



Research article

The public's considerations about implementing non-pharmaceutical interventions to manage a novel COVID-19 epidemic

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ABSTRACT

In the future, new variants of the SARS-CoV-2 virus might emerge and cause outbreaks. If this occurs, the implementation of non-pharmaceutical interventions (NPIs) can be reconsidered. Consideration of the potential benefits and harms of implementing NPIs, and ultimately deciding about implementing NPIs, is currently mainly executed by experts and governments. However, general literature on public engagement suggests that integrating public perspectives into decision-making can enhance the quality of decisions and foster greater public understanding of them. In this study, a deliberative mini-public was conducted to integrate this public perspective. The aim was to elicit public considerations regarding non-pharmaceutical interventions by asking a diverse group of citizens to participate as decision-makers and convene, learn and deliberate about implementing non-pharmaceutical interventions during a hypothetical outbreak of a new SARS-CoV-2 variant. Participants emphasized the importance of early implementation during the outbreak, to prevent exceeding healthcare capacity, long-term mental health issues, educational deficits, and bankruptcies. Additionally, participants stressed taking public support into account, and shared ideas on maintaining support. Furthermore, participants wanted to give citizens personal responsibility and freedom in making their own assessment regarding adherence to interventions and how much risk of infection they would be willing to accept. Participants also expressed the need for the government to adopt a learning attitude towards improvements in pandemic response, and to generate more focus on long-term strategies. The deliberative mini-public, revealed public considerations that reflected public values and needs. These considerations might be helpful in better aligning epidemic management policies with public perspectives. Regarding the deliberative mini-public, uncertainties remain about the design and impact on a bigger scale.

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1. Introduction

In 2023, a few years after the onset of the COVID-19 pandemic, the pandemic has evolved into a new phase. The disease burden has been considerably reduced by high immunity levels in populations due to immunization programs and natural immunity gained as a result of the circulation of various SARS-CoV-2 variants, as well as improved clinical case management [1]. After various cycles of disruptive restriction measures, societies are recovering from the pandemic [2]. Yet a persistent threat is looming, with the possibility of the emergence of highly virulent SARS-CoV-2 variants that could challenge current immunity and vaccine protection. If this occurs, the implementation of non-pharmaceutical interventions (NPIs) such as hygiene measures, social distancing or closure of public places might be considered once again. When deciding upon implementing NPIs, a key challenge is to consider the different and competing values, beliefs, interests, and perspectives within society. Besides health protection, threats to individual liberties, impact on mental health and long-term economic damage should be carefully considered when deciding on appropriate interventions [3,4]. Furthermore, for a number of NPIs, uncertainties remain about how effective they are on a variety of outcomes [5,6]. When considering these issues, underlying beliefs can also play a role, such as individualism and responses to (scientific) information [7]. Ultimately, implementation of NPIs depends on their positive and negative effects, and how these are valued and prioritized [8].

Currently, the decision-making regarding NPIs predominantly involves experts from healthcare institutions and policymakers. However, numerous institutions, such as the World Health Organization, emphasize the importance of engaging societal views in pandemic response [9,10]. These appeals rest on the premise that inclusive deliberation can diversify perspectives in decision-making, which may ultimately increase the quality of decisions. The process of engagement can also foster public understanding about the process of decision-making. Overall, public support might increase by developing decisions that are more receptive to public experiences and values, as well as by increasing public understanding about how decisions were made [11,12]. Public engagement can serve as a tool to achieve these objectives.

In the context of this study, public engagement is considered as the spectrum of activities aimed at incorporating the beliefs, values, and perspectives of those affected by an epidemic into NPI decision-making. The mode of engagement is context-specific and can vary between informing, consulting, involving, collaborating, and empowering the public [13]. Several studies explored the potential of public engagement in the response to the COVID-19 pandemic, often focusing on consulting the public [14]. For instance, Krauth et al. (2021) used discrete choice experiments to collect preferences from 1020 German citizens regarding exit strategies from COVID-19 lockdowns [15]. Similarly, Betti et al. (2020) executed discrete choice experiments to examine the views of 1562 Italian citizens about different re-opening or lockdown strategies [16]. These studies typically employed online preference methods, allowing for the rapid collection of data by including a considerable number of citizens [17]. Furthermore, the online method is beneficial for collecting insights into real-time preferences during times of lockdowns. However, there is limited room to gain understanding regarding underlying reasons for preferences. Moreover, for instance during a discrete choice experiment, individual preferences of participants might be diverse and potentially conflict with one another, with no room to deliberate about how to consider this variation or conflict. This might impede the integration of findings into practical decision-making.

In order to create such a space, another approach to public engagement is deliberative mini-publics (DMPs). In DMPs, a diverse group of citizens, ranging from 12 to more than 100 participants, is asked to consider ethical or value-based dilemmas and invited to carefully weigh competing views [18]. This approach is designed for participants to learn about complex topics, deliberate and reflect on them, and to develop informed opinions. It provides room to capture in-depth and informed perspectives and provides room for new ideas or topics to emerge outside of the study's scope. Furthermore, by means of deliberation, participants can share their individual preferences, and ultimately formulate a solution or recommendation as a group [19]. An example is a citizens' forum in the Netherlands, in which 24 participants deliberated on COVID-19 vaccine uptake and preferences for public vaccination campaigns. Participants felt that the forum helped them to better understand the establishment of policies in epidemic management. Improvements for campaigns included more transparency regarding safety and effectiveness of vaccines, preferably communicated by independent experts. It would also be valuable to offer citizens opportunities to engage in dialogue with experts [20].

DMPs offer potential value in engaging the public in decision-making regarding epidemic management, particularly for complex and value-laden topics such as NPIs [21]. This might reveal the underlying values and beliefs driving public preferences and increase the understanding of how public considerations are weighed regarding NPIs [22]. In the future, new variants of the SARS-CoV-2 virus might cause outbreaks, possibly leading to the reconsideration of NPIs [23]. It is therefore important to shed light on how the public weighs considerations when deciding upon NPIs, when they are in the position of a decision-maker. In the end, integration could aid decision-makers in creating policies that are more in line with the values, needs and preferences of the people who have to adhere to NPIs [24]. We aim to study public preferences regarding the considerations about implementing NPIs and the rationales underlying these preferences. Additionally, we explore the viability of DMPs as a tool for collecting rationales to inform NPI decision-making. This dual objective aims not only to clarify public considerations and underlying rationales but also to provide guidance on DMP as a method to gather such insights. This might provide useful knowledge for future public engagement. This study aims to answer the following research question:

What are the public considerations about implementing non-pharmaceutical interventions to manage an outbreak of an unknown SARS-COV-2 variant in the Netherlands, while being placed in the role of decision-maker during a deliberative mini-public?

2. Method

In this study, a deliberative mini-public (DMP) was executed to illicit considerations and underlying rationales of Dutch citizens regarding NPIs in a novel hypothetical outbreak of an unknown SARS-COV-2 variant.

