VACCINE MISINFORMATION MANAGEMENT FIELD GUIDE

Guidance for addressing a global infodemic and fostering demand for immunization

LISTEN | UNDERSTAND | ENGAGE

VACCINE MISINFORMATION MANAGEMENT FIELD GUIDE

This resource was created by the UNICEF Programme Division, Health Section, Immunization Unit C4D team, in collaboration with The Public Good Projects, First Draft and Yale Institute of Global Health.

It was developed to facilitate the development of strategic and well-coordinated national action plans to rapidly counter vaccine misinformation and build demand for vaccination that are informed by social listening.

This guide should help practitioners to:

Develop an evidence-grounded understanding of misinformation in the context of vaccination, how it spreads and gets traction, what can be done to mitigate its impact.

Implement evidence-based approaches to address misinformation

Develop a comprehensive and tailored national strategy for misinformation management

Who is it for?

The guide should support practitioners working in immunization programs, including immunization managers, C4D communication for development specialists, behaviour and social change specialists, external and digital communications and health teams.
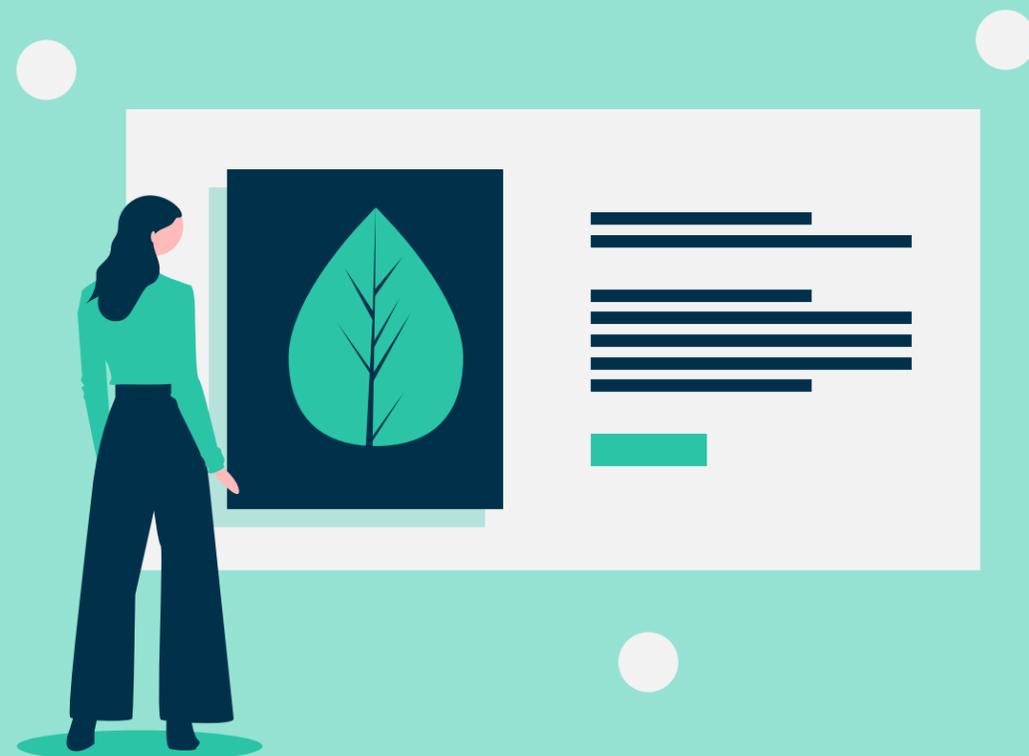
PART I: VACCINATION IN THE INFORMATION AGE

Digital communication shapes vaccine demand. Modern, resilient health systems need infrastructure and tools to listen to, understand, and engage with their communities.

Vaccines help children to survive and thrive. They save more than 5 lives every minute, helping people to grow up and grow old in good health[1]. Thanks to vaccines, more than 18 million people – who would otherwise have been paralysed by polio – are able to walk, play, and dance today[2]. Vaccinated children do better at school[3] and their communities benefit economically[4]. Vaccines advance global welfare and are among the most cost-effective means of doing so[5]. Despite this, 20 million children miss out on vaccines annually[6] and nearly 30 per cent of deaths among children under 5 years of age are caused by vaccine-preventable diseases[7]. Seasonal influenza vaccination is recommended for older adults to reduce the risk of complications and hospitalisation[8,9]. However, coverage in adults is suboptimal in high-income countries[10,11,12] while influenza vaccines are seldom used in low- and middle-income settings[13].

Vaccine hesitancy is a key driver of under-vaccination[14]. While vaccine hesitancy is as old as vaccination itself[15] the nature of the challenge changes over time[16]. Digital communication, and social media in particular, catalyse the rapid spread of false information, threatening public health. In 2019, the WHO named 'vaccine hesitancy' among the Top 10 threats to global health[17], citing its potential to undermine global efforts to eradicate polio, eliminate measles and contain cervical cancer.

The novel SARS-Cov-2 virus has triggered two parallel pandemics: a biological one which has spread to every country in the world, and a social pandemic of misinformation – an infodemic - spreading across social networks. Vaccines have been sucked into this vortex of confusing information which ranges from the innocently misleading to the intentionally deceiving. Vaccine-critical messaging increased more than 2-fold compared to pre-COVID-19 levels, with 4.5 billion views of content spreading vaccine misinformation in just the United States alone between March-July 2020.[18]

This infodemic threatens to augment vaccine hesitancy, which in turn could impact routine immunization programs, complicate new vaccine introductions (including SARS-CoV-2 and nOPV2 vaccines) and erode public trust in public health.

"We're not just fighting an epidemic; we're fighting an infodemic. Fake news spreads faster and more easily than this virus and is just as dangerous."

—Tedros, Director-General of the World Health Organization (WHO)

Vaccine Hesitancy

Vaccine hesitancy, the reluctance or refusal to vaccinate despite the availability of vaccines[19], is a context and vaccine-specific phenomenon, which may be influenced by a complex mix of historical, political, social and behavioural determinants.

Across a broad spectrum of vaccine attitudes and intentions, most parents accept vaccination, with only a small minority actively refusing them (Figure 1). Vaccine hesitant individuals may accept all vaccines but remain concerned about vaccines, some may refuse or delay some vaccines - but accept others, and some individuals may refuse all vaccines.[20,21]

ACTIVE DEMAND
ACTIVELY SEEKING

VACCINE HESITANCY
ACCEPT SOME, DELAY SOME, REFUSE SOME

PASSIVE ACCEPTANCE
ACCEPT ALL, MAYBE UNSURE

REFUSE ALL VACCINES
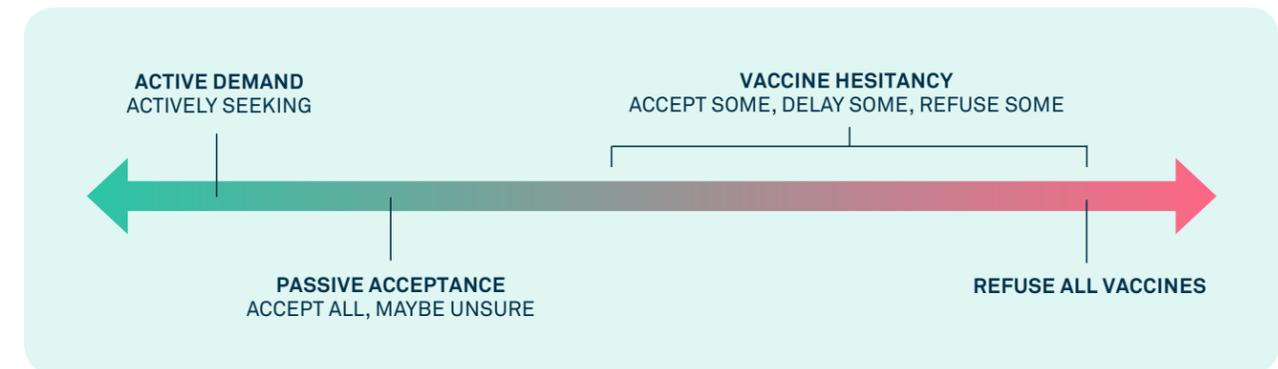
Figure 1. Acceptance of and demand for vaccination exists along a continuum.

A broad range of socio-psychological determinants of vaccine hesitancy have been identified. These may range from attitudes, past experiences and cognitive biases[22], to trust[23], social norms and even moral values[24] and worldview[25] (Figure 2). Evidence suggests that well-intentioned vaccine promotion content can actually backfire, decreasing intentions to vaccinate, particularly in those who are already hesitant[26,27]. Thus, vaccine promotion narratives and their component messages should wherever possible be designed based on behavioural and social evidence, tailored to specific audiences, and tested and monitored for both efficacy and safety before and during implementation.

THOUGHTS, FEELINGS

ATTITUDES, COGNITIVE BIASES

TRUST, SOCIAL NORMS, BELIEFS, EXPERIENCES, FEARS

MORAL VALUES, IDEOLOGY, IDENTITY, WORLDVIEW

Figure 2. Socio-psychological determinants of vaccine decision making.

Infodemics, misinformation and disinformation

The WHO defined an infodemic as being an "overabundance of information – some accurate and some not – that occurs during an epidemic. [Which] can lead to confusion and ultimately mistrust in governments and public health response."[28]

Due to the uncertainty that arises during a disease outbreak, conflict or natural disaster, crises are fertile grounds for sowing false information. In this context, an infodemic may arise from an excess of information in general, a lack of reliable information[29], or an increase in misinformation and disinformation.

Unverified information can cause harm by sowing confusion and drowning out accurate health information; it can change behaviour, including panic-buying or consumption of dangerous and unproven treatments[30]; it can shape attitudes to vaccines[31].

Misinformation is false information that's shared by people who don't realise it is false and don't mean any harm, including vaccine proponents[32].

Disinformation is deliberately engineered and disseminated false information with malicious intent or to serve agendas.

First Draft, a non-profit that focuses on misinformation, has created a typology of seven types of information disorder: fabricated content, manipulated content, imposter content, false content, misleading content, false connection, and satire or parody[33,34].
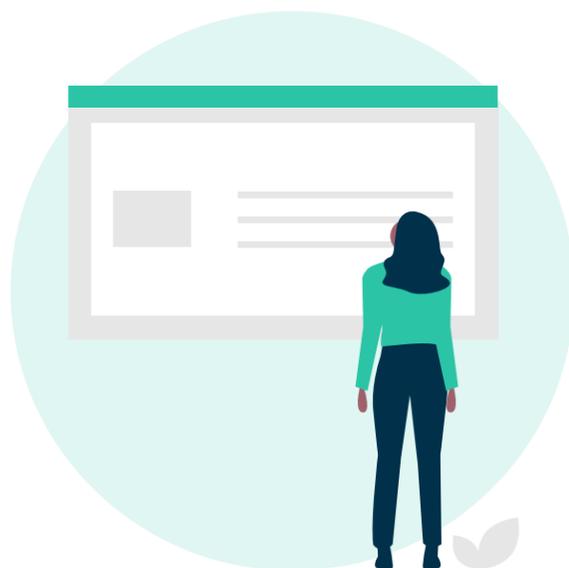
INFORMATION
'Data with meaning': the basis of knowledge when it is resonant, actionable, trusted

RUMOUR
Unverified information: stories/reports that spread rapidly through a group or population – can be *true or false*

MISINFORMATION
Accidental falsehoods. Wrong or misleading information with the power to dilute, distract, *distort*

DISINFORMATION
Deliberate, engineered falsehoods circulated with malicious intent or for the purpose of serving a *personal, political or economic agenda*

"A reliable way to make people believe falsehoods is frequent repetition, because familiarity is not easily distinguished from truth."

—Daniel Kahneman[54]

Why are people susceptible to misinformation?

People are vulnerable to misinformation[35], especially in times of uncertainty, due to a complex mix of cognitive, social and algorithmic biases. These include information overload and limited attention spans, various cognitive biases[36,37], the novelty of misinformation, trust, and algorithmic popularity.

Lower trust in science and scientists[38], in journalists and the mainstream media[39], or in authorities[40], has been linked to increased susceptibility to misinformation. Belief in conspiracies may help people reduce the complexity of reality and contain uncertainty and may be driven by feelings of powerlessness and mistrust.

People may be exposed to misinformation through media or voiced opinions and rumours, and more and more through online social networks which fuel the infodemic. By amplifying attention-grabbing information, social media algorithms may incentivise the circulation of misinformation and disinformation[41], allowing false information to spread faster and further than true information[42]. This has had a negative impact on polio vaccine campaigns in Pakistan[43] and efforts to contain Ebola in the DRC[44]. Rumours that start online can also spread offline, in printed media and through word-of-mouth[45].

