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TECHNICAL REPORT

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After-Action Review on evidence-based decision-making

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After-Action Review on evidence-based decision-making

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Abbreviations

AAR	After-Action Review
AIGHD	Amsterdam Institute for Global Health and Development
Bufdir	Norwegian Directorate for Children, Youth and Family Affairs
DSB	Norwegian Directorate for Civil Protection
EEA	European Economic Area
EU	European Union
Hdir	Norwegian Directorate of Health (Helsedirektoratet)
NIPH	Norwegian Institute of Public Health (Folkehelseinstituttet, FHI)
TISK	Testing-Isolation-Tracing-Quarantine
TLM	Traffic Light Model
Udir	Norwegian Directorate for Education and Training
WHO	World Health Organization

Summary

Background

This After-Action Review (AAR) investigates the use of evidence in Norway's advice-making process about school continuity in secondary (13–15 years old) and upper secondary schools (16–18 years old) during the COVID-19 pandemic. We focused on the time before and after the 2021 school holidays, particularly the period from the summer of 2021, the Delta wave, and up until Omicron appeared during the winter of 2021–22. The following questions were considered:

- How was evidence used to inform advice about school continuity during this period?
- What happened and who was involved?
- What influenced the advice-making process?
- Why did the advice-making process turn out as it did?

In Norway, children's daycare and schools were closed during the first wave of the COVID-19 pandemic on 13 March 2020 and gradually re-opened under strict Infection Prevention and Control (IPC) measures from 20 April 2020. Concern about the impact school closures had on the wellbeing and educational progress of children and adolescents versus concerns about COVID-disease in children, led to continuous discussions on the best way to protect this group throughout the pandemic. Increasing evidence showed low COVID disease severity in children and adolescents and evidence that transmission in schools was limited. Advice-makers developed and proposed a Traffic Light Model (TLM) with measures adaptable to the local epidemiological situation and different age groups as a means to keep schools open as much as possible. Later, this was followed by intensive efforts to roll out a regular antigen testing program to limit the use of quarantine and more intrusive IPC measures. Norwegian schools and preschools largely remained open throughout the pandemic, including during the second and third waves. Municipalities had the authority to make decisions about local school closures in response to local outbreaks, and school closures were always combined with full-time distance learning. Closures were limited to short-term closures and they were mainly in secondary schools. The Norwegian experience contrasts with that of many other countries where school closures were more frequent and lasted longer.

Methods

The AAR's core methodology is a process-driven learning exercise that builds on a qualitative review of a delimitated case. The case-study approach allows for in-depth explorations of how key advice travels through and across relevant organisations, as well as how it changes over time in light of new evidence. This involves identifying and making explicit any external pressures, informal practices, and networks (both within and across agencies) that affect the advice-making process. Data was gathered during a two-day consultive process with key stakeholders who had played a role in the advice-making process during the pandemic. Semi-structured interviews were also conducted during the week of the workshop and in the subsequent week. Stakeholders were identified by the Norwegian Institute of Public Health (NIPH) in cooperation with the Norwegian Directorate of Health (Hdir) and the Norwegian Directorate for Education and Training (Udir). Participants included in the facilitative workshop included representatives from the NIPH, Hdir, Udir, municipal medical officers from the Oslo, Lillestrøm and Bærum municipalities, and the Education Directorate at the County Governor of Oslo and Viken (Statsforvalteren). Additional interviews were conducted with representatives from the School Student Union of Norway (Elevorganisasjonen), Directorate of Children, Adolescents, and Family (Bufdir) and the Norwegian Ombudsperson for Children (Barneombudet).

Results

Early in the pandemic, the Norwegian government declared that children and adolescents' health and wellbeing should be prioritised. Yet, the advice-making process during the period of analysis can be characterised as having had two competing interpretations of children's best interest. Both approaches sought to reduce the pandemic burden for children. One interpretation of children's best interest led to keeping children at home to reduce the risk of infection and consequently a policy inclination toward closing schools – or moving to the highest risk level (red) in the traffic light model whenever new variants arrived. This group included more medically oriented actors and decision makers, and its view was also largely espoused by risk perceptions among the general public and strongly advocated by some teachers and teachers' organisations.

Another interpretation of what was in children's best interest was to avoid disruption of their everyday life, including keeping the schools open as much as possible. This approach said that the measures should not impact children more than the infection itself. This was supported by a group including i.e. the NIPH school group and actors related to the childcare and education sectors.

This group interpreted children's health broadly as a combination of social, physical, and mental wellbeing, and was also based on evidence of low COVID-19 disease severity in children and adolescents. This group also emphasised children's right to education. The AAR brought to light the challenging conditions under which this latter group had to bring the growing evidence to the decision-makers' table and be heard.

Sources of evidence for advice-making were varied, but broadly classifiable as expert groups, peer reviewed literature, modelling studies, anecdotal evidence, epidemiological registers and methods, contact tracing studies and educational and demographic surveys. Participants noted a continued need for more randomised controlled trials to test the effectiveness and impact of interventions, evidence on the risk perceptions of teachers, and lived experiences of students.

At times, participants experienced their advice-making work as a struggle against the tendency to throw the 'baby out with the bathwater' each time a new virus variant appeared, because each new variant of SARS-CoV-2 increased uncertainty. Fear and risk avoidance led decision makers and public perceptions back to the precautionary intervention of distance learning and reduced attendance/red level, and it appeared difficult to convince public opinion and teachers of alternative measures for children and adolescents. Some leaders and spokespersons in the response team sometimes did not appear fully up-to-date on the existing evidence to sufficiently advocate keeping schools open. At times, arguments made by the NIPH school group (responsible for technical and epidemiological scientific advice on schools and COVID-19) were not weighted or communicated further.

Sometimes the advice given by national authorities to schools was not actionable. For example, after the summer of 2021, NIPH and Hdir advised municipalities to administer antigen tests to students for the sake of avoiding quarantine and distance learning. However, test supplies were lacking at the same time as the country faced a new mutation (Delta). Participants also noted that advice was slow to trickle down the chain because discussions about the advice and interpretations of evidence had to be repeated at several levels, slowing down the process. Participants further recalled that advice-making was constrained by national laws, inhibiting flexibility in advice that could be offered to specific municipalities. Municipal medical officers also had to work to prevent local politicians from being stricter than national or municipal laws required.

Review participants noted that surge capacity was available. For instance, many retirees proved willing to volunteer for work as needs arose. However, recruitment of competent experts was challenging in both the public health and education fields. At the national level, those involved in advice-making who initially worked on the school issue described their work as 'a train that speeds up and is increasingly hard for others to jump onto'. This was made more challenging by the rapid growth of tasks because there was no time to sit down and better organise or reflect. This situation was prolonged because everyone kept believing that the end of the pandemic was near. Participants recalled that strong mutual solidarity helped them to cope and stay resilient. In addition, there was some (delayed) mental health support. Issues of overburdening were also mentioned by municipal medical officers.

Through the workshop and interviews with the AAR team, review participants derived the following lessons from what went well and not so well in this advice-making process:

- Give priority to children and related stakeholders as a separate focus-area in the outbreak response, organised across sectors, represented at a high level and with a formal position and mandate. In several ways, participants emphasised that children's and related stakeholders' interests and perspectives had been less vocal or represented in the focus period than they should have been. In some situations, it became a struggle in advice-making to take heed of effects social distancing measures could have on children's wellbeing. Here, more direct and persistent involvement of child or school-related stakeholders and representatives could have made a difference. Participants noted that there should have been a 'children's group' represented at a high level in all inter-agency forums and meetings from the start – with a formal position and mandate. All issues regarding children, whether health or education and other, implies specific considerations to act on their behalf and with their best interest in mind.
- Recognise and remedy important data gaps. There were gaps in data, data standardisation and available evidence. Although the knowledge regarding cases, transmission and disease impact kept increasing, there was still a need for systematic knowledge regarding implemented measures, e.g. knowing how many schools were on red level or how many students were in quarantine each week, as well as data on student and teacher experiences in schools. Also, it proved impossible to conduct randomised controlled trials on the impact of targeted measures in schools, both on the effect on virus transmission and on students' general wellbeing and their learning.
- Recognise and remedy important gaps in capabilities. There was an urgent need expressed for more personnel and a better understanding of available supportive resources within organisations. Recruitment of competent experts was challenging in both the public health and education fields. Rapid growth of tasks and little time to sit down and better organise or reflect aggravated the situation. These factors generated stress and fatigue. Psychological support was lacking and at best, was late. Participants recalled that strong mutual solidarity, working together and pooling resources helped them to cope and stay resilient, despite intense stress and fatigue.

- Further boost coordination and collaboration. Participants generally lauded the ability of different organisations to work together, pool resources, and contribute their respective strengths to advice-making. However, such coordination and collaboration did not work equally well in every situation, and more could have been done. Remedies include several ways to further improve how different actors interact and find common purpose at local, regional, and the national levels, and between these levels.

With respect to good practice, participants from the national, regional, and municipal level contributed exemplary ways of working that they had developed and used. The AAR team identified four categories of these: 1) Data, analyses, and research outputs, 2) Organisation, 3) Collaboration, and 4) Communication.

Conclusion

Despite the official policy of prioritising children and adolescents, the advice-making process was influenced by different interpretations of what this prioritisation actually meant. One interpretation emphasised keeping children at home, protecting them (and their contacts) from infection, which led to a policy inclination toward closing schools or moving to the TLM's 'red' level (with distance learning) whenever new variants arrived. The other interpretation meant prioritising children by avoiding disruption of their everyday life, to a greater extent than was the case for the adult population. This included keeping the schools open as much as possible.

This AAR highlighted the challenge of bringing evidence to the decision-makers' table, despite robust data from a variety of sources, including expert groups, peer reviewed literature, modelling studies, anecdotal evidence, epidemiological registers and methods, contact tracing studies and educational and demographic surveys. The cumulative evidence supporting open schools was repeatedly called into question with each new mutation, and fear and risk avoidance led decision-makers and public perception back to the precautionary intervention of closing schools or 'red level' (with distance learning). Consequently, advice-making down the organisational chain was difficult and at times slow and seemingly inconsistent. Municipal medical officers sometimes had to convince local politicians and stakeholders not to implement stricter measures than required by national or municipal laws. In addition, advice given by national authorities to schools was not always actionable or constrained by national laws.

Four key, overall lessons emerged out of the AAR discussions:

- Give priority to children and related stakeholders as a separate focus-area in the outbreak response, organised across sectors, represented at high level and with a formal position and mandate;
- Important gaps in data should be recognised and filled;
- Important gaps in capabilities should be recognised and remedied;
- Coordination and collaboration should be further boosted.

Introduction

After-Action Reviews

After-Action Reviews serve as means for identifying best practice and areas for improvement for future health emergencies. An AAR is a country-led and country-owned initiative to conduct a qualitative review of actions taken to respond to an emergency with the purpose of identifying best practices, gaps and lessons learned [1,2]. Following an emergency response to a public health event, an AAR would identify what did and did not work well and how these practices can be maintained, improved, institutionalised, and shared with relevant stakeholders. AARs typically encompass a broad number of response dimensions which are investigated in a series of facilitated meetings with key stakeholders. Importantly, AARs are not evaluations and they do not seek to assign blame for suboptimal responses. Nor are they intended to assess individual performance or competency. Instead, they seek to identify learning opportunities and to contribute to the cycle of continuous quality improvement in emergency preparedness and response planning.

The World Health Organization (WHO) and the ECDC have developed guidance and methods for AARs across many different aspects of health emergencies [1-3]. Teasing out learning opportunities and lessons learned in the context of the COVID-19 responses appear particularly pertinent. As COVID-19 has developed into a long-running (or even endemic) health emergency, ECDC and WHO have developed Intra-Action Reviews [4] and In-Action Reviews [5] to ensure that important learnings and reflections can be undertaken while the emergency is still ongoing. An alternative approach to these interim AARs is to conduct an AAR on a particular aspect of the pandemic that is delimited both temporally and thematically. ECDC has referred to such an AAR as a focused AAR [5].

Focused After-Action Reviews on evidence-based decision-making

One important area for self-reflection and lessons learned was the role of evidence in advice-making processes during COVID-19 [6]. Advice-making encountered challenges in interpretating evidence and integrating it into the process, primarily due to uncertainty, time-pressure, and suboptimal guidelines and/or organisational structures [7,8]. Scientific evidence pertaining to the pandemic had also gone from being scarce in the initial phase to becoming so abundant a year later that it risked overburdening agencies with contradictory, non-contextual evidence of varying scientific quality [9,10]. An investigation of the intricacies of advice-making processes during such a complex and long pandemic demands a focused approach. Hence, in 2021, the ECDC commissioned and published a protocol for focused AARs aimed at understanding advice-making during the COVID-19 pandemic [5].

Focused AARs can shed light on advice-making processes underlying a particular decision (or group of decisions). The decision should ideally be both delimited temporarily and along sectoral lines. In the case of this AAR the decision concerned a non-pharmaceutical intervention that was decided on during a particular phase of the pandemic and pertained to schools.

Such a delimited case-study approach allows for in-depth explorations of a specific advice-making process and provides lessons for future health emergencies, both in-country and between countries. Importantly, the specific case functions as an entry-point into the review process and as an anchor for subsequent discussions, rather than a constraining factor in conversations with stakeholders. Participants in the AAR will often reflect on processes leading up to the specific decision, going back several months. The core methodology is to trace how key advice travels through and across relevant organisations as well as how it changes over time due to new evidence. This involves identifying and making explicit important external pressures (e.g. media, public, political, international, and so forth) on the advice-making process and gaining insight into any informal practices and networks (both within and between agencies) that affect the advice-making process.

