



Knowledge, evidence
and learning for
development

Vaccine hesitancy: guidance and interventions

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Questions

- *Are there variations in definitions of vaccine hesitancy?*
- *Is there any guidance on developing vaccine policies?*
- *What methods/interventions are being used to tackle vaccine hesitancy?*

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The K4D helpdesk service provides brief summaries of current research, evidence, and lessons learned. Helpdesk reports are not rigorous or systematic reviews; they are intended to provide an introduction to the most important evidence related to a research question. They draw on a rapid desk-based review of published literature and consultation with subject specialists.

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1. Summary

Research shows that vaccine hesitancy (i.e. ‘the delay in acceptance or refusal of vaccines despite the availability of vaccination services’ (WHO SAGE, 2014a) is rising, resulting in alarming figures on disease outbreaks reported globally. Despite availability of vaccines, the number of countries reporting hesitancy has steadily increased since 2014 (Lane et al., 2018). Therefore, there is a need to understand what governments and partners can do to tackle this problem.

The evidence for this rapid review is gender blind and taken from grey literature, including systematic reviews, interviews, research reports, and peer-reviewed academic papers from vaccine-related projects (e.g. Vaccine Confidence Project). Strategies aimed at specific populations in grey literature differed from those in peer reviewed literature (WHO SAGE, 2014a). This review does not focus on anti-vaccination (anti-vaxx/anti-vac) sentiments or movements. Drivers of vaccine hesitancy are also not explored in this review.

Key points include:

- *Definition:* The “3Cs” (complacency, convenience, and confidence) World Health Organization (WHO) definition of vaccine hesitancy proposed in 2011 is used widely by governments as a standard term (MacDonald & SAGE, 2015). The more positive term ‘vaccine confidence’ is also used by the Vaccine Confidence Project and US National Vaccine Advisory Committee.
- *Guidance for policymakers:* Evidence shows that integrated stakeholder approaches, such as National Immunization Technical Advisory Groups (NITAGs), can provide guidance for policy developments and strengthen national vaccine decision-making, by acting as referees or technical resources in response to rumours or hesitancy (Howard et al., 2018).
- *Guidance for healthcare workers (HCWs):* HCWs can also be hesitant, whether considering vaccination for themselves, their children, or their patients (ECDC, 2015). Guidance tools for healthcare professionals from around the world are available to empower them to become more effective advocates of vaccination (e.g. European Centre for Disease Prevention and Control); some of which have been adapted for use in other countries using WHO guidance (e.g. *Guide to Tailoring Immunization Programmes* or *Western Pacific Regional Guidance*).
- *Guidance to address parents:* Researchers have also developed recommendations for health professionals and regulatory agencies to address parents’ hesitancy about vaccinations (ADVANCE Toolkit; US PolicyLab and the Vaccine Education Center).
- *Potential methods to tackle vaccine hesitancy:* These include adopting a lower-profile approach (i.e. reducing frequency of vaccination campaigns) in order to avoid renewed suspicions (Pakistan). Adapted storytelling strategies can be used by individuals to tell personal stories about vaccines (Jacobs, 2018). Immunisation Information Systems (IIS) could help to fight vaccine hesitancy through recording additional information regarding reasons for delay, interruption or refusal of vaccinations (Gianfredi et al., 2019). However, a review by Schuster et al. (2015) revealed gaps in knowledge due to the paucity of studies in low- and middle-income country (LMIC) settings.
- *Effective strategies to decrease hesitancy:* These include use of mass media; (tailored) communication tool-based training for HCWs (Centers for Disease Control and

Prevention); non-financial incentives, and reminder/recall-based interventions (Jarrett et al., 2015). Approaches can be applied in combination or individually, depending on the grade of vaccine hesitancy and funding available (Arede et al., 2019). Use of religious leaders/community influencers in community engagement strategies to address negative perceptions has also been successful (e.g. *Nigerian Community Engagement Framework*). The *Stop HPV – stop cervical cancer* information campaign has been successful due to collaborations between health agencies and social media (Denmark).

- *Lessons learned:* A unidirectional (top down) approach to communication is successful among some individuals and groups, but not all; success is dependent on the nature and degree of hesitancy (Jarrett et al., 2015). Familiarity and trust with the messenger is a key feature in tackling hesitancy (WHO SAGE, 2014a; Nayar et al., 2019). Vaccine hesitancy and political populism are driven by similar dynamics: a profound distrust in elites and experts (Kennedy, 2019). Many experts believe that it is best to counter hesitancy at the population level (Kumar et al., 2016). Lessons learned have been compiled in the *Catalogue of interventions addressing vaccine hesitancy* technical report (ECDC, 2017). Some countries have turned to mandatory vaccination programmes (USA, France – albeit temporarily) – however experimental evidence shows that making one vaccine mandatory might reduce people’s uptake of others (Omer et al., 2019). Other approaches include penalties for non-compliance (Germany, Italy), or making vaccination a requirement for enrolment in childcare and school, which can help to increase rates (USA, Australia). Although popular, the effectiveness of promoting alternative vaccination schedules to decrease hesitancy has not been studied conclusively enough (National Research Council, 2013; Feemster, 2016).

2. Definitions of vaccine hesitancy

From 2000 to 2017, measles vaccination prevented an estimated 21.1 million deaths (WHO, 2019a). However, at the same time, routine immunisation uptake of the first dose of a measles-containing vaccine (typically measles-mumps-rubella, MMR), has declined in 12 EU member states (Larson et al., 2018). This has contributed to a rise in the number of measles outbreaks across the European region; resulting in over 82,000 cases and the deaths of 72 children and adults in 2018 (WHO Europe, 2019a). This escalation can be seen across the world, with measles outbreaks also in the US, Philippines, Myanmar, and Brazil (Whitford, 2019). Across the world, scepticism about vaccines is on the rise, leading to lower uptakes of key vaccines, and subsequently to the spread of diseases (APPG, 2019: 3). According to a recent Gallup survey (Wellcome, 2019), the most striking example is France, where an upsurge in measles cases has accompanied collapsing faith in all vaccinations: one in three French people (33%) regard vaccines as unsafe - the highest level in the world.

