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VACCINE INSTITUTE

From Data to Action:

A Vaccine Confidence Playbook



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Executive Summary

Sustained vaccine confidence requires trust in vaccines, those who deliver them, and the system that supports them. This Playbook provides a pathway through which ministries of health can move from data to action to build and sustain vaccine confidence and uptake in their countries and communities. Starting with diagnosing the problem through collection and review of data with key stakeholders, this Playbook details seven interconnected pillars that transform immunization programs into trusted, responsive national immunization programs. Drawing from a non-exhaustive review of global evidence from 2022 and practical case studies, these pillars equip ministries of health with actionable strategies to achieve person-centered immunization programs that sustain vaccine confidence, uptake, and demand across an evolving vaccination landscape. They include:

- **Align Governance and Policy for Vaccine Trust:** Evidence consistently shows governance and leadership play a role in shaping vaccine confidence and uptake. Effective governance includes transparent, evidence-based policy processes that are supported by clear and consistent communication help maintain public confidence and inclusive policy development, accountability mechanisms, and robust stewardship of service delivery systems to ensure timely supply, equitable access, and responsive communication about vaccines.
- **Equip a Confident Health Workforce:** Health workers are consistently the most trusted source of health information, and evidence shows that when health workers trust vaccines and can clearly recommend them, community confidence rises. However, gaps in training, resources, and system support often hinder their effectiveness. Ensuring that all health cadres are equipped and empowered to communicate about vaccination strengthens both vaccine confidence and health system resilience.
- **Deliver Person-Centered Immunization Services:** A high-quality, person-centered immunization experience encompasses every aspect of a client's interaction with the health system, from accessibility and convenience to quality of care and satisfaction. It depends on the performance of health workers, the efficiency of service delivery, and the environment in which care is provided, as well as the accessibility and affordability of services and reliable vaccine supply. This pillar emphasizes the design of vaccination services that are accessible, equitable, reliable, and respectful. It considers where and when services are offered, how consistently vaccines are available, and how people are treated during visits.
- **Activate Community Partnerships and Norms:** Trust in institutions and peer behaviors strongly influence vaccination decisions, underscoring the importance of community partnerships and engagement. Collaborations between health providers and trusted local actors (e.g., faith leaders, educators, and civil society groups) complement data collection with lived experience and supports the development of culturally relevant approaches that reinforce positive norms and equitable access. Embedding community engagement across all stages of immunization programs builds trust, strengthens transparency and accountability, and enhances system resilience.
- **Foster Healthy Information Ecosystems and Communication:** Effective vaccine communication extends beyond message delivery to reflect the social, cultural, and behavioral contexts that shape

people's decisions. Evidence shows that inconsistent or impersonal communication erodes confidence, while approaches grounded in behavioral and social insights can build understanding and trust. Furthermore, recognizing that vaccine information circulates within complex information ecosystems, including social and digital media, national programs must proactively monitor and respond to public concerns, misinformation, and emerging narratives. Behaviorally informed, context-specific communication strategies that engage communities and their trusted voices are essential to sustaining vaccine confidence in an evolving information landscape.

- **Strengthen Confidence in Vaccine Safety and Effectiveness:** Vaccine-specific factors are among the most frequently cited barriers to vaccine uptake and can either be broad (vaccine-agnostic) or targeted (vaccine-specific), affecting all vaccines or only certain ones. They may include how much people trust the processes by which vaccines are developed, tested, authorized, and updated; the ingredients and specific antigen; and perceptions of side effects and long-term safety, among others. Ultimately, when people have doubt in a vaccine-specific factor, they may delay, refuse, or selectively accept vaccines. Clear, transparent, and responsive communication about these vaccine-specific factors is essential to building and sustaining trust in both new and long-standing vaccines.
- **Enhance Learning and Feedback Systems:** Sustained vaccine confidence requires that programs continuously learn and adapt, especially in contexts of evolving evidence, changing epidemiology, and dynamic information environments. Continuous measurement, monitoring, and learning form the backbone of sustained vaccine confidence, and help to transform data into actions that enable immunization programs to adapt. Routinely tracking coverage, attitudes, experiences, and hesitancy drivers, then sharing insights with communities, civil society, and frontline teams fosters trust via transparency, responsiveness, and lasting institutional memory for future challenges. This holistic and inclusive approach positions immunization systems as resilient learning organizations capable of sustaining confidence through crises and transitions.

The seven pillars provide ministries of health with a comprehensive framework for building and sustaining vaccine confidence across diverse contexts. By systematically strengthening these mutually reinforcing pillars and integrating real-time data and social and behavioral insights, national immunization programs can achieve not only higher coverage but also greater resilience against future shocks. As emerging trends like digital misinformation, new vaccine platforms, and shifting demographic priorities reshape public perceptions, forward-looking investment in these pillars will ensure immunization systems remain trusted cornerstones of public health.

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Background and Rationale for the Playbook

Vaccine confidence is a cornerstone of successful immunization programs. Yet across regions, public trust in vaccines and in the systems that deliver them is becoming increasingly fragile. This fragility threatens progress toward global immunization goals and underscores the growing need to understand how behavioral, social, and structural factors interact to influence vaccine uptake (1).

Governments and health systems worldwide are mobilizing to strengthen vaccine confidence through person-centered service delivery, modernized communication strategies, the establishment and maintenance of nontraditional and community partnerships, and systematic approaches to confronting misinformation. In addition, ministries of health and immunization partners are expanding their efforts to better understand the drivers of vaccine acceptance across priority populations, including confidence in vaccines, providers, and delivery systems. In recent years, field studies and surveys produce valuable local insights into perceptions, attitudes, and social dynamics. However, these findings often need to be translated into practical, evidence-informed guidance that links global best practices with country-level operational realities. Such guidance can help health leaders and technical teams design interventions and prioritize investments that reinforce confidence and sustain vaccine demand.

This Playbook responds to that need by offering detailed, practice-oriented guidance for program managers, policymakers, and technical advisors working to build and sustain vaccine confidence. Grounded in a non-exhaustive review of global evidence from 2022 onward, this Playbook highlights critical components of vaccine confidence and aims to support ministries of health in developing responsive, person-centered immunization programs that sustain confidence and demand across an evolving vaccination landscape. By systematically strengthening these interconnected aspects of national immunization programs and integrating real-time data with social and behavioral insights, national immunization programs can achieve not only higher vaccine confidence and vaccination coverage but programs with greater resilience to future shocks.

Objectives of the Playbook

The purpose of this Playbook is to provide ministries of health and their partners with practical, actionable guidance to systematically strengthen and sustain vaccine confidence as an integral component of immunization system performance. It aims to consolidate global evidence, country experiences, and emerging practices into a coherent framework that supports decision-making, policy formulation, and implementation at national and subnational levels.

Specifically, the objectives are to:

- Support ministries of health to build and sustain confidence in vaccines and the systems that deliver them.
- Provide evidence-based, high-impact strategies, drawn from global lessons learned and best practices, for building and sustaining vaccine confidence.
- Prioritize actions across policy, service delivery, partnerships, communication, and monitoring to build environments supportive of vaccines and vaccination.
- Highlight ways in which insights from planned and future national field studies can be translated into tailored national and subnational interventions.

A variety of different scenarios may prompt ministries to consider using this Playbook, such as in advance of a new vaccine introduction or vaccination campaign (e.g., supplemental immunization activity, periodic intensification of routine immunization, outbreak response activity), or when evidence suggests low vaccine uptake or a decline in vaccine uptake in specific populations or communities (2). Ministries of health may also consider using this Playbook to review and strengthen national immunization strategies and plans through a vaccine confidence lens; to prioritize investments and technical assistance where there may be deficits and/or opportunities for impact in the short- to medium- to long-term; and to build resilient systems to sustain vaccine confidence and close equity gaps through systemic investment across these foundational pillars.

Understanding Vaccine Confidence and Demand

Vaccine demand refers to the willingness and motivation of individuals and communities to seek, accept, and advocate for vaccination (3). It exists on a spectrum, from refusal to passive acceptance to active promotion, and can shift over time depending on context, available information, and personal or community experiences (2).

Sustained vaccine uptake depends on three conditions being met simultaneously: availability (a reliable supply of safe, effective vaccines), accessibility (convenient, affordable, and culturally appropriate services), and confidence (trust in vaccines and providers) (See Figure 1 below). While this Playbook focuses primarily on vaccine confidence, it is equally important to ensure the adequate, timely supply of vaccines and equitable access to vaccination services. Confidence alone cannot translate into improved coverage if vaccines are unavailable or inaccessible. Conversely, without vaccine confidence, even systems with adequate supply of vaccines, accessible health services and a skilled workforce will not reach immunization coverage goals (4).

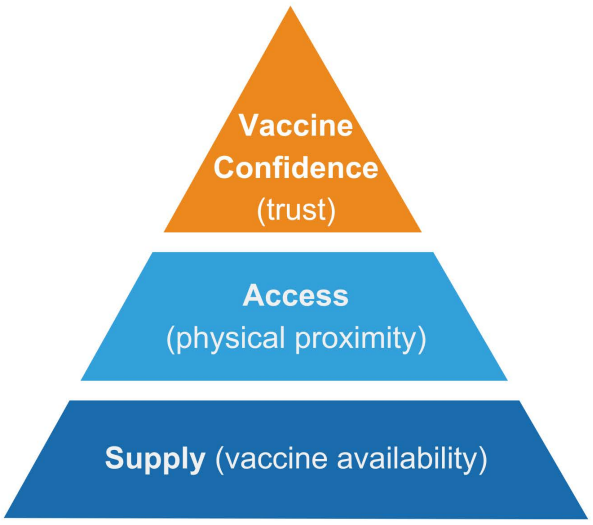


Figure 1. Conditions for sustained vaccine uptake.

Vaccine confidence reflects trust in three interdependent areas (5):

- ***Vaccines:*** safety, effectiveness, contents of the vaccine; antigen/disease targeted, target population; mode of administration (e.g., nasal/oral, intramuscular)
- ***Vaccinators:*** health worker confidence, capacity, and support to administer vaccines; quality of services and client/caregiver experience of care.

- ***Vaccination systems:*** policies and guidelines; vaccine development, manufacturing, licensing, and recommendations for use.

When trust in vaccines, those who administer them, or the systems that deliver them falters, so does vaccine confidence. Negative experiences, such as stockouts, unclear policies, poor interactions between health workers and clients, or exposure to misinformation, can erode trust, diminish confidence, and result in a decline in demand. Conversely, positive community norms, consistent service delivery, and trusted communication can strengthen it.

WHO's Behavioral and Social Drivers (BeSD) framework identifies four domains influencing decisions to vaccinate (3):

1. Thinking and feeling about vaccines, including perceptions of risk and safety
2. Social processes, such as norms and recommendations
3. Motivation to seek vaccination
4. Practical issues related to access and delivery

When national immunization programs have insight into how these four domains shape vaccine decision making, they can use them to complement existing immunization program efforts with culturally relevant interventions responsive to community needs. The next section of the Playbook highlights the importance of using data to understand barriers to vaccine confidence and uptake.

Understanding Barriers of Vaccine Confidence and Uptake

Vaccine demand refers to the willingness and motivation of individuals and communities to seek, accept, and advocate for vaccination (3).

Understanding why specific populations do not receive recommended vaccines is a key step to informing and tailoring strategies to improve vaccine confidence and increase vaccine uptake (6). A critical first step to unearthing the "why" behind vaccine confidence and uptake barriers and enablers is to review existing data (e.g., administrative data, surveillance data, health facility data, social monitoring data) or consider collecting new data (e.g., surveys, qualitative feedback, community input) to better understand the problem, population, geography, or vaccine affected.

WHO's *Behavioural and Social Drivers of Vaccination: Tools and Practical Guidance for Achieving High Uptake* highlights that data can help national immunization programs in the following ways (3):

1. Understand what communities and specific populations think about vaccines
2. Pinpoint communities and specific populations at risk for low vaccine uptake
3. Assess barriers and enablers to vaccine confidence and uptake
4. Map the people and channels through which you can communicate with communities and specific populations
5. Prioritize intervention strategies to increase vaccine confidence and uptake
6. Evaluate how effective those interventions have been

A variety of data collection and analysis tools have recently been developed to support ministries of health to collect, analyze, interpret and use behavioral and social drivers data to act on gaps in vaccine confidence. Table 1 below highlights some of these tools and offers brief explanations as to how they may be of use to ministries of health. Consider including local community members to participate in research design and implementation to strengthen local capacity and yield deeper insights to help prioritize intervention selection.

Table 1. Key guidance documents and tools to support national immunization programs to diagnose their vaccine-confidence related barrier

Guidance/Tool	Description
Behavioral and Social Drivers of Vaccination: Tools and Practical Guidance for Achieving High Uptake (BeSD)	This guidebook supports the use of the BeSD tools to understand what drives uptake of vaccines. It is intended for immunization program managers and others collecting, analyzing and using data for vaccine program planning and evaluation (3).
Demand for Health Services: A Human-Centered Field Guide for Investigating and Responding to Challenges	This field guide introduces human-centered design as an approach to addressing challenges in community demand for basic health services like immunization. Human-centered design is a collaborative, problem-solving process that starts with understanding people's lived experiences and contexts, then works with caregivers, health workers, and communities to co-design solutions that are feasible, appropriate, and locally owned (7).
Human-Centred Design for Tailoring Immunization Programs (HCD-TIP)	The HCD-TIP guide is designed to help anyone in the health and immunization system identify and address barriers or leverage drivers to immunization by locally codesigning and evaluating human-centered, tailored immunization programs. Structured un four stages (Diagnose, Design, Implement and Evaluate), this guide outlines an iterative process to overcome hurdles to vaccination and can be used to tailor programs for any priority group or vaccine across the life course (8).
Rapid Community Assessment Guide	This rapid community assessment (RCA) guide for immunization is for health department or ministry of health staff worldwide who wish to better understand their community's needs regarding acceptance and uptake of vaccines. The guide is meant to be adaptable and for use by hospitals, health systems, clinics, and other organizations that have strong connections with the communities they serve and want to increase vaccine uptake (2).

An Introduction to the Vaccine Confidence Pillars

High and equitable vaccination coverage depends on trust and confidence in vaccines, health providers, and health authorities and systems that deliver them. These factors are critical to immunization performance and health system resilience. Confidence is earned when people see that vaccines are safe, recommended by trusted actors, easy to access and consistently available, and supported by a system that works.

Drawing on global evidence and practical experience, this Playbook proposes seven interrelated pillars as a framework for strengthening and sustaining vaccine confidence. The following seven pillars provide a foundation that national immunization programs can build throughout the life course. They are intended to offer a way for national immunization programs to understand, organize and prioritize interventions aimed at increasing vaccine confidence and uptake. The pillars are designed to complement, not replace, existing strategies such as Immunization Agenda 2030 or national immunization plans. Each pillar includes a description of its importance for building and sustaining vaccine confidence, outlines key actions ministries of health can take, and highlights country case studies that demonstrate the practical application of evidence-based approaches.

The seven pillars include:



The pillars are organized in this manner to progress from system-level enablers, such as foundational governance and a confident health workforce, and extend out toward community engagement, vaccine-specific trust, and adaptive learning. Though presented this way for clarity, the pillars are not meant to be implemented strictly in order or all at once. Data may reveal multiple factors affecting vaccine confidence and uptake, so national immunization programs may need to touch across multiple pillars simultaneously, leveraging their interconnections for impact.

Barriers related to vaccines, the people who vaccinate, and the systems in which vaccination occurs operate across multiple levels. To address them effectively, strategies must also operate across levels

and be multi-pronged and behaviorally informed, as well as evidence-based, context-specific, culturally sensitive, and tailored to the populations they aim to serve. As such, there cannot be a “one-size-fits-all” approach to building confidence; rather, strategies must recognize the lived realities of communities and the people within them. Thus, the menu of actions included under each pillar are intended as starting points.

Consider co-designing interventions with affected communities and other stakeholders, and paying attention to social, cultural, historical context that shapes their daily lives (e.g., gender, ethnicity, and migration status). By doing so, ministries can feel confident that the interventions are equitable, culturally appropriate, and responsive to the specific barriers and concerns people face. Keep in mind that any solutions should consider the capacity required, the ability to scale, sustainability, funding available, human resources, and time, and aim to increase trust in vaccines, those who administer them, and the health system that provides them (2).

The Playbook also includes a corresponding tool, ***From Data to Action: A Vaccine Confidence Decision Tree*****,** which translates select synthesized evidence across the pillars into a clear, step-by-step, decision-support tool for countries. The Decision Tree is meant to support country program leaders, communication teams, and technical units to move logically from problem identification to the identification of the most appropriate interventions based on the specific challenge, populations, or operational context being faced. While embedded within the Playbook, the Decision Tree can also be used as a standalone visual reference countries can use during strategy development and planning meetings as well as rapid response discussions.

The annexes provide a glossary of key terms, a compendium of selected tools that ministries of health can use to operationalize interventions under certain pillars, and additional case studies (not included in the Playbook's main body) for reference.

From Data to Action: A Vaccine Confidence Decision Tree

Assumptions for Using the From Data to Action: A Vaccine Confidence Decision Tree

- Before using this Decision Tree, your program has identified thresholds and conducted an internal risk assessment to determine that action is needed to increase vaccine confidence and uptake. Example triggers: Percent drop in vaccine coverage, documented health worker hesitancy for new vaccines, change in vaccination policy, vaccine misinformation circulating widely in national media.
- Data may reveal multiple factors affecting vaccine confidence and uptake, including those not listed here. Explore multiple Decision Tree pathways to identify appropriate solutions and consult the Vaccine Confidence Playbook for further options.
- These solution lists are illustrative and intended as starting points. Use the Vaccine Confidence Playbook to find additional approaches, and prioritize stakeholder-driven ideas, proven strategies, and adaptable methods suited to your context.

KEY

- *Phase 1: Diagnose the Problem*
- *Phase 2: Define Partners*
- *Phase 3: Design Solutions*
- *Phase 4: Deliver and Demonstrate Results*
- *Tips to Remember*
- *Responses*

START HERE

Common Scenarios Prompting Vaccine Confidence Investigation

- New vaccine introductions;
- Upcoming vaccination campaign (e.g., supplemental immunization activity, periodic intensification of routine immunization);
- A decline in vaccine uptake or persistently low coverage in specific populations or communities;
- A disease outbreak or emergency;
- A vaccine-related event, such as an adverse event following immunization.

Assess Your Current Situation

Are you currently facing any of these scenarios?

No

Maintaining Vaccine Confidence and Coverage

- Monitor administrative, surveillance, facility, and social data to track shifts in immunization coverage and confidence.
- Strengthen quality improvement and structured monitoring [e.g., Reaching Every District/Community (RED/REC)] to quickly address low coverage and prevent confidence issues.
- Strengthen health worker skills and confidence in vaccine communication and support their well-being through enabling policies.
- Keep vaccine communication with the public ongoing, not crisis-driven.
- Invest in health literacy to improve people's ability to access, understand, and use health information.

Yes

Check Your Data for Insights

Is program data available to identify where there may be coverage gaps or emerging confidence issues?

