



Policy recommendations for healthcare authorities, organizations and professionals on vaccine hesitancy in Europe: From evidence to practice

Tiago Correia^{a,b,*}, Ana Patrícia Hilário^c, Cátia Guerreiro^{a,b}, Joana Mendonça^d, Rita Moraes^{a,b}, Fábio Rafael Augusto^e, André Beja^{a,b}

^a Associate Laboratory in Translation and Innovation Towards Global Health, LA-REAL, Global Health and Tropical Medicine, GHTM, Instituto de Higiene e Medicina Tropical, IHMT, Universidade Nova de Lisboa, UNL, Lisboa, Portugal

^b WHO Collaborating Center for Health Workforce Policies and Planning, Instituto de Higiene e Medicina Tropical, IHMT, Universidade Nova de Lisboa, UNL, Lisbon, Portugal

^c Centro Interdisciplinar de Ciências Sociais, Universidade de Évora (CICS.NOVA.UÉvora), Portugal

^d Instituto Universitário de Lisboa (ISCTE-IUL), CIS-Iscte, Lisboa, Portugal

^e Instituto de Ciências Sociais, Universidade de Lisboa, Lisboa, Portugal

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ABSTRACT

Vaccine hesitancy presents significant challenges to public health, exacerbated by a lack of cohesive policies in Europe. Recognized as a complex social phenomenon influenced by various factors, vaccine hesitancy threatens health systems and public trust. This paper analyses the political background and current gaps in policies addressing vaccine hesitancy, with a specific focus on the role of healthcare authorities, organizations and professionals in shaping effective responses. The VAX-TRUST project, funded by H2020 and conducted in seven European countries, provides a framework for translating social scientific research into actionable strategies within healthcare settings. Using methodologies such as the Delphi method, the project developed the ASTARE model, which encompasses six dimensions: Awareness, Support, Training, Agency, Recognition, and Engagement. These dimensions guide tailored recommendations to strengthen the capacity of healthcare professionals, organizations, and authorities in addressing vaccine hesitancy, enhancing public trust, and vaccine confidence and uptake. The paper highlights the necessity of evidence-based, collaborative, and adaptive policies that raise public awareness, counteract misinformation, and support healthcare professionals. Effective policymaking requires understanding legislative processes, leveraging scientific evidence, and fostering stakeholder participation. By emphasizing context-sensitive interventions and culturally informed strategies, this study provides a comprehensive approach for health systems to address vaccine hesitancy and improve public health outcomes across Europe.

1. Political background

1.1. Political factors underpinning vaccine hesitancy

Although vaccines are recognized as both an individual and public good [1], and mass vaccination is a critical public health measure for controlling and preventing infectious diseases [2], a growing global movement questions their efficacy and safety [3].

Political factors play a crucial role in this context by influencing trust in institutions, access to healthcare, and the spread of misinformation. Government policies, regulatory decisions, and public health messaging can either strengthen vaccine confidence or fuel skepticism, particularly

when inconsistent guidelines or perceived conflicts of interest arise. Distrust in pharmaceutical companies and concerns about profit-driven agendas further politicize vaccination efforts, while social media amplifies partisan debates and conspiracy theories. Political instability, corruption, and a history of unethical medical practices contribute to deep-seated mistrust in vaccination campaigns. Marginalized groups, who often face systemic discrimination and medical neglect, may perceive vaccines as tools of social control rather than public health interventions [4].

* Corresponding author at: Rua da Junqueira, 100, 1349-008, Portugal, Lisboa.
E-mail address: tiago.correia@ihmt.unl.pt (T. Correia).

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1.2. Meaning of vaccine hesitancy

In 2014, the WHO's Strategic Advisory Group of Experts (SAGE) on immunization defined vaccine hesitancy as a delay in acceptance or refusal of vaccines despite the availability of vaccination services [5]. Since then, it has become clear that hesitancy is context-specific [6]. The concept has evolved to encompass a 'motivational state of being conflicted about, or opposed to, getting vaccinated; includes intentions and willingness' [7]. This broader definition emphasizes the importance of considering both practices and varying levels of reflexivity, which provide insights into the underlying motives behind hesitancy [8].