The central question of the focused AAR is to determine the role of scientific evidence in the deliberations and decisions made by public health authorities in their process of developing policy advice. What types of evidence were available to public health experts when advising policymakers? What value and weight did public health experts place on different pieces of evidence? How did they adapt evidence to be applied to their own context? And, what happened when there was no conclusive scientific evidence available? Inspired by ECDC best practice for AARs, the findings of this focused AAR on evidence-based decision-making will be structured around three main sections:

- What happened and who was involved?
- What influenced the advice-making process?
- Why did the advice-making process turn out as it did?
- What should change and how can it be implemented?

To facilitate the use of AARs in European Union and European Economic Area (EU/EEA) countries, ECDC decided to conduct focused AARs on school interventions in Finland, Sweden, and Norway (this work is complemented by similarly oriented focused AARs on long-term care facilities in Norway and Georgia). In Finland and Sweden, the AARs focused on the advice-making process for school interventions from March through July 2020 in the initial stage of the pandemic, specifically the Alpha (November 2020–April 2021) and Omicron (December 2021–March 2022) phases. From these AARs we learned that initially, each new coronavirus variant renewed the scientific uncertainty and general anxiety and called for renewed consideration of restrictions on in-person schooling. In each of these later pandemic stages, each country's health and educational authorities were generally hesitant to recommend comprehensive closures of in-person schooling. The current report concerns the Norwegian experience on school interventions. In collaboration with the NIPH, the AAR was focused on the role of evidence in advice-making during the period from the summer of 2021, the Delta wave, and up until Omicron appeared during the winter of 2021–22 in secondary (13-15 years old) and upper secondary schools (16–18 years old).

Norwegian-focused AAR on advice-making for school continuity

In Norway, children's day-care and schools were closed during the first wave of the COVID-19 pandemic on 13 March 2020 and gradually re-opened under strict IPC measures from 20 April 2020. Concern about the impact of these closures on children and adolescent's wellbeing and educational progress led to a continuous effort to keep schools open during the remainder of the pandemic. In collaboration with stakeholders from the education sectors, an innovative Traffic Light Model (TLM) [11] was proposed by NIPH, adaptable to the local epidemiological situation and age group. Norwegian schools and preschools implemented the TLM and remained largely open throughout the pandemic, including in the second and third waves. In response to local outbreaks, schools generally only used short-term closures and distance learning was mainly used in secondary schools [11]. This Norwegian experience contrasts with many other countries, where school closures were more frequent and longer. Analysing the advice-making process during the focus period is particularly interesting because it showcases how, after the initial rush to respond to the pandemic in 2020, routine and collaborative preparedness and response systems dealt with new uncertainties and translated emerging evidence into advice that could support keeping schools as open as possible. Illuminating the use of evidence in this advice-making process is thus likely to produce useful lessons for future pandemic preparedness and response in educational settings and beyond.

Norwegian health emergency management structure

The Norwegian Ministry of Health and Care Services (Helse- og omsorgsdepartementet) was initially the central crisis management ministry for handling the pandemic. Later on, the Ministry of Justice and Public Security took over this responsibility. Norway, like most of the other Nordic countries, followed the responsibility principle where the same agencies that are responsible in normal times retain their responsibility during times of crises. Concretely, this meant that two expert agencies, the Norwegian Directorate of Health (Hdir) (Helsedirektoratet) and the Norwegian Institute of Public Health (NIPH) (Folkehelseinstituttet), were highly involved in the decision-making processes. The NIPH served mainly as a scientific epidemiological advice body while the Hdir is an executive agency authorised under the Ministry of Health and Care Services with several roles, including administration and interpretation of health legislation. The Hdir was delegated responsibility for coordinating the COVID-19 response in the beginning of 2020 with the authority to impose regulatory measures during the pandemic. NIPH was responsible for monitoring the epidemic situation and offering evidence-based advice about infection control to national, regional, and municipal authorities. Generally, requests for advice was sent from the Ministry of Health and Care Services to both Hdir and NIPH, depending on the topic. During crises, Hdir consolidates the response advice of both agencies, and hence, to some extent superseded NIPH in managing the COVID pandemic, although ultimately, the Ministry of Health and Care Services decided which advice to follow. Several studies point to substantial overlapping roles and authority between the two agencies in practice [12,13]. In the case of schools, the Ministry of Education and Research received advice from multiple sources, including Udir and Bufdir. Overall, Norwegian decision making through this system was seen as more leaning more towards balancing several political interests, rather than being purely science-based [12].

Norway's healthcare system is mostly decentralised to the country's more than 350 municipalities. Norway's Infection Control Act explicitly places infectious disease authority at the municipal level. Municipalities, therefore, have the authority to respond to a health crisis by implementing a range of local non-pharmaceutical measures. Municipal medical officers (kommuneoverleger) are responsible for the local pandemic preparedness systems in terms of monitoring, documenting, and managing the response. As such, municipalities have a substantial degree of freedom to implement stricter (or in a few cases, more lenient) measures than those recommended. This led to an overall pattern of varied, localised response interrupted by shorter periods of nationwide coherent government response [12]. Different areas in Norway therefore had significant disharmony in measures during COVID-19. Cities tended to have higher incidence rates and more outbreaks than smaller communities, and city populations were

therefore subject to longer periods of stricter measures. On the other hand, some local governments outside urban areas used their powers to exceed national guidelines on use of quarantines, closing schools etc. [12] .

Norway's educational management structure

Governance of the education system in Norway is shared between the central government, regional and local authorities. The Norwegian Ministry of Education and Research sets the goals and framework for kindergartens, primary and lower secondary schools, upper secondary schools, tertiary vocational education and higher education. The Norwegian Directorate for Education and Training is the executive agency for the Ministry of Education and Research. The Directorate is responsible for kindergartens, as well as primary and secondary education and has the overall responsibility for supervising kindergarten, education and the governance of the education sector. However, the Norwegian national assembly has adopted a decentralised administrative structure which delegates considerable authority and financial freedom of action to county governors and municipalities. This means that municipalities run primary and lower secondary schools and counties run upper secondary schools with much freedom. Block grants are given, and county and municipal authorities determine their activities according to existing legislation and regulations [14]. The Ministry of Education and Research emphasises the importance of placing local responsibility for didactical interpretation and adaptation with the school owner, in accordance with the Education Act and national regulations. Norway has generous funding at all levels of the education system. Public education is free, except at kindergartens where parents pay fees. Expenditure on education institutions as a percentage of GDP (for all educational levels combined) is one of the highest among OECD countries [15].

Definitions

This focused AAR makes use of two key concepts that require clarification upfront: (i) the advice-making process and (ii) the extent to which advice-making is evidence-based.

School closures

School closures in this AAR is understood as a closure of schools for in-person teaching for most classes with exceptions for children with special needs or where the parents were needed as part of the workforce. As distance learning was possible and used often, school closures did not mean discontinuing teaching or completely closing school premises for all students. In the Norwegian context, the red level in the TLM was an alternative to school closures. The red level had flexibility and used reduced physical presence, especially for older students, rather than complete closures of in-person learning (see Figure 2 below).

Advice-making process

Providing advice entails taking decisions on the best course of action and communicating them to the right stakeholders. Advice can be guided by individual experience and intuition, or it can be the result of a deliberative decision-making process among several people with the purpose of gathering and analysing information about different potential responses and then recommending and communicating a subset of those responses to policy makers. The advice-making process referred to in this AAR concerns the latter.

Formalised advice-making processes builds on organisational structures and practice that shape deliberations and influence what advice is considered and how it is addressed [16-18]. Advice-making also encompasses decisions relating to internal resource allocations, staff management, communication, implementation considerations and so forth. During the COVID-19 pandemic, experts from national and international public health agencies were typically highly involved in the deliberative advice-making processes that inform policy. However, advice-making is different from policymaking in that it only constitutes the first stage of the decision-making process that ultimately results in policy.

Evidence-based

One of the key properties of advice-making is that it is evidence-based or -informed [19]. Evidence in this context refers to scientific evidence that adheres 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 [20]. The body of scientific evidence, therefore, will mostly consist of systematically gathered data, reports produced and validated by expert-agencies and peer-reviewed scholarly publications both nationally and internationally. 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, which could be observed clearly during the COVID-19 pandemic [21,22].

Other than using scientific evidence, the advice-making process can also draw on experience-based evidence [23], sometimes referred to as 'implementation-based evidence' [24] or 'ecological evidence' [25]. 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. Experience-based evidence could come from implementing agencies that would be able to provide an assessment of the current situation and

feedback on how the given advice works in practice. The advantage of making decisions using experience-based evidence during health emergencies is the pace by which the evidence can be collected and interpreted.

What constitutes pertinent scientific evidence changes and shifts over time and is shaped by relationships between experts 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 [18,26,27]. The interpretation of evidence is not only inherent to the scientific process, but also to the advice-making process, wherein identical pieces of scientific evidence in similar contexts can result in very different advice [18,28]. The underlying ideational and bureaucratic differences can create variations in how health experts produce advice during COVID-19 [16,29-31]. Importantly, therefore, even the best evidence can produce suboptimal advice under flawed advice-making processes.

AAR process and data sources

This section describes each step in the AAR process. The primary component of this AAR was an in-country visit. It consisted of a two-day consultative workshop and seven semi-structured interviews. The workshop had sixteen participants and seven complementary interviews were conducted. The text in this report refers to all informants as 'review participants'. All review participants were informed of the purpose of the AAR and signed informed consent forms (see ethical considerations). The AAR team recorded and transcribed workshop conversations and interviews and only took notes for use in the analyses in this report. For the sake of eliciting candour, participation happened under the condition of anonymity, meaning that quotes, paraphrasing, and summaries of participants' recollections and viewpoints are not attributed to any named individual.

Preparation

In preparation for the workshop, key representatives from NIPH met online with ECDC staff and AIGHD consultants on 23 September and 10 October, 2022. The meetings included discussion of the purpose and focus of the AAR, scheduling for the country visit, agreement on the format and scope of the workshop, and exchange of key documents of relevance to the advice-making process concerning school closures. Fourteen secondary sources were consulted in preparation for the country visit, shown in Annex 1.

In-country visit

Consultative workshop

The participatory consultation is the core activity of the AAR. It is a two-day workshop aimed at discussing the use of evidence in the advice-making process with key staff of the agencies who were involved in the recommendations relevant for the continued operation of schools during the period of study. The two-day consultative workshop took place on 25 and 26 January 2023, with participation from key NIPH staff (five participants), the Norwegian Directorate for Education and Training (Udir) (one participant), municipal medical officers from the Oslo, Lillestrøm and Bærum municipalities (three participants), the Norwegian Directorate of Health (Hdir) (two participants), and the Education Directorate at the County Governor of Oslo and Viken (*Statsforvalteren*) (one participant). The workshop was facilitated by two consultants from AIGHD and attended by two ECDC staff. A third consultant from AIGHD took notes. Henceforth, the AIGHD consultants and the ECDC staff are referred to as the 'AAR team.' The workshop took place in the NIPH office in Oslo.

The agenda for the consultative workshop is attached in Annex 2. The first day of the workshop focused on agreeing on a timeline of events; mapping out who was involved in the advice-making process and in what capacity; as well as discussing why the advice-making processes unfolded as it did with a focus on the use of evidence. The purpose was to reflect on how evidence influenced the advice-giving decision-making process as well as what evidence was available and how it was used (or not used). The second day focused on reflecting how people made sense of the situation and identifying and discussing major lessons about the use of evidence during key advice-making processes relevant for schools. The consultative workshop was guided by specific theoretical tools and methods, most notably the Evidence-Based Public Health framework (see analytical approach). On 27 January the consultants presented a hot debrief with broad-based participation from relevant stakeholders invited by the NIPH.

Interviews

The AAR team conducted a total of seven interviews with stakeholder representatives. Interviewees were identified and scheduled by NIPH. The interviews were semi-structured and open-ended, allowing them to cover comparable themes while also leaving room to pursue specific issues raised during the conversations. The interview guide is shown in Annex 3. One interview was conducted face-to-face at the NIPH office in Oslo. The rest were conducted online. Each interview took about 45 minutes. The seven interviewees included representatives from the School Student Union of Norway (*Elevorganisasjonen*), Directorate for Education and Training (Udir), Directorate of children, adolescents, and family (Bufdir) and the Norwegian Ombudsperson for Children (*Barneombudet*), and three further interviews with NIPH staff, including communications, the COVID-19 leader group, and the test trace isolation quarantine group.

Analytical approach

The data collected through the consultative workshop and interviews seeks to inform the advice-making process surrounding school interventions and derive lessons. Some key theoretical and methodological tools and techniques were used when gathering and interpreting the data. The interviews were semi-structured and relied on an interview guide.

The consultative workshop made use of a combination of written questions as well as select statements from academic papers, guidelines, or risk assessments that were used to facilitate the discussions. In collaboration with participants, the AAR team developed a timeline that was subsequently used as a point of reference during the remainder of the workshop. This established a common understanding of key events. Participants were also asked to draw ego-centric stakeholder maps illustrating the most important actors in the advice-given process on school closures. This included reflecting on actors that they thought had been missing in the process. This exercise both helped to visualise important interrelationships on the spot but was also used for a more thorough aggregate mapping exercise presented in this report (see Stakeholder Mapping).

The discussion of evidence was guided by a simplified version of the Evidence-Based Public Health framework [32], illustrated in Figure 1 below.