‘Vaccine hesitancy’ has become the focus of growing attention and concern globally, despite overwhelming evidence of the value of vaccines (Marti et al., 2017). It is increasingly becoming a factor in low and stalling immunisation rates (APPG, 2019: 24). Since 2014, the number of countries reporting vaccine hesitancy has steadily increased (Lane et al., 2018). WHO/UNICEF Joint Reporting Form data from 2015–2017 states that only 14 countries out of 194 reported no vaccine hesitancy (Lane et al., 2018; APPG, 2019: 24), although an even lower value (seven

countries) was reported in 2017 (WHO, 2018: 1, 8). This led the WHO to announce vaccine hesitancy as one of the top ten threats to global health in 2019.¹

‘Vaccine hesitancy’: WHO SAGE

Vaccine hesitancy is known as a ‘delay in acceptance or refusal of vaccines despite the availability of vaccination services’ (WHO SAGE, 2014a: 7).

As their review of the literature did not reveal an established definition, the WHO Strategic Advisory Group of Experts (on Immunisation) Vaccine Hesitancy Working Group in 2013-2014 defined hesitancy and its determinants (WHO SAGE, 2014a: 7; MacDonald & SAGE, 2015).² The Working Group retained the term ‘vaccine’ rather than ‘vaccination’ hesitancy. Although vaccination hesitancy more correctly implies the broader range of immunisation concerns, as vaccine hesitancy is the more commonly used term, The Working Group accepted the term ‘hesitancy’ and then explored potential factors needed in its definition (MacDonald and SAGE, 2015). The definition was made in order to ensure that immunisation programme managers, policy makers, clinicians, and researchers would consistently use a standard term to cover the broad range of factors causing low vaccine uptake, which excludes those not related to personal/community behaviour choices (MacDonald and SAGE, 2015). The Working Group noted that vaccine confidence was too narrow a term, covering only one category of factors that affect vaccine acceptance decisions (WHO SAGE, 2014a: 9).

‘Confidence in Vaccines’: National Vaccines Advisory Committee

‘Hesitancy’ and ‘confidence’ have been used in the literature to describe those individuals who fall in the middle of “a continuum ranging from complete refusal to complete acceptance of all recommended vaccines administered at the recommended times” (NVAC, 2015: 577; Peretti-Watel et al., 2015). Reluctance, hesitation, concerns, or a lack of confidence have caused some parents to question or forego recommended vaccines (NVAC, 2015: 575). As significant gaps exist in measuring, monitoring, and tracking vaccine confidence, the US National Vaccines Advisory Committee (NVAC) put together a Vaccine Confidence Working Group (VCWG) in February 2013 (NVAC, 2015: 574). For the VCWG, ‘vaccine confidence’ refers to the trust that parents or health-care providers have (1) in the immunisations recommended by the Advisory Committee on Immunization Practices (ACIP); (2) in the provider(s) who administer(s) vaccines, and (3) in the processes that lead to vaccine licensure and the recommended vaccination schedule. When confidence is high, people will likely support immunisation recommendations and follow recommended schedules. When confidence is low or lacking, people are more likely to hesitate, and may decide to delay or forego recommended vaccinations (NVAC, 2015: 576).

¹ <https://www.who.int/emergencies/ten-threats-to-global-health-in-2019>

² Vaccine hesitancy is complex and context specific, varying across time, place, and vaccines. It includes factors such as complacency, convenience, and confidence. This definition – known as the “3Cs” model of hesitancy in 2011 - encapsulates the possible drivers of vaccine acceptance or refusal (see Larson et al., 2018: 6). However, measuring five psychological antecedents of vaccination (5Cs: confidence, complacency, convenience, risk calculation, and collective responsibility) that synthesise prior models of vaccine hesitancy and confidence has recently been proposed [see Betsch et al., 2019: <https://doi.org/10.31234/osf.io/we2zb>]. Whilst vaccine hesitancy in industrialised countries is influenced by the “5Cs model”, the knowledge gap surrounding the reasons for vaccine hesitancy in low- and middle-income country (LMIC) settings requires a more multi-sectorial research focus (see Cooper et al., 2018: [10.1080/21645515.2018.1460987](https://doi.org/10.1080/21645515.2018.1460987) and Madhi & Rees, 2018: <https://doi.org/10.1080/21645515.2018.1522921> for more information).

3. Guidance/Recommendations for development of vaccine policies

The growing concern about vaccine hesitancy is reflected in the creation of guidance for stakeholders (e.g. governments, public health institutions, healthcare professionals etc.), as well as for parents/caregivers. The following is a list of examples used around the world:

Stakeholders

i. National/Regional Immunization Technical Advisory Groups

National and/or Regional Immunization Technical Advisory Groups (NITAGs/RITAGs) are examples of an integrated approach to prevent vaccine hesitancy (see Section 5.iii). These technical resources can supply guidance to national policy makers and programme managers, to enable them to make evidence-based immunisation related policy and programme decisions suited to the locality (Duclos, 2010; Howard, 2018; WHO, 2018: 8). Multi-country comparative research shows that they have strengthened national vaccine decision-making, engaging with healthcare professionals, and acted as referee/technical resources in response to vaccine rumours or hesitancy (Howard et al., 2018). NITAGs can contribute to the National immunisation programme, including tailoring of recommendations, being country-advocates, and assisting in monitoring and advising on immunisation matters. Guidance by the *Regional Immunization Technical Group* will contribute to the 2018 Global Vaccine Action Plan (GVAP) goals of country ownership and universal vaccine coverage that is free of inequity (WHO, 2018).

