

TECHNICAL REPORT

Protocol for a focused after-action review on evidence-based decision-making for selected COVID-19 response measures

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ansterdam institute for GLOBAL HEALTH & DEVELOPMENT This report was commissioned by the European Centre for Disease Prevention and Control (ECDC) and coordinated by Svetla Tsolova. The protocol was produced by Daniel de Vries, Olivier Rubin and Ben Duncan.

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Abbreviations

AAR	After-action review
EBDM	Evidence-based decision-making
EBPH	Evidence-based public health
EBM	Evidence-based medicine
EEA	European Economic Area
ECDC	European Centre for Disease Prevention and Control
EU	European Union
GRADE	Grading of Recommendations, Assessment, Development and Evaluations
IAR	In-action review
LTCF	Long-term care facilities
MERS	Middle East respiratory syndrome
NPI	Non-pharmaceutical interventions
PHEP	Public health emergency preparedness
SARS	Severe acute respiratory syndrome
WHO	World Health Organization

1. Introduction

The coronavirus disease (COVID-19) pandemic is ongoing, yet it is already – by far – the most severe and disruptive public health emergency in living memory. Over the next few years, public health systems in European Union and European Economic Area (EU/EEA) countries will likely be reshaped by the lessons learned from this pandemic. This offers an opportunity to strengthen and further improve these systems, provided that the right lessons from the pandemic are identified, analysed and acted on.

Throughout the pandemic, political leaders and decision makers have actively sought the advice of public health and other scientific experts for critical response decisions. For example, experts were consulted regarding non-pharmaceutical interventions (NPIs) such as school closures, limitations on public assemblies, visitor bans in long-term care facilities (LTCFs), limitations on movement and mandates on the wearing of face masks in public. Common challenges to evidence-based decision-making (EBDM) during disease outbreaks include obstacles or barriers (e.g. uncertainty concerning risks, insufficient capacity, mistrust in government), variability in how decision makers and stakeholders interpret and apply evidence, availability of new evidence, behavioural changes over time, competing demands on time, and political pressure. All of these factors shape a decision maker's ability to consider and act upon the available evidence [1–3].

When looking at the use of scientific evidence, the details are important. For example, what types of scientific evidence were looked at? How was this evidence gathered? How was it interpreted? What other factors were looked at alongside the evidence and how were these balanced against each other when decisions were made? Examining one or a small number of related decisions and looking at them in depth is a technique used by social scientists to enable a detailed review in an instance such as an infectious disease outbreak, including a large-scale, cross-border public health event like a global pandemic.

Improving the use of scientific evidence in decision-making is just one of several areas where EU/EEA countries will want to review their systems in light of the COVID-19 pandemic. The World Health Organization (WHO) and the European Centre for Disease Prevention and Control (ECDC) have developed guidance and methods for after-action reviews (AARs) across all aspects of pandemic response [4,5]. Nonetheless, the use of scientific evidence in public health decision-making is of such fundamental importance to the quality, effectiveness and credibility of response measures that it merits a specific AAR of its own.

1.1 Scope and purpose

Reviews seek to assess actions undertaken during the response to an event of public health concern by objectively observing, analysing gaps and/or best practice, and identifying areas for improvement in preparedness and response activities [4]. Reviews do not seek to assign blame, as they are not intended to assess individual performance or competence. Instead, they seek to identify learning opportunities and to contribute to the cycle of continuous quality improvement in emergency preparedness and response planning [6].

The after-action review (AAR) is the most widely used type of review. Typically, an AAR takes a wide view of several response domains or technical categories – also referred to as 'pillars' – such as surveillance, laboratories, coordination and emergency response, risk communication and community engagement, and case management and countermeasures [4]. Each category includes several specific technical areas – also referred to as 'functions'– that are used to structure the review. For example, a review in the surveillance category could include the following functions: early warning, alerts management, surveillance information management and contact tracing. AARs often combine several technical categories with multiple technical areas, although a review may only assess a single technical area. Conducting AARs is particularly valuable in dynamic and complex settings where decision-making and evidence gathering need to be adjusted and recalibrated continually, as the lessons learned in such cases can provide important insight into how to improve and optimise existing decision-making processes. While a typical AAR is conducted three to six months after the event ends, an IAR – which is necessarily smaller in scale and scope, and is conducted more quickly – takes place during the event.

This ECDC protocol for a focused AAR on EBDM for selected COVID-19 response measures uses the standard AAR/IAR approach but focuses on a single category or function – EBDM – as opposed to a whole range of activities [4]. We consider the decision (or group of decisions) made as the event to be reviewed, whereby the event comprises both the process that leads to the decision outcome and the impact of that outcome. It follows a case study-based research design. In the social sciences, a case study approach looks at one selected event in depth and explores what can be learned about broader, systemic interrelationships and linkages. Due to the complex impact of COVID-19 on all aspects of society, an investigation of the intricacies of EBDM demands a focused approach.

The AAR outlined in this protocol focuses on addressing the role of scientific evidence in EBDM among technical experts that advise politicians. It can be used to examine COVID-19 response decisions that have already taken place, including ongoing information gathering regarding the implementation and impact of these decisions.

The central question of the protocol is: What has been the role of scientific evidence in the deliberations and decisions made by public health authorities in the process of informing policy? For example, when public health experts decided to advise policymakers that face masks should be worn in public places, what role did evidence play in these discussions? What limitations and challenges existed?

The advice and tools in this document will enable competent authorities in EU/EEA countries to conduct case studies as part of focused AARs on how scientific evidence has been used in their national pandemic decision-making process, and provide a reliable and comparable way to analyse how scientific evidence has informed decision-making. This is important, as gathering and analysing scientific evidence is one of the key tasks that governments ask public health institutions to perform during health emergencies. This can help EU/EEA countries to better understand the opportunities and constraints related to this gathering and analysing activity during a real-life emergency, the types of evidence that have the most impact on decision makers, and the factors beyond scientific evidence that may also influence decision makers. Ultimately, conducting these AARs can help to identify practical ways to improve the performance of such key tasks in future public health emergencies.

The protocol is not directly about the relationship between politicians and health experts, but about deliberations regarding technical decision-making within public health authorities. It focuses on health authorities' advising processes and is not intended to support an AAR of the policymaking process, such as the political decision to accept the health authority recommendation to wear face masks and implement it as national policy. This policymaking process typically evolves in the context of many competing societal demands, including the economic and social needs of the populations involved. The protocol is partly based on and complements ECDC's guidance on conducting in-action and after-action reviews of the public health response to COVID-19 [5].

Improving how EU/EEA countries gather, analyse and present scientific evidence should also improve the quality of public health decision-making and how these decisions are communicated to the public during future emergencies. This, in turn, should reinforce the trust that policymakers and the public place in health authorities.

1.2 Target audience and required resources

The target audience for this protocol is public health authorities in EU/EEA countries, EU enlargement countries and European Neighbourhood Policy countries. It can be used by experts that provide advice at national, regional or municipal levels.

The resources required to conduct a focused AAR varies depending on the extent of the review, ranging from rapid to comprehensive. This protocol outlines the elements of both rapid and comprehensive focused AARs. A rapid focused AAR is an assessment of the scientific evidence that was available and the decision-making processes that were undertaken at the time of a specific decision or small number of related decisions. A comprehensive focused AAR also assesses a broader pallet of socio-economic factors involved in the decision-making, such as cultural practices, sense-making frames and community engagement.

Dedicated leadership is essential to properly conduct the AAR, including coordinating and motivating both the participants and the external social scientist facilitator. For the rapid version, one coordinator can organise the AAR with support from one to two additional staff members. Three weeks should be allocated for preparatory work, one to two days for the participatory consultation and complementary interviews or small focus groups (if needed), and three to six days for creating and disseminating the final report. For the comprehensive version, a working group comprised of about three to five people (though this may vary depending on organisational culture or other factors) should be established to organise and coordinate the AAR. One to two months should be allocated for preparatory work, three to five days for the participatory consultation and complementary interviews or small focus groups, and five to ten days to create and disseminate the final report. Actual time needs will vary depending on the complexity of the decision being assessed.

Regardless of the length and type of focused AAR, discussions should be led by an experienced facilitator with a qualitative social science research background. Ideally, the facilitator should be external and have training in (rapid) fieldwork techniques and case study methodology. Issues such as trustworthiness and data saturation [7] (when enough data is enough) are difficult to implement without experience in qualitative research methodologies. The facilitator should also have experience with self-reflexivity and positionality, be sensitive to power relationships and thoroughly understand a constructivist approach to research and reporting [8]. Note takers should also be recruited to support the process.

Participants in the focused AAR are preferably a small group of experts (8 to 12 people) who have been involved in the decision-making process for the case being examined. Participation should always be voluntary, anonymous and confidential.

A focused AAR on decision-making might need to involve politicians, as it is important to understand the ways in which politicians have used technical advice. Including politicians in the process of an AAR is also a way to increase mutual understanding. However, this is an aspect that should be considered carefully. A strong reason not to include politicians is to minimise the risk of politicising the process. The manipulation of science for political gain has

been a central challenge of the COVID-19 response. Inclusion of politicians risks losing the perceived objectivity of the outcomes. Instead, it is recommended that a brief summary be distributed to policymakers after the focused AAR has been performed and that organisers of the review consider taking additional steps to more broadly engage politicians in mutual learning. If direct inclusion is desired, peripheral involvement of politicians could take the form of separate qualitative interviews conducted by the external facilitator, as long as confidentiality and anonymity can be maintained throughout the process.

ECDC is able to offer technical assistance to EU/EEA countries, EU enlargement countries and European Neighbourhood Policy countries interested in using the protocol and can work with competent authorities to collect data and conduct multi-country analyses, including translating case studies into English.

2. Evidence-based decision-making (EBDM) during health emergencies

Evidence-based decision-making (EBDM) requires that decisions are made based on the 'best available scientific evidence,' which generally means up-to-date and peer-reviewed research [2,3]. A more comprehensive understanding of EBDM not only highlights this need, but also emphasises the importance of a systematic and transparent use of data, community engagement in the process and effective mechanisms for evaluation and dissemination [9].

Importantly, EBDM during health emergencies builds on the concept of evidence-based medicine (EBM). EBM is explicitly linked to clinical management and care for individual patients. While EBM has developed tools to assess certainty about the strength of evidence and associated recommendations (e.g. Grades of Recommendation Assessment, Development and Evaluation (GRADE) for healthcare), these tools cannot typically stand alone when informing recommendations across countries and contexts, or when faced with evidence that is foundational, preliminary or exploratory, which is often the case during health emergencies [10]. In situations where health implications are localised and contained, and where past data can easily be translated into current contexts, EBM can produce robust recommendations with limited potential harm from miscalculations.

During major transboundary public health emergencies, however, both EBM and EBDM are challenged by uncertainty, urgency, complexity and difficulties related to coordination [11]. While EBM is more epistemologically restricted in scientific approaches (with randomised controlled trials at the top of the evidence hierarchy), EBDM has the flexibility to rely on more broadly constructed evidence types, such as experience-based evidence.

EBDM can be unpacked into two distinct process components:

- evidence gathering and interpretation and
- decision-making.

For the second component, it is important to look at both formal and informal processes and structures underlying decisions. For a comprehensive AAR, which analyses more complex decision-making processes and dynamics – possibly over longer periods of time – the evidence-based public health (EBPH) framework is suggested as an appropriate methodological approach. An outline of the EBPH framework can be found in Chapter 5.

2.1 Evidence gathering and interpretation

EBDM refers to scientific evidence, which differs from evidence in general by adhering to a set of academic standards. These standards might vary according to the field of inquiry, but will usually encompass the collection and testing of empirical data according to scientific methods and models that have been validated by peers [12]. The body of scientific evidence, therefore, will mostly consist of peer-reviewed scholarly publications. There is always an elusive element to scientific evidence because it is constantly evolving and being reinterpreted, as scientists continuously work to affirm or expound existing evidence.

As SARS-CoV-2 was a novel coronavirus, scientific evidence was limited when the COVID-19 pandemic began in early 2020. In addition, the public health preparedness and response evidence landscape in general has been characterised as 'weak' [13] and the 'ideal of a preparedness and response field fully grounded in scientific evidence' has not been realised [14].