Figure 1. Evidence-Based Public Health framework

Based on Satterfield et al. (2009)

The advice-making process is assumed to be shaped by:

- the availability of best available scientific evidence (what type of evidence is used and how is it interpreted?);
- the state of crisis communication both internally in the emergency management system but also externally towards the public;
- the organisational capabilities and resources of advice-making and implementing bodies.

The framework was useful in encouraging participants to think through their advice-making process as dependent not only on evidence but also on other important external factors. In short, the framework embeds the advice-making process in a larger socio-political environment. The framework, with its three overlapping factors, is used to structure the section on the advice-making process (see 'The advice-making process'-section).

Reporting

Reporting on key preliminary findings was done on a continuous basis during the visit, especially through the hot debriefing on 27 January. The present report has been subject to internal feedback and approval from ECDC and NIPH. Stakeholders participating in the AAR were also given the opportunity to read the report and provide feedback.

Ethical considerations

Written informed consent was obtained from all respondents. The informed consent form is included in Annex 4. The objective of the AAR was explained to the interviewees and workshop participants, and they were assured of their right to withdraw from the interview/workshop discussion at any time. Unless respondents explicitly confirmed in writing that they were willing to go on record, they remained anonymous in the reporting. Anonymity was pursued for all interviewees, and where it was not possible (due to easily identifying traits) the interviewees were explicitly made aware of this. All interview and field note materials were stored securely in AIGHD in compliance with Regulation (EC) No 45/2001 on the storage of personal data and ensuring citizens' privacy. Only the AAR team had access to it and any recording were deleted prior to the publication of this report.

Timeline of events

A summary of selected pieces of advice recalled by participants in the consultative workshop is shown in Annex 5. This Annex is not a complete review of all advice given but based on recall during the workshop through interactive remembering of events. In the following, a narrative overview will be provided on the history of advice giving during this period, based on data collected from the consultative workshop, interviews, and documents reviewed.

Initial closing of schools

As part of Norway's national lockdown in the first wave of COVID, all schools closed their in-person learning and moved to distance learning from 13 March to 20 April 2020[i]. In-person learning remained in place for children of healthcare personnel and those with other critical societal functions, and for children with special educational needs [33]. The Infection Control Act served as the legal basis for the school lockdown. The main argument for the lockdown was to stop the spread of the novel virus. At the time, no cost-benefit analyses were available to assess other impacts of intervention. However, the Holden reports estimated the economic cost of interventions that were implemented in society [34]. Their first report was published in April 2020 and concluded that the cost of closing schools was high in terms of parents not being able to work. The report did not look into long term costs on what this could mean for children's education and wellbeing.

On 27 March 2020, a temporary Corona law [35] was passed, granting the government power to make response decisions without involving parliament. This temporarily shifted legislative power to the government [33]. At the end of May, this law was replaced by a new temporary law to reduce the consequences of COVID-19 in schools and kindergartens [36]. The underlying rule was to offer education to all. If the schools were closed and they could not get an offer at school, they were entitled to get education at home. The schools' approach to education at home was primarily through digital means, which was possible, to a large degree, in Norway, due to a well-developed digital infrastructure. Parents in high-risk groups could also apply for an allowance to homeschool children if needed.

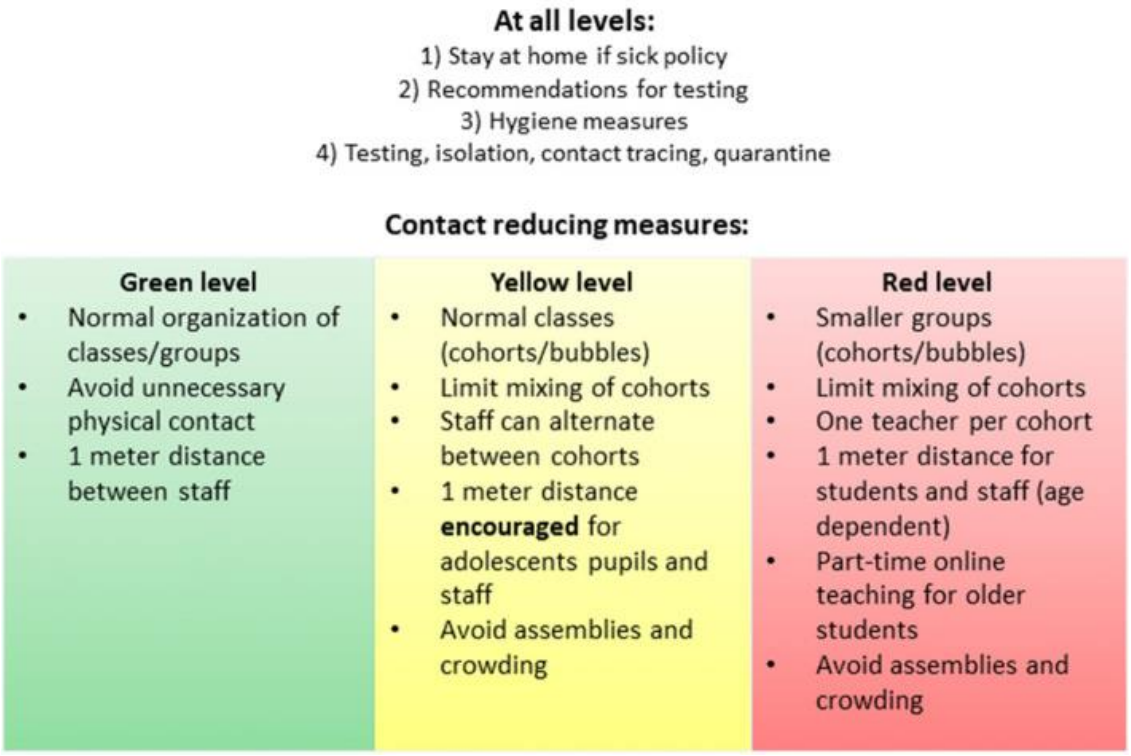
During this period, the Directorate of Youth, Families and Children (Bufdir) had started to lead a coordination group on COVID-19 issues for vulnerable children. The Ministry of Children and Families (*Barne- og familiedepartementet*) established the group in April 2020, with members from all directorates working with vulnerable children, including Bufdir, Udir, Hdir, NIPH as well as immigration services and the police [37]. The group monitored accessibility, referrals and the number of consultations for different health and social services for children and adolescents. Initially, they focused on vulnerable groups, but as the pandemic went into the second and third year, all children were regarded as potentially vulnerable, due to the duration of the pandemic and the burden of prolonged infection control measures. The group provided regular information about the situation for child welfare, and the first report was published on 20 April 2020. This supported and advised the re-opening of schools for all age groups as quickly as possible, and implement hygiene and other infection control measures in their facilities in order for them to remain open. The report was delivered to the coordinating body at Hdir and the Ministry of Children and Families. The group published 14 subsequent reports through the pandemic.

[i] Daycare and kindergartens reopened on 20 April, grade 1–4 reopened 27 April, grade 5 upward 11 May 2020 (after publication of 2. revision of the school IPC guidelines)

Development and implementation of the Traffic Light Model

During this period, more intense cooperation started between NIPH and Udir based on a shared concern and requested advice from the MOES regarding what could be done to safely keep schools open. As a result of this collaboration, the intersectoral 'school group' emerged. In May 2020, the legal changes, with a new law replacing the Corona law, became the basis for the NIPH school group to propose the use of a flexible Traffic Light Model (TLM), adaptable to the local epidemiological situation and to different age groups. The model is shown below in Figure 2 [11]. The advice was to assess proportionality locally rather than in one national rule, abandon incidence in the entire age group as a primary indicator, and consider including other indicators to measure impact. The model was first implemented in June 2020, when all schools had to operate on the yellow level as a minimum. However, many schools in Norway operated on the red TLM level with smaller cohorts and more comprehensive mitigation measures for the remainder of the school year [38].

Figure 2. Traffic Light Model



Source: Stebbings et al., 2022

Building the case for a regular testing strategy

Alongside the TLM model, the NIPH also started to work on the idea that frequent testing could be extremely beneficial for keeping schools open. Initially, PCR-testing in Norway was primarily available to symptomatic cases and healthcare personnel [39]. However, the testing capacity was rapidly increased and PCR tests soon became accessible to anyone through local municipal test stations, leading to increased testing rates as infections rose from August 2020. NIPH explored different testing strategies throughout the summer and autumn of 2020, as alternatives to physical distancing measures. At the time, evidence on testing effectiveness was still weak and many different rumours were circulating on social media.

Suggested test strategies included: a) testing symptomatic children; b) testing close contacts, to substitute for quarantine; and c) regular mass testing with PCR or antigen tests at certain indications. Following this, the NIPH TISK group in December 2020, issued a document advising exploration and use of testing as an alternative to quarantine and other contact reducing measures, such as limiting school attendance. The group also recommended increased use of antigen tests when PCR capacity was low. However, review participants noted that this advice was not practical at many times during the pandemic due to a lack of testing capacity nationwide. In the spring of 2021, different testing techniques were trialled (e.g. PCR on saliva samples and pooled nasal samples, antigen testing in and outside schools, professional testing, supervised - and unsupervised self-testing).

One COVID-19 case in a class usually led to the entire class having to quarantine, according to the TISK strategy. The burden of quarantine seemed disproportional to the burden of disease in these groups. By 25 May, the school group presented a strategy for the downscaling of TISK and reaching a green light on the TLM, for both the TISK steering committee and the outbreak response council at Hdir. Two alternatives for downscaling of TISK were presented:

- Contacts of a COVID-19 positive individual should stay home only if they get symptoms;
- Replace TISK with TIST, where the added 'T' signifies testing close contacts instead of quarantining them.

This advice was followed by constant discussions, especially about the lack of tests, which should be free of charge and distributed by the municipalities. It was noted in the workshop that many teachers were sceptical about the idea of regular testing. There were concerns about the risk reducing effect of the testing strategies, and if this would imply increased risk of infection and/or having to quarantine/isolate for long periods. In addition, they worried they would have to use their time on testing assistance rather than teaching. However, despite these concerns, the NIPH issued the general advice in late spring 2021 that frequent testing of students was a better tool for limiting transmission than limiting school attendance. On 27 May Hdir advised that schools with regular testing would be able to go to the green level[ii].

Because of the uncertainty regarding the availability of antigen tests internationally, NIPH and HDIR recommended using methods and infrastructure for PCR on pooling of nasal samples in all Norwegian health regions. This recommendation was not followed up by the government.

In the summer of 2021**,** the TISK group used data from a pilot study of frequent testing at several schools in Oslo to model the strategy. It concluded that regularly testing children in schools was feasible, especially for secondary school students. The argument was that frequent testing could be substitute for school closures; as by rapidly finding those infected and isolating them, infection wouldn't spread, and schools wouldn't be sites for transmission. This effect would increase as the testing regime stayed in place. As an NIPH participant recalled:

> 'We did not have real-world data for how effective it was. But we could see that this was possible and based on our modelling and available literature, it was likely to be better than closing schools.' (NIPH participant).

The underlying aim of keeping schools open using this strategy was further substantiated by a report in June 2021 by the County Governors educational secretariat. This 'Parr report' summarised findings from the many reports produced by the Bufdir group on vulnerable children, complemented by consultations with several groups and children in high schools and student unions [40]. These results informed policy making, as Bufdir, Udir, and eventually also Hdir, advised their ministries to replace quarantines with a testing regime and go to green light after the summer (unless there were high transmissions locally). At the municipal level, medical officers advised prioritising the vaccination of teachers, regular testing (twice per week) in case of increased incidence rates and abandoning the TLM.

Delta variant, post summer-infections, and shortage of tests

On 3 September 2021, ECDC reclassified the Alpha variant from a variant of concern to a de-escalated variant, due to its limited impact on vaccine-induced immunity and the drastically reduced circulation following the emergence of the Delta variant (B.1.617.2) [41]. The Delta variant established itself in Norway, during the summer when schools were closed for the school holiday. By August 2021, the adult population had largely been vaccinated. Unvaccinated adolescents in secondary and upper secondary school had the highest infection rates at this time, and the incidence rates rapidly increased when schools reopened. The senior year high school-students were vaccinated along with the adult population above 18 years, i.e. mainly before the start of the school year. Recommendations to vaccinate adolescents aged 16-17 years came in June 2021 and was delivered to the Ministry of Health and Care Services at the same time as the first reports of mRNA-vaccine induced myocarditis in young adult males was being reported, which resulted in a delayed implementation of the recommendation and a renewed evaluation and recommendation in August 2021. In addition, there was a lack of vaccines and therefore, vaccination was slightly delayed compared to some other countries and started at the beginning of September. This meant that prioritising low risk groups like adolescents would mean that other groups of adults which had a slightly higher risk would have to be postponed.

In early autumn 2021, the NIPH TISK group responded by reaffirming its advice to test children in schools frequently using antigen tests, instead of more invasive school measures and the use of quarantine. Home testing was considered the best method to limit spread until the adult population was completely vaccinated. However, the problem was that municipalities did not have sufficient access to self-tests, and PCR tests required more resources

ii Experiences from the spring were formalised into a report published in November 2021. See: https://www.fhi.no/globalassets/dokumenterfiler/rapporter/2021/jevnlig-testing-var-2021.pdf

than were available. Participants from municipalities noted that this was a difficult situation for them. They communicated with NIPH to argue that this advice needed to be adjusted according to the test supply situation. Some municipalities tried to buy tests in the open market. Sharing was also challenging:

> 'We were asked to distribute tests between municipalities, but we never knew when we were going to be hit. '

Schools had opened at the green level after summer (for the first time since the beginning of the pandemic). However, many municipalities soon went to the yellow level as a result of increasing infection rates due to the new mutation and limited testing capacity. Similarly, the agreement made during the summer when the Ministry of Heath decided to follow the advice from NIPH and Hdir to test, was no longer relevant, as the lack of tests rendered the advice to test school students impossible to follow. New advice had to be worked out according to this situation. This shifting advice was difficult and frustrating for all parties; both NIPH, municipal public health officers, school personnel and students.

