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TECHNICAL REPORT

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Contents

Abbreviations

ECHR	European Convention of Human Rights
EEA	European Economic Area
EU	European Union
IHR	International Health Regulations
PHSMs	Public Health and Social Measures
RCCE	Risk Communication and Community Engagement
WHO	World Health Organization

Introduction

Scope and intended audience

Public health and social measures (PHSMs) refer to non-pharmaceutical measures implemented in community settings to abate the spread of infectious disease.

This document outlines key strategic and operational considerations to inform pandemic preparedness planning around the design and implementation of PHSMs in community settings in the European Union (EU) and European Economic Area (EEA). This guidance is based on the findings from two expert consultations arranged by ECDC in June 2022 [1] and May 2023 (see Annex 1), and draws on multiple lessons learned exercises [2,3] and relevant ECDC [4,5] and World Health Organization (WHO) documentation [2,6].

This document is not a review of the evidence base on PHSMs.

The report provides recommendations across five areas:

- Incorporating PHSMs in health security governance landscapes – which are the processes, structures and institutions in place to oversee and manage a country's healthcare system;
- Monitoring and assessing the implementation of PHSMs;
- Assessing the broader social and public health impact of PHSMs;
- Building trust and ensuring effective communication through community engagement;
- Enhancing multi-disciplinary coordination in decision-making.

The intended audience includes experts and decision-makers in Ministries of Health and national public health authorities and institutions responsible for pandemic preparedness planning and/or infectious disease control. While the scope of this document is the application of PHSM during large-scale respiratory disease outbreaks or pandemics, PHSM may also be deployed to control, for example, sexually transmitted infections or mosquito-borne disease, and many of the discussion points raised in this document are relevant to those topics as well.

Background

Potential pandemic risk trajectories related to zoonotic diseases (e.g. COVID-19 and influenza [7]) remain difficult to map because of the persistent threat of novel variants [8], a wide animal reservoir for potential pathogen circulation and adaptation, and the unpredictable timing and severity of pathogens that successfully emerge to cause disease amongst humans [7-10].

The use of PHSMs were the primary public health response during the initial phase of the COVID-19 pandemic, until vaccines became widely available, and it is likely that PHSMs will be relied upon in the early phases of future pandemics. However, notably, their effectiveness may be affected by timeliness of decision-making and may vary across different contexts. Additionally, there has been much less investment in research focused on assessing the effectiveness and impact of PHSMs than there has been for drugs and vaccines [11]. By as early as autumn 2020, the social and economic costs associated with the COVID-19 pandemic had already far exceeded past investments in preparedness and response [12].

There remain gaps in the evidence about the effectiveness, costs, and benefits of PHSMs, which should be addressed given the significant socio-economic consequences of their use as well as their possible important role in the control of future pandemics, particularly during periods where no medical countermeasures are available [3,13-15].

Moreover, there continue to be major gaps in social science research and capacity that could contribute to the design of measures, how they are accepted and communication around them [16,17].

During the early part of the COVID-19 pandemic, ECDC developed guidance on PHSMs, presenting and classifying several specific situations where these interventions have been used. For each of them, the underlying evidence, or considerations for their implementation was provided [4]; a summary of the classification of PHSMs for community settings relevant to this guidance document can be seen in the Annex 2. WHO also developed a framework characterising and categorising PHSMs [18].

It is important that lessons learned [10] and future knowledge around PHSMs are integrated into pandemic preparedness plans in a way that informs decision-making and action during health crises. In the context of the European Union, this should also be done in a manner consistent with the provision of Regulation (EU) 2022/2371 [19], the International Health Regulations (IHR) [20] and other global agreements around pandemic prevention, preparedness and response [21].

The underpinning principles that inform this document are that:

- PHSMs should be implemented in a time-limited manner that is proportionate to the threat and cognisant of the potential negative impacts of these measures;
- Considerations around the implementation of PHSMs will vary according to the nature of the health emergency and the phase of the event (for example, decisions will need to be kept under review during protracted crises);
- The design and implementation of PHSMs should be as equitable as possible;
- Mechanisms to monitor, evaluate, and learn from the implementation of PHSMs should be in place so as to enable continual assessment of the effectiveness and societal impact of PHSM;
- Implementation of PHSMs should involve/include engagement and communication with respective communities, including insight from social and behavioural sciences;
- Implementation of most PHSMs involves multiple sectors (e.g. transport, education etc.) and pandemic preparedness plans should include processes for intersectoral decision-making for such PHSMs;

This document is organised as follows. For each chapter, an overview of the context is provided, followed by recommendations which have been informed by expert consultations and the lessons learned reports which underpin this report.

Incorporating public health and social measures within health security and governance landscapes

Overview

Many countries globally may need to update communicable disease laws or regulations surrounding the implementation of PHSMs [22].

Governance surrounding PHSM must ensure that timely, evidence-based public health interventions can be made in a manner that also considers national and international obligations towards human rights.