This evidence contributes to a growing body of research that addresses vaccine hesitancy as a complex social phenomenon [9], influenced by variations over time, location, target groups, and specific vaccines. Notably, vaccine-preventable diseases are increasing in the northern hemisphere, posing significant risks to health systems due to the burden of preventable diseases and the undermining of responses to other conditions [10]. Healthcare professionals are key to addressing vaccine hesitancy, as they bond the patient to the health system [10]. They face greater risks, becoming more susceptible to transmission and occupational illnesses, which affect their physical and mental health [11].

COVID-19 demonstrated how outbreaks can severely undermine health systems' capacity to respond adequately [12]. Beyond challenging healthcare infrastructure, the pandemic amplified a range of interconnected social and economic risks. For example, widespread school closures [13] disrupted education globally, exacerbating inequalities and posing long-term developmental challenges. Mobility restrictions [14] imposed to contain the virus disrupted travel and commerce, impacting economies and global supply chains. The resulting economic fallout included significant job losses and increased unemployment rates [15], plunging many households into financial distress and jeopardizing livelihoods. Additionally, infection control measures like social distancing and quarantine heightened social isolation [16], impacting mental health and exacerbating feelings of loneliness and disconnection in communities worldwide. Even when health systems are not under pressure due to excess demand, immunization programs are of great value to health systems leading to cost offsets [17].

1.3. The lack of policies to address vaccine hesitancy

This context underscores the complex landscape of political challenges stemming from vaccine hesitancy. Despite the urgent need for cohesive action, the formulation of effective policies remains fragmented and contentious. Political difficulties are evident at international, national, and local levels [18,19]. Countries have adopted their own national strategies, sometimes lacking strong scientific support and exhibiting territorial variations [20]. Consequently, mixed approaches have emerged, including mandatory and voluntary vaccination measures, extensive and universal immunization programs, and vaccines administered by restricted or broader professional groups. Even when vaccine-related decisions are evidence-based, their scalability is often limited, restricting the transfer of learnings both within and between countries [21].

2. General aspects of policies targeted at vaccine hesitancy

The need for improved policies designed to mitigate vaccine hesitancy is clear. It is essential to foster confidence and increase vaccination rates through strategic, evidence-based interventions and targeted communication efforts [6]. Current knowledge highlights that policies should aim to achieve increased vaccination rates by setting clear targets for vaccine uptake [22], particularly focusing on reaching underserved and hesitant populations [23,24]. This is likely to improve public health outcomes, with a quantifiable decrease in the prevalence of vaccine-preventable diseases and the achievement of herd immunity

thresholds, thereby protecting communities, including those who cannot be vaccinated [5]. Additionally, such policies need to foster greater trust in vaccines, working towards a measurable improvement in public attitudes towards immunization and enhancing the credibility of the healthcare system as a reliable source of vaccine information and services [25].

Building on this knowledge, the general aspects of outcomes and key characteristics of policies [26] targeted at vaccine hesitancy can already be systematized.

2.1. Intended outcomes

Based on current understanding of vaccine hesitancy, such policies should aim to achieve the following general objectives:

- **Enhance Public Understanding**
 - **Educate the Public:** Develop a robust educational campaign that highlights the critical role vaccines play in individual and public health, emphasizing the rigorous processes behind vaccine development and approval.
 - **Raise Awareness:** Launch a multi-channel awareness campaign, leveraging social media, traditional media, and community events to ensure widespread dissemination of accurate vaccine information.
- **Counteract Misinformation**
 - **Combat False Information:** Create a rapid response team to address vaccine misinformation in real-time, providing clear, scientifically backed responses to public concerns.
 - **Fact-Checking Resources:** Partner with fact-checking organizations and establish a dedicated portal for the verification of vaccine-related information.
- **Support Healthcare Professionals**
 - **Training and Resources:** Offer comprehensive training modules and up-to-date resources to healthcare professionals to enhance their vaccine literacy and communication skills.
 - **Professional Development:** Improve vaccine education in the core curriculum of medical and nursing schools and provide continuing education credits for vaccine-related training.

