Detecting HPV Vaccine Misinformation: Protocol for a living systematic review

Protocol information

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Introduction

Background on HPV and the Importance of Vaccination

Despite global initiatives aimed at increasing vaccine uptake, vaccine-related misinformation continues to pose a significant threat to public health worldwide (PolandandJacobson, 2001; Lee et al., 2022). Vaccine misinformation has emerged as a significant global public health challenge, accelerated by the widespread use of digital technologies and social media platforms that enable the rapid spread of false or misleading information (Calo et al., 2021). The World Health Organization (WHO) has identified the global infodemic as a major threat to effective public health responses, with misinformation contributing to growing vaccine hesitancy worldwide. During the COVID-19 pandemic, misinformation intensified dramatically, demonstrating how quickly false narratives can undermine public trust, distort risk perceptions, and disrupt vaccination programmes (WHO, 2019; Loomba et al., 2021). This globalized flow of misinformation has affected not only COVID-19 vaccines but also other critical vaccines, with anti-vaccine narratives originating in high-income countries now spreading widely throughout Africa, Asia, and Latin America (Wilson and Wiysonge, 2020).

Against this backdrop, the human papillomavirus (HPV) vaccine which is one of the most effective interventions for preventing cervical cancer, has become a particular target of misinformation (Bigaad and Franceschi, 2021). HPV remains the most common sexually transmitted infection, and cervical cancer disproportionately affects women in low and middle income countries (LMICs), which account for nearly 90% of global cervical cancer deaths (WHO, 2023). Although the HPV vaccine has demonstrated safety and efficacy exceeding 90% when administered before becoming sexually active (Drolet et al., 2019), widespread misinformation about fertility, severe side effects, sexual promiscuity, and long term safety continues to undermine vaccine confidence and uptake (Deane et al., 2018). These challenges have been exacerbated by the spillover of COVID-19 misinformation, which has strengthened fears and facilitated the spread of new false claims within HPV vaccine narratives (Puri et al., 2020).

LMICs face particular vulnerability to misinformation due to limited access to authoritative health information, lower digital literacy, sociocultural norms, weak health communication systems, and longstanding mistrust in authorities (Clark et al., 2022). In several LMIC settings, misinformation has led to disruptions in HPV vaccine introduction, refusal outbreaks, and public backlash fueled by local radio, WhatsApp groups, and community influencers (Vraga et al., 2023). Understanding the nature, spread, and impact of this misinformation is essential for developing targeted

interventions, counter-messaging strategies, and public health policies to build confidence, increase vaccination rates, and advance global goals like cervical cancer elimination. Due to the profound implications of misinformation on HPV vaccine acceptance, early detection and monitoring of misinformation across digital, community, and traditional media platforms is essential to safeguarding public trust and ensuring successful vaccination programmes in LMICs. In many settings, these challenges surrounding HPV vaccination are further shaped by broader societal and structural factors, including stigma related to sexually transmitted infections, gender norms influencing decision-making around adolescent girls, and varying levels of trust in health institutions (Berhanu et al.,2025). These contextual influences can make misinformation more persuasive and harder to counter, particularly where official communication systems are weak or fragmented. As a result, ensuring accurate, timely, and culturally appropriate information becomes essential to reinforcing vaccine confidence and supporting the successful rollout of HPV vaccination programmes (Dube et al.,2013).

The Challenge of Vaccine Misinformation

The rapid increase in digital communication channels has made vaccine-related misinformation a major global health threat. Vaccine related misinformation often manifesting as rumors, fake news, disinformation, malinformation, or false narratives reduces public confidence and affects vaccination behaviors (Wilson and Wiysonge, 2020).

In this review, misinformation is defined as: False or unverified information with or without bad intention” (Shiyi et al 2024). This definition is broad enough to encompass diverse forms of misleading content circulating across digital, community, and traditional media environments. In LMICs, where trust in health systems may already be fragile, such misinformation can significantly distort risk perceptions, delay decision-making, and weaken immunization programme performance (Goldstein et al., 2022). HPV vaccination, in particular, has been targeted by narratives focusing on fertility fears, exaggerated side effects, and cultural or religious concerns (Berhanu et al., 2025).