2.1. Participant recruitment

The participants were recruited from an online research panel (Norstat; ISO 20252:2019). This panel consists of more than two million members of 18 years and older from the Netherlands, who are invited for membership based on random samples of name and address data [25]. The aim was to recruit a group of around 50 participants, from this panel, varying in gender, age, place of residency, education level, and migration background, to capture a diverse range of ideas, perspectives, and needs regarding NPIs. Based on the desired number of participants and the variety in demographic characteristics, a sample of 667 members was invited to participate. This invitation included information about the background and goal of the study, and consent was asked to share contact information with the researchers. After one week, a reminder was sent out to the initial sample. Throughout the sampling procedure, the variety in demographic characteristics was tracked in order to ensure a variety in perspectives during the DMP. After the initial sampling, it was identified that young participants were underrepresented. Therefore an additional invitation was sent to 60 people between 18 and 25 years old.

2.2. Design of the deliberative mini-public

The process of the DMP is depicted in Fig. 1, adapted from Carman et al. on public deliberation [21], which is used to explain the design of the DMP of this study:

2.2.1. Convene

On May 9th, 2023, 44 citizens convened in a 2.5-h live deliberative mini-public at the Dutch National Institute for Public Health and the Environment (RIVM). Before starting the actual DMP, there was a period of 30 min in which participants could enter the room, provide written informed consent to participate, and get familiar with other participants and researchers. At the start of the DMP, the goal of the study was again explained, and all participants were assigned the role of a decision-maker in the government. The DMP consisted of three learning and deliberation phases. During each learning phase, participants were presented with a hypothetical outbreak scenario followed by a live expert briefing in a plenary setting. Each learning phase was followed by a deliberation phase, in which participants separated into groups of 6–7 participants. They deliberated about the implementations of NPIs corresponding to the presented scenarios. After deliberation, participants reconvened in the plenary session for the next learning phase. In each learning and deliberation phase, participants went through a similar procedure, with the hypothetical outbreak scenario and corresponding NPIs increasing in severity. The full script can be found in Supplementary file 1, and each step is explained further below (corresponding with Fig. 1).

2.2.2. Learn

Each phase of the DMP started in a plenary setting, by conveying a hypothetical outbreak scenario to participants by video (see Supplementary file 1 for video-content). The specific characteristics of outbreak scenarios 1,2, and 3 are displayed in Fig. 2.

Following the video, two medical experts in infectious disease control reflected on each outbreak scenario based on their expertise and they advised three NPIs to be nationally implemented in the current phase of the outbreak. Fig. 2 depicts the advised NPIs.

This advice was created beforehand with all experts involved, resulting in joint advice from the two medical experts to the participants in favor of implementing the advised NPI. Per advised NPI, an explanation was given about the underlying rationale as to why these NPIs could work, e.g. minimizing contact between people and protecting vulnerable populations (see Supplementary file 1). For scenario 2 and 3, a graph was shown that displayed a general image of the expected effects of the advised NPIs on the number of patients admitted to the ICU, see Supplementary file 1. These graphs also displayed what would happen with the number of admitted

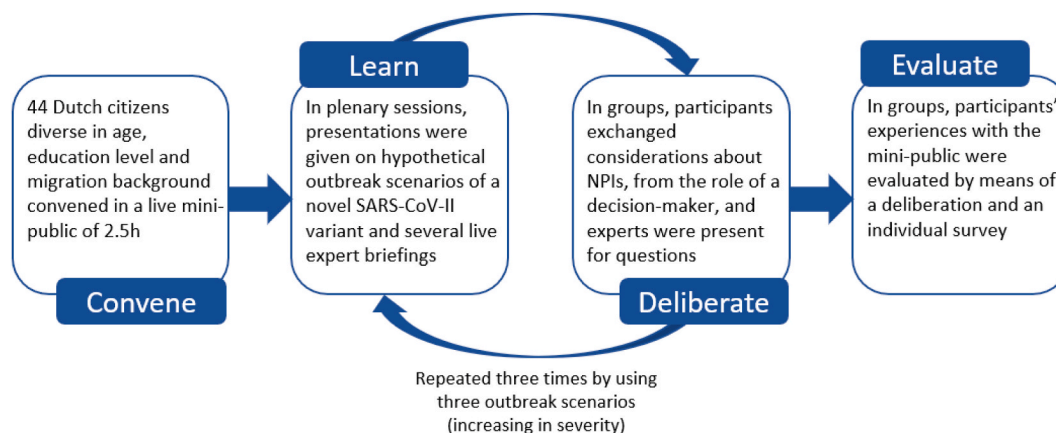
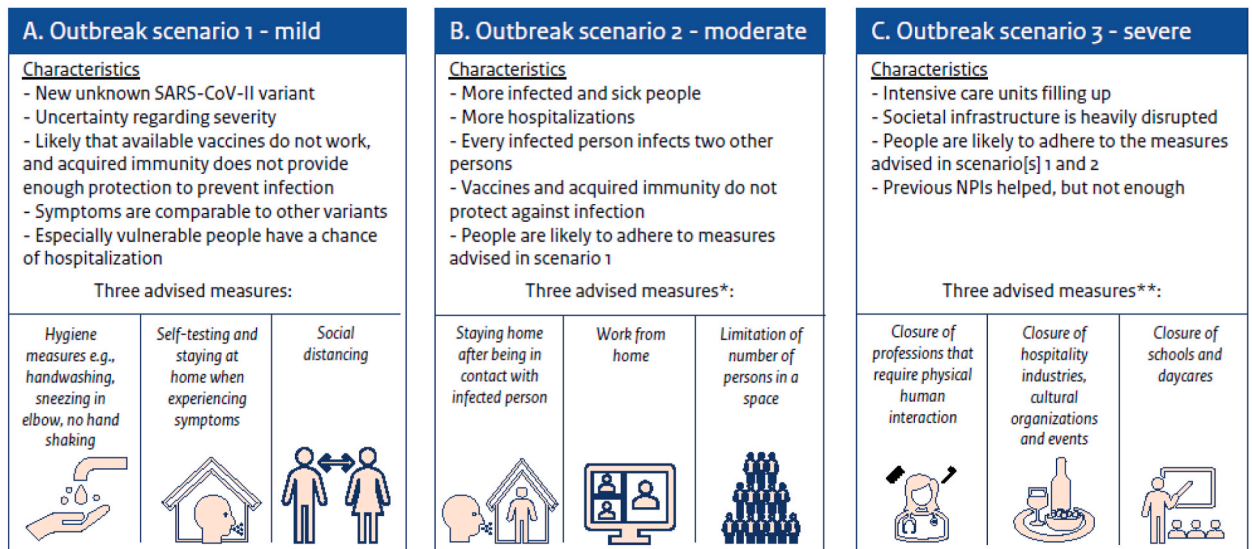


Fig. 1. The four steps in the process of the deliberative mini-public, adapted from Carman et al. (2015). Please note that step 4 in the original figure portrayed Report, which we changed to Evaluate to better fit our study process.



A | Information on outbreak scenario 1, representing a mild outbreak with corresponding characteristics and the three advised measures.
 B | Information on outbreak scenario 2, representing a moderate outbreak with corresponding characteristics and the three advised measures.
 C | Information on outbreak scenario 3, representing a severe outbreak with corresponding characteristics and the three advised measures.
 *Additional to the three advised measures in scenario 1.
 **Additional to the six advised measures in scenario 1 and 2.