Yes

Not sure

No

Review Existing Data

- May include administrative data, surveillance data, health facility data, social monitoring data, etc.
- Or consider collecting new data such as surveys, qualitative feedback, community input, to better understand the problem, population, geography, or vaccine affected.

Identify and Involve Key Stakeholders

Identify key stakeholders to include in the data review and the design, implementation, and monitoring of interventions.

Think Beyond Traditional Partners

Beyond traditional immunization partners, conduct a formal stakeholder mapping and include local health and social NGOs, school and parent associations, religious leaders, youth ambassadors, professional associations, and groups experienced in health promotion and community engagement.

Collaborative Data Review and Solution Design

- Review and analyze data and generate solutions with key stakeholders.
- Invite partners to existing data review meetings; host listening sessions; or use a human-centered co-design approach, such as a design intervention workshop.
- Summarize key findings, barriers and facilitators to vaccination, and solutions proposed by attendees.

Any Solutions Identified Should Consider:

- Capacity required
- Ability to scale to the community
- Sustainability
- Funding
- Human resources
- Time

Collaborative Data Review and Solution Design

Primarily an issue with **vaccine access**?

An Issue with Vaccine Access Barriers May Look Like:

- Community experiencing barriers to accessing vaccination services (e.g., timing, location, convenience, cost of services).
- Vaccination demand is unmet due to supply or cold-chain disruptions.

Interventions to Mitigate Vaccine Access Barriers:

- Engage communities in reviewing service delivery approaches (e.g., timing, location, mode) to ensure convenience, trust, and cultural relevance.
- Expand on-site vaccination through mobile units, home visits, schools, workplaces, and high-traffic areas, including evening and weekend options.
- Integrate vaccination into routine health services such as antenatal care, child health visits, and chronic disease follow-ups to reduce missed opportunities.
- Build vaccine supply resilience through stronger cold chain and logistics systems, quarterly forecasting, and closer coordination between logistics and EPI teams.
- Provide vaccines free of charge and remove hidden costs (e.g., transport or time barriers).

Primarily an issue with **health professional or service experience**?

An Issue with Health Professional or Service Experience May Look Like:

- Health professionals indicate lack of knowledge, confidence, and/or time for vaccine counseling.
- Community highlights poor service experience (e.g., poor interactions with health professionals, delays of service) as deterrents to vaccination.

Interventions to Address Health Professional and Service Experience Concerns:

- Develop up-to-date health worker toolkits with guides, FAQs, visuals, and techniques for pain management and vaccine communication to improve vaccine acceptance and service quality.
- Integrate vaccine communication into pre-service curricula and provide ongoing training, mentorship, and supervision on empathetic, person-centered approaches.
- Prioritize health worker vaccination, mental health, and well-being to strengthen trust and morale.
- Integrate vaccination into routine services and other outreach platforms to enhance convenience and access.
- Expand task sharing by training pharmacists, community health workers, and other allied healthcare personnel in vaccine delivery and counseling.

Primarily an issue with **vaccine-related concerns**?

An Issue with Vaccine-Related Concerns May Look Like:

- Doubts about vaccine safety, effectiveness, and long-term protection (including new variants).
- Concerns about vaccine ingredients.
- Fears of side effects and long-term health risks.
- Distrust of vaccine development, testing, or authorization processes.
- Belief that vaccines are not essential for disease prevention.

Interventions to Address Vaccine-Related Concerns:

- Use educational campaigns (e.g., posters, media) to raise awareness about disease risk and vaccine benefits, and tailor messages to social, cultural, and linguistic contexts.
- Hold community education sessions with local leaders and hosted by local organizations to emphasize disease risks, vaccine importance, and community protection.
- Strengthen provider communication on vaccine importance; equip them with clear, accurate information, talking points, and decision aids to support patient discussions.
- Ensure reliable vaccine information is available through trusted sources and channels; present vaccine development, approval, and safety oversight in plain language, with simple visuals, and equip frontline workers to explain these confidently.

Primarily an issue with **social norms**?

An Issue with Social Norms May Look Like:

- Community lacks strong social norms supporting vaccination.
- Social norms supportive of vaccination do not extend across the lifecourse.

Interventions to Shape Pro-Vaccination Social Norms:

- Strengthen institutional and community participation through workplace and school vaccination drives and community events, incentives, and visible symbols of support.
- Partner with trusted messengers and community or faith organizations to co-design outreach, address beliefs, strengthen community trust, and model vaccination as a shared social value.
- Promote accurate information and counter misinformation through traditional and digital media, using relatable narratives and peer-based communication.
- Review and adapt existing policies or practices (e.g., open vial rules, school entry requirements) to remove barriers and make vaccination more convenient and the simple, expected choice.

Primarily an issue with **circulation of mis- or disinformation**?

An Issue with Circulation of Mis- or Disinformation May Look Like:

- Exposure to vaccine mis- and disinformation is resulting in vaccine skepticism and refusal.
- Social media is amplifying online vaccine mis- and disinformation.

Interventions to Address the Circulation of Mis-and Disinformation:

- Use a multipronged approach to monitor online mis- and disinformation, integrating quantitative and qualitative data from diverse sources and languages.
- Apply risk assessment tools to gauge potential harm and prioritize response actions.
- Activate governance and communication structures at all levels for rapid, multisectoral coordination.
- Partner with trusted actors to co-create and amplify response strategies, such as messaging campaigns.
- Monitor and evaluate response efforts to assess impact and refine strategies.

Test, Implement, and Monitor

- Design vaccine confidence interventions with clear objectives and indicators from the start, and establish a monitoring and evaluation plan with targets and milestones to track impact, refine the approach, and identify interventions ready for scale.
- Consider starting with a small-scale pilot to assess effectiveness before expanding, particularly if the approach is untested.
- Capture lessons in practical formats (e.g., reports, notes, infographics, peer exchanges) and regularly review them with stakeholders to identify barriers, adapt strategies, and strengthen sustainable vaccine uptake and trust.
- If monitoring shows limited change or new insights are needed, revisit, or collect additional data and adjust the approach accordingly.

Pillar 1. Align Governance and Policy for Vaccine Trust

Evidence shows that trust in governments and institutional governance is one of the strongest and most consistent predictors of vaccine uptake (9–11). The ways decisions are made, evidence is applied, and policies are communicated can affect how well vaccine confidence is built and maintained over time. For example, recent evidence from the COVID-19 pandemic in the United States shows that inconsistent communication, a lack of clarity about the reasoning behind policy changes, delayed data sharing, and the early discontinuation of mitigation measures fueled widespread confusion and skepticism about COVID-19 vaccines (12). These experiences underscore that governance and leadership, including transparent decision-making and communication, are central to building and sustaining vaccine confidence.

Policy has a significant influence on vaccination confidence and uptake, shaping factors such as eligibility and costs for vaccination, health worker recruitment and competencies, who can administer vaccines and where, and supply and cold chain management, thereby either facilitating or hindering access to vaccines and vaccination services (12). Evidence suggests that including community leaders, educators, and patient groups in policy development can offer more insight into underlying social determinants of health affecting vaccine uptake and foster shared responsibility and improve the acceptance and sustainability of immunization programs (13). Beyond adopting a participatory approach to policy development, governance also includes ensuring that communities and civil society organizations are able to hold national and subnational authorities accountable for delivering quality, person-centered immunization services, and that governance structures and health agencies accept that responsibility (14,15).

Governance of immunization programs extends beyond the formulation of policies to encompass the stewardship of service delivery systems. For vaccine confidence and demand, this means establishing and operationalizing advocacy, communication, and social mobilization (ACSM) units under the Ministry of Health (MoH) or within national immunization programs, with the responsibility to collect, analyze, interpret, and use immunization program and behavioral and social data to strengthen vaccine confidence and uptake. It also involves building capacity for the regular use of structured monitoring to detect early signs that the system is not performing as intended (e.g., declines in coverage, uptake, or confidence) so that corrective actions can be taken promptly.

As such, this pillar focuses on the roles and responsibilities of ministries of health and national immunization technical advisory groups (NITAGs) to shape immunization policy and implementation. It highlights practical actions these entities can take to build strong and resilient governance processes that can achieve vaccine confidence and reach more people with vaccines. Governments have the power to make vaccines accessible and acceptable; the list below outlines concrete actions they can take to do so.

Menu of Potential Actions:

Strengthen evidence-based policy and advisory processes by clarifying roles, mandates, and operating procedures for NITAGs and other advisory bodies.

Ministries should ensure that documentation of policy and advisory processes clearly shows how evidence is gathered, appraised, and used to inform vaccine recommendations. In addition, it will be important to regularly communicate the rationale behind immunization policies and decisions, including clear explanations of how scientific evidence and behavioral and social data are used to inform recommendations. Vaccine safety and effectiveness information should be published and regularly updated through trusted institutional platforms, ensuring that both the public and health workers can access reliable, timely information (see Pillars 3, 5 and 6 for additional details).

Conduct a thorough stocktaking of policies and practices that may hinder access to vaccines and vaccination services to strengthen both equity and uptake.

This includes revisiting open vial policies to ensure health workers feel supported in vaccinating and are less constrained by fear of vaccine wastage. In countries where vaccines are mandated for school or daycare enrollment, governments should assess how these requirements are implemented in practice and ensure that supportive systems (e.g., referral pathways, onsite vaccination services, or the provision of vaccines free of charge) are in place to enable equitable access and facilitate compliance (12). It could mean reviewing policies across sectors to ensure coherence and promote equity. It may also mean embedding immunization within primary health care and national strategies for universal health coverage to promote sustainability and integration into the broader health system (15). In parallel, countries should review or develop policies that support workforce competence (e.g., incorporating vaccine communication skills into pre-service education curricula) and address health worker shortages in places where this may coincide with coverage gaps (13,15). Taking care to review and update these policy levers to ensure easier access to vaccination can help alleviate practical barriers for communities and directly influence the consistency and quality of vaccine delivery, which are key drivers of public confidence and demand.

Include a variety of stakeholders in the development or updating of evidence-based national vaccine policies or guidelines.

Governments and immunization partners should ensure that national vaccine policies and guidelines are developed or updated through inclusive, evidence-based processes that engage a broad range of stakeholders (16). Inclusive governance that incorporates local voices (e.g., community leaders, educators, and patient groups) can result in practical and feasible policies that are responsive to local realities and which promote shared responsibility and sustainability of immunization programs (13). In addition, including members from across the health system and regulatory bodies helps strengthen policy coherence across sectors, and involving behavioral scientists and social scientists ensures that policies account for the social determinants of health, trust, social norms, and other drivers of vaccine decision-making. This multi-disciplinary and inclusive approach to governance supports more coherent, equitable, and

trusted immunization policies that are more likely to translate into sustained vaccine confidence and uptake.

Establish accountability frameworks for all stakeholders, spanning governments and communities, with platforms for engagement and dialogue.

Communities and civil society organizations must have avenues to hold health authorities accountable for delivering person-centered immunization services (17). Transparency and accessible data enable dialogue between communities and institutions, reinforcing mutual trust and responsiveness (14,18). Governance structures that emphasize collaboration with communities and civil society rather than authority create conditions in which vaccination is more aligned with community needs.

Consider establishing (or reinforcing) structures equipped with the capabilities to gather, synthesize, and analyze behavioral and social data on vaccine confidence and uptake.

Establishing such a structure emphasizes how these data affect vaccine uptake and allows for regular use of structured monitoring for identifying and addressing low vaccine coverage or uptake quickly, to address potential vaccine confidence issues before they grow. Ensure connection with broader immunization program monitoring efforts (e.g., Reaching Every District/Reaching Every Community [RED/REC]), and consider connecting this unit with stakeholders responsible for vaccine safety monitoring and response, so that communication functions can be aligned, as needed (see Pillar 7, *Enhance Learning and Feedback Systems* for additional details).

Establish risk communication and community engagement strategies that include clear systems for responding rapidly to misinformation, adverse events, or policy changes that may undermine trust.

These strategies help ensure that real or perceived safety signals, misinformation, or shifts in policy are managed consistently and transparently, minimizing confusion and skepticism. However, they require resources to implement. Ministries may benefit from establishing a dedicated, multi-disciplinary unit with expertise in risk communication, community engagement, social and behavioral research, and infodemic management (19).

Maintain reliable supply chains to uphold continuous, high-quality immunization service delivery across all regions.

Strong vaccine supply chains are essential; without them, there are no vaccines to administer. Countries should strengthen vaccine supply chains to ensure vaccines are available on time and in good condition at the place of administration. Consider promoting integration with other supply chains to support more effective delivery of primary health care (see Pillar 3, *Deliver Person-Centered Immunization Services* for additional details).

Global Exemplars

South Korea's Infodemic Response During the COVID-19 Pandemic

During the COVID-19 pandemic, South Korea delivered a public health response that paired diagnostic testing, contact tracing, and vaccination with robust digital communication. Yet misinformation about vaccines, transmission, and treatment spread rapidly online, threatening public trust. By 2021, online platforms were inundated with false claims, especially about vaccine safety and efficacy, fueling hesitancy and undermining public health messaging. The government faced the challenge of curbing harmful content without overstepping freedom of expression.

Policy and Legal Approach

- ***Targeted legal framework:*** Existing telecommunications and broadcasting laws were amended to allow removal or correction of explicitly false COVID-19 content, particularly misinformation about vaccines, treatment, and disease control measures.
- ***Institutional coordination:*** A "Promotion and Fake News Response Council" united six government agencies for coordinated fact-checking, content takedown, and corrective messaging. The Korea Communications Commission and Korea Internet Self-Governance Organization (KISO) oversaw enforcement, supported by a Vaccine Disinformation Reporting Board for public submissions.
- ***Platform self-governance:*** KISO and major online platforms adopted rules permitting correction or removal of exclusively false content, preserving legitimate debate while preventing blanket censorship.
- ***Public health communication:*** Authorities paired enforcement with proactive, evidence-based messaging delivered through trusted intermediaries like health professionals and community leaders.

Between April and October 2021, KISO acted on 1,538 false online posts, demonstrating significant enforcement reach. The coordinated approach helped contain major disinformation clusters and sustain high vaccine uptake and compliance. The effort also exposed tensions between public health protection and free expression, raising concerns about legal thresholds and its effects on debate.

Key Lessons:

- Legal precision: Narrowly defining harmful health misinformation and linking it to demonstrable risks limits rights infringements.
- Integrated strategies: Enforcement is most effective when combined with trusted public-health communication.
- Cross-agency coordination: Integrating health, communications, and internet-governance bodies ensures faster, more consistent infodemic management.

- Policy adaptability: Flexible, iterative approaches are vital as misinformation and digital ecosystems evolve.

Source: (20) Wasti S, Lee H, Kim H. South Korea's Health Misinformation Response during COVID-19: A Narrative-Thematic Analysis. Asian Bioeth Rev. 2025 Jun 16;17(3):425-448. doi: 10.1007/s41649-024-00323-3. PMID: 40741305; PMCID: PMC12304358.

Pillar 2. Equip a Confident Health Workforce

Health workers are among the most trusted sources of health information for communities, and as such, the interaction between health workers and patients and caregivers play an important role in vaccine decision-making (21). Evidence shows that health workers' confidence in vaccine safety and effectiveness as well as their ability to clearly recommend vaccination strongly influences community trust and uptake (12). Their capacity to listen to concerns and respond with culturally appropriate language, empathy, and respect is also a critical determinant of vaccine acceptance (22). However, many health workers face gaps in training on vaccines and vaccination communication, lack up-to-date information on vaccines, time constraints for consultation, and available resources to support vaccine education activities (23,24). Health workers are tasked with explaining vaccine-related information to patients; however, due to these constraints, they may leave questions unaddressed (12) or discontinue challenging conversations in order to prioritize the provider-patient relationship (23).

In addition, health workers themselves may have concerns that prevent them from getting vaccinated. These concerns may mirror those of their patients and communities, such as fear of possible side effects; low perception of disease risk; and, in some cases, mistrust in health authorities and the pharmaceutical industry (21,24–26). In these situations, some health workers may avoid voicing any vaccine-related concerns, particularly to colleagues, lest they risk being lectured or stigmatized, all of which result in a missed opportunity to address any concerns (27).

Furthermore, when health workers themselves have concerns, they may be less likely to recommend vaccination and less confident in addressing patients' questions, which undermines both their self-efficacy and commitment to vaccine advocacy (28). This dynamic is particularly important in populations where certain cadres are more trusted than others, such as with midwives and pregnant women (21). If the providers who are most trusted are also more hesitant to recommend vaccines, this can contribute to lower uptake (21). Furthermore, if health workers are recommended vaccines because they are at higher risk of contracting or spreading the disease to patients, but do not get vaccinated, this can present as a wider health system continuity risk, especially during outbreaks and emergencies (29). These findings highlight the importance of engaging all health worker cadres in

efforts to strengthen vaccine confidence, with tailored approaches that address the specific concerns and roles of each cadre.

To deliver consistently positive experiences, health workers require supportive conditions at individual, social, and system levels. Their responsibilities have expanded in recent decades, with a larger range of vaccines to administer safely across the life course, more client encounters, and new technologies to adopt (30). Yet many face heavy workloads, irregular or delayed pay, and extended unpaid hours that strain morale and performance. Investing in supportive measures, such as fair compensation, task shifting, mental health services, workplace safety, opportunities for skills development, and strengthened peer and supervisory networks, enhances motivation and well-being (30). Managers play a critical role in creating these conditions by equipping health workers with the resources and support they need, fostering positive work environments, and ensuring regular performance monitoring and improvement (30). When health workers feel valued and equipped, they can provide safe, reliable, and respectful care that fosters community trust and bolsters health system resilience.

With this information in mind, a critical component to building and sustaining vaccine confidence and uptake in countries is to equip a confident health workforce that can recommend vaccines at every appropriate encounter as a pathway to lifting vaccine confidence. It encompasses health workers' own trust in vaccines, their technical knowledge, their communication and listening skills, and the system conditions that enable them to engage meaningfully with patients and communities. It applies to all health worker cadres who shape vaccine decisions, including doctors, nurses, midwives, pharmacists, community health workers, and non-clinical staff who may interact with clients.

Ministries of health can consider the following actions to empower a confident, well-supported workforce, equipped with practical tools and system support, to act as a living pillar of vaccine confidence in every facility and outreach session.

Menu of Potential Actions:

Support health workers' own vaccination and well-being by ensuring easy access to vaccination, clear policies, and supportive workplace norms.

Health facilities should make vaccination for health workers easy, convenient, and free by offering vaccines onsite and during work hours, with flexible scheduling across shifts and options to receive multiple vaccines in a single visit (31). Workplace policies (e.g., mandates) should be clearly communicated, consistently applied, and implemented in a fair and transparent manner to support trust and perceived equity. Consider peer-to-peer engagement through champions and role models within each cadre, along with visible cues such as badges, testimonials, and photo displays, to reinforce positive social norms and help normalize vaccination as part of professional identity and duty of care (25). Structured education, formal training, and transparent communication channels that allow health workers to raise questions and concerns can build trust, strengthen vaccine-related knowledge, and encourage informed vaccine decisions (25). Because vaccine acceptance can vary across occupational groups,

communication should be tailored to reflect the distinct concerns and confidence levels of different cadres (25).