Misinformation is sticky

Misinformation can 'stick' in people's minds and continue to influence their thinking even when it seems to have been corrected[46]. The possibility of a backfire effect, when a correction actually leads to someone increasing their belief in the misconception being corrected, has also been posited for various types of misinformation. Corrections may increase people's familiarity with the misinformation, which can be confused with truth. If a correction seems to run against a person's beliefs or worldview, they may actually strengthen their original opinion further. Though recent evidence suggests backfire effects may be overstated for misinformation in general,[47,48] there is emerging evidence that pro-vaccination communications can indeed backfire. This may be particularly true in people who are already vaccine hesitant[49,50,51,52].

The good news is that it is possible to 'inoculate' people against misinformation, much as we can vaccinate against infectious diseases[53]. This strategy is outlined in detail in **Part 2**.
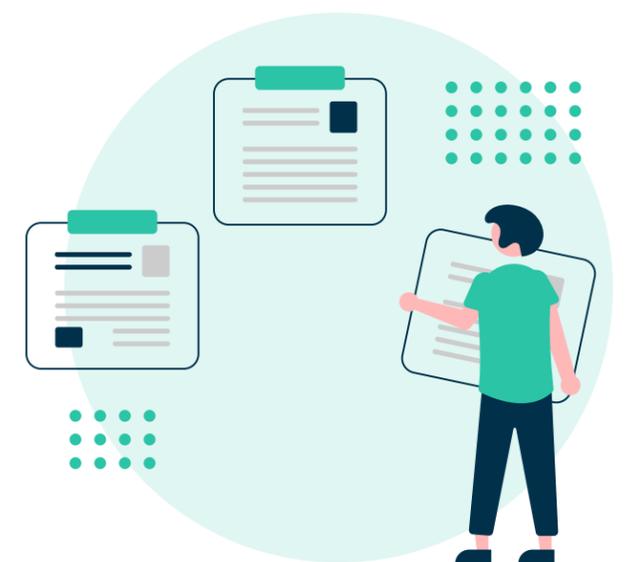
3 reasons why people create vaccine disinformation

People create vaccine disinformation to:

MONETISE   **POLARISE**   **POLITICISE**

Attention-grabbing disinformation motivates people to visit websites and social media accounts and view content such as videos. Each visit to a website hosting an advertisement creates revenue for the owner of that website and the content on it. Individuals and organizations hoping to sell products can also hope to funnel some of the attention disinformation creates to purchases[55,56]. Vaccine disinformation campaigns have been employed for political purposes[57]. 'Weaponised health information' that focused on vaccines was disseminated by a state actor using bots and trolls in an attempt to promote social discord and polarisation[58].
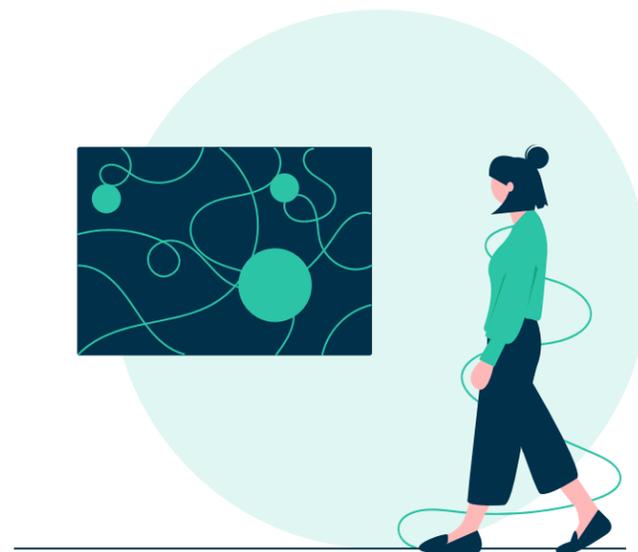
Don't be distracted by disinformation

Disinformation may influence some people's vaccination decisions. However, behind the noise are many people with valid concerns and questions that must be heard and addressed. In periods of uncertainty like a pandemic, people are actively seeking information, and even unintentional falsehoods can increase confusion and erode trust[59]. Thus, it is important to be able to track and understand more nuanced falsehoods and to acknowledge and address valid concerns[60].

A strategic approach to misinformation management

The risks of disinformation to vaccination programmes has never been higher – nor have the stakes. The successful rollout of novel oral polio vaccine (nOPV) campaigns, efforts to close the childhood immunisation gap and reach children missed during the COVID-19 pandemic, and demand for future vaccines against COVID-19, require national health systems to actively and systematically monitor and address misinformation.

Anti-vaccination actors clearly often operate from a strategy. Current evidence suggests they can have significantly greater reach than vaccine advocates and reach the undecided with content that is often more persuasive. On Facebook, anti-vaccine pages are 'heavily entangled' with undecided users, while pro-science sites are talking to the converted[61]. The top 10 websites identified by researchers as spreading health misinformation had almost four times as many views on Facebook as information from established health sites[62]. Anti-vaccine messages are 'stickier' than pro-vaccine messages[63]. Anti-vaccine websites and social media accounts use persuasive techniques that tap into parents' values and lifestyles; they tend to be more emotionally resonant, salient and visual[64] than official communications[65]. Anti-vaccine entrepreneurs connect with each other and mobilise others to increase their reach[66,50].

Any approach to vaccine misinformation management and pro-vaccine engagement must also be driven by a comprehensive strategy that closely couples social listening and analysis with risk communication and community engagement (RCCE), communications, advocacy and social mobilisation activities.

The World Health Organisation has called for "Member States to develop and implement action plans to manage the infodemic by promoting the timely dissemination of accurate information, based on science and evidence, to all communities, and in particular high-risk groups; and preventing the spread, and combating, mis- and disinformation while respecting freedom of expression."[67] The next section provides comprehensive guidance for the development of a national action plan for vaccine misinformation management.

PART 2: MISINFORMATION MANAGEMENT: A FIELD GUIDE

This field guide outlines an operational framework for vaccine misinformation management that is organised into three phases: **Listen, Understand**, and **Engage**[68].

PREPARATION
Build Team
Information Ecosystem Analysis

LISTEN
Build Listening System
Social Listening
Detect Misinformation
Rumor Log

UNDERSTAND
Assess Misinformation
Analytics & Intelligence
Actionable Insights
Rapid Reaction

ENGAGE
Strategic Engagement
Content Development Campaigns
Inoculation Content
Monitoring & Evaluation
Lessons Learned

Strategic implementation should be iterative to ensure continual refinement and adjustment, and cooperative to ensure coordination of all actions and actors. A preparatory phase involves developing a tailored strategy, an information ecosystem assessment, and building the right team. Social listening needs to aggregate and visualise the relevant data sources, whether media, social media, novel digital channels or even offline. Understanding is making sense of the signals in the noise, detecting, tracking with a rumor log, verifying and assessing misinformation, and developing real-time situational insights. Engaging may involve content development and dissemination, creation of inoculation messages, measuring impact, and refining and repeating the cycle.

1 PREPARATION PHASE

1.1 Build Team and Strategy

Any integrated program of misinformation management will require, along with development of new actions, close coordination with a number of ongoing activities. These may include: ongoing traditional media and social media monitoring, community feedback processes, RCCE coordination structures, crisis response mechanisms, vaccine readiness & delivery planning and routine immunization demand work[69]. It may be important to engage with national, regional and local bodies, as well as coordinating with international agencies and NGOs, to avoid duplication of effort and increase the reach of listening and engagement. A misinformation management program should be guided by a strategy that ensures such close coordination, has clear objectives, and includes all the steps in the listen, understand and engage phases described below.

Where feasible, implementation may be guided by a central function, a social analyst or 'infodemic manager' which coordinates the listening, identification and assessment of rumours, and provides actionable insights and recommendations to communications, RCCE, advocacy and other teams involved in public engagement.

A cross-disciplinary function, the fully-trained infodemic manager will require knowledge and competencies in vaccine hesitancy and demand, misinformation and fact-checking, social media and monitoring tools, data analytics, health communication science and social marketing/behaviour change, even if specialists may perform some of these functions[70]. This function may need to consolidate feedback from offline channels as well. It will require ongoing professional development for any individual to achieve this broad span of skills and knowledge, and in the interim this role may be achieved through coordinated work of different specialists.

In addition, all team members should be trained in the basics of misinformation. A good starting point is the First Draft SMS course *Protection from Deception*[71].

1.2 Information Ecosystem Assessment

A country-level communications ecosystem assessment will inform every part of a misinformation management strategy. It should answer the following questions:

What media do people rely upon to stay informed? news media, social media, messaging apps, personal communication, offline comms (e.g., posters and pamphlets)

What information/misinformation appears locally when you search on Google, YouTube and Facebook for vaccine-related queries?

Which platforms are the most popular, for what audiences, which accounts have the most reach?

What rumours have already been identified? How were they identified? Where were they (online communities, real-world communities)? Who are the authors?

Who is influencing conversations (e.g., trusted voices, vaccine advocates)?

What digital engagement, RCCE, communications initiatives are already in place?

This contextual overview should inform each step of the action plan.

2 LISTEN PHASE

2.1 Build Social Listening System

By aggregating and filtering data from different sources, a social listening system can help streamline the detection of signals in the noise, shifts in online conversations, and identification of emerging or common concerns. The development of a social listening system should be guided by a triangulation between the various tools available and the mapping of the information ecosystem, in particular the channels where vaccine-related information is being diffused and discussed.

Most importantly, the tool is not the solution. Teams should ensure they are equipped with the necessary skills to use these tools and make sense of the data to deliver actionable insights.

2.1.1 Monitoring Tools

There is a variety of free and paid-for media monitoring and analytical tools available. The monitoring system that you create should be able to access the channels, communities, and conversations that were identified as important in the Information Ecosystem Assessment, and thus the system is likely to incorporate a combination of tools.

Google provides a simple alert service and a tool for monitoring search trends. Each of the major social media platforms have an analytics tool. There are a number of paid-for social media monitoring services such as TalkWalker or Brandwatch that can be employed to access multiple platforms. These services have limitations, including the channels they can access and search algorithms (e.g., for sentiment) that are adapted to product sales, not health behaviours. Users should understand the limitations of any tools, including the data that can or cannot be accessed. See **Appendix 2** for a list of these various tools.

In addition, UNICEF and partners have a number of novel tools that may be implemented for listening and engagement, including HealthBuddy[72], Health Alert[73], U-Report[74], RapidPro[75] and Viamo[76]. See **Appendix 2** for guidance on how to select and configure these various tools.

2.1.2 Search Queries

To use any of these tools it is necessary to first choose the relevant keywords for searches and Boolean search queries (combinations of search terms). Terms can be combined into search strings by joining a series of keywords with connectors such as AND, OR, NOT. Keywords should be in all relevant languages and variations in spelling between formal/informal language should be considered. An example search string for vaccination is shown in **Appendix 2**.

2.2 Social Listening

Social listening must become routine to effectively detect early signals of rumours before they become "trending events" and begin to get significant traction and spread. Early signals are defined as patterns that appear well before rumours reach their peak time. Early detection can help guide proactive content development to address community concerns and questions ahead and fill information gaps before they are filled by misinformation.

Some tools have a 'virality score' that may help detect misinformation that is starting to spread or get traction. Detection also involves planning ahead to prepare for specific events that may trigger new misinformation or resurface old content.

2.3 Rumour Log

A rumour log[77] should be used to capture rumours/ misinformation events. Keeping a rumour log will enable you to analyse trends and recurring issues, coordinate the responses to rumours, and share information with other organisations.

3 UNDERSTAND PHASE

Develop a library of factual information and, where possible, consult with experts who can help determine whether the information is correct. This will help to unpack the rumour and deepen your understanding of why the rumour was so virulent. Access to fact sheets and to experts can also help in crafting an appropriate and accurate response.

The potential impact of a rumor should be assessed before any response is formulated, which requires a strong situational understanding. The first task is to understand who is starting and spreading rumours, where the information is circulating, what concerns and stories have traction, how fast and far it is spreading, and why the rumour has taken hold. Questions that could inform this assessment include:

3.1. Assess Misinformation

Analysing the potential impact of misinformation in a structured way helps to triage rumours and identify the rumours that require a response. Developing a Standard Operating Procedure (SOP) for recording new challenges, verifying and assessing the impact of misinformation, and tracking trends make it easier to share intelligence between partners.

Not all rumours are false; many contain a grain of truth. It can be challenging to determine conclusively whether something is true. The process requires some investigative work to piece together as much information as possible.

Begin by following the 5 Pillars of Verification[78]

Would a response actually just give oxygen to the misinformation, causing it to spread further?