> 'We had to come again with new advice. The tests were not available. The municipal doctors could not handle all the testing because the advice came too late [to prepare sufficient testing capacity]. It was a total chaos. '

Despite this, this period appears relatively short lived. Later in the autumn of 2021, the NIPH testing group reviewed whether testing was implementable and concluded that despite reports of difficulties, adherence to testing was still quite high and the strategy was accepted.

During the autumn period, the school group advised a return to normal operations for schools and kindergartens (only basic IPC measures), the use of the TLM only by local authorities for local outbreaks and using antigen testing rather than limiting access to physical presence at school.

Moreover, analysed data from late 2020 showed how many teachers were infected compared to other professions, like bartenders and drivers [42].

> 'We saw that more teachers were infected in Oslo than in other areas [compared to similar public professions], but overall, at the national level [infection rates in different professions were] almost the same and it showed that the risk was not higher for teachers than other groups. '

However, the new information did not seem to reach teachers or the public. Even though the results were shared directly with the teachers' organisations, they did not seem to believe the results were correct. Many remained worried about infections.

Omicron variant: increased uncertainty again

The Omicron (B.1.1.529) variant of SARS-CoV-2 was first reported to the NIPH on 30 November 2021, notified by a local laboratory in Oslo after a case emerged resulting from a local Christmas party. On 7 December the government mandated the TLM to be reintroduced nationally.

> 'Our modelling showed that Omicron would be severe, and it would be very difficult to stop. At that time, we did not know what the public effect would be. We did know that it was a milder infection. We wanted to stay on the safe side. However, already in January we knew that Omicron was mild and not harmful to the vast majority of children. ' (NIPH review participant)

Although most agreed that the Omicron wave would be severe in terms of numbers, the sentiment that it would be severe in terms of severe disease and death, and the wish to stay on the safe side, was not shared by all NIPH personnel involved. However, the level of fear and trust in the modelling report was high among many, both at NIPH and in the government.

During this period, the Udir actively advised Ministry of Education and Research, including letters sent on the 10 and 11 December, advising them not to implement the red level as a countrywide measure. Local needs varied considerably, and it did not seem proportionate to put all schools on red in the entire country.

Public and political anxiety and scientific uncertainty about the impact of this new mutation also led to the discussion to start the Christmas holiday early so to avoid quarantine and the spread of infection at Christmas, which some municipalities decided to do. There was also a push to close schools in many municipalities.

The NIPH school group and Udir argued strongly against both school closures and starting the holiday early. Based on the importance of keeping children in school as much as possible and the increasing observations that the Omicron variant caused very few severe infections in children, they advised to use the yellow light level nationally for all grades, and only local use the red level if needed. They also referred to the recent vaccination and low infection rates among adolescents in secondary schools to emphasise it was unnecessary to put secondary schools at the red level.

With most adults vaccinated and hence reduced risk of severe disease, the argument for reducing transmission among children to protect the adults from getting infected did not seem valid anymore. The advice was given formally in an assignment from NIPH and Hdir on 13 Dec 13 2021 [43].

On 16 Dec 2021, the government issued the policy to implement the yellow level for all grades 1-10 nationally, and the red level for grades 11-13. In addition, the pupils should be tested before returning to school after Christmas holiday.

In addition, in schools that considered moving to the red level, regular testing and a lower TLM-level was recommended as a preferred alternative. This only applied to schools with a high number of COVID-cases and where the local situation was dire with high infection rates and a high burden on the healthcare system. The NIPH advised to shield the youngest pupils from testing as long as possible and rather test teachers or parents if necessary. A school group participant noted:

> 'We were not worried about the infections anymore, but it was trying to avoid school closure that became the aim of the testing strategy '.

Overall, the sentiment to keep schools away from the red level was shared by all participants in the workshop. However, despite this, the government still moved to red level for upper secondary schools. According to school group participants, 'fear overrode everything that we were advising. '

In principle, the red level in the TLM should not imply a complete lock-down, but in the end, it was up to local municipalities to implement and adapt the measures. Participants noted that overall, a red level technically meant that a lot of schools had to close due to limited classroom and staff capacities. Furthermore, new rules for quarantine for teachers meant they had to quarantine if they had been in close contact with a case, even though they were vaccinated. Many teachers in quarantine further strained the schools' capacity. At the municipalities this advice had to be weighed against local spikes in infections at individual schools.

> 'For some municipalities and for some single schools it was very difficult [to run the school without staff present], and we had dialogue with these municipalities, and we supported their decision to close. '

One of the arguments made by the County Governor was also that because of the legal right to education, keeping children at home during Christmas meant having to keep them longer in school in the summer. Some municipalities bypassed this by providing online teaching, which formally meant they were not closed, and hence did not have to substitute lost days.

After the Christmas holidays, the infection rates went up, likely driven by increased socialisation during the period. Based on growing evidence for the low impact of the new mutation, on 13 Jan. 2022 the government opened school for grades 11-13 nationally to resume on the green level. In January 2022, the NIPH advised to let teachers test rather than quarantine, remove social distancing measures in schools at all levels (green light in TLM), and test only symptomatic cases. The impact of the measures was seen as high and emotional. A NIPH participant noted:

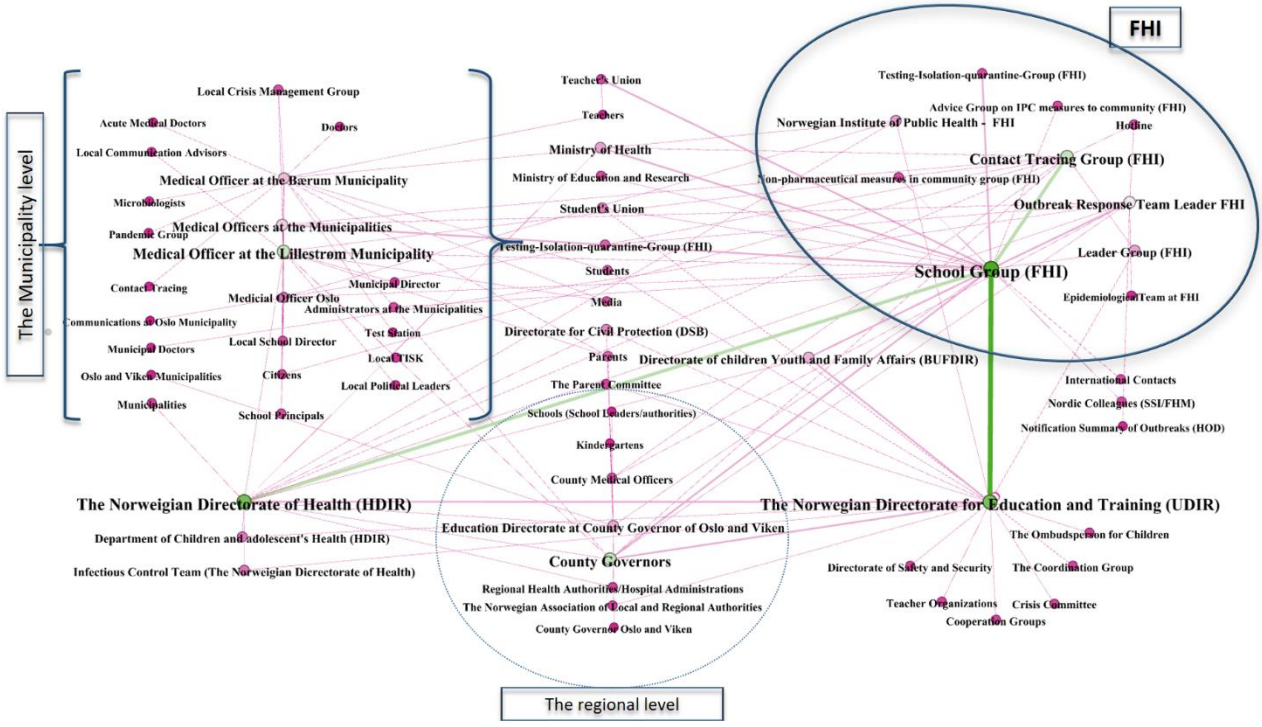
> 'It was the hardest period for me. As a public health physician, my aim is to reduce public harm and increase public health. We had long realized that some of the restrictive measures were harmful to children. '

On 12 February 2022, the government changed policy by lifting all school measures nationally as part of the lifting of all measures in society overall.

Stakeholder mapping

To map their contacts, each workshop participant drew an ego-network map of organisations that they had interacted with during the focused-phases. The ego-network map that participants were asked to draw puts the person at the centre, related organisations in the periphery, and lines connecting the person to the organisations. This exercised yielded 11 individual's networks, where they identified 66 nodes and 108 edges (connections), shown in Figure 3.

Figure 3. Representation of the advice-making network as reported by 11 workshop participants



Node sizes represent their importance in the network (in-between centrality/degree centrality), as indicated by the number of mentions of nodes by workshop participants. The colours of the nodes represent whether they were mentioned often (green) or rarely (purple). The thickness of the line between the nodes represents the number of connections between the two nodes. Note: FHI = NIPH

To analyse these data, the Gephi analytical programme was used to create a combined stakeholder social network visualisation based on all the individually drawn ego-network of participating members of the workshop. The undirected network visualisation represents an approximation of the interactions amongst different actors. It is important to realise the time restraints of the exercise and hindsight biases in the visualisation presented above.

Degree Centrality measures the importance of each node in relation to the number of connections that they have in the network. School Group (NIPH), The Norwegian Directorate of Health (HDIR) and The Norwegian Directorate of Education and Training (UDIR) and County Governors respectively are the most mentioned nodes in the network. If FHI (NIPH) is put in one Node, then it is the most important node in terms of connection for the entire network (in-betweenness) and in terms of being the most mentioned node (Degree Centrality). A strong connection between FHI, UDIR and HDIR is evident during the advice-making process, where the bulk of the connection is established between the NIPH School Group and UDIR.

There are three levels of community groups (national, the regional and the municipality). The municipality level has a high number of individual nodes connected to it from the local level, but it is obvious from the analysis that the municipality level, despite being connected to NIPH, county governors, UDIR and HDIR, is still not as strongly connected to the regional and national level as the national level organisations are connected amongst themselves.

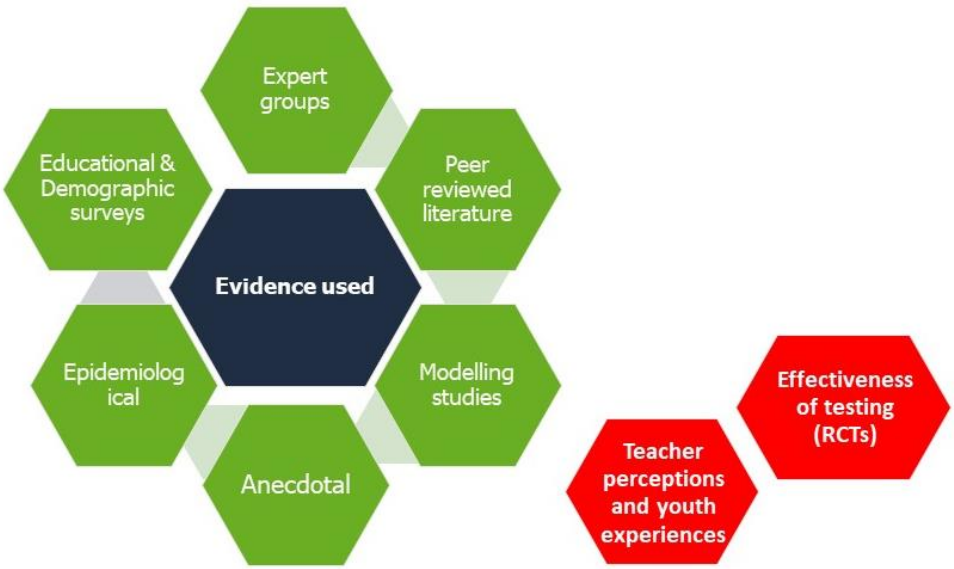
Advice-making process

This section discusses the major factors that shaped the advice-making processes, and it is structured around four main categories. Developing this description of the process began from the Evidence-Based Public Health framework introduced to workshop participants to inspire their discussion (Figure 1). Through the discussion and review of the available materials, the AAR team was able to identify four categories of influential factors. As anticipated in the Evidence-Based Public Health framework, the first category relates to the collection and interpretation of **evidence**. Here, the focus is on what evidence was used (and what was lacking), and how the evidence was integrated into the advice-making process. The second category is **dilemmas and values.** This category emerged during the workshop because participants repeatedly and frequently emphasised how values had to be negotiated and settled in advice-making, and how such dilemmas persistently shaped their advice-making. The third category, also anticipated in the Evidence-Based Public Health framework, is **communication and coordination**: how the advice was communicated to the public at large, to school practitioners and associations and regional health authorities, and inside and between agencies and institutions. The fourth identified category of factors shaping advice-making is combinations of **capabilities and resources**. Such factors mattered at all levels of the advice-making process and had consequences for how advice could be developed and implemented.