Invest in health worker mental health.

In many countries, the health workforce faces staff shortages, low pay, inadequate and unsafe working conditions, all which can lead to mental health challenges. These challenges become especially acute in emergency contexts where limited time, heavy workloads, and pressure to deliver rapid vaccination can escalate stress (32). Some approaches to support health worker mental health may include education on coping techniques and management of stress, building team unity, or allowing for adjusted work hours (33,34). Consider collaborating with frontline health workers to ascertain needs and develop solutions (34).

Consider task sharing and shifting to alleviate the burden on frontline health workers by leveraging diverse cadres, such as pharmacists and community health workers (CHWs), to deliver vaccinations and engage communities on vaccine topics. In high-income and middle-income countries (HICs and MICs), evidence supports pharmacists' pivotal role due to their accessibility, trust within communities, and training in vaccine administration and counseling, enabling them to address hesitancy through evidence-based discussions, myth correction, and strong recommendations (35,36). Ministries of health could pilot strategies that incorporate non-traditional health worker cadres to enhance reach of immunization services and build trust while aligning with workforce optimization needs.

Create virtual and in-person spaces or communities of practice for health workers to share their own experiences, discuss their own questions and challenges, receive and review evidence updates, and debrief difficult conversations.

Recent research shows that health providers learn techniques to approach vaccine conversations by observing coworkers and discussing with peers (23). Consider collaborating with professional or medical associations, non-governmental organizations, or other entities to host these spaces. Such interventions allow health workers to find reassurance and support and provide a foundation for workplace community amongst health workers (31). It also empowers them to implement more effective interpersonal communications with clients and communities.

Provide regular in-service, mentorship, and supportive supervision that build skills in empathetic, person-centered vaccine communication, leveraging adult learning principles and in-person practice. Offer structured trainings, mentorship, group problem-solving and case discussions to strengthen skills and confidence (37). Review interpersonal communication techniques during supportive supervision visits and ensure that any questions from health workers are addressed.

Review and refine communication strategies designed to share up-to-date immunization guidelines and vaccine information with health workers.

Without clear communication strategies, health workers and organizations may obtain information from a variety of sources, possibly leading to confusion, particularly given the rapidly changing nature of the information environment (24). Countries may consider establishing health worker-specific hotlines or website resource pages to access up-to-date information or updating bi-directional communication channels where health workers can access information

on vaccines and provide insights into vaccine attitudes and questions. Keeping health workers up to date through national training programs and advisory mechanisms helps address misconceptions, alleviate hesitancy, and empower them to serve as confident advocates of immunization (31).

Strengthen institutional support and role clarity by developing, curating and regularly updating a concise, point-of care toolkit for health workers.

Examples of such tools may include conversation guides for common concerns (e.g., safety, effectiveness, side effects); frequently asked questions (FAQs); referral pathways; and visual aids or common scenarios faced in vaccine conversations–designed for use within time constrained consultations (6). Consider that different health cadres may need tools reflective of their roles and the level at which they engage with community members (e.g., health facility, pharmacy, in a community setting–such as during outreach). Schedule opportunities to regularly review and update the tools based on community concerns and health cadres feedback to ensure relevance and usability (28).

Integrate vaccine communication content into pre-service education:

WHO's Standard Competencies Framework for the Immunization Workforce identifies "advocacy and communications" as one of ten core competency domains, which includes the ability to address vaccine hesitancy and misconceptions, particularly at the community level (38). A recent systematic review of immunization-related pre-service training across multiple health worker cadres found that communication and counseling on vaccination were among the most frequently included competencies (39). Given the growing prevalence of vaccine-hesitant clients and caregivers, ministries of health may wish to review and, where needed, strengthen pre-service curricula to align with WHO competencies, current programmatic and health worker needs (23). Updating or introducing content on vaccine development, technology, safety monitoring, and policy, alongside training in person-centered approaches (e.g., motivational interviewing and presumptive dialogue), can better prepare health workers to engage in effective vaccine discussions, build trust, and respond confidently to hesitancy among their patients and in their communities (6,23,24,40).

Global Exemplars

International Pediatric Association (IPA) Vaccine Trust Course: Global Health Worker Training (2020–2021)

To support the reduction of vaccine hesitancy in communities, disseminate information on the value of vaccination, and increase demand for immunization the IPA, launched an international training of trainers in 2018. Through these in-person workshops, they prepared a pool of master trainers, who were then designated to conduct a series of workshops in their respective countries. The project then

planned phase II of the training of master trainers in 2019. However, the COVID-19 pandemc interrupted the in-person events. Responding to the COVID-19 disruptions, IPA transformed their in-person training into a free, self-paced online Vaccine Trust Course in seven languages, ultimately reaching 4,926 registrants from 137 countries.

The course was completed primarily by pediatricians (70%), as well as nurses, and public health professionals. The 8-hour, 7-module program covered infodemiology, behavioral science, interpersonal communication, social media engagement, interacting with vocal vaccine deniers, and media interaction. The format included video lectures, exercises, quizzes, and pre/post surveys, shifting from prior in-person train-the-trainer workshops to online learning.

Three months following the training, 42% of participants responded to a follow-up survey, confirming 90% of them applied skills in their own setting, with 61% reporting increased caregiver empathy, counseling confidence, and patient vaccine acceptance.

Key Lessons:

- Shifting from face-to-face to online training due to the COVID-19 pandemic helped to increase global reach, and multi-language access boosted equity
- Skills translated to trust-building interactions with patients and caregivers, emphasizing pre-service curricula integration, refresher modules (e.g., AEFI, risk communication), and partnerships for non-physician health workers to strengthen frontline vaccine confidence globally.
- Trained health workers reported increased empathy towards caregivers and confidence while counseling; health workers observed vaccine uptake, attributing this to skills gained in the course

Source: (22) Uttekar S, MacDonald N, Orenstein WA, Danchin M, Blaser V, Thomson A, et al. Empowering Health Workers to Build Public Trust in Vaccination: Experience from the International Pediatric Association's Online Vaccine Trust Course, 2020–2021. Vaccine. 2023 Jan;41(2):435–43. doi:10.1016/j.vaccine.2022.11.061

Pillar 3. Deliver Person-Centered Immunization Services

A high-quality, person-centered immunization experience encompasses every aspect of a client's interaction with the health system, from accessibility and convenience to quality of care and satisfaction. It depends on the performance of health workers, the efficiency of service delivery, and the environment in which care is provided.

When vaccines are reliably available, easily accessible, and delivered with respect, clients are more likely to trust the health system and complete their vaccination schedules. Conversely, stockouts, long waits, or discourteous treatment can erode confidence, discourage return visits, and contribute to vaccine hesitancy. A supported, well-equipped health workforce can strengthen immunization service

delivery and enhance client experiences (see Pillar 2, *Equip a Confident Health Workforce* for more details). Frequent, positive interactions with the health system help build trust and health literacy, reinforcing vaccine-seeking behavior and confidence in health services more broadly (41).

Accessibility and affordability of services also shape the immunization service experience and uptake of vaccines. Factors such as facility location, hours of operation, outreach timing, and cost determine how easily clients can reach services (42). As noted in UNICEF's report, *The State of the World's Children 2023: For Every Child, Vaccination,* affordability extends beyond direct costs of care to include transport expenses or lost income from time away from work (43). These challenges vary across rural, urban, and crisis settings, underscoring the need for context-specific strategies to reach every community.

Reliable cold chain and logistics systems are equally foundational to the immunization service because they ensure vaccines are available for use. In some settings, when clients travel long distances, take time off work, or arrange childcare only to find vaccines unavailable, their trust in the health system falters (44). Repeated disruptions can reinforce perceptions of inequity and poor-quality service, ultimately lowering confidence in both vaccination and government institutions (45). Such disruptions can demotivate health workers, who must contend with dissatisfied clients and, in some contexts, personally transport vaccines between facilities at their own expense. Ensuring consistent vaccine availability protects the dignity and experience of both clients and providers while strengthening system reliability.

This pillar emphasizes the design of vaccination services that are accessible, equitable, reliable, and respectful. It considers where and when services are offered, how consistently vaccines are available, and how people are treated during visits. While not all factors influencing service experience can be addressed within immunization programs alone, even small, targeted improvements can reinforce trust and confidence in vaccines, encourage schedule adherence, and contribute meaningfully to overall performance.

Menu of Potential Actions:

Enhance client and community experience through improved service delivery design.

This could include establishing shaded or comfortable waiting areas, visible signage that clearly indicates vaccination services, and separate spaces that allow for privacy. Ministries can also conduct periodic assessments of client flow to identify points of congestion and redesign service delivery layouts to improve efficiency or work. Consider engaging with non-health stakeholders, such as engineers, to consider how to improve efficiency and reduce patient waiting times (46). At the community level, consider co-locating vaccination with other child health services (e.g., nutrition) or community events to foster familiarity and trust (43). To identify culturally relevant service delivery improvements, consider engaging local leaders and women's groups, conducting exit interviews following vaccination visits, or using community scorecards (18,47).

Support health workers to collaborate with trusted community leaders to identify service delivery approaches that best respond to community needs and preferences.

This may involve gathering community and client feedback to improve service experience and to guide decisions about how, when, and where vaccines are offered. In addition to community-based or flexible delivery models, responsiveness can include adapting hours of operation at government and private facilities to accommodate working families, removing or reducing out-of-pocket or hidden costs, and ensuring that all vaccination sites are welcoming and culturally sensitive (48). Such approaches help reach the unreached, including migrants, minority groups, and people living in conflict-affected areas or dense urban settlements, by reducing barriers related to timing, location, and affordability while reinforcing trust and equity in service delivery (42).

Leverage opportunities to integrate immunization into the delivery of other health services or via additional platforms with access to priority populations, such as routine primary health care, antenatal and child health visits, and other community-based or institutional settings (15). For example, evidence from Europe and the United States of America shows that logistical barriers (e.g., inconvenient service points) often prevent women from being vaccinated during pregnancy, while integrating immunization into routine antenatal care improves both convenience and uptake (49). Beyond the health system, integration with other platforms such as schools, daycares, workplaces, or community outreach events can help identify and reach un- or under-immunized individuals, further reducing missed opportunities for vaccination and improving equity in vaccine coverage (12). Integration may also facilitate resource and knowledge sharing across programs and the optimization of health worker training, service delivery costs, and logistics.

Provide ongoing training and mentoring to health workers focusing on pain management during vaccine administration.

Evidence shows that pain from injection or fear of needles are barriers to vaccination, and that addressing pain and fear has the potential to significantly improve vaccination acceptance (50). Ministries may consider implementing additional training or on-the-job mentorship on pain-reduction techniques and client comfort during vaccine administration (51). Alternatively, a supportive supervision model could be established in which experienced mentors observe sessions, provide constructive feedback, and reinforce quality standards and empathetic care (52). Integrating modules on communication skills and management of vaccine hesitancy into existing training curricula further enhances client trust and satisfaction (see Pillar 2, *Building and Supporting a Confident Health Workforce* for more details).

Use digital tools and registries to strengthen program performance and ease health worker workload.

Introduce or expand digital registries that capture individual-level immunization histories to improve the accuracy and continuity of records. These systems can automatically generate reminders and recalls through SMS (text message) or health program dashboards, reducing dropout rates and minimizing the need for manual follow-up (53,54). They can also flag missed doses or missed opportunities for vaccination, helping health workers focus their outreach on children most in need. Combining registry data with geo-mapping or other analytics can guide targeted efforts to reach underserved or hard-to-reach populations (55). For managers, real-time dashboards can track coverage trends, vaccine stocks, and outreach performance.

Ensuring that health workers are trained, supported, and equipped to use these tools is critical for sustained impact.

Strengthen immunization supply chain and logistics systems to maintain continuous vaccine availability.

A reliable vaccine supply and well-functioning cold chain ensure consistent access to vaccines and help ministries remain accountable to communities for immunization services. Poor supply chain and logistics planning can create unmet demand when clients and/or caregivers visit the health facility for vaccination only to find vaccines unavailable. These missed opportunities can undermine confidence and damage program credibility (56). Ministries may consider conducting regular cold chain equipment inventories or implementing quarterly supply chain forecasting reviews to update procurement and distribution needs. Ministries of health may also consider partnering with regional centers of excellence or resource centers in immunization supply chain management to access specialized expertise in research, training, and systems strengthening (57). These resource centers can support advancing effective vaccine logistics, quality assurance, and distribution, contributing to stronger and more resilient immunization programs (57). TechNet: The Global Immunization Network has a repository of technical documents, tools, case studies and a network of immunization professionals available to help create strong vaccine supply chain and logistics systems and is a useful place to start.

Global Exemplars

Using the CARD (Comfort-Ask-Relax-Distract) Approach to Improve the School Vaccination Experience and Uptake

In school-based vaccination programs in Canada, many students experience fear, pain, and stress around injections, which contributes to vaccine refusal, dropout, and negative perceptions of future vaccines. In a region of Ontario, Canada, baseline coverage for HPV, hepatitis B, and meningococcal conjugate-ACYW (MCV) vaccines in grade 7 students was low in some schools, and stress-related reactions (e.g., dizziness, fainting, anxiety) were common concerns for both students and public health staff.

Public health nurses introduced the CARD (Comfort-Ask-Relax-Distract) system as a student-centered, low-cost behavioral strategy to improve the vaccination experience and acceptance.

- **Comfort:** Ensuring physical comfort, clear information, and an option for parental presence.
- **Ask:** Proactively asking students about their fears and preferences.
- **Relax:** Guiding students through slow breathing or grounding techniques.
- **Distract:** Using age-appropriate distraction during the shot (e.g., conversation, breathing focus, or visual cues).

Before vaccination day, nurses delivered brief CARD education sessions in classrooms and included CARD information in parent materials. On vaccination day, nurses applied CARD techniques in a

standardized but flexible way, tailoring support to each student's needs.

The CARD-informed approach improved how students perceived and coped with injections, making the experience feel safer, more predictable, and more manageable. Students reported less fear and pain, and in some cases, noted that the CARD approach positively influenced their decision to get vaccinated.

Key Lessons and Best Practices:

- CARD-style strategies can be embedded into existing school-based programs with minimal infrastructure changes; simple, low-cost techniques make a tangible difference in pain and anxiety.
- Targeting lower-coverage schools for CARD-style support can help close equity gaps where fear-related non-compliance is a recognized barrier.
- Short, focused training and simple checklists (e.g., "ask–relax–distract" prompts) help nurses apply the approach consistently without disrupting workflow.
- Improving the immunization experience at an early age can reduce needle fear for future doses and support broader vaccine acceptance and confidence.

Source: (58) Taddio A, Mulvey K, Gudzak V, Bucci LM, Logeman C, McMurtry CM, et al. Effect of CARD (Comfort-Ask-Relax-Distract) on acceptance of school-based vaccinations: A controlled before and after study. Hum Vaccin Immunother. 2025 Dec 31;21(1). doi:10.1080/21645515.2025.2516180

Reach and Reliability: Vaccination Recovery in Brazil

Brazil's immunization recovery demonstrates how a public program can expand coverage by pairing access innovation with service quality improvement. After years of declining coverage, national and municipal leaders shifted from a narrow clinic-based model to a territorial strategy built on microplanning, school vaccination, extramural outreach, and stronger digital monitoring.

At the national level, the Ministry of Health supported local planning for high-quality vaccination activities, school vaccination, and real-time monitoring through integrated information systems. These efforts were intended not only to raise coverage, but also to identify population needs, allocate resources more effectively, and correct operational gaps as they emerged.

In Rio de Janeiro, the city used georeferenced monitoring to find children missed by routine services, then brought vaccines into schools, shopping centers, transit hubs, stadiums, and mobile units, while also creating exclusive vaccination centers with extended hours. The result was a more flexible system designed to meet families where they were, including in vulnerable and violence-affected areas.

Quality assurance was treated as equally important. The municipality introduced certification for vaccination rooms based on good practices in cold chain, record keeping, safe administration, and client guidance, signaling that coverage gains had to be matched by safe, reliable, and well-documented care. The experience in Rio shows that immunization recovery depends on both reach and quality, supported by strong leadership and coordination across sectors.

Source: (59) United Nations Children's Fund (UNICEF). Vacina, Rio: Reinventing the vaccination strategy.

Pillar 4. Activate Community Partnerships and Norms

Vaccine confidence is deeply embedded within the fabric of social norms and what people believe others around them think and do (60). Vaccine-related decisions rarely occur in isolation; individuals weigh perceived community attitudes, trust in institutions, and the behaviors of peers when forming their own judgments (61). Importantly, these social norms can differ depending on the vaccine and the population in question. For example, norms that strongly support childhood immunization may not extend across the life course to vaccines such as influenza, HPV, or COVID-19. Building trust and shifting these social perceptions requires active engagement with communities themselves. Across diverse settings, partnerships between health providers and trusted local actors (e.g., faith leaders, educators, and grassroots organizations) have proven vital for understanding the influences that shape vaccine acceptance and for co-developing culturally resonant strategies that reinforce positive norms (12). Whether through storytelling campaigns that counter misinformation, provider-led recommendations, or accessible service delivery, meaningful engagement offers insight into local beliefs as well as an avenue for strengthening the social foundations of vaccine confidence.

Community engagement is an important aspect of both global immunization strategies (e.g., Immunization Agenda 2030) and practical guidance for national immunization programs (e.g., Reaching Every District (RED) and Reaching Every Community (REC) approach) (15,62). Evidence suggests that when there is consistent collaboration and mutual investment between the health system and community actors, confidence in the health system grows (16). However, there is no one way to build trusted alliances and community partnerships or to engage them in immunization programs (63). Community engagement can take many forms; it is a dynamic process that operates across contexts and with varying intensities, all which influence the nature and extent of the community partnerships formed and the levels at which they operate (63).

In the context of building vaccine confidence and uptake, building trusted alliances and community partnerships can provide insight into social and behavioral drivers of vaccine confidence and uptake, including social norms, gender-related barriers, practical constraints, and the influence of misinformation and disinformation (64). These partnerships can support the co-development of service delivery or vaccine promotion interventions, strengthening local capacity for health equity, and shifting the dynamic so that they are active contributors to their public health outcomes as opposed to passive recipients (63). They may also take the form of sharing program updates and data back with communities, and updating approaches based on community feedback, paving the way for collective problem solving, and reinforcing transparency in decision-making and accountability (64,65). These relationships can be especially important for harder-to-reach populations, such as migrant or refugee populations, or other populations who are marginalized or vulnerable.

Immunization programs often consider these partnerships as essential for community-level interaction, and they can occur across a range of actors and levels. Examples of potential partners include civil society groups, community and religious leaders, youth and cultural institutions, medical and professional associations, academic institutions, other non-health government entities (e.g., education

sector for child and adolescent vaccination programs), and the private sector. Different types of alliances and partnerships enable health systems to respond effectively in the face of outbreaks, epidemics, pandemics, and adverse events following immunization (AEFI), but also in advance of new vaccine introductions and if there are declines in immunization coverage (66). Ongoing collaborations between health systems and community partners strengthen overall system capacity to withstand shocks, adapt to challenges, and sustain vaccination efforts over time.