What happens if nothing is done?

Are there other facts or events that you should wait for the outcome on before deciding? Is there additional expertise to be sought?

What is the reach and scope of the misinformation?

What is the likelihood of spread or escalation?

Could it erode general trust in vaccination or in a specific vaccine?

What is the capacity to respond?

Provenance
Are you looking at the original account, article or piece of content?

Source
Who created the account or article, or captured the original piece of content?

Date
When was it created?

Location
Where was the account established, the website created, or the piece of content captured?

Motivation
Why was the account established, the website created, or the piece of content captured?

An example risk evaluation matrix is shown below, and **Figure 4** shows a simple algorithm to follow.

INDICATOR	LOW RISK	MEDIUM RISK	HIGH RISK
RISK TO VACCINE HESITANCY & DEMAND	Low risk to vaccine demand	Potential to trigger hesitancy to vaccinate	Potential to lead to vaccine refusals
REACH AND SCOPE OF MISINFORMATION	Limited potential reach or scope	Moderate potential reach or scope	Wide or cross-country reach or scope
LIKELIHOOD OF ISSUE SPREAD OR ESCALATION	Unlikely to spread in community or online	Spreading in community and/or online	Spreading rapidly in community and online
RESPONSE CAPACITY	Strong messaging and capacity in place	Limited existing messages & resources to manage crisis	Limited existing messages and capacity exceeded
GENERAL PUBLIC TRUST	Remaining trust in government, health services, vaccines	Reduced trust in government, health services, vaccines	Outward displays of mistrust government, health services, vaccines
RESPONSE	Monitor closely, consider prebunking	Debunk, raise trusted voices	Debunk, raise trusted voices

Figure 3. Example risk evaluation matrix.

FACT

Lead with the fact

Make it clear, relevant, sticky

WARNING

Misinformation alert! (antigen)

Misleading tactics alert!

FALLACY

Flag tactics being used to decieve

Undermine trust in disinformation authors

Highlight misleading tactics

Reveal hidden agenda

FACT

Provide alternative correct info

Must replace misinformation, cannot leave a vacuum

Make correct information stickier than misinformation

Figure 4. Inoculating against specific misinformation

3.2 Actionable Insights

Social analytics need to turn interesting data into actionable insights to be useful. It needs to answer the question *"So what, who cares?"* for the teams who are engaging with communities. Insights reports should be first developed with the RCCE taskforce or other teams involved in engagement and communications in a country to ensure that the content is clear and actionable. Many end users may not have much experience with social media monitoring for example. Reports should be short and could include:

A short top-line summary with key insights and recommendations for action.

Sections on the key themes identified with:
- examples of disinformation relating to these issues, including where and how it is circulating;
- key interactions and engagements, including who is picking it up and circulating it (journalists, influencers, known vaccine-critical accounts, etc),   in which networks or communities is it circulating, and who the audiences are;
- what are the target audiences of the disinformation, what disinformation techniques are being used, what are the possible motives of the authors or spreaders;
- trends and changes in tone and attitudes (can be enriched by any behavioural insights or polling data);
- what is the potential impact of misinformation on audience's attitudes and health behaviours;
- and a summary and actionable recommendations.

4 ENGAGE PHASE

4.1 Shape the Agenda

Misinformation loves a vacuum. Ensure that people searching for information can easily find credible, accurate, and relevant information on vaccines, infectious diseases and immunity in their language. The content should be relevant is available to people searching for in formats that will resonate. Curate and aggregate existing content into content hubs[79,80], including websites of trusted organisations[81,82], and create country-level local-language hubs of vaccine information. See **Appendix 3** for tips on how to create sticky content.

Regularly disseminate this content through the channels that are hosting vaccine-related conversations, and consider novel push tools that may reach those with limited or no internet access (e.g., radio, Internet of Good Things[83]). Use this content to connect with and amplify existing trusted pro-vaccine voices. Galvanise new voices to join the conversation such as health professionals[84], youth[85,86], and religious leaders.

To limit the impact of misinformation, amplify trusted online voices such as UNICEF, WHO and public health agencies[87] and partner channels, and connect with those who influence public attitudes on health and social issues (the information ecosystem assessment will have mapped out trusted influencers). Build diverse coalitions and equip them to address misinformation.

4.2. Prevention

There are a few strategies that have been shown to prevent misinformation from sticking in the first place.

4.2.1 Simple Warnings

Warning labels that flag misinformation on social media may reduce the perceived credibility of the false information and users' intentions to share[88]. Any cues or processes that redirect people to reliable information, or simply increase the effort required to share misinformation may reduce its impact[89]. Engagement with social media platforms to encourage such measures may improve the hygiene of the local communication ecosystem[90], but it may also be possible to directly encourage social media users to not share and even refute misinformation[91].

4.2.2 Media and Health Literacy

Helping people to critically evaluating the accuracy of information and sources can reduce the influence of misinformation and the likelihood that people will share[92]. Short online courses and school curricula that may increase media and health literacy are listed in **Appendix 6**. Finland has implemented a national curriculum of information literacy and critical thinking curriculum, and is currently considered the country the most resistant to misinformation[93].

It is critical to ensure that influential networks (including media organisations) have the context and data that they need to present reliable information. Empower journalists with toolkits and training that helps them to know misinformation when they see it (see **Appendix 6**). Work with fact-check organisations and resources to verify misinformation. Connect journalists with experts on vaccination by liaising directly with news organisations and with professional networks.

4.2.3 Inoculation (Prebunking)

Emerging evidence shows that it is possible to pre-emptively debunk, or prebunk, misinformation before false beliefs have a chance to take hold[94]. People can be '*inoculated*' against misinformation by being exposed to a weakened version of the misleading tactics used in misinformation or the hidden motives of the disinformation authors, and a refuted version of the message beforehand[95,96]. Just as vaccines generate antibodies to resist future viruses, inoculation messages equip people with counter-arguments that potentially convey resistance to future misinformation, even if the misinformation is congruent with pre-existing attitudes.

Common misleading tactics of science-related misinformation include, for example, cherry-picking of data, or reference to fake experts. A taxonomy of the tactics used in misinformation is available in the **Conspiracy Theory Handbook**[97]. Another strategy is to highlight the ulterior motives for creating and disseminating vaccine disinformation, which can undermine people's trust in that information.

One benefit of inoculations is their potential to convey an "umbrella of protection", providing resistance not just against a single argument but multiple arguments, and even across different topics. Inoculations that focus on specific rhetorical techniques in one area (e.g., tobacco misinformation) have been found to effectively inoculate against the same technique in another area (e.g., climate change)[98].

4.2.4 Inoculating at Scale

Inoculation may be effectively taken to scale with some games and apps that prebunk misinformation. The Bad News game which casts players in the role of a misinformation creator increased players' ability to spot misinformation and decreased its credibility in their eyes[99]. **Appendix 6** lists some examples.

4.3. Debunking

There is emerging evidence to support the careful debunking of specific myths or rumours. If a rumour has been assessed as medium or high risk, development of debunking content which may help provide specific immunity to specific misinformation. An inoculating message highlights not only that a message is false, but explains *why* it is false, and what may have led people to believe the falsehood in the first place, and it includes the facts in simple, clear terms. After an expert review of the literature, the **Debunking Handbook 2020**[100] proposes the combination for a debunking message shown in **Figure 5**.

1. Fact
Lead with the truth, state the facts clearly. Do not try to refute the misinformation, just state what is true.

2. Warning
An explicit warning that misinformation is coming, which may contain a weakened version of the misinformation. Only repeat the misinformation once.

3. Fallacy
Explain why the misinformation is wrong and, as with prebunking, explain the specific misleading tactics being employed, or highlight the hidden motives of the authors of the disinformation.

4. Fact
Repeat the truth. This is crucial because the alternative correct information fills the mental 'gap' generated by the correction. Make the facts 'stickier' than the misinformation (see **Appendix 3** for tips).

See **Appendix 4** for examples of inoculating messages. The recommendations here are based on the approach proposed in the **Debunking Handbook 2020**[100].
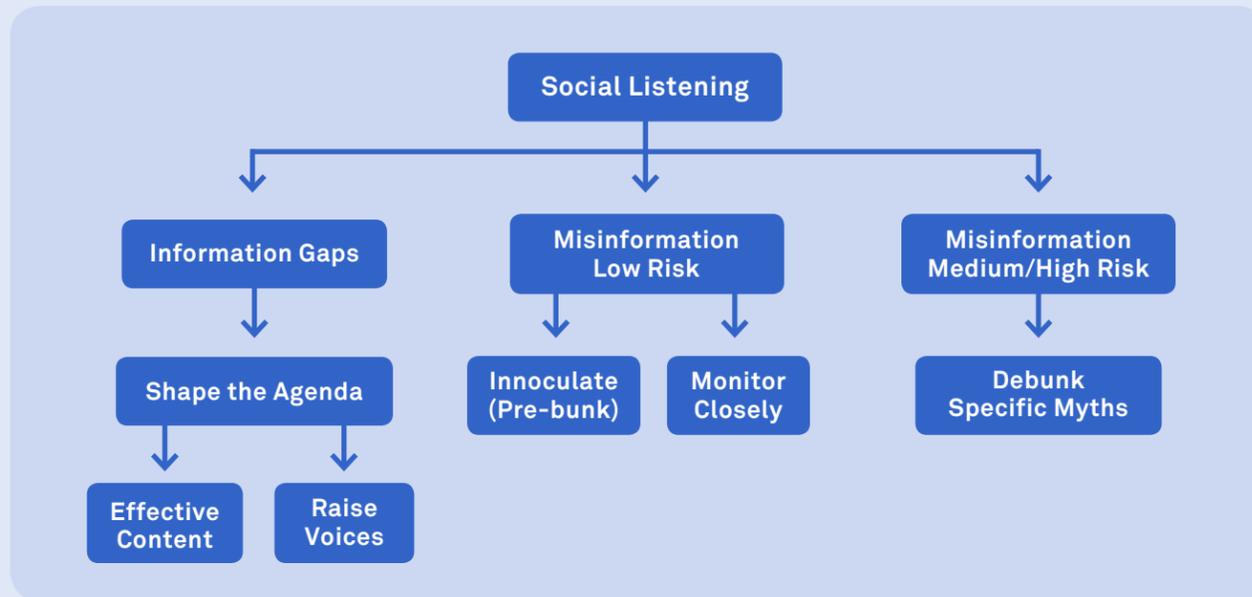

Figure 5. Deciding when to engage

4.4 Trustworthy Communicators

The bedrock of vaccination demand is public trust[101]. Credible information alone is not enough, the information source or communicator also must also be credible, expert and trustworthy. A recent study showed that trustworthiness was actually more important than expertise when addressing vaccine misinformation[102].

Public health agencies and other expert organisations are consistently trusted and effective voices, and are encouraged to raise their voice in social media[103,104]. Health professionals are among the most trusted sources of health information and a provider recommendation to vaccinate significantly may increase vaccine uptake[105]. A multicountry study found that trust in scientists was consistently associated with decreased susceptibility to misinformation[106].

Relationships with community leaders and media and social media influencers can be leveraged to address the rumour. Building and maintaining a network of relationships requires time, resources and skills. Speaking local languages and understanding the cultural and political context is vital.

Mistrust may be as important as *misinformation* in formation of beliefs in conspiracy theories[107], thus anything (and anyone) that helps to build trust with the audience may help unstick misinformation, especially with vaccines.

4.5 Quantify Impact

It is important to implement metrics and qualitative assessment of outputs, outcomes and impact of response to disinformation. As the information ecosystem evolves, your keywords and algorithms may need to change and evolve. Capture lessons learned that can inform future actions.

When creating an evaluation protocol, distinguish between performance evaluation and outcome evaluation. Examples of performance metrics and outcome metrics are provided in **Appendix 5**. The main difference between the two is that performance metrics typically include interim measures that provide directional evidence that an effort is having an impact, whereas outcome metrics indicate verifiable shifts in knowledge, attitudes, and behaviour have occurred. Some of the metrics below apply to both misinformation and the response to misinformation, such as impressions, page views, reach, and frequency. It is important to measure the performance of both in order to be able to compare the relative impact of one to the other. Ideally, one of the first actions of misinformation management would be to select performance and outcome measures and establish a baseline to compare on-going efforts against.
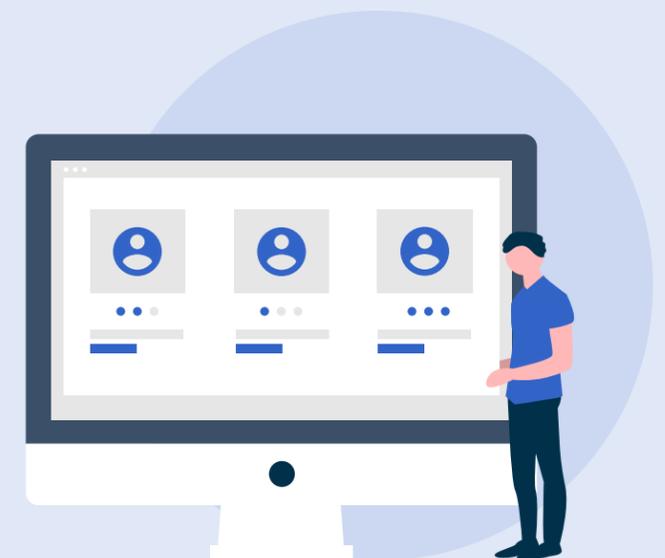
CONCLUSION

It is possible to immunize against misinformation.