Addressing vaccine misinformation is therefore not only a matter of correcting false claims but also of understanding the underlying social and behavioural dynamics that allow such narratives to take hold. This requires approaches that recognise how concerns about safety, morality, fertility, and trust intersect with local values and everyday communication patterns. In the context of HPV vaccination, these dynamics highlight the importance of strategies that are responsive to community beliefs, sensitive to cultural norms, and grounded in ongoing engagement.

Digital Information Ecosystems and the Amplification of Misinformation

The digitalization of communication combined with the speed and reach of social media platforms such as Facebook, X/Twitter, TikTok, and WhatsApp has amplified the spread of vaccine misinformation (Goldenberg, 2023). Social media algorithms tend to prioritize emotionally charged content, inadvertently elevating sensational or false claims (Cinelli et al., 2020). These dynamics were heightened during the COVID-19 pandemic, which illustrated how misinformation can travel rapidly across borders and across vaccine specific topics, suggesting a highly interconnected information ecosystem (Islam et al., 2021).

For HPV vaccination, misleading posts or viral messages often circulate without validation, shaping parental beliefs and influencing decisions about adolescent vaccination (Stein et al., 2023). Countries with limited digital literacy or poor access to evidence-based content may be particularly vulnerable. The speed and scale at which digital misinformation spreads also means that traditional reactive communication is often insufficient. By the time false claims are identified, they may already have circulated widely through multiple platforms and audiences. This underscores the need for proactive monitoring systems and communication approaches that can identify emerging narratives early, anticipate points of vulnerability, and support timely, coordinated responses that reach audiences before misinformation becomes entrenched

Offline Channels and the Social Spread of Rumors

Beyond digital spaces, misinformation also spreads through offline interpersonal networks. Community discussions, health worker interactions, civil society observations, and call in radio shows are powerful avenues for shaping vaccine attitudes in many LMIC contexts (Robinson et al., 2022). Frontline health workers often serve as trusted sources but can themselves be influenced by misinformation if not adequately trained or supported (Dube et al., 2021). Traditional media such as radio, newspapers, television, remain especially influential in rural and low resource settings, making them critical channels to monitor (Ekezie et al., 2024). These offline pathways highlight that misinformation is not solely a digital phenomenon. Influential community members, informal social networks, and trusted intermediaries can play a central role in shaping public understanding of the HPV vaccine. Due to this, strategies to address misinformation must also consider how beliefs form and spread within households, peer groups, schools, and community spaces, and how local communication traditions can either counteract or reinforce misleading information.

Approaches for Detecting HPV Vaccine Misinformation

Efforts to detect vaccine misinformation increasingly integrate multiple sources of evidence. Digital and social media listening tools enable real time monitoring of online conversations, trends, sentiment, and emerging narratives (Dadzie et al., 2023). Community feedback mechanisms including rapid health worker reporting, community dialogues, and qualitative monitoring provide contextual insights into how misinformation influences behaviours. Traditional media monitoring complements these strategies by tracking narratives disseminated through television, radio, and newspapers. Effective detection systems also include structured engagement and reporting mechanisms to ensure misinformation signals are shared promptly with decision makers, enabling rapid response, coordinated communication, and adaptive risk communication strategies (UNICEF, 2022). Taken together, these approaches illustrate the need for integrated systems that can capture misinformation signals from diverse sources and translate them into actionable insights. Effective detection relies not only on technology, but also on strong coordination between health authorities, communication specialists, and partners working at community and national levels. This integration is essential for ensuring that misinformation trends are recognised early and that responses are aligned, evidence-informed, and context-specific.