To foster strong alliances and community partnerships, ministries should prioritize the following actions and systematically integrate community engagement across all phases of immunization program design, planning, implementation, and monitoring (12):

Menu of Potential Actions:

Conduct ongoing stakeholder mapping at all levels to identify key partners to engage in building vaccine confidence and demand.

This mapping should go beyond the usual actors by proactively seeking new and diverse voices. Ask current partners to recommend others and scan local social media, news, and online sources for emerging groups, influencers, or organizations (2). Mapping stakeholders within and beyond communities can unveil potential partners for the immunization program and help address issues related to vaccine confidence and uptake according to local contexts. For example, respected community and religious leaders and influencers can promote positive immunization conversations, counter negative narratives, and help shape supportive social norms around vaccination. Academia, in turn, can support research on social and behavioral drivers and the identification of context-specific solutions (67).

Include community partners in advisory and coordination immunization program mechanisms.

Embedding community partners (e.g., community leaders, civil society, youth organizations, parent/teacher associations, faith-based groups, professional-academic partners, etc.) into governance structures supports ongoing representation of community perspectives and voices, allows for iteration and flexibility, and paves the way for community-led initiatives to become a standard and sustained practice (16,68). Furthermore, evidence indicates that when communities perceive meaningful involvement in program planning and implementation, their confidence in vaccines may increase (16). Make sure to define clear roles for partners in co-designing strategies, implementing, and monitoring efforts aimed at increasing vaccine confidence.

Include local community members on research teams and leverage participatory action research methods.

Consider using a participatory research approach to explore the behavioral and social drivers of vaccination. Methods such as Photovoice, which combine photography and storytelling to amplify marginalized voices, can help communities articulate their experiences and foster ownership of the data collected. Partnerships between academic institutions and community

organizations can add scientific rigor and research capacity at the local level (69,70). Through participatory approaches, community members engage directly in designing, conducting, and analyzing the assessment, which may include helping define objectives, planning data collection, joining the research team, and sharing findings with local leaders (71). This collaboration often yields deeper insights and stronger community support for the resulting strategies.

Identify tailored interventions with communities to ensure they are culturally relevant and owned by local actors.

Efforts to engage communities in building vaccine demand and uptake should consistently elevate local perspectives and voices (16). This can include intentional incorporation of community partners in existing data review meetings; hosting listening sessions; or utilizing a co-design approach, such as a human-centered design intervention workshop. These co-design approaches ensure interventions evolve collaboratively and build on what has previously worked for them, emphasize equitable and empowering solutions, and create opportunities for trust-building. UNICEF's human-centered design tools offer practical ways to apply this approach. Beyond the initial identification of interventions, consider routinely sharing program data/findings with communities for live adaptation to feedback (71).

Conduct locally tailored social mobilization activities carried out by key community leaders and influencers.

Community engagement and trusted alliances shape pro-vaccination social norms by leveraging peer influence and collective identity. Local organizations and community leaders, faith leaders, and other influencers can translate scientific information into culturally resonant narratives and messages, normalizing vaccination as a shared value rooted in family protection and community solidarity rather than an individual burden. For example, in some contexts, religious groups have resisted vaccines due to concerns about their compatibility with spiritual beliefs (12). In a recent review of public health partnerships with faith-based organizations, where approaches included interfaith learning, training programs, recruiting faith leaders as vaccine ambassadors, and designing faith-sensitive vaccine communication, evidence shows that these partnerships improved vaccine confidence and uptake in marginalized populations (72).

Engage community partners to increase equitable access to vaccines.

This may include working with community leaders and local organizations to determine the best locations, timing and format for immunization sessions (e.g., outreach, mobile, home-based services) or to track those who are due for vaccines to remind them of appointments. It may be encouraging institutional participation through workplace or school vaccination drives and community events, and providing visible symbols of support (e.g., stickers, digital visuals) to encourage uptake with other colleagues or community members (73–76).

Establish or leverage existing community social accountability mechanisms to help monitor performance, provide feedback on service quality, and support corrective action.

Establishing or leveraging existing community social accountability mechanisms can enhance both trust and service responsiveness within immunization programs. When communities are involved through transparent data reporting, participatory planning, and structured dialogue

(e.g., community scorecards, quality improvement teams, or regular feedback sessions), they gain a tangible role in identifying priorities and monitoring service quality (18). This engagement fosters shared ownership and strengthens communication between health workers and community members, helping align services with local needs and expectations. Furthermore, evidence suggests that social accountability mechanisms can enhance community empowerment, transparency, and mutual trust, all of which contribute to more equitable and sustainable immunization systems (77).

Global Exemplars

Community-Based Participatory Research to Understand Immunization Dropout in Rural Mozambique

In Namarroi and Gilé districts, about 19% of children under 2 years start but do not complete the recommended vaccination schedule, amid low provincial coverage. Caregivers face compounded barriers like distance to facilities, social norms burdening mothers, COVID-19 disruptions (e.g., stockouts, reduced outreach), and health system issues in a rural, hard-to-reach area with recent outbreaks of measles and polio.

To address these issues, researchers trained local "Caregiver Researchers" to lead data collection via Photovoice (participants photographed vaccination experiences), in-depth interviews (32 caregivers of partially vs. fully vaccinated children), and SMS exchanges with 12 health workers. Analysis used the WHO Increasing Vaccination Model and the UNICEF Caregiver Journey model to identify barriers across motivation, social processes, and practical issues (pre-, during-, post-service).

The study revealed four barrier patterns leading to dropout: limited family support, poor service quality (e.g., stockouts), side effect fears, and power imbalances with health workers. Fully vaccinated caregivers cited enablers like family accompaniment. Best practices identified include strengthening supply chains, health worker empathy training, reliable outreach brigades, and community-centered communication to boost completion rates.

Key Lessons:

The study shows that community engagement can move research beyond identifying “low uptake” to understanding why it happens in everyday life. It also demonstrates that solutions should be designed with communities, not just for them. The authors recommend stronger logistics to prevent stockouts, improved health worker training and empathic communication, and reliable outreach services for remote communities. In other words, community-informed research can generate interventions that are more realistic, respectful, and likely to be used.

Source: (44) Powelson J, Magadzire BP, Draiva A, Denno D, Ibraimo A, Benate BBL, et al. Determinants of immunisation dropout among children under the age of 2 in Zambézia province, Mozambique: a community-based participatory research study using Photovoice. BMJ Open. 2022 Mar 15;12(3):e057245. doi:10.1136/bmjopen-2021-057245

Fiji Vaccine Champions Program (2022)

Despite vaccination infrastructure, Fiji faced declining confidence in COVID-19 vaccines. Coverage gaps among adults, youth (5-18 years), and communities were exacerbated as boosters were prioritized alongside routine childhood immunization, as well as by post-pandemic hesitancy, misinformation, and a lack of trusted local voices to normalize vaccination.

In partnership with Fiji's Ministry of Health and UNICEF, supported by the Australian Government, the program used a three-phase model to build vaccine confidence:

1. Co-design workshop with stakeholders (government, non-government organizations, community representatives) to tailor content to local gaps and culture.
2. Training for 35 vaccine champions (health workers, faith/village leaders, Fiji rugby and cricket teams, Red Cross, youth) on vaccine education, communication skills (e.g., storytelling), and advocacy.
3. Delivery of 54 community sessions over 6 months, reaching 1,700+ people, emphasizing dialogue over directives.

Champions' knowledge, self-efficacy (confidence in their ability to take action), and COVID-19 vaccine trust improved post-training and community intention to vaccinate jumped from 41% (pre-session) to 83% (post-session). National booster rates rose from 44% to 54% during rollout and sessions sparked peer-sharing ("I also want to be a vaccine champ"), with sustained interest in continuing the program.

Key Lessons:

- Co-design ensures cultural fit (e.g., Pacific storytelling resonates)
- Diverse champions amplify reach and trust across sectors (sports and faith amplify health messages)
- Government buy-in and ongoing support overcome barriers like confidence gaps

Sources:

(78) Kaufman J, Overmars I, Fong J, Tudravu J, Devi R, Volavola L, et al. Training health workers and community influencers to be Vaccine Champions: a mixed-methods RE-AIM evaluation. BMJ Glob Health. 2024 Sep 8;9(9):e015433. doi:10.1136/bmjgh-2024-015433

(79) Australian Regional Immunisation Alliance (ARIA). Community engagement key to Vaccine Champions program in Fiji [Internet]. 2023 [cited 2026 Aug 3]. Available from: https://regionalimmunisationalliance.org.au/community-engagement-key-vaccine-champions-program-fiji

Pillar 5. Foster Healthy Information Ecosystems and Communication

Traditional communication-focused approaches often overlook other key influences on vaccination decision-making and information-seeking, such as social, cultural, and contextual factors (e.g., sex, age, education, income, ethnicity, religion, past experiences, convenience of available services). Furthermore, evidence suggests that a lack of clear, consistent, and culturally relevant public health communication has contributed to confusion and reduced confidence in vaccines (12). To address these gaps, communication approaches need to personalize health information to reflect contextual, social, and structural realities, while also responding directly to individual concerns (6). As such, leveraging behavioral insights—that is, what people think, feel, and experience—to identify and equip trusted messengers and communication platforms to deliver tailored and culturally sensitive information about vaccines can have a profound impact on shaping the vaccine decision-making process (48). In practice, this may mean tailoring vaccine communication to address perceived risk and validate concerns within certain populations, using appropriate language and images representative of the population as well as working with community partners they trust (e.g., civil society organizations, non-governmental organizations, medical associations, religious and traditional leaders, etc.) to design and delivery communication about vaccines (65) (see Pillar 4, *Activate Community Partnerships and Norms* for additional details).

Applying behavioral and social insights to design communication approaches, such as tailoring messages, selecting credible messengers, and choosing effective formats, is essential for informing communities about vaccines, it is equally important to recognize that this information circulates within an existing information ecosystem, much of which lies beyond the direct control of ministries of health. Information ecosystems are complex. They encompass the information sources communities rely on (e.g., television, radio, and digital platforms); shape how information flows within and between communities; and, determine where, how often, and from whom people receive information (80). The health literacy of individuals, defined as their ability of individuals to critically assess and interpret health information, plays a vital role in how vaccine-related messages are understood and acted upon (81). Within today's ecosystem, digital and social media play an especially influential role, accelerating the spread of both credible health information and misinformation, which has created new challenges for sustaining vaccine confidence and demand.

In recent years, the rapid spread of information, rumors, and vaccine-related mis- and disinformation through social media has powerfully shaped public attitudes toward vaccination (13). A 2022 systematic review found that high social media use is the primary global driver of vaccine hesitancy, with particularly strong effects in parts of Asia (82). While digital platforms present valuable opportunities for health promotion and the swift dissemination of credible, behaviorally informed content, they have also enabled the uncontrolled circulation of false and misleading claims about vaccines (13). Monitoring public concerns, rumors, misinformation, and perceptions on these platforms is therefore critical to assessing risks to national immunization programs and guiding timely responses (83). For more details on the online circulation of mis- and disinformation, see the *Spotlight on the Use of Artificial Intelligence*

(AI) and Machine Learning-Enabled Tools for Detection and Monitoring of Online Vaccine Mis- and Disinformation.

Building vaccine confidence requires understanding the broader information ecosystem (e.g., who communicates, on which platforms, and using what narratives) and recognizing it as a dynamic system that can be shaped and leveraged both during routine periods and during outbreaks. These interrelated dynamics underscore the importance of behaviorally informed communication that is proactive and ecosystem-aware to sustain public trust and improve vaccine uptake. The following interventions translate this approach into practice.

Menu of Potential Actions:

Draw on Behavioral and Social Driver (BeSD) data and complementary research to understand the concerns, motivations, social norms, and barriers influencing vaccination.

Use these insights to develop tailored communication and outreach strategies for specific groups (e.g., parents, older adults, workers). Select content and formats (such as narratives or testimonials) that resonate with them and engage trusted messengers and communication channels that can effectively amplify accurate information and encourage vaccine uptake (84). Pilot interventions to assess their effectiveness before scaling, allowing for iterative adjustments and refinement to ensure strategies are responsive, resource-efficient, and evidence-based. In addition, remember that some barriers will require actions beyond communication, such as improving service experience, adjusting vaccine policy, or addressing access barriers. Review the other pillars in this Playbook for a deeper dive into possible actions to take to address system-side barriers influencing vaccine confidence and uptake, and coordinate efforts, as needed.

Treat the information environment as a dynamic system to enable proactive engagement rather than reactive action during crises.

Map the voices, platforms, and algorithms that shape what people see and hear to support ongoing interaction and activation, as needed. Create content that is accurate and credible as well as engaging, well-designed, emotionally resonant, and optimized for the channel through which you plan to share it to counter the compelling, but false, content online. Storytelling narratives are an effective approach (85). Partner with media outlets, digital platforms, and civil society to strengthen the visibility and accessibility of content, including by integrating vaccine topics into broader health programing, rather than focusing solely on labeling or removing false content to build.

Build on or strengthen existing community feedback and social listening mechanisms (online and offline) to monitor public concerns, rumors, misinformation, and perceptions about vaccines. Regularly analyze, triangulate and synthesize these social data to identify populations and geographies demonstrating a change in vaccine confidence and uptake and inform intervention design. Insights from these mechanisms should support continuous learning and refinement of plans in collaboration with key stakeholders.

Invest in health, digital, and media literacy to strengthen people's ability to access, interpret, and apply reliable health information.

Evidence shows that individuals with higher health literacy are less likely to believe vaccine myths, such as misconceptions about safety or immune system overload, and are correspondingly less vaccine hesitant (81). Strengthening digital, news, and health media literacy through age-appropriate education can help people critically assess misinformation, support positive vaccine attitudes, and build resilience into immunization programs and health systems more broadly.

Consider interventions in the information environment that extend beyond communication-only strategies and include policy-level approaches that shape how health information circulates and is governed.

One important avenue to address misinformation about vaccines is the use of policy levers and legal and regulatory frameworks. For example, establishing interministerial teams to coordinate fact-checks, corrections, and guidance across relevant agencies can support rapid and cohesive response to misinformation circulating online (20). Similarly, collaboration with digital-platform regulators can support the removal or correction of false claims, while preserving space for legitimate debate and criticism (20). When paired with strong communication and community engagement, policy tools can help contain mis- and disinformation without resorting to broad censorship, thereby supporting trust and compliance with health programs (20).

Global Exemplars

Short case study: Behavior Integration to Design a Vaccine Confidence Strategy in Southeastern Europe

In Moldova, North Macedonia, and Serbia, COVID-19 vaccination uptake lagged amid high levels of vaccine skepticism, low institutional trust, and practical barriers, especially among priority groups such as pregnant women and people with chronic diseases. The project used the Behavior Integration framework to identify local drivers of hesitancy and co-design a vaccine confidence and demand strategy tailored to each country's context.

The team began with a mixed-methods formative assessment: 21 in-depth interviews with public health and civil society stakeholders, plus online surveys of 2,742 individuals in Moldova and Serbia. Findings showed that the main barriers included: safety concerns, misinformation, distrust in government and media, and some logistical obstacles such as appointment scheduling and time constraints. Motivators for vaccination included concern for personal health, recommendations from health care providers, and social norms such as wanting to travel or knowing others were vaccinated.

Based on these findings, the project built two linked interventions. First, it delivered a continuing medical education course for health care providers to strengthen vaccinology knowledge and communication skills; 2,403 providers took part and post-test results showed improved knowledge and confidence in applying course learnings. Second, the project ran collective engagement workshops for 3,260 chronic disease patients and 842 pregnant women, using discussion, role play, puzzles, and

take-home materials to help participants talk through concerns and make concrete vaccination commitments.

The project used adaptive learning throughout implementation, adjusting the course and workshops based on participant and facilitator feedback. Examples included modularizing the continuing medical education (CME) curriculum, adding information on influenza and measles, reducing SMS frequency in North Macedonia, and involving partners and family members in some Serbian workshops. Follow-up calls found that many participants had taken intermediate steps toward vaccination, and approximately 6.75% reported receiving a COVID-19 vaccine after the workshops.

Key Lessons:

Vaccine demand strategies work best when they are locally grounded, behavior-led, and iterative. This work also shows the value of trusted messengers, interactive provider training, community-based facilitation, and rapid feedback loops for refining implementation in real time.

Source: (86) Mandić-Rajčević S, Cvjetković S, Oot L, Tasevski D, Meghani A, Wallace H, Cotelnic T, Popović D, Ebeling E, Cullen Balogun T, Cogswell L. Using Behavior Integration to Identify Barriers and Motivators for COVID-19 Vaccination and Build a Vaccine Demand and Confidence Strategy in Southeastern Europe. Vaccines (Basel). 2024 Oct 2;12(10):1131. doi: 10.3390/vaccines12101131. PMID: 39460298; PMCID: PMC11511038.

Spotlight:



The Use of Artificial Intelligence (AI) and Machine Learning-Enabled Tools for Detection and Monitoring of Online Vaccine Mis- and Disinformation

In 2025, 74% of the world's population was estimated to have internet access and 82% globally had mobile phones (87). This rapid growth in global connectivity has implications for human health; it enables new channels beyond traditional media (e.g., television and radios) and in-person communication, allowing for more immediate and round-the-clock access to health information. A consequence of the growing online information ecosystem and information seeking is the surge of online mis- and disinformation. While this phenomenon, termed an "infodemic", was thought to primarily coincide with acute public health crises such as disease outbreaks, it is now understood to characterize the broader post-COVID-19 information environment, where persistently high levels of mis- and disinformation have become the norm (88). The current online information ecosystem includes malicious actors such as bots

(automated accounts) and trolls (malicious humans) that amplify negative sentiments and malcontent, and sow discord and confusion through divisive rhetoric, leading to reduced trust in health entities, undermining public health response to crises, and worsening health and wellbeing outcomes (89–91). The ability to rapidly and effectively respond to online mis- and disinformation is a critical public health need.

An area where online mis- and disinformation have had a significant impact is on vaccine uptake (91). Numerous scientific studies and reports have documented increases in online vaccine mis- and disinformation narratives during disease outbreak events, including the COVID-19 pandemic (43). Studies have also established a correlation between exposure to vaccine mis- and disinformation and vaccine skepticism and refusal, making it an area where proactive and responsive strategies are necessary to stem outbreaks and save lives (43,92). In parallel, studies on information sources have examined a role for social media in amplifying online vaccine mis- and disinformation, with factors such as information polarization, echo chambers, and cognitive styles of decision-making affecting vaccination outcomes in response to social media use. The effectiveness of traditional public health communication strategies and efforts to debunk misinformation have been poorly studied, and in some cases, shown to be ineffective (93,94). An approach focused on communication alone also ignores other potential correlates of vaccination decision-making and information seeking behaviors that may be tied to social determinants of health. Hence, newer approaches to communication are warranted that can personalize health information to reflect contextual, social, and structural factors while also being tailored to respond to specific concerns of individuals.