Human rights, which include those related to the rights to liberty and security, respect for private and family life, freedom of movement and residence, freedom of assembly and of association, freedom of the arts and sciences, gathering, work, and education, could all be affected by certain PHSMs, such as stay-at-home orders [23]. According to the International Covenant on Civil and Political Rights (ICCPR) and, in Article 15 of the European Convention of Human Rights (ECHR), countries may derogate from certain human rights obligations under a state of emergency to protect human health through lawfully adopting measures that would otherwise breach these conventions, but such derogations should be time-bound and targeted to the threat [24,25]. States have specific obligations to uphold the human rights of socially vulnerable groups, which would include those with disproportionately higher risks during public health emergencies [24].

Importantly, States implementing derogations to Article 15 of ECHR shall notify the Secretary General of the Council of Europe of the measures that they have taken and the rationale for these measures, and it shall also notify them when such measures have ceased to operate [24].

The International Health Regulations (IHR) seek to strike a balance between disease control and interference with international trade and travel [26]. Article 43 of IHR notes that measures implemented by countries 'shall not be more restrictive of international traffic and not more invasive or intrusive to persons than reasonably available alternatives that would achieve the appropriate level of health protection.' Such measures should be based upon scientific principles, available scientific evidence, and/or any specific guidance or evidence provided by WHO.

In the EU/EEA, Regulation (EU) 2022/2371 on serious cross-border threats to health [27] is aligned with the IHR and aims to strengthen EU coordination in preparedness and response to infectious disease threats. Mechanisms to do so include the Health Security Committee (Articles 4, 21), the Union prevention, preparedness and response plan (Article 5), coherence across countries and the Commission on national prevention, preparedness and response plans (Article 6), alert notification of public health measures intended to be taken at national levels (Article 19, paragraph 3(g), Article 21 paragraph 3), the recognition of public health emergencies at Union level (Article 23) and an Advisory Committee on public health emergencies (Article 24).

Additionally, in relation to public health measures[i], Article 22 of Regulation (EU) 2022/2371 notes that the Commission could complement the action of Member States through adopting recommendations on common temporary public health measures, noting that these shall be 'necessary, suitable and proportionate to the public health risks' and 'avoiding any unnecessary restriction on the free movement of persons, of goods and of services', also promoting 'coordination of measures between Member States'.

Finally, it is important to note the ethical considerations surrounding PHSMs. Determining the 'right' course of action involves ethical considerations and not sole reliance on technical aspects or evidence of effectiveness in preventing disease transmission. To enhance responses to health emergencies, government policies should not only be based on biomedical evidence but should also explicitly incorporate ethical principles. Both prior to and during emergencies, input from ethicists alongside epidemiologists and other experts could help to ensure a comprehensive and ethical approach to decision-making around the implementation of PHSMs [28].

Additionally, it would be useful for public health workers to undergo ethics training. This specialised training could help them become acquainted with fundamental ethical principles, understand how to apply ethical considerations in developing and implementing public health interventions, enhance their ability to identify ethical dilemmas and, if relevant, make informed decisions. This training could also encourage self-reflection on moral beliefs and promotes adherence to established rules and standards of behaviour [29].

[i] Article 3 of Regulation (EU) 2022/2371 does not explicitly define 'non-pharmaceutical interventions' but states that a 'public health measure' means a decision or an action which is aimed at preventing, monitoring or controlling the spread of diseases or contamination, combatting severe risks to public health or mitigating their impact on public health'.

Recommendations

Based on the above, it is recommended that:

- National pandemic preparedness plans for EU/EEA countries are aligned with IHR and with Regulation (EU) 2022/2371, and are revised based on lessons learned from the COVID-19 pandemic;
- Pandemic preparedness plans account for the implementation of PHSMs, including outlining mechanisms and/or capacity for monitoring the impact and effectiveness of PHSMs;
- Countries assess the need to review which PHSM can be implemented under national law, and if necessary, consider updating national communicable disease or other laws to ensure alignment with pandemic preparedness plans;
- Pandemic preparedness plans account for the provision of support to socially vulnerable groups prior to and during pandemics;
- The European Commission, ECDC and Member States conduct stress tests of PHSM provisions in pandemic preparedness plans to assess coordination across the EU;
- Organisations dealing with public health crises would benefit from having dedicated ethical training offered to their staff - to effectively incorporate ethics into emergency response, Ethicists could also play an active role in the decision-making process during emergencies by participating in policy formulation.

Monitoring and assessing the implementation of public health and social measures

Overview

Gathering and synthesising evidence for the effectiveness of PHSMs is needed to allow for the prioritisation of the most effective and cost-effective PHSM, as well as ensuring the optimal combination of PHSMs are implemented to control the transmission of an outbreak [30]. This requires the effective collaboration of several stakeholders, including a PHSM monitoring framework to collect high-quality data on PHSMs, surveillance and modelling, and outbreak-related research. During outbreaks or emergencies, different legal contexts may exist for the collection of some types of data, such as contact tracing data. Knowledge-generation should be action oriented and collected in a timely way to respond effectively to the epidemiological situation [31].