Evaluation: The number of countries with functioning NITAGs increased by 20% in 2017 (WHO, 2018: 8). Many LMICs have established NITAGs over the past decade (Howard, 2018). For example, the Pakistan NITAG was established in 2008 by the Ministry of Health, in accordance with WHO guidelines. A programme policy/guideline document was developed in 2015 with the support of partners.³ This document lays out policy direction and guidelines for involvement of female health workers in immunisation service delivery, as well as the private sector's role in immunisation. However, in 2016 only 43% of 47 African countries had an established NITAG, of which only two-thirds were assessed as functional (Adamu et al., 2018). Therefore, gaps remain in many African LMICs regarding immunisation performance, which needs to be addressed in order to understand hesitancy further (Wiyeh et al., 2018).

ii. WHO European Region Guide to Tailoring Immunization Programmes (TIP)

To better identify factors influencing vaccine hesitancy, WHO developed *The Guide to Tailoring Immunization Programmes* for infant and child vaccinations (WHO, 2013). It is targeted at National immunisation programme managers, together with WHO Europe technical officers. It includes proven methods and tools to diagnose vaccine-preventable disease in susceptible populations; identifies supply-and-demand barriers and enablers and recommends evidence-based responses to build and sustain vaccination rates. The TIP principles are applicable to communicable, non-communicable, and emergency planning where behavioural decisions influence outcomes (Buttler et al., 2015). With application of these methods, governments can

³ Pakistan Expanded Programme on Immunization (EPI): <http://www.emro.who.int/pak/programmes/expanded-programme-on-immunization.html>

shift away from traditional, expensive programmatic and/or regulatory interventions to lower cost, more subtle, effective, targeted interventions that have positive impacts in the selected problem subgroup (e.g. for immunisation, communicable or non-communicable disease control, outbreak control or emergency disaster planning). In times of fiscal constraint, this means that governments can deliver better services with better outcomes with fewer resources (Buttler et al., 2015).

Evaluation: An evaluation of the TIP tool was conducted in 2016. TIP has been applied successfully in a few countries (Bulgaria, Lithuania, Montenegro, Sweden, and the UK) to improve the understanding of concerns in vaccine-hesitant populations and develop targeted strategies. Other countries have initiated application of TIP, and the process is ongoing (ECDC, 2017: 5).

Public health professionals/institutions

iii. WHO SAGE Recommendations

WHO SAGE carried out a review (Schuster et al., 2015), and proposed a set of recommendations directed to the public health community, to WHO and its partners, and to the WHO member states (WHO SAGE, 2014b). The recommendations fall into three categories: (1) those focused on the need to increase the *understanding* of vaccine hesitancy, its determinants and the rapidly changing challenges it entails; (2) those focused on *dealing* with the structures and organisational capacity to decrease hesitancy and increase acceptance of vaccines at the global, national and local levels, and (3) those focused on the *sharing* of lessons learned and effective practices from various countries and settings, as well as the development, validation and implementation of *new tools* to address hesitancy (Eskola et al., 2015).

iv. WHO Western Pacific Regional Guidance

The WHO *Western Pacific Regional Guidance on Addressing Vaccine Hesitancy to Help Foster Vaccine Demand* guidance focuses on interventions that can increase vaccine uptake at the programme and individual levels. It has recently been adapted for use by healthcare professionals in Canada (MacDonald and Dubé, 2019).

v. European Centre for Disease Prevention and Control Guides/Toolkits

More and more studies show that healthcare workers themselves can be hesitant, whether considering vaccination for themselves, their children, or their patients. The ECDC provides guides and toolkits for healthcare workers, immunisation programme managers, and public health experts, to support their efforts in addressing vaccine hesitancy (ECDC, 2017).

vi. Learning Network for Countries in Transition/Vaccine Confident Project Resources

The LNCT and the Vaccine Confidence Project have prepared a compilation of vaccine hesitancy and refusal resources for Gavi transitioning countries.⁴ The resources include global and country-specific analyses, factors, and strategies to address it.

Healthcare professionals and parents

vii. US: PolicyLab Recommendations

Paediatricians are considered as the most influential source for vaccine information (Siddiqui et al., 2013). The Vaccine Education Center at Children's Hospital of Philadelphia, US provides complete, up-to-date and reliable information about vaccines to parents and healthcare professionals. It is a member of the WHO Vaccine Safety Net.

PolicyLab (within the CHOP Research Institute – one of the largest paediatric research institutes in the US) and the Vaccine Education Center recently released an Evidence to Action brief *Addressing Vaccine Hesitancy to Protect Children and Communities against Preventable Diseases*. The brief includes a review of vaccine hesitancy, identification of three areas of concern, and a series of recommendations to address the concerns (Nabet et al., 2017: 10, 17).

viii. US Centers for Disease Control and Prevention Resources

The CDC, under the US Department of Health and Human Services, is also working to address vaccine hesitancy. This includes creating new resources and updating existing CDC resources to counter misinformation. CDC continues outreach to the medical associations to help spread clear, consistent and credible vaccine information through trusted sources.⁵ It offers continuing education opportunities on vaccination, including training on how to improve vaccination rates. Available courses also include materials that health care educators can incorporate into existing medical school curricula (CDC, 2016).

Evaluations of the individual-level interventions for parents to increase the likelihood that they will follow the recommended schedule for children are published in the *Catalogue of interventions addressing vaccine hesitancy* (ECDC, 2017: 19-23). Successes are found in behavioural interventions (addressing cervical cancer hesitancy in mothers), as well as tailored and corrective messaging (addressing MMR vaccination hesitancy). Messaging to parents must be tailored to meet individual needs as there is considerable variability in the specific issues of concern, as well as the types of messages which would be effective (Siddiqui et al., 2013).