2.2. Key characteristics

Following evidence in public policies and policy analysis, effective policies in general—and vaccine-hesitancy-related policies in particular—need to comply with at least the following key characteristics:

- **Evidence-Based:** Policies must be grounded in the latest scientific evidence, incorporating successful strategies from various initiatives. Continuous research is essential to adapt measures based on new scientific findings and evolving public health needs.
- **Collaborative:** Fostering coalitions of stakeholders from various sectors ensures a cohesive and united front against vaccine hesitancy. Multi-sector involvement can be complemented by partnerships, leveraging the reach and expertise of public and private sector entities in communication and technology.
- **Adaptive:** Policies must be designed with flexibility, allowing for swift adaptations in response to the evolving landscape of vaccine science and public sentiment. Establishing a structured feedback loop with stakeholders and the public ensures that policy adjustments and improvements are informed by ongoing input and feedback.

3. Scientific methodologies for policy-making targeted at vaccine hesitancy

The challenge remains: how can we translate these general processes into concrete policy-making in different countries? Although general

frameworks of policy analysis help understanding essential aspects of formulating and implementing policies targeted at vaccine hesitancy [26–28], the complexity of the phenomenon requires a more detailed approach. Local, national, and international policymakers need to understand how to make these policies more effective. This step is critical and still underrepresented in the literature. A more sustained focus on political processes is necessary to describe the 'how-to' of policy-making.

In response to this need, the Vax-Trust project was conceived [29]. Funded by H2020, this project was conducted in Belgium, Czech Republic, Finland, Italy, Poland, Portugal, and the UK aiming to demonstrate how to translate complex public health issues into social scientific research across different healthcare systems. It involved conducting context-sensitive research on vaccine hesitancy in specific regions [8], supporting healthcare professionals (HCPs) in their engagements with vaccine-hesitant individuals, and drawing recommendations for addressing vaccine hesitancy at the European level. The specific responsibilities of various professional groups involved in vaccination are not detailed, as the organization and division of labor vary significantly between countries.

By focusing on social and cultural contexts, VAX-TRUST provided evidence-based knowledge to understand and address vaccine hesitancy, including recognizing the societal and cultural aspects influencing vaccine attitudes, the role of media, and the relational dynamics between HCPs, parents, and children. It followed WHO guidelines for tailoring immunization programs [30], focusing on situational analysis, ethnographic research, and intervention and evaluation design. These efforts culminated in evidence-based recommendations for European, national, and local public health authorities, enhancing policy-making through comprehensive understanding and culturally sensitive interventions.

The methodological approach used in the project to translate scientific evidence into policy recommendations was based on the Delphi method. The Delphi method is recognized for its effectiveness in solving complex issues through expert and stakeholder input [31]. Initially, the research team compiled a list of 280 items from empirical findings on vaccine-hesitancy related practices and motives based on the findings of the VAX-TRUST project. The list was refined to 42 recommendations, which were further reviewed by VAX-TRUST members, resulting in a shortlist of 26 items. A pilot survey with the advisory board finalized this list to 21 recommendations.

A total of 112 experts and stakeholders were recruited via snowball and purposive sampling techniques and were mostly distributed across the seven countries of the VAX-TRUST consortium plus four other European countries. They were involved in two rounds of questioning using Qualtrics®. Participants, drawn from academia, civil society, NGOs, healthcare services, and governmental organizations, rated their level of agreement on each recommendation on a five-point Likert scale. An 85 % agreement threshold, consistent with other international Delphi studies [31–33], was set for item inclusion in the consensus statement.