Accordingly, evidence from related health emergencies (in particular, from annual seasonal influenza epidemics, the severe acute respiratory syndrome (SARS) epidemic in 2003 and, to a lesser extent, the H1N1 influenza pandemic in 2009 and the Middle East respiratory syndrome (MERS) outbreak in 2012) was initially used as a point of reference to make decisions. However, during the COVID-19 pandemic, evidence that could be used to base decisions on was compiled at an unprecedented speed. By one estimate, approximately 23 000 COVID-19 papers were published between January and May 2020 [15]. The amount and speed of this scientific output, combined with condensed time periods for peer reviews, have raised concerns about study design and rigour. For instance, *The Lancet* and the *New England Journal of Medicine* have had to retract flawed COVID-19 studies [16]. Additionally, preprints that have not undergone peer review have been cited as valid and placed in the public domain. As a result, many COVID-19 response decisions have had to be revisited to adjust for new findings.

Even when scientific evidence is available and accessible, the interpretation of evidence is grounded in different theories of what scientific knowledge is (i.e. epistemologies) that also value different methods or approaches of inquiry. The interpretation of evidence is not only inherent to the scientific process, but also to the decision-making process, wherein identical pieces of scientific evidence in similar contexts can result in very different decisions [17,18].

Other than using scientific evidence, decision makers can also draw on experience-based evidence [19], sometimes referred to as 'implementation-based evidence' [20] or 'ecological evidence' [21]. For example, the observation that

the first EU/EEA countries to revoke school closures did not face substantial increases in infection rates could constitute experience-based evidence. This type of evidence can be essential during outbreaks of previously unknown pathogens, due to the initial lack of scientific studies. The advantage of making decisions using experience-based evidence during health emergencies is the pace by which the evidence can be collected and interpreted. However, the evidence will often be better tailored to the specific context that the experience is drawn from. Experience-based evidence can be subject to scientific inquiries and interpretations, but is not necessarily subject to the scientific process of setting up a specific research design and submitting to peer review.

The COVID-19 response provides a unique opportunity to assess how experts and decision makers utilised evidence that was emerging, evolving, unavailable or of questionable quality. What types of evidence were available to experts and decision makers at the time of the decision? What value and weight did experts and decision makers place on different pieces of evidence? How did experts and decision makers adapt evidence to their own context? What happened when there was no conclusive scientific evidence available? In light of such questions, an AAR focused on EBDM could inform:

- how scientific evidence is gathered and produced,
- how decisions change and evolve over time,
- how scientific evidence is interpreted by national and international health agencies,
- what should be done when a decision needs to be made but scientific evidence is not available or inconclusive, and
- how recommendations are made and communicated based on scientific evidence and experience.

2.2 Decision-making

In the context of this protocol, a decision is defined as a choice between two or more alternatives that involves an irrevocable allocation of resources. Decisions can be guided by individual experience and intuition or they can be the result of a deliberative decision-making process among a team of people. The deliberative decision-making process is integral to addressing more complex challenges and makes choices by identifying several possible responses, gathering and analysing information about these responses, and then assessing these responses.

Decision-making builds on organisational structures and practices that shape deliberations and influence what responses are considered and how they are addressed [18,22,23]. It also encompasses decisions relating to internal resource allocations, staff management, communications, recommendations to policymakers and so forth – decisions that should also be made based on best available scientific evidence. It should be noted that decision-making is distinct from policymaking in this protocol.

2.3 EBDM during the COVID-19 pandemic

During the COVID-19 pandemic, experts from national and international public health agencies have typically been highly involved in the deliberative decision-making processes that inform policy. Importantly, even the best evidence can produce suboptimal decisions under flawed decision-making processes. What constitutes pertinent scientific evidence changes and shifts over time and is shaped by relationships between scientists and their social, economic, organisational and political environments. Experts are faced with a host of cognitive and institutional factors that influence interpretations of scientific evidence [18,24,25]. These underlying ideational and bureaucratic differences can create variations in how health experts make decisions during public health emergencies [17,23,26,27].

COVID-19 revealed a plethora of different bureaucratic procedures and practices for public health emergency risk assessment and management. These, in turn, produced different decisions with regards to the scope and timing of several key NPIs across EU/EEA countries. Some preliminary decision-making challenges with respect to the COVID-19 response were: the difficulties of including a broader roster of experts with a variety of skills and knowledge in the decision-making process in a longer-term advisory group, limited transparency in the decision-making process, and limited consultations with civil society, community groups and local practitioners actually responsible for implementing and upholding decisions [1,28].

This focused AAR protocol enables exploration of the decision-making processes in national, regional and local health agencies by:

- mapping out the key actors and structures involved in the collection of evidence and the formal decision-making
 process by analysing preparedness plans, public health/communicable disease/epidemic laws, standard operating
 procedures and protocols, roles and functions of key stakeholders (as described in plans and operational procedures),
 task force compositions, and so forth;
- process tracing how key decisions are altered as they travel through and across organisations, as well as how decisions change over time (this may include looking at enablers and obstacles to implementing a decision and any eventual need to pursue or change a decision through appropriate risk communication);
- identifying and making explicit any external pressures (e.g. media, public, political and so forth) on the decisionmaking process; and
- gaining insight into any informal practices and networks (both within and across agencies) that affected the decisions reached.

Table 1 provides a basic overview of possible research design components for inquiries into EBDM. These questions and methods form the guidance for this focused AAR protocol.

Table 1. Research design components for a	focused AAR on EBDM
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Process components	Primary disciplinary approaches	Research focus	Questions	Resources
Evidence gathering and interpretation	Science Communication	How evidence is gathered, communicated and interpreted	 What types of evidence were available to decision makers at the time? What value and importance did decision makers place on that evidence? To what extent did decision makers contextualise evidence? What evidence was expected/needed? 	 Literature review of peer-reviewed publications on the specific NPIs that were the subject of the decision Experience-based evidence gathered in reports and guidelines (grey literature) Participatory consultation, with limited complementary interviews or small focus groups (if needed), on how evidence was interpreted
Decision-making	 Public administration (e.g. public health institutes) Organisational theory 	How organisational structures and practices shape decision-making	 Which actors are involved in the decision-making process in a public health crisis? What are the organisational structures and practices in place? Did informal networks and practices impact the decision-making process? 	 Organisational charts, procedural plans, crisis management strategies Consultation, with limited complementary interviews or small focus groups (if needed), on the formal and informal aspects of the decision-making process

For the rapid version, there is analytical merit to approaching EBDM as consisting of the two key dimensions of: science (generating, interpreting and communicating reliable evidence) and organisation (optimising formal and informal decision-making processes and practices). A comprehensive AAR could, in addition, address the interrelationship and tensions between these dimensions.

3. Protocol for a focused AAR on EBDM

A focused AAR should ideally be conducted three to six months after the technical decision being examined was made, in order to avoid issues of recall and hindsight bias. Before planning begins in earnest, best practice would be to first produce a concept note that defines the scope of the focused AAR, as agreed with key stakeholders.

An overview of the focused AAR on EBDM protocol is shown in Table 2, as well as in Figure 1 (rapid version) and Figure 2 (comprehensive version). Both begin with a preparation phase and end with a reporting and dissemination phase, but the central activity is the participatory consultation, which comprises a facilitated look-back meeting and complementary interviews or small focus groups (if needed).

Table 2. Overview of the components of a focused AAR on EBDM, rapid and comprehensive versions

Components	Rapid focused AAR	Comprehensive focused AAR	
Duration of participatory consultation	1–2 days	3–5 days	
Leadership	Coordinator and facilitator, plus support staff	Working group and facilitator, plus support staff	
Case selection	Relatively bounded decision, e.g. mask wearing	Complex decision under dynamic conditions (changing evidence and context) and over an extended period, e.g. school closure or reopening	
Preparatory analysis	Document analysis	Preliminary analysis and power/interest matrix (see Figure 3), if desired	
Participant selection	Stakeholder mapping, limited to core decision makers and key intersectoral actors	Broader stakeholder mapping, including intersectoral actors and larger community context	
Theoretical framework	Limited (see Table 1 as guidance)	Evidence-based public health (EBPH) framework as guidance (see Chapter 5)	
Sense-making	Limited attention	Cynefin tool as guidance (see Chapter 6)	
Quality control	Trustworthiness (see Section 4.3)	Trustworthiness (ECDC's 11 validity-enhancing considerations tool as guidance (see Table 3) [6])	
Methodology	Participatory consultation, limited complementary interviews or small focus groups (if needed)	Participatory consultation, complementary interviews or small focus groups (if needed)	
Debrief and review	Hot debrief, evaluation and review of the final report	Hot debrief, evaluation, validation meeting (if desired) and review of the final report	

Figure 1. Focused AAR on EBDM, rapid version



Figure 2. Focused AAR on EBDM, comprehensive version



3.1 Preparation

It is important to allocate sufficient time to prepare for the focused AAR. Preparation should begin well ahead – three weeks in advance for a rapid AAR and one to two months in advance for a comprehensive AAR. For a rapid AAR, preparations can be undertaken by one coordinator, an external social scientist facilitator and one or two support staff. For a comprehensive AAR, a working group (approximately three to five people, though this may vary) should be established instead of a singular coordinator.

To prepare for a rapid focused AAR, the coordinator must properly consider and consult on key strategic decisions to determine which case to select for the review and who to recruit as participants. For a comprehensive review, the working group must also work with the facilitator to conduct a pre-consultation analysis of the timeline and stakeholders. For both versions, decisions should also be made regarding the report writing process, such as to what extent revisions can be made or additional evidence can be added to supplements, as well as when the process will be closed.

Coordination

It is ideal if AAR coordination is collaborative to bolster the trustworthiness of the activity, protect the outcomes from individual influences and motivate group ownership. For a rapid focused AAR, only one coordinator is needed, but one or two support staff can make the process more collaborative. The coordinator is ultimately responsible for the process and sets the agenda for the review. For a comprehensive AAR, coordination should be handled by a working group. The composition of the working group depends on the issue under consideration. Generally, it is suggested that the group comprise people from different networks and perspectives, such as practitioners representing the jurisdiction(s) affected by the decision being reviewed, representatives of community-based and/or private agencies that were involved and peer public health practitioners from outside areas that are willing to review the incident response. A 'Terms of reference on expectations for working group members' template is given in Annex 1.

It is important to involve the facilitator early on in the planning and implementation of the AAR and to have support from the host organisation's leaders, particularly those who are responsible for the technical decision-making process. Previous experience has shown that this is critical for a successful AAR [29].

Pre-consultation analysis

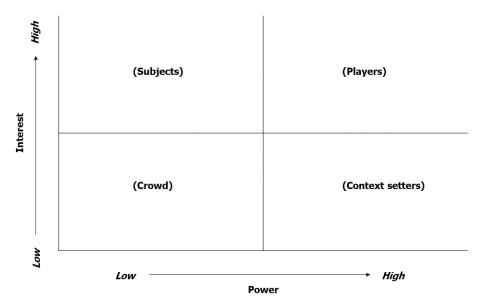
For a comprehensive focused AAR, conducting a pre-consultation analysis is recommended. During this process, the working group and the facilitator can outline a first approximation of key elements of the AAR and answer the question: What happened? Ideally, the facilitator will lead this process. The working group members – complemented by other key people who were closely involved in the decision-making, if needed – will provide the information for this preliminary analysis by each submitting the following materials to the facilitator:

- A timeline of events: The timeline of the decision-making process should describe how it developed and include supporting evidence (e.g. relevant email correspondence, reports).
- **Relevant documents:** These include key documents needed for contextual understanding of the decision, such as information about the structure of a country or a state's technical advice committee and the extent to which they are relied upon (e.g. meeting notes, impact reports, media reports, etc.)

• **Stakeholder map:** This map is an overview of the people who interacted during the decision-making process. In this context, a stakeholder can be thought of as a person or group with legitimate interests in procedural and/or substantive aspects of the decision-making process. As this AAR focuses on how public health authorities determined what technical guidance to provide to policymakers, it is likely that many stakeholders will be part of the authority that undertook this deliberative decision-making process. Outside consultants, advisors, pressure groups and even journalists may have had an influence on the process as well. To map stakeholders, AAR working group members should identify the people that they personally had contact with, then add any others who were involved. Then, for each identified stakeholder, a score should be assigned according to their decision-making power and their influence on the response (a form that can be used to map stakeholders involved in the EBDM process is given in Annex 2).