Fig. 2. The three outbreak scenarios used in the deliberative mini-public with corresponding advised NPIs.

patients when no additional NPIs would be taken (potentially exceeding the maximum ICU capacity in the Netherland). Apart from these graphs, no details were given regarding the exact effects of the NPIs in all advice, such as the decrease in infections. The overall advice did not include specificities about uncertainties regarding the consequences of NPIs, or about disagreements in the scientific community regarding the effectiveness or harms of NPIs. The advice did include contextual uncertainties such as the uncertain role of

Table 1

Background information on the involved experts and the process of developing scenarios, briefings, and the DMP script.

Involved experts	Four experts informed the participants with several briefings. Two medical experts in infectious disease control (NN, TW) who worked at the National Institute for Health and the Environment. They were frequently involved in advising the government regarding the national COVID-19 response. Both medical experts were trained as public health physicians and had more than ten years of experience in public health. Furthermore, both experts had worked (or still worked) at the municipal health services in the Netherlands (decentralized public health institutions). Based on their experiences in public health from both a national, coordinating perspective, and a regional, executing perspective, they could provide advice. Two experts in the field of social sciences, of whom one expert (RH) worked at The Netherlands Institute for Social Research and the other expert (MH) worked at The Council of Public Health & Society. These institutions are independent advisory and research institutions that have provided the Dutch ministers and parliament with advice regarding the social aspects of COVID-19 response policies. Both experts had around five years of experience with their roles in these institutions and were involved in advising the Dutch parliament about COVID-19. They both had backgrounds in health policy and research and were experienced in integrating public values in science and healthcare. These two types of experts (medical & social) were selected to reflect the process of decision-making regarding NPIs during the COVID-19 pandemic in the Netherlands. In this process, prior to decision-making, advisory bodies focusing on the medical and socio-economic effects of the pandemic reflect upon the outbreak and propose NPIs (27).
Development of hypothetical outbreak scenarios	The scenarios displayed in Figure 2 were developed based on two reports from institutions in the Netherlands that created several future outbreak scenarios regarding the COVID-19 pandemic (28, 29). These documents were used, and in collaboration with an expert (AJ) in developing infectious disease outbreak exercises for public health professionals from the Dutch National Institute for Public Health and the Environment, the three scenarios were developed. These scenarios were further shaped in coordination with the four experts (MH, RH, NN, TW).
Development of expert briefings	The expert briefings were developed with the experts during multiple meetings. The content of these briefings was based on experiential knowledge of the experts and historical information regarding NPIs taken during the COVID-19 pandemic in the Netherlands and advice to the government on socio-cultural effects of NPIs.
Practicing the DMP	The DMP was piloted with a group of researchers (n=10), during which most facilitators (5 out of 7) were present. This resulted in improving the questions in the focus group guide to better reflect the goal of the study. Additionally, parts of the presentations were altered with the aim of increasing participants' understanding.

children, or uncertainties about individuals being infected without having symptoms.

When advising NPIs in scenarios 2 and 3, experts added those to the NPIs advised in the earlier scenarios. Consecutively, for each scenario, two social science experts reflected on what the outbreak and the advised NPIs could mean for the public and for the functioning of society. Furthermore, they provided participants with guidance on their role as decision-makers, for example, how participants have to make trade-offs between individual versus public interest, and how difficult it is to make these types of trade-offs in decision-making. Overall, no recognition was given to the possibility that other experts who were not present might offer different advice. During the DMP, participants received an information leaflet containing the three scenarios, advised NPIs, and content of the expert briefings. All four experts provided the participants with considerations about the implementation of NPIs to take into consideration during the deliberation phase. Supplementary file 1 contains the expert briefings. Table 1 contains additional background information regarding the inclusion of experts, and the development of the scenarios and expert briefings.

2.2.3. Deliberate

Following the expert briefings, participants separated into seven pre-classified groups of 6–7 participants, varying in gender, age, education level, and migration background. In general, for heterogeneous groups, the ideal group size typically ranges from 5 to 8 participants [26]. Participants were positioned as decision-makers in the government during the deliberation phase to challenge them not only to consider and reflect from individual viewpoints, but also to weigh the needs and values of all groups within society. Deliberations started with asking participants' considerations about (not) implementing NPIs. Participants were free to add, delete, or alter the advised NPIs, and they were always asked to elaborate on their views and ideas. All group deliberations were recorded. Every group remained of the same composition and had one facilitator. All facilitators had experience in qualitative methods and received a briefing of the goal and script of the DMP.

2.2.4. Evaluate

At the end of the DMP, all participants evaluated their experiences with the DMP. This two-step evaluation started with a 10-min open deliberation per group (qualitative), which was recorded on audio. The facilitators proposed one initiating question: *How have you experienced today's workshop?* The evaluation ended with an individual survey containing nine statements (quantitative). These statements covered [1] the experience of participants with the DMP, such as room to speak up and the information provided by the experts, and [2] how participants perceived the benefit of such processes, for instance increased understanding of policies or support for NPIs. The survey was based on literature on the motivations for public engagement [27,28]. Detailed information regarding the qualitative evaluation guide and survey can be found in Supplementary file 2.

2.3. Data analysis

The recordings of the group deliberations were transcribed verbatim, and a thematic analysis based on the approach of Braun and Clarke [29] was executed by two researchers (SK and EdW) using the Atlas.ti 23 software. Both researchers had previous experience with thematic analysis and were actively involved in the DMP. The analysis process was initiated with a meeting (SK and EdW), clarifying analysis objectives and methodology. This included agreement on using a data-driven (inductive) approach at the start of the analysis, without any preconceived themes or frameworks.

The researchers independently coded the transcript of Group 1, and consecutively discussed coding differences and similarities. For example, the recurrent references by participants to prior experience with COVID-19 prompted the creation of a new category. After the discussion, alterations to the coding of Group 1 were applied. This iterative process of coding, discussion and refining was repeated for Group 2. Discrepancies were resolved by taking account of the research questions and study scope while accommodating the emergence of new categories. At the end of the discussion about Group 2, a preliminary codebook was established, guiding the subsequent analysis of Group 3 deliberations. This altered the data-driven coding approach to a more deductive coding approach, but still provided room to explore new categories. Analysis of Group 3 was conducted independently (SK and EdW). The researchers reconvened to discuss the analysis and refinements to the codebook (mainly adding new categories). One researcher (SK) coded the transcripts of Groups 4 and 5, by using the developed codebook. Afterwards, EdW checked the coding, and alterations were discussed (SK & EdW). This process was repeated for the last two groups. Finally, the two researchers discussed overarching categories and themes for reporting (SK & EdW).

The recordings of the evaluations were transcribed verbatim, and a thematic analysis based on the approach of Braun and Clarke [29] was executed using the MAXQDA software. As with the abovementioned analysis, an inductive, data-driven approach was first used to identify wider categories and themes, without the use of preconceived frameworks. After analyzing the first two groups, a preliminary codebook was created with the identified categories. This preliminary codebook was used to analyze the remainder of the group evaluations. One researcher (MD) executed this process. The preliminary codebook and final codebook were discussed between two researchers (MD and SK). IBM SPSS V28 and Excel were used for the descriptive analysis of (proportions) for survey questions.

Ethical approval

The study protocol (reference number LCI-589) was reviewed by the RIVM Clinical Expertise Centre. Based on this review, it was determined that the research plan does not fall under the scope of the Dutch law on medical research involving humans (WMO) and was therefore exempted from further ethical approval.