The possibility of pre-designing guidance/protocols/templates for outbreak-related research should be considered as part of preparedness planning, so when an outbreak occurs, evidence is gathered and synthesised within an effective process.

One of the lessons identified during the COVID-19 pandemic is the need for a robust monitoring framework to collect high-quality data on PHSMs, document their implementation, and assess their effectiveness as well as their broader public health and societal impact [5,22,32]. In the early months of 2020, a large variety of PHSMs were implemented across Europe by different national authorities in response to the pandemic [33], which resulted in many disjointed initiatives emerging from European institutional and research stakeholders to document their implementation. However, as there was no standardised guidance on how to collect and record PHSM data, the resulting information varied between countries, as different methodologies were used. Consequently, assessing the effectiveness of PHSMs during the pandemic was a key challenge [1,30]. This was partly due to the simultaneous introduction of multiple measures [30], but was also related to difficulties in conducting outbreak-related research. However, if there were to be a predesigned mechanism for this, it would allow for the quick establishment and integration of data sources, and more timely analyses of the effectiveness of PHSMs [1]. In order to prepare for future pandemics, it is imperative to integrate evaluation into the design and implementation of public health interventions and policies from the beginning of any public health emergency [34].

Data collection and monitoring frameworks should draw from issues identified from the different European and global data collection initiatives. A common taxonomy is needed to allow for systematic and standardised reporting of PHSM data, the development of which can be a task for international organisations, including ECDC. Dedicated teams may be required for data collection and analysis, and commensurate financing may be required to implement PHSM monitoring systems.

Data collection

A robust data collection process is vital for assessing the effectiveness of PHSMs. This includes both primary and secondary data sources.

Primary data collection sources

The following are recommended primary data collection components:

- **Systematic collection of PHSM implementation data**: public health institutions should record the details of implemented PHSMs, including the scope, start and end dates, geographical area and the targeted population. Data should be gathered at the decision-making level. To ensure uniformity in the reported dates of PHSMs, it is essential to differentiate between the date when a PHSM is announced and the date if and when it is mandated (in case these are not recommendations that are supposed to be followed-up immediately). Studies suggest that behavioural shifts frequently occurred before the official enforcement of PHSMs, highlighting the importance of this distinction [30]. Data should be collected with a frequency depending on the needs of the response and the policy-makers. Member States should contribute to and use existing PHSM databases, such as the ECDC-Joint research Council (JRC) response database [33,35-39], to facilitate data sharing and collaboration. Data exchange, sharing insights, and regular updates require dedicated protocols to establish transparent and synchronised communication with stakeholders. Also, global, comparative data about the implementation of PHSM is extremely relevant for decision-makers, researchers and the general public, and pivotal in a sustainable system.

- **Collection of epidemiological data:** situational awareness of the epidemiological situation is essential for sound decision-making around PHSMs, as they are implemented with the express aim of breaking transmission chains [40]. Key epidemiological indicators such as the number of infections and confirmed cases, is crucial for evaluating the impact of PHSMs. In addition, further epidemiological outcomes like hospitalisations and deaths would be needed to enable comprehensive analyses that address, for example, important risk factors. Lessons identified from the COVID-19 pandemic around data collection and analysis talk about robust but agile surveillance systems connected to existing registries, to be able to collect various types of data. Epidemiological data should be as geographically specific as possible, making it possible to evaluate PHSMs at the geographical level where they are implemented.
- While each category of data has its unique advantages and limitations, their relevance for assessing the impact of PHSM greatly relies on the consistency of reporting. For instance, inconsistencies in data collection over time could interfere with patterns in epidemiological outcomes, potentially misattributing these trends to transmission patterns [30].
- **Collection of additional data** such as economic data, changes in employment, work-life balance and GDP, can be used to monitor the impact of PHSMs on the economy.
- **Categorisation of intervention data**: To evaluate the effectiveness of comparable PHSMs among various populations, it is essential to systematically categorise these measures. However, some inconsistencies were found between several public databases, probably determined by subjective coding judgments. To mitigate this, it is crucial that researchers keep a separation between data collection and the coding of interventions, enabling the application of different codes to the same raw data [30].
- **Monitoring public adherence and acceptance**: data on public adherence and acceptance to PHSMs can be collected through regular population surveys, social media monitoring, and other innovative data sources such as public geospatial mobility data [41,42].

Through data collection, it is important that the following principles are also applied:

- **Acknowledge uncertainties:** uncertainty in data collected from diverse sources can be significant in the context of epidemiological modelling, due to the frequent oversight of quantifying and reporting uncertainty. Acknowledging uncertainty in epidemiological parameters is particularly important, especially in the case of newly emerging pathogens where the understanding of transmission and disease progression is still limited [30].
- **Validation of data**: in order to facilitate a more comprehensive understanding of PHSM implementation, validating data is crucial and supports enhancing reliability and identifying gaps.
- **Transparency**: information accessibility and accountability can be secured by transparent data collection and appropriate reporting systems.