The rise of AI, and greater availability of consumer tools utilizing generative AI, present both challenges and opportunities in the context of online mis- and disinformation. AI-enabled applications such as those that simplify coding, image or video development, and language translation can be used to amplify mis- and disinformation in diverse formats and languages (e.g., via deepfake images and videos, botnets (networks of automated or compromised accounts used to spread content at scale), and malicious agents embedded in social networks) (95). The propensity of generative AI applications to hallucinate (i.e., generate false or misleading information that appears plausible) may also inadvertently generate and propagate misinformation (96). AI-generated content may be as persuasive and difficult to distinguish from human-generated content, exacerbating potential harms (97). AI-enabled chatbots may overly agree with users' views, even when they are inaccurate, which can increase biases and cause psychological and physical harm by reinforcing negative health-related attitudes, practices, and outcomes (98).

On the other hand, AI-enabled tools hold potential to accelerate strategies that parse and respond to online mis- and disinformation. AI, machine learning, and large language model applications represent automated approaches that can be used for real-time monitoring of the immense volume of data generated each day on the web and social media, offering advantages for improving the timeliness and proactivity of public health responses to online mis- and disinformation (99). A systematic review of the literature identified 63 studies that examined the use of AI in response to health misinformation (99). Most studies included in the review coincided with the timeframe during and after the COVID-19 pandemic (2020–2024), and just over half (54%) used AI for online information monitoring and surveillance. AI-enabled

approaches have been applied to scrape and collate online content, monitor and identify emerging and escalating anti-vaccine narratives, and to generate responsive resources that may be used to respond to online mal-narratives (i.e., harmful or misleading narratives). However, key gaps were identified in the review in terms of geographic representativeness of implementations and inclusivity for vulnerable populations. As national governments and health systems look for approaches to address online vaccine-related mis- and disinformation at scale, AI-enabled tools may offer a key opportunity to develop effective tools and strategies to rebuild confidence in vaccines.

Below is a summary of best practices for the use of AI and machine learning-enabled tools for the detection and monitoring of online vaccine mis- and disinformation. They are organized according to the World Health Organization's five-point framework for infodemic management (100).

1. Identifying evidence (collate, review, appraise trusted information)

- Adopt a proactive rather than reactive stance towards monitoring and detecting online mis- and disinformation
- Leverage existing social listening platforms and AI technologies that have been identified using a comprehensive landscape analysis and stakeholder input.
- Use a multipronged strategy for monitoring and detecting online mis- and disinformation, including quantitative and qualitative data collection methods, diverse information sources, and languages.
- Include human oversight in the use of AI tools to help identify and correct potential limitations of AI such as biases, hallucinations, and limited local contextualization of underlying training data.

2. Translating knowledge and science (by developing actionable communication)

- Adopt frameworks that allow triaging of emerging narratives based on threat or risk level such as the UNICEF risk evaluation matrix (101).
- Adopt common taxonomies and frameworks so that narratives and sentiments around online vaccine mis- and disinformation can be described and compared consistently across different groups.
- Develop easy to use reports that include action items and the resources to operationalize actions. For example, public facing materials may use video formats to facilitate comprehension of content and dashboards may be used to make reports more accessible to implementers.

3. Amplifying action (disseminating evidence)

- Partner with trusted entities and individuals to co-create and amplify strategies (e.g., messaging campaigns) in response to online vaccine mis- and disinformation.

- Identify and build on any existing positive sentiments around vaccinations
- Co-implement strategies to promote digital, science, and health literacy to complement strategies for mitigating online vaccine mis- and disinformation.

4. Quantifying impact (tracking trends)

- Establish monitoring and evaluation systems to track the impact of and refine any strategies implemented in response to identified mis- and disinformation.

5. Coordination and governance (from grassroots to the national level and cross sectors)

- Establish a dedicated and permanent information management unit that is responsible for routine monitoring of online vaccine mis- and disinformation trends.
- Establish governance and communication structures to allow for rapid and multisectoral coordination (e.g., with social listening platforms, social and traditional media institutions, healthcare entities, community-based organizations) and develop routine information sharing practices.

Gaps in current applications and opportunities for future innovation

The years during the COVID-19 pandemic saw a steep rise in negative online discourse about vaccines, and in parallel, and increase in the use of social listening tools for detecting and monitoring online vaccine mis- and disinformation. Many, but not all applications identified in the review used off-the-shelf AI and/or machine learning-enabled social listening platforms for the curation of data from diverse sources. However, there were limited instances of the use of AI and machine learning for data synthesis, inference, and response. Large scale applications like WHO EARS, which were stood up with pandemic-era funding, are no longer active. Rigorous evaluations of applications identified in this review are also lacking, and the summary of best practices reflects strategies used broadly but not necessarily tied to robust scientific evidence. Despite these limitations, advances in AI continue in the realms of vaccine research and public health more broadly. Examples relevant to detecting and monitoring online mis- and disinformation include:

- Development of a validated taxonomy of vaccine concerns, which may allow for greater harmonization in the reporting and sharing of social listening data (102).
- Advances in the use of AI-enabled qualitative analysis tools, which may allow more timely insights by speeding up data synthesis and review from textual or other non-numeric data that is common in blogs, websites, and social media (103–107).
- Advances in the use of AI-enabled tools for systematic or other forms of literature reviews that could permit rapid curation of scientific evidence in response to identified mal-narratives (108).

- Advances in generative AI tools that enable conversational applications (e.g., chatbots) for sharing information and answering questions (109,110).
- Advances in tools (e.g., Claude Opus 4.6) for the development of AI agents to automate tasks in the detection and monitoring of online vaccine mis- and disinformation.

These advances hold promise for real-world applications, but some results of their implementation are mixed and human intervention may be necessary to achieve safe use of the AI-enabled tools (106,109). Yet, as part of a more robust public health system, using AI and large language models to continue monitoring and online vaccine discourse is not only beneficial but crucial, given the volume of online information. The COVID-19 pandemic accelerated the use of AI-enabled tools for online mis- and disinformation detection and monitoring through a necessarily reactive approach. However, future efforts should consider a proactive stance that is backed by dedicated teams, funding, rigorous monitoring and evaluation efforts, stakeholder and community engagement, and approaches that overcome current limitations of AI technology.

Global Exemplars

Mapping Vaccine Misinformation Online: Social Listening Insights and Strategic Recommendations in the European Union/European Economic Area (EU/EEA)

The goal of this project was to evaluate the main sources of vaccine misinformation online in the EU/EEA and the current strategies used to address it (94). This then informed an evidence-based tailored strategy recommended to public health authorities. Using Awario, researchers collected social media content, including tweets, digital news sources, open-access blogs and websites, and YouTube videos, based on identified keywords in the main language of each country. Analysis found the proportion of misinformation ranged from 3% in Spain to 12% in the Netherlands and Romania, with COVID-19 misinformation representing a much higher proportion compared to other diseases and vaccines. The identified themes focused on vaccine injuries among children, severe side effects as a result of vaccination, and conspiracy theories. YouTube had the highest share of vaccine misinformation content, with new videos continually being uploaded. Based on these findings, this report highlighted recommendations for action:

- Utilize social listening tools: collecting widespread public discourse cannot be done by hand and social media has only grown in reach and access.
- Routinely monitor social media pages for official sources: if misinformation or concerns are being shared, this can be a good place to share correct information.
- Preemptive interventions: inoculation (i.e., preparing people to recognize and resist misinformation before they encounter it) and promoting health literacy and education.
- Appropriate monitoring and evaluation techniques: adopting a learning-based approach that is flexible and allows for strategies to change based on continued social listening.

Source: (94) de Jongh T, Rofagha B, Petrosova L. Countering online vaccine misinformation in the EU/EEA 2021 [Internet]. Stockholm; 2021 [cited 2026 Mar 31]. Available from: https://www.ecdc.europa.eu/sites/default/files/documents/Countering-online-vaccine-misinformation-in-the-EU-EEA.pdf doi:10.2900/329304

Building Confidence in Routine Childhood Vaccines in Indonesia

In a recent collaboration, UNICEF, Meta, the Yale Institute for Global Health and The Public Good Projects came together to understand public sentiments around childhood vaccinations in Indonesia (111). Contextual research found that Indonesia has seen declines in routine immunization for children since the pandemic, but further work was needed to find out how the public discourse was contributing to this. Using social listening to scour sources like Facebook, Twitter, digital news outlets, and blogs, the collaboration found that the majority of vaccine posts:

- Received positive engagement
- Were written by individuals aged 25–34 years
- Were written by women

Negative sentiments identified focused on the belief that natural immunity is superior and there are safety concerns related to side effects from vaccination.

Strategic messaging campaigns were then developed from the social media data and focused on:

- Building on existing positive sentiment about vaccines
- Targeting the ‘purity’ (natural immunity) concern through values-based messaging
- Testimonials from parents who vaccinate
- Incorporating large-scale vaccine successes

These campaigns were launched with a short survey via Facebook to capture memorability and influence on vaccination attitudes. Ninety-one million people in Indonesia were reached, with more engagement of these ads in low- and medium-coverage areas, highlighting a potential information gap. In areas with lower coverage, content with an emotional component was the preferred strategy, particularly those that featured images of parents with children. By utilizing social listening to generate real community perspectives and concerns, combined with evidence-based communications strategy, a tailored approach can have a positive impact on those who need it most.

Source: (111) UNICEF. From Insights to Impact: Building confidence in routine childhood vaccines in Indonesia CASE STUDY: INDONESIA [Internet]. 2023 Jan 18 [cited 2026 Mar 31]. Available from: https://www.unicef.org/media/133691/file/Indonesia-case-study-Building-confidence-in-routine-childhood-vaccines-2023.pdf

Pillar 6. Strengthen Confidence in Vaccine Safety and Effectiveness

Vaccine-specific factors are among the most frequently cited barriers to vaccine uptake and can either be broad (vaccine-agnostic) or targeted (vaccine-specific), affecting all vaccines or only certain ones. Some vaccine-specific factors that can shape confidence include:

- The timeline over which vaccines were developed
- How much people trust the processes by which vaccines are developed, tested, authorized, and updated
- The country of origin or manufacturer
- The ingredients and specific antigen
- Vaccine administration pathways and dosing schedule
- Perceptions of side effects and long-term safety
- How safe and effective people believe vaccines are
- Beliefs about how well vaccines work (including against new variants or strains)
- Belief that vaccines are not essential for disease prevention or that the vaccine poses more risk than the disease itself (11,26,48)

Confidence in vaccine safety, effectiveness, and development processes is shaped by social, cultural, and contextual factors (e.g., sex, age, education, income, ethnicity, religion, exposure to information, and convenience of available services), all of which influence how people make decisions about vaccine uptake (48,112). It is also shaped by levels of trust in the institutions and actors responsible for developing, approving, and communicating about vaccines, including scientists, pharmaceutical companies, regulators, health systems, and national public health agencies (28,41). (see Pillar 1, *Align Governance and Policy for Vaccine Trust* for additional details). For example, mistrust in pharmaceutical companies around profit motives and transparency about side effects can erode confidence in the vaccines they produce, a pattern observed across diverse contexts and populations (11).

Ultimately, when people have doubt in the vaccine-specific factors listed above, or their vaccine preferences are unmet or ignored, they may delay, refuse, or selectively accept vaccines, even when they are accessible and free (48). Conversely, when they understand how vaccines are developed and monitored, and feel that risks are acknowledged and managed transparently, confidence may be reinforced and they may be more likely to accept recommendations (48).

By treating confidence in vaccine safety, effectiveness, and development processes as a dedicated pillar, national immunization programs acknowledge that clear, transparent, and responsive communication about these vaccine-specific factors is essential to building and sustaining trust in both new and long-standing vaccines. Specific approaches that ministries of health can take to address vaccine-specific factors influencing vaccine confidence and uptake are included below.

Menu of Potential Actions:

Deliver coordinated public education and awareness efforts.

This can include implementing multimedia educational campaigns (posters, radio, TV, social media) to raise awareness about disease risk and the benefits, safety, and effectiveness of vaccines. It may also include conducting community and group education sessions, working with local organizations and community leaders to emphasize disease risks, vaccine protection, and collective responsibility for health. Ensure to tailor messages and materials to diverse social, cultural, and linguistic contexts, in collaboration with community members, to ensure accessibility and relevance (s*ee Pillars 4 and 5 for additional details*).

Promote transparency and trust in vaccine development, regulation, and safety.

Make available information about vaccine development, approval, and safety monitoring processes as well as oversight mechanisms in plain language and with visuals via trusted communication channels and platforms (113,114) Clearly communicate how regulatory authorities and pharmaceutical companies are held accountable, highlighting the roles of independent scientific review and global regulatory standards (61,115). Publicize how the Ministry monitors vaccine safety through ongoing surveillance and proactively share updates if new safety information emerges. Prepare for these events by maintaining and practicing clear communication plans for addressing safety-related rumors and emerging concerns with relevant stakeholders.

Amplify trusted voices and strengthen information integrity.

Identify trusted messengers (e.g., community and religious leaders, scientists, clinicians, public health agencies, etc.) who can share vaccine-related information and endorse vaccines transparently and consistently with communities (41,61). Ensure coordinated messaging to maintain consistent, transparent engagement with the public. Monitor misinformation proactively through collaboration with social media platforms and community organizations, providing real-time corrections and factual updates through trusted channels (see Pillars 4, 5 and 7 for additional details).

Integrate proactive misinformation monitoring and response.

Perceptions of vaccines can shift over time, necessitating continuous monitoring of changes in vaccine uptake. Work with social media platforms and community organizations to identify emerging rumors, provide real-time corrections, and disseminate factual, clear responses using trusted messengers (12) (see Pillar 5, *Foster Healthy Information Ecosystems and Communication* for additional information).

Strengthen health provider communication and counseling.

Equip health workers with accurate, up-to-date vaccine information, including product-specific details, common concerns, and evidence-based responses. Integrate this content into provider training, decision aids, and job materials to support clear, confident vaccine recommendations

at every point of care. Ensure that all messaging and updates are consistent across national, subnational, and frontline levels so communities receive coherent information (see Pillar 2, *Equip a Confident Health Workforce* for additional details).

Global Exemplars

Faith-Based Partnerships: Overcoming COVID-19 Vaccine Hesitancy in Multi-Faith India

India launched one of the world's largest COVID-19 immunization programs in January 2021, targeting over 930 million adults amid high vaccine hesitancy fueled by myths about vaccine safety, limited trust in authorities, and religious concerns, particularly in states with religious minorities and rural vulnerabilities. Despite available COVID-19 vaccine supply uptake lagged with only 13.73% of the 0.93 billion adult target population having been vaccinated between January and September 2021.

John Snow India Pvt. Ltd. (JSIPL) partnered with 18 faith-based organizations (FBOs) and over 400 religious institutions, selecting them based on follower size, crisis responsiveness, and collaboration willingness. Key activities included mapping and documenting FBOs, identifying vaccine champions, capacity-building workshops on COVID-19 science, disseminating leader endorsements via social media and sermons, hosting vaccination camps at worship sites (e.g., mosques during Eid, churches on Sundays), and countering myths during religious gatherings.

Engagement with FBOs facilitated 3,717 vaccination camps across 298 districts, vaccinating 410,881 people by January 2023, with strong results in states like Punjab (160,539 vaccinated) and Nagaland. These efforts boosted community confidence vaccine uptake and created a sustainable network of engaged and trained partners from diverse faiths, fostering longer-term collaboration and ownership in future health crises.

Key Lessons:

- Co-create faith-sensitive messaging early with trusted community leaders to dispel rumors effectively, leveraging behavioral models like WHO's BeSD supports culturally relevant interventions
- Leverage religious events and sites for accessible service delivery.

Source: (116) Soni, G.K.; Bhatnagar, A.; Gupta, A.; Kumari, A.; Arora, S.; Seth, S.; Rastogi, A.; Kanagat, N.; Fields, R. Engaging Faith-Based Organizations for Promoting the Uptake of COVID-19 Vaccine in India: A Case Study of a Multi-Faith Society. *Vaccines* **2023**, *11*, 837. https://doi.org/10.3390/vaccines11040837

Pillar 7. Enhance Learning and Feedback Systems

Sustained vaccine confidence requires that programs continuously learn and adapt, especially in contexts of evolving evidence, changing epidemiology, and dynamic information environments.

Continuous measurement, monitoring, and learning form the backbone of sustained vaccine confidence, and help to transform data into actions that enable immunization programs to adapt. These data provide real-time signals of emerging concerns, information gaps, misinformation trends, and shifts in public attitudes, ensuring programs remain responsive rather than reactive.

For ministries, this means strategic investments in connected and integrated platforms and the incorporation of behavioral data indicators into routine monitoring systems, as well as purposeful measurement and monitoring of specific vaccine confidence-related interventions. This also means improving country capacity in data analysis and building a culture of continuous learning where data feedback loops close across all levels, from communities to the national level (18,117). Routinely track coverage, attitudes, experiences, and hesitancy drivers, then share accessible insights with communities, civil society, and frontline teams. This fosters trust via transparency, responsiveness, and lasting institutional memory for future challenges. This holistic and inclusive approach positions immunization systems as resilient learning organizations capable of sustaining confidence through crises and transitions.

Ministries may adopt the actions below to make collaborative monitoring, evaluation, and learning with stakeholders at all levels the standard practice for sustaining vaccine confidence and uptake.

Menu of Potential Actions:

Integrate behavioral and social data drivers into existing routine data systems.

Ministries may consider incorporating a short list of behavioral and social drivers indicators into existing data collection systems, like regular surveys, alongside coverage and equity metrics (18). WHO's Behavioral and Social Drivers (BeSD) tools demonstrate how standardized behavioral indicators can be incorporated into routine monitoring and evaluation, enabling programs to track trends over time and target interventions to areas of greatest need.

Build integrated, interoperable data systems.

Triangulating existing indicators from immunization programs with behavioral and social drivers data can provide clarity on the reasons behind low coverage (18). Consider linking data from immunization registries, coverage data, AEFI and safety surveillance, disease surveillance, and behavioral and social indicators in ways that allow analysis by geography, population group, and time. The integration of real-time monitoring systems overall and the incorporation of behavioral and social indicators therein allows for the early detection of any changes in vaccine confidence and enables ministries to investigate changes, adapt policies, and refine interventions (13).

Strengthen analytic skills within national immunization programs so teams can interpret and act on data on behavioral and social drivers to vaccination.

To improve and sustain vaccine confidence, it is vital to establish a culture of routine use of social and behavioral data to inform planning, design, and refinement of interventions. In some contexts, analyzing and interpreting social and behavioral data is in beginning stages. In these cases, programs can create continuing education opportunities or focus on learning by doing to enhance their behavioral and social data collection and analysis skills (117). In others, ministries

may consider establishing a behavioral unit into the immunization department or a community of practice, resourced with experts to track, analyze, and interpret behavioral data (117).

Design interventions aimed at building and sustaining vaccine confidence with clear objectives and indicators from the outset.

Consider starting with a small-scale pilot or field testing to assess effectiveness before expanding, particularly if the approach is untested (8). Before scaling, create a monitoring and evaluation plan with targets, milestones, and priority indicators (8). The measurement and monitoring of these activities will be important to show the impact of the intervention and to make changes, as needed.