The facilitator will analyse the submitted materials to develop a preliminary timeline and a preliminary stakeholder map that provides an initial overview of the stakeholder universe and its relationships. The data can also, if desired (particularly for the comprehensive version), be turned into a power/interest matrix that maps the roles these actors played in the response (Figure 3) [30]. The facilitator will use these preliminary analysis materials as a basis for the participatory consultation and complementary interviews, as well as to select the correct mix of participants.

Figure 3. Example of a power/interest matrix



Source: Adapted from Ahsan and Pedersen, 2018 [30].

Invitations to participate

When selecting participants to invite, it is important to include diverse views (as highlighted by the power/interest matrix, for a comprehensive AAR) and to represent the full range of sectoral and content expertise among the people who were involved in the decision-making. It is ideal to recruit 10 to 15 participants.

For a rapid focused AAR, the coordinator will need to identify the most relevant people to invite. As personal bias could affect this selection, collecting advice from outsiders – particularly the facilitator – is recommended in order to increase the trustworthiness of the process. Another option is to ask the participants that are initially identified to reach out to intersectoral experts that they feel are relevant to include. For a comprehensive focused AAR, the facilitator's advice is integrated during the preliminary analysis process via the stakeholder mapping exercise, which the working group can use as a basis for participant selection.

Note again that this focused AAR examines how public health authorities developed technical advice provided to elected officials, and interrogates and follows the evidence used in this context. While elected officials may have influenced this process, it is important to reduce the possible politicisation of the AAR. For this reason, it may be beneficial to have separate interviews with stakeholders such as elected officials or political appointees. For the comprehensive AAR, the preliminary analysis can also indicate any necessary changes to the composition of the working group.

The invitations to participants should provide the logistical details of the AAR, an outline of the review process and an indication of the outcome expected from the exercise: the final report (a sample 'Invitation to participants' is given in Annex 3). Participants need to be informed about how the information they provide will be used, as well as when and how they can provide feedback on the report.

The invitation may also need to include the following information:

- Participation is voluntary and there will be no repercussions for those who choose not to accept the invitation.
- Participants can leave the process at any time.
- Anonymity and confidentiality are explicitly ensured from the outset, in order to create a safe space for dialogue.
- The AAR is not an attempt to find a singular truth nor to assign blame. Rather, it aims to collect accounts of the decision-making process from a variety of perspectives and to use this information to document the lessons learned, best practice, gaps and challenges. It is an opportunity to collaboratively develop constructive strategies for the next stages of the pandemic, building on existing internal structures for decision-making.

3.2 Participatory consultation

The participatory consultation is the core activity of the AAR. It is a facilitated look-back meeting to discuss the EBDM process with representatives of the organisations that were involved in the response. A draft programme is provided in Annex 4.

Group dialogue is central to making shared learning effective. It is critical that the facilitator who leads the session is objective and neutral, to help stimulate and guide the discussion. The facilitator needs to find ways to give each participant equal input and time to contribute and may be required – on occasion – to directly ask some participants to yield the floor or to single out quieter participants to elicit their responses. A facilitator may also need to challenge participants' assumptions.

Discordant views may develop during the consultation. For this reason, the facilitator needs to have mediation skills. Throughout the review, it is very important that the facilitator emphasise that this is a learning exercise and not an evaluation of anyone's performance. It is also key to highlight that participants need to keep dialogue constructive. However, if tensions arise, an empathy-based communication approach should be followed [31]. This entails asking participants to focus on their own observations and experiences, while validating their feelings, listening empathically and identifying their underlying needs, so that they may find common ground.

Together, the stakeholders present will look at the role of evidence in the decision-making process based on the central questions of an AAR:

- What happened, who was involved and how did they make sense of the situation?
- Why did it happen? How did evidence contribute? Why did the decision develop the way it did?
- What can be learned? What should change? How can change be implemented and monitored?

It may be useful for the facilitator to enlist specific participants to briefly introduce each discussion topic. Assigning individuals ahead of time engages participants in the process from the beginning. Such introductions also provide participants with some common ground to begin each discussion and engages a variety of participants. Depending on the context and logistics, more than one meeting may be organised; however, to maximise the opportunities for stakeholders to learn from each other's perspectives, splitting the group up for separate meetings should be avoided, as possible. In addition, the facilitator should start the AAR process by providing an outline of the report writing process, indicating when input and review will be possible. It should be noted that note takers must be present at all stages of the participatory consultation, outlined to follow.

What happened, who was involved and how did they make sense of the situation?

The first phase of the participatory consultation examines how the decision-making process unfolded over time and who was involved. For a comprehensive AAR, the facilitator's preliminary analysis can be used as a starting point for the discussion, but it is important not to presume that this initial account is complete or definite. During the discussion period, participants should critically question the timeline of events and the stakeholder map.

The aim of this first step is to find common agreement on:

- What decision was made?
- What steps were taken to make this decision?
- Who was involved?
- How did people make sense of the situation at the time of the decision-making process?
- How did the decision that was made affect the epidemiological situation?

During this discussion, it is important for the facilitator to not allow the participants to get sidetracked in causal analysis – such as why this happened or why certain evidence was or was not included – which is the next step in the consultation. Contributions that hint towards this can be set aside and revisited later, possibly to open up the next discussion.

The fourth question – examining how people made sense of the situation at the time of the decision-making process – is essentially a sense-making analysis. When detailing the reasons why certain evidence was used or was not used, people have the tendency to apply hindsight knowledge and reinterpret what they recall thinking at the time. In other words, there is a common tendency for people to perceive past events as having been more predictable than they actually were [32]. Hindsight bias may distort participants' memories of what they knew or believed before the decision was made. To negate this tendency, it is important that participants are encouraged to reflect on how they felt at the time of the decision-making process.

For the comprehensive version, sense-making can be reviewed using, for example, Cynefin's framework of sense-making (see Chapter 6). This framework introduces an existing typology of different frames, which makes it possible to categorise participant views at the time according to the already deduced sense-making domains. The framework can help participants to reflect on how they perceived the situation in order to increase their understanding of their own and other people's behaviour [33,34]. The facilitator can ask each participant to identify how they perceived the situation at the time of the decision-making process and evaluate what action mode they used to navigate through the decision-making terrain.

Why did it happen? How did evidence contribute? Why did the decision develop the way it did?

The next phase of the consultation involves collaboratively exploring the role of evidence in the decision-making process, looking at it through the lens of what was known at the time. The key questions are:

- What evidence was used?
- How was it used?
- How did it contribute to the final decision made?

The facilitator can use Table 1 (rapid version) or the EBPH framework (comprehensive version, see Chapter 5) as a guide to systematically point attention to the different factors that may have hindered or contributed to the use of evidence during the decision-making process. For example, components of the EBPH framework can be used as probes (e.g. Was objectivity of evidence an issue?).

Personal testimony is central to this part of the review. A useful method is to have all participants privately think of responses, then write them on sticky notes that are posted onto a larger board (or approximate the activity using a suitable digital tool if the meeting is online). The facilitator can then go through the responses to generate dialogue and can organise the outcomes using the questions listed in Table 1 (rapid version) or the EBPH framework (comprehensive version). It is also helpful to immediately distinguish between main (immediate) and contextual (contributory) factors, as well as agreement or disagreement about the relevance of the different inputs common to root cause analysis.

The relevance of certain factors may be re-evaluated through the course of the discussion. It is also important in this step to remain open to the possibility that participants may not share a common definition of 'evidence'. The goal of the exercise is not to develop an authoritative definition, but to identify what was perceived as evidence at the time and how this influenced the final decision.

What can be learned? What should change? How can change be implemented and monitored?

The previous two parts of the consultation will have revealed a variety of influences, barriers and opportunities. During this final phase, participants reflect on the discussion in order to:

- elicit specific lessons learned, best practice, gaps and challenges regarding good use of evidence;
- review, prioritise and document the lessons learned, and develop recommendations;
- develop suggestions regarding how such changes can be implemented; and
- plan for how such changes can be monitored over time.

Hot debrief and evaluation

Closing the participatory consultation with a hot debrief is common practice. A hot debrief dedicates time for participants to review the discussion and the group's responses [29]. It is a relatively short meeting in which the facilitator presents a preliminary outline of the consultation's findings – i.e. a list of elements of good practice, lessons learned, and gaps and challenges that need addressing – so that participants can provide feedback for the writing of the final report. The facilitator may engage participants by asking each individual to identify two or three of the most important elements of best practice and/or suggestions for improvement.

Afterwards, the facilitator can circulate a brief evaluation form or lead a similar discussion (a sample evaluation form is provided in Annex 5). In closing, the facilitator should explain the next steps, including reviewing when and how participants can provide feedback on the final report. Once the consultation has ended, it is good practice for the coordinator (rapid version) or working group (comprehensive version) and the facilitator to debrief. The note takers should remain present during this internal debriefing.

Complementary interviews

If some key stakeholders are unable to participate in the participatory consultation, or if they have deliberately not been included because of power differences or other considerations (e.g. avoiding the process becoming politicised), they can instead be interviewed individually using the same questions that guide the participatory consultation (see Annex 6 for a sample interview instrument). In some circumstances, a small focus group may also be appropriate or more efficient (e.g. if a few key stakeholders could not be present at the consultation).

Although each situation is unique, it is generally better to conduct such interviews after the participatory consultation. This will make the interview more efficient, as the group will have already developed a consolidated view and therefore the interview can focus on complementary issues and allow the person to reflect on the group's conclusions. This also prevents any one person from having the opportunity to bias the facilitator through a private conversation before the consultation. It is recommended that the facilitator lead any complementary activities as well, to draw upon their social science interview skills and techniques.

3.3 Report writing and dissemination

The last stage of the AAR is writing and disseminating the final report. The coordinator (rapid version) or working group (comprehensive version) and the facilitator must decide how the report will be written, how to handle revisions and controversies, if there will be an external round of review (and by whom) and/or a validation meeting (comprehensive version) to enhance trustworthiness, and how widely the report should be disseminated. The facilitator should be responsible for overseeing the production of the report and for suggesting further actions.

The report should be written in a way that can be read and understood by outsiders so they can become involved in the learning process. The coordinator or working group and the facilitator collaborate on creating the outline and writing the report using an iterative process.

Dissemination of the report is at the discretion of the coordinator or working group. However, it is critical that at least the recommendations are disseminated, and that the report is archived at a location and place where other relevant stakeholders can have access to it in the future. Although the coordinator or working group could decide to keep the report internal (e.g. if sensitive issues were discussed), the goal of an AAR is to encourage system-wide learning, so broad dissemination is ideal.

The contents of the report should reflect the outcomes of the participatory consultation, together with the evidence gathered from documents, notes, interviews or focus groups. It should identify lessons learned, good practice, gaps and challenges, suggested changes and plans for monitoring the suggested changes. The monitoring plan in particular should explicitly detail what actions can be taken to support good practice and address gaps and challenges.

Based on ECDC's experience with case studies [8] and AARs [6,8], recommendations for the report writing include:

- limiting the use of quotes to maintain the anonymity of participants;
- emphasising that the report is not an authoritative account, but part of a learning process (as there are multiple versions of what happened and these are not always reconcilable);
- exploring any contradicting or alternative findings, as well as the general consensual views, to encourage open and critical assessment;
- being transparent about the data selection process (e.g. of participants, documents) and providing a clear description of possible limitations to enable external readers to review for potential selection bias;
- involving multiple analysts and reviewers during the report's production to help uncover perception bias and ensure insights are roundly developed;
- clearly pointing out efforts to improve the trustworthiness of the report's findings (e.g. hot debriefs, peerreview processes, etc.); and
- writing a clear and well-developed conclusion.

It should be anticipated that an AAR can include some controversial elements and possibly even spark heated debates. The report's authors need to remain aware that the narrative coming out of the AAR may not reflect a singular version of the truth, but rather various experiences of it, and that a group's consensus may not be shared by everyone. The resulting report, therefore, may require compromise and may contain inherent contradictions. As a result, the report could be criticised for being inaccurate or distorting the facts. This underlines the importance of starting and ending the AAR with an outline of the report writing process, particularly when input and review will be possible, so that all participants feel as though they were adequately involved in its production. The coordinator or working group should have decided in the preparatory stage when and to what extent revisions can be made or additional evidence can be added to supplements, as well as when the process will be closed.