Parents/Guardians/Primary caretakers

ix. US: National Vaccines Advisory Committee

In 2015, the NVAC released *Assessing the State of Vaccine Confidence in the United States* (NVAC, 2015). This report identifies and describes: factors that may affect parental vaccine confidence; ways to improve parental vaccine confidence, and ways to measure vaccine

⁴ <https://lnct.global/2018/11/14/vaccine-hesitancy-resources-for-gavi-transitioning-countries/>

⁵ <https://www.cdc.gov/media/releases/2019/t0429-national-update-measles.html>

confidence to inform future interventions. The report also includes recommendations to the Assistant Secretary for Health (ASH) on how improving vaccine confidence can help reach Healthy People 2020 immunisation coverage targets.

x. Parent Attitudes about Childhood Vaccines

Research in first-time mothers found that they were three times more likely than others to identify as unsure, somewhat, or very vaccine hesitant (Corben and Leask, 2018). PACV is one of several tools developed to measure vaccine hesitancy (Opel, 2011; 2013). It is completed by parents to stratify them according to their *level* of vaccine hesitancy.

Evaluation: PACV was validated in relation to acceptance of seasonal influenza vaccine in a paediatric emergency department setting in Washington State, US, but did not include all recommended childhood vaccines (Williams et al., 2015). Although a valid and reliable screening tool is necessary for identifying the target population of interest, the PACV and its overall score has not yet been shown to clearly distinguish parents who are potentially more amenable to change from parents who are not. For instance, two parents may both score highly on the PACV but may have very different reasons for hesitancy and different flexibility in their final vaccine decision making (Williams et al., 2015). It has been widely used in the Americas (Canada), Asia (India, Malaysia, The Philippines, Singapore), and Europe (England, Croatia) (Opel, n/d). The survey was found to be a successful surveillance tool to identify vaccine-hesitant parents (ECDC, 2017: 7).⁶

4. Approaches used to tackle vaccine hesitancy

It is suggested that immunisation concerns are “co-opted to serve political purposes” (WHO, 2017: 18). Vaccine hesitancy and political populism are driven by similar dynamics: a profound distrust in elites and experts (Kennedy, 2019). Working together to stimulate demand will also help to prevent hesitancy (WHO, 2018: 8). Hesitancy can be caused by individual, group, and contextual influences, as well as any vaccine-specific issues (WHO, 2019c). Hesitancy in relation to vaccination may affect motivation, causing people to reject it for themselves or their children. The following approaches to tackle hesitancy can be applied in combination or individually, depending on the grade of vaccine hesitancy and funding available (Arede et al., 2019):

Laws mandating vaccines and fines

There is a need to understand the variety of ways in which legislation and regulation have been used to advance the cause of immunisation (including its use to address hesitancy), the impact of such measures, and the contextual factors that have influenced their effectiveness (WHO, 2017: 19). The following country evidence are examples of government laws mandating vaccines:

⁶ In comparison, using data from a large population-based survey conducted among parents of children aged 24–35 months, Smith and collaborators (2011) concluded that the four psychosocial domains of the health belief model (perceived susceptibility to, and seriousness of, vaccine-preventable diseases; perceived efficacy of vaccines, and concerns and influences that facilitate or discourage vaccination) allowed for measurement of beliefs linked with vaccine hesitancy and could be useful for predicting the parental decision to delay or refuse vaccines for their child (see Smith et al., 2011: DOI:10.1177/00333549111260S215).

US: Laws mandating vaccines for school entrance are state-based. Hence, there is substantial variability in the laws across the country. These are based on coverage of school grades, vaccines included, introduction of new vaccines, reasons for exemptions, and procedure for granting these exemptions. Mandatory immunisation laws for school entrance were designed to control outbreaks of vaccine preventable diseases such as smallpox and measles (Orenstein & Hinman, 1999). However, certain exemptions are permitted to school entrance immunisation laws in each state. All states, besides Mississippi and West Virginia, permit religious exemptions, while only 20 states permit philosophical or personal belief exemptions (Siddiqui et al., 2013).

In light of rising vaccination hesitancy, some European countries have turned to mandatory vaccination programmes, including rigid penalties for non-compliance. However, experimental evidence shows that making one vaccine mandatory might reduce people's uptake of others (Omer et al., 2019):

France: New laws that took effect from the beginning of 2018 now make it mandatory for parents to vaccinate their children against diseases.⁷ The move followed a rash of measles deaths across Europe. To help reduce this scepticism and combat rejection rates, the French government expanded the number of compulsory vaccines from 3 to 11 for children up to the age of 2 years. In addition to the new law, the government is conducting promotional campaigns and providing additional support to healthcare professionals who have vaccine-hesitant patients. The mandate is intended to be temporary until the government sees evidence of higher confidence among the public (Rey et al., 2018).

Italy: In February 2017, the Ministry of Health issued the 2017–2019 *National Immunisation Prevention Plan*, and in July 2017 the law 119/2017 for compulsory vaccination was approved.⁸ As of September 2017, new law 73/2017 calls for children to receive 12 vaccines if they want to be enrolled in school (Crenna et al., 2018).

Germany: Although no legal mandate exists, parents now face a hefty fine of 2,500 euros (£2,175; USD 2,800) if they don't immunise their children.⁹ Since 2015, parents in Germany must present proof that they have received medical vaccination advice to childcare centres. However, the centre is not allowed to refuse a child a place if they have not done so, as parents have a legal right to one. Unlike Italy, Germany has not made it mandatory for children to receive certain vaccinations before being accepted by childcare centres, although many doctors and parties such as the Free Democratic Party (FDP) have called for such a law.