Rationale for This Living Systematic Review

Misinformation around HPV vaccines evolves rapidly across digital and offline networks, making static evidence quickly outdated. A living systematic review (LSR) is essential to track emerging narratives, monitor the impact of programmatic changes, and integrate innovations such as AI models, social listening dashboards, and machine learning classifiers in real time. With HPV vaccination scaling up in LMICs toward WHO 2030 cervical cancer elimination goals, timely, actionable evidence is critical for NITAGs, EPI teams, Ministries of Health and Education, and implementing partners to anticipate misinformation and guide communication strategies.

Evidence from LMICs remains fragmented, and current detection methods vary in effectiveness and scalability. A living review consolidates global research, identifies the most feasible detection strategies for LMICs, and ensures coordinated, up-to-date guidance, strengthening responses to misinformation and supporting global HPV vaccination efforts.

This LSR is being produced for the Alive HPV Living Evidence and Knowledge Partnership, read more about the partnership here. The goal of Alive is to transform the global evidence ecosystem into a collaborative and coordinated system that is dynamic, reliable, and efficient in responding to the world's evidence needs.

This project will be governed by a steering committee. See *[Note: link to be added later]* for the involved individuals. The coordination is run by an interorganisational tactical team that ensures smooth progress. The tactical team contains members of the HPV vaccine delivery community and representation from the producers of the evidence. The team commissioned to produce this review is eBASE Africa.

Given the rapidly evolving and context-dependent nature of misinformation, a traditional static review would quickly become outdated. An LSR provides an approach that can continuously incorporate new evidence, track emerging patterns, and support timely decision-making for countries introducing or scaling up HPV vaccination. This is particularly important in LMIC settings, where programmes must often adapt to dynamic information environments, resource constraints, and varying. We currently have funding to keep the review living until early 2027, but are exploring options for sustainability beyond that.

Research questions

Primary Research Question

How can HPV vaccine related misinformation be detected across digital, community, and traditional media platforms?

Secondary Research Questions

1. What methods or systems have been used globally to detect HPV vaccine misinformation across digital, community, and traditional media platforms?
2. How effective are different misinformation detection approaches (e.g., social listening, community feedback systems, traditional media monitoring, religious media monitoring) in identifying early warning signals related to HPV vaccines?
3. What types of HPV misinformation (e.g., fertility fears, safety concerns, sexual promiscuity myths, bulging stomach, insects emerging from the genital area) are detected?
4. What tools, technologies, and analytical techniques (e.g., AI-based monitoring, sentiment analysis, qualitative community feedback) are used to classify and interpret misinformation trends?
5. What contextual, sociocultural, or systemic factors shape the spread and detectability of HPV misinformation in LMICs?

Definition of misinformation

Misinformation is known by many names: misinformation, disinformation, malinformation, rumours, fake news. The definition used in this review is: False or unverified information with or without bad intention (Shiyi et al 2024).

Description of the interventions

This review will consider a broad range of approaches used to detect HPV vaccine misinformation across digital, community, religious and traditional communication environments. The interventions fall into the following categories:

1. Digital and Social Media Listening

   Approaches that monitor online conversations, posts, comments, and trends across platforms such as Facebook, X/Twitter, WhatsApp, TikTok, and other digital forums. These systems may track keywords, sentiment, hashtags, and emerging narratives to identify misinformation in real time. They help detect early warning signals and understand the volume, spread, and nature of HPV-related misinformation circulating online.

2. Community and frontline feedback

   Mechanisms that gather insights from healthcare workers, community leaders, social mobilizers, teachers, parents, religious leaders, adolescents and other local actors. These may include community dialogues, rapid field reporting, qualitative discussions, informal observations, and routine feedback systems embedded in service delivery. Such approaches capture context-specific rumors and concerns that may not appear in digital spaces, particularly in low-resource or rural settings.