Drawing on social sciences research, evidence-based interventions can help to debunk and pre-bunk potentially damaging rumours. Coupled with fostering strong relationships with professional media, social media platforms, health professionals and other trusted actors, the full benefits of vaccination can be realised.
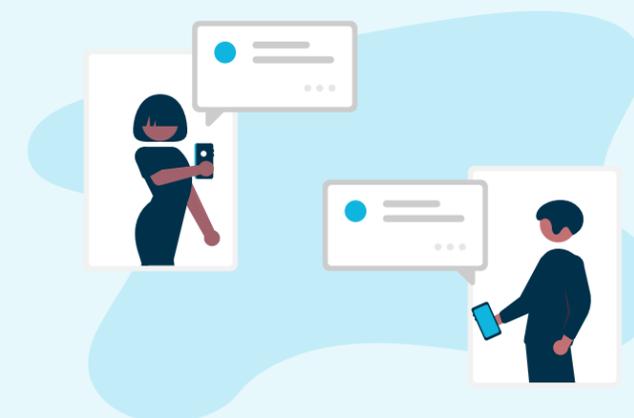
The infodemic of vaccine misinformation is a public health threat.

It undermines the enormous progress delivered by immunisation programmes and jeopardises campaigns to deliver nOPV and SARS-CoV-2 vaccines.

Social listening should access online and offline data sources.

This could include social media, mainstream median, and community feedback. All the data needs to be aggregated, analysed, and used to inform debunking of misinformation and fostering of positive conversations around vaccines.

The task ahead is significant, but inaction is not an option.

To effectively address misinformation, resilient health systems need to build capacity in new areas. Infrastructure, tools and skills must be developed to support social listening. This will deepen understanding and empower engagement.

Local actors play a role in mitigating the impact of disinformation and misinformation.

Strong, robust social mobilisation and community engagement for vaccine promotion will contribute to building public trust. Together, skilled individuals, motivated organizations and modern tools can mitigate the risks of rumours and negative information about vaccines.

APPENDIX 1: CASE STUDIES

Case Study I: Polio in Pakistan: Fake videos fuel mistrust

In April 2019, videos of unconscious children lying motionless on hospital beds began circulating in Pakistan. The clip features a man claiming that the boys began sick after receiving the polio vaccine, adding that unnamed authorities would 'take us away' if they refuse to administer the vaccine.

The videos spread like wildfire, prompting 25,000 children to be taken to hospital in the city of Peshawar for fear that they were at risk due to vaccines they had received. By the end of the week, the number of hospitalisations linked to the videos was estimated to be 45,000[108]. A mob of 500 people set fire to a clinic in Peshawar, leading to the death of two police offers and a health worker. Five days after the misinformation outbreak, authorities suspended anti-polio campaigns leading two million children to miss out on immunization.

The video was a deliberate attempt to undermine polio eradication efforts in one of two countries where the diseases are still endemic. Polio vaccination has been the target of rumours and misinformation for decades. Conspiracy theories have included false claims of a western plot to sterilise Muslim women and inaccurate reports that vaccines contain ingredients forbidden by Islam.

A study by First Draft[109] revealed that the staged scenes gained more than 24,000 interactions on Twitter within 24 hours, with their impact further amplified by Facebook and WhatsApp. Some professional media and political organizations shared the videos with ineffective caveats and disclaimers, fuelling their spread rather than effectively blunting their impact.

The experience illustrated the power of visual communication in spreading emotional disinformation on social media platforms. Social media companies have stepped up their efforts to limit the spread of dangerous misinformation and to direct users to reliable sources of information when they use vaccine keywords in their searches. By improving their capacity to identify and address rumours, authorities can seek to slow or stop the spread of disinformation before it derails immunization efforts.

Case Study II: Dengue in the Philippines: How vaccine controversy spreads

In 2016, the Philippines became the first country to launch a nationwide vaccination campaign against dengue fever – a disease which is endemic in the region and puts a significant burden on public health and the health system. Two years later the campaign was suspended, controversy swirled online, and trust in all vaccines was strained[110].

The problem with the misinformation circulating about the safety of the dengue vaccine was that it grew from a grain of truth. A review by the vaccine's manufacturer in late 2017 pointed to rare cases where the vaccine could increase the risk of severe dengue illness. People who had not had the disease prior to being vaccinated were at risk of hospitalization and, potentially, death if there were subsequently infected by one of the four strains of the virus the causes dengue fever.

The government shut down the vaccination programme which had been introduced by their predecessors, sparking a deluge of online conspiracies under the hashtag #denggate. Politicization of a scientific issue, coupled with a lack of clear medical consensus left an opening for anti-vaccine voices, amplifying the concerns of parents. A deep decline in public trust in immunization followed: confidence in vaccine safety fell from 82 percent in 2015 to 21 percent in 2018[111].

The dengue vaccine controversy has been blamed for the decline of vaccine coverage and subsequent cases of polio[112] and measles[113]. It is a stark reminder of how quickly anti-vaccine ideas can take hold, particularly in the absence of clear and consistent messaging from medical and political leaders. It also illustrates the extent to which controversy in one vaccine immunization program can pollute public perceptions of other vaccines.

Case Study III: HPV in Malawi: Crisis preparedness ahead of vaccine rollout

The Human Papilloma Virus (HPV) vaccine is used in more than 100 countries where it is successfully reducing infections with a cancer-causing virus[114,115] . Along with screening and treatment, HPV vaccines are part of a strategy that could ultimately eliminate cervical cancer[116,117] . Despite its potential, the HPV vaccine has been beset by false rumours which have damaged vaccine programmes in Japan[118], Denmark[119] and Ireland[120].

A HPV Vaccine Crisis Communication Plan[121] was central to preparations for the vaccine's introduction in Malawi in 2018. The plan aimed to rapidly contain or limit the negative effectives of misinformation, rumours and misperceptions arising from incidences of adverse events following immunization (AEFI), whether real or perceived. It was designed to build, retain or restore trust and confidence in the vaccine and the vaccine delivery system.

Key components of the crisis preparedness and response plan:
- Systematically tracking rumours, misconceptions, and AEFIs at the field level
- Orienting all District Health Officers, PROs, and designated Spokespersons on the basics of assessing rumours and AEFIs, to respond effectively to any crisis
- Engaging with and sensitizing media-persons and broadcasters, at national and sub-national levels, prior to the launch of the HPV vaccine introduction
- Training all teachers and frontline health workers on the basic management of rumours, misperceptions, and AEFIs
- Using innovative SMS and WhatsApp-based platforms (e.g. the UNICEF RapidPro based U-Report system) for opinion polling, analysing perceptions, messaging, tracking rumours, and monitoring communication interventions

This exemplary approach draws on a range of existing tools and positions health authorities to swiftly identify and address misinformation.

APPENDIX 2: SETTING UP BASIC SOCIAL LISTENING SYSTEMS

Choosing keywords, building Boolean search queries

Search engines can play a central role in searching for information and news, as well as in rumour verification. Google accounts for approximately 90% of online searches worldwide. Like other search tools, including Yahoo, Bing, Baidu, Yandex, DuckDuckGo and others, Google uses Boolean logic. This is a mathematical expression of what you are looking for. For example, when you search for a combination of keywords such as "coronavirus vaccine", Google retrieves content that has "coronavirus" OR "vaccine". If the term is in quotation marks, only results with the exact phrase will be returned i.e. articles, images and videos with "coronavirus" AND "vaccine".

Automatic News Alerts

Setting up **Google Alerts** for relevant keywords triggers alerts for specific keywords or combinations of keywords. Alerts can be further configured by language and region, providing a simple and easy way to monitoring online content. More complex requests combine keywords in ways that deliver alerts on a wide range of relevant topics.

EXAMPLE SEARCH STRING FOR VACCINATION

("vaccin*" OR "vaccination" OR "vaccinations" OR "vaccine" OR "vaccines" OR "vaccinated" OR "vaccinate" OR "immunization" OR "immunizations" OR "immunize" OR "immunisation" OR "immunisations" OR "immunise" OR "informed choice" OR "medical freedom" OR "vaxxers" OR "antivax" OR "antivaxx" OR "antivaxers" OR "anti-vax" "anti-vaxers" OR antivaccination OR anti-vaxx)

How to set up an RSS feed

RSS feeds are an alternative way to collect and group content on topics of interest[122]. RSS stands for Really Simple Syndication and is a way of monitoring multiple websites in one aggregated feed. There are a number of RSS readers, such as Feedly. Once you set up an account you can add new content by topic, website or RSS feed, creating lists of interesting websites or blogs in a similar way to Twitter or CrowdTangle lists. Once added, new posts will appear. It's really easy to use the interface to monitor the output once or twice a day to see new article.

Monitoring Web Search Activity

Google trends. Tracks the volume of searches for certain keywords on several channels including general web, Image search, New search and YouTube. It can compare results for different key words (up to 15). Results can be filtered by time, geography or even related queries. Can help in signal detection and tracking of shifts in conversations.

Platform Analytics

For a full guide to monitoring of different platforms see this **guide** by First Draft.

Twitter. One of the easiest platforms to monitor, but be sure that the relevant conversations are happening here. Often used to identify break news. Twitter has an **advanced search option** which gives an easy interface to mak e very specific queries, like only searching for tweets from or to specific accounts, during certain time periods, or containing particular types of content, like videos or links.

One of the easiest and most effective ways of navigating Twitter is with **TweetDeck**, a free and easy-to-use dashboard owned by Twitter. With TweetDeck, you can display an unlimited number of columns containing tweets from Twitter lists, search strings and specific accounts or activity all side-by- side, updating in real-time.

Facebook and Instagram. Facebook's native search includes a host of filters, including the ability to search for public posts in public Groups and Pages, for example. You can also search by date and by tagged location, as well as by media type, such as videos, photos or livestreams. The best tool for monitoring lists of Facebook and Instagram accounts is CrowdTangle, a platform owned by Facebook. Permission may need to be obtained to use this tool (journalists can request access for example).

WhatsApp. Closed groups, messaging groups and online ads can pose particular challenges when tracking the spread of information. They are often overlooked because they are not amenable to monitoring via search engines, RSS feeds or built-in analytics tools[123]. Nonetheless, they can be influential. WhatsApp is the most popular messaging app globally and its group chat function is well suited to amplifying the impact of information. One of the simplest ways of monitoring and researching WhatsApp for specific information is by establishing a tip line for particular topics so that people can submit misinformation that they come across.

Social Media Monitoring

In addition to the paid social media monitoring services, there are some free tools available.

Agora Pulse: synchronises your social media accounts around the clock, offers unlimited reports and graphics of performance analytics, retains all your account data, compares your page with others on key metrics.

Hootsuite: a social media listening tool with specific search terms in real- time. Can be used to monitor mentions of your brand, products, or relevant keywords you are interested in. Also handy to track all of your social media accounts in one dashboard.

Iconosquare: allows effective management of conversations and your social media accounts. Also facilitates communication planning.

Sprout Social: a popular and user-friendly social media management software – contains tools such as social performance reporting, advanced social analytics, social monitoring and listening tools, and advanced social listening (at the moment does not include visual networks such as YouTube).