Finland: general vaccination acceptance is “very good”¹⁰ and coverage is “excellent.”¹¹ However, according to the Ministry of Health's chief physician, parliamentarians have

⁷ <https://www.efe.com/efe/english/technology/france-makes-11-child-vaccines-compulsory-no-school/50000267-3480979>

⁸ Italia. Ministero della Salute. National Immunization Prevention Plan 2017-2019. Published on the Italian Official Gazette, 18 February 2017. www.gazzettaufficiale.it/eli/id/2017/02/18/17A01195/sg

⁹ <https://www.dw.com/en/germany-moves-to-improve-child-vaccination-rate/a-39004792>

¹⁰

https://yle.fi/uutiset/osasto/news/frustrated_and_disappointed_one_father_asks_why_finland_wont_make_childhood_vaccines_compulsory/10023122

¹¹ <https://thl.fi/en/web/vaccination/national-vaccination-programme/vaccination-programme-for-children-and-adolescents>

raised concerns about lower vaccination coverage rates in some parts of the country and have pondered ways to address the problem.¹⁰

Vaccine intervention strategies

In their systematic review of interventions for reducing parental vaccine refusal and vaccine hesitancy, Sadaf et al. (2013) found limited evidence on effective strategies to guide policy makers. However, a number of such strategies have been reported by WHO SAGE and ECDC (Jarrett et al., 2015; ECDC, 2017):

i. Dialogue-based interventions

Leader involvement: Interventions with religious or traditional leaders align themselves with natural community processes – seeking out community leaders and encouraging dialogue across multiple levels to both inform and influence. Leaders include those from government, religious institutions, and the local community (both male and female). Research shows that success could be attributed to the efforts made to understand the target audience via open dialogue and integrate activities with familiar processes and systems (WHO SAGE, 2014a: 12; Jarrett et al., 2015). For example, successful interventions relating to hesitancy on uptake of reproductive health technology (RHT) in African and South Asian centred on the interpretation of local religious and cultural norms, particularly around the understanding and perceptions of both men and women, to create an environment to support pro-RHT decision-making (WHO SAGE, 2014a: 12). In 2018, a Community Engagement Framework (CEF) developed by the National Primary Healthcare Development Agency (NPHCDA), WHO and its partners, worked with traditional leaders in communities to quash social media rumours that the Nigerian Government had stopped free immunisations due to safety of the vaccines.¹² NPHCDA and its partners also developed a *Demand creation package*, which uses community influencers such as Quranic teachers for mobilisation and health camps to provide free health services.

Mass media: Mass media channels (e.g. television, radio, public transport advertising, and the internet) are among the best tools to communicate public policy to all segments of a community. This was found in India, where target parents with low awareness of health services in India found an association with increased uptake of all routinely recommended vaccines (Jarrett et al., 2015). At a broader contextual level, group sessions with journalists and mass media campaigns have also been used to positive effect to support message consistency.

Social media: There is a plethora of misinformation about vaccines, reducing public trust and confidence in their safety and efficacy. The rise of social media and “fake news” has only enhanced the spread of these messages (Whitford, 2019). Negative messages are circulated mostly via groups on social networking apps, such as WhatsApp, rather than by individual messaging. Most messages are anonymous and are forwarded without any content verification (Nayar et al., 2019). Arede et al. (2019) recommend that WHO, CDC, ECDC, and/or national health departments use social media platforms in order to inform the public, especially adolescents, about relevant scientific data (with financial support from international and national entities). For example, the Pakistani government is now considering different options on how to respond to the aftermath of the polio eradication panic (Yusufzai, 2019). These include adopting a lower-profile approach during the government-led immunisation campaign, in order to avoid

¹² <https://www.afro.who.int/news/nigeria-consolidates-efforts-curtail-vaccine-hesitancy>

renewed suspicions started on social media (Liuhto, 2019). In addition, it is reported that the government and its partners have launched a perception management campaign to combat misinformation. This includes working with Google, Facebook, YouTube, and Twitter.

Training for HCWs – communication tool-based: This generally has a positive effect (e.g. for Expanded Programme on Immunization (EPI) vaccines, DTP3); however, the size of the effect and evidence quality vary. Observations about this example and mass media suggest that interventions that adopt a unidirectional (top down) approach to communication may be successful among some individuals and groups, but not all; success is dependent on the nature and degree of hesitancy (Jarrett et al., 2015). However, the use of field workers instead of local opinion leaders was definitely not as effective as employing both in community group discussions. In certain contexts, defensive communication (e.g. debunking and fact checking) might reassure public health professionals and have some positive impact. Although, it does not address negative emotions towards vaccines, which causes hesitancy (Gesualdo et al., 2018).

Training for HCWs – information-based tool: HCWs can also be hesitant, whether considering vaccination for themselves, their children, or their patients (ECDC, 2015: 1). Vaccine education tools, along with guidance from professional authorities like the ACIP and AAP (American Academy of Pediatrics), can help health providers overcome their own doubts regarding the safety and effectiveness of routine childhood immunisations. This is important as there is a need for communication of a unified message from healthcare providers to parents on the benefits of vaccines and their timely uptake in children (Siddiqui et al., 2013). Interventions focusing on improving knowledge of healthcare workers were mostly found to have a positive impact on vaccine uptake (ECDC, 2015: 8). However, unless the intervention is appropriately targeted, it will be unsuccessful (Jarrett et al., 2015). This is due to low confidence of HCWs.

ii. Non-financial incentives

By addressing basic needs such as food, this intervention simultaneously builds confidence and reduces vaccine hesitancy (Jarrett et al., 2015). This is because the target population feel that their other critical needs are being addressed. This approach could be particularly important for underserved groups (Jarrett et al., 2015).

iii. Reminder-recall notifications

In some countries, as vaccination services are private, the functions dedicated to recording of the vaccinated population are well separated from others dedicated to the management of vaccination process. Therefore, a system of written reminders can act as a follow-up mechanism with parents of unvaccinated or under-vaccinated children. One has been introduced in Denmark, with a “significant improvement” in vaccination levels (Sabin Vaccine Institute, 2018: 9).