For the comprehensive version, organising an additional validation meeting with participants and external advisers to further discuss the implications of the report is recommended. A contentious report should not be seen as an invalid report. Rather, the process of working out these controversies and dealing with incoherence or contradictions is part of the mediation and learning process that can make an AAR useful in the long term.

It is recommended that a brief summary of the report be sent to policymakers and, if resources allow, that additional steps are planned to more broadly engage in mutual learning with politicians. It is important, however, to remain aware of the risk of politicisation of the report. Maintaining confidentiality and anonymity throughout all stages of the AAR, including any follow-up processes, remains a necessary safeguard to avoid this.

4. Background and approach

Guidance on how to conduct a general AAR in the wake of a health emergency has been outlined in key publications by ECDC [5,6] and WHO [4]. These publications describe best practice for key methodologies, facilitations, timelines and so forth. ECDC also generally recommends performing AARs on selected non-pharmaceutical and pharmaceutical health interventions. These can enable countries to review operational strengths and weaknesses in their public health emergency preparedness and response through the analysis of events and lessons learned during the COVID-19 pandemic.

The goal of the focused AAR is to foster opportunities for discussion and dialogue on core capacities for preparedness planning and response, cross-border dynamics, interoperability of plans and business continuity of actions, with a focus on EBDM processes for selected COVID-19 response measures.

Given the unique and prolonged nature of the COVID-19 pandemic, ECDC and WHO also recommend conducting general intra-action reviews [35] or in-action reviews (IARs) [5] to enable public health authorities to derive lessons learned during the ongoing health emergency. In light of the limited capacity available during a crisis, IARs aim to quickly identify readily implementable actions that can immediately address pressing issues and improve the current response [5].

4.1 Focused AAR approach

This protocol outlines how to conduct a focused AAR on EBDM using a case-study approach. These case-specific AARs will pertain to critical junctures in the decision-making process, with respect to major health interventions at various stages of the pandemic, e.g. decisions to close and reopen schools, mandate the wearing of face masks, ban visits to LTCFs, etc. Information on how key decisions were reached could support improvements to COVID-19 response and operational planning at national and subnational levels. The purpose of this focused AAR is to provide critical information that can feed into the ongoing COVID-19 emergency response, as well as inform cross-sectoral IARs and full AARs that may be produced at a later stage.

Central review questions

ECDC has outlined five central questions that a general AAR approach should address [6]. These also pertain to this case-specific, focused AAR on EBDM:

- What happened? This fact gathering phase seeks to establish the details of a given decision and to establish what happened before, during and after a decision was made, in detail and in chronological order. The focus is on collecting as much factual information as possible, in an effort to establish an agreed-upon account of what occurred. A timeline of events is typically based on country-specific preparedness and response documentation (emergency plans, protocols, action plans), personal testimony (individual or group interviews, discussions or consultations) and external sources (e.g. COVID-19 Health System Response Monitor).
- Why did it happen? Why was the decision taken? This phase seeks to establish the main (immediate cause) and contextual (contributory factors) reasons why the emergency decision-making process unfolded the way it did. Was there deviation from emergency protocols? Did decision makers know about action plans or were these overlooked because they were not recognised as relevant? This examination is usually more qualitative in nature, relying on personal testimony. Best practice seeks to go beyond identification of immediate causes, unsafe acts or latent failures, and to explore the array of contributory factors that led to system success, failure or omission (i.e. the root causes).
- What can be learned? What can be learned from the information gathered in response to the previous two questions that can help to improve pandemic preparedness in the future? What was effective and what was not? Why? This often takes the form of a 'lessons learned' section of the final report that describes the various successes and failures and their relative impact on the decision and its outcomes, as well as how this could apply to future pandemics.
- What should change? What procedures or ways of working need to change to mitigate any problems identified in the decision-making process to reduce the impact of similar events in the future, as well as to generally improve pandemic preparedness? For example, was surveillance capacity sufficient to identify the threat in good time? Were the organisational structures optimised for decision-making under stress and with limited evidence?
- How can change be implemented? This phase involves creating a plan for how the changes suggested by the focused AAR can be implemented and monitored. This completes the review and enables a continuous quality improvement cycle. How can lessons learned be implemented in the form of real improvements in emergency preparedness capabilities or capacities? What is needed to improve EBDM in future health emergencies?

Methodology

This protocol's system-level methodological approach builds on the AAR approach outlined by ECDC, recent lessons learned through ECDC's AWARE project (which conducted an AAR of West Nile virus transmission in Europe in 2018 [6,36]) and ECDC's 11-item tool for assessing AAR methodological rigour (Table 3) [6].

	Consideration	Recommendation		
1	Prolonged engagement	AARs should dedicate adequate time to observing the setting and incident documentation, as well as speaking with a range of people to build a deep understanding of the action and its context. Prolonged and repeated engagement with the people and processes involved in the action over time offers a greater chance of uncovering deeper and more valid insight than brief and sporadic engagement with the study subject.		
2	Use of theory	AARs may benefit from being more closely aligned with theoretical frameworks (e.g. after-action technique) to ensure public health emergency preparedness (PHEP) improvement plans from AARs address root causes. Furthermore, AARs should consider applying basic qualitative methods such as validity checks as a standard (e.g. those in this 11-item validity enhancing tool) to boost the validity of the insights gained. This – and additional concepts such as data saturation – could also help improve efficiency where an 'ask everyone, gather everything' approach is not pragmatic.		
3	Data selection	Study sample rationales should be clearly described in all AARs to allow readers to easily understand how data informed the review (e.g. how participants in interviews were targeted and selected). This is important to enable assessment of potential selection bias.		
4	Information sampling*	Study samples should be clearly described in all AARs to allow readers to understand which individuals, groups or data were used to inform the review (e.g. to the extent possible, documenting the number of people interviewed, their job titles and their roles in the action). Without this, readers do not know whether important views, reports or data were excluded, and are therefore less able to evaluate the review for selection bias. However, requests for anonymity should be respected.		
5	Multiple data sources	AARs should use multiple approaches for data collection to ensure a variety of information is considered, reducing the risk that one potentially biased data source dominates and increasing the likelihood that root causes and relevant contributory factors will be appropriately uncovered. It is common for comprehensive AARs to include a combination of personal testimony (e.g. different types of interviews, questionnaires, etc.), document review (e.g. PHEP protocols, guidelines, relevant reports on the incident, safety reports before the incident, etc.) and – where relevant – one or more site visits.		
6	Triangulation	Triangulation can help uncover perception bias and ensure insights are more roundly developed. It is recommended that multiple analysts, observers or reviewers be used to check interpretation of data, specifically looking at consistencies and divergences among and within various data sources.		
7	Negative case analysis	AARs should clearly report how discordant evidence (from personal testimony, reports, site visits or that arose while forming improvement plans) has been reconciled. AARs should discuss any evidence that contradicts initial findings, explanations for these contradictions, and developing theories alongside the consensual views. This encourages open and critical assessment of emergent themes and conclusions when forming the AAR and may discourage seeking only harmonious views as part of the AAR sample.		
8	Peer debriefing and support	Sharing preliminary or draft findings of the AAR with PHEP experts outside of the event for critical comment may increase the validity by introducing a fresh and independent perspective that may be better able to point out any gaps in the review or analysis. This may also serve to facilitate learning across different sectors and geographies, increase awareness, and build and expand professional networks.		
9	Participant validation	Initial insight and findings should be checked by those who contributed to the review (i.e. a validation meeting with participants) to ensure the accuracy and relevance of the AAR findings. This technique increases the likelihood that the AAR accurately represents the views of those who contributed to it.		
10	Audit trail	As a minimum standard, AARs should report the methods they have used to gather and analyse information, and should clearly report how this led to the recommendations made. To aid readability, these can be included as an annex, but should be easily available for those who want to evaluate the validity of the AAR. The development of evidence-based minimum reporting standards for AARs, similar to the CONSORT statement for randomised controlled trials, may facilitate this process and comparisons between AARs.		
11	Depth and insight	AARs should seek to uncover and report active and latent failures, contributory factors, and root causes of the actions and make specific recommendations to improve PHEP as a result of significant depth and insight into the issues at hand. They should be explicit in describing their methods of data collection and analysis, as well as how they interpreted data to gain insight into improvement processes, including any attempts to increase the validity of their insights (e.g. via independent interpretive checks through peer review).		

* As anonymity can be a critical part of conducting this focused after-action review protocol (see the Ethics section to follow), the ability to provide such detailed information may be limited. Source: Adapted from [6].

Ethics

Coordinators of a focused AAR should obtain informed consent from all participants. Unless participants explicitly confirm in writing that they are willing to go on record, they should remain anonymous in any reports and/or subsequent publications resulting from the study. This should be communicated from the outset. Although some people may be proud to be included by name as contributors, it is generally preferred to maintain anonymity and confidentiality. This increases the possibility of creating a safe space for those who would otherwise feel hesitant to participate and also reduces the possibility of politicising the outcomes. All participants need to be assured of their right to withdraw from the consultation, interview or focus group at any time.

4.2 Selecting a case

The case study approach is one of the main scientific research designs in the social sciences. A case is 'an edited chunk of empirical reality where certain features are marked out, emphasised and privileged, while others recede into the background. As such, a case is not "natural," but a mental or analytical construct aimed at organising knowledge about reality in a manageable way' [37]. Cases can range from being concrete (actual, in-context, corporeal, tangible) to abstract (conceptual, decontextualised), and from general (common, extensive) to specific (limited, particular, precise).

For the purposes of conducting a focused AAR on EBDM, one needs to select a case with a clearly demarcated decision-making process with regards to a particular COVID-19 response measure, such as limiting public assemblies, mandating the wearing of face masks, or closing/reopening schools and borders.

A case study approach is particularly useful when there is a need to obtain an in-depth view of an issue, event or phenomenon of interest, in its natural or real-life context [38]. It is also helpful when the boundaries between phenomena, such as a certain decision and its context, are not clearly evident [39]. A case study approach is valuable to understand the use of evidence in decision-making because the potential number of influences is limitless, there is high complexity (often multiple sectors and systems are involved), and stakeholders have different experiences and situations from which they understand the decision-making context.

It is useful to select a case that is instrumental in illustrating the broader dynamics of the decision-making processes that have been applied to COVID-19 response. This means that the details of a selected case may be less important than how much of an opportunity it offers to explore and learn from the general processes, issues, relationships and patterns involved. As case studies often illustrate underlying cultures of behaviour and thinking, identified patterns and processes are often systematic and consistent across different cases. Thus, it is ideal that the information and lessons learned from the case extend beyond the case itself and can inform ongoing practices and decision-making processes in related COVID-19 initiatives.

It is also possible to select a deviant or atypical case (also called 'critical') if this may be the most informative for learning. In some situations, multiple cases may also be chosen in order to detect patterns. For example, four case studies on synergies between public health authorities and community actors formed the basis of an overall guidance on community engagement for public health events [8,40].

The following considerations could be taken into account when choosing a case to study [38]:

- Does the case represent a decision that is instrumental in clarifying patterns that would be recognisable in other decisions? If not, is the atypical (critical) case considered so compelling that learning is expected anyway?
- Does the case help to assess EBDM regarding core capacities for preparedness planning and response, interoperability of plans and cross-sectorial collaboration, and business continuity of actions during the COVID-19 pandemic?
- Has a relatively limited amount of time passed (three to six months) so that involved stakeholders may accurately recount the processes involved?
- Does the case allow inclusion of the most relevant people?
- Does the case place any undue burden (emotional or professional) that could make relevant people hesitant to
 participate even with the anonymity and confidentiality provided?

Chapter 7 provides examples of potential case study topics, including school closures (Section 7.2) and visitor bans in long-term care facilities (Section 7.3). These are just two of many possible examples of NPIs introduced in full or in part in all EU/EEA countries during the COVID-19 pandemic. Decision-making processes, however, can be found anywhere, including in areas that are technical (e.g. supply chain logistical operations), which could uncover crosssectoral issues.

4.3 Data and considerations for analysis

Data collection and analysis in a case study approach differs from the far more structured methodologies used in experiments (e.g. clinical trials) or cross-sectional surveys. Often multiple sources of evidence are used, ranging from surveys to interviews, and these are compared, contrasted and triangulated (i.e. do they say the same thing?) to heighten the validity of results.

Table 4 shows the most common forms of data collection, with examples and key considerations.