Secondary data collection sources

Scientific assessments of PHSM are required to inform decision-making during an outbreak as well as provide evidence that can be used to revise pandemic preparedness plans. Thus, while outbreak-related research is vital to inform decision-making and for the quick adaption of measures, longer-term studies, or those conducted during so called 'peace time' are also essential to generate evidence on certain measures. Mathematical modelling, and retrospective and prospective studies have been the principal forms of evidence on the effectiveness of various PHSMs, while very few randomised control trials of PHSMs have been conducted. Various qualitative methodologies have also provided data on social acceptance and uptake of PHSMs.

Mathematical and statistical modelling techniques can be used to assess the effectiveness of PHSMs and explore their impact in scenarios of potential future disease trajectories and on courses of action. Modelling can be used to explore different scenarios and predict the potential impact of PHSMs under various conditions. This will be important to inform the correct timing of PHSMs, as measures can have a delayed and decreased effect if they are implemented too early or too late.

ECDC has highlighted that increasing the capacity for outbreak-related research would be advantageous, i.e. research during the crisis aiming to answer questions important for operational decisions [1]. Better evidence is needed on how well PHSMs work but also why and how they work, with recognition that the same measure may work differently depending on setting, location etc. Retrospective studies are important for evaluating the effectiveness of PHSMs that have already been implemented, and evidence can usually be found in published (or pre-print/grey) literature. Prospective studies or other relevant studies undertaken during the implementation of PHSMs, however, provide real-time data on the impact of the PHSMs on disease transmission.

There are many key challenges to conducting research during a crisis, both pre- and during crisis which should be improved [2]. For example; the capacity for planning studies in advance, defining priority research questions/outcomes, considering strengths and weaknesses of various study designs, using indirect evidence to better understand current interventions applied in other contexts, using a variety of research approaches, and ensuring a multi-sectoral approach. [2]. Outbreak-related research and the need to plan studies in advance should

be considered as an important part of preparedness and response for health emergencies, such as outbreaks, epidemics and pandemics.

It is also important that research is not solely focused on more traditional epidemiological evidence but that it also addresses the factors that could increase or decrease public acceptance of and adherence to various PHSMs. This can be investigated through, for example, serial cross-sectional surveys [42]. However, qualitative data should also be used to shed light on why and how acceptance and adherence levels may be high or low. Such information can be an invaluable support to decision making about the optimal level and nature of any planned PHSMs [16].

Recommendations

Based on the above considerations, it is recommended that:

- PHSM implementation should be monitored using an agreed framework and methodology which clearly defines the scope and objectives of the data collected. Relevant guidance, training, and data collection tools should be developed.
- Such framework should include a common PHSM taxonomy and learn from issues identified during the collection of information on PHSMs implemented in response to the COVID-19 pandemic.
- Ensure effective collaboration and data sharing between teams responsible for data collection and surveillance and those involved in analysis and modelling, while securing necessary permissions to facilitate a rapid assessment of the effectiveness of PHSMs.
- Where empirical data are lacking, the capacity to use the results from modelling studies to inform decision-making should be maintained. Public health institutions should communicate clearly and transparently about the limitations and uncertainties associated with modelling results, to both policy-makers, as well as the public.
- An emphasis is placed on outbreak-related research that could be quickly conducted during outbreaks, and the need to develop standardised and pre-established protocols for monitoring and assessing PHSMs, collection and sharing of data through collaboration and research partnerships.
- Strengthen international, national, and sub-national capacity for evaluating the implementation of PHSMs through the development of improved methodologies, and the identification of appropriate datasets.
- Systems and capacities aimed at monitoring PHSMs should be able to assess their impact on society, including on the most vulnerable groups of the population.
- Better harmonisation of the categories, scope and conditions across EU/EEA and globally should be a goal, while developing monitoring systems. Comparability between countries will enhance the collection of evidence related to PHSMs.
- Any single PHSM may have limited impact in isolation. For a desired reduction in pathogen transmission, multiple PHSMs may need to be combined. Consequently, it is important to consider and, when data are available, to evaluate their cumulative intended and undesired impact before implementing a measure.
- Health professionals and stakeholders from other involved sectors should be involved in the elaboration and optimisation of the PHSMs, as well as in teaching how to properly apply and communicate about them.

Assessing the broader public health and social impact of public health and social measures

While it is important to understand and assess the effectiveness of PHSMs in preventing infectious disease transmission, it is also essential to assess their broader social impact. During the COVID-19 pandemic, the implementation of PHSMs had broad public health and social impact on society as a whole and on certain groups of people [43-46]. The impact varied across countries and settings, depending on the nature, length and extent of the measures implemented, as well as on sociodemographic population structures and the different characteristics and resilience of public health and social welfare systems. Some measures were implemented for an extended period of time without sufficient evidence on their effectiveness, resulting in adverse health, social and economic outcomes for individuals and communities [17].