Offline Sources of Insights

Social listening should incorporate offline sources of insights as well. For example, many mechanisms exist for collection of community feedback, and some news sources are not online.
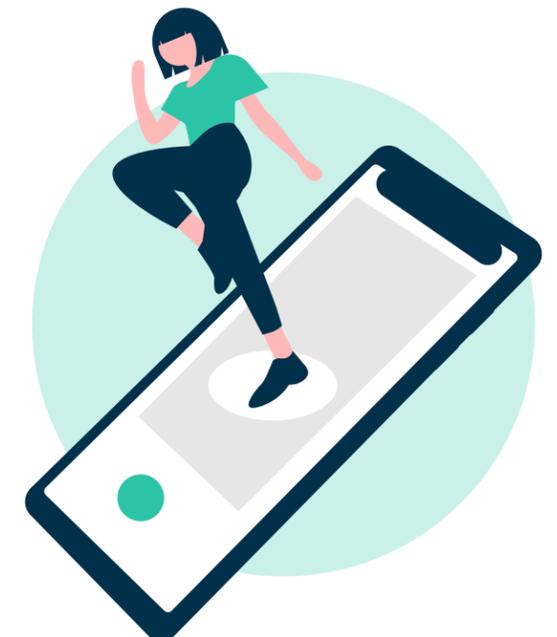
APPENDIX 3: FIVE TIPS TO MAKE YOUR CONTENT STICKIER THAN DISINFORMATION

Evidence suggests that anti-vaccine messages are 'stickier', i.e. grab attention and stick in the memory, than pro-vaccine messages[124]. Anti-vaccine websites and social media accounts use persuasive techniques that tap into parents' values and lifestyles; they tend to be more emotionally resonant, salient and visual[125] than official communications[126]. Here are 5 tips for making vaccine-promoting content stickier than misinformation. Combining these tips may help optimise the impact of pro-vaccine and inoculating content[83].

1. Capture Attention

We are more likely to do something that our attention is drawn towards.

Visuals. A picture is worth a thousand words. Visuals can attract attention, facilitate information processing and retention, and help people understand numbers and risks. Plus, they can simplify information processing.

Emotion. Elicit an emotional reaction. Create designs that stand out and remain memorable by appealing to our emotions — with surprise, curiosity, or urgency. Beware however of fear appeals, which may backfire[127].

Personalise. Show personalized content. People respond strongly to messaging that is customized and relevant based on their behaviors, interests, and values.
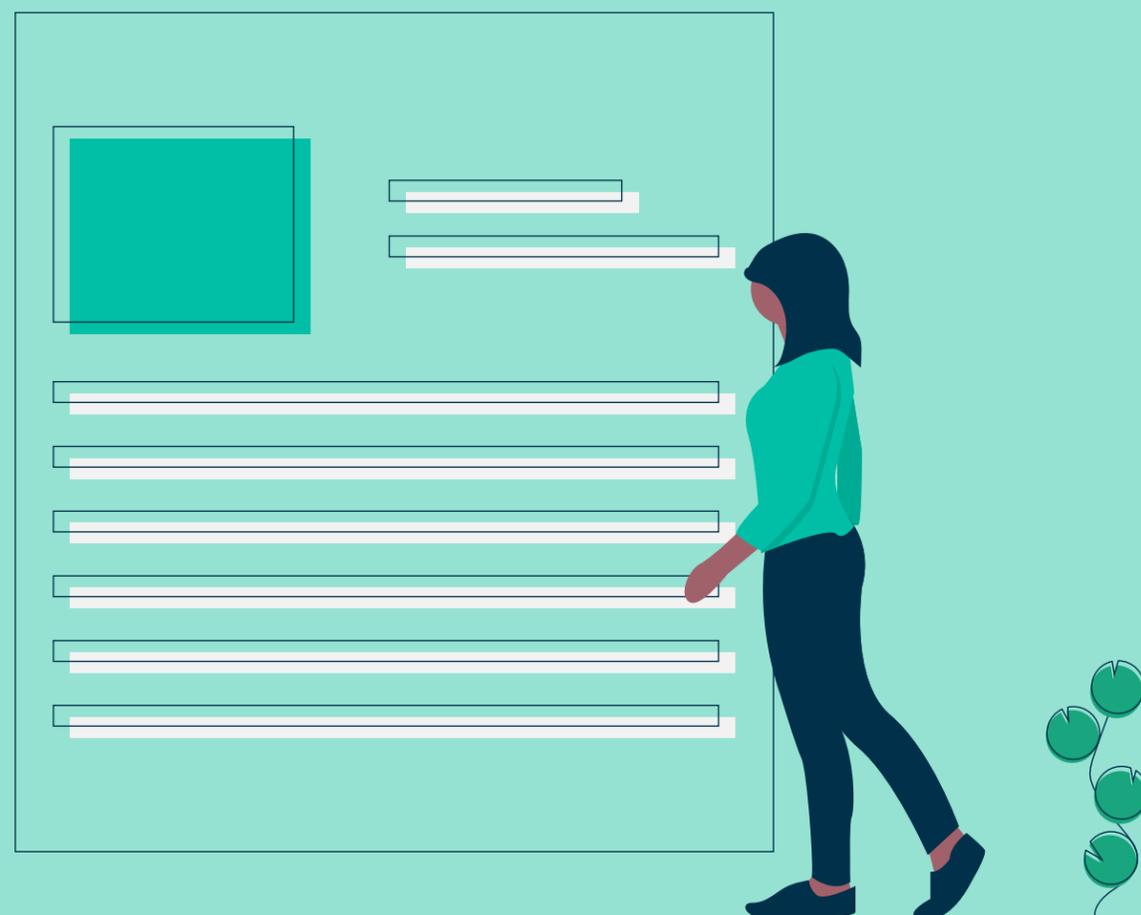
2. Easy = True

Keep it clear. Information is more likely to stick the more easily it can be processed and the more familiar it feels. Or, when a communication is easy to read and understand, it seems more familiar, and familiar feels true[128]. Provide clear, straightforward content, that is easy to understand and easy to remember. Eliminate jargon, keep language simple, present the key message early, use simple fonts and high contrast colours.

Repeat. Repeating (positive!) messages increases cognitive fluency. Words seen before become easier to see again. In contrast, if someone strains to understand they are more likely to be vigilant and suspicious[129].
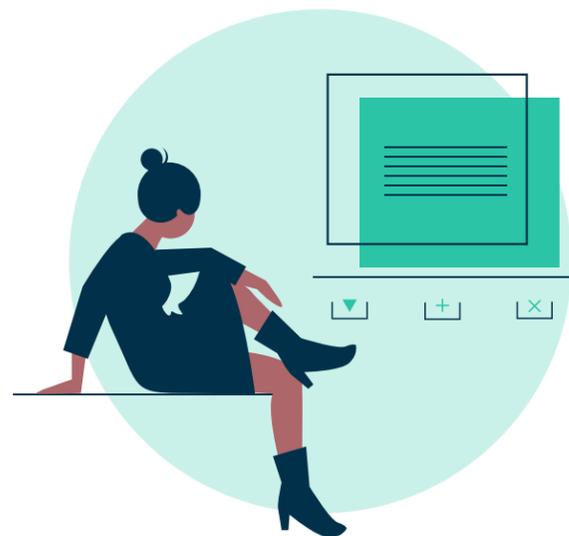
3. Be Credible

The information needs to be credible (peer-reviewed scientific research), relevant to target audience, and the source or communicator also needs to be credible (trustworthiness more important than expertise). Anything and anyone that helps to build trust with the audience will help unstick misinformation, especially with vaccines[130].
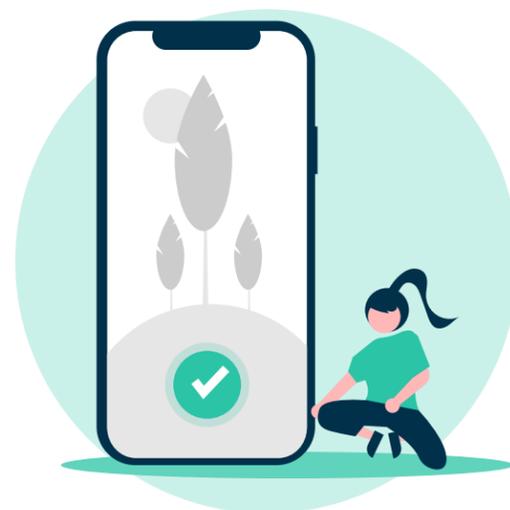
4. Motivate

Consider communicating vaccination as an aspiration, not an act. If you are communicating to increase vaccine acceptance, then using pictures of distressed, crying children receiving vaccines may make most viewers more reactive - and less receptive - to any new information[131,132,133]. Up to one-quarter of all adults may have a fear of needles, with most fears developing in childhood. About 10% of people may actually avoid vaccination because of needle fears. Vaccines help ensure people grow up and grow old in good health, safe from many infectious diseases. Consider putting vaccination in a 'gain frame'. Show happy, healthy, productive people in graphics, and if you must show the act of vaccination try to avoid needles and tears.

Social norms. Social norms offer implicit guides for our behaviour. Explaining that the majority of people adopt a certain behaviour (descriptive norm), and that it is what others expect you to do to achieve a common good (injunctive norm) may increase the chance that people will adopt that behaviour[134].

Self efficacy. Give people a way of coping with a threat. People will make a parallel appraisal of a threat (eg, risk of catching an infectious disease) and their ability to cope with that threat (a solution that they are able to effect)[89,135].

5. Tell Stories

We understand our world through stories as much as facts. Use narratives to engage your audience[136]. An analysis of content on a European pro-vaccine online hub found parental stories were consistently the most accessed kind of content[137].

APPENDIX 4: EXAMPLES OF INOCULATING MESSAGES

An inoculating message (debunking or prebunking) should contain several key elements. First, it should provide a "replacement fact", an alternative explanation that fills the causal gap left by the corrected misinformation. This can come first, last, or can bookend the message. Second, it should mention the myth, but in a weakened form, which can be a warning that a myth is coming. Third, it should explain why the misinformation is wrong (fallacy). Often this takes the form of explaining the misleading tactics used by the misinformation to distort the facts, or the hidden agenda of the misinformation authors.

Example 1. Debunking the "HPV vaccine causes injury" myth

FACT
Large scale studies find no link between the HPV vaccine and auto-immune symptoms. All the scientific evidence tells us HPV vaccines are safe and effective.

MYTH
One common vaccine myth is that they cause negative health impacts. The evidence cited is often specific examples where a child received a vaccination then suffered adverse health impacts afterwards.

FALLACY
Anecdotes like this mistake correlation for causation. Just because a vaccination and an injury happen close to each other doesn't mean one causes the other. This logic is the same as thinking that wearing lucky colours at a sports game led to your team winning.

This argument also employs anecdotal thinking, relying on isolated examples rather scientific evidence. While stories can be persuasive, they can also mislead if a single experience is not representative of the general populace.

FACT
This is why scientists look at large samples rather than single cases before coming to conclusions.
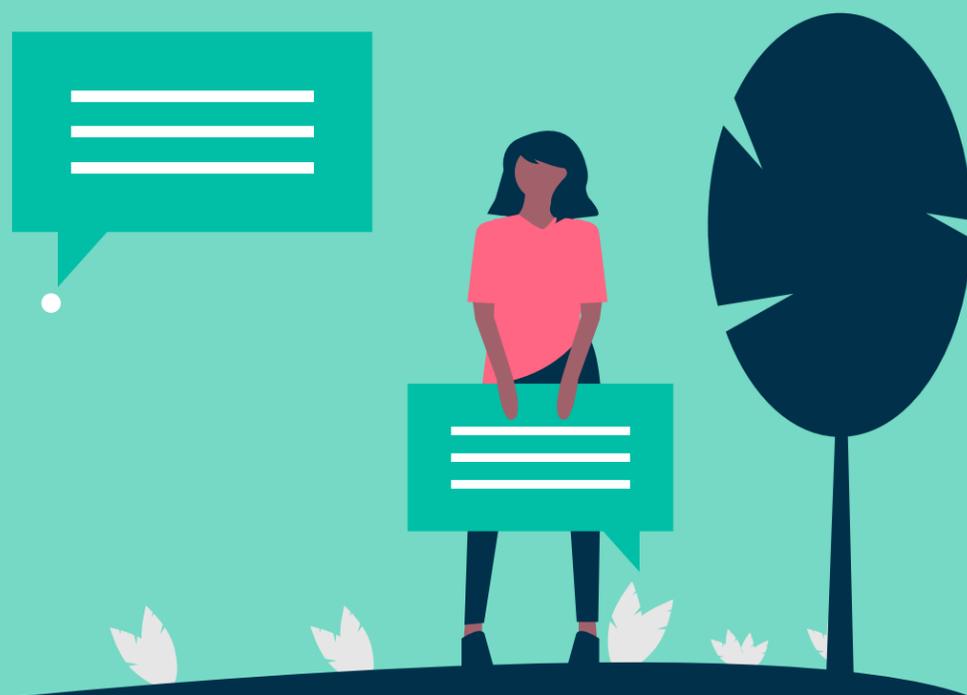
Example 2. Debunking the "MMR Causes Autism" Myth

FACT

A huge study of over 500,000 Danish children found that unvaccinated children were just as likely to develop autism as vaccinated children.