However, although positive, the relatively low observed effect of reminder–recall interventions in LMIC settings seems to reflect the limitations of using this kind of intervention alone to tackle multiple causes of hesitancy (Jarrett et al., 2015).

Measurement tools

Different tools have been developed to measure vaccine hesitancy, identify hesitant populations (including clinicians and members of the public), and assess the concerns in hesitant populations

(Larson et al., 2015; ECDC, 2015). These include surveys with Likert scales, and open-ended questionnaires. However, evaluations are not always available (ECDC, 2017: 11). The following is a range of tools which have been used with positive results:

iv. Vaccine Hesitancy Scale (VHS): Population surveys and monitoring

New ways of analysing country responses are needed to provide a clearer picture of demand and hesitancy issues at a national level (WHO, 2018: 9). The availability of validated scales of vaccine hesitancy/confidence, and their regular use in a country, allows monitoring the antecedents of vaccination, and detecting potential early warning signals (Lane et al., 2018).

Many experts are of the view that it is best to counter vaccine hesitancy at the population level. They believe that it can be done by introducing more transparency into policy decision-making before immunisation programmes, providing up-to-date information to the public and health providers about the rigorous procedures undertaken before introduction of new vaccines, and through diversified post-marketing surveillance of vaccine-related events (Kumar et al., 2016).

First, Governments have to clarify if vaccine hesitancy is a leading cause of low vaccination rates in their country (Arede et al., 2019). Therefore, surveys on the vaccination status and attitude of the population should be performed using guidelines, such as the one provided by the WHO SAGE Working Group on vaccine hesitancy (WHO SAGE, 2018). WHO SAGE developed a diagnostic tool, the Vaccine Hesitancy Scale (VHS), to identify and compare hesitancy of parents in different global settings. It has been field tested in both rural and urban Guatemala (Domek et al., 2018), and in the UK for general attitudes (Luyten et al., 2019). However, problems interpreting the multiple constructs of vaccine hesitancy have been found (Domek et al., 2018).

Each country will have to define their own evaluation framework to measure the success of their particular implementation. For example, Sweden conducted an analysis of the reasons behind lower immunisation rates among immigrant populations in several areas of the country and undertook a targeted information campaign. Similarly, Denmark conducted an analysis to discover the reasons behind the human papillomavirus (HPV) vaccine hesitancy and addressed it through a targeted information campaign (Sabin Vaccine Institute, 2018: 9). This tactic resulted in immunisation rates significantly improving.

v. The ADVANCE consortium Toolbox

The *Accelerated development of vaccine benefit-risk collaboration in Europe* has developed the ADVANCE Toolbox, which can be used by the scientific community and regulatory agencies to streamline the monitoring of the health benefits and risks of vaccines.¹³ It comprises of different online open source applications to assess potential impact of possible disease- and exposure-misclassification; derive prevalence estimates and validity indices, and visualises near real-time monitoring.

vi. The Vaccination Determinants Matrix

The more complex *Working Group Determinants of Vaccine Hesitancy Matrix* has determinants arranged in three categories: contextual, individual and group, and vaccine/vaccination-specific

¹³ <http://www.advance-vaccines.eu/>

influences (WHO SAGE, 2014a: 12). While not primarily intended as a practical tool, this may be helpful for researchers, survey question developers, and those developing interventions to address hesitancy, to approach the problem more broadly than as simply an issue of confidence (MacDonald & SAGE, 2015).

vii. Immunisation Information System: ongoing surveillance

Immunisation Information Systems (IISs) are confidential, electronic population-based systems, storing individual-level data on vaccines received within a given geopolitical area. They are also known as immunisation registries, and in the majority of cases, data are entered by HCWs. Sometimes the general population may also enter data, followed by a general practitioner (GP)'s approval (Gianfredi et al., 2019). It is recommended that increased paediatrician or GP involvement would be helpful for determining vaccine hesitancy (Jacobson et al., 2015); especially as vaccine hesitancy can rapidly undermine coverage of specific vaccines, often in highly localised settings (WHO, 2017: 18).

IISs have the potential to improve the performance of vaccination programmes and to increase vaccine uptake, as they are able to generate reminder and recall notifications. The strength of IIS is to provide decision makers with support for a vaccine strategy aimed to evaluate the efficacy of such vaccine policy, and to improve programme management (Siddiqui et al., 2013; Whitford, 2019).

Most IISs have additional capabilities, such as monitoring vaccine stocks to facilitate timely procurement of vaccines in order to limit wastage and ensure adequate supplies, as well as monitoring of adverse events following immunisation (AEFI) reporting, and communicating with other health information systems, in particular with civil and cancer registries (Gianfredi et al., 2019).

Another use specific to hesitancy is recording delay information. IISs could help to fight vaccine hesitancy through recording additional information regarding reasons for delay, interruption or refusal vaccinations. Alternative vaccination schedules offer delaying receipt of some vaccines or doses, selective avoidance of some vaccines, and limiting the number of vaccinations received by children at any visit to the physician's office (Siddiqui et al., 2013). Delaying receipt of vaccines might increase susceptibility of children by exposing them to vaccine-preventable diseases. Alternative vaccine schedules have become popular; however, the safety or effectiveness of these schedules has not been rigorously studied (National Research Council, 2013; Feemster, 2016). However, a review on vaccine hesitancy by Schuster et al. (2015) revealed gaps in knowledge especially due to the paucity of studies from LMICs settings. This is because several countries are still developing or piloting these instruments.¹⁴

viii. Vaccine safety systems

A rigorous vaccine safety system that takes advantage of new technologies and new scientific methods, along with effective communication approaches to address vaccine concerns, is key to maintaining public confidence (Siddiqui et al., 2013). The US has one of the most advanced systems in the world for tracking vaccine safety.¹⁵ These include the *Vaccine Adverse Events*

¹⁴ The ECDC provided the last updating data on IIS implementation among European countries, while WHO made available data for the other developing countries.