The economic burden of the COVID-19 pandemic was substantial. However, PHSMs implemented for pandemic control demonstrated a positive impact on the extension of life years, both at the individual and societal level, compared with 'no-intervention' scenarios, although the cost-benefits of such interventions differed depending on the perspective, the time frame, the setting and the epidemiological context of the pandemic [47].

Existing socio-economic and health inequalities widened during the COVID-19 pandemic because of the disproportionate impact experienced by already disadvantaged or vulnerable groups [46]. These included disproportionate high mortality from COVID-19, financial losses due in part to PHSMs, as well as mental health effects. Affected groups included people with low income; people with chronic comorbid medical conditions; people living with physical disabilities or mental health concerns; residents of congregant settings; and essential workers. First responders, service-sector workers, and other essential workers often hold relatively low incomes and, in some countries, have low access to high-quality healthcare, and therefore disproportionately experience negative health, economic, and social effects. Additionally, most healthcare workers are women and there is thus a need to consider gender inequalities when adopting measures [45]. Socially and socioeconomically disadvantaged groups would benefit from continued monitoring and increased public health efforts to prevent and mitigate long term effects, not only from the effects of COVID-19 but also from other health threats.

In addition, the pandemic impacted on the mental health of the population in most European countries, reflected by increases in reported anxiety and depressive disorders. Available data suggest that the impact on people's mental health was especially marked in young people, socially or medically vulnerable older people, and people with underlying health conditions or disabilities and people with a history of mental health problems [48,49]. The magnitude and duration of these impacts, particularly among some vulnerable groups such as people with low income or racial or ethnic minority groups, is difficult to assess as there is a lack of data to allow assessment of trends over time [50].

The effects of school closures and distance learning on the lives of children and their families had a range of negative effects, including; social isolation; financial hardship; loss of education and future earnings; food insecurity; harmful mental health effects for children and caregivers; increased gender inequality; lack of or gaps in access to healthcare, and illness and death [51-56]. Previous research on the educational impact from the 2014 Ebola outbreak in West Africa and the 2008 global financial crisis exemplifies how the learnings from past crises were not harvested sufficiently [57]. Educational systems would benefit from recovery efforts that also include plans for future preparedness and crisis management [58].

Domestic violence was reported to be exacerbated by the pandemic, as home confinement intensified contact between abusers and victims, leading to increased violence and fewer reported cases [59]. Moreover, the transition to remote healthcare consultations hampered confidential discussions, hindering disclosure, especially for individuals isolated from their social support networks – as such physical interactions serve as a tangible connection to the outside world for many people in those situations. [60].

It is important to increase our understanding of the complex, direct and indirect health and social impact of the pandemic and to more quickly assess and adapt different PHSMs accordingly. To understand how we can mitigate the negative effects, timely and continuous assessment is needed. This requires a comprehensive public health approach to determine research methodologies which allow for holistic assessment of the impact of PHSM during health emergencies across different sectors of society [2]. Moreover, PHSMs that are broadly socially accepted are more likely to be sustainable, and by proxy, effective in the long term [23].

Systematically assessing the adverse consequences on health inequality across population groups also requires a structured and planned approach to intersectoral collaboration, preferably set up before crises hit. To improve the assessment of social impact stratified by groups in society, we need to foster a greater range of collaboration and knowledge exchange across public health and other disciplines, notably economics, policy sciences, and social sciences, including behavioural insights [1]. Assessing harms and benefits of PHSMs for different groups is challenging and includes weighing costs that fall on some sections of society more than others [61]. From the policy-making perspective, the implementation of a Health in All Policies approach could help to address policies in every sector of government to prevent unintended consequences and inequities in health [62]. There is a need to account for broader public health objectives and principles of human rights and democracy, such as the right to health and education [63,64] for all regardless of sex, age, health status, disabilities or ethnic background [65].

Recommendations

- Continue to conduct studies on the long-term impact, both direct and indirect, of PHSMs through multi-disciplinary research coordinated at national and international levels.
- Based on the lessons learned from the COVID-19 pandemic, advocate and work with policy-makers to decrease social inequalities, particularly in the area of access to healthcare.
- Continue to invest in healthcare system recovery and resilience as well as targeted workforce recovery measures to address the wider health impact and inequalities of the COVID-19 pandemic.
- Increase intersectoral collaboration in planning, monitoring and evaluation as well as in the advice- and decision-making process around PHSMs.
- When planning for or implementing PHSMs, a comprehensive approach is needed to allow for inclusive assessment of the impact of PHSMs across sectors and segments of society.
- Adopt strategies to mitigate the unintended negative consequences of public health and social measures, and to protect vulnerable populations from disproportionate socioeconomic harm [22].
- To minimise the social impact of the crisis, implement support policies targeted at the most disadvantaged groups in society, including groups more severely affected by mental health issues [3].