Table 4. Forms of data collection

Data source	Examples	Key considerations
Documents	 Preparedness and response plans Standard operating procedures and protocols Technical briefings Meeting minutes Policy documents Response action reports that indicate lessons learned 	 Confidentiality of documents may not allow for all information to be used Keep track of sources Treat documents like interview transcripts in the analysis phase
Stakeholder mapping	 Preliminary stakeholder map Expansion of preliminary stakeholder map after further data collection Lists of contacts (from participants) Review of linkages from documents 	 Various techniques are possible, but will depend on capacity and the facilitator Formal social network analysis is time consuming
Timeline of events	• Events plotted onto a timeline and linked to the evidence available at the time, alongside the decisions introduced at each point in the response actions	 Identifying the exact timeline of the decision-making process can be difficult if multiple factors have played a role
Participatory consultation	 Participant observation in meetings Informal conversations Online exchange of information 	Keeping notes is keyParticipants need to be aware of the purpose
Complementary interviews	 Interviews with key stakeholders who could not attend the participatory consultation Formal stakeholder interviews, e.g. with those who might otherwise politicise the process External expert interviews 	 Semi-structured interview instrument is needed (see Annex 6) Informed consent required Making notes during the interview versus audio taping
Focus groups	Focused group discussions (with a maximum of eight people)	 Pay attention to hierarchies in group discussions Always include another observer who takes notes Record audio Focus on interaction, as well as content

Both data collection and analysis of case study materials should be conducted by an experienced social science researcher. In all data collection methodologies, issues of ethics are crucial, including informed consent and assurance of confidentiality and anonymity. Having an external note taker take good notes during interviews might be a more appropriate approach than recording interview sessions, as it allows for a more informal and trusting conversation, and as audio recordings can create an atmosphere of formality. In addition, by only taking notes, one can avoid the burden of transcription and conduct a faster analysis. Audio recording and transcription are very time consuming and are not necessary if a good note taker is present.

A very important aspect of case study design is the acknowledgment of different biases and opinions [8]. As qualitatively different perspectives about the same event will be voiced, the facilitator must have a reflexive attitude and not try to tease out the 'right' perspective. Instead, they should work under the assumption that different versions of reality can coexist in the same domain. A case study approach works from the notion that all versions of reality are taken seriously as ideas that motivate social behaviour and action. In such a constructivist scientific approach, the goal is to compare and contrast different versions (called 'frames') of what happened, identifying agreements and disagreements, as well as how these lead to particular actions during the outbreak [8]. Facilitators need to be reflexive towards their own influence in this process as well.

Compared to clinical trials or other quantitative data-gathering methods, case study data is often seen as of lesser scientific value. For this reason, it is important to pay attention to the following mechanisms, which can increase the trustworthiness of the results [41]:

- **Credibility**: Demonstrate that a true picture of the phenomenon under scrutiny is being presented. In a case study context, this often means that instead of a coherent and 'right' view of the event, contrary views and paradoxes are shown. Such incoherence typifies social reality.
- **Transferability**: Provide sufficient detail of the context for a reader to be able to decide whether the prevailing environment is similar to another situation they are familiar with and whether the findings can justifiably be applied to this other setting. Note that the idea of generalisation differs between qualitative and quantitative methodologies. While quantitative generalisation often looks for universal laws across populations, qualitative generalisation includes identifying a broader (higher level) recognisable set of features or processes, called 'theoretical' generalisation.
- **Dependability**: Clearly and accurately describe the study's process and methods to enable future investigators to repeat the study. As it is nearly impossible to exactly replicate a qualitative case study, insight into the context of data collection is even more important.
- **Confirmability**: Take steps to demonstrate that findings emerge from the data and not researchers' own predispositions. Be aware of personal biases or trying to fit the data into a preconceived mould.

Finally, Crowe et al [38] provide an overview of potential pitfalls and mitigating actions when undertaking a case study approach, shown in Table 5 in slightly adapted form.

Potential pitfall	Mitigating action
Selecting/conceptualising cases with limited potential for empirical and theoretical generalisations	Develop in-depth knowledge of theoretical and empirical literature, justifying choices made
Collecting large volumes of data that are not related to the specific decision(s) under analysis or not gaining access to sufficient data to shed light on the decision(s)	Focus data collection in line with research questions, while being flexible and allowing for exploration of different paths
Insufficient defining/bounding of the case	Focus on related components (either by time and/or space) and be clear what is outside the scope of the case
Lack of rigour (trustworthiness)	Undertake triangulation, have participants validate the final results (i.e. via a validation meeting), consider an external round of review and maintain transparency throughout the research process
Ethical issues	Anonymise appropriately (as cases are often easily identifiable to insiders) and ensure informed consent of participants
Poor integration with theoretical framework	Allow for unexpected issues to emerge and do not force data to fit, test out preliminary explanations and be clear about epistemological positions in advance

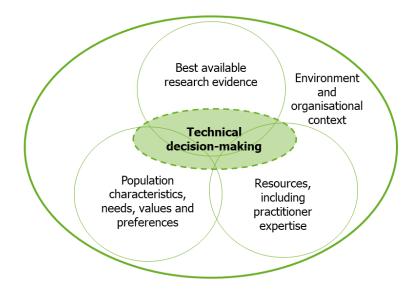
Table 5. Potential pitfalls and mitigating actions when undertaking a case study approach

Source: Adapted from Crowe et al. 2011 [38].

5. Evidence-based public health (EBPH) framework

For a comprehensive AAR, wherein more complex decision-making processes and dynamics are analysed, possibly over longer periods of time, the EBPH framework can be used. An outline of the framework, developed by Satterfield et al in 2009, is shown in Figure 4 [42]. This approach accounts for several contextual, cross-cutting forces that influence decision-making (the crossing point is in the middle of the Venn diagram).

Figure 4. Evidence-based public health (EBPH) framework



Source: Adapted from Satterfield et al. 2009 [42].

The socio-political scope of the EBPH framework, with its inclusion of broader sets of indirect and direct societal factors, could provide more comprehensive insight into the decision-making process behind a given intervention. However, it is also a more demanding approach, drawing on more diverse sets of analytical perspectives, data collection methods and levels of investigation.

In 2019, ECDC published a report on the use of evidence in decision-making during public health emergencies, which is used to map different factors that would fall into the components of the EBPH framework [3]. This illustrates the different decision-making elements that may be explored when using the framework. A summary of the framework's major themes is shown in Table 6, while further details are discussed to follow.

Research evidence	Resources	Population characteristics	Environment and organisational context
Objectivity	Human resources and institutional memory	Socio-political factors (populism, economic interests, etc.)	Intersectoral
Uncertainty	Capacity for knowledge translation	Cross-border issues	Economic
Time pressure	Situational awareness	Media influence and citizen participation	Institutional and legal

Table 6. Major themes of the EBPH framework, by category

5.1 Best available research evidence

The 'Best available research evidence' category refers to the collection of evidence to determine the benefits, harms and costs of alternative interventions. Further discussion of what constitutes 'best available research evidence' can be found in Chapter 2. Importantly, in the EBPH framework, scientific evidence constitutes one of four main categories determining decision-making. The following are possible factors of relevance to available evidence.

Objectivity

A large body of research shows a blurring of boundaries between experts and decision makers when it comes to objectivity [43]. Experts (often unknowingly or unwillingly) incorporate, in technical language, judgments about the acceptability of risk that are coloured by socio-political factors. Decision makers also carry their own opinion bias, are sensitive to context or may use evidence that is based on inconsistent or poor methodology. The perceived objectivity and therefore credibility of evidence – to some extent – is in the eye of the beholder, contrasting expert advice (expertise) from institutional advice (technocratic) or tacit knowledge (leadership) from stakeholder expertise (experiential, democratic). In addition, there are different ways in which evidence is understood depending on context. Regional-level stakeholders appear to be more likely to reject globally applicable research results in favour of a type of multidisciplinary evidence that enables localised action. In an ECDC report [3], it was noted that EBDM may risk favouring one methodological approach over others, thereby promoting uniformity and confirmation of the status quo, at the cost of missing the benefits of epistemological diversity, which tends to foster more critical insights and relevant questions. Preliminary studies addressing decision-making during COVID-19 also emphasise the need for epistemological diversity. For example, in California's Bay Area, swarm leadership was the hallmark of the decision-making process during the initial phase of the COVID-19 pandemic, wherein each expert was able to contribute their knowledge and skill set without the constraints of a formal hierarchy of evidence [1,44].

Uncertainty

Scientific uncertainty is a major issue affecting decisions during public health emergencies. It is particularly prevalent in situations that Cynefin describes as chaotic (see Chapter 6) [33]. Understandings of the risks posed by a given disease outbreak can evolve rapidly, which makes it challenging for decision makers to keep up to date. Nevertheless, public health agencies may be pressured to provide advice anyways, such as for travelling. Three coping mechanisms (not mutually exclusive) are suggested that decision makers can use to deal with such uncertainty:

- use of best available evidence,
- reversion to preparedness plans or
- action based upon the precautionary principle [2].

Many politicians activated the precautionary principle in light of the high stakes and great uncertainties associated with COVID-19 and initially implemented lockdown measures that went beyond those recommended by their national health agencies [45,46]. While uncertainty is the hallmark of any crisis, the protracted and complex nature of COVID-19 is unique in that it keeps generating new uncertainties [47].

Time pressure

Though there is a perception that gathering more evidence improves decision-making, this ideal directly competes with time pressure. Under time pressure, decisions are made using extrapolated data or historical information that may not be particularly well-suited to the emergency at hand. This may be a possible mismatch between the state of a system and the decision-making frame that makes sense of it [33]. Under time pressure, decision makers are forced to take quick decisions based on an incomplete picture and may consult within their own networks of contacts. Experts may only have small windows of time to brief elected decision makers.

5.2 Resources, including practitioner expertise

The 'Resources, including practitioner expertise' category addresses the adequacy of the required and available financial and organisational resources, including practitioner expertise, experience and organisational capacity. Is there sufficient capacity to translate evidence into initiatives that can be implemented in practice? Drawing on the school closure example, one could inquire whether practitioners (such as teachers, school leaders and local bureaucrats) have the necessary experience, incentives and resources to implement the recommended physical distancing initiatives. The following are possible factors of relevance [3].

Human resources and institutional memory

Changes in the individuals responsible for decision-making – whether due to reorganisation, staff turnover or elections – can disrupt established communication channels or result in a loss of institutional memory.

Capacity for knowledge translation

The feasibility of implementing scientific advice depends on the capability of experts and decision makers to channel information from the scientific domain into the decision-making realm. There is an intrinsic cultural difference between taking action (the realm of decision makers) and gathering information (the realm of risk assessors) [48]. One issue of concern is technical experts' reluctance to simplify their scientific findings in order to effectively communicate related uncertainties and assumptions. Further, suboptimal links often exist between scientific experts and decision makers, wherein scientists fail to consider the time pressure placed on decision

makers. It is well known that without effective exposure and knowledge translation to decision makers, scientific evidence may have marginal political influence, particularly when in competition with other factors. Other issues include where the best point of entry lies, how framing of evidence influences decision-making and how scientific dissemination models can best fit with governance styles.

Situational awareness

Cynefin's sense-making framework – detailed in Chapter 6 – illustrates the relevance of situational awareness among decision makers during moments of crisis [33,34]. Wilkinson has further described how such ways of ordering reality may differ between crisis and peace time [49]. During disease outbreaks, for example, decision makers may think of themselves as heroes and act accordingly (expediency), while during peace time they may consider themselves as bureaucrats or rational decision makers to justify their inability to achieve policy outcomes. Another influence concerns the regularity with which decision makers are involved in the EBDM process. While emergency managers are involved continuously, leaders from the community or private sector may have little if any formal training in or involvement with public health decision-making, even though they are highly influential in their communities. Elected officials may only get involved episodically. Finally, a host of cognitive biases influence decision makers' situational awareness, including routines, priming and framing, mental models, confirmation bias (filtering the world through prior experience) and emotions.

5.3 Population characteristics, needs, values and preferences

The 'Population characteristics' category addresses the needs, values and preferences of those who will be affected by the interventions and addresses the extent to which the decision-making process takes these factors into account. During a pandemic, broad-based public support for and compliance with the chosen NPIs are essential. An effective means to secure this would be through community engagement and stakeholder participation in the decision-making process. Another essential means is simple, consistent and transparent communication on the rationale behind the decided NPI, and an acknowledgement of the grievances that these interventions can cause various social groups. The following are possible factors of relevance [3].