3. Traditional media monitoring

   Tracking misinformation trends and narratives disseminated through radio, newspapers, television, and other mass communication channels. In many LMIC settings, traditional media remains a primary source of information and plays a significant role in shaping public attitudes toward HPV vaccination. Monitoring these channels helps identify widely broadcast narratives that may influence public perceptions.

4. Integrated misinformation reporting and response dashboards

   Systems that consolidate information from digital, community, and traditional media sources into a unified platform. These dashboards support the identification, classification, and escalation of misinformation signals. They

enable coordinated decision-making and help ensure that findings are communicated promptly to immunization programmes, risk-communication teams, and relevant authorities.

5. Behavioural and communication response interventions (Indirect Detection)

   Strategies that address misinformation by analysing behavioural responses, public concerns, or communication gaps that emerge in relation to HPV vaccination. These may include audience-specific messaging, targeted communication campaigns, or health worker counselling approaches that reveal the types of misinformation circulating within communities. Although primarily designed to respond to misinformation, these interventions often provide indirect insights into the misinformation landscape.

Engagement and reporting

The primary users of this LSR will be national decision-makers and their advisors, in low- and middle-income countries (LMICs), involved in HPV vaccine planning and delivery, including but not limited to: EPI managers, HPV focals, NITAG members, and implementing partners. However, this LSR has application to policy, program design, and implementation decisions across multiple system levels including for: global normative and financing institutions, such as WHO, Gavi, and UNICEF; regional technical and learning partners; and evidence intermediaries at all levels.

While the review is not intended to replace national decision-making processes, it is designed to support evidence-informed deliberation by ensuring that decision-makers at all levels have access to a continuously updated, contextually relevant synthesis of HPV vaccine delivery evidence related to misinformation detection.

We will facilitate and convene a community of users to engage with, support the dissemination of, and directly use evidence that emerges from the LSR. This community and engagement process will focus on collectively refining a rigorous body of evidence to ensure policy and practice questions are met with timely and context-specific answers.

The community will be engaged through three structures.

- A project Steering Group (SG) which is accountable for the development of a living HPV vaccine delivery evidence base that meets the needs of users. It provides strategic direction and builds legitimacy within the larger project structure. The SG operates at the top of the project governance structure.

- Tactical Group (TG): The TG provides expert guidance and technical oversight to the commissioned production team - eBASE Africa. The TG ensures the development of a robust, high-quality protocol, providing input on PICO frameworks, search strategies, and inclusion criteria and recommending the final base protocol and subsequent major amendments to the SG for formal approval. The Tactical Group is accountable for the quality and currency of the LSR protocol but is not responsible for the operational execution or full dissemination of the LSR itself. The Tactical Group includes membership from the user community, eBASE Africa and Alive.
- Advisory Group (AG): Provides technical input and systems insight to inform the SG's strategic decisions. The AG includes membership from global normative and financing institutions and regional technical and learning partners and evidence intermediaries.

We will establish a free and open data repository to store and manage all data and analyses compiled and generated by the project.

Methods

This study is an LSR and will be updated continually. An LSR is a high quality, up-to-date online synthesis of health research that is updated as data from new relevant research that meets study inclusion criteria becomes available (Elliott et al 2014). This means that, following an initial search from 2000 (GAVI Strategy 1.0) to December 2025, repeat searches will be re-run monthly, any new studies incorporated into the review, and updates will be regularly published. Based on current funding, we anticipate that the last update will be in early 2027, but are exploring options for sustainability beyond that.

The protocol will be registered on PROSPERO. In this protocol, we have considered PRISMA guidance established for LSRs (Akl et al., 2024).

[Note: the methods will be updated to make it clear which methods relate to which research question, once the questions are locked in]

Eligibility criteria

Study types

Inclusion

- Diagnostic accuracy studies

- Studies that utilize a comparative design
- Observational studies
- Mixed-methods studies
- Case studies

Exclusion

- Opinion pieces, commentaries, and editorials without primary data
- Studies that focus on intervention effectiveness but do not explicitly describe detection methods
- Studies without methodological detail

Publication status

Inclusion

- Published studies with both open and closed access
- Grey literature, e.g., reports from WHO, UNICEF, ministries of health, and other credible organisations containing sufficient detail to assess risk of bias and extract data

Exclusion

- Authors of conference abstracts or preprints without peer review or sufficient detail will be contacted for additional information and possible inclusion in a subsequent update.