MYTH

One common vaccine myth is that vaccines can cause negative health impacts. The evidence cited is often specific examples where a child received a vaccination then suffered adverse health impacts just afterwards.

FALLACY

Some people believe that vaccines can cause unrelated diseases that usually appear around the same time that we give children vaccines. They mistake correlation for causation.

For example, if children who receive a teddy bear and children who receive a vaccine both have their teeth fall out, it doesn't mean that either receiving a teddy bear or receiving a vaccine caused this to happen – it's just a coincidence.

Also, this concern began with a study led by an English doctor which was retracted because he was found to have lied about the findings, creating an elaborate fraud. He subsequently lost his medical license for acting dishonestly, unethically, and with "callous regard" for the children, and was shown to have major undisclosed financial conflicts of interest[138].

FACT

We still don't know exactly what causes autism, but over 10 high-quality studies show that it is not caused by vaccines. The observed rise in autism rates is mostly due to broadened diagnostic criteria and heightened awareness of the condition[139].

Example 3. Debunking the "Polio campaign is actually a covert way of testing COVID-19 vaccines" Myth

FACT

Polio is still a risk for children in [country/community], and there is no cure for this disease. Polio drops are the safest, most effective way to protect children from polio. Continuous protection is needed to keep your child safe from polio.

MYTH

A rumor that is circulating at the moment suggests that this campaign is giving something other than polio drops to children.

FALLACY

During the COVID-19 pandemic there have been many different conspiracy theories circulating. These are often created by people who want to attract attention and traffic to their online businesses to make money. There are specific traits of conspiratorial thinking that are red flags of potential misinformation, such as overriding suspicion of institutions and attributing nefarious intent to benign programs.

FACT

Polio is a real, very dangerous, and highly infectious virus. Millions of doses of polio drops have been administered throughout the world and there are millions of children who are walking and playing and dancing because they did not catch polio. This type of polio drop has been tested in clinical trials, and is proven to safely prevent children from getting polio.

APPENDIX 5: EXAMPLE PERFORMANCE METRICS AND OUTCOME METRICS
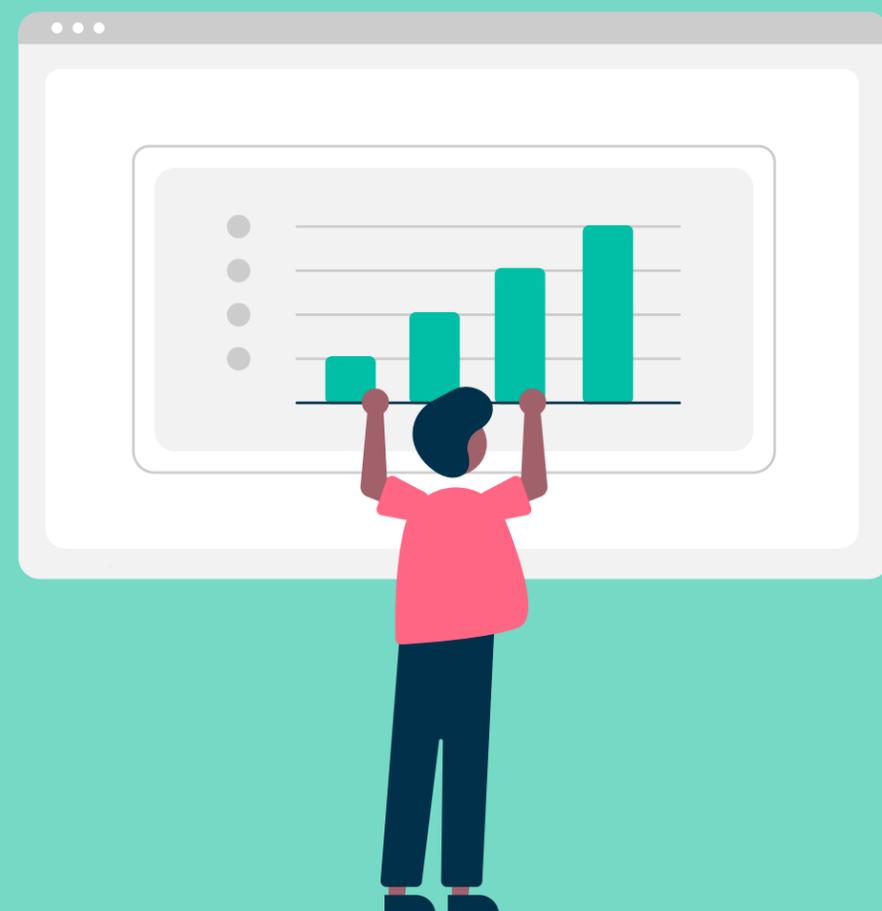
INDICATOR	PERFORMANCE	OUTCOME
NUMBER OF MISINFORMATION ARTICLES/MESSAGES *(how many identified, by source/channel)*	✕	
IMPRESSIONS *(number of views of content)*	✕	
PAGE VIEWS *(of websites/webpages)*	✕	
REACH *(number of people who viewed content)*	✕	
FREQUENCY *(number of times people saw content, and/or number of times content was posted or shared)*	✕	
ORGANIZATIONS, LEADERS, INFLUENCERS RECRUITED TO DISSEMINATE MESSAGES	✕	
INOCULATION OR COUNTER MESSAGES CREATED	✕	
MISINFORMATION IDENTIFIED AND LOGGED	✕	
TRAINING AND TECHNICAL ASSISTANCE PROVIDED	✕	
MISINFORMATION AWARENESS *(recall/exposure to misinformation)*		✕
BELIEF IN MISINFORMATION *(trust in sources of misinformation, and misinformation messages)*		✕
CAMPAIGN AWARENESS *(recall of inoculation and/or counter messages)*		✕
RELEVANCE AND CREDIBILITY OF CAMPAIGN MESSAGES *(receptivity of target audiences to messages)*		✕
KNOWLEDGE OF FACTS AND RESOURCES *(awareness of local resources, knowledge of priority vaccination facts)*		✕
INTENT TO VACCINATE *(self-reported intent to vaccinate self or children)*		✕
ATTITUDE TOWARD AUTHORITIES *(trust in health authorities and institutions)*		✕
VACCINE HESITANCY *(validated measures of hesitancy)*		✕
VACCINATION COVERAGE *(proportion of priority populations vaccinated)*		✕

APPENDIX 6: INTERVENTIONS TO BUILD IMMUNITY TO MISINFORMATION

Here are some trainings, games and curricula that may increase community immunity to misinformation.

Media and Health Literacy

Protection from Deception[140] is a free two-week text message course from First Draft that teaches people to how to protect themselves and their community from misinformation. Currently in English and Spanish. A second course, Too Much Information, is available online[141].

Informed Health Choices Effective learning resources to enable primary students to think critically about health claims & make informed choices. Efficacy shown in randomised trial in Uganda[142]. Podcast for adults.

Kids Boost Immunity[143] — Over 60 lessons and quizzes developed by teachers and health professionals to engage digital-age students in grades 4-12. Free for teachers. Currently in Canada, Scotland and Ireland (in English and French) but could be adapted to other countries.

UN Verified initiative has developed the **"Pause. Take care before you share"** campaign[144] which encourages people to stop and verify sources before deciding whether to share any content online. In multiple languages.

Inoculation

Bad News – Online game which inoculates players against fake news across different cultures by focusing on misinformation techniques (prebunking)[145,146] . Users experience life as a fake news creator.

Go Viral is based on Bad News but focuses on coronavirus misinformation.

Cranky Uncle – A game which uses cartoons, humor, and critical thinking to expose the misleading techniques of science denial and build public resilience against misinformation.

Catching conspiracies – Short guide on how to spot COVID conspiracy theories.

For Journalists

First Draft reporter's **Toolkit**

FACT and FIT Initiative – Combating medical misinformation in India through fostering News and information accuracy and credibility

World Federation Science Journalists (WFSJ) Lab - Course in science **journalism**

Google News Initiative -Journalist Training that shows the best ways to use Google tools for reporting and storytelling.

UNESCO - Journalism, 'Fake News' and Disinformation: A Handbook for Journalism Education and **Training**

International Center for Journalists - Resources for **Journalists**. Make it easy for journalists to find experts on vaccination. For example, **Scholars Strategy Network & the Council for the Advancement of Science Writing** have compiled lists of top experts & scholars who are available for comment on the COVID-19 **pandemic**
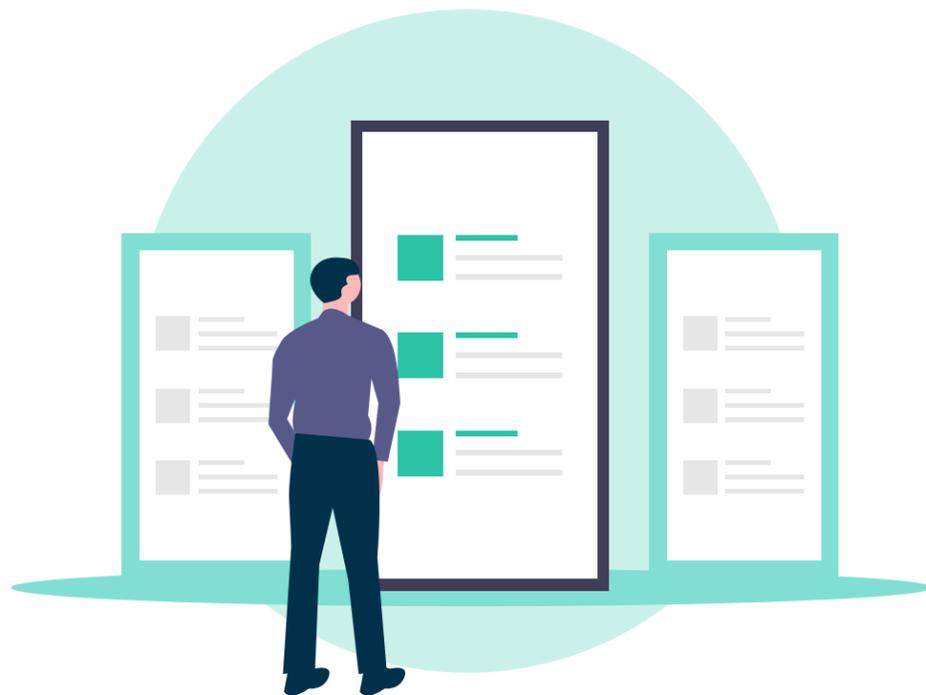
REFERENCES

1 World Health Organization: Immunization https://www.who.int/news-room/facts-in-pictures/detail/immunization (accessed 9 Nov 2020)

2 World Health Organization: Polio fact sheet https://www.who.int/news-room/fact-sheets/detail/poliomyelitis (accessed 9 Nov 2020)

3 Nandi A, Kumar S, Shet A, Bloom DE, Laxminarayan R. Childhood vaccinations and adult schooling attainment: Long-term evidence from India's Universal Immunization Programme. Soc Sci Med. 2020 Feb 26;250:112885.

4 Return On Investment From Childhood Immunization In Low- And Middle-Income Countries, 2011–20 Sachiko Ozawa, Samantha Clark, Allison Portnoy, Simrun Grewal, Logan Brenzel, and Damian G. Walker Health Affairs 2016 35:2, 199-207

5 Copenhagen Consensus Center. Copenhagen consensus 2008. Fredriksberg, Denmark: Copenhagen Consensus Center; 2008. Available at http://www.copenhagenconsensus.com/home.aspx

6 World Health Organization: 20 million children miss out on lifesaving measles, diphtheria and tetanus vaccine in 2018 https://www.who.int/news-room/detail/15-07-2019-20-million-children-miss-out-on-lifesaving-measles-diphtheria-and-tetanus-vaccines-in-2018 (Accessed 10 Nov 2020)

7 United Nations Children's Fund, 'Child Survival: Under-five mortality', March 2018, <https://data.unicef.org/topic/child-survival/under-five-mortality/>,accessed 16 August 2018.