Building trust and ensuring effective communication through community engagement

Overview

It has been observed that the management of the COVID-19 pandemic in Europe was hindered by declining public acceptance to proposed control measures [66]. While this was not universal across all countries, the reasons for it are multi-faceted, including not only the side-effects of PHSMs themselves, but also low confidence in government advice, sub-optimal health literacy, inadequate or poorly targeted behavioural change interventions, and misinformation and disinformation campaigns that undermined confidence in the recommended or mandated measures [45]. There were also challenges in presenting and justifying changes in sometimes complex recommendations or mandates to the population, in spite of the widespread use of approaches, including infographics, for disseminating messages in both traditional and social media [67]. Moreover, many countries reported little or no capacity to manage mis- and disinformation during the COVID-19 pandemic, while risk communication and community engagement (RCCE) were consistently identified as among the biggest challenges for public health professionals in EU/EEA countries [10].

The importance of effective RCCE came to the fore during the COVID-19 pandemic through a recognition of the challenges in securing community support for and adherence to recommended or mandated PHSM measures [10,22]. It also became apparent that insights from the social and behavioural sciences needed to be incorporated more fully into technical guidance [10,22]. For example, social and behavioural sciences could have provided detailed insights into the behavioural choices, barriers and drivers affecting adherence to PHSMs as well as vaccination acceptance and uptake. It could have also facilitated the design of measures that matched the needs of communities, and informed stakeholder and community engagement strategies [68]. The COM-B model (about how capabilities, opportunities and motivation can affect behaviours) [69] provides a useful and easily understood framework for shaping intervention strategies so that adherence to measures such as PHSMs can be optimised. However, the model has so far not been extensively integrated into public health preparedness planning.

Establishing trust with communities to counter opposition to public health initiatives during emergencies requires transparency, frequent and targeted crisis communication, and consistent dialogue and engagement [3]. Socially vulnerable groups often suffered disproportionately from the undesired effects of PHSMs during the pandemic, and yet they were also often under-represented in the public discourse. Specific outreach activities to engage these groups and/or the civil society organisations representing them as a means of working collaboratively and thereby identifying community-friendly solutions, emerged as a priority during the COVID-19 pandemic. As building trust is very challenging during a health crisis, such investments should be made on a routine basis during peacetime, as this creates a strong foundation to build on when a health emergency emerges [1].

The importance of ensuring multi-disciplinarity among crisis management teams and scientific advice bodies is often emphasised [3]. Public policies during the COVID-19 pandemic are generally thought to have failed to draw upon the social and behavioural sciences, when doing so may have helped to increase societal trust and minimise disparities while also optimising adherence to, and therefore effectiveness of interventions [45]. In the EU/EEA, the potential of social and behavioural science research was not fully realised due to an insufficient awareness of it among key decision-makers, but also due to longer term capacity limitations, primarily focused on staffing and resource issues. These in turn were caused by limited priority previously given to the area by decision-makers and thus a shortage of investment in this field [16]. Furthermore, there was an under-representation of social and behavioural scientific expertise among COVID-19 emergency management teams which may have prevented the important insights from these fields in shaping more acceptable and effective national COVID-19 responses [16].

Recommendations

- Pandemic preparedness plans should:
  - ensure that social and behavioural sciences are integrated into crisis management structures;
  - emphasise the importance of RCCE, and include clear details on RCCE strategies;
  - detail mechanisms to address rumours, misinformation and disinformation, based on social listening strategies;
- Countries should seek to train their public health and crisis management professionals in risk communication and community engagement principles;
- The state-of-the art in the fields of risk communication and community engagement needs to be advanced through developing longer-term investment aimed at building trust with the population during peacetime, and deploying social and behavioural scientists when health crises emerge;
- Communities of practice for social and behavioural scientists that would contribute to public health emergency preparedness and response activities, should be developed, trained and supported as a matter of routine.

Enhancing multi-disciplinary coordination and decision-making

Overview

To support informed, evidence-based and ethically-informed decision-making on the use of PHSMs in a public health emergency, international, multi-disciplinary and cross-sectoral coordination is crucial for effective national crisis management.

The COVID-19 pandemic re-enforced and further confirmed the importance of a robust, cross-sectoral, and multi-disciplinary public health emergency plan to ensure readiness to act, whether it is on the use of PHSM or other response activities. Experience from the COVID-19 pandemic, showed that an emergency plan needs to address and ensure a whole-of-government intersectoral response with clear roles and responsibilities. It also needs to be regularly exercised and updated in collaboration with sectors beyond health. A formal role of public health institutions in providing evidence-based advice for (policy) decision-making, also needs to be guaranteed and reflected in a national emergency plan [10]. Moreover, institutions involved need to have clearly defined areas of responsibility to avoid duplication and unnecessary loss of time when an outbreak occurs [70] and to avoid acting beyond the scope of their mandate [55].

Cross-sectoral preparedness planning for PHSM may also help to anticipate the types of public policy responses required during pandemics to offset the indirect impact of PHSMs; examples could include unemployment insurance, paid sick leave, or mental health programs [71].