Leverage and strengthen community feedback and social listening mechanisms (online and offline) to monitor public concerns, rumors, misinformation, and perceptions about vaccines. Data from these mechanisms should be regularly analyzed and used to adapt communication content, inform demand promotion strategies, guide intervention design, identify priority populations and geographies, and support continuous plan refinement in collaboration with national and subnational stakeholders.

Foster inclusive learning loops with communities.

Beyond internal Ministry reviews, it is critical to proactively share findings with communities and frontline staff. Tailor communication materials, formats, and channels to match community values, languages, and preferences—like one-page summaries, infographics, radio spots, or slide decks (71). Verbally presenting results at a community meeting is a simple way to share findings. These partners bring essential perspectives that technical data alone cannot capture; communities understand local barriers and norms; civil society tracks equity gaps; and frontline workers observe implementation realities. Organize joint review sessions with these partners to discuss results, share observations, and propose adaptations together. Deliberate inclusion of these voices ensures program adjustments reflect lived realities, builds ownership across partners, and reinforces that community input and frontline experience are valued data sources. Such collaborative learning can improve vaccine uptake and sustainability, strengthen relationships, and generate adaptive capacity for future challenges.

Treat documentation and dissemination of learning as a core component of any vaccine confidence initiative.

Ministries can approach this practically through multiple channels, even with limited time and resources, such as formal reports for major evaluations; meeting minutes or slide decks from routine program reviews; one-page briefs or infographics highlighting key successes/challenges; or peer exchange sessions at national/subnational technical working groups. Even simple records created during existing platforms (e.g., national immunization program coordination meetings, quarterly reviews, or lessons-learned discussions) build institutional memory, enable course correction, and position programs to contribute to the broader evidence base on vaccination demand promotion. Prioritizing this step, however modest, transforms operational experience into strategic assets for current and future immunization efforts (8).

Global Exemplars

Nepal's Journey to Health and Immunization Framework: Stakeholder-Driven Behaviors and Social Drivers Analysis (2023)

Nepal maintains high childhood vaccination coverage (over 80% in 2022), yet the number of zero-dose children increased from 1% in 2016 to 4% in 2022, especially among urban poor and marginalized groups in areas like Kathmandu. To address this, JSI, UNICEF Nepal, and Dhulikhel Hospital–Kathmandu University School of Medical Sciences, launched a Behavioral Science Center to build practitioner capacity in applying behavioral science to immunization.

The Center strengthened capacity by engaging diverse stakeholders (government officials, health workers, community leaders, caregivers) in formative research (e.g., learning by doing) using the Journey to Health and Immunization Framework. This included conducting in-depth interviews with 52 caregivers and 12 health workers/female community health volunteers and analyzing the information gathered using the JTHI framework. In addition, workshops on human-centered design and JHTI trained Nepal's Ministry of Health and Population staff to identify behavioral and social drivers like access barriers, trust gaps, and decision influences, while distinguishing routine monitoring signals from intervention impacts. In recognition of its value, the JHTI framework was integrated into the government's training curriculum, earning official accreditation. Over 500 individuals from government agencies, partner organizations, and Kathmandu University have received this training.

Applied learning (learning by doing) supported Ministry of Health and Population teams to gain proficiency to independently lead analyses and develop tailored strategies, boosting behavioral science integration into policy and programming. This sustainable, academic-hosted capacity hub enhanced equity, confidence, and adaptive management via routine surveillance, targeted evaluations (e.g., pre/post confidence shifts), and skill institutionalization for ongoing signal detection and refinement.

Source: (117) Castle N, Kunwar S, Khanal L, Oot L, Elkes K, Shrestha S, et al. Using the Journey to Health and Immunization (JTHI) Framework to Engage Stakeholders in Identifying Behavioral and Social Drivers of Routine Immunization in Nepal. Vaccines (Basel). 2023 Nov 10;11(11):1709. doi:10.3390/vaccines11111709

Conclusion

The seven pillars provide ministries of health with a comprehensive framework for building and sustaining vaccine confidence across diverse contexts. By systematically strengthening these interconnected pillars integrating real-time data with social and behavioral insights, national immunization programs can achieve not only higher coverage but also greater resilience against future shocks. As emerging trends like digital misinformation, new vaccine platforms, and shifting demographic priorities reshape public perceptions, forward-looking investment in these pillars will ensure immunization systems remain trusted cornerstones of public health.

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References

1. Eagan RL, Larson HJ, de Figueiredo A. Recent trends in vaccine coverage and confidence: A cause for concern. Hum Vaccin Immunother. 2023 Aug;19(2). doi:10.1080/21645515.2023.2237374

2. U.S. Department of Health and Human Services Centers for Disease Control and Prevention. Rapid Community Assessment Guide.

3. World Health Organization. Behavioural and social drivers of vaccination Tools and practical guidance for achieving high uptake [Internet]. Geneva; 2022 [cited 2026 Oct 3]. Available from: https://iris.who.int/server/api/core/bitstreams/c9f4a77a-001e-477d-a9d1-b05832820b64/content

4. Pan American Health Organization. Behavioral science: Vaccine demand and confidence [Internet]. [cited 2026 Dec 3]. Available from: https://www.paho.org/en/topics/immunization/immunization-toolkit/behavioral-science-vaccine-demand-and-confidence#:~:text=Vaccine%20confidence%2C%20or%20the%20belief,and%20experience%20of%20vaccination%20services.

5. MacDonald NE. Vaccine hesitancy: Definition, scope and determinants. Vaccine. 2015 Aug;33(34):4161–4. doi:10.1016/j.vaccine.2015.04.036

6. Tuckerman J, Kaufman J, Danchin M. Effective Approaches to Combat Vaccine Hesitancy. Pediatric Infectious Disease Journal. 2022 May 8;41(5):e243–5. doi:10.1097/INF.0000000000003499

7. UNICEF. Demand for Health Services Field Guide: A human-centred approach. New York.

8. World Health Organization & United Nations Children's Fund (UNICEF). Human-centred design for tailoring immunization programmes [Internet]. World Health Organization; 2022 [cited 2026 Aug 3]. Available from: https://iris.who.int/handle/10665/354457

9. Kamadjeu R, Wyka K, Kelvin EA. Governance matters: Exploring the impact of governance on routine immunization performance in 54 African countries: A 10-year (2012−2021) analysis using linear mixed models. Vaccine. 2024 Dec;42(26):126293. doi:10.1016/j.vaccine.2024.126293

10. Leblang D, Smith MD, Wesselbaum D. Trust in institutions affects vaccination campaign outcomes. Trans R Soc Trop Med Hyg. 2024 Nov 4;118(11):720–8. doi:10.1093/trstmh/trae048

11. Sapienza A, Falcone R. The Role of Trust in COVID-19 Vaccine Acceptance: Considerations from a Systematic Review. Int J Environ Res Public Health. 2022 Dec 30;20(1):665. doi:10.3390/ijerph20010665

12. Brumbaugh K (Quirk), Gellert F, Mokdad AH. Understanding Vaccine Hesitancy: Insights and Improvement Strategies Drawn from a Multi-Study Review. Vaccines (Basel). 2025 Sep 25;13(10):1003. doi:10.3390/vaccines13101003

13. Kurpas D, Stefanicka–Wojtas D, Soll–Morka A, Lomper K, Uchmanowicz B, Blahova B, et al. Vaccine Hesitancy and Immunization Patterns in Central and Eastern Europe: Sociocultural, Economic, Political, and Digital Influences Across Seven Countries. Risk Manag Healthc Policy. 2025 Jun;Volume 18:1911–34. doi:10.2147/RMHP.S519479

14. Olayinka F, Sauer M, Menning L, Summers D, Wonodi C, Mackay S, et al. Building and sustaining public and political commitment to the value of vaccination: Recommendations for the Immunization Agenda 2030 (Strategic Priority Area 2). Vaccine. 2024 Apr;42:S43–53. doi:10.1016/j.vaccine.2022.11.038

15. World Health Organization. Immunization Agenda 2030: A Global Strategy to Leave No One Behind.

16. Sommers T, Dockery M, Burke N, D'Souza S, Troupe B, Agbonyinma T, et al. Building trust and equity in vaccine communication through community engagement. Hum Vaccin Immunother. 2025 Dec 31;21(1). doi:10.1080/21645515.2025.2518636

17. Olayinka F, Sauer M, Menning L, Summers D, Wonodi C, Mackay S, et al. Building and sustaining public and political commitment to the value of vaccination: Recommendations for the Immunization Agenda 2030 (Strategic Priority Area 2). Vaccine. 2024 Apr;42:S43–53. doi:10.1016/j.vaccine.2022.11.038

18. World Health Organization. Quality Immunization Services: A Planning Guide. Geneva; 2022.

19. World Health Organization. WHO Policy Brief: Building trust through risk communication and community engagement and infodemic management [Internet]. 2024 Dec [cited 2026 Dec 3]. Available from: https://www.who.int/docs/default-source/coronaviruse/policy-briefs/policy-brief_covid-19_rcce.pdf?sfvrsn=ada67c54_4&download=true

20. Wasti S, Lee H, Kim H. South Korea's Health Misinformation Response during COVID-19: A Narrative-Thematic Analysis. Asian Bioeth Rev. 2025 Jul 16;17(3):425–48. doi:10.1007/s41649-024-00323-3

21. Pavlovic D, Sahoo P, Larson HJ, Karafillakis E. Factors influencing healthcare professionals' confidence in vaccination in Europe: a literature review. Hum Vaccin Immunother. 2022 Jan 31;18(1). doi:10.1080/21645515.2022.2041360

22. Uttekar S, MacDonald N, Orenstein WA, Danchin M, Blaser V, Thomson A, et al. Empowering Health Workers to Build Public Trust in Vaccination: Experience from the International Pediatric Association's Online Vaccine Trust Course, 2020–2021. Vaccine. 2023 Jan;41(2):435–43. doi:10.1016/j.vaccine.2022.11.061

23. Holford D, Anderson EC, Biswas A, Garrison A, Fisher H, Brosset E, et al. Healthcare professionals' perceptions of challenges in vaccine communication and training needs: a qualitative study. BMC Primary Care. 2024 Jul 20;25(1):264. doi:10.1186/s12875-024-02509-y

24. Gabellone V, Nuccetelli F, Gabrielli E, Prato R, Lopalco P. Exploring determinants of vaccine hesitancy among healthcare professionals: a systematic literature review. Expert Rev Vaccines. 2026 Dec 31;25(1). doi:10.1080/14760584.2025.2607479

25. McCready JL, Nichol B, Steen M, Unsworth J, Comparcini D, Tomietto M. Understanding the barriers and facilitators of vaccine hesitancy towards the COVID-19 vaccine in healthcare workers and healthcare students worldwide: An Umbrella Review. PLoS One. 2023 Apr 12;18(4):e0280439. doi:10.1371/journal.pone.0280439

26. Siani A, Tranter A. Is vaccine confidence an unexpected victim of the COVID-19 pandemic? Vaccine. 2022 Nov;40(50):7262–9. doi:10.1016/j.vaccine.2022.10.061

27. Heyerdahl LW, Dielen S, Nguyen T, Van Riet C, Kattumana T, Simas C, et al. Doubt at the core: Unspoken vaccine hesitancy among healthcare workers. The Lancet Regional Health - Europe. 2022 Jan;12:100289. doi:10.1016/j.lanepe.2021.100289

28. Verger P, Botelho-Nevers E, Garrison A, Gagnon D, Gagneur A, Gagneux-Brunon A, et al. Vaccine hesitancy in health-care providers in Western countries: a narrative review. Expert Rev Vaccines. 2022 Jul 3;21(7):909–27. doi:10.1080/14760584.2022.2056026

29. Hasan T, Lynch M, King C, Wehbe C, Plymoth M, Islam MS, et al. Vaccine-Preventable Disease Outbreaks Among Healthcare Workers: A Scoping Review. Clinical Infectious Diseases. 2024 Aug 16;79(2):555–61. doi:10.1093/cid/ciae209

30. JSI Research & Training Institute Inc (JSI) & UNCF (UNICEF). Enhancing Service Experience: A Practical Guide for Immunization Managers. Washington, DC; 2026.

31. Utrilla MG, Tan SY, Moore M, Lomazzi M. Exploring the complexities of vaccine sentiment among healthcare and public health professionals: essential strategies for encouraging vaccine uptake. Front Public Health. 2025 May 9;13. doi:10.3389/fpubh.2025.1537255

32. Ghahramani S, Kasraei H, Hayati R, Tabrizi R, Marzaleh MA. Health care workers' mental health in the face of COVID-19: a systematic review and meta-analysis. Int J Psychiatry Clin Pract. 2023 Jun 1;27(2):208–17. doi:10.1080/13651501.2022.2101927

33. Grünheid T, Hazem A. Mental wellbeing of frontline health workers post-pandemic: lessons learned and a way forward. Front Public Health. 2023 Jun 19;11. doi:10.3389/fpubh.2023.1204662

34. Robins-Browne K, Lewis M, Burchill LJ, Gilbert C, Johnson C, O'Donnell M, et al. Interventions to support the mental health and well-being of front-line healthcare workers in hospitals during

pandemics: an evidence review and synthesis. BMJ Open. 2022 Nov 7;12(11):e061317. doi:10.1136/bmjopen-2022-061317

35. Shen AK, Tan ASL. Trust, influence, and community: Why pharmacists and pharmacies are central for addressing vaccine hesitancy. Journal of the American Pharmacists Association. 2022 Jan;62(1):305–8. doi:10.1016/j.japh.2021.10.001

36. Rahim MHA, Dom SHM, Hamzah MSR, Azman SH, Zaharuddin Z, Fahrni ML. Impact of pharmacist interventions on immunisation uptake: a systematic review and meta-analysis. J Pharm Policy Pract. 2024 Dec 31;17(1). doi:10.1080/20523211.2023.2285955

37. Bluestone J, Bryce E, Rowe AK, Ahuja NJ, Murathi WM, Njogu RN, et al. Insights from national stakeholders and health workers on learning and performance interventions in immunisation programs: a multi-country situational analysis. J Glob Health. 2025 Mar 28;15:04109. doi:10.7189/jogh.15.04109

38. World Health Organization. Standard Competencies Framework for the Immunization Workforce Immunization Program Competencies Initiative [Internet]. 2018. Available from: https://www.who.int/immunization/programmes_systems/workforce/standard_competencies_framework/en/

39. Tchoualeu DD, Fleming M, Traicoff DA. A systematic review of pre-service training on vaccination and immunization. Vaccine. 2023 May;41(20):3156–70. doi:10.1016/j.vaccine.2023.03.062

40. Lucas Ramanathan P, Baldesberger N, Dietrich LG, Speranza C, Lüthy A, Buhl A, et al. Health Care Professionals' Interest in Vaccination Training in Switzerland: A Quantitative Survey. Int J Public Health. 2022 Nov 30;67. doi:10.3389/ijph.2022.1604495

41. Arsenault C, Ravishankar S, Lewis T, Armeni P, Croke K, Doubova S V., et al. The role of health systems in shaping vaccine decisions: Insights from Italy, Mexico, the United Kingdom, and the United States. Vaccine. 2025 Apr;54:127134. doi:10.1016/j.vaccine.2025.127134

42. Zimba B, Mpinganjira S, Msosa T, Bickton FM. The urban-poor vaccination: Challenges and strategies in low-and-middle income countries. Hum Vaccin Immunother. 2024 Dec 31;20(1). doi:10.1080/21645515.2023.2295977

43. UNICEF. The State of the World's Children 2023 | UNICEF [Internet]. 2023 [cited 2026 Mar 31]. Available from: https://www.unicef.org/reports/state-worlds-children-2023

44. Powelson J, Magadzire BP, Draiva A, Denno D, Ibraimo A, Benate BBL, et al. Determinants of immunisation dropout among children under the age of 2 in Zambézia province, Mozambique: a community-based participatory research study using Photovoice. BMJ Open. 2022 Mar 15;12(3):e057245. doi:10.1136/bmjopen-2021-057245

45. Wang Q, Leung K, Jit M, Wu JT, Lin L. Global socioeconomic inequalities in vaccination coverage, supply, and confidence. NPJ Vaccines. 2025 May 9;10(1):91. doi:10.1038/s41541-025-01143-8

46. Valladares L, Nino V, Martínez K, Sobek D, Claudio D, Moyce S. Optimizing patient flow, capacity, and performance of COVID-19 vaccination clinics. IISE Trans Healthc Syst Eng. 2022 Oct 2;12(4):275–87. doi:10.1080/24725579.2022.2066740

47. FHI 360. Leveraging Women's Groups: Evidence on pro-equity interventions to improve immunization coverage for zero-dose children and missed communities. Durham, NC; 2023.

48. Landicho J, Bravo TA, Wachinger J, Silvestre C, Bärnighausen K, Scott K, et al. Vaccine preferences and their role for vaccine confidence and uptake: a meta-ethnography. Glob Health Action. 2026 Dec 31;19(1). doi:10.1080/16549716.2025.2588846

49. Razai MS, Mansour R, Ravindran P, Freeman S, Mason-Apps C, Morris J, et al. Facilitators and barriers to vaccination uptake in pregnancy: A qualitative systematic review. PLoS One. 2024 Apr 19;19(4):e0298407. doi:10.1371/journal.pone.0298407

50. Taddio A, McMurtry CM, Logeman C, Gudzak V, de Boer A, Constantin K, et al. Prevalence of pain and fear as barriers to vaccination in children – Systematic review and meta-analysis. Vaccine. 2022 Dec;40(52):7526–37. doi:10.1016/j.vaccine.2022.10.026

51. van Vreeswijk B, Reijneveld SA, Bos-Veneman N. Behavioural determinants of the use of pain-reducing interventions—a survey among professionals who vaccinate children. Eur J Pediatr. 2026 Jan 13;185(2):74. doi:10.1007/s00431-025-06740-2

52. Shorbaji K, Shedul GL, Ripiye N, Ojji D, Hirschhorn LR, Goss CW, et al. The evolution of supportive supervision in low- and middle-income countries. BMC Global and Public Health. 2026 Jan 2;4(1):1. doi:10.1186/s44263-025-00230-1

53. Louw GE, Hohlfeld ASJ, Kalan R, Engel ME. Mobile Phone Text Message Reminders to Improve Vaccination Uptake: A Systematic Review and Meta-Analysis. Vaccines (Basel). 2024 Oct 8;12(10):1151. doi:10.3390/vaccines12101151

54. Rosen K, Krelle H, King WC, Klapheke N, Pina P, Anderman J, et al. Effect of text message reminders to improve paediatric immunisation rates: a randomised controlled quality improvement project. BMJ Qual Saf. 2025 May;34(5):339–48. doi:10.1136/bmjqs-2024-017893

55. FHI 360. GIS Mapping: Evidence on pro-equity interventions to improve immunization coverage for zero-dose children and missed communities. Durham, NC; 2023.