8 ECDC (2020) Systemic review of the efficacy, effectiveness and safety of newer and enhanced seasonal influenza vaccines for the prevention of lab-confirmed flu in individuals aged 18 and over Available at: https://www.ecdc.europa.eu/sites/default/

files/documents/seasonal-influenza-vaccines-systematic-review-efficacy.pdf

9 National Foundation for Infectious Diseases: Flu in adults age 65 and older — what are the risks? https://www.nfid.org/infectious-diseases/flu-in-adults-age-65-years-and-older-what-are-the-risks/#:~:text=Older%20adults%20are%20at%20higher,of%20infection%20for%20those%2065%2B. (Accessed 9 Nov 2020)

10 ECDC (2018) Influenza vaccination coverage rates insufficient across EU Member States Available at: https://www.ecdc.europa.eu/en/news-events/influenza-vaccination-coverage-rates-insufficient-across-eu-member-states

11 CDC (2019) General Population Flu Vaccination Coverage. Available at : https://www.cdc.gov/flu/fluvaxview/coverage-1819estimates.htm

12 Okoli, G., Abou-Setta, A., Neilson, C., Chit, A., Thommes, E. and Mahmud, S., 2019. Determinants of Seasonal Influenza Vaccine Uptake Among the Elderly in the United States: A Systematic Review and Meta-Analysis. Gerontology and Geriatric Medicine, 5, p.233372141987034. https://journals.sagepub.com/doi/full/10.1177/2333721419870345

13 Justin R Ortiz, Kathleen M Neuzil, Influenza Immunization in Low- and Middle-Income Countries: Preparing for Next-Generation Influenza Vaccines, The Journal of Infectious Diseases, Volume 219, Issue Supplement_1, 15 April 2019, Pages S97–S106, https://doi.org/10.1093/infdis/jiz024 https://academic.oup.com/jid/article/219/Supplement_1/S97/5304930

14 WHO SAGE Working Group on Vaccine Hesitancy https://www.who.int/immunization/sage/sage_wg_vaccine_hesitancy_apr12/en

15 Rosselli R, Martini M, Bragazzi NL.

The old and the new: vaccine hesitancy in the era of the Web 2.0. Challenges and opportunities. J Prev Med Hyg. 2016;57(1):E47-E50.

16 Schwartz JL, New media, old messages: Themes in the history of vaccine hesitancy and refusal. Virtual Mentor. 2012;14(1):50-55

17 World Health Organisation (2019): Ten threats to global health

18 Byrd B, Smyser J; Grantmakers In Health. Notes from the Field. Lies, Bots, and Coronavirus: Misinformation's Deadly Impact on Health. https://www.gih.org/views-from-the-field/lies-bots-and-coronavirus-misinformations-deadly-impact-on-health/

19 MacDonald NE; SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope and determinants. Vaccine. 2015 Aug 14;33(34):4161-4

20 MacDonald NE; SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope and determinants. Vaccine. 2015 Aug 14;33(34):4161-4

21 Leask J, Kinnersley P, Jackson C, Cheater F, Bedford H, Rowles G. Communicating with parents about vaccination: a framework for health professionals. BMC Pediatr. 2012 Sep 21;12:154

22 Brewer NT, Chapman GB, Rothman AJ, Leask J, Kempe A. Increasing Vaccination: Putting Psychological Science Into Action. Psychol Sci Public Interest. 2017;18(3):149-207.

23 Thomson A, Robinson K, Vallée-Tourangeau G. The 5As: A practical taxonomy for the determinants of vaccine uptake. Vaccine. 2016;17;34(8):1018–24

24 Amin AB, Bednarczyk RA, Ray CE, et al. Association of moral values with vaccine hesitancy. Nat Hum Behav. 2017;1(12):873-880

25 Hornsey MJ, Harris EA, Fielding KS. The psychological roots of anti-vaccination attitudes: A 24-nation investigation. Health Psychol. 2018 Apr; 37(4):307-315

26 Nyhan B, Reifler J, Richey S, Freed GL. Effective messages in vaccine promotion: a randomized trial. Pediatrics. 2014 Apr;133(4):e835-42

27 Pluviano S, Watt C, Della Sala S. Misinformation lingers in memory: Failure of three pro-vaccination strategies. PLoS One. 2017;12(7):e0181640.

28 World Health Organization (2020) Infodemic Management https://www.who.int/teams/risk-communication/infodemic-management

29 Data & Society (2019). Data voids: where missing data can easily be exploited. https://datasociety.net/wp- content/uploads/2019/11/Data-Voids-2.0-Final.pdf

30 Bote, J., 2020. At least 44 dead from drinking toxic alcohol in Iran after coronavirus cure rumor. USA Today, [online] Available at: <https://eu.usatoday.com/story/news/world/2020/03/10/44-dead-iran-drinking-toxic-alcohol-fake-coronavirus-cure/5009761002/> [Accessed 9 November 2020].

31 Chan MS, Jamieson KH, Albarracin D. Prospective associations of regional social media messages with attitudes and actual vaccination: A big data and survey study of the influenza vaccine in the United States. Vaccine. 2020 Sep 11;38(40):6236-6247. doi: 10.1016/j.vaccine.2020.07.054. Epub 2020 Aug 10. PMID: 32792251; PMCID: PMC7415418.

32 Jamison, MA; Broniatowski, DA; Dredze, M.; Sangraula, A.; Smith, M. C.; Quinn, S. C. (2020). Not just conspiracy theories: Vaccine opponents and proponents add to the COVID-19 'infodemic' on Twitter. The Harvard Kennedy School (HKS) Misinformation Review, 1(3).

33 First Draft (6 July 2020) The Seven Most Common Types of Information Disorder | USA examples [Video] YouTube https://www.youtube.com/watch?v=klBW_LMPZvE

34 First Draft (2019) Understanding Information Disorder. Available at: https://firstdraftnews.org/wp-content/uploads/2019/10/Information_Disorder_Digital_AW.pdf?x76701

35 Lazer, D. et al. The science of fake news. Science 359, 1094–1096 (2018).

36 First Draft (2020) The psychology of misinformation and why we are vulnerable. Available at: https://firstdraftnews.org/latest/the-psychology-of-misinformation-why-were-vulnerable/

37 Thinking Fast and Slow. Daniel Kahneman. 2011

38 Roozenbeek J, Schneider CR, Dryhurst S, Kerr J, Freeman ALJ, Recchia G, van der Bles AM, van der Linden S. 2020 Susceptibility to misinformation about COVID-19 around the world. R. Soc. Open Sci. 7: 201199.

39 van der Linden S, Panagopoulos C, Azevedo F, Jost JT. 2020 The paranoid style in American politics revisited: evidence of an ideological asymmetry in conspiratorial thinking. Polit. Psychol. (doi:10.1111/pops.12681)

40 Jolley D, Douglas KM. The effects of anti-vaccine conspiracy theories on vaccination intentions. PLOS ONE 2014;9(2):e89177.

41 NBC News (2020) Coronavirus misinformation surges fueld by clout chasers. Available at : https://www.nbcnews.com/tech/social-media/coronavirus-%20misinformation-surges-fueled-chase-attention-n1126511

42 Vosoughi S, Roy D, Aral S. The spread of true and false news online. Science. 2018 Mar 9;359(6380):1146-1151. doi: 10.1126/science.aap9559.

43 First Draft (2020) Case study: Understanding the impact of polio vaccine disinformation in Pakistan. Available at: https://firstdraftnews.org/long-form-article/first-draft-case-study-understanding-the-impact-of-polio-vaccine-disinformation-in-pakistan/

44 Council on Foreign Relations (2019) Disinformation and disease:

social media and the Ebola epidemic https://www.cfr.org/blog/disinformation-and-disease-social-media-and-ebola-epidemic-democratic-republic-congo

45 Internews (2019). Managing Misinformation in a Humanitarian Context: Rumour Tracking Methodology

46 Lewandowsky, S, Cook, J, Ecker, UKH., et al. (2020). The Debunking Handbook 2020. Available at https://sks.to/db2020.

47 Swire-Thompson, Briony, Joseph DeGutis, and David Lazer. 2020. "Searching for the Backfire Effect: Measurement and Design Considerations." PsyArXiv. May 15. doi:10.31234/osf.io/ba2kc

48 Pluviano S, Watt C, Ragazzini G, Della Sala S. Parents' beliefs in misinformation about vaccines are strengthened by pro-vaccine campaigns. Cogn Process. 2019;20(3):325-331

49 Pluviano S, Watt C, Della Sala S. Misinformation lingers in memory: Failure of three pro-vaccination strategies. PLoS One. 2017;12(7):e0181640

50 Nyhan B, Reifler J, Richey S, Freed GL. Effective messages in vaccine promotion: a randomized trial. Pediatrics. 2014;133(4):e835-e842.

51 Nyhan B, Reifler J. Does correcting myths about the flu vaccine work? An experimental evaluation of the effects of corrective information. Vaccine. 2015;33(3):459-464

52 Reavis RD, Ebbs JB, Onunkwo AK, Sage LM. A self-affirmation exercise does not improve intentions to vaccinate among parents with negative vaccine attitudes (and may decrease intentions to vaccinate). PLoS One. 2017;12(7):e0181368.

53 Lewandowsky, S, Cook, J, Ecker, UKH., et al. (2020). The Debunking Handbook 2020. Available at https://sks.to/db2020.

54 Thinking Fast and Slow. Daniel Kahneman. 2011

55 Deer B. How the case against

the MMR vaccine was fixed. BMJ. 2011;342:c5347.

56 CCDH https://252f2edd-1c8b-49f5-9bb2-cb57bb47e4ba.filesusr.com/ugd/f4d9b

57 Jegede AS (2007) What Led to the Nigerian Boycott of the Polio Vaccination Campaign? PLoS Med 4(3): e73.

58 Broniatowski DA, Jamison AM, Qi S, AlKulaib L, et al. Weaponized Health Communication: Twitter Bots and Russian Trolls Amplify the Vaccine Debate. Am J Public Health. 2018 Oct;108(10):1378-1384.

59 McAweeney E. Who benefits from misinformation? https://points.datasociety.net/who-benefits-from-health-misinformation-8d094804058d (Accessed 10 Nov 2020)

60 Jamison, M. A.; Broniatowski, D. A.; Dredze, M.; et al (2020). Not just conspiracy theories: Vaccine opponents and proponents add to the COVID-19 'infodemic' on Twitter. The Harvard Kennedy School (HKS) Misinformation Review, 1(3). 9_7aa1bf981990429 5a0493a013b285a6b.pdf

61 Johnson, N.F., Velásquez, N., Restrepo, N.J. et al. The online competition between pro- and anti-vaccination views. Nature 2020. https://doi.org/10.1038/s41586-020-2281-1

62 Washington Post (2020). Avaaz study of Facebook finds coronavirus misinformation. https://www.washingtonpost.com/technology/2020/08/19/facebook-misinformation-coronavirus-avaaz/ (Accessed 10 Nov 2020)

63 S. Lewandowsky, U. K. H. Ecker, C. M. Seifert, N. Schwarz, J. Cook. Misinformation and Its Correction: Continued Influence and Successful Debiasing. Psychological Science in the Public Interest, 2012; 13 (3): 106 DOI: 10.1177/1529100612451018

64 Paynter J, Luskin-Saxby S, Keen D, et al. (2019) Evaluation of a template for countering misinformation—Real-world Autism treatment myth debunking. PLOS ONE 14(1):

e0210746.

65 Moran, MB, Lucas, M, Everhart, K, et al. (2016). What makes anti-vaccine websites persuasive? J. Comm Healthcare, 9(3), 151–163

66 Johnson, N.F., Velásquez, N., Restrepo, N.J. et al. The online competition between pro- and anti-vaccination views. Nature 582, 230–233 (2020). https://doi.org/10.1038/s41586-020-2281-1

67 World Health Organization (2020): Managing the COVID-19 infodemic https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation (Accessed 10 Nov 2020)

68 Thomson A, Watson M. Listen, understand, engage. Sci Transl Med. 2012;4(138):138ed6.

69 Breakthrough Action (2020). COVID-19 Rumor Tracking. Available at: https://breakthroughactionandresearch.org/wp-content/uploads/2020/05/COVID-19-Rumor-Tracking-Technical-Brief_v1.1.pdf

70 World Health Organization (2020) Call for applications: 1st WHO training in infodemic management https://www.who.int/news-room/articles-detail/call-for-applicants-for-1st-who-training-in-infodemic-management

71 First Draft (2020) Introducing an SMS course to prepare for US election misinformation. Avaialble at: https://firstdraftnews.org/latest/course-training-us-election-misinformation/

72 Health Buddy https://healthbuddy.info/index

73 WHO Health Alert https://www.who.int/news-room/feature-stories/detail/who-health-alert-brings-covid-19-facts-to-billions-via-whatsapp

74 UNICEF U-Report https://www.unicef.org/innovation/ureportCOVID19

75 RapidProf https://rapidpro.io/

76 Viamo https://viamo.io/

77 Sample rumour/misinformation tracking approach https://www.dropbox.com/s/ruyw1rtwwl35up2/RUMOR%20EVENT%20CAPTURE%20TOOL%20_EXAMPLE1_Mar%2020.docx?dl=0

78 First Draft (2019): Verifying Online Information. Available at: https://firstdraftnews.org/wp-content/uploads/2019/10/Verifying_Online_Information_Digital_AW.pdf?x65316

79 WHO Vaccine Safety Net https://www.who.int/vaccine_safety/initiative/communication/network/vaccine_safety_websites/en/

80 Vaccines Today https://www.vaccinestoday.eu

81 UNICEF: Parents' Frequently Asked Questions (Immunization) https://www.unicef.org/immunization/parents-frequently-asked-questions-vaccines (Accessed 10 Nov 2020)

82 World Health Organization Q&A on vaccines https://www.who.int/vaccines/questions-and-answers/q-a-on-vaccines

83 Internet of Good Things https://www.internetofgoodthings.org

84 Shots Heard Around the World https://www.shotsheard.org/

85 Vaccines Today. Young People Demand Healthier Future (20 May 2019) https://www.vaccinestoday.eu/stories/vaccine-champions-young-people-demand-healthier-future/

86 World Health Organization: Engaging young people in the response to COVID-19 in WHO Eastern Mediterranean Region http://www.emro.who.int/media/news/engaging-young-people-in-the-response-to-covid-19-in-whos-eastern-mediterranean-region.html (Accessed 10 Nov 2020)

87 Vraga, E. K., & Bode, L. (2017). Using Expert Sources to Correct Health Misinformation in Social Media. Science Communication, 39(5), 621–645.