Lessons from COVID-19 identified several areas that will be important to address to ensure a robust coordination and decision-making process for any future public health crisis. These include [10]:

- Establishing a formalised role for the public health sector in decision-making and crisis management structures and enhancing the role of the public health sector during health emergencies;
- The facilitation of intersectoral work in the preparedness and response to public health crises;
- During the phase of preparedness planning, there is a need to update existing legislation that governs communicable disease control, to consider ethics/human rights and intersectoral effects as well as to outline responsibilities;
- The need to strengthen and improve international cooperation, coordination and solidarity.

The decision-making process around the implementation of PHSMs during the COVID-19 pandemic was very heterogenous across countries [1]. The need for multi-disciplinary governmental advisory groups was identified as critical for the future, as well as ensuring that social equity and gender equality are addressed in advice to decision-making. It is also important to clarifying the roles of public health institutions, where often the role has been more one of advice-making than decision-making. The decision to introduce PHSMs needs to consider the socio-economic and political context, ethics, behavioural insights, socio-economic impact, and any levels of uncertainty [1] as well as the need to control the spread of a pathogen. For this, clear processes and procedures for using expertise from all these fields/sectors needs to be established, described and exercised in a public health emergency plan. Moreover, the use of shared guiding principles makes the reasoning behind recommended actions easier to present, and following the same principles ensures greater consistency across recommendations [55].

If decision-makers do not consider diverse disciplines, preparedness and response efforts can be negatively compromised. This risk, highlighted by previous outbreaks, is posed by the absence of an inclusive research agenda that integrates various disciplines [17].

As described in the WHO global technical consultation on PHSM during health emergencies, establishing and using multi-disciplinary groups to inform the decision-making process can strengthen the confidence in any advice provided and subsequent decision taken. Whilst it might also bring its own inherent difficulties, as different sectors will consider different aspects of importance making consensus more difficult to reach, it will ensure decision-makers and crisis managers are presented all areas of concern as they consider which actions to take. Furthermore, it can also increase the understanding behind any decision taken [2].

The current serious cross-border threats to health regulation also highlights the importance of a multi-sectoral, all-encompassing decision-making process. EU preparedness and response activities are called upon to be cross-sectoral and to involve all relevant stakeholders, including patient organisations and social partners, in the decision-making process [27].

In addition to an informed multi-disciplinary decision-making process, the need to ensure coordinated action and implementation plays an important role in ensuring a transparent and accepted use of PHSMs. Ensuring all sectors have discussed and agreed on the actions/response each will enact will ensure a coherent approach and allow for a coordinated communication. Such coordination is important on all levels; regional, national, international. However, a coordinated response does not imply an identical response across all sectors/entities, regions or countries, but rather that all sectors and partners are informed and have discussed the approaches and can transparently explain and present the responses (i.e. introduction of PHSMs) introduced in any given context/setting. Such coordination can be supported through multi-disciplinary forums, meetings and/or digital platforms. Processes and procedures for multi-disciplinary and cross-sectoral coordination need to be described and exercised in emergency preparedness plans. This lesson has been reinforced by after-action reviews focused on decision-making during the COVID-19 pandemic in varying national contexts [55,70].

In summary, to ensure a rapid and effective introduction and use of PHSMs during a pandemic, the need for a coordinated, structured, and inclusive decision-making process is essential. The advisory structure to decision-makers and crisis managers needs to include a multi-disciplinary team/platform, with a process that is grounded in an informed, whole-of-society, advice basis, to inform the decision-making process.

Recommendations

- Within emergency plans, clarify roles and responsibilities and establish and exercise clear processes and procedures for requesting expertise from all relevant fields/sectors, to allow an all-encompassing advice and decision-making process.
- Formalise the role of Public Health institutions and bodies in decision-making and crisis management structures [10].
- Update (national) legislation governing communicable disease control during preparedness planning, considering ethics/human rights, intersectoral effects and outlining responsibilities [10].
- Pre-established partnerships across the health and economic sectors might facilitate the timeliness and salience of information available for decision-making during crises [1]. Common activities such as trainings and simulation exercises can assist in forming these partnerships during peacetime.
- Platforms, forums and procedures to support coordination need to be established and available before any next public health emergency occurs.
- Develop tools to support national and subnational decision-makers in their implementation of evidence driven public health and social measures, which maximise their benefit and minimising their health, social and economic burden.

Conclusion

The potential future implementation of PHSM requires careful consideration – informed by lessons learned from the COVID-19 pandemic – and should be explicitly addressed by national pandemic preparedness plans. During future epidemics and pandemics, there may be a period of time before the widespread availability of medical countermeasures where PHSMs may again be relied upon to reduce disease transmission, and mitigate deleterious health impacts. The public health objective of reducing overall harms to population health should continue to apply in crisis situations. A general principle should be that measures with the highest level of acceptability/feasibility and the lowest negative consequences could be introduced first and removed last, while also noting that the early implementation of some measures will yield the highest effectiveness.

This guidance document identifies key issues and recommendations, informed through extensive consultation with experts and ECDC stakeholders, related to the application of PHSMs in community settings. The recommendations presented here are intended to assist national and international public health institutions in identifying potential priority areas for work within their jurisdictions. It is noted that many matters discussed here may require extensive cross-governmental collaboration and sponsorship, but given the high stakes surrounding pandemic management – not to mention the significant impacts that PHSMs may have on communities – commensurate efforts are warranted.