¹⁵ <https://www.vaccines.gov/basics/safety>

*Reporting System (VAERS)*¹⁶ (an early warning system managed by CDC and FDA, for use by patients, health care professionals, vaccine companies, and others), and *The Vaccine Safety Datalink (VSD)*¹⁷ (a collaboration between CDC and several health care organisations across the nation).

5. Effective responses to hesitancy ‘outbreaks’: lessons learned

Countries vary greatly in their preparedness for hesitancy ‘outbreaks’ or declining coverage, with middle-income countries in particular typically lacking the capacity to manage hesitancy challenges (WHO, 2017: 19). The following lessons learned are necessary to consider for future responses to hesitancy ‘outbreaks’:

i. Quality hesitancy assessments/trend information

In 2016, 83% of countries reported at least one reason for hesitancy. However, only a third (33%) of countries had carried out a hesitancy assessment (WHO, 2017: 18). This number needs to be increased, as assessments are also key for determining if an intervention has been effective in reducing overall hesitancy (Lane et al., 2018). For this to happen, the barriers to undertaking assessments need to be determined. Increasing assessments would not only enhance the validity of the reasons cited, but when done serially e.g. before and after an intervention has been implemented, could help grow the evidence for what strategies work in what settings and in what contexts to improve vaccine acceptance. In the interim, when stakeholders are working with countries to address hesitancy and improve vaccine acceptance, if assessments are not available, it might be helpful to look at both regional trends, as well as trends by country income level to determine what concerns might most effectively be targeted to help the country (Lane et al., 2018).

ii. Government investment in immunisation

Data from the WHO shows that government investment in immunisation has grown by 108% in the African region and by 78% in the Western Pacific region since 2010, but has fallen by 12% in the European region (WHO, 2017: 18). Although the investment made by national governments in immunisation has been steadily increasing, a decline in the European region is worrying (WHO, 2017: 12). Newer NITAGs (e.g. Nigeria, Uganda, and Senegal) have expressed concerns about lacking guaranteed funding (Howard et al., 2018). UNICEF is currently urging governments in Europe and Central Asia to invest in health systems that prioritise reaching the most vulnerable children with life-saving immunisations, alongside national campaigns to address the concerning trend of growing vaccine hesitancy.¹⁸

¹⁶ <https://www.cdc.gov/vaccinesafety/ensuringsafety/monitoring/vaers/>

¹⁷ <https://www.cdc.gov/vaccinesafety/ensuringsafety/monitoring/vsd/>

¹⁸ <https://www.unicef.org/kyrgyzstan/press-releases/governments-must-invest-immunizing-most-vulnerable-children-and-addressing-vaccine>

iii. Integration with health programmes

Integrating activities with familiar processes and systems has been shown to be successful (WHO SAGE, 2014a: 12; Jarrett et al., 2015; Adamu et al., 2018). An integrated approach includes involvement of stakeholders involved in evidence synthesis, programme managers, and those involved in vaccine delivery, as well as end-users (parents/caregivers).

The lack of basic services in Pakistan and Afghanistan has fuelled vaccine hesitancy in some of the most deprived and underserved communities there.¹⁹ Therefore, the *Global Polio Eradication Initiative (GPEI) 2019–2023 Strategy* has initiated a new integrated model that responds to vaccine hesitancy and polio fatigue (WHO, 2019b: 41). UNICEF Country Offices in Pakistan and Afghanistan are working to integrate activities around health, WASH, nutrition, and education in these communities.

iv. Target strategies

An analysis of grey literature demonstrates that the strategies aimed at specific populations differ from the peer reviewed literature (WHO SAGE, 2014a: 34).²⁰ Most strategies were aimed at the local community, HCWs, and parents, with some policy-based strategies aimed at government officials. All of these implemented a focus in Africa. However, strategies aimed at the local community were also common in high income regions, particularly in the Americas, as were strategies aimed at HCWs, parents and adolescents (WHO SAGE, 2014a: 34).

Stakeholder collaborations: Each country should develop a vaccine hesitancy management strategy, to include ongoing national assessment of vaccine concerns, trust-building and active hesitancy prevention, and crisis response plans. This is the main responsibility of the countries themselves, as well as other key stakeholders, e.g. WHO regional offices, RITAGs, Global NITAG Network, associated technical experts, and civil society organisations (CSOs) (WHO, 2017: 28).

In Denmark, health authorities launched a media campaign to restore public confidence in response to negative media reports questioning the safety of the HPV vaccine, and a related decline in the number of teenage girls getting it. The results have been impressive: in 2017 around 30,000 girls began the HPV vaccination programme, which is a doubling compared to the year before (WHO Europe, 2019b). Authorities conducted a survey and created several focus groups to better understand the concerns parents had with the HPV vaccination. They were eager to know who to target, and the results from the survey told them that it was primarily mothers who made the decisions. One of the most important facts gleaned from the survey and the focus groups was that parents wanted to learn more about the HPV vaccine. With that information the Danish Health Authority partnered up with the Danish Cancer Society and the Danish Medical Association to design the information campaign *Stop HPV – stop cervical cancer*. A public relations firm was hired to help communicate the message; a website was developed, and Facebook and other social media platforms were used to reach the target group (WHO Europe, 2019b).

¹⁹ <http://polioeradication.org/wp-content/uploads/2019/01/polio-partners-group-chairs-statement-20181203.pdf>

²⁰ The strategies were categorised into themes including: multi-component, dialogue-based, incentive-based and reminder/recall-based. Within the peer reviewed literature, most evaluated interventions were multi-component.