Concepts

Inclusion

- HPV vaccine-related misinformation detection across any platform (digital, community-based, or traditional media). Any strategy employed for this purpose will be considered, including: website analytics, use of artificial intelligence, media monitoring, infodemic analyses, opinion polls, feedback from community events, patient feedback surveys, and discussion forums
- Detection based on other vaccines (e.g., COVID-19, measles) that are transferable to HPV vaccine contexts

Exclusion

- Studies that focus on vaccine hesitancy or attitudes without describing methods for detecting misinformation

- Studies that focus on countering misinformation without addressing detection methods

Participants

Inclusion

- Studies involving any human population exposed to or generating misinformation that is related to vaccines

Exclusion

- No specific human groups will be excluded
- Animal studies

Geographical context

Inclusion

- Global

Exclusion

- None

Language

Inclusion

- Studies published in English or French

Exclusion

- Languages other than English or French

Year

Inclusion

- Studies published from 2000 (GAVI strategy 1.0)

Exclusion

- Studies published before 2000

Search and screening

Search strategy

A comprehensive search strategy will be developed in collaboration with an information specialist. The search strategy will aim to locate both published and unpublished studies from 2000 onwards, representing the year when the HPV vaccine was introduced. Searches will be performed in the following electronic databases: MEDLINE (PubMed), Embase, Web of Science, Scopus, CINAHL, PsycINFO, EBSCO, Taylor and Francis, ProQuest, and the Cochrane Library. Grey literature will be searched via Google Scholar, Open Alex, WHO IRIS, UNICEF, WHO and Gavi repositories. The search will combine MeSH terms (for controlled vocabulary) with free-text keywords to account for evolving terminology in misinformation research. The strategy will incorporate truncation, wildcards, and proximity operators where supported, and will be adapted for each database. This strategy is presented in Appendix 1.

Title and abstract screening

Following the search, all identified citations will be collated and uploaded into EPPI Reviewer, a web application that enables researchers to manage the entire lifecycle of a review in a single location (Thomas et al., 2023), and duplicates removed. Following a pilot test, titles and abstracts will then be screened by two independent reviewers for assessment against the inclusion criteria for the review. Any disagreements will be resolved by a third reviewer or through team discussions.

A subset of items from the pilot test, that have been double screened and reconciled by two reviewers, will be used to iteratively develop and test the use of Large Language Models (LLMs) for screening. Prompts will be developed using the inclusion and exclusion criteria for the review and run in EPPI Reviewer using the integrated OpenAI GPT-4.1 model. The performance of the LLM will be evaluated by comparing it to the gold standard human reviewer judgements to determine the accuracy of the model in correctly including and excluding citations. Once the prompt has been refined and evaluated to accurately achieve above .95 recall, it will be deployed on all remaining unscreened citations. A 10% random selection of records will then be screened by an independent human reviewer to calculate agreement with the LLM, after which all included citations will be screened by an independent reviewer.

Full text screening

Two reviewers will independently assess the full text of studies retained after title and abstract screening. Discrepancies will be resolved by a third reviewer, or through team discussions. Reasons for exclusion will be documented. The results of the search and the selection process will be illustrated on a PRISMA flow diagram.

Data extraction

Data will be extracted using a standardized form (see Appendix 2 for the data extraction form). For each study retained after full-text screening, one reviewer will extract the data and a second reviewer will verify the data for accuracy and completeness.