Evidence used in the advice-making process

As indicated in the timeline, the period of analyses shows the use of various forms of evidence emerging at different moments, used by different agencies involved for their advice-making. Based on the discussions in the workshop and interviews we have categorised evidence in several broad categories, shown in Figure 4 below.

Figure 4. Evidence perceived to be used (green) and missing (red) during the advice-making process



Expert groups

A very important source of information was expert groups. Broadly we can distinguish two such groups: on the one hand, professional experts were consulted as reference groups by advice-makers. One example is the Norwegian Pediatric Association. Another, less visible example are school nurses or the public health nurse organisation, which from time to time provided information to the NIPH school group. Another form of expert groups were experts in various fields, i.e. public health epidemiology or education, who were brought together early in the pandemic to address specific crisis topics. These groups not only bring years of experience working in their respective fields but based on this experience also obtained specific roles in amassing and interpreting data and information, forming an increasing ad-hoc expertise along the way. A clear example of this is the intersectoral school group itself, which includes actors form several agencies in the education domain, or the expert subgroups in NIPH, such as the NIPH school group and the NIPH TISK group (test, isolation, and quarantine). These groups gave advice to the NIPH leader group that eventually finalised the advice to the Hdir and the Ministry of Health and Care Services.

Similarly, Udir brought together an expert group on reopening schools by instruction of the Ministry of Education. Bufdir coordinated a broadly represented intersectorial group to assess the impact of measures in schools and leisure activities on children, called 'the coordination group for vulnerable children'. The coordination group started out focusing on vulnerable children, but later in the pandemic their mandate was widened to view all children as potentially vulnerable due to the duration of the pandemic and implemented measures. What we see here is a nesting of advice layers, and the development of expertise during crisis time.

Peer reviewed literature

Advice-makers also used peer-reviewed literature. At the NIPH, systematic reviews were conducted to see how COVID-19 had affected children and to what extent they were spreading the virus. As evidence grew and systematic reviews were conducted by others, these were consulted. An important database frequently consulted was from the Canadian McMaster University[iii] [44] as well as ECDC risk assessments on COVID-19 in children and the role of school settings in transmission (at a later phase) [45]. In the early pandemic stages, the school group was focused on trying to systematically gather information but found that the few studies that were published had different conclusions depending on their methods and context, and that some of the published articles were not of good scientific quality. It was emphasised several times that much of the international data was inconsistent with the Norwegian context, and hence, of limited value for developing national advice. This also included reports from WHO and ECDC that were often perceived to be too generic. Later in the pandemic, the scarcity of literature was replaced by a deluge of articles, of which many were not peer-reviewed (pre-publications).

Modelling studies

Using epidemiological or other data, many countries including Norway tried to model scenarios to predict the effects of measures and strategies. Some early modelling studies came from the United States and United Kingdom. The NIPH itself developed models based on basic data collected in the field, including saliva samples. This formed a first basis for arguing that regular testing was feasible for school children, especially secondary school students, although data on its effectiveness was missing. There were also socio-economic modelling studies, such as the Holden cost-benefit analyses. These reports were used by NIPH because cost-benefit analyses of specific measures were lacking.

It was noted that modelling studies as evidence was challenging. While it had a very high impact amongst politicians, the uncertainties were not sufficiently considered, and models were often interpreted as risk assessments. For example, there were several modelling studies from Imperial College, London (UK) that implied, amongst other things, that closing schools could reduce community transmission of the COVID-19 when it was added to other social distancing measures. The assumption in this model was that children and adults transmitted the virus to the same degree. However, evidence from transmission studies did not support this, but rather showed that children transmitted the disease to a lesser extent than adults. Still, the main interpretation among some leaders was that letting children attend school would add to community transmission, even though the authors of the study noted that school closure would have less impact than other infection prevention measures and did not evaluate what the effect was of schools that had implemented infection prevention measures. Participants noted that,

> 'when the big modelling studies showed that [COVID] is going to have a huge impact if you don't close schools, even though we tried to criticize the model, it still impacted the advice provided.'

Anecdotal evidence

This type of evidence is based on personal experience or observation, often collected in a casual or non-systematic manner from individual accounts. Several forms of anecdotes existed. On the more systematic side, municipal medical doctors noted that they had weekly and even daily contact with school directors and communal leaders:

> 'We had weekly meetings with all the principals or the leaders of municipalities. They were very much incorporated in the local advice-giving. I had a couple of meetings with the schools and teachers when there were a lot of concerns at specific schools. But we did not have the chance to speak to all teachers'.

Furthermore, every municipal medical officer had close contact with NIPH. According to NIPH participants,

> 'we had a really tight dialogue about what was happening. We had a good sense of what was going on at schools. We knew all of these people in charge. We also had different meetings at these settings.'

[iii] See also the Norwegian summary: https://www.fhi.no/publ/2020/risiko-for-smitte-av-covid-19-pa-skoler-og-i-barnehager/

In addition, municipalities received email and calls from a lot of parents every day:

> 'Our role is publicly available. We got 150 to 200 e-mails coming up every day!'

Municipalities in turn forwarded this information further up the chain through their weekly interactions with county governors, or regional level administration, including some deeper dialogue with chosen municipalities. In this way, anecdotal information from schools, teachers and students came from counties to Udir.

Epidemiological

The NIPH health registry included several sources of information, including the national emergency preparedness register (Beredt C-19), the Norwegian Surveillance System for Communicable Diseases (MSIS), the National Population Register, and the national outbreak alert system (VESUV). Registry data were also coupled with contact tracing data at the municipal level, including schools [11]. The municipal medical officers were responsible for collecting contact tracing data in their respective municipalities.

> 'We had conversations at the individual level. We would trace individuals that had infections from, for example, their aunt and then more students would be infected in that class. So that is how we tracked. Most of the students were not infected in school but were infected outside school. It was an excel [spread sheet]. We had a team of contact tracers who did all the individual tracing and then we would put them in one sheet.'

Contact tracing studies

The NIPH led a contact tracing study in schools called, 'The Corona Child Study', where children who had been to school during the infective period were included, and children and staff in the same cohort were tested twice to evaluate the secondary attack rate [38,46]. The two studies from this contact tracing study were from 2020-2021 (Wuhan- and Alpha-variant periods). They showed that the secondary attack rate among pupils and staff in school was very low. The evidence from these studies was used actively in advice-making, but it was difficult to achieve acceptance for the results, especially with the arrival of each new variant.

Educational and demographic surveys

A final broad class of evidence includes educational and demographic surveys. On the education side, the Udir conducted public surveys, addressing school leaders, school owners and teachers etc. with questions about COVID-19. This was used in advice-making and reflected in the Education Mirror. The Education Mirror is the Directorate's annual publication including statistics and research about the kindergarten, primary, and secondary education sector [47]. Another source of information is the national student survey, which although not directly referenced in the workshop, was mentioned as an important source of information for the student association. In addition to these data sources, evidence came from surveys done by different academic institutions. One of these was the UNGdata cross-national data collection scheme (Oslo Metropolitan University), designed to conduct youth surveys at the municipal level in Norway [48]. Another evaluated information about public trust in the 'Pandemic rhetoric' research project (University of Oslo) [49].

Relevant evidence lacking from the advice-making process

Workshop participants pointed to two additional types of evidence that would have been beneficial to have in the advice-making process:

First, despite the anecdotal evidence collected from school directors and other stakeholders, there was a lack of knowledge regarding the student and teacher experiences in schools. At the Hdir, it was noted that it was difficult to understand the problems at school level. More systematic feedback from schools would have been helpful, in particular on the practicalities. For instance, we lack information about the actual, local use of distance learning. It was noted by one review participant that while the idea behind closing the cafeteria was to avoid students sitting close together, the result was that they all sat close together in the hallways. However, these concrete, practical challenges were not sufficiently picked up at higher levels of advice-making.

The Minister for Education held regular 'COVID-19 follow-up' meetings with Udir teachers' unions, student unions and other relevant stakeholders. The NIPH school group was invited to present the current knowledge on the COVID-situation, transmission in schools and infection rates among staff. The NIPH was also invited to answer questions from teachers, students and parents through webinars and other means (meetings, video messages, Q&A sessions etc.) in different teachers' unions. However, while some were vocal and easily reachable, it was difficult to connect with less vocal students, sometimes with less resources and possibly more vulnerable. Thus, the feedback from students was likely unbalanced. Interestingly, students themselves seemed to see their participation in meetings at the Ministry of Education and Research Ministry of Education and Research during the pandemic more as information-dissemination sessions rather than places of dialogue based on equal representation.

> 'We did not give advice as much as we got data on what was happening. We got a prestation from FHI [NIPH] at the start of each meeting and then we could ask questions. We had five meetings and follow-up meetings. We had contact with the education directorate. Every meeting, we started saying that I am not a doctor and expert on this. So, it was really hard to give advice and influence decisions, because for this kind of advice one needs a degree and knowledge… I appreciate the information we got, but I would have liked if the contact between our organization and FHI [NIPH] was closer.'

There was also insufficient information from teachers about their perceptions and experiences. While teachers' unions were vocal in their point of view, the actual perception of teachers themselves was not systematically obtained. Some studies were conducted, but these focused on infection rates or how they handled digital teaching, but not social-behavioural attitudes and risk perceptions. A school group participant noted that the dominant focus was on children, and less so on teachers 'I think we fell short here.'

There was a substantial knowledge gap on what impact targeted measures in schools, including closures, had on students and their learning. In several publications the perception was expressed that

> 'there is an urgent need to evaluate the effect of school closures on disease transmission vs the negative effects on children in the context of the COVID-19 pandemic ' [50].

One of the issues expressed by researchers from the NIPH, was that efforts to start systematic trials failed several times.

> 'You needed to have approval from all participants to carry out an RCT. We would need approval from every parent and that was impossible. In addition, the politicians were afraid to start a study on it, because they thought it would increase infections. '

Therefore, trials could not be carried out. 'We were told to implement the measures, but we could not do the pilot.'

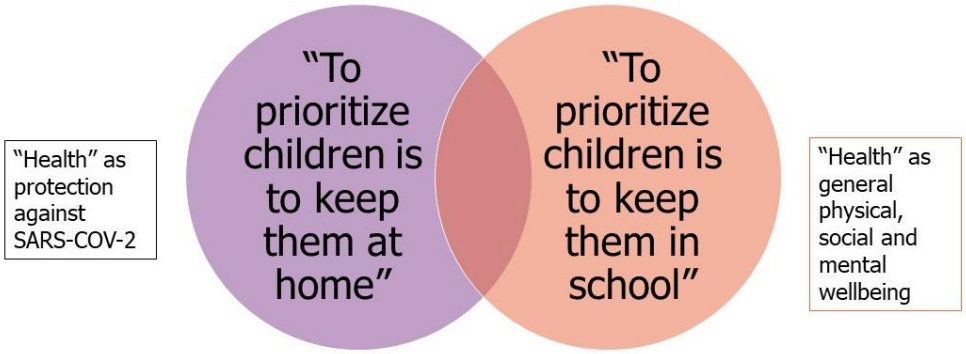
Dilemmas and values

Ambiguity about the meaning of 'prioritising children'

The Norwegian government declared early that children and adolescents should be prioritised in the pandemic response. Thus, the overarching principle in the advice-making process was the value-based idea that the needs of children needed to be prioritised over other issues. However, this did not automatically translate to a political will locally to keep schools and preschools open at the expense of other sectors.

Despite the overall agreement on prioritising children, the understanding of what this meant, differed. The participants referred to two 'lines' of interpretation of evidence and considerations, as shown in Figure 5.

Figure 5. Contrasting the meaning of 'prioritising children' in the two 'lines' of the school advice-making process



In the 'health line' – roughly comprised of representatives from Hdir, the Ministry of Health and Care Services, teachers, and reflected also in DSB coordination meetings – prioritisation of children tended to be explained as the need to keep them at home in order to minimise social contact and hence, virus transmission and disease. This view can be said to be driven by a medical idea that in this crisis, 'health' equated to protection against SARS-COV-2.

The overriding concern was limiting rates of infections. On the other hand, the 'education line' – roughly compromised of representatives from Udir, Bufdir, the Children's Ombudsman, and the NIPH outbreak response subgroups (including NIPH school group) –argued from the beginning that to prioritise children meant keeping them in school. Health was considered in a broader perspective and pointed to documentation showing that school closures have profound negative consequences for students' learning, well-being, and mental health. Schools are closely linked to other childcare services, and serve as coordinating units for vulnerable children and children with learning disabilities. From this perspective, participants noted that they 'were less afraid of infections and more afraid of school closures '. Keeping children out of schools (=harm) did not justify the benefit (=decreasing infection rates). From the point of view of the NIPH school group, evidence for the effect of school closures on transmission was lacking at the onset of the pandemic. As more evidence was gathered, it showed little or inconsistent benefit of school closures for limiting transmission, further strengthening the view that school closures caused children more harm than good.