Socio-political factors

Preparedness and response activities require continued attention to address novel threats, which are exacerbated by factors such as public mistrust and the spread of misinformation. The spread of populism has increased political pressure and avoidance of blame among decision makers. Stakeholder interests may prioritise short-term response measures that are not necessarily effective. In addition, public health organisations in many countries have little influence in the policy sphere; in these instances, their input may be fragmented or they may be superseded by other sectors in the national emergency management structures [50]. Public health decisions are also often cross-sectoral, which means that decisions taken by one authority (e.g. a national public health agency) will spill over into many other sectors that could have conflicting authorities and interests, such as transportation, business, tourism and trade.

Cross-border issues

Some public health emergencies are cross-border events that affect different groups and sectors internationally and, as such, require a much larger, internationally coordinated effort to contain and eliminate. It has also been noted that experts from neighbouring countries can come up with different conclusions using the same evidence [17].

Media influence and citizen participation

Opinions expressed in the media and on social media by key opinion leaders (such as elected politicians, interest groups, campaigners, high-profile academics, self-appointed experts and even celebrities) influence public opinion. This, in turn, can impact the ways in which decision makers use evidence during crises. A complicating factor is that pandemics contain an element of elusiveness (i.e. the virus is not perceptible to the senses), unlike other emergencies such as terror, natural disaster and so forth. This gives rise to conspiracy theories and widespread scepticism as to whether the pandemic is real, which has been observed during the COVID-19 pandemic.

The extent to which community leaders are able to participate in decision-making processes is a challenging issue. While transparency, community engagement, and community trust and ownership of decisions is desired, what happens if the community has different priorities than the public health officials? Furthermore, collaborative structures have to be set up to make the community a true partner in the response, rather than just having superficial or tokenistic involvement, which may actually decrease the community's trust.

5.4 Environment and organisational context

The environment and organisational context shapes the overarching cultural context in which the decision-making process takes place. These factors embed the decision-making process in a larger socio-political environment that shapes which choices are considered and how they are assessed. For example, during the initial phases of the pandemic, health agencies in European countries were not quick to recommend wearing face masks for several reasons, including cultural ones [21,51]. The following are possible factors of relevance [3].

Intersectoral

Compared to other sectors, the public health sector places a high self-imposed threshold on the quality and quantity of evidence needed to make decisions (similar to the need for firm evidence in decision-making processes in medicine). Yet, when a quarantine needs to be imposed, for example, a health minister needs to collaborate with other sectors where different mindsets may be dominant. Although intersectorality could be regulated beforehand to some extent, this likely complicates engagement with decision makers during public health emergencies. Decision makers may look for academic experts who embrace a larger perspective beyond their sectoral expertise and who understand the linkages between, for example, urbanisation, migration, travel and specific characteristics of the COVID-19 outbreak, including morbidity and fatalities [1,52,53]. At the same time, these academic experts often lack direct experience dealing with management of public health emergencies.

Economic

Disease outbreak events can severely undermine economies at various levels. As a result, companies can pressure authorities to put measures in place that reassure the public in order to gain economic stability, which may not be evidence-based from a public health point of view. Further, during times of economic hardship, the pressure on politicians and decision makers to compromise is much higher.

Institutional and legal

Different usage of evidence may also be due to variations in resources, budgets, objectives and decision-making mandates. In addition, institutional silos limit evidence sharing due to limited collaboration between divisions or disciplines. International, national and regional differences in institutional and public health policy may also constrain or enable the use of evidence in decision-making.

6. Cynefin sense-making framework

The Cynefin sense-making framework, developed by David J Snowden in 1999, is a tool for professionals to use when making decisions. It guides a decision maker's analysis of the context in which a decision is made and aims to help leaders understand that every situation is different and requires a unique approach to decision-making. The framework contains four sense-making domains and one outcome domain (Figure 5) [33,34]:

- The simple domain is characterised by stability and clear cause-and-effect relationships. In this domain, the
 decision maker merely needs to select empirical facts and put them into categories of existing practice in order
 to choose a response option.
- The **complicated domain** is characterised by several right answers to a given problem. The decision maker needs to consider several solutions to the same problem, which necessitates collecting new evidence and analysing data rather than merely categorising existing data.
- The **complex domain** is characterised by incomplete data, which means that it is very difficult even with rigorous scientific methods to pinpoint optimal solutions. The situation is in flux and there is little scope for making sense of the data. Decision makers, therefore, need to engage in more experimental modes of decision-making by trial and error.
- The **chaotic domain** is characterised by high turbulence, which inhibits the potential to establish clear causeand-effect relationships. Therefore, the primary focus of decision makers is to make decisions that re-establish stability. Such decisions are often based on sense and intuition, with a focus on what works rather than a search for the right answers.
- The **domain of disorder** (the small domain in the centre of Figure 5) is an outcome rather than a sensemaking domain. In the absence of clear hierarchies between the different sense-making domains, contrasting sense-making perspectives will jostle for prominence, thereby generating disorder. This disorder should clearly be avoided, as it leads to factionalism and cacophony [33].

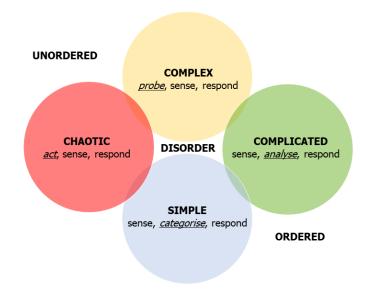


Figure 5. Cynefin sense-making framework

Source: Adapted from Snowden et al. 2007 [33].

The framework encourages decision makers to reflect on how they perceive situations in order to increase their understanding of their own and other people's behaviour. During the initial phase of the COVID-19 pandemic, for example, it appears that health experts and leading politicians were in different sense-making domains and that these domains clashed openly, exposing a lack of understanding and communication across the different sense-making domains [34].

7. Practical example and topic illustrations

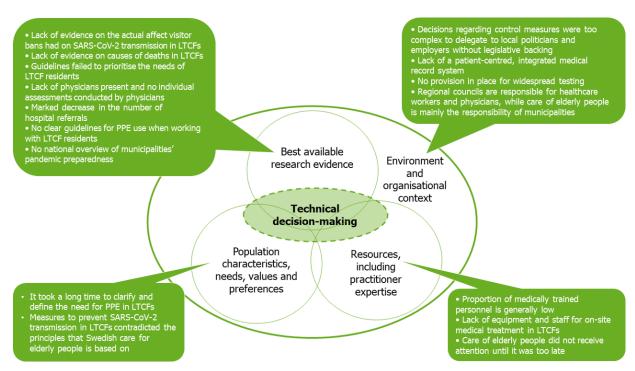
The evidence-based public health (EBPH) framework can be used to map evidence-based decision-making (EBDM) factors as part of a comprehensive focused AAR on EBDM for selected COVID-19 response measures. A practical example – looking at factors that may have influenced decision-making regarding the care of elderly people in Sweden – as well as two topic illustrations that could be addressed using the focused AAR protocol (school closures and visitor bans in long-term care facilities (LTCFs)) are provided to follow.

7.1 Practical example: mapping EBDM factors using the EBPH framework

High mortality among the elderly population in Sweden during the COVID-19 pandemic could be one reason to investigate challenges to EBDM in this area. On 15 December 2020, the Swedish Corona Commission published an interim report on elderly care during the pandemic [54]. In the report, the Commission provides details on what are considered to be the most important reasons for the wide spread of infection and the high death rate among elderly people in Sweden. At the time of the report's publication, 7 000 people had died of COVID-19 in Sweden. Almost 90% of these deaths occurred in cases aged 70 years or older, half of whom were living in LTCFs.

In Figure 6, the challenges listed in the report are mapped to the EBPH framework to show the possible influence of certain factors on evidence-based, technical decision-making, which could be further explored during a focused AAR. When undertaking this exercise, it is important to note the specific context in which health authorities operate (e.g. health agencies in Sweden have relatively high autonomy compared to other countries). Note that this example does not reflect the outcome of an actual AAR of the EBDM process.

Figure 6. EBPH framework applied to causes of mortality among the elderly population in Sweden



Source: The base EBPH framework figure is adapted from Satterfield et al. 2009 [42]. The bullet points are extracted from the interim report on elderly care during the pandemic, published by the Swedish Corona Commission, 2020 [54].

7.2 Topic illustration: school closures

School closures were one of the key NPIs that almost all EU/EEA countries implemented in the initial phase of the COVID-19 pandemic. For most EU/EEA countries, school closures were a cornerstone of their physical distancing strategies, aimed primarily at slowing down the spread of COVID-19 to avoid breakdowns in their core national healthcare systems.

The scientific evidence behind the effectiveness of school closures was initially weak, as there was no scientific evidence to suggest that closing schools would substantially curb the spread of COVID-19. While there was compelling scientific evidence that school closures reduced transmission of influenza, particularly among school-aged children, the few studies that had been published on severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) provided 'limited information about the effectiveness of school closures and no data on cost-effectiveness' [55]. Decision makers responding to the COVID-19 health emergency, therefore, were faced with limited scientific evidence other than indiscriminate knowledge that physical distancing initiatives in general are effective in reducing disease transmission.

Several EU/EEA countries looked to the dire situation unfolding in Italy and Italy's decision to become the first country in the EU to close schools [56]. The exponential increase in COVID-19 cases across many EU/EEA countries by the beginning of March 2020 prompted a mostly precautionary response by public health authorities. They activated a broad range of physical distancing initiatives, including school closures.

Figure 7. Scope of school closure initiatives across the 27 EU countries and the UK, 2020 illustrates the scope of school closure initiatives across the 27 EU countries and the United Kingdom (UK), using data from the Oxford University Coronavirus Government Response Tracker, which publishes daily updates on key COVID-19 pharmaceutical and non-pharmaceutical interventions (a similar database, the Response Measures Database operated by ECDC and the Joint Research Centre (ECDC-JRC), could also have been consulted [57]). The shaded error bar indicates daily divergence on school closure measures across the EU. Thus, a larger error bar in any given period suggests increased variance in school closure policies.

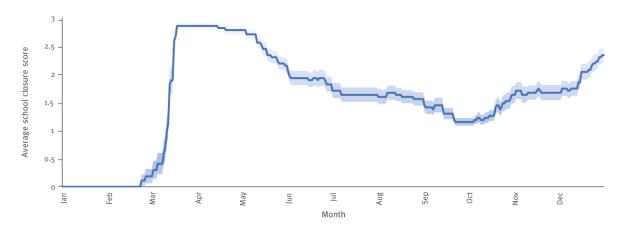


Figure 7. Scope of school closure initiatives across the 27 EU countries and the UK, 2020

Daily average score of school closure initiatives across the 27 EU countries and the UK is indicated, including shaded error bars. School closure indicator ratings are from 0 to 3 (0: no measures; 1: recommend closure or all schools open with alterations resulting in significant differences compared to usual operations; 2: require closure (only some levels or categories, e.g. just high schools or just public schools); 3: require closure, all levels).

Source: Oxford University Coronavirus Government Response Tracker, 2020 [58].

As Figure 7 illustrates, strict school closure measures were almost uniformly implemented across the 27 EU countries and the UK in early March 2020 in just a matter of days – even in the absence of strong transnational governance coordination – and these measures remained in place throughout the month. However, there was increasing variance as these countries began to reopen at different points throughout the spring and summer, as well as to initiate further closures in autumn of 2020.

Following the initial strict school closure initiatives, scientific evidence on the effectiveness of school closures in halting COVID-19 transmission picked up significantly. Many contributions were in the form of commentaries [59–62], but several research articles started to be published in both peer-reviewed and preprint versions, primarily in the medRxiv archive [63–68]. Some of the studies were made possible by the reopening of schools, which provided a quasi-experimental research design to assess the impact of these reopenings. In 2020, two technical reports published by ECDC compiled much of the scientific evidence on school closures [69,70]. Indicative of the speed by which scientific evidence was accumulated, the updated version published in December could draw on close to twice as many studies as the initial version published in August. The scientific consensus outlined in the December report was that COVID-19 transmission in schools was relatively uncommon. Studies from select EU/EEA countries and beyond (Australia, Singapore, United States (US)) found no or very low secondary attack rates within preschool, primary school and secondary school settings [69]. In addition, the reopening of schools in the spring and summer of 2020 'did not appear to have been a driving force in the upsurge in cases observed in many EU/EEA countries from October 2020' [69].