88 Mena, P. (2020). Cleaning up social media: The effect of warning labels

on likelihood of sharing false news on Facebook. Policy & Internet, 12(2), 165-183.

89 Lorenz-Spreen, P., Lewandowsky, S., Sunstein, C.R. et al. How behavioural sciences can promote truth, autonomy and democratic discourse online. Nat Hum Behav 4, 1102–1109 (2020).

90 Merchant RM, Lurie N. Social Media and Emergency Preparedness in Response to Novel Coronavirus. JAMA. Published online March 23, 2020.

91 Bode, L., & Vraga, E. K. (2018). See something, say something: Correction of global health misinformation on social media. Health Communication, 33(9), 1131-1140.

92 Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. Psychological Science, 31, 770-780.

93 Henley, J., 2020. How Finland starts its fight against fake news in primary schools. The Guardian, [online] Available at: https://www.theguardian.com/world/2020/jan/28/fact-from-fiction-finlands-new-lessons-in-combating-fake-news [Accessed 10 November 2020].

94 Lewandowsky, S, Cook, J, Ecker, UKH., et al. (2020). The Debunking Handbook 2020. Available at https://sks.to/db2020.

95 Cook, J., Lewandowsky, S., & Ecker, U. K. H. (2017). Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence. PLOS ONE, 12, e0175799.

96 Jolley, D., & Douglas, K. M. (2017). Prevention is better than cure: Addressing anti-vaccine conspiracy theories. Journal of Applied Social Psychology, 47, 459–469. doi:10.1111/jasp.12453

97 Lewandowsky, S., & Cook, J. (2020). The Conspiracy Theory Handbook. Available at http://sks.to/conspiracy

98 Cook, J., Lewandowsky, S., & Ecker, U. K. H. (2017). Neutralizing misinformation through inoculation:

Exposing misleading argumentation techniques reduces their influence. PLOS ONE, 12, e0175799.

99 Basol, M., Roozenbeek, J., & van der Linden, S. (2020). Good News about Bad News: Gamified Inoculation Boosts Confidence and Cognitive Immunity Against Fake News. Journal of Cognition, 3(1), 2. DOI: http://doi.org/10.5334/joc.91

100 Lewandowsky, S, Cook, J, Ecker, UKH., et al. (2020). The Debunking Handbook 2020. Available at https://sks.to/db2020.

101 Thomson A, Robinson K, Vallée-Tourangeau G. The 5As: A practical taxonomy for the determinants of vaccine uptake. Vaccine. 2016;17;34(8):1018–24

102 Pluviano S, Della Sala S, Watt C. The effects of source expertise and trustworthiness on recollection: the case of vaccine misinformation. Cogn Process. 2020;21(3):321-330

103 Vraga, E. K., & Bode, L. (2017). Using Expert Sources to Correct Health Misinformation in Social Media. Science Communication, 39(5), 621–645.

104 Sutton J. Health Communication Trolls and Bots Versus Public Health Agencies' Trusted Voices. Am J Public Health. 2018;108(10):1281–1282.

105 Opel DJ et al. The architecture of provider-parent vaccine discussion at health supervision visits. Pediatrics. 2013;132(6): 1037-1046

106 Roozenbeek J, Schneider CR, Dryhurst S, Kerr J, Freeman ALJ, Recchia G, van der Bles AM, van der Linden S. 2020 Susceptibility to misinformation about COVID-19 around the world. R. Soc. Open Sci. 7: 201199

107 Mistrust and Misinformation: A Two-Component, Socio-Epistemic Model of Belief in Conspiracy Theories. Pierre JM. Journal of Social and Political Psychology, 2020, Vol. 8(2), 617–641

108 First Draft (2020). How fake news videos unravelled Pakistan's war on polio. Available at: https://firstdraftnews.org/latest/how-fake-videos-unravelled-pakistans-war-on-polio/

109 First Draft (2020: Understanding the impact of polio vaccine disinformation in Pakistan. Available at: https://firstdraftnews.org/long-form-article/first-draft-case-study-understanding-the-impact-of-polio-vaccine-disinformation-in-pakistan/

110 First Draft (2020): Exploring the controversy around Dengvaxia and vaccine misinformation in the Philippines. Available at: https://firstdraftnews.org/long-form-article/exploring-the-controversy-around-dengvaxia-and-vaccine-misinformation-in-the-philippines-draft/

111 Heidi J Larson, Kenneth Hartigan-Go & Alexandre de Figueiredo (2019) Vaccine confidence plummets in the Philippines following dengue vaccine scare: why it matters to pandemic preparedness, Human Vaccines & Immunotherapeutics, 15:3, 625-627

112 ABS:CBN News (20 Sept 2019). As vaccine debate rages, polio remerges. Available at: https://news.abs-cbn.com/news/09/20/19/as-vaccine-debate-rages-polio-reemerges

113 NPR (23 May 2019). The Philippines is fighting one of the world's worst measles outbreaks. Available at: https://www.npr.org/sections/goatsandsoda/2019/05/23/725726094/the-philippines-is-fighting-one-of-the-worlds-worst-measles-outbreaks?t=1597412968229

114 Public Health England (2020): Vaccine Update https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/861230/PHE_11533_vaccine_update_304_January_2020.pdf

115 Palmer Tim, Wallace Lynn, Pollock Kevin G, Cuschieri Kate, Robertson Chris, Kavanagh Kim et a. Prevlanace of cervical disease at age 20 after immunisation with bivalent HPV vaccine at age 12-13 in Scotland: retrospective population study. BMJ. 2019; 365:l1161

116 WHO (2020) World Health Assembly adopts global strategy to accelerate cervical cancer elimination. Available at: https://www.who.int/news/item/19-08-2020-world-health-

assembly-adopts-global-strategy-to-accelerate-cervical-cancer-elimination#:~:text=Projections%20show%20that%20achieving%20the,could%20be%20averted%20by%202120

[117] DeWeerdt S. Nature 580 S20S4 (2020) https://www.nature.com/articles/d41586-020-01036-x

[118] Kate T Simms, Sharon JB Hanley, Megan A Smith, Adam Keane, Karen Canfell. The Lancet Public Health. Col 5, Issue 4, E223-E234, April 01 2020

[119] WHO (2018): Denmark campaign rebuilds confidence in HPV vaccination. Available at: http://www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/news/news/2018/3/denmark-campaign-rebuilds-confidence-in-hpv-vaccination

[120] HPV World: How Ireland reversed a HPV vaccination crisis https://www.hpvworld.com/communication/articles/how-ireland-reversed-a-hpv-vaccination-crisis/

[121] Global HPV Communication (2019): Crisis communication prepardenss and response to support introduction of HPV vaccine in Malawi. Available at : https://globalhpv.org/document/crisis-communication-preparedness-and-response-to-support-introduction-of-the-hpv-vaccine-in-malawi/

[122] Automatic news alerts

[123] First Draft (2019): Closed groups, messaging apps & online ads. Available at : https://firstdraftnews.org/wp-content/uploads/2019/11/Messaging_Apps_Digital_AW-1.pdf?x65316

[124] S. Lewandowsky, U. K. H. Ecker, C. M. Seifert, N. Schwarz, J. Cook. Misinformation and Its Correction: Continued Influence and Successful Debiasing. Psychological Science in the Public Interest, 2012; 13 (3): 106 DOI: 10.1177/1529100612451018

[125] Paynter J, Luskin-Saxby S, Keen D, et al. (2019) Evaluation of a template for countering misinformation—Real-world Autism treatment myth debunking. PLOS ONE 14(1): e0210746.

[126] Moran, MB, Lucas, M, Everhart, K, et al. (2016). What makes anti-vaccine websites persuasive? J. Comm Healthcare, 9(3), 151–163

[127] Pluviano S, Watt C, Della Sala S. Misinformation lingers in memory: Failure of three pro-vaccination strategies. PLoS One. 2017;12(7):e0181640.

[128] Schwarz, N., Newman, E., & Leach, W. (2016). Making the truth stick & the myths fade: Lessons from cognitive psychology. Behavioral Science & Policy, 2(1), pp. 85–95.

[129] Thinking Fast and Slow. Daniel Kahneman. 2011.

[130] Thomson A, Robinson K, Vallée-Tourangeau G. The 5As: A practical taxonomy for the determinants of vaccine uptake. Vaccine. 2016;17;34(8):1018–24

[131] Taddio A, Chambers CT, Halperin SA, et al. Inadequate pain management during childhood immunizations: the nerve of it. Clin Ther 2009;31(Suppl 2):S152–67.

[132] Hamilton JG. Needle phobia: a neglected diagnosis. J Fam Pract 1995;41:169–75.

[133] McMurtry CM. Managing immunization stress-related response: A contributor to sustaining trust in vaccines. Can Commun Dis Rep. 2020 Jun 4;46(6):210-218.

[134] Stout ME, Christy SM, Winger JG, Vadaparampil ST, Mosher CE. Self-efficacy and HPV Vaccine Attitudes Mediate the Relationship Between Social Norms and Intentions to Receive the HPV Vaccine Among College Students. J Community Health. 2020 May 16. doi: 10.1007/s10900-020-00837-5. Epub ahead of print.

[135] Ling M, Kothe EJ, Mullan BA. Predicting intention to receive a seasonal influenza vaccination using Protection Motivation Theory. Soc Sci Med. 2019 Jul;233:87-92. doi: 10.1016/j.socscimed.2019.06.002. Epub 2019 Jun 6. PMID: 31195194.

[136] Suzanne Tesselaar (21 July 2016) Verbal Vaccine [Video] YouTube https://www.youtube.com/watch?v=tS2zPtsO0Rc&feature=youtu.be

[137] Finnegan G, Holt D, English PM, Glismann S, Thomson A, Salisbury DM, Bogaerts H, Bonanni P. Lessons from an online vaccine communication project. Vaccine. 2018 Jun 16. pii: S0264-410X(18)30612-1.

[138] Deer B. How the case against the MMR vaccine was fixed. BMJ. 2011;342:c5347.

[139] Hansen SN, Schendel DE, Parner ET. Explaining the increase in the prevalence of autism spectrum disorders: the proportion attributable to changes in reporting practices. JAMA Pediatr. 2015 Jan 1;169(1):56–62. pmid:25365033

[140] Fist Draft (2020): An SME training course to prepare for US election misinformation https://firstdraftnews.org/latest/course-training-us-election-misinformation/

[141] First Draft: Too much information https://firstdraftnews.org/project/too-much-information-a-public-guide/ (Accessed 10 Nov 2020)

[142] Nsangi, A., Semakula, D., Oxman, A. et al. (2017). Effects of the Informed Health Choices primary school intervention on the ability of children in Uganda to assess the reliability of claims about treatment effects: a cluster-randomised controlled trial. The Lancet, 390(10092), 374–388.

[143] Kids Boost Immunity https://kidsboostimmunity.com

[144] Take care before you share https://www.takecarebeforeyoushare.org

[145] Roozenbeek, J., van der Linden, S. Fake news game confers psychological resistance against online misinformation. Palgrave Commun 5, 65 (2019).

[146] Basol, M., Roozenbeek, J., & van der Linden, S. (2020). Good News about Bad News: Gamified Inoculation Boosts Confidence and Cognitive Immunity Against Fake News. Journal of Cognition, 3(1), 2. DOI: http://doi.org/10.5334/joc.91

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