56. Chandra D, Shweta, Yadav AK, Jain V. An integrated framework for managing vaccine supply chain shortages in the child immunization program of India. Comput Ind Eng. 2025 Jul;205:111149. doi:10.1016/j.cie.2025.111149

57. Singh SK, Gupta GK, Agrawal D, Zaidi SHN, Batra J, Sharma L, et al. Leveraging Resource Centers for Strengthening Immunization Supply Chain. Cureus. 2024 Apr 25. doi:10.7759/cureus.58966

58. Taddio A, Mulvey K, Gudzak V, Bucci LM, Logeman C, McMurtry CM, et al. Effect of CARD (Comfort-Ask-Relax-Distract) on acceptance of school-based vaccinations: A controlled before and after study. Hum Vaccin Immunother. 2025 Dec 31;21(1). doi:10.1080/21645515.2025.2516180

59. United Nations Children's Fund (UNICEF). Vacina, Rio: Reinventing the vaccination strategy.

60. Dempsey RC, Wood AM. Perceived Social Norms and Vaccine Hesitancy. Curr Dir Psychol Sci. 2025 Dec 30;34(6):357–64. doi:10.1177/09637214251340023

61. Unfried K, Priebe J. Vaccine hesitancy and trust in sub-Saharan Africa. Sci Rep. 2024 May 13;14(1):10860. doi:10.1038/s41598-024-61205-0

62. WHO Regional Office for Africa. Reaching Every District (RED): A guide to increasing coverage and equity in all communities in the African Region, 2017 Edition. Brazzaville; 2017.

63. Xie YJ, Liao X, Lin M, Yang L, Cheung K, Zhang Q, et al. Community Engagement in Vaccination Promotion: Systematic Review and Meta-Analysis. JMIR Public Health Surveill. 2024 May 10;10:e49695. doi:10.2196/49695

64. O'Brien KL, Lemango E, Nandy R, Lindstrand A. The immunization Agenda 2030: A vision of global impact, reaching all, grounded in the realities of a changing world. Vaccine. 2024 Apr;42:S1–4. doi:10.1016/j.vaccine.2022.02.073

65. Crosby LE, Real FJ, Cunnigham J, Mitchell M. Overcoming Vaccine Hesitancy Using Community-Based Efforts. Pediatr Clin North Am. 2023 Apr;70(2):359–70. doi:10.1016/j.pcl.2022.11.012

66. Vandrevala T, Morrow E, Coates T, Boulton R, Crawshaw AF, O'Dwyer E, et al. Strengthening the relationship between community resilience and health emergency communication: a systematic review. BMC Global and Public Health. 2024 Nov 27;2(1):79. doi:10.1186/s44263-024-00112-y

67. Jeffers A, Kuiper NM, Ramakrishnan A, Swarna H, Goodman K, Gandhi P, et al. Building trust in community-academic partnerships: Strategies for enhancing vaccine confidence and demand – Lessons from Prevention Research Centers. Vaccine. 2025 Jul;60:127624. doi:10.1016/j.vaccine.2025.127624

68. Abad N, Bonner KE, Kolis J, Brookmeyer KA, Voegeli C, Lee JT, et al. Strengthening COVID-19 vaccine confidence & demand during the US COVID-19 emergency response. Vaccine. 2024 Sep;42:125604. doi:10.1016/j.vaccine.2024.01.029

69. Bray LA, Jervis LL, Janitz AE, Ross L, Tallbull G, VanWagoner TM. Toward trustworthy COVID-19 interventions: Building vaccine trust through community-university partnerships. PLoS One. 2024 Mar 27;19(3):e0300872. doi:10.1371/journal.pone.0300872

70. Hara-Hubbard KK, Flores Moreno MG, Sanchez M, Abdi N, Harris JR, Hannon PA, et al. The partnership for vaccine confidence: community-academic partnerships to promote COVID-19 vaccines to underserved urban and rural communities using the listen, plan, act, evaluate process. Vaccine. 2025 Jul;60:127487. doi:10.1016/j.vaccine.2025.127487

71. Allen C, Frankel E, Watanabe-Galloway S, Keeler H, Palm D, Fitzpatrick B, et al. Driving key partner engagement by integrating community-engaged principles into a stakeholder analysis: A qualitative study. J Clin Transl Sci. 2024 Nov 27;8(1):e219. doi:10.1017/cts.2024.665

72. Song MY, Blake-Hepburn D, Karbasi A, Fadel SA, Allin S, Ataullahjan A, et al. Public health partnerships with faith-based organizations to support vaccination uptake among minoritized communities: A scoping review. PLOS Global Public Health. 2024 Jun 5;4(6):e0002765. doi:10.1371/journal.pgph.0002765

73. Gualano MR, Santoro PE, Borrelli I, Rossi MF, Amantea C, Tumminello A, et al. Employee Participation in Workplace Vaccination Campaigns: A Systematic Review and Meta-Analysis. Vaccines (Basel). 2022 Nov 10;10(11):1898. doi:10.3390/vaccines10111898

74. Malik AA, Ahmed N, Shafiq M, Elharake JA, James E, Nyhan K, et al. Behavioral interventions for vaccination uptake: A systematic review and meta-analysis. Health Policy (New York). 2023 Nov;137:104894. doi:10.1016/j.healthpol.2023.104894

75. Boender TS, Louis-Ferdinand N, Duschek G. Digital Visual Communication for Public Health: Design Proposal for a Vaccinated Emoji. J Med Internet Res. 2022 Apr 7;24(4):e35786. doi:10.2196/35786

76. Karing A. Social Signaling and Childhood Immunization: A Field Experiment in Sierra Leone. Q J Econ. 2024 Oct 9;139(4):2083–133. doi:10.1093/qje/qjae025

77. FHI 360. Social accountability: Evidence on pro-equity interventions to improve immunization coverage for zero-dose children and missed communities. Durham, NC; 2023.

78. Kaufman J, Overmars I, Fong J, Tudravu J, Devi R, Volavola L, et al. Training health workers and community influencers to be Vaccine Champions: a mixed-methods RE-AIM evaluation. BMJ Glob Health. 2024 Sep 8;9(9):e015433. doi:10.1136/bmjgh-2024-015433

79. Australian Regional Immunisation Alliance (ARIA). Community engagement key to Vaccine Champions program in Fiji [Internet]. 2023 [cited 2026 Aug 3]. Available from: https://regionalimmunisationalliance.org.au/community-engagement-key-vaccine-champions-program-fiji

80. The UN Refugee Agency. Information Integrity Toolkit: Information ecosystem assessment [Internet]. 2024 [cited 2026 Aug 3]. Available from: https://www.unhcr.org/handbooks/informationintegrity/practical-tools/situation-analysis/information-communication-needs-and-ecosystem-assessments/information-ecosystem-assessment

81. Lubej M, Kirbiš A. Why does health literacy matter, and for whom? Explaining the differentiating impact of health literacy on vaccine attitudes. Front Psychol. 2025 Mar 27;16. doi:10.3389/fpsyg.2025.1470654

82. Okuhara T, Terada M, Okada H, Yokota R, Kiuchi T. Experiences of Public Health Professionals Regarding Crisis Communication During the COVID-19 Pandemic: Systematic Review of Qualitative Studies. JMIR Infodemiology. 2025 Mar 14;5:e66524. doi:10.2196/66524

83. World Health Organization and the United Nations Children's Fund (UNICEF). How to Build An Infodemic Insights Report in Six Steps [Internet]. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF); 2023. Available from: http://apps.who.int/bookorders.

84. Pennisi F, Genovese C, Gianfredi V. Lessons from the COVID-19 Pandemic: Promoting Vaccination and Public Health Resilience, a Narrative Review. Vaccines (Basel). 2024 Aug 7;12(8):891. doi:10.3390/vaccines12080891

85. Ballout S, Darwish SA, Kelly PJ, Keller T, Shegog R, Aboul-Enein BH. The use of storytelling in COVID-19 vaccine promotion: A scoping review of interventions and campaigns. Vaccine. 2026 Feb;72:128098. doi:10.1016/j.vaccine.2025.128098

86. Mandić-Rajčević S, Cvjetković S, Oot L, Tasevski D, Meghani A, Wallace H, et al. Using Behavior Integration to Identify Barriers and Motivators for COVID-19 Vaccination and Build a Vaccine Demand and Confidence Strategy in Southeastern Europe. Vaccines (Basel). 2024 Oct 2;12(10):1131. doi:10.3390/vaccines12101131

87. Measuring digital development: Facts and Figures 2025 - ITU [Internet]. [cited 2026 Mar 31]. Available from: https://www.itu.int/hub/publication/D-IND-ICT_MDD-2025-3/

88. Infodemic [Internet]. [cited 2026 Mar 31]. Available from: https://www.who.int/health-topics/infodemic#tab=tab_1

89. WHO. Infodemic [Internet]. [cited 2026 Mar 31]. Available from: https://www.who.int/health-topics/infodemic#tab=tab_1

90. Broniatowski DA, Jamison AM, Qi SH, AlKulaib L, Chen T, Benton A, et al. Weaponized health communication: Twitter bots and Russian trolls amplify the vaccine debate. Am J Public Health. 2018 Oct 1;108(10):1378–84. doi:10.2105/AJPH.2018.304567 PubMed PMID: 30138075.

91. Do Nascimento IJB, Pizarro AB, Almeida JM, Azzopardi-Muscat N, Gonçalves MA, Björklund M, et al. Infodemics and health misinformation: a systematic review of reviews. Bull World Health Organ. 2022 Sep 1;100(9):544–61. doi:10.2471/BLT.21.287654 PubMed PMID: 36062247.

92. Boatman D, Starkey A, Acciavatti L, Jarrett Z, Allen A, Kennedy-Rea S. Using Social Listening for Digital Public Health Surveillance of Human Papillomavirus Vaccine Misinformation Online: Exploratory Study. JMIR infodemiology. 2024 Mar 8;4(1):e54000. doi:10.2196/54000 PubMed PMID: 38457224.

93. Nyhan B, Reifler J, Richey S, Freed GL. Effective Messages in Vaccine Promotion: A Randomized Trial. Pediatrics. 2014 Apr 1;133(4):e835–42. doi:10.1542/PEDS.2013-2365 PubMed PMID: 24590751.

94. de Jongh T, Rofagha B, Petrosova L. Countering online vaccine misinformation in the EU/EEA 2021 [Internet]. Stockholm; 2021 [cited 2026 Mar 31]. Available from: https://www.ecdc.europa.eu/sites/default/files/documents/Countering-online-vaccine-misinformation-in-the-EU-EEA.pdf doi:10.2900/329304

95. Whyte C. Deepfake news: AI-enabled disinformation as a multi-level public policy challenge. Journal of Cyber Policy. 2020 May 3;5(2):199–217. doi:10.1080/23738871.2020.1797135

96. Shao A. New sources of inaccuracy? A conceptual framework for studying AI hallucinations. Harvard Kennedy School Misinformation Review. 2025 Aug 27;6(4). doi:10.37016/MR-2020-182

97. Huang G, Wang S. Is artificial intelligence more persuasive than humans? A meta-analysis. Journal of Communication. 2023 Dec 14;73(6):552–62. doi:10.1093/JOC/JQAD024

98. Cheng M, Lee C, Khadpe P, Yu S, Han D, Jurafsky D. Sycophantic AI decreases prosocial intentions and promotes dependence. Science (1979). 2026 Mar 26;391(6792). doi:10.1126/SCIENCE.AEC8352

99. Cianciulli A, Santoro E, Manente R, Pacifico A, Quagliarella S, Bruno N, et al. Artificial Intelligence and Digital Technologies Against Health Misinformation: A Scoping Review of Public Health Responses. Healthcare (Switzerland). 2025 Oct 1;13(20):2623. doi:10.3390/HEALTHCARE13202623/S1

100. WHO. World Health Organization [Internet]. 2020 [cited 2026 Mar 31]. p. 1–43. An ad hoc WHO technical consultation managing the COVID-19 infodemic: call for action. Available from: https://iris.who.int/server/api/core/bitstreams/533c8487-eb17-4277-83d7-e46f4c9535e2/content

101. Thomson A, Finnegan G. Vaccine Misinformation Management Field Guide [Internet]. New York; 2020 [cited 2026 Mar 31]. Available from: https://vaccinemisinformation.guide/

102. Stureborg R, Nichols J, Dhingra B, Yang J, Orenstein W, Bednarczyk RA, et al. Development and validation of VaxConcerns: A taxonomy of vaccine concerns and misinformation with

Crowdsource-Viability. Vaccine. 2024 Apr 11;42(10):2672–9. doi:10.1016/j.vaccine.2024.02.081 PubMed PMID: 38521676.

103. Cook DA, Ginsburg S, Sawatsky AP, Kuper A, D'Angelo JD. Artificial Intelligence to Support Qualitative Data Analysis: Promises, Approaches, Pitfalls. Acad Med. 2025 Nov 22;100(10):1134–49. doi:10.1097/ACM.0000000000006134 PubMed PMID: 40560241.

104. Prescott MR, Yeager S, Ham L, Rivera Saldana CD, Serrano V, Narez J, et al. Comparing the Efficacy and Efficiency of Human and Generative AI: Qualitative Thematic Analyses. JMIR AI. 2024;3. doi:10.2196/54482 PubMed PMID: 39094113.

105. Lee VV, van der Lubbe SCC, Goh LH, Valderas JM. Harnessing ChatGPT for Thematic Analysis: Are We Ready? J Med Internet Res. 2024;26. doi:10.2196/54974 PubMed PMID: 38819896.

106. Espinosa L, Salathé M. Use of large language models as a scalable approach to understanding public health discourse. PLOS Digital Health. 2024 Oct 1;3(10):e0000631. doi:10.1371/JOURNAL.PDIG.0000631

107. Tai RH, Bentley LR, Xia X, Sitt JM, Fankhauser SC, Chicas-Mosier AM, et al. An Examination of the Use of Large Language Models to Aid Analysis of Textual Data. bioRxiv. 2024 Jan 9;2023.07.17.549361. doi:10.1101/2023.07.17.549361

108. The Cochrane Collaboration. How is Cochrane advancing responsible AI for evidence synthesis? | Cochrane [Internet]. 2025 [cited 2026 Apr 7]. Available from: https://www.cochrane.org/about-us/news/how-cochrane-advancing-responsible-ai-evidence-synthesis

109. Lee KY, Dabak SV, Kong VH, Park M, Kwok SLL, Silzle M, et al. Effectiveness of chatbots on COVID vaccine confidence and acceptance in Thailand, Hong Kong, and Singapore. npj Digital Medicine 2023 6:1. 2023 May 25;6(1):96-. doi:10.1038/s41746-023-00843-6

110. Passanante A, Pertwee E, Lin L, Lee KY, Wu JT, Larson HJ. Conversational AI and Vaccine Communication: Systematic Review of the Evidence. J Med Internet Res. 2023 Jan 1;25(1):e42758. doi:10.2196/42758 PubMed PMID: 37788057.

111. UNICEF. From Insights to Impact: Building confidence in routine childhood vaccines in Indonesia CASE STUDY: INDONESIA [Internet]. 2023 Jan 18 [cited 2026 Mar 31]. Available from: https://www.unicef.org/media/133691/file/Indonesia-case-study-Building-confidence-in-routine-childhood-vaccines-2023.pdf

112. Kafadar AH, Tekeli GG, Jones KA, Stephan B, Dening T. Determinants for COVID-19 vaccine hesitancy in the general population: a systematic review of reviews. J Public Health (Bangkok). 2023 Nov 19;31(11):1829–45. doi:10.1007/s10389-022-01753-9

113. Shanahan EA, DeLeo RA, Albright EA, Li M, Koebele EA, Taylor K, et al. Visual policy narrative messaging improves COVID-19 vaccine uptake. PNAS Nexus. 2023 Apr 3;2(4). doi:10.1093/pnasnexus/pgad080

114. Penlington M, Goulet P, Metcalfe B. Improving knowledge and trust in vaccines: A survey-based assessment of the potential of the European Union Clinical Trial Regulation No 536/2014 plain language summary to increase health literacy. Vaccine. 2022 Feb;40(6):924–33. doi:10.1016/j.vaccine.2021.12.045

115. Bíró-Nagy A, Szászi ÁJ. The roots of COVID-19 vaccine hesitancy: evidence from Hungary. J Behav Med. 2023 Apr 14;46(1–2):185–200. doi:10.1007/s10865-022-00314-5

116. Soni GK, Bhatnagar A, Gupta A, Kumari A, Arora S, Seth S, et al. Engaging Faith-Based Organizations for Promoting the Uptake of COVID-19 Vaccine in India: A Case Study of a Multi-Faith Society. Vaccines (Basel). 2023 Apr 13;11(4):837. doi:10.3390/vaccines11040837

117. Castle N, Kunwar S, Khanal L, Oot L, Elkes K, Shrestha S, et al. Using the Journey to Health and Immunization (JTHI) Framework to Engage Stakeholders in Identifying Behavioral and Social Drivers of Routine Immunization in Nepal. Vaccines (Basel). 2023 Nov 10;11(11):1709. doi:10.3390/vaccines11111709

118. Stryker C, Kavlakoglu E. What Is Artificial Intelligence (AI)? | IBM [Internet]. [cited 2026 Mar 31]. Available from: https://www.ibm.com/think/topics/artificial-intelligence

119. U.S. Office of the Surgeon General. Confronting Health Misinformation: The U.S. Surgeon General's Advisory on Building a Healthy Information Environment [Internet]. Washington DC: US Department of Health and Human Services; 2021 [cited 2026 Mar 31]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK572166/

120. Wilhelm E, Ballalai I, Belanger ME, Benjamin P, Bertrand-Ferrandis C, Bezbaruah S, et al. Measuring the Burden of Infodemics: Summary of the Methods and Results of the Fifth WHO Infodemic Management Conference. JMIR infodemiology. 2023 Feb 20;3(1):e44207. doi:10.2196/44207 PubMed PMID: 37012998.

121. Boender TS, Schneider PH, Houareau C, Wehrli S, Purnat TD, Ishizumi A, et al. Establishing Infodemic Management in Germany: A Framework for Social Listening and Integrated Analysis to Report Infodemic Insights at the National Public Health Institute. JMIR infodemiology. 2023 Jun 1;3(1):e43646. doi:10.2196/43646 PubMed PMID: 37261891.

122. Stryker C. IBM [Internet]. [cited 2026 Mar 31]. What Are Large Language Models (LLMs)? | IBM. Available from: https://www.ibm.com/think/topics/large-language-models

123. Southwell BG, Brennen JSB, Paquin R, Boudewyns V, Zeng J. Defining and Measuring Scientific Misinformation. Annals of the American Academy of Political and Social Science. 2022 Mar 1;700(1):98–111. doi:10.1177/00027162221084709;WGROUP:STRING:PUBLICATION

124. Kolis J, Brookmeyer K, Chuvileva Y, Voegeli C, Juma S, Ishizumi A, et al. Infodemics and Vaccine Confidence: Protocol for Social Listening and Insight Generation to Inform Action. JMIR Public Health Surveill. 2024;10. doi:10.2196/51909 PubMed PMID: 39447166.