Table 2
The characteristics of the participants per group in the deliberative mini-public.

Characteristics	Age	Sex	Education level	Migration background*	Place of residency
Group 1					
Participant 1	18	Female	Post-secondary education (level 4)	No	Village
Participant 2	30	Male	Master's	No	City
Participant 3	38	Female	Master's	No	City
Participant 4	48	Male	Post-secondary education (level 4)	No	City
Participant 5	61	Male	Post-secondary education (level 4)	Yes	Village
Participant 6	61	Female	Post-secondary education (level 1)	No	City
Group 2					
Participant 7	27	Female	Bachelor's	No	City
Participant 8	42	Male	Post-secondary education (level 4)	No	City
Participant 9	44	Male	Master's	No	City
Participant 10	58	Female	Post-secondary education (level 4)	No	City
Participant 11	61	Male	Secondary education	Yes	Village
Participant 12	68	Male	Bachelor's	No	Village
Group 3					
Participant 13	25	Female	Master's	No	City
Participant 14	34	Female	Post-secondary education (level 3)	No	City
Participant 15	45	Male	Post-secondary education (level 4)	No	City
Participant 16	55	Female	Bachelor's	No	Village
Participant 17	56	Male	Secondary education	Yes	City
Participant 18	67	Male	Post-secondary education (level 1)	No	City
Group 4					
Participant 19	22	Male	Master's	No	City
Participant 20	41	Male	Bachelor's	No	City
Participant 21	53	Female	Secondary education	No	City
Participant 22	53	Male	Post-secondary education (level 4)	Yes	City
Participant 23	59	Female	Secondary education	No	City
Participant 24	60	Female	Bachelor's	No	City
Group 5					
Participant 25	18	Female	Master's	No	City
Participant 26	34	Female	Master's	No	City
Participant 27	41	Male	Post-secondary education (level 4)	No	City
Participant 28	58	Female	Post-secondary education (level 2)	Yes	City
Participant 29	64	Male	Bachelor's	No	City
Participant 30	72	Male	Bachelor's	Yes	City
Group 6					
Participant 31	22	Female	Master's	No	City
Participant 32	30	Male	Post-secondary education (level 4)	No	City
Participant 33	42	Male	Bachelor's	No	City
Participant 34	51	Female	Secondary education	Yes	City
Participant 35	52	Female	Post-secondary education (level 4)	No	Village
Participant 36	63	Female	Post-secondary education (level 1)	No	City
Participant 37	66	Male	Bachelor's	Yes	City
Group 7					
Participant 38	23	Female	Master's	Yes	City
Participant 39	29	Male	Bachelor's	No	City
Participant 40	44	Female	Post-secondary education (level 3)	No	City
Participant 41	53	Female	Post-secondary education (level 3)	No	City
Participant 42	62	Male	Post-secondary education (level 3)	No	City
Participant 43	67	Male	Master's	No	City
Participant 44	76	Female	Post-secondary education (level 1)	No	City

* Migration background is defined as the participant being born in a country other than the Netherlands, or if one or both of their parents are born in a country other than the Netherlands.

3. Results

3.1. Participant characteristics

Forty-four citizens convened in the DMP, whose characteristics are displayed in [Table 2](#), divided into the seven deliberation groups. The various ages, genders, and migration backgrounds of participants were overall well represented. Persons with an education level below post-secondary education (level 2) and those under the age of 25 were underrepresented. All participants were living in the province of Utrecht, mostly in the city of Utrecht (n = 27), with other participants residing in smaller cities (n = 10) or villages (n = 7, classified as <25,000 inhabitants) surrounding the city of Utrecht.

3.2. Group deliberations

The analysis of the group deliberations resulted in two themes. The first theme includes participants' considerations about implementing NPIs. These considerations encompass all sorts of perspectives, ranging from practical considerations to more underlying beliefs about what is the right thing to do within our society. The second theme includes proposed improvements for pandemic response. Even though the deliberation guide (Supplementary file 1) did not specifically focus on deliberating pandemic response, participants still occasionally mentioned alterations and recommendations. We therefore deem it important to describe these findings under theme 2. The three outbreak scenarios will be jointly discussed throughout the themes. Lastly, some results will be shared regarding the evaluation of the participants' experiences with the DMP.

3.2.1. Considerations about NPIs

In this first theme, six categories were identified as considerations receiving the most mentions by our participants in deciding whether to implement NPIs [1]; Prevention [2], Public support [3], Personal responsibility [4], Tailoring of NPIs [5], Uniformity of NPIs and [6] Societal and Outbreak context.

Firstly, many participants mentioned **prevention** when deliberating about implementing NPIs, with the aim of averting severe outbreaks and, as a result, preventing societal repercussions such as hospitalizations of patients with severe COVID-19 disease and mental health issues among young people.

“What do you prefer? A strict lockdown for two weeks followed by an assessment? I think that way you limit the risk of this horror scenario the most, of reaching code black and applying triage to ICU patients.” (female, Group 5)

In the first scenario, many participants advocated for early, stringent measures during the epidemic to contain the spread of the virus, as they found the increase from 3 to 500 infected persons within one week worrisome. Many participants proposed implementing additional NPIs, such as ventilation in closed spaces, face mask use in public spaces, and self-testing when experiencing symptoms. Vaccination was also frequently deliberated as a way to end the epidemic, prompting calls from participants for the rapid development of vaccines, as no vaccines were available in our scenarios. Overall, participants perceived health as one of the most important considerations, with one participant literally referring to life and death situations regarding COVID-19 infections, which for them overruled any other consideration.

Other participants responded to this by deliberating about the **public** support of NPIs. They predicted limited public support for early, stringent NPIs, considering the mild outbreak scenario (scenario 1) and the fact that not many people were infected. This relatively low number of infections would imply that not many people had firsthand experience with the virus. This would influence the risk perception of the public towards the outbreak. Consequently, participants predicted limited public support for NPIs, fearing that a perceived disproportionality between the stringency of NPIs and the severity of the outbreak could provoke public resistance and dissatisfaction. Participants extensively deliberated about the balance between NPI acceptance and the mental load of NPIs on citizens, particularly after enduring multiple lockdown cycles in recent years. One participant shared an idea to organize small-scale outdoor festivals to foster social interaction and prevent loneliness.

“... You say, let's not organize a festival in some factory, because the air ventilation isn't good enough, okay fair enough. But if you organize an outdoor festival, I think you would maintain much more public support compared to when you cancel everything.” (male, Group 1)

Concerning public support, participants also highlighted the importance of preserving freedom as a fundamental human right, even during times of crises.

“Nothing is prohibited, which is something very positive because it preserves people's freedom, and that is what people want. You don't want people to revolt. however, maybe this freedom also indicates that some people don't take it [the situation] seriously yet.” (female, Group 2)

Another frequently mentioned consideration was the **personal responsibility** of citizens. Some participants considered it important to give citizens more ownership, so that citizens could decide for themselves how much infection risk they are willing to take. According to some participant, citizens should for example be able to have ownership regarding the balance between infection risk and maintaining a healthy mental status, which in turn might improve solidarity among citizens.