Using a subset of studies with data extraction verified by two reviewers, LLM prompts will be iteratively developed and tested for all items on the data extraction form using the integrated OpenAI GPT-4.1 model within EPPI Reviewer. The prompts will be applied to all studies included at full text with a 10% random subset double screened by a human reviewer. If agreement is above 95%, the LLM will extract the remaining studies and then verified by a human reviewer for accuracy and completeness.

The extraction form will include details on the following areas:

- Study characteristics: author, year, country, setting, study design, aim, funding.
- Detection method: digital/social media listening, community feedback, traditional media monitoring.
- Type of misinformation detected (fertility fears, safety concerns, sexual promiscuity myths, etc.)
- Outcomes related to detection effectiveness or utility
- Contextual factors influencing detection (eg, digital literacy, sociocultural norms)
- Key findings and conclusions

Risk of bias

To ensure trustworthiness, relevance, and data integrity, we will assess the risk of bias in all included studies using the Joanna Briggs Institute (JBI) critical appraisal tools. These tools accommodate a wide range of study designs, including qualitative, quantitative, observational, and mixed-methods research. Two reviewers will independently conduct the appraisal, with any disagreements resolved through discussion or consultation with a third reviewer. For this LSR, RoB assessments will be updated as new studies are incorporated. The results will be presented in summary tables and will inform the interpretation of findings and the overall confidence placed in the body of evidence.

Analysis

A narrative synthesis will be the primary method of analysis, given the expected heterogeneity in study designs, detection methods, platforms, and contexts. The synthesis will be structured around the review's specific questions.Studies will be grouped and described by:

- Method of detection
- Types of misinformation detected
- Technology/tools used
- Geographical area and income-level of countries concerned
- Effectiveness or utility for public health decision-making

If a sufficient number of homogeneous studies report comparable quantitative outcome measures (e.g., proportion of posts containing misinformation, detection rate), then a meta-analysis will be performed. For instance, if we find sufficient diagnostic accuracy studies, then a bivariate random-effects meta-analysis will be used to estimate pooled sensitivity and specificity. Also, hierarchical summary receiver operating characteristic (HSROC) curves will be generated and forest plots will display individual study estimates and pooled estimates with 95% confidence intervals.

Certainty assessment

Certainty of the evidence of effect will be assessed using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach. The GRADE approach offers a structured framework for assessing the certainty of a wide range of different evidence types and supporting healthcare decision-making (Neumann I, Schünemann H (Editors) 2024).

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Appendices

Appendix 1. Search Strategy

MeSH Terms

Category	MeSH Terms
HPV and Vaccines	"Papillomavirus vaccines"[Mesh]; "Human papillomavirus 0"[Mesh]; "Vaccines"[Mesh]; "COVID-19 Vaccines"[Mesh]; "Measles vaccine"[Mesh]; "Influenza vaccines"[Mesh]
Misinformation	"Health misinformation"[Mesh]; "Communication barriers"[Mesh]; "Health communication"[Mesh]; "Social media"[Mesh]; "Consumer health information"[Mesh]; "Vaccine hesitancy"[Mesh]
Detection/Monitoring	"Data mining"[Mesh]; "Natural language processing"[Mesh]; "Machine learning"[Mesh]; "Sentinel surveillance"[Mesh]; "Population surveillance"[Mesh]; "Mass media"[Mesh]; "Public health surveillance"[Mesh]

Keywords

- HPV and Vaccines: HPV vaccine*, Gardasil*, Cervarix*, papillomavirus vaccine*, COVID* vaccine*, measles vaccine*, influenza vaccine*, "vaccine*", "immunization*", "vaccination program*"
- Misinformation Variants: misinform*, disinfor*, "fake news", rumor*, rumour*, "false information", hoax*, myth*, "anti-vaccine", antivax*, hesitancy, "vaccine scare*", "vaccine safety" , "infodemic*"
- Detection Methods: detect*, monitor*, surveill*, "social listening", "infodemiology", "infoveillance", "sentiment analy*", "topic model*", AI, "artificial intelligence", "machine learning", "natural language processing", NLP, "data mining", "content analysis"
- Platforms/Channels: "social media", Twitter, X, Facebook, Instagram, TikTok, WhatsApp, Reddit, Telegram, "traditional media", radio, newspaper*, television, "community feedback"