While this is an oversimplification, as there clearly is a middle ground and not everyone at the mentioned institutions thought about this the same way, workshop participants still grounded their overall experience of the school response in this overall dichotomy. They noted that at times the different views between these lines were striking and led to heated debates. For example, one NIPH participant noted:

> 'The Directorate of Health was more likely to give the advice to shut down the schools. Both in the general public and the Norwegian Directorate of Health and sometimes even at the top leadership levels of FHI [NIPH]. We had quite harsh public debates between FHI and the Directorate of Health. At times we felt a bit alone, because many believed that the opening of schools was dangerous even though the research we provided supported keeping schools open. '

This sentiment was also expressed at the county and municipal levels. One participant noted that the Directors of Health and the Directors of Education at the County Governor's level 'lived in different realities', with the municipality receiving two completely different views on the same issue. Moreover, many participants from the 'education line' felt that there was a level of disbelief regarding the presented epidemiological data. Participants from the school group noted:

> 'The Directorate of Health did not believe our data and sometimes we had to explain it within NIPH as well. Some of the leaders in the outbreak response were not always up-to-date with the data or what knowledge we had generated from these data, and we had to provide information about it to them within the institutions. These leaders were often the ones who were going to meetings where implementation of measures was discussed, and we wanted to make sure that this information was being used externally as well. '

Making this more complex was that overall, the public opinion supported closing schools [51]. The roles of NIPH and Hdir differ: NIPH is working mainly on surveillance and advice regarding infection control, while Hdir is supposed to take a broader perspective society wise and has judicial authority. Because Hdir's role is to put policies into action and implement them, their views may have to align quicker with broader public sentiment. At the same time, the broader mandate also provided less time to attend to and take in new kinds of information and perspectives. One review participant explained this as follows:

> 'I feel maybe that the bureaucracy was maybe the hardest part to convince, and I think that - I hope that - it was not because they didn't want to listen and understand this obligation, I think it was just that they had so much to do, and everything that came from above they were supposed to do very quickly, and so they were using the thinking that they all always had done. And their job is to look at the health perspective of it. So, they used what they already knew '.

Others affirmed this perspective noting that decisions regarding advice were sometimes so quick and purely based on medical perspectives that high level education bureaucrats had to come in 'kicking and screaming ' to get attention for their point of view. Eventually this seemed to have made some impact, as 'decisions and advice later tended to be broader and more inclusive, and we were involved more in the second half [of the pandemic] than the first half. '

A key player of political influence was the teacher unions. Norway has several such unions: Lærernes Yrkesforbund, Utdanningsforbundet, Skolenes landsforbund, Skolelederforbundet (for leaders in educational institutions) and Norsk Lektorlag (for academic teachers). One interviewee explained that, in particular, Utdanningsforbundet and Norsk Lektorlag were generally more in favour of closing schools and pushed for measures on the red level. As it seems, these unions held the strongest opposing view to some of the 'education line ' participants in the workshop[iv]. Participants expressed their view that the teachers did not want to listen to the increasing evidence that there was not a much larger risk for teachers than other professions in the public sphere.

[iv] Indicative of this strive was that none of the teacher union representatives were able or willing to join the AAR workshop and were not available for interviews.

While the teacher's voices were also not in unison on the matter, unions activated their base and seemed to have censored some of the communication efforts made by NIPH and others to present epidemiological data and evidence. For example, the NIPH held webinars and developed small information movies with the Ministry of Education, but these were not distributed among members of their organisations. Many review participants noted that an additional problem that further halted a solution or compromise at a later stage, was that teachers were not prioritised for vaccinations like health workers were.

Differences over what rights to include in advice making

As noted in the previous section, overall approaches, and ways of thinking about the meaning of 'health#, influenced what conclusions were taken from various lines of evidence. To review participants, this seemed at times almost to equate to an influence of personal views and values, in advice making. This could at times result in a level of selectivity in picking evidence to back up your position:

> 'So if you have already made up your mind, you can always find some publications that confirm that point of view. So, you can call it evidence against evidence, but you have to look at how good the evidence is.'

Several participants gave examples of how this affected evidence-based advice making. For example, one participant noted:

> 'there were others who did not want to listen to what I said. To prioritise children is to not send them to school, they argued. So, it was very hard to get through to them the evidence we got from the authority [NIPH].'

On the other hand, there were also roles and positions that provided grounds to take on a certain perspective. The same participant, as such, noted that:

> 'My job was to keep schools open and when I talked to people about that, people were surprised, because they wanted them to stay home.'

The expressed conviction to keep the schools open at a deeper level is related to human rights. From the beginning, the 'education line' viewed the issue as one related to the rights of children to go to school for social, physical, and psychological wellbeing reasons [52]. In particular, the Norwegian Children's Ombudsman (Barneombudet) participated in the advice-making process, not necessarily from an evidence-based point of view, but from a rights-based perspective. They supported keeping the schools open, and used their trusted, institutional power to back the education line's arguments. Their role was to speak on behalf of children.

> 'Because there is not a lot of actors speaking for Children's Rights and the situation and interest of children in a way that we do. They are very fragmented. Some of them are focusing on child welfare, on health. So, for us who are all watchdog for overall children's interest and have a position as we have, I think that was very valuable for the interests of children in this situation.'

As a review participant noted, the legal voice of the Children's Ombudsman concerning children's right to education was a key factor keeping the balance between these opposing views in the advice-making process:

> 'So, it was quite sharp fronts, between us and the teacher's unions. And I think that if we didn't have an ombuds office for children in Norway, the balance would not be good. And we spoke with a very strong voice from the beginning and made it even stronger during the pandemic, because of course, the media was also interested in what we meant, and they understand the legal argumentation very clearly.'

One of the implications of uncertain evidence is that when new variants emerged, the process of building up the evidence base had to start again. In the workshop, participants from the 'education line' expressed frustration about their experience that with each new mutation, the 'health line' again reverted to the precautionary 'close down schools' argument and evidence had to be re-stated.

Conflicting demands

The Ministry of Health and Care Services, Ministry of Education and Research Ministry of Education and Research , and the Ministry of Children and Families all issued assignments, often jointly, requesting advice. The Ministry of Health and Care Services mostly asked to also take the assignments of the other ministries into account at the same time. These assignments were given to the Directorates and NIPH, which discussed them in and between their institutions and coordination bodies. However, stakeholders outside this were usually not involved and privy to the weighing of information and evidence that led to the final advice. This meant that when advice or national decisions flowed down to municipalities or counties, reasons had to be presented at those levels, leading to loss of time.

Related to this was lack of feedback from decision-makers back to advice-makers, an issue that participants expressed several times. On what ground was the final decision made? This sentiment existed at all levels of the 'education line'. At the highest level, NIPH participants noted that there were some processes in the Ministry fo Health that were not very clear to them:

> 'How did they end up in the final decision? There were discussions in the Ministry with other actors that had input on the advice that was given.'

At the other end of the pipeline, students often did not know who was responsible for what decision, what the reasoning was, or who to contact about it. Participants argued that this was especially harmful for students in higher education in vulnerable situations who had no idea where to go with special requests.

Another challenge was the flexibility municipalities had to displa when making their own decisions between national laws and regulations and the advice provided by various actors. For NIPH experts, it was commonly a negotiation to stay true to national advice while simultaneously supporting flexible decision-making by municipalities.

> 'We tried to give advice based on the situation and we tried to give practical advice. We had to follow the government [legal] guidelines. Sometimes we had given advice to the government that was different from what we had received feedback on [from municipalities]. It was difficult to be as flexible as we wanted to. Sometimes the advice was not picked up, sometimes it took too long, sometimes we disagreed. We felt constrained.'

In the workshop, participants emphasised that legal requirements occasionally helped to keep the school open. For example, the right to education as codified in Norwegian laws meant that rules restrict home-schooling. On the other hand, national laws could be experienced as rigid depending on the situation. At the municipal level, a main challenge was to encourage local politicians to not be stricter than these national laws:

> 'If we had local regulations that were stricter, we could change them. Usually, we wanted strict national laws when cases were increasing, but when they decreased, businesses pressured to be open, and then we wanted flexibility to open again. So, we talked a lot about our preferences over national strictness across municipalities and with the counties.'

Communication and coordination

Being able to effectively communicate advice to relevant stakeholders is an important dimension of advice-making. Review participants emphasised communication on multiple levels: between national response agencies and the public; with educational stakeholders (including schools, parents, teachers, students, and related associations); with county governors and municipal medical officers; and within and between national health and educational agencies and departments. The review included discussion with participants about how effective communication was accomplished.

Communication with the public

The NIPH, Hdir and Ministry of Health and Care Services started to hold regular press conferences, broadcast from the office of the Prime Minister, joined later also by the Ministry of Education and Research Ministry of Education and Research. The Prime Minister invoked the concept of 'dugnad ' to argue for solidarity, a concept integral to the Norwegian national identity meaning civic duty due to a sense of community [33].

Hdir received many questions from the onset of the pandemic. The Directorate worked daily with preorganised Q&A formats before establishing a dedicated communication platform, including a chat bot and people that could answer questions. This platform was later also used for people to obtain their vaccine certificate which made it an excellent location for public communication. Overall, it was felt that the users were satisfied with the information they received from the Hdir, which included information about the uncertainties. A lot of questions came to a special website providing an overview on what young people were asking. The website included information about psychological health for young people and was integrated with TikTok and Instagram. Finally, Hdir also established an intersectoral communication group regarding schools which started meeting in August (2021), andincluded NIPH, Udir, Hdir, the police, DRA (a communication group).

Initially, NIPH experts replied individually to questions from the public. Later, a system with a small team dedicated to e-mail responses was established (which eventually discontinued). NIPH also created a COVID-19 hotline for officials, not for the public. It was noted that the communications department got increasingly more involved in the outbreak response. The communications department was responsible for social media and media, and from the summer 2021 formulated Question and Answer sheets and redirected questions when needed. NIPH experts also wrote opinion pieces and articles in the newspapers in some cases. NIPH developed a detailed website with information on COVID-19 for schools, events, workplaces, employers, health care institutions, laboratories etc.

At Udir, a comprehensive website was developed to communicate temporary regulations during the COVID-19 pandemic in response to many legal questions from the County Governors and the public. This was based on the Infection Control Act, which the Ministry of Health regulates.

At municipal levels, special communication departments managed telephone hotlines, which according to participants included good information from the national level. They also worked closely with local media. Although time intensive and demanding, this turned out to be quite useful, because they helped inform the public efficiently. Municipal participants noted that communication to the public was not very difficult when their local rules were similar to national rules/ neighbouring municipalities. However, when rules differed, explaining these differences was costly in time and effort.

Overall, public risk perception was experienced as challenging because teachers and a proportion of parents were very concerned about infections in schools. It was noted that changing their risk perception was very difficult because the media appeared to share this concern.

> 'It just seemed obvious that when you gather a lot of people, especially 14-year-old pupils, this might be very dangerous, and many could become infected. It was very hard to counter that with facts.'

The new findings that teachers were not impacted more than other public professionals helped to make this easier. The NIPH school group developed three main messages as a result:

- Children transmit less than adults and do not become severely ill to the same extent as adults;
- The negative consequences of keeping children out of schools are large;
- It is the sum of all measures that will keep infection rates under control – so we can allow less IPC measures among low-risk children while adults and higher risk groups have to follow more strict measures.

But it was an uphill battle to convey these messages:

> 'It was extremely difficult to explain why measures were different for children than others. We tried to explain that children transmitted infection to a lesser extent and that the negative consequences for children were higher, but we kept receiving the same objections again and again. The entire communication was really hard, and I don't know who could have helped us.'

This might have also been the result of the debate between authorities taking place in the medial. An example of this can be seen in a publication by the Norwegian Broadcasting Corporation based on statements from the FHI chief physician saying it was a mistake to close the schools [53]. Some review participants took it as their responsibility to be a media presence arguing for the education line's argument, often in tandem with the children's ombudsman, even though this may have been perceived as controversial.

Finally, it was noted by review participants that communication to young people was suboptimal and they lacked proper feedback on their experience (see missing evidence). Social media campaigns addressing adolescents and rules that applied to them were established after the first pandemic year, trying to explain why rules were different for children and adolescents compared to society in general.

Communication and coordination between public agencies

Despite the differences and difficulties described above, there was consensus that the group represented at the workshop had a very cohesive and good collaboration throughout the process, even though making all these connections was time consuming.

> 'We had a really good collaboration with all of the different actors that were promoting children and school rights and their health. The FHI [NIPH), the directorate of education, the directorate of health, we had a very good collaboration.'

The opinion was expressed that without this close collaboration, there would have been more lockdown of schools and services.

As mentioned previously, several coordinating bodies were established to deal with the school response, with those listed below mentioned during the AAR.

- Hdir intersectoral communications group;
- Bufdir intersectorial coordination group for vulnerable children;
- NIPH Leader group or crisis team;
- NIPH Infection prevention and control (IPC) group, with the NIPH school group as a sub-group;
- NIPH Test, Isolation and quarantine group (TISK);
- Ministry of Education and Research Ministry of Education and Research crisis management group;
- Udir Covid follow up meetings (Arena);
- Udir Expert group on reopening schools;
- Norwegian Directorate for Civil Protection (DSB)'s regular meetings;
- County Governor's weekly meetings.

At the regional and municipal levels, the close coordination appeared more challenging because the effect of the two lines of thinking and advice (health as infection prevention versus health as broad wellbeing) were experienced as being more pronounced. For example, at the County Governor's level, it was noted that there should have been better coordination between the health and the education lines.

> 'We were told to keep the kindergarten and schools open while the infection rates were high in our area and a lot of schools consequently closed… It was very difficult. We said different things in the education line and health line. Within the county level we should have been more unified and connected.'

This sentiment was echoed at the municipal level:

> 'It didn't feel coordinated at the higher level and there were two different lines of advice coming and we had to figure that out at our own level. Each municipality had to decide for themselves what to do with the regulations and recommendations.'

Some key spokespersons did not always seem to address the complexity of the situation for students, such as the impact of reduced school attendance and education, in a balanced and updated manner. During the workshop, some discussion ensued about the extent to which this insufficient attention was the result of lack of participation of the education line at the DSB's weekly meetings with the County Governors and the municipalities:

> 'It is a stable channel, but the importance of schools and kindergarten wasn't communicated in those meetings quite sufficiently.'

