. The objective is not to eliminate all risks, but to identify risks early and manage them through coordinated action before they evolve into national or global crises. Operationalizing prevention also reinforces a central insight of this series: global health security is not defined by individual systems, but by how systems function together under real-world conditions.

In the next brief, we turn to detection: how surveillance systems, laboratory networks, workforce capacity, and integrated data systems can be strengthened to identify threats early and translate signals into rapid action.