Search string (PubMed)

(
("Papillomavirus Vaccines"[Mesh] OR "Papillomavirus Infections/prevention and control"[Mesh] OR "Papillomavirus Vaccines"[tiab] OR HPV[tiab] OR Gardasil*[tiab] OR Cervarix*[tiab] OR "HPV vaccine*"[tiab])
OR
("Vaccines"[Mesh] OR "COVID-19 Vaccines"[Mesh] OR "Measles Vaccine"[Mesh] OR "Influenza Vaccines"[Mesh] OR COVID*[tiab] OR measles[tiab] OR influenza[tiab] OR "vaccine*"[tiab] OR vaccination[tiab] OR immunization[tiab])
)
AND
("Health Misinformation"[Mesh] OR "Vaccine Hesitancy"[Mesh] OR "Communication Barriers"[Mesh] OR "Health Communication"[Mesh] OR "Social Media"[Mesh] OR misinform*[tiab] OR disinfor*[tiab] OR "fake news"[tiab] OR rumor*[tiab] OR rumour*[tiab] OR "false information"[tiab] OR hoax*[tiab] OR myth*[tiab] OR "anti-vaccine"[tiab] OR antivax*[tiab] OR hesitancy[tiab] OR "vaccine scare*"[tiab])
AND
("Data Mining"[Mesh] OR "Natural Language Processing"[Mesh] OR "Machine Learning"[Mesh] OR "Population Surveillance"[Mesh] OR "Mass Media"[Mesh] OR "Public Health Surveillance"[Mesh] OR detect*[tiab] OR monitor*[tiab] OR surveill*[tiab] OR "social listening"[tiab] OR infodemiolog*[tiab] OR infoveillance[tiab] OR "sentiment analy*"[tiab] OR "topic model*"[tiab] OR AI[tiab] OR "artificial intelligence"[tiab] OR "machine learning"[tiab] OR NLP[tiab] OR "content analy*"[tiab])

Appendix 2. Data Extraction Form

1. General Study Information

- Authors
- Year of Publication
- Title
- Country / Region
- Study Setting (Global, HIC, LMIC, rural, urban)

2. Study Characteristics

- Study Design (qualitative, quantitative, mixed methods, case study, surveillance report, evaluation study, cross-sectional, etc.)
- Population / Sample (platform users, community members, general public, health workers)

3. Misinformation Detection Methods Used

- Type of Detection System
- Platforms Monitored
  (Facebook, X/Twitter, TikTok, WhatsApp, radio, TV, newspapers, community meetings)
- Detection Frequency (real-time, daily, weekly, ad hoc)

4. Tools, Technologies and Analytical Techniques

- Technologies Used
- Analytical Techniques
- Automation Level (Manual, Semi-automated, Fully automated)

5. Types of HPV Misinformation Detected

- Fertility myths
- Safety concerns
- Sexual promiscuity myths
- Conspiracy theories (population control, Western plot, etc.)
- Religious or cultural objections
- Moral concerns
- Vaccine ingredient misconceptions
- Program-related misinformation (free vaccines are dangerous, fake vaccines circulating)

6. Effectiveness of Detection Approaches

- Effectiveness Measures Reported
- Strengths of the Approach
- Limitations of the Approach
- Comparison of Methods

7. Integration into Immunization Programmes

- How Findings Were Used
- Decision-Making Integration
- Feedback Loops Established

8. Contextual and Sociocultural Factors

- Cultural Factors
- Social Factors
- Systemic Factors
- LMIC-Specific Challenges Identified
- Equity Considerations

9. Quality and Risk of Bias Assessment

- Assessment Tool Used (MMAT, CASP, ROBINS-I, etc.)