Finally, an example of the need for better coordination between the advice and available resources, was the NIPH testing advice in the fall of 2021. As already described, this advice was not feasible due to a shortage of tests, and this led to challenging situations for many municipalities (see Timeline). Hdir was responsible for procurement and distribution of tests, and information on availability was at times unclear to NIPH. One of the municipal participants noted:

> 'What FHI [NIPH] advised was not feasible at that time. The technicalities of it. It was not possible with the resources that we had. There is a coordination problem. A lot of municipalities sent back to FHI that these measures are not possible.'

Capabilities and resources

While resource scarcity and consequent stresses are common in crisis management, review participants offered a more nuanced picture of the situation for Norwegian agencies. At the national level, agencies were eventually relatively well resourced. At the regional and municipal levels, capabilities and resources were more constrained. In addition, all levels experienced pressures from and tensions with other actors that could impact their efficacy.

Challenges in scaling-up capacity

Many of the institutions had relative continuity in staffing, but participants noted that staff numbers, and hence capacity, was generally lacking to adequately respond to the crisis. At the municipal levels, medical officers were present by law, but in varying capacities without much room for new hirings. To obtain more help, several retirees came and helped with testing and vaccinations, including people who had been laid off or who were not allowed to work in other sectors, like the food sector. In addition, some of the less essential work was outsourced in municipalities who had the resources to do so, but this wasn't possible everywhere.

At the County Governor's level, people said they worked continuously without many extra resources. Not untypically, lack of resources led to an overall conservatism in trying out new directions, as the ability to find new staff to try out things was limited. Some participants argued that the reason that schools wanted to close was sometimes because they did not have enough teachers, not because of the spread of virus. Also here, retired teachers were enlisted to help.

At NIPH the subgroups developed organically during weekly outbreak meetings. Initially the school group consisted of three people, but by the end of the pandemic the team had grown to five, plus support from analysts and members from other groups. Similarly, the testing group grew from 4 to 15 people. Here, the government did provide swift budgets to be able to involve more people within the first year of the pandemic. The bottleneck here, as well as in the teaching field, was the lack of available experts able to jump in. At Hdir, a national list of available health workers was established, and this was used a lot to recruit people. However, 'everybody was fighting for the same person for testing, vaccination etc. There weren't enough people even when we had money. '

Pressures, stressors, and resilience

The workload also escalated during the pandemic. One participant likened this situation to a train which kept on speeding up, making it more difficult for new recruits to catch up.

> 'The expectations on our advice also escalated. In the beginning it was more general and then after a while we were expected to have more and more evidence as well as detail. The level of expectations and the need for specific information increased rapidly. It was difficult to recruit people with the necessary level of expertise. It was just like a snowball rolling.'

It was mentioned at the workshop that because there generally was too much work for too few people in a high pressure, fast-paced crisis, there was often not time available to sit down and figure out how to reorganise to work more efficiently. One participant summarised the overall sentiment by noting casually that 'people have been crying in meetings ' and 'One of us said, I don't cry as much anymore as I used to '. Participants from municipalities explained that they had to report on different issues, and some of their colleagues were complaining that the Directorate should not ask for that much data. In addition to all of this, the media at times was rather harsh towards the experts, not least those working with topics covering schools, children and adolescents. To support themselves during this period, the earlier mentioned close collaboration between all the actors involved, appeared crucial. This sense of solidarity provided mutual support. In addition, small symbolic gestures made were the provision of food for the continuation of work during later hours. Professional mental health support was also provided at the NIPH, including debriefings and counselling, although it was noted that this came too late to be useful.

Finally, any type of reflexive activity was seen as not needed because the continued expectation was that the end of the pandemic would be near. For this reason, people also tended to continue working in crisis mode, continuously and unconsciously adapting to the imagined 'near-end' of the pandemic. At the time of the AAR, the pace had slowed down. However, with that also came a recent reduction of staff. For example, at the NIPH it was noted that five months ago the groups were discontinued while many staff left the institution.

> 'There is a revised national budget that has allocated much less funding to the public health institute, compared to what we requested.'

For example, reductions in funding at NIPH have led not only to the loss of temporary ('COVID- ') staff, but also staff with permanent positions.

Lessons learned and good practice

Motivated by questions about what they experienced went well and not so well in the advice-making process, review participants generated several lessons and good practice. Participants suggested lessons based on what they had found problematic and how they imagined these problems could be remedied. In turn, good practice suggested by participants included ways of working developed in the process that they considered exemplary. Given that AAR participants included representatives from national agencies, regional authorities, and municipalities, the practices identified could operate at any level of advice-making. The AAR team gathered all participants' suggestions and sorted them into major lessons and categories of best practice.

Key lessons learned

The many specific problems and remedies that participants identified are summarised here under four major lessons. These are:

- Give priority to children and related stakeholders,
- Data gaps should be recognised and filled,
- Gaps in capabilities should be recognised and remedied, and
- Coordination and collaboration should be boosted further.

The tables below each major lesson contain the details of the related problems that participants experienced during the focus period, and remedies they developed and proposed in the workshop.

Give priority to children and related stakeholders

Participants emphasised that children's and related stakeholders' interests and perspectives had been less vocal or represented in the focus period than they should have been. In some situations, it became a struggle in advice-making pay attention to the effects social distancing measures could have on children's wellbeing. Here, more direct and persistent involvement of children's interests and child or school-related stakeholders and representatives could have made a difference. Participants noted that there should have been a 'children's group' represented at a high level in all inter-agency forums and meetings from the start – with a formal position and mandate. All issues relating to children, whether health, education and other, should imply specific considerations on their behalf and with their best interests in mind.

What could have worked better?	What should be done
NIPH School Group (SG) did not have a formal position in the NIPH response organisation.	• Start SG at response outset and give it higher status. E.g. like TISK-/advice to the general population/Advice to healthcare work groups • Raise evidence about children and schooling to high priority at all levels.
Children's and educational issues were generally under-represented in inter-agency forums and meetings.	• Organise a 'children's group', represented at a high level in all inter-agency forums and meetings from the start – with a formal position and mandate. • Include Udir and Bufdir in all inter-agency meetings during crises. • Include SG in inter-agency forums. • Include SG and children's/schooling experts in DSB-led meetings.
Few voices from children and youth.	• Prioritise systematic and representative feedback from/about children and adolescents.
At local levels, teachers reported feeling left out.	• Acknowledge teachers' concerns. • Prioritising children should also mean prioritising teachers. • Give teachers more lead time to adjust according to new advice.
At local levels, parents' views were unsystematically recorded.	• Prioritise systematic and representative feedback from parents.
University and other tertiary students were not sufficiently prioritised.	• Prioritise tertiary students' interest and representatives.

Important data gaps should be recognised and filled

There were gaps in data, data standardisation and available evidence. Although the knowledge regarding cases, transmission and disease impact kept increasing, there was still a need for systematic knowledge regarding implemented measures, e.g. knowing how many schools were on red level or how many students were in quarantine each week, as well as data on student and teacher experiences in schools. Also, it proved impossible to conduct randomised controlled trials on the impact of targeted measures in schools, both on the effect on virus transmission and on students' general wellbeing and their learning.

What could have worked better?	What should be done?
Evidence about the impact of measures on education and children was slow to accumulate, and slow to reach relevant analysts.	• Early planning for collecting educational statistics and evidence. • Share new evidence as soon as it is available – don't sit on it.
Restrictive school measures were used with little evidence about epidemiological effects as well as costs, both psychosocial, educational and economical.	• Systematic reporting of measures used and TLM setting, when and where. • Real-time tracking of measures' effects on epi outcomes. • Ease conduct of studies. E.g. five RCTs were tried, but stopped by various hindrances. • Include multiple agencies and stakeholders in discussions about study designs, to address concerns – as part of pandemic preparedness. • Adopt longer time horizon on pandemic. • Cost of measures should be explicitly assessed.
Too little analytical capacity in municipalities	• Hire and/or train dedicated analysts in municipalities
Different data collection platforms and formats between municipalities.	• Standardise data collection and platforms

Important gaps in capabilities should be recognised and remedied

There was an urgent need expressed for more personnel and a better understanding of available supportive resources within the organisations. Recruitment of competent experts was challenging in both the public health and education fields. The rapid growth of tasks and little time to sit down and better organise or reflect aggravated the situation. These factors led to stress and fatigue. Psychological support was lacking and at best, late. Participants recalled that strong mutual solidarity, working together and pooling of resources helped them to cope and stay resilient, in spite of intense stress and fatigue.

What could have worked better?	What should be done?
Reliance on same key staff for long response periods	• Plan for long-term response, e.g. by rotating staff into and out of response periodically. • More people to share the workload. • Maintain capabilities and skills, by retaining them in peacetime. • Outsource activities that can be, from the outset of response.
Psychological support	• Engage counselling services from outset of response effort. • Leaders should signal that their employees need some rest and do so by not working even more themselves: set an example.

Coordination and collaboration should be further boosted

Participants generally lauded the ability of different organisations to work together, pool resources, and contribute their respective strengths to advice-making. However, such coordination and collaboration did not work equally well in every situation, and more could have been done. Remedies include several ways to further improve how different actors interact and find common purpose at local, regional, and national levels, and between these levels.

What could have worked better?	What should be done?
Matching advice about testing with testing capacity.	• Agree common goals and resources available for Government, Hdir, and NIPH . • Use private lab capacities. • Plan more ahead of testing rollouts, including better information and enough time to prepare for those responsible for carrying out the actual testing. • Clear messaging about antigen vs. PCR tests. • Better communication between labs-NIPH-Hdir. • Sort out logistics for acquisition and distribution, including re-distribution among municipalities.
Managing challenges for children crossing municipal borders to go to school.	• Boost school measure coordination between municipalities and regions.
Confusion about NIPH and Hdir units' roles and responsibilities.	• Engage with agency leaders and peers to clarify distinctions and differences between the agencies.
Municipalities sometimes needed opportunities to meet with other municipalities in similar situations.	• Create sub-groups within each region – e.g. by TLM setting, by size, or by closeness to main city.

Good practice

The good practice listed here were recalled and contributed by the AAR's participants from their experiences with advice-making in the focus period. They are exemplary, and worth considering and even replicating in future events affecting schooling and children. They are also often the results of periods of trial, error, and learning. Each good practice listed is attributed to the agency or level where one or more participant described it had been used. But good practice can be transferrable to other organisations and levels. Hence, rather than teams in future efforts proverbially re-inventing the wheel, following these examples may help them hit the ground running. The AAR team has summarised the best practice identified by review participants into four themes, each presented in a separate table: 1) Data, analyses, and research outputs, 2) Organisation, 3) Collaboration, and 4) Public communication.

Data, analyses, and research outputs

Agency/level	Good practice
Several national agencies	Prioritise dedicating specific staff in each agency to work on children's issues – will also help as contact points for collaborations.
Several national agencies	Having a preparedness registry with general ethical approval - made analyses easy.
Several national agencies	Dedicated advice-giving groups with continuing mandate – to anchor and enhance skills.
NIPH	Fast piloting of different testing strategies – common goal, involving universities and NIPH TISK group, different schools, community doctors, microbiologists, and Hdir.
NIPH	School group post-wave summary reports highlighting surveillance data, incidence, and situation – very useful for showing others the epidemiological situation and describe what was done, as well as for publications.
Udir	Persistent advocacy for children's rights in public, to ministry, to counties.
Municipalities	Local data for municipal advice-making – very valuable and highly trusted.
Municipalities	Local data analysts where available - ensured real time evidence on infections at schools.
Municipalities	TLM model was useful - predictable guidelines, matched to handbook with risk profiles, contagion thresholds, and expected reactions from different populations.

Organisation

Agency/level	Good practice
Several agencies, municipalities	Daily meetings that included many kinds of staff – help to share awareness of situation and challenges, and offered mutual support – hence, boosts resilience.
NIPH	Establish School Group, include experienced people, and eventually support staff to handle some of the many routine tasks.
NIPH	Culture of informal mutual support – staff help and support each other's mental ability to cope.
Udir	Compact, visible, and active operational management group of about five people, many top-management - close to everything, could act, stayed on top of the pandemic.

Collaboration

Agency/level	Good practice
Several national agencies	Working groups combining all relevant agencies and directorates, implemented from the outset of response.
Several national agencies	Unified response among national agencies to government assignments – coordinate advice between the 'lines' (silos)
NIPH	Two-way webinars for municipal public health doctors.
NIPH	Multiple disciplines combined in NIPH TISK group.
NIPH	Collaboration between NIPH TISK and School groups.
NIPH	Collaboration with Norwegian Paediatric Association - on guidelines for children, feedback on experience from paediatric wards, collaboration on communicating to paediatric patient organizations and publications etc.
Hdir	Regular meetings NIPH-Udir about web-based infection control guidelines, and many other issues related to children.
Hdir	Collaboration with school nurses, and webinars when big announcements were made.
Municipalities	Easy access from municipalities to NIPH – needed for health knowledge, resilience, and support.
Municipalities	Collaboration within municipalities between school leaders and municipal public health doctors – important for trust building.
Municipalities	Weekly meetings with county governors.