“I think it’s important to find a balance between implementing NPIs for everyone ... and still giving people some autonomy to decide about their life. In this way, you can also consider mental health, allowing individuals to make their own choices despite having to abide by the rules. A good balance is crucial. I believe it also reduces friction between the Government and the people.” (male, Group 4)

Another theme that was frequently emphasized by participants was the **tailoring** of NPIs and **uniformity** in NPIs. Initially, participants were conflicted about tailoring NPIs for certain population groups and sectors on the one hand, and maintaining uniformity across population groups, sectors, and even European countries on the other. Some participants argued that tailoring NPIs to the needs of vulnerable groups such as children, the elderly, and healthcare personnel could lead to more sustainable NPIs and minimize long-term consequences of NPIs. In line with this, participants debated what should be deemed essential for daily life, such as weddings versus funerals or grocery stores versus clothing shops. However, not all participants favored tailoring NPIs. They expressed concerns about excessive modifications and exceptions regarding NPIs, leading to inequalities between population groups and sectors.

“Take a business owner who has already suffered so much. Why would you subject them to this again, especially when restaurants are allowed to remain open? This was contradictory, leading to a lot of misunderstanding and frustration.” (male, Group 3)

This could cause misunderstanding among the public and might ultimately lead to the rejection of NPIs by the public. In line with the deliberation about sectors, some participants proposed to keep places such as restaurants, gyms, schools, and shops open instead of engaging in a total closure, by dividing access among different groups at different times. For example, schools could have classes with limited students present. This would facilitate education and generate income for certain sectors. Other participants suggested a rotational approach, where one sector closes while another reopens after several months.

One final consideration that was regularly mentioned was the **current societal and outbreak context**. Some participants noted that the COVID-19 epidemic and ongoing NPIs have permanently changed circumstances, such as the widespread adoption of working from home. Participants maintained that many citizens have grown accustomed to this, making these types of NPIs easier to implement, as the infrastructures is already in place. Regarding the current societal context, participants pointed out the growing skepticism about NPIs among citizens, for example regarding their effectiveness, suggesting that authorities should be prepared for increased public resistance. Moreover, some participants mentioned that some sectors such as restaurants, cafes, and theaters might still be recovering financially from previous lockdowns, and that another strict lockdown could further damage them. Participants also discussed managing misinformation, with authorities actively monitoring it, without resorting to censorship.

3.2.2. Proposed improvements for pandemic response

In addition to the considerations regarding NPIs and their appraisal, participants also deliberated about their own experiences with the COVID-19 epidemic and government functioning, offering suggestions for improvement. Although it was not the primary focus, this topic emerged due to the apparent need of participants to voice their opinions. Firstly, many participants expressed a desire for the government to try to learn from the COVID-19 epidemic, to improve and prepare for the future. One participant stated:

“But what has been done to generate hospital beds? What has been done to train nurses? Because that way, you guarantee capacity. But our leaders aren’t doing a damn thing about it.” (male, Group 1)

Many participants expressed criticism about the reflexive abilities of the government, especially in the current stage of the epidemic (largely under control in the Netherlands). Participants emphasized that they thought the government should invest more in assessing the effectiveness of certain NPIs and develop future scripts. Another important element was the improvement of communication. Most crucially, a lot of participants expressed the importance of clarity and being unambiguous in communication about NPIs, as variations in NPIs between sectors, population groups, and countries were noted. Participants thought this led to a lack of clarity, which could lead to misunderstandings and decreased public support for NPIs. Participants felt a need for straightforward, uniform, and transparent communication. This included details about the expected effects of NPIs on the outbreak and any accompanying uncertainties, consequences of not implementing NPIs, specific details on considerations to (not) implement certain NPIs, and the consequences of NPIs on daily life. Some participants also needed some perspective, in the form of a roadmap indicating when NPIs might be relaxed. This perspective would help citizens to adhere to measures:

“There was no perspective for the people. And when we got the notion that a vaccine was coming, people calmed down. When you see no future at all, because everyone must sit inside... then you won’t get people to adhere to your policies anymore.” (male, Group 2)

Furthermore, some participants urged the government to create a long-term vision for pandemic response, considering long-term consequences such as mental health, social cohesion, and learning disabilities in children. A few participants advocated for an interdisciplinary approach to pandemic response, including various disciplines, such as philosophy, psychology and anthropology.

3.3. Participant evaluation of the DMP

Many participants experienced the role of deliberating as decision-makers on NPIs to be complex, due to the multifaceted medical, socio-cultural, and economic consequences that were involved. Several participants mentioned the challenge of reaching consensus amongst themselves, let alone when tasked with making decisions for an entire country. They stressed the near impossible task of satisfying every individual within a country due to the many interests that must be considered. At the same time, by experiencing this complexity in the process of decision-making, some participants expressed that they were able to learn about policymaking during

times of crises. By being positioned as a decision-maker, an activity that comes with much responsibility, they gained insights into making complicated and inevitable decisions. A few participants, however, expressed difficulties in taking on the role of a decision-maker, especially since the scenarios heavily mirrored the onset of the COVID-19 epidemic. This prompted them to base deliberations on their previous experiences as citizens. They stated that it was difficult to harmonize a new, decision-making vision with their previous experiences with NPIs as a citizen. While many participants appreciated the diversity of backgrounds and perspectives among participants, some expressed a desire for more diversity. For example, some mentioned the absence of young people, or people believing in alternative theories about COVID-19. A few participants suggested including individuals with divergent viewpoints, for example, those denying the existence of the SARS-CoV-2 virus. This would offer them insights into other lines of argumentation. Others pointed out that younger people have a distinct perception of time, which would offer unique perspectives on lockdown measures.

Furthermore, participants occasionally questioned the expert role, feeling a lack of autonomy because the expert briefings were too fixed, with the type and number of advices NPIs already predetermined. Some participants felt a need for more freedom in deliberating about NPIs, instead of already receiving advice regarding them. One participant referred to the value of receiving information about how the experts developed their advice (during the DMP but also during the COVID-19 epidemic), to learn about experts' considerations. A few participants also suggested to include politicians, philosophers, or ethicists in the deliberations. This would highlight the variety in consequences of implementing NPIs. Moreover, some participants were disappointed that the advised NPIs during the DMP were very similar to the real-time implemented NPIs during the epidemic. These participants linked this to their perception that the government was not reflexive enough regarding the real-time implemented NPIs, as they considered that during the DMP, they felt only a slight difference in advice on NPIs compared to what happened in real time.

All participants were asked to complete a survey, including questions about their take on the benefits of DMPs. More than half of the participants agreed (somewhat agree and strongly agree) that [1] citizens can offer valuable ideas about NPIs not considered by policymakers (73 %) [2], these types of DMPs can increase public support for NPIs (68 %), and [3] that this DMP provided participants with more understanding about governmental decisions on NPIs (64 %). Supplementary file 2 displays the additional survey results.

4. Discussion

Positioning a diverse group of citizens as decision-makers and allowing them to learn and deliberate about implementing NPIs during a hypothetical outbreak of an unknown SARS-CoV-2 variant revealed a variety of public considerations. When deliberating about these considerations and weighing them against one another, participants often expressed conflicting opinions about what they found important. Firstly, participants considered access to healthcare to be paramount, although mental health, social cohesion, and economic stability were also considered to be of great importance, especially for vulnerable populations. Secondly, when implementing NPIs, public support for NPIs, possibilities to take personal responsibility, the tailoring of NPIs, uniformity between population groups and sectors, and the current societal and outbreak context were important aspects for the citizens to consider. In addition, participants opted for a strong preventive approach by suggesting suing measures early in the outbreak scenario, e.g., ventilation in closed spaces and face mask use in public areas, to prevent further escalation of the outbreak. This consideration about prevention conflicted, for example, with the consideration of the importance of a public support base for NPIs. To help improve pandemic preparedness and response, participants suggested that governments should engage in ongoing research on NPI effectiveness and consequences and adopt interdisciplinary long-term strategies. Furthermore, participants emphasized clear communication and the provision of alternatives when restricting daily life with NPIs.