In both rounds (August 28 - September 15, 2023, and September 22–28, 2023), participants' anonymous ratings were analyzed to ensure unbiased results [34]. A Principal Component Analysis was developed to explore the associations between the different recommendations, allowing the identification of groups of recommendations that are highly correct and others that are poorly correlated. This enabled the identification of six dimensions: 1) Awareness; 2) Support; 3) Training; 4) Agency; 5) Recognition, and 6) Engagement which will be described in the following section.

4. Evidence-Based recommendations to inform policies targeted at vaccine hesitancy in Europe: The astare model

Based on the scientific methodologies employed in the VAX-TRUST project, a final list of 16 recommendations to address vaccine

hesitancy at the European level is here proposed. These recommendations were elaborated at three different levels, targeting healthcare professionals, healthcare organizations, and healthcare authorities. These recommendations were aggregated into six dimensions, forming the ASTARE model: Awareness, Support, Training, Agency, Recognition, and Engagement (see Table 1).

In summary, the ASTARE model offers a structured framework for policymakers to address vaccine hesitancy through targeted and

Table 1

Summary description of the recommendations to address vaccine hesitancy at the European level – ASTARE model.

Dimensions	Recommendations
Awareness	Informing users and healthcare professionals about immunisation by providing clear, accurate, and evidence-based information. R1. Healthcare organisations should target specific groups by providing evidence-based information on vaccination and vaccine-preventable diseases, and using clear and targeted language. R2. Healthcare authorities should take action to raise awareness of the importance of vaccination for diseases that are currently under control. R3. Healthcare authorities should create channels that may help healthcare professionals to clarify doubts regarding the potential side effects of vaccination.
Support	Provide organisational/institutional mechanisms to facilitate the communication between healthcare professionals and migrant populations. R4. Healthcare authorities should make vaccines-related information accessible to migrant families by, for instance, translating the vaccination schedule to different languages. R5. Healthcare organisations should try to reduce linguistic barriers between healthcare professionals and migrants, for instance, by providing translation services.
Training	Promote the scientific and technical preparation of healthcare professionals to communicate effectively with vaccine-hesitant users. R6. Healthcare organisations should provide training to healthcare professionals about how to effectively communicate with vaccine hesitant parents. R7. Healthcare authorities should reinforce the social scientific knowledge about vaccination into healthcare professionals' curriculum plan. R8. Healthcare authorities should develop guidelines and examples of effective evidence-based communication practices (e.g. based on the motivational interviewing approach) between healthcare professionals and vaccine-hesitant users.
Agency	Recognise users' needs and characteristics and adapt the strategies used in the vaccination process accordingly. R9. Healthcare professionals should be equipped with tools to acknowledge users' agency and, wherever possible, address them directly and recognise their feelings.
Recognition	Showing recognition for users' views on how to manage their own or their children's health (e.g. extended breastfeeding, vegetarian or macrobiotic diet). R10. Healthcare professionals should recognize the existence of different lifestyles.
Engagement	Fostering a collaborative partnership by integrating the specific physical and emotional needs of users and parents into clinical decisions. R11. Healthcare professionals should be equipped with time and resources to keep up to date with scientific knowledge to discuss vaccination with users and parents. R12. Healthcare professionals should be more empathic to the needs of each person, including children and families and strive to build a strong relationship of trust. R13. Healthcare professionals should be equipped with tools to recognise the singularity of users and acknowledge their specific socio-cultural context. R14. Healthcare professionals should be equipped with using strategies to minimize pain and/or discomfort during vaccination. R15. Healthcare authorities should provide training to healthcare professionals on strategies to deal with users with special needs (e.g., cognitive, or physical disabilities) at the time of vaccination. R16. Healthcare professionals should be given the possibility to dedicate more time and resources to provide balanced information to users on the benefits and potential side effects of vaccination.

Source: Delphi Survey – 1st and 2nd Rounds (VAX-TRUST).

evidence-based interventions. Its primary contribution lies in delimiting the scope that these policies should encompass.