Alongside the emerging scientific evidence of limited epidemiological effects of school closures, there was increased scientific attention towards the adverse secondary effects of school closures. Much scientific evidence documented the negative physical, mental and educational impact of proactive school closures on children [71–77], as well as the adverse impact on inequality [78–81] and economic growth/productivity [71,81–83]. These effects also needed to be factored into school closure decisions. Based on the totality of evidence, ECDC recommended that 'given the severe consequences of school closures on children and their communities, this measure should be employed as a last resort for disease control' [69]. The US Centers for Disease Control and Prevention (CDC) recommended, along the same lines, that 'opening schools for in-person learning as safely and quickly as possible, and keeping them open, is important given the many known and established benefits of in-person learning' [84]. Thus, the scientific evidence at the time seemed to point towards control and prevention strategies aimed at reducing transmission within schools, rather than indiscriminate school closures across the board. These strategies included, among other initiatives, smaller class sizes, physical distancing, and hygiene and sanitation measures.

The availability of this new evidence might explain why the second round of school closures in EU/EEA countries appears to have been more incremental and less strict, despite much higher rates of infection from October onwards (Figure 7). In contrast to March 2020, the autumn school closure initiatives among the Nordic countries, for example, were much more limited in scope. Primary schools and preschools in Norway, Finland and Denmark remained open, though only up to grade five in Denmark. Sweden kept all levels of schools open throughout the outbreak, although it did close down secondary schools in December. Still, the fact that many countries reinstated some of the same school closure initiatives that were implemented in March 2020 might suggest that another round of decision-making based on the precautionary principle occurred, as new and more contagious strains of the virus emerged.

While current evidence indicates that school closures are among the least effective physical distancing initiatives, closing schools still appears to have some effect, particularly when implemented in combination with other physical distancing initiatives and contact tracing. This effect might be even more pronounced with virus strains of higher transmissibility. Precautionary decisions might also reflect the fact that, despite the surge in evidence production, the available scientific evidence can still be characterised as weak. WHO, for example, still acknowledges that 'the role of children in transmission is not yet fully understood' [85] and ECDC highlights that more studies are needed to 'detect and understand transmission among mild or asymptomatic children and teachers' [69].

Importantly, for many EU/EEA countries, school closures in the autumn of 2020 were not bundled together with other physical distancing initiatives, but were implemented as a last resort measure to control exponentially rising infection rates. Nevertheless, more concrete insights into how individual countries reached decisions regarding the design and timing of their school closure initiatives, as well as their decisions to reopen schools, are lacking. A focused AAR could shed light on the distinct dynamics and characteristics of national decision-making processes in individual EU/EEA countries, thereby providing valuable lessoned learned for future health emergencies.

A focused AAR on EBDM regarding school closures could use the EBPH framework to develop relevant questions, which could include:

- **Best available research evidence:** What peer-reviewed literature about past outbreaks with similar characteristics was available? What published analyses of analysed response actions were available?
- **Resources:** Did the decision-making processes factor in the role of practitioners (such as teachers, school leaders and local officials) and their ability to implement closures or physical distancing initiatives? To what extent did the decision-making process factor in the long-term costs of school closures?
- Population characteristics: Did school practitioners, pedagogical experts and relevant community organisations
 participate in the decision-making process? What role did the media play in the decision-making process? Does the
 population trust decision makers and to what extent did they embrace the implemented policies and guidelines?
- **Environment and organisational context**: How did the need to make decisions or recommendations quickly and based on limited scientific evidence impact the decision-making process? To what extent did experience from other countries and guidelines from international organisations impact national decision-making?

7.3 Topic illustration: visitor bans in LTCFs

Substantial differences in the organisation of long-term care between and within European countries affected infectious disease preparedness and response in LTCFs [86]. These include differences related to the involved levels and elements of government; the mix of public, private for-profit and non-profit service providers; and the amount of public funding allocated for long-term care. Overall, considerable out-of-pocket costs for LTCF residents, low pay and relatively poor working conditions for LTCF employees, as well as a large number of family caregivers without support structures, are common across countries. Moreover, people with long-term care needs often require continuous, complex and personalised support structures [87]. The COVID-19 pandemic has highlighted how fragmentation between long-term care services, along with inherent weaknesses in the overarching governance structure for long-term care, has led to devastating consequences for LTCFs [88].

Early on in the COVID-19 pandemic, in spring 2020, rising community transmission and anecdotal evidence of high mortality in LTCFs led many governments across the world to resort to unprecedented visitor bans in LTCFs [89–92]. This included not allowing residents to leave LTCFs, except to receive essential medical treatment. Some countries, such as Norway, allowed for exceptions to facilitate compassionate care situations, such as end of life care [91]. Widespread criticism was expressed that most of these bans were not implemented early enough to save the lives of many people aged 70 years and older, despite knowledge of their vulnerability. In addition, evidence has shown that the impact of visitor bans has been severe for residents, their family members and staff [93–95]. The ban likely contributed to an increased staff workload because informal care provided by family members ceased. It also negatively impacted the mood and behaviour of residents and increased feelings of guilt, fear, worry and isolation in residents' families. In addition, the reopening of LTCFs to visitors varied greatly between facilities. Over time, these impacts have led to revisions in the general policy approach to banning visitors from LTCFs [96].

The case of visitor bans in LTCFs offers a rich opportunity to uncover lessons learned regarding EBDM. For example, what were the reasons for the decision to close LCTFs to visitors? Was it considered a timely decision? What evidence was used to conclude that bans on visits would reduce infections? What considerations were made regarding the value and extent of informal caregiving by residents' family members? What assessments were made to evaluate how and if safe on-site visiting practices could be used? What evidence was used to guide the reopening of LTCFs to visitors? Did new evidence arise that suggested an alternative strategy? If so, when was this recognised?

Outbreaks in LTCFs showed a much higher risk of SARS-CoV-2 infection and mortality than outbreaks in other community settings [97,98]. This is partly due to residents' age, as advanced age suggests the possibility of weaker immune systems and multiple comorbidities. [99]. Other contributing factors may have been a lack of testing for COVID-19 and personal protective equipment (PPE), as well as staff working in multiple facilities [100]. In addition, due to the lack of dedicated surveillance systems in LTCFs, and differences in testing strategies and capacities among countries, COVID-19 cases and deaths in LTCFs have most likely been under-reported [100]. It is possible that these factors contributed to anecdotal evidence being used initially to inform decision-making, as public and political support for measures to curb rising infections was apparent [101]. Many LTCFs implemented a visitor ban between February and the end of March 2020 [20], and did not lift the ban until response measures began to be relaxed, around summer 2020.

There has been little evidence on how many SARS-CoV-2 infections in LTCFs were brought in by visitors when safe visiting practices were in place [89]. A review found no scientific evidence that visitors to care homes introduced COVID-19 and only anecdotal reports attributed infections to visitors before restrictions were introduced. Governments did not report the sources of infections in LTCFs (i.e. from staff, from residents returning from hospital or from the community, from other external professionals or from visitors). Evidence from the Netherlands and Hong Kong suggests that when community transmission is low, safe visitation does not introduce COVID-19 into LTCFs [102,103].

Decisions regarding reopening LTCFs to visitors was often not mandated by governments, but was left to the discretion of LTCF staff, who needed to ensure that they were in a position to safely allow visitors and to decide when to reopen. In some cases, reopening was mandated in stages (tiers) linked to certain measures. Guidance documents on the topic, such as the WHO guidance published in March 2020 and updated in January 2021 [104], focused on regional context as a key consideration in this decision, as COVID-19 prevalence in the community appears to be a strong predictor of COVID-19 cases in LTCFs [105–107]. There also appeared to be no consistency regarding what COVID-19 community transmission rates were considered low enough for safe reopening [89].

There has been criticism that visitor restrictions were more stringent than they needed to be, given the negative impact on residents and the lack of data showing that banning visitors prevents COVID-19 [108,109]. Overall, it appears that supporting the well-being of residents was a secondary consideration to infection prevention in visitor restriction policies. This is in contrast to many LTCF philosophies and policies, wherein safety and measurable efficiency targets have made way for the inclusion of quality of care indicators [100]. It could be argued that the pandemic emergency context drew out an old reflex in the system of prioritising infection prevention above anything else.

A focused AAR on EBDM regarding visitor bans in LTCFs could shed light on the distinct dynamics and characteristics of national decision-making processes in individual EU/EEA countries, thereby providing valuable lessons for future health emergencies. Alternatively, an AAR could be conducted on how the preparation of vaccination strategies included targeting residents of LTCFs for priority vaccination in preparation for COVID-19 vaccines becoming available.

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Annex 1. Terms of reference on expectations for working group participants

Background

The comprehensive focused after-action review (AAR) approach involves the active participation of key stakeholders in a collective, group-oriented review focused on a case study. The work is facilitated by a social scientist and builds upon ECDC's previous experience with AARs. This AAR is considered 'focused' because it is selective in its attention to the role of evidence in decision-making, instead of attempting to review all key elements of the public health response to COVID-19 (i.e. the approach taken in the more traditional, wide-ranging AAR).

Requested tasks

A working group (including an experienced social scientist facilitator) will be established to coordinate and prepare the AAR. The following tasks are envisioned for working group members.

Ahead of the AAR

- Participate in preliminary organisational meetings to provide input on the proposed methodology, define roles
 and responsibilities, select the case study and agree upon the timeline of the focused AAR.
- Share the following with the social scientist facilitator:
 - documents relevant to the specific decision-making process under examination (e.g. meeting minutes, reports, preparedness plans, standard operational procedures, evaluation reports, etc.);
 - a timeline of how the decision-making process unfolded, ideally with supporting evidence; and
 - a list of stakeholders with whom they interacted during the decision-making process.

A preliminary analysis conducted by the social scientist facilitator will guide the selection of participants and their recruitment from a wide range of sectors and perspectives. Note that recruiting people to join the working group, focus groups or interviews requires time, and that the process often takes longer than initially estimated.

During the AAR

- Join the participatory consultation and help to create a productive, safe space for dialogue and learning, wherein placing blame is avoided and not necessary.
- Participate in the initial meeting (day 1) and possibly a debrief meeting (morning of day 5).
- Facilitate access to key informants, who will be interviewed by the social scientist facilitator.

After the AAR

- Be present at the hot debrief, which will take place after the participatory consultation and complementary interviews/focus groups are complete (1 hour).
- Review the social scientist facilitator's report summarising the findings of the AAR (3 hours)
- Decide whether there is a need for a wider validation meeting for the final report.
- Support dissemination of the report and other outputs.

Privacy and ethics

Data collected by the social scientist facilitator and working group members should comply with national guidance on ethics and privacy, or Regulation (EC) No 45/2001 on the storage of personal data and on ensuring citizens' privacy.

Annex 2. Form for mapping stakeholders involved in the EBDM process

Name and contact information	Role in decision-making process	Decision-making power (low, medium, high)	Influence on the response (low, medium, high)

Annex 3. Invitation to participants

Background

Assessing the actions taken after a public health event is an important part of improving public health emergency preparedness, response and recovery. The [name of responsible institution] is assessing operational strengths and weaknesses through a focused after-action review (AAR) of [name of case study] during the COVID-19 pandemic, in collaboration with [name of key stakeholders (if relevant)].

Goal

The goal of this focused AAR is to foster opportunities for discussion and dialogue on the role of evidence in decision-making around [case]. Using a collaborative approach, we invite stakeholders to participate in the identification of barriers and facilitators regarding evidence-based decision-making processes, including helping to identify best practice and make suggestions for improvement.

Methods

A local [coordinator (rapid version)/working group (comprehensive version)] has been established to lead this process. Evidence-based decision-making processes, challenges and opportunities will be explored using the following general set of questions:

- What happened, who was involved and how did participants make sense of the situation?
- How did evidence contribute to the decision? Why did the decision develop the way it did?
- What can be learned? What should change? How can changes be monitored?

Your participation

You have been identified as a potential stakeholder who was engaged in the decision-making process. We would like to invite you to take part in the review. If you agree to participate, we will invite you to join the participatory consultation (a [number of days]-day consultation) or to give an interview, depending on your availability and wishes. For personal interviews, you will receive the questions in advance of the interview to allow you to prepare. The participatory consultation will be conducted at [location].