Participants emphasized the importance of preventing further escalation of outbreak situations and the access to healthcare, aligning with global goals of epidemic response, by providing security and protecting the health of citizens [30,31]. A study in the Netherlands focusing on preferences of citizens regarding COVID-19 management similarly found accessible healthcare to be one of the most important goals. Mental health and freedom were also found to be very important, in line with our results [17,32]. Similar findings emerged in preference studies conducted in Portugal, Germany, and France, indicating that individuals prioritize averting COVID-19 mortality as one of the most important consequences when implementing NPIs [33–35]. Additionally, economic considerations such as unemployment rate were factored in during other preference elicitation studies. We noted this economical consideration to some degree in our deliberations, as participants considered potential financial damage to specific sectors in the event of another strict lockdown [33,36]. In Germany, a citizen's assembly was held, with a randomly selected group of 50 citizens who deliberated about experiences with the COVID-19 epidemic and its response [37]. This deliberation resulted in similar themes as ours, such as mental health concerns and healthcare capacity. Furthermore, the idea of making COVID-19 testing free for citizens was shared [38]. This consideration of individual budget was not a prominent theme during our DMP. Our DMP also identified other considerations not found in earlier literature that decision-makers might incorporate in their assessment of NPIs. One example of an NPI for which the identified considerations could be relevant is working from home, as this is an NPI that participants deemed as something that many people are nowadays already accustomed to, making it easier to implement and accept. Our findings indicate that citizens have a broad spectrum of considerations regarding NPIs that they find valuable. These encompass not only public values, such as freedom, equality, autonomy, and solidarity, but also pragmatic or contextual considerations such as the presence of existing infrastructures for NPIs, or the capacity of sectors to financially handle additional NPIs. These insights reflect the needs and preferences of a specific citizen group at a given time. This offers potential enhancements for future epidemic preparedness and response, through aligning policy with public values and perceptions [39]. Furthermore, participants offered insights into potential improvements or alterations to NPIs, and improvements for the role of government, highlighting the value of engaging the public in deliberations. In the future, similar public engagement practices, such as citizens' assemblies, could be used to address governmental dilemmas, gather public considerations and ideas, and gauge support for NPIs (or other types of policies).

Moreover, participants drew on their own experiences with NPIs and the COVID-19 epidemic as citizens to deliberate as decision-makers. They emphasized public support for NPIs and granting citizens more autonomy and responsibility in determining how suitable NPIs were for personal circumstances of citizens. Even though we asked participants to act as decision-makers, they still incorporated their personal experiences as citizens in their deliberations. This is exactly one of the benefits of engaging the public in these processes, as the perspectives of citizens might be overlooked by decision-makers [40–42]. Furthermore, this dual perspective – citizen and decision-maker – might explain some contradictions that we have identified during the DMP; for instance, the contradiction between tailoring NPIs for specific groups and sectors while seeking uniformity across sectors and countries. It is important to recognize that we cannot provide a definitive answer to what matters most to people. This is partly due to the setup of the DMP, in which participants were not specifically asked to make trade-offs between NPIs or considerations. Besides, this ambiguity in considerations is an inherent aspect of decision-making in response to a pandemic [8,43]. However, this citizen-centric prioritization might be an element to further explore in the future, to aid decision-makers in their assessment of implementing NPIs [44,45].

At the end of the DMP, we assessed participants' experiences with the DMP. This evaluation served not only to uncover study limitations, but also to gain insight into important design considerations for future DMPs. Three key aspects emerged. Firstly, participants valued the inclusion of diverse voices in deliberations, and suggested more diversity than what was currently achieved, for example by including people who have alternative beliefs regarding COVID-19 or younger people. Other DMPs sampled on characteristics such as disability, occupation, or vaccination status [46]. However, sampling on specific characteristics influences the extrapolation of results to the wider public. This notion of representation by DMPs is already often contested in literature, as irrespective of the type of participants, their number is usually too small to claim they would be representative of the whole population [47]. The decision about which type of participant to include might depend on what we already know about the topic and on the experiences of certain populations. For instance, future DMPs could further explore the experiences of vulnerable populations with NPIs, to diversify our results. Furthermore, to enhance direct two-way interaction about policies, decision-makers can also be included as participants.

Secondly, the type and role of experts within DMPs warrants consideration [48]. When using experts to inform participants in deliberative processes, concerns exist about the amount of expert influence. The authority of expertise could overrule experiential knowledge from citizens [49]. Leino et al. (2022) examined the impact of experts on participants' views in a DMP about COVID-19 measures, concluding that although experts framed the context to some extent, they would not systemically alter participants' opinions [50]. On the other hand, in the analysis of an Irish citizens' assembly about climate policies, the influence of expert briefings on participant deliberation was indeed demonstrated. The information provided by experts played a significant role in the final recommendations by the participants [49,51]. The impact of experts also depends on topic complexity and the prior knowledge of participants [48]. In our DMP, some participants desired more autonomy, as they perceived that the pre-set expert briefings restricted their freedom to deliberate about NPIs. Furthermore, the information provided by the experts could have been more elaborate, including detailed information about the expected effects of NPIs (or uncertainties about this) and mentions about differences in viewpoints among experts and scientists [5,6]. Although we included experienced experts, we acknowledge that including more or other experts could have led to a difference in assessment of the effect of certain NPIs. Furthermore, it might have been beneficial to select a more diverse group of experts, including, for example, philosophers or ethicists, as suggested by our participants. More diverse experts can broaden the type of considerations and views presented to participants, and can display disagreement and uncertainty among the evidence about NPIs [52]. Different interpretations of the evidence can also be given by diverse experts, to create more room for participants to consider conflicting views.

Thirdly, the value of DMPs was observed in the learning process of our participants, who indicated that they had a better grasp of the complexity of crisis decision-making. As described in some of the literature, DMPs can empower participants to form well-informed opinions on complex problems such as climate change or technological advancements [53,54]. DMPs relating specifically to decision-making about non-pharmaceutical interventions or epidemic management should be further explored to make conclusions about their potential value.