4.1. Awareness

Healthcare authorities should lead national and regional immunization awareness campaigns, ensuring that vaccine-related information is clear, evidence-based, and widely accessible. They should develop policies that counter misinformation and promote trust in immunization programs. Healthcare organizations should facilitate access to updated educational materials for both professionals and patients, ensuring that vaccine-related concerns are addressed systematically within healthcare settings. Healthcare professionals play a crucial role in reinforcing these messages in clinical interactions, but they should be supported by institutional resources and guidance.

4.2. Support

Healthcare authorities must ensure immunization policies are inclusive, providing language support and tailored outreach programs for migrant and marginalized communities. Healthcare organizations should implement structural support mechanisms such as translation services and culturally competent communication protocols. Healthcare professionals should be trained to use these tools effectively to engage with diverse populations and ensure equitable access to immunization services.

4.3. Training

Healthcare authorities should mandate and fund ongoing vaccine-related training for healthcare professionals, incorporating social scientific insights into vaccine hesitancy. Healthcare organizations should integrate such training into professional development programs, ensuring that all staff are equipped with communication strategies to address hesitancy. Healthcare professionals should actively participate in these educational programs to strengthen their vaccine literacy and patient engagement skills.

4.4. Agency

Healthcare authorities should promote policies that empower both professionals and the public in vaccination decisions, integrating informed choice with public health priorities. Healthcare organizations should institutionalize patient-centered counseling and decision-support tools to ensure individuals, especially parents and caregivers, receive tailored information in a supportive setting. Healthcare professionals should apply motivational interviewing and shared decision-making techniques, ensuring that patients, including children when appropriate, feel heard and engaged in the vaccination process.

4.5. Recognition

Healthcare authorities should shape policies that acknowledge diverse cultural, social, and personal factors influencing vaccine decisions while maintaining scientific integrity. Healthcare organizations should foster inclusive environments by implementing culturally sensitive communication strategies and professional guidelines. Healthcare professionals should respect diverse health beliefs, such as dietary preferences or traditional medicine, while maintaining open dialogue to build trust and promote vaccine acceptance.

4.6. Engagement

Healthcare authorities should foster partnerships between public health agencies, community leaders, and the media to build vaccine confidence at a societal level. Healthcare organizations must develop

patient-centered engagement strategies, ensuring that hesitant individuals receive adequate counseling and support. Healthcare professionals should work within these frameworks to establish trust-based relationships with patients, utilizing evidence-based motivational interviewing techniques.

5. From recommendations to policy processes in vaccine-hesitancy

In addition to the policy scope, it is crucial to consider the need for more effective political processes orientated towards prevention and responses to vaccine hesitancy. National and local specificities make it challenging to provide clear guidelines for different contexts. However, the reflection on the recommendations (Section 4) and the general aspects of policies (Section 2) reveals various political processes that seem to facilitate more effective decision-making regarding this issue: legislative processes, driving forces, target groups, public awareness, and implementation.

Understanding the legislative process is essential. Reforms to address vaccine hesitancy do not need to be part of a top-down process; they should involve the bottom-up participation of concerned actors and stakeholders. As demonstrated by VAX-TRUST and other supranational projects, scientific evidence outside the political actors' agenda can leverage the formulation and implementation of evidence-based policies. Advocacy in public and media spaces can help policymakers make informed choices.

Indeed, the driving forces to advance vaccine-hesitancy-related policies are not restricted to healthcare authorities. It is necessary to have fundamental and practical research agendas at national and international levels to create robust evidence on this phenomenon.

The target groups of these policies should include healthcare organisations, healthcare authorities, healthcare professionals, parents – especially migrant parents – and children. Ignoring any of these groups in addressing a complex phenomenon like vaccine hesitancy risks creating limited policy designs. This concern should be accompanied by communication strategies targeted at specific groups. This article does not provide an in-depth analysis of a broader approach to minority and vulnerable groups, as their definition and composition vary according to the sociopolitical and epidemiological context of each country. While this is a relevant issue, a comprehensive examination would require a dedicated study beyond the scope of this paper.