Public communication

Agency/level	Good practice
Several national agencies	Transparent and honest communication about what we know and what we don't – well received
NIPH	Media commentaries and similar contributions – helped explain advice and measures.
Hdir	Weekly survey of public trust – useful for, e.g. shaping outputs to public.
Hdir	Hotlines and Chatbot – answer questions from stakeholders and public, relieves pressure on organisations.
Hdir, municipalities	Public communication in many languages – reaches most/ all communities.
Municipalities	Regular meetings for schools, including all kinds of school staff (e.g. teachers, cleaners)

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Annex 1. Literature reviewed in preparation

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FHI Guidelines for municipal doctors, including advise on what IPC measures to implement in schools in various epidemiological settings. https://www.fhi.no/nettpub/overvaking-vurdering-og-handtering-av-covid-19-epidemien-i-kommunen/ti-trinn2/tiltaksvurdering/?term=&h=1#saerlig-om-tiltak-i-skoler-og-barnehager

FHI Information and advice concerning test programmes in schools: https://www.fhi.no/historisk-arkiv/covid-19/koronavirusveilederen-arkiv/jevnlig-testing/

FHI Information on children and adolescents on our webpage: https://www.fhi.no/en/op/novel-coronavirus-facts-advice/facts-and-general-advice/advice-and-information-for-children-and-adolescents/. These pages also included information on the available evidence on disease burden in children and transmission in schools.

Smitte av covid-19 hos barn og unge etter skolestart høsten 2021 Available Nov 2021

Annex 2. Workshop programme overview

After-Action Review on COVID-19 school measures advice-making in Norway

Location: FHI, Lovisenberggata 8, room 1025

Date	Activities
Tuesday Jan 24 – Arrival & interviews	
13:00 – 14:00	• Brief coordination meeting at the Hub hotel with ECDC & FHI team
14:30 – 17:30	• Online (Teams) interviews with stakeholders not in the workshop
Wednesday Jan 25 – Workshop 'The use of evidence '	
9:00 – 10:00	**Session 1: Introduction of project** The goal of the AAR is to foster opportunities for discussion and dialogue on the role of evidence in decision-making regarding technical advice for the continued operation of schools in the periods before and after holidays: the weeks after summer holiday 2021 (early fall, delta wave) and Christmas holiday 2021/22 (omicron wave). Participants are invited to reflect on the advice-giving decision-making process and help identify best practice suggestions for improvement. • Word of welcome (5 min.) – Trygve Ottersen / Are Berg, FHI • Introduction of project (10 min.) – Svetla Tsolova, ECDC • WHO IAR/AAR activities (10 min.) – Jussi Sane, WHO Europe • Brief round of introduction (15 min.) • Review of AAR activities (20 min.) Danny de Vries, Associate Professor, Department of Anthropology, University of Amsterdam **10.00-10.30 Coffee break**
10:30 – 12:00	**Session 2: What happened and who was involved** In this session we plan to discuss a preliminary timeline of key decision/advice giving events and trace the processes (formal and informal) related to technical decisions regarding formal advice(s) to school closures. This also entails mapping out the various stakeholders that participants had contact with during the response, including agency roles.
12:00 – 13:00	Lunch & break
13:00 – 16.00	**Session 3: Why did the decision develop the way it did? How was evidence used?** Here we will discuss how evidence influenced the advice-giving decision-making process as well as what evidence was available and how it was used (or not used). 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 what role evidence played in these dynamics. Participants will be asked to identify how and when evidence was brought into the advice's decision-making process, and the response to it.
Thursday Jan 26 – workshop 'learnings '	
09:00 – 10:30	**Session 4: How did decision makers make sense of the situation?** In this session, participants' opinions will be collected to get a variety of perspectives on why the decision-making process of the formal advice unfolded as it did. Participants should also reflect on how various professional backgrounds and experiences; institutional practices and procedures, and the type and availability of evidence shaped and defined sensemaking. **10.30-11.00 Coffee break**
11:00 – 12:00	**Session 5: What can be learned? Any need for change? How can new initiatives be implemented and monitored?** Identify and discuss major lessons learned about the use of evidence during key decision-making processes regarding advice related to school closures or physical attendance. What can be done to improve gaps or challenges and to sustain best practice?
12:00 – 13:00	Lunch & break
13:00 – 14:00	**Session 5 (continued)**
14:00 – 15:00	**Session 6: Wrap up, closing and evaluation** Opportunity to reflect on the consultation process itself, but also on the outcomes. Agreement on the next steps, including the writing process for the final report. The session will be closed with a brief evaluation.
Friday Jan 27 – debrief and follow-up interviews	
10:00 – 12:00	Follow-up interviews
13:00 – 14:00	**Session 7: Hot Debrief** Consultants will review preliminary findings to all interested parties, verify and validate the findings, and review agreements for next steps.
14:30	Follow-up interviews

Annex 3. Interview guide

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

Involvement

1. What does your institution do? What is your role?
2. What was the role of your institution in the advice-giving process? How were you included?
    a. If not included: Did you want to be? Why were you not involved in the advice making process?
3. *If role in advice making*: can you map out the various stakeholders or groups that you were involved in during the advice-making process?
    a. 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? (1=low, 2=medium, 3=high)
    b. 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? (1=low, 2=medium, 3=high)

Sense-making analysis

4. When you first heard about the Alpha variant, to what extent could you apply your previous experience with similar events?
5. 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?

For reference and probing: Major themes of the Evidence-Based Public Health 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

Evidence in advice-making

6. What struck you as most influential on the way that the advice-making process developed? Why?
    a. Think beyond research evidence, also think about resources, population characteristics or environmental and organisational contexts.
7. To what extent do you feel that the advice made was 'evidence-based'? Why/why not?
    a. What value and weight did experts and decision-makers place on different pieces of evidence?
    b. What happened when there was no conclusive scientific evidence available?
    c. What types of scientific evidence were looked at? How was this evidence gathered? How was it interpreted?
    d. What other factors were looked at alongside the evidence and how were these balanced against each other when decisions were made?
8. How has evidence been used to inform decisions made during this period? How did decision makers adapt evidence to apply it in their own context?
    a. How does it compare to earlier waves?
9. Could you give an example of when evidence was used well / not used well?
    a. How did you determine if evidence was used well or not well?
    b. What monitoring mechanisms do you use?
10. Who assessed the impact of the advice and how did they do so?

Implementation

11. How did you understood and implement the advice? Were there unclarities?
12. Were you able to provide feedback about implementation?
13. How did the advice change the epidemiological situation?

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

14. What were the main lessons learned from this event, with respect to evidence-based decision-making?
15. What should change, with respect to the evidence-based decision-making process?
16. 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?

Annex 4. Informed consent form

After-Action Review of evidence-based decision making about school closures during COVID-19

The goal of this project is to conduct an After-Action Review (AAR) on evidence-based decision makingduring COVID-19. This AAR looks at the advice-giving process in Sweden for the continued operation of schools during COVID-19 with particular emphasis on the Alpha phase (December 2020 until June 2021). The central question is how evidence has been used to inform recommendations.

You have been identified as a stakeholder who has been part of the advice-making process, and this is why you are asked to participate in this exercise.

- Your participation in the interview/workshop is entirely voluntary, and if you agree to take part, you are free to change your mind or withdraw at any time without consequences.
- If you agree to take part in the interview/workshop, any processing of your personal data will comply with Regulation (EU) 2018/1725 and Swedish national law. ECDC is the data controller of this processing operation, and the data is collected and stored by the Amsterdam Institute for Global Health and Development on its behalf, in its role as processor of the data.
- With your agreement, we may want to quote some of what you say in a country and/or aggregated report, but we will do so in a way that ensures that it cannot be ascribed to you.
- With your agreement, we may want to include your name and institutional affiliation in an Annex that lists the informants who have contributed to this case study project.
- With your agreement, we may want to record the conversation which will only be used for our notes and be deleted after the project finishes.

As a data subject, you have the right of access and rectification of your personal data. Feel free to ask any questions you may have about the interview or the processing of your personal data. If you have questions after the interview/workshop is over, please contact Jonathan Suk at ECDC: Jonathan.Suk@ecdc.europa.eu

Please check 'yes' or 'no' by each of the following statements, and then sign and date the document in the space provided below.

	Yes	No
1. I agree for this conversation to be audio recorded and understand that the recording will be used for notetaking only and deleted after the project.		
2. I agree to having my words used as quotes in the final report, and I understand that my words will be anonymized so that it will not be possible to ascribe any of my comments to me.		
3. I agree to having my name and institution included in an Annex at the end of the final report that lists the informants who have contributed to this case study project.		

Signature: _____

Name (in CAPITALS): _____

Place & Date: _____

Annex 5. Timeline of relevant advice given

This timeline is based on information provided during the workshop and is not a complete overview. It also includes some policy changes (bold).

Period	Advice	Advice from:	Advice to:
April. 2020	Open the schools with measures in kindergarten and schools	Bufdir, Udir, NIPH	Hdir, Ministry of Families and Children
Dec. 2020	Use frequent testing in schools	NIPH contact tracing & test unit	Hdir
Spring 2021	Replace distance learning with frequent testing	NIPH contact tracing & test unit	Unclear
Easter 2021	Keep schools open	Munic. PH doctor	Lillestrøm Kommune
Weeks 17-23 2021	Use drop-in testing in high schools, mass testing in some	Munic. PH doctor	Lillestrøm Kommune
27 May 2021	National Green Light	NIPH, Udir and Hdir	All schools
Spring/Summer 2021	Replace quarantines with testing regime	NIPH, Udir and Hdir	Ministry of Health and Ministry of Education and Research
Spring/Summer 2021	Extend rules of absence	Udir	Ministry of Education and Research
Spring/Summer 2021	Plan and publish info early	NIPH, Udir and Udir	Ministry of Health and Ministry of Education and Research
June. 2021	Prioritise vaccination of teachers	MOE	All schools
Summer 2021	Green light after summer	NIPH, Udir and Hdir	Ministry of Health and Ministry of Education and Research
Summer 2021	Replace quarantine with testing regime	NIPH, Udir	Ministry of Health
Summer 2021	Need for more logistics and tests for testing regime after summer vacation	NIPH contact tracing unit and school group	Ministry of Health outbreak group, Hdir, NIPH leaders
Summer 2021	Explore and use regular testing rather than quarantine	NIPH testing unit	Unclear
Aug. 2021	National Green Light, but local yellow or red permissible if high transmission	NIPH	Municipalities, schools, school owners
Aug. 2021	Use testing rather than quarantine for unvaccinated contacts	NIPH	Municipalities, schools, school owners
Aug. 2021	Keep kids in school and schools open	NIPH	Municipalities, schools, school owners
30 Aug. 2021	Testing high school students twice per week	Munic. PH doctor	Bærum Kommune schools
Aug. 2021	Avoid school closures at Christmas 2021	Munic. PH doctor	NIPH, Oslo Kommune
Aug. 2021	Avoid mass testing of children	Munic. PH doctor	NIPH, Oslo Kommune
Aug. 2021	Abandon traffic light model	Munic. PH doctor	NIPH, Oslo Kommune
Aug. 2021	Vaccinate teachers	Munic. PH doctor	Lillestrøm Kommune Tisk unit
Sept. 2021	Too few tests	NIPH	Municipalities
Sept. 2021	Detailed logs of spread in each school	Munic. PH doctor	Lillestrøm Kommune politicians
25 Sept. 2021	**Policy change: National re-opening**		
25 Sept. 2021	Return to normal in schools and kindergartens	Hdir, Udir, NIPH	Ministry of Health, Municipalities
25 Sept. 2021	TLM only to be used for local outbreaks, by local authorities	Hdir, Udir, NIPH	Ministry of Health, Municipalities
Autumn 2021	Use home testing rather than school closures, etc.	NIPH testing unit and school group	Ministry of Health, Municipalities
Nov. 2021	Use alternatives to school closures – testing, TLM, restrictions on after-school social activities	NIPH contact tracing unit and school group	Munic. PH doctors
Nov. 2021	Use frequent testing	NIPH	Municipalities
Nov. 2021	Set TLM to yellow or red if needed according to local situation	NIPH	Municipalities
7 Dec. 2021	**Policy change: TLM re-introduced nationally**		
16 Dec. 2021	**Policy change: Grades 1–10 yellow, 11–13 on red light nationally**		
9 Dec. 2021	Move low grades to yellow, and high schools to red	Munic. PH doctor	Bærum Kommune local school director, high school principals
11 Dec. 2021	Move grades 1-13 to yellow	Hdir, NIPH	Ministry of Health
11 Dec. 2021	Advice to not extend Xmas break	Hdir, NIPH	Ministry of Health
16 Dec. 2021	Add two days to Xmas holiday	Munic. PH doctor	Bærum Kommune local school director
21 Dec. 2021	Home test all students prior to return to school	Munic. PH doctor	Bærum Kommune local school director
27 Dec. 2021	Home test all students prior to return to school	NIPH, UDIR and Hdir	Municipalities and Ministry of Health
13 Jan. 2022	**Policy change: Green light for grades 11–13 nationally**		
21 Jan. 2022	Use testing rather than TLM	NIPH testing unit, NIPH	Municipalities and Ministry of Health
21 Jan. 2022	Assess proportionality locally, rather than one national rule	NIPH school group, NIPH	Municipalities
25 Jan. 2022	Let teachers test rather than quarantine	NIPH	Ministry of Health
25 Jan. 2022	Remove social distancing measures in schools (green light)	NIPH	Ministry of Health
25 Jan. 2022	Test only symptomatic cases	NIPH	Ministry of Health
Jan. 2022	Abandon incidence in age group as primary indicator	NIPH	Municipalities
Jan. 2022	Consider other indicators	NIPH	Municipalities
17 Jan. 2022	two tests/week for all 1–10 grade students	Munic. PH doctor	Bærum Kommune schools
12 Feb. 2022	**Policy change: All school measures lifted nationally**		

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