4.1. Limitations

Several aspects must be considered when interpreting our results. We used a limited sample during a specific phase of a fictional emergence of a new SARS-CoV-2 variant in the Netherlands. Participants primarily lived in and around the city of Utrecht in the middle of the Netherlands, and younger people (18–25 years old) and people with education levels below post-secondary education level 2 were underrepresented. There was also no information collected about other demographic variables from participants such as occupation or political affiliation. As the deliberations revolved mainly around values and beliefs, these types of variables can play a role in the considerations mentioned. The DMP had a time constraint of 2.5 h, potentially influencing the time and space for opinion-forming and expert consultation. Regarding the experts, some framing occurred despite efforts to replicate NPI decision-making as accurately as possible. Furthermore, only four experts were included, from the fields of infectious disease control and the social sciences. Due to the limited number of experts and perspectives, there might be limited diversity in considerations regarding the implementation of NPIs. The information provided by experts might also not have been sufficient, as 32 % of participants disagreed that they received enough information from experts to make choices about NPIs (18 % of participants were neutral and 51 % of participants agreed). This also includes detailed information about expected effects of NPIs, and uncertainties about this. The group deliberations were led by different facilitators. Even though they were all briefed beforehand and used similar guidelines during the DMP, everyone has their own unique facilitation style. There are some limitations to consider in evaluating the DMP. The setup of the evaluation was brief, providing limited opportunity for in-depth exploration of responses. For instance, it was difficult to understand

participants' precise interpretation of the term "enough information" included in the statement: "I have received enough information during this workshop from experts to be able to make choices about NPIs." Another limitation is the hypothetical nature of the DMP. Participants did not actively engage in real decision-making. This lack of real-world involvement could have altered their positions regarding NPIs and their overall assessment of the experience. Lastly, the live setting offered more room to explore the depths of statements. However the location at the National Institute for Public Health and the Environment could have discouraged participation of those skeptical towards the Institute, as the Institute was involved as the main coordinating center for COVID-19 management. While some valued the Institute inviting them in, others might have abstained, meaning that some valuable perspectives may have been missing.

5. Conclusion

We have gained insight into the considerations that citizens make when learning and deliberating about implementing non-pharmaceutical interventions from the role of a decision-maker. These considerations reflect the preferences, needs, and values of citizens, which can possibly be integrated into how NPIs are considered and assessed by decision-makers. Ultimately, this could improve the reflection of citizens' perspectives in national NPIs. Recommendations to enhance government roles during epidemics were also given by participants. The use of DMPs to engage the public in decision-making seems like a promising method to further explore; however, many challenges remain, such as the diversity in participants, the role of experts and the type of experts to include, and the exact impact of DMPs on decision-making. With this study and the lessons learned during the evaluation, we hope to inspire reflection on how to promote open dialogue between citizens and authorities regarding the management of the COVID-19 epidemic and possibly other outbreaks or epidemics. Future research could explore DMPs that include citizens, experts, and decision-makers, to create direct two-way interaction.

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Ethics statement

The study protocol (reference number LCI-589) was reviewed by the RIVM Clinical Expertise Centre. Based on this review, it was determined that the research plan does not fall under the scope of the Dutch law on medical research involving humans (WMO) as it did not require participants to undergo invasive procedures. Therefore the study was exempted from further ethical approval. All participants provided informed consent to participate in the study and for the publication.

Data availability statement

The datasets used and/or analyzed during the current study are not deposited into a publicly available repository due to data protection and confidentiality. Data are however available upon reasonable request from the authors and with permission of the Centre for Infectious Disease Control in the Netherlands.

CRediT authorship contribution statement

Sophie Kemper: Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Conceptualization. **Marion de Vries:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization. **Esther de Weger:** Writing – review & editing, Methodology, Investigation, Formal analysis. **Marloes Bongers:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization. **Frank Kupper:** Writing – review & editing, Visualization, Methodology, Conceptualization. **Aura Timen:** Writing – review & editing, Validation, Supervision, Methodology, Funding acquisition, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used chatGPT in order to check grammar and improve readability. The authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e30390>.