Annex 1. Agenda of ECDC consultation on the implementation and evaluation of PHSMs in community settings

24 May 2023, Wednesday, 09.00-17.00

08:30–09:00	Registration at the hotel's reception area
09:00–10:00	**Introductory plenary session** - Welcome and introduction to the Consultation, Thomas Hofmann (ECDC) - Meeting aims, objectives, and organisation, Jonathan Suk (ECDC) - WHO activities on public health and social measures
10:00–10:30	**Moderated plenary discussion: the role of PHSMs in future pandemics** (Jonathan Suk, Favelle Lamb (ECDC))
10:30–11:00	**Coffee-break**
11:00–12:00	**Plenary session: Implementing NPIs under conditions of uncertainty: what have we learned?** (Moderator: Ettore Severi (ECDC)) - Atle Fretheim (Norwegian Institute of Public Health) - Veronica Toffolutti (Queen Mary University of London) - Henrik Kugelberg (Stanford University)
12:00–13:00	**Lunch**
13:00–14:30	**Plenary session: what can we learn from school closures during the pandemic?** (Moderators: John Kinsman, Jonathan Suk (ECDC)) - Introduction - Film screening: "We thought it would be fun", Lianne Cremers, Cato Janssen (Vrije Universiteit Amsterdam) - Q&A on the film - Plenary discussion: Reflections on school closures: Lianne Cremers, (Vrije Universiteit Amsterdam), Olivier Rubin (Roskilde Universitet), Charlotte Deogan (ECDC)
14:30–15:00	**Coffee-break**
15:00–16:30	- Introduction to group work - Group work
16:30-17:00	**End of day plenary discussion on group work**
19:00–20:30	**Dinner at the hotel**

25 May 2023, Thursday, 09.00-16.30

09:00–09:30	Registration at the hotel's reception area
09:30–10:15	Recap Day 1 Behavioural insights for guiding pandemic response, Marijn de Bruin (RIVM)
10:15–10:45	Coffee-break
10:45–12:00	Working groups
12:00–13:00	Lunch
13:00–14:30	Working groups
14:30–15:00	Coffee-break
15:00–15:15	Slido exercise
15:15–16:30	Final plenary discussion on group work
16:30–16:35	Meeting closure

Annex 2. Examples of PHSMs for community settings relevant to this guidance document

Community PHSMs			
1. Personal PHSMs	**2. Social PHSMs**	**3. Environmental PHSMs**	**4. Travel measures**
Hand hygiene: • Washing hands with soap and water or using alcohol-based hand sanitiser when soap and water is not available When: • regularly • before contact with people at risk of developing severe forms of disease • before and after contact with potentially contaminated objects or surfaces • before and after passage in frequently used spaces	Limiting physical interpersonal interactions: • Organise and keep a 0.5-m distance between people • Limit the number of close contact people (social bubbles gatherings) • Meet in open spaces (outdoor) whenever possible • Wear a face mask when physical distancing cannot be respected (crowded places)	Cleaning frequently used surfaces and objects	Enforcement of movement restrictions and local curfews • Restricting entry • Restricting exit • Restricting visas • Stay-at-home order • Restricting domestic movement
Respiratory etiquette: • Covering cough and sneezes with a disposable tissue • Coughing in your elbow • Wearing a medical face mask When: • meeting with people at risk of developing severe forms of disease • having flu-like symptoms • physical distancing cannot be respected (crowded places)	Adapt the social space to minimise the spread of viruses: • In public transport, public spaces, etc. • In schools, working spaces, service delivery, etc. • Size restrictions for private or public gatherings	Improving the quality of air through: • Ventilation • Filtration • Humidification	Travel advice and recommendations (non-essential journeys): • Travel advice • Travel warning
Staying at home and self-monitoring signs when: • sick or • after close contact with an infectious person.	Stay-at-home orders and closure of: • educational institutions if appropriate • non-essential businesses • implement teleworking when possible	Avoid sharing personal items	Screenings at borders or points of entry and advice to entering travellers: • Exit/entry screening for symptoms • Exit/entry screening for exposure • Testing
Be prepared and informed (via official and validated channels)	Implement and facilitate measures related to cases and (close) contacts: • Testing • Isolation of non-hospitalised cases • Quarantine of close contacts and suspected cases • Effective contact-tracing capacities		Travel bans (to/from specified countries/areas) and border closure: • Closing entry borders • Closing exit borders • Closing internal land borders
	Implement measures for specific population groups or communities (for instance: prisons, migration centres, minorities, impaired persons, etc.)		Case reporting and communication with neighbour or foreign authorities
	Provide information and risk communication messages, ensuring inclusion of the most vulnerable or isolated communities		Quarantine of entering travellers and passengers: • Home quarantine • Healthcare facility quarantine • Other quarantine

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