For policies to be effective, they must address vaccine hesitancy across multiple levels of the healthcare system. Healthcare authorities must prioritize sustainable immunization strategies by ensuring regulatory oversight, funding research initiatives, and developing inclusive communication policies. Vaccination promotion campaigns should involve clear, evidence-based communication to counter vaccine hesitancy and address concerns about vaccine safety and components. Healthcare organizations must translate these policies into practice by implementing institutional frameworks that support vaccine advocacy, including structured communication training for staff, ensuring flexible scheduling for hesitant populations, and reinforcing public trust in healthcare institutions. Healthcare professionals, as frontline actors, should be equipped with institutional resources and guidance to engage effectively with vaccine-hesitant individuals. The recognition of the pluralism of discourses is a first step to diminish the polarization of vaccine-related attitudes and to inform interventions to different targets [35]. This multi-tiered approach ensures a well-balanced strategy to tackle vaccine hesitancy across Europe.

Facilitating implementation includes providing translation services and flexible consultation scheduling. Policy updates require proper monitoring and evaluation techniques, which should prioritize small-scale implementation in various contexts.

6. Conclusion

Addressing vaccine hesitancy should be set as a priority for health authorities requiring more than just well-structured policy content; it necessitates the development of effective political processes that consider national and local specificities. The multifaceted nature of vaccine hesitancy, influenced by social, cultural, and contextual factors, poses significant challenges to policymakers. This complexity is compounded by the lack of consensus on effective policy formulation and the varied approaches adopted by different countries.

The VAX-TRUST project provides a valuable framework for understanding and addressing vaccine hesitancy through context-sensitive research and evidence-based recommendations. By focusing on the social and cultural contexts influencing vaccine attitudes, the project highlights the importance of tailored interventions and the role of healthcare professionals in engaging with vaccine-hesitant individuals.

Effective policies should be evidence-based, collaborative, and adaptive. They must enhance public understanding, counteract misinformation, support healthcare professionals, and recognize the agency and diverse lifestyles of users. The ASTARE model, developed through the VAX-TRUST project, offers a structured approach to addressing vaccine hesitancy by targeting healthcare authorities, organizations, and professionals. This model emphasizes awareness, support, training, agency, recognition, and engagement as critical dimensions for fostering trust in vaccines and improving vaccination rates. The model does not intend to be a 'one-size-fits-all' but enhances an approach that should be sensitive to the local contexts within which it will be applied. Translating these recommendations into concrete policy processes involves understanding legislative mechanisms, leveraging scientific evidence for policymaking, and fostering bottom-up participation from stakeholders. Advocacy in public and media spaces can further support policymakers in making informed, evidence-based decisions.

Effective policies to address vaccine hesitancy must encompass a comprehensive approach that spans from initial formulation to thorough implementation strategies. Key priorities include prioritizing public awareness through targeted campaigns that not only educate about vaccines but also address common misconceptions. Ensuring accessibility to information, especially for vulnerable groups facing language or resource barriers, is crucial, supported by diverse communication channels and translation services. Healthcare professionals need comprehensive training emphasizing empathy and cultural sensitivity to effectively engage hesitant individuals, building trust in vaccination. Collaborative engagement with communities ensures interventions meet local needs, while flexible scheduling enhances accessibility. Monitoring and evaluation frameworks are essential for tracking progress, identifying barriers, and adapting strategies, ensuring policies are scalable and adaptable across different contexts. This multifaceted approach fosters an environment where vaccination is widely accepted and supported as integral to public health.

CRedit authorship contribution statement

Tiago Correia: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Ana Patrícia Hilário:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Cátia Guerreiro:** Writing – review & editing, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **Joana Mendonça:** Writing – review & editing, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **Rita Morais:** Writing – review & editing, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **Fábio Rafael Augusto:** Writing – review & editing, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **André Beja:** Writing – review & editing, Validation, Methodology, Investigation, Formal

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Declaration of competing interest

None.

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