Children and adolescents: Vaccine hesitancy has several causes, and emotions play an important role. As a result of their literature review, Arede et al. (2019) suggest the alternative approach of stakeholders targeting children and adolescence, who might not have strong emotions about vaccines yet (and whose opinion can still be influenced through different sources). This is important, as in adults, the chances of improving risk perception solely by providing appropriate information are low due to the already established emotional connection to the topic of vaccination. Tools can differ according to different developmental periods. Investing into prevention and health promotion, as well as communicating the importance of vaccination to young generations can have long-lasting beneficial effects in the population (Arede et al., 2019). However, as it is likely to have a very heterogeneous group of hesitant people, it is crucial that the strategy is well adapted to a particular subgroup (Jacobs, 2018: 101).

v. (Re-)building/understanding trust

Allied to this work is the need to develop strategies for building and maintaining trust with communities – an area where several groups can play valuable roles (WHO, 2017: 19; WHO, 2018: 12). The underlying dynamics of the relationship between governments and their citizens that help explain why finding appropriate, and effective, policy responses can be challenging. They are also not well documented (Kieslich, 2018):

Government collaborations: Research has shown that, in the concept of trust, parents describe governments as ‘socially remote institution[s]’ rather than supportive when discussing vaccines (Dubé et al., 2016). Rebuilding trust about vaccines will require co-ordination between many different areas of government, including health, education, media and international development. Local communities, CSOs, and religious groups are also essential in building confidence in immunisation and must be given the tools to utilise their engagement in all areas of society (Whitford, 2019).

Health professionals: As HCWs have the potential of influencing patient vaccination uptake, it is crucial to improve their confidence in vaccination, and engage them in activities targeting vaccine hesitancy among their patients (Karafillakis et al., 2016). However, state–society relations in vaccination policy are characterised by contestation over the credibility of scientific evidence and a distrust of citizens in public health institutions (Kieslich, 2018).

It is recommended that clinicians should build trust with patients and their families, as well as build relationships with leaders in the community (Ashkir and Mohamed, 2017). Interventions that are less successful are those that did not engage closely with the individual. Specifically, the use of field workers instead of local opinion leaders was not as effective as employing both in community group discussions. Familiarity and trust with the messenger seem to be a key feature in these instances (WHO SAGE, 2014a: 12). Absence of trust between care givers and health workers is seen as an important issue in vaccine hesitancy (Nayar et al., 2019). Also, many parents no longer want to be told what to do for the health of their children by their paediatrician, but rather want a shared decision-making process (Siddiqui et al., 2013).

CSOs: The field of state–society relations comprise not one approach, but multiple lenses that ascribe varying degrees of policymaking influence to state actors and society actors, respectively (Kieslich, 2018). Greater collaboration between immunisation actors, with civil society at the centre, is vital in order to counter attacks on immunisation and reach those children most in need (APPG, 2019: 3). On the national stage, CSOs can play a critical role in advocacy and in holding

governments to account. They also have the potential to make significant contributions to national hesitancy management strategies (WHO, 2017: 19).

Communities: The EU-funded project EBODAC (Ebola Vaccine Deployment, Acceptance and Compliance) focuses on trust building and community engagement around recruiting participants into Ebola vaccine trials in Africa. It includes investigation of the evolution and impacts of negative rumours, such as those that led to the suspension of two Ebola vaccine trials in Ghana.²¹ The learnings from the EBODAC Consortium 2017 symposium have contributed to a training resource which is now available as an open-access tool for anybody who is interested in community engagement, communications and enabling technologies for clinical trials in outbreak settings.²²

Parents: A qualitative review from Canada shows that parental/caregiver vaccination decisions are complex and multi-dimensional (Dubé et al., 2018). There are genuine concerns that parents/caregivers have about vaccines and their possible side effects (Edwards et al., 2016). However, sometimes these concerns have been dismissed as uninformed or uneducated, but this is unhelpful and counterproductive (Whitford, 2019). Results taken from Freed et al. (2011) show that parents most often trusted their child's paediatrician for safety information (76% expressed 'a lot of' vs 'some' trust), followed by other healthcare providers (26%), government vaccine experts (23%), and family and friends (15%). However, over a quarter (26%) of parents surveyed had placed some trust in celebrities (Freed et al., 2011). 73% of the parents placed at least some trust in other parents who believed that their child was harmed by a vaccine. Websites from doctor groups (e.g. the AAP) were the most popular source of information trusted by parents (used by 27%). Furthermore, there were gender differences among parents. Women were more likely than men to place at least some trust in parents claiming a vaccine hurt a child. Women were more likely to trust celebrities, television shows, magazines and news articles for vaccine safety (Freed et al., 2011).

Therefore, those who design public health efforts to provide evidence-based information must recognise that different strategies may be required to reach some groups of parents who use other information sources. The government must bring in people with genuine fears for their children's health, open the conversation, and rebuild trust around vaccines again. No question should be deemed unreasonable or unreasoned (Whitford, 2019). Public Health England is working with the Cabinet Office disinformation unit to include measles as one of topics being tested as part of the 'Don't feed the beast' campaign. The campaign encourages people to use the S.H.A.R.E checklist to look for misleading news and content.²³

²¹ <https://www.vaccineconfidence.org/rise-vaccine-hesitancy-related-pursuit-purity/>

²² Hosted by the Vaccine Confidence Project: <https://www.vaccineconfidence.org/ebohandbook-introduction/>

²³ <https://sharechecklist.gov.uk/>

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Key websites

- The Vaccine Confidence Project™ is a WHO Centre of Excellence on addressing Vaccine Hesitancy: <https://www.vaccineconfidence.org/research/vaccine-hesitancy/>
- Stop HPV campaign website (Danish): <https://www.stophpv.dk/>
- Technical Report: Catalogue of interventions addressing vaccine hesitancy (including lessons learned): <https://ecdc.europa.eu/sites/portal/files/documents/Catalogue-interventions-vaccine-hesitancy.pdf>
- EBODAC (Ebola Vaccine Deployment, Acceptance and Compliance) training resources: <https://www.vaccineconfidence.org/ebohandbook-introduction/>

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