125. Chaney SC, Benjamin P, Mechael P, Healthenabled F. Finding the Signal through the Noise A landscape review and framework to enhance the effective use of digital social listening for immunisation demand generation PROCESS FACILITATED AND REPORT WRITTEN.

126. Lohiniva AL, Nurzhynska A, Hudi AH, Anim B, Aboagye DC. Infodemic Management Using Digital Information and Knowledge Cocreation to Address COVID-19 Vaccine Hesitancy: Case Study From Ghana. JMIR Infodemiology. 2022 Dec 1;2(2):e37134. doi:10.2196/37134 PubMed PMID: 35854815.

127. UNICEF. Tackling the infodemic using conversational insights - Case Study of UNICEF Response in MENA - World | ReliefWeb [Internet]. 2021 [cited 2026 Mar 31]. Available from: https://reliefweb.int/report/world/tackling-infodemic-using-conversational-insights-case-study-unicef-response-mena

128. Public Good Projects. The Public Good Projects [Internet]. [cited 2026 Mar 31]. Case Study: Using Google's COVID-19 Vaccine Search Insights to Increase Vaccine Confidence and Demand Among BIPOC Communities. Available from: https://www.gstatic.com/vsi/pdf/pgp-case-study.pdf

129. O'Connor C, Ayad M. MENA Monitor: Arabic COVID-19 Vaccine Misinformation Online [Internet]. 2021 [cited 2026 Mar 31]. Available from: https://www.isdglobal.org/wp-content/uploads/2021/04/MENA-Covid-Vaccine-Misinformation-Monitor-1.pdf

130. Bonnevie E, Ricciulli V, Fields M, O'Neill R. Lessons Learned From Monitoring Spanish-Language Vaccine Misinformation During the COVID-19 Pandemic. Public Health Rep. 2023 Jul 1;138(4):586–92. doi:10.1177/00333549231168452 PubMed PMID: 37102367.

131. Sommariva S, Mote J, Bon HB, Razafindraibe H, Ratovozanany D, Rasoamanana V, et al. Social Listening in Eastern and Southern Africa, a UNICEF Risk Communication and Community Engagement Strategy to Address the COVID-19 Infodemic. Health Secur. 2021 Jan 1;19(1):57. doi:10.1089/HS.2020.0226 PubMed PMID: 33606573.

Annex 1. Glossary of Terms

Term	Working definition
Artificial Intelligence (AI)	Technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity and autonomy (118).
Behavioral and social drivers of vaccination	Beliefs and experiences specific to vaccination that are potentially modifiable to increase vaccine uptake (3)
Best Practice	• An approach to building or sustaining vaccine confidence that has demonstrated meaningful impact (i.e., increased or sustained reported confidence in recommending or receiving vaccines; increased or sustained uptake/coverage of vaccines) and is both practical and replicable across multiple contexts. • It is supported by a combination of evidence (preferably implementation experience outside of a lab setting), has been applied in more than one setting or country, and shows consistency in outcomes even if not validated through highly controlled study designs. • In assessing best practices, consider both the strength and quality of evidence and the extent of real-world adoption, prioritizing approaches that are feasible, adaptable, and proven in practice rather than only described in theory or limited settings.
Demand promotion	The planning and implementation of the necessary range of interventions needed to achieve high vaccine confidence and uptake (4)
Disinformation	Misinformation that is spread intentionally to serve a malicious purpose, such as to trick people into believing something for financial gain or political advantage (119)
Infodemic	An infodemic is excess information, including false or misleading information, that spreads in digital and physical environments during a public health emergency (120).
Infodemic management	The systematic use of risk- and evidence-based analysis and approaches to manage the infodemic and reduce its impact on health behaviors during health emergencies. Infodemic management aims to enable good health practices through four types of activities: (1) listening to community concerns and questions; (2) promoting

	understanding of risk and health expert advice; (3) building resilience to misinformation; and (4) engaging and empowering communities to take positive action (121)
Large Language Models (LLM)	Large language models (LLMs) are a category of deep learning models trained on immense amounts of data, making them capable of understanding and generating natural language and other types of content to perform a wide range of tasks (122).
Machine Learning	Approaches for creating models by training an algorithm to make predictions or decisions based on data. It encompasses a broad range of techniques that enable computers to learn from and make inferences based on data without being explicitly programmed for specific tasks (118)
Misinformation	Information that is false, inaccurate, or misleading according to the best available evidence at the time (119)
Scientific misinformation	Publicly available information that is misleading or deceptive relative to the best available scientific evidence and that runs contrary to statements by actors or institutions who adhere to scientific principles (123)
Social Listening	Monitoring of different web-based data (e social media) and offline data (traditional media and other sources such as user search trends, epidemiological data, and socio-behavioral data) sources to understand population understanding, perceptions, concerns and questions, information voids, narratives, misinformation and disinformation, and other relevant information about people's reactions to a health topic (121)
Vaccine Confidence	Belief that vaccines are effective, safe, and part of a trustworthy medical system. Low vaccine confidence is distinct from, but may contribute to, vaccine hesitancy (3)
Vaccine Demand	The actions of individuals and communities to seek, support, and/or advocate for vaccines and immunization services (4)
Vaccine Hesitancy	Motivational state of being conflicted about, or opposed to, getting vaccinated; includes intentions and willingness (3)
Vaccine Uptake	The proportion of a population that has received a certain dose of a vaccine in a certain timeframe (4)

Annex 2. Selected Tools to Support Pillar Implementation

Pillar	Tools for Implementation Support
Pillar 2. Equip a Confident Health Workforce	• Strengthening Confidence In Vaccines, Demand For Immunization And Addressing Vaccine Hesitancy: Considerations For Frontline Health Workers • Communicating with Families and Promoting Vaccine Confidence • Strategies for Improving Vaccine Communication and Uptake
Pillar 3. Deliver Person-Centered Immunization Services	• Managing pain during vaccine administration: A training module for health workers • Improving the Vaccination Experience: Learn how to play your CARDs • Improving the Vaccination Experience • Enhancing Service Experience: A Practical Guide for Immunization Managers
Pillar 4. Activate Community Partnerships and Norms	• Fpcc 2024 Faith Guidance Document On Immunisation: Training Faith Leaders On Promoting Childhood Immunisation • Promoting Vaccination: A Toolkit For Collaborating With Faith Communities • On Promoting Childhood Immunisation
Pillar 5. Foster Healthy Information Ecosystems and Communication	• Behavioral and social drivers of vaccination: tools and practical guidance for achieving high uptake [BeSD] • How to Build and Infodemic Insights Report in Six Steps

Annex 3. Supplemental Case Studies on Individual AI-Applications

1. CDC's Insights Unit (124)	
Tool type/strategies	Social listening
Implementing agency	US Centers for Disease Control and Prevention (CDC)
Implementation setting(s)	United States
Goal	To utilize social listening to understand the questions, concerns, mis- and disinformation around COVID-19 vaccination and establish coordinated communications efforts among internal and external agencies and partners.
Data Source	Social media, news outlets, research (literature and surveys), internet trends, calls and email inquiries
Description	A large-scale manual system was established to collect, review, and synthesize qualitative and quantitative data from multiple sources. Relevant data was then analyzed by experts using various frameworks and incorporated into reports for distribution internally and to external partners.
Evidence of impact	By August of 2022, the Insights Unit created and shared 34 reports to over 950 recipients within the CDC and externally. A survey of the report's users found that approximately 75% of respondents found them 'very' or 'extremely' relevant. These reports informed messaging and communications strategy.
Best practices	Establish a dedicated infodemic management unit Create a threat matrix to provide further context to findings and determine possible actions to address dominant and emerging vaccine confidence issues. Use multiple data sources Report format should be easily digestible (e.g., use bulleted lists), included recommended actions, and include resources to help operationalize the report's recommendations
Link	Infodemics and Vaccine Confidence: Protocol for Social Listening and Insight Generation to Inform Action - PubMed

2. Countering online vaccine misinformation in the EU and EEA (94)	
Tool type/strategies	Social listening
Implementing agency	European Centre for Disease Prevention and Control
Implementation setting(s)	European Union and European Economic Area
Goal	To combat misinformation and understand how public health authorities are reacting, a multicomponent strategy was implemented including social listening via Awario.
Data Source	Social media (YouTube, Twitter, etc.) and digital media (news outlets, websites, etc.)
Description	A large-scale system to collect, review, and synthesize qualitative and quantitative data from multiple sources was created. Relevant data was then analyzed by experts using various frameworks and incorporated into reports for distribution internally and to external partners.
Evidence of impact	Not evaluated for efficacy.
Best Practices	Identify a lead organization or standing committee for vaccination monitoring. Utilizing social listening to understand target populations and their messaging needs Develop cross-sector partnerships (e.g., with Twitter) to disseminate interventions
Link	Countering online vaccine misinformation in the EU/EEA

3. Building Confidence in Routine Childhood Vaccines in Indonesia (111)	
Tool type/strategies	Social listening
Implementing agency	UNICEF, META, the Yale Institute for Global Health (YIGH), and the Public Goods Project (PGP)
Implementation setting(s)	Indonesia
Goal	A multi-agency partnership to explore how the use of targeted online communications can build vaccine confidence by first identifying concerns, then designing and testing new campaigns.
Data Source	Social media (Facebook, Twitter, etc.) + digital media (news outlets, etc.)
Description	Insights were generated from public social media content with the help of Meta. This content then informed responsive messaging strategies that were tested and iterated through Facebook campaigns. Finally, a randomized control trial measured impact and reach of these developed campaigns.
Evidence of impact	Two key concerns were identified: natural immunity was reported as superior and safety concerns around side effects of vaccinating. However, the developed campaigns found success when building on existing positive sentiment, incorporating values-based messaging, testimonials, and leveraging stories of success.
Best Practices	Triangulate multiple data sources Partner with local organizations and stakeholders to develop responsive messaging Use monitoring and evaluation studies to test and iterate on campaigns as they are implemented Assess real world impact (vaccine uptake)
Link	Indonesia-case-study-Building-confidence-in-routine-childhood-vaccines-2023.pdf

4. Finding the Signal Through the Noise – Pakistan (125)	
Tool type/strategies	Social listening
Implementing agency	Expanded Programme on Immunization, UNICEF country office and Facebook Data for Good
Implementation setting(s)	Pakistan
Goal	To gather information on trends from multiple digital sources, traditional surveys, a national phone hotline, and standard immunization epidemiological data.
Data Source	Social media, news sources, surveys, feedback from a national phone hotline, chatbots, and epi data.
Description	Multiple digital and non-digital sources were used to collect misinformation trends. Facebook helped to identify trusted sources of online information, digital influencers that could be leveraged, uncovered the demographics of users, and tested content messages.
Evidence of impact	A tailored campaign was successful in reaching intended groups based on demographic findings. Positive sentiment of this campaign remained positive at 42%, neutral at 55%, and negative at 5%. Engagement for the official Expanded Programme on Immunization Facebook page increased.
Best Practices	Use data to identify key influencers on social media, test content of messages, and understand user demographics Establish a sophisticated network of diverse community influencers and disseminate information in multiple formats (online, offline/print, traditional communication) Tailor potential solutions, as there is no one size fits all solution
Link	Finding the Signal through the Noise

5. Infodemic Management in Ghana (126)	
Tool type/strategies	Social listening
Implementing agency	Health Promotion Division of Ghana Health Services (GHS), UNICEF Country Office
Implementation setting(s)	Ghana
Goal	To identify public concerns that may increase vaccine hesitancy and improve compliance with COVID-19 recommendations and safety measures through tailored messaging.
Data Source	Twitter, YouTube, and other open websites
Description	Talkwalker was used to for web-based monitoring of misinformation. Members of the task force for this work then analyzed the identified data for theme, engagement rate and reach, and risk level. These findings were presented biweekly to then formulate appropriate responses that could be distributed via press released, social media, and direct communications.
Evidence of impact	Not evaluated for efficacy.
Best Practices	Routinely monitor the main social media channels; Develop pre-emptive interventions such as inoculation Address health literacy and science education Use appropriate M&E techniques to help authorities adopt a learning-based approach, which allows strategies to be adjusted based on what works and what does not Engage in knowledge co-creation with stakeholders to ensure feasibility and acceptability for local context Establish a dedicated misinformation management task force Use risk classification systems to triage emerging vaccination narratives (e.g., using the UNICEF Risk matrix)
Link	Infodemic Management Using Digital Information and Knowledge Cocreation to Address COVID-19 Vaccine Hesitancy: Case Study From Ghana - PMC

6. Tackling the Infodemic Using Conversational Insights in the Middle East and North Africa (127)	
Tool type/strategies	Social listening + AI enabled natural language processing
Implementing agency	Regional RCCE Interagency Working Group, UNICEF
Implementation setting(s)	Middle East and North Africa
Goal	To proactively address the reasons that are driving people to refuse the COVID-19 vaccine via misinformation detection.
Data Source	Social media
Description	Talkwalker was used to track mention of keywords for COVID-19 misinformation and analyzed for sentiment to understand positive/negative feelings. The country-specific RCCE teams then used these analysis reports to tailor strategies for social media campaigns as well as implementing community-based strategies for information sharing.
Evidence of impact	Multiple strategies showed varying levels of success. For example, a video-focused campaign titled "#TakeCareBeforeYouShare received 155k globally and made information easier to understand via short-form visuals and by highlighting multiple voices (influencers).
Best Practices	Incorporate modalities such as videos that are far better at making information more accessible for everyone. Incorporate multiple voices and perspectives from various parts of the region Increase digital literacy in parallel
Link	Tackling the infodemic using conversational insights - Case Study of UNICEF Response in MENA - World | ReliefWeb

7. Using Google's COVID-19 Vaccine Search Insights to Increase Vaccination Rates Among Communities of Color(128)	
Tool type/strategies	Social listening
Implementing agency	Public Goods Project, Equity First Vaccination Initiative, community-based organizations
Implementation setting(s)	United States
Goal	To develop tailored communication guidance for local community-based organizations based on tracked real-time misinformation and gaps in information spreading online.
Data Source	Social media and digital media (news sites and blogs, online magazines, etc.)
Description	Google's Vaccine Search Insights was used to collect anonymized data broken down into the statewide, city, and zip code level. This data was organized by theme by Google (e.g. eligibility, availability, accessibility, safety) and summarized. Messaging content specific to cities was created via newsletters and shared with community-based organizations to further share information.
Evidence of impact	Not evaluated for efficacy.
Best Practices	Health communications campaigns should be as localized as possible, and can make use of publicly available tools to create real-time data-informed messaging and strategies
Link	Using Google's COVID-19 Vaccine Search Insights to Inform Strategy for a Multi-site Initiative to Increase Covid-19 Vaccination Rates Among Communities of Color

8. WHO Early Artificial Intelligence–Supported Response With Social Listening Platform (EARS) (129)	
Tool type/strategies	Social listening
Implementing agency	World Health Organization
Implementation setting(s)	Global
Goal	To help public health officials combat mis- and disinformation by creating a social listening tool powered by Citibeats that can datascrape and implement natural language processing to understand context.
Data Source	Social media (Facebook, Twitter, etc.) + digital media (news sites, blogs, online forums, etc.)
Description	The EARS (Early AI-supported Response and Social Listening) platform was developed to summarize topics related to COVID-19 that are trending, or on the rise, in approximately 40 countries.
Evidence of impact	Not available
Best Practices	Use AI-enabled applications to boost ability to work with large volumes of data Use taxonomy to analyze narratives and ensure coherence and interoperability across diverse systems and settings
Link	WHO launches pilot of AI-powered public-access social listening tool

9. MENA Monitor: Arabic COVID-19 Vaccine Misinformation Online(129)	
Tool type/strategies	Social listening
Implementing agency	Institute for Strategic Dialogue (ISD)
Implementation setting(s)	Algeria, Egypt, Iraq, Jordan, Türkiye, United Kingdom, Saudi Arabia
Goal	To provide a snapshot of Arabic-language COVID-19 mis- and disinformation spreading on Facebook.
Data Source	Social media (Facebook, Instagram, etc.)
Description	Data was collected using Crowdtangle API and then analyzed by ISD using a bespoke analytical platform with a focus on hate, extremism, conspiracy theories and polarization around COVID-19. Throughout 2021, a series of briefings and reports explaining the key COVID-19 vaccine misinformation themes.
Evidence of impact	There is limited social listening research among Arabic language communities. This project routinely found trending misinformation that was fact-checked by Facebook in English, went unidentified when posted in Arabic, exposing the need for misinformation monitoring for other languages.
Link	MENA-Covid-Vaccine-Misinformation-Monitor-1.pdf

10. Public Good Projects – Spanish Language Vaccine Misinformation During the COVID Pandemic (130)	
Tool type/strategies	Social listening
Implementing agency	Hispanic Communications Network and World Voices Media/Pinyon Foundation in collaboration with Public Good Projects
Implementation setting(s)	United States
Goal	To identify vaccine misinformation reaching Hispanic/Latinx population and use local influencers and Spanish media to tailor content and distribute messaging.
Data Source	Social media (e.g. Facebook, Instagram, Twitter), news sources, blogs, video websites, other websites
Description	Spanish language conversations around COVID-19 vaccines were collected using an AI powered media monitoring software (provided by Zignal Labs, Inc). A list of Spanish terms to detect misinformation was created. Public health experts analyzed this data for source, origin country, and thematic grouping. Strategic communications messaging was developed by the experts to be distributed among community organizations through a weekly newsletter.
Evidence of impact	Not evaluated for efficacy.
Best practices	Address gaps in the availability of social listening applications for underprioritized communities and languages Engage in collaboration with local communities and emphasize community building and empowerment.
Citation/Link	Lessons Learned From Monitoring Spanish-Language Vaccine Misinformation During the COVID-19 Pandemic - PubMed

11. Social Listening in Eastern and Southern Africa, a UNICEF Risk Communication and Community Engagement Strategy (131)	
Tool type/strategies	Social listening
Implementing agency	Africa Infodemic Response Alliance, UNICEF ESARO
Implementation setting(s)	Eastern and Southern Africa (Comoros, Kenya, Madagascar, Malawi, and Zambia)
Goal	To identify vaccine misinformation in the Eastern and Southern African region
Data Source	Hotlines, social media (e.g., Facebook, Instagram, Twitter), radio broadcast, community feedback (varied across countries), SMS and IVR bot
Description	Development of ad hoc monitoring platforms embedded into channels that can collect feedback is helpful considering the social media tools are designed for brand monitoring and business development. Kenya has modified in messaging toward focusing on social obligation and social trust. While in Comoros, it has been adapted to rebuild trust between leaders, health workers and public.
Evidence of impact	Not evaluated for efficacy.
Best practices	Conduct a landscape analysis of existing data sources and leverage them Establish a routine for social listening activities Use a shared taxonomy to facilitate regional coordination Adopt a dissemination model that includes periodic reporting and use of interactive displays Monitor ongoing performance and understand impact of mitigation activities in communities Work with local partners to manage rumors and misinformation Collaboratively build misinformation (digital) literacy
Citation/Link	Social Listening in Eastern and Southern Africa, a UNICEF Risk Communication and Community Engagement Strategy to Address the COVID-19 Infodemic - PMC