Your participation in the review is entirely voluntary and there will be no repercussions for not participating. The process will be anonymous and confidential, and participants can leave the process at any time. Please note that any AAR process is not an attempt to determine a single version of the truth or to assign blame. Rather, it aims to collect various stories of different experiences and, based on this, to collaboratively identify lessons learned, best practice, gaps and challenges, as well as to develop effective strategies for the future. The outcome is a final report, which will be disseminated widely and archived for future learning. You will be given the opportunity to review the report before it is finalised.

Annex 4. Draft programme for the participatory consultation

The expected duration of the participatory consultation is one day (eight hours), comprised of the following sessions.

Session 1: Introduction

(half hour, in plenum)

Outline the purpose of the focused AAR

- To map and assess the role of evidence in decision-making processes in [selected case].
- To foster opportunities for discussion of evidence-based decision-making capacities for future preparedness planning and response activities.
- To identify drivers and barriers for the use of scientific evidence in decision-making processes related to concrete health emergencies.
- To develop and share recommendations on how to facilitate a scientific evidence-based decision-making process.
- To describe how evidence-based decision-making processes affected the interoperability of plans and business continuity of actions.

Outline the purpose of the participatory consultation

- To document participants' perspectives on the role of evidence in the decision-making process, as relevant to the selected case.
- To attempt to find consensual answers to the following questions:
 - What happened and who was involved in the process?
 - Why did the process unfold as it did? Could there have been other (unexplored) courses of action at particular points in the process?
 - How can lessons be extracted from this experience? To what extent are the lessons context- or healthspecific?
- To use facilitative instruments to optimise the consultation process and theoretical tools to structure inputs.
- To transfer knowledge both ways: participants will share their perspectives and important insights and will also learn tools and skills to analyse dynamics of underlying decision-making processes.

The facilitator should also provide an outline of the report writing process during this session, including indicating when input and review will be possible.

Session 2: What happened, who was involved and how did they make sense of the situation?

(1 hour, in plenum and breakout groups)

Purpose

Once the available (official) documents are reviewed, participants can share their perspectives on the decisionmaking process.

Theoretical tools

- **Timeline of key events:** This is an important but relatively simple tool that illustrates the timing of key events. It serves to establish a common understanding of events, but also to expose divergent views of what actually happened. There will likely be some discrepancies with regards to the timing of events, as well as what events should be included in the timeline.
- **Stakeholder mapping:** The stakeholder map provides an overview of the stakeholder landscape. It visualises people and organisations that were likely to have had an influence on the decision-making process by mapping out the relevant stakeholders and their interrelations. The map can be augmented by a power/interest matrix that illustrates the power and influence of individual stakeholders. The tool should provide an understanding of the relationships between the various actors, as well as the nature of these relationships.

Facilitated processes

- In plenum, there should be discussion and agreement on a timeline of key events and an attempt to trace the
 decision-making process from the initial health crisis to the management of response and recovery policies. If
 agreement cannot be reached, the facilitator should acknowledge that there are different interpretations of the
 key events, and that this is to be expected (as actors might perceive key events very differently).
- In breakout groups, participants will identify the key stakeholders in the decision-making process:
 - Participants should map out the various stakeholders that they had contact with during the response.
 - The participants could be asked to add dimensions of power and interest to these stakeholders via a
 power/interest matrix or to contemplate the extent to which these relations were the result of written
 procedures, institutional practices or informal connections.
 - The graphical representations of key stakeholders will likely vary according to the perspective and position of the actor within the decision-making process (a health expert reporting the crisis upwards in the system will face a different set of stakeholder dynamics than a decision maker at the top of the system).
 - The facilitator can, on the spot, try to elucidate some of the most prominent relations between stakeholders, although a more thorough analysis needs to be conducted after the consultation.

Session 3: How did decision makers make sense of the situation?

(1 hour, breakout groups and in plenum)

Purpose

In this session, participants' opinions will be collected to get a variety of perspectives on why the decision-making process unfolded as it did.

Theoretical tools

Sense-making: Briefly introduce the concept of sense-making, as well as the Cynefin framework if it is a comprehensive AAR. Cynefin offers four decision-making domains: simple (or obvious), complicated, complex and chaotic. The domain of disorder, which is a possible outcome rather than a sense-making domain, is also possible and should be avoided (see Chapter 6). This tool can help decision makers identify how they perceive situations and make sense of their own and other people's behaviour. During crises, decision makers commit themselves to certain frames as the basis for their sense-making, which strengthens their capacity for quick and consistent decisions, but might also blind them to alternative framings (tunnel-vision).

Facilitated processes

In breakout groups, participants will be asked to identify the dominant frame that they operated in during the decision-making process. Note that frames will often vary according to the agency/actor. Frames might also have changed over time as the crisis unfolded.

Participants should also reflect on how their professional background and institutional practices contributed to the frame(s) they operated in. Were predefined written procedures followed? To what extent did the procedures reinforce a productive frame and to what extent did they lock the decision-making process into a suboptimal trajectory?

In plenum, participants can also be asked to try to imagine the frames of other key stakeholders in the decisionmaking process. How might the frames of a local politician, for instance, differ from that of the health specialist? Participants could be encouraged to consider counterfactual decision-making processes and results by identifying potential points of divergence. To what extent was the decision-making process constituted by rational and optimal procedures, to what extent was it constituted by sense-making frames and to what extent was it the result of randomness?

Session 4: Why did it happen? How did evidence contribute? Why did the decision develop the way it did?

(3 hours, breakout groups and in plenum)

Purpose

In this session, how evidence influenced the decision-making process will be discussed, as well as what evidence was available and how it was used (or not used). The evidence used in the decision-making process will be traced.

The purpose of the session is not to uncover 'mistakes' or 'good decisions' (with the benefit of hindsight), but to understand why the decision-making dynamics unfolded as they did and – specifically – what role evidence played in these dynamics.

Theoretical tools

Briefly introduce the evidence-based public health (EBPH) framework as the conceptual model to organise enablers and barriers to evidence-based decision-making.

The EBPH framework offers four categories of classification: best available research evidence; resources, including practitioner experience; population characteristics, needs, values and preferences; and general environment and organisational context.

Facilitated processes

In breakout groups, participants will be asked to identify how and when a piece of evidence was brought into the decision-making process, and how it was responded to. What were possible reasons for adoption or rejection of the evidence? If there are significant pieces of evidence, these could also be traced through the process and participants could assess how people involved responded to their significance.

Participants will be asked to consider if the utilisation or availability of evidence changed over time, as well as if this differed across stakeholders or according to the different frames used. They will also be asked to reflect on the major barriers and enablers to evidence-based decision-making using the EBPH framework.

In plenum, participants will be asked to agree on the major influences on the timeline, to reflect on the meaning of 'evidence' and to identify the major barriers and enablers encountered.

Session 5: What can be learned? What should change? How can change be implemented and monitored?

(1.5 hours, in plenum or breakout groups)

Purpose

In this session, the overall lessons learned are drawn out based on the results of the previous sessions. Key questions to discuss include:

- What do we all agree on?
- What contradictions or disagreements still exist?

Facilitated processes

In plenum or in breakout groups, participants will be asked to identify five major lessons learned about the use of evidence during the decision-making process in this case study. For each of these, they should also identify what can be done to improve gaps or challenges and to sustain best practice.

Session 6: Hot debrief and evaluation

(1 hour, in plenum)

A qualitative reflection on the participatory consultation in the form of a hot debrief is recommended. This provides participants with the opportunity to reflect on the consultation process itself, but also on the outcomes. It is important to provide equal space for all participants during this session. If any tensions have arisen during the course of the day, participants could be asked what further work they propose to resolve these, if necessary.

The facilitator should also review and ensure there is agreement on the next steps, including the writing process for the final report, when participants will have the opportunity to provide input, whether or not an external round of review and/or validation meeting (comprehensive version) is required, and how the report will be disseminated.

The process can be closed with the evaluation form provided in Annex 5.

Annex 5. Evaluation form

This form can be used at the end of the participatory consultation to gather participants' views on the effectiveness of the focused AAR, in order to improve the process in the future. This form was adapted from WHO, 2019 [4].

1. To what extent do you agree that the focused AAR reached the following objectives? Please use a scale of 1 (fully disagree) to 5 (fully agree).

1 = Fully disagree to 5 = Fully agree	1	2	3	4	5
The AAR allowed participants to identify EBDM challenges and gaps encountered during the course of the response.					
The AAR allowed participants to share EBDM experiences and best practice encountered during the course of the response.					
The AAR contributed to strengthening interdisciplinary collaboration and coordination on EBDM between health sector stakeholders involved in the response.					
The AAR contributed to strengthening EBDM collaboration and coordination between sectors (health, civil protection, environment, law enforcement, etc.) and governance levels (national/local) involved in the response.					
The AAR allowed participants to propose actions for improving EBDM.					
The choice of case was well suited to gain insight into EBDM processes.					

2. How effective were these aspects of the focused AAR in achieving the objectives? Please use a scale from 1 (low) to 5 (high).

1 = Low to 5 = High	1	2	3	4	5
Presentations on the methodology and process of the AAR					
Session 1: Introduction					
Session 2: What happened and who was involved?					
Session 3: How did decision makers make sense of the situation?					
Session 4: How was evidence used during the decision-making process?					
Session 5: Lessons learned					
Session 6: Hot debrief and evaluation					
The number of participants					
The profile of participants, as related to the function of the response examined					
The AAR methodology					
Please specify:					

3. Would you use this focused AAR methodology for other public health emergencies in your country?

Yes/no

Please specify:

4. Do you think the results of the focused AAR can contribute to the following objectives? Please use a scale from 1 (low) to 5 (high).

1 = Low to 5 = High	1	2	3	4	5
Strengthening preparedness and response capacity					
Strengthening coordination and collaboration mechanisms					
Strengthening preparedness and preparedness plans					
Empowering individuals to better appreciate the challenges of emergency response					
Other (please specify):					

- 5. Other comments/suggestions on the focused AAR methodology:
- 6. Other comments on the results of the focused AAR:

Thank you!

Annex 6. Interview instrument

The questions below should be seen as a working draft that is subject to amendment based on discussions among the coordinator or the working group and the social scientist facilitator. These generic questions should be made more specific and be tailored to the case selected for the focused AAR. Note that the questions do not aim to attract simple yes or no responses, but rather to facilitate an open discussion about each of the issues.

Part 1: What happened, who was involved and how did they make sense of the situation?

Who was involved?

- Can you map out the various stakeholders or groups that were involved in the decision-making process?
- If you were to rate each of these stakeholders by the amount of influence they had on the decision-making process, who would have had the most influence?
- If you were to rate each of these stakeholders by the level of interest they had in the decision, who would have had the highest level of interest?

Sense-making analysis

- When you first heard about the event, to what extent could you apply your previous experience with similar events? Do you think this was the same for other people who were involved?
- Using the Cynefin framework, which of the following descriptions fits best with the way that you experienced the event: complex, complicated, chaotic or obvious/simple?

Part 2: Why did it happen? How did evidence contribute? Why did the decision develop the way it did?

- What struck you as most influential on the way that the decision-making process developed? Why?
- To what extent do you feel that the decisions made in the response phase were 'evidence-based'? Why/why not? How would you define 'evidence' in the context of decision-making?
- Could you give an example of when evidence was used well? Could you give an example of when evidence
 was not used well? How did you determine if evidence was used well or not well? What monitoring
 mechanisms do you use?
- How and when did the decision change the epidemiological situation? Who assessed the initial impact of the decision and how did they do so?

Note that the EBPH framework (Chapter 5) can be used as probes (see the major themes of the framework in the table below).

Major themes of the EBPH framework, by category

Research evidence	Resources	Population characteristics	Environment and organisational context
Objectivity	Human resources and institutional memory	Socio-political factors (populism, economic interests, etc.)	Intersectoral
Uncertainty	Capacity for knowledge translation	Cross-border issues	Economic
Time pressure	Situational awareness	Media influence and citizen participation	Institutional and legal

Part 3: What can be learned? What should change? How can change be implemented and monitored?

- What were the main lessons learned from this event, with respect to evidence-based decision-making?
- What should change, with respect to the evidence-based decision-making process?
- Have you seen any changes in the decision-making process since the event? To what extent have these changes benefitted the use of evidence in the process?

Closing

• Is there anything else you would like to add?

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