References

- [1] World Health Organization, Statement on the fifteenth meeting of the IHR (2005) Emergency Committee on the COVID-19 pandemic [internet], World Health Organization (2023). May [cited 2023 Aug 15]. Available from: [https://www.who.int/news/item/05-05-2023-statement-on-the-fifteenth-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-coronavirus-disease-\(covid-19\)-pandemic](https://www.who.int/news/item/05-05-2023-statement-on-the-fifteenth-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-coronavirus-disease-(covid-19)-pandemic).
- [2] World Health Organization, Archived: WHO Timeline - COVID-19 2020 [internet], World Health Organization, 2020 April [cited 2023 Aug 15]. Available from: <https://www.who.int/news/item/27-04-2020-who-timeline-covid-19>.
- [3] S. Lohse, K. Bschor, The COVID-19 pandemic: a case for epistemic pluralism in public health policy, *Hist. Philos. Life Sci.* 42 (4) (2020) 58.
- [4] D. Aslan, Can transdisciplinary approaches contribute to the COVID-19 fight? *Global Health Promotion* 28 (2) (2021) 72–77.
- [5] D. Duval, B. Evans, A. Sanders, J. Hill, A. Simbo, T. Kavoi, et al., Non-pharmaceutical interventions to reduce COVID-19 transmission in the UK: a rapid mapping review and interactive evidence gap map, *J. Publ. Health* (2024) fdac025.
- [6] A. Lison, N. Banholzer, M. Sharma, S. Mindermann, H.J.T. Unwin, S. Mishra, et al., Effectiveness assessment of non-pharmaceutical interventions: lessons learned from the COVID-19 pandemic, *Lancet Public Health* 8 (4) (2023) e311–e317.
- [7] E.J.R. Clarke, A. Klas, E. Dyos, The role of ideological attitudes in responses to COVID-19 threat and government restrictions in Australia, *Pers. Individ. Differ.* 175 (2021) 110734.
- [8] A. Saxena, P.A. Bouvier, E. Shamsi-Gooshki, J. Köhler, L.J. Schwartz, WHO guidance on ethics in outbreaks and the COVID-19 pandemic: a critical appraisal, *J. Med. Ethics* 47 (6) (2021) 367.
- [9] World Health Organization, Critical Preparedness, Readiness and Response Actions for COVID-19 [internet], World Health Organization, 2021 May. 16. Available from: <https://iris.who.int/bitstream/handle/10665/341520/WHO-2019-nCoV-Community-Actions-2021.1-eng.pdf?sequence=1>.
- [10] D. Rajan, K. Koch, K. Rohrer, C. Bajnoczki, A. Socha, M. Voss, et al., Governance of the Covid-19 response: a call for more inclusive and transparent decision-making, *BMJ Glob. Health* 5 (5) (2020) e002655.
- [11] N. Scheinerman, M. McCoy, What does it mean to engage the public in the response to covid-19? *BMJ* 373 (2021) n1207.
- [12] S. Harvard, E. Winsberg, J. Symons, A. Adibi, Value judgments in a COVID-19 vaccination model: a case study in the need for public involvement in health-oriented modelling, *Soc. Sci. Med.* 286 (2021) 114323.
- [13] International Association for Public Participation, IAP2 spectrum of public participation [internet] [cited August 20], International Association for Public Participation (2018). iap2.org/resource/resmgr/pillars/Spectrum_8.5x11_Print.pdf.
- [14] S. Kemper, F. Kupper, S. Kengne Kamga, A. Brabers, J. De Jong, M. Bongers, A. Timen, Public engagement in decision-making regarding the management of the COVID-19 epidemic: views and expectations of the ‘publics’, *Health Expect.* 25 (6) (2022) 2807–2817.
- [15] C. Krauth, C. Oedingen, T. Bartling, M. Dreier, A. Spura, F. de Bock, et al., Public preferences for exit strategies from COVID-19 lockdown in Germany—A discrete choice experiment, *Int. J. Publ. Health* 66 (2021) 591027.
- [16] Betti G, Guidi M, Isernia P, Martini S, Olmastroni F, Pin P. Public Preferences for the COVID-19 Reopening Policies: an Experimental Assessment 2021.
- [17] N. Mouter, J.I. Hernandez, A.V. Itten, Public participation in crisis policymaking. How 30,000 Dutch citizens advised their government on relaxing COVID-19 lockdown measures, *PLoS One* 16 (5) (2021) e0250614.
- [18] G. Smith, M. Setälä, 300Mini-Publics and deliberative democracy, 0, in: A. Bächtiger, J.S. Dryzek, J. Mansbridge, M. Warren (Eds.), *The Oxford Handbook of Deliberative Democracy*, Oxford University Press, 2018.
- [19] I. Barinaga-Rementeria, A. Erauskin-Tolosa, P.J. Lozano, I. Latasa, Individual and social preferences in participatory multi-criteria evaluation, *Sustainability* 11 (20) (2019) [Internet].
- [20] M.J. Leon Bijlmakers, Marijn de Bruin, Rob Baltussen, ‘In gesprek over vaccinatie’ – bevindingen van een burgerforum over bereidheid tot vaccinatie tegen het coronavirus [internet], RadboudUMC (2021) [cited August 25]. Available from: <https://www.radboudumc.nl/getmedia/a2b3d4a4-2242-4f50-b811-deba80921487/Rapport-bevindingen-burgerforum-vaccinatiebereidheid-coronavirus.aspx>.
- [21] K. Carman, C. Mallery, M. Maurer, G. Wang, S. Garfinkel, M. Yang, et al., Effectiveness of public deliberation methods for gathering input on issues in healthcare: results from a randomized trial, *Soc. Sci. Med.* 133 (2015) 11–20.
- [22] E. Teasdale, M. Santer, A.W.A. Geraghty, P. Little, L. Yardley, Public perceptions of non-pharmaceutical interventions for reducing transmission of respiratory infection: systematic review and synthesis of qualitative studies, *BMC Publ. Health* 14 (1) (2014) 589.
- [23] A.M. Carabelli, T.P. Peacock, L.G. Thorne, W.T. Harvey, J. Hughes, T.I. de Silva, et al., SARS-CoV-2 variant biology: immune escape, transmission and fitness, *Nat. Rev. Microbiol.* 21 (3) (2023) 162–177.
- [24] C. Marston, A. Renedo, S. Miles, Community participation is crucial in a pandemic, *Lancet (London, England)* 395 (10238) (2020) 1676–1678.
- [25] Norstat, Over norstat group [internet]. Norstat; 2023 [cited Sep 10]. Available from: <https://norstat.nl/over-norstat-group>, 2023.
- [26] D. Stewart, P. Shamdasani, D. Rook, Focus Groups, California, Thousand Oaks, 2007. Available from: <https://methods.sagepub.com/book/focus-groups>.
- [27] D.J. Fiorino, Citizen participation and environmental risk: a survey of institutional mechanisms, *Sci. Technol. Hum. Val.* 15 (2) (1990) 226–243.
- [28] A. Conklin, Z.S. Morris, E. Nolte, Involving the Public in Healthcare Policy: an Update of the Research Evidence and Proposed Evaluation Framework, RAND Corporation, 2010.
- [29] V. Braun, V. Clarke, Thematic Analysis, 2012, pp. 57–71.
- [30] F. Klausner, D. Pauschinger, Searching for the right balance between openness and closure: spatial logics of crisis management and control in the policy response to pandemic disease such as COVID-19, *J. Contingencies Crisis Manag.* 30 (1) (2022) 32–40.
- [31] J.S. Ott, F.L. Edwards, P. Boonyarak, Global responses to the COVID-19 pandemic 21 (4) (2021) 619–627.
- [32] E. Uiters, F. Kroese, M. de Bruin, P. Spruijt, C. Kolner, R. Wuyts, N. Mouter, T. Geijsen, De langetermijnaanpak van het coronabeleid: voorkeur van burgers en het maatschappelijk middenveld [internet], in: Rijksinstituut voor Volksgezondheid en Milieu, TU Delft, 2022 [cited Sep 20]. Available from: [file:///N:/Documents/Downloads/De%20langetermijnaanpak%20van%20het%20coronabeleid%20-%20voorkeur%20van%20burgers%20en%20het%20maatschappelijk%20middenveld%20\(7\).pdf](file:///N:/Documents/Downloads/De%20langetermijnaanpak%20van%20het%20coronabeleid%20-%20voorkeur%20van%20burgers%20en%20het%20maatschappelijk%20middenveld%20(7).pdf).
- [33] C. Krauth, C. Oedingen, T. Bartling, M. Dreier, A. Spura, F. de Bock, et al., Public preferences for exit strategies from COVID-19 lockdown in Germany—a discrete choice experiment, *Int. J. Publ. Health* 66 (2021).
- [34] J. Sicsic, S. Blondel, S. Chyderiotis, F. Langot, J.E. Mueller, Preferences for COVID-19 epidemic control measures among French adults: a discrete choice experiment, *Eur. J. Health Econ.* 24 (1) (2023) 81–98.

- [35] L. Filipe, S.V. de Almeida, E. Costa, J.G. da Costa, F.V. Lopes, J.V. Santos, Trade-offs during the COVID-19 pandemic: a discrete choice experiment about policy preferences in Portugal, *PLoS One* 17 (12) (2022) e0278526.
- [36] K. Manipis, D. Street, P. Cronin, R. Viney, S. Goodall, Exploring the trade-off between economic and health outcomes during a pandemic: a discrete choice experiment of lockdown policies in Australia, *Patient* 14 (3) (2021) 359–371.
- [37] Initiative Offene Gesellschaft, Sächsisches Staatsministerium der Justiz und für Demokratie, Europa und Gleichstellung [internet], Forum Corona Bürgerrat (2023) [cited Sep 30]. Available from: <https://www.forum-corona.de/>.
- [38] Freistat Sachsen, Handlungsfeld Gesundheit [internet], 2023 [cited Sep 30]. Available from: <https://www.demokratie.sachsen.de/handlungsfeld-gesundheit-5390.html?cp=%7B%22accordion-content-5425%22%3A%7B%220%22%3Atrue%7D%2C%22previousOpen%22%3A%7B%22group%22%3A%22accordion-content-5425%22%2C%22idx%22%3A0%7D%7D>.
- [39] T. Richards, H. Scowcroft, Patient and public involvement in covid-19 policy making, *Br. Med. J.* 370 (2020) m2575.
- [40] E.J. Cockcroft, N. Britten, L. Long, K. Liabo, How is knowledge shared in Public involvement? A qualitative study of involvement in a health technology assessment, *Health Expect.* 23 (2) (2020) 348–357.
- [41] S. Atkinson, H. Bradby, M. Gadebusch Bondio, A. Hallberg, J. Macnaughton, Y. Söderfeldt, Seeing the value of experiential knowledge through COVID-19, *Hist. Philos. Life Sci.* 43 (3) (2021) 85.
- [42] M. Jones, Patient and Public Involvement in Healthcare: Potentials and Challenges of Lay Expertise and Experiential Knowledge, 2021.
- [43] A. Fariba, Saeedi T. Saeedeh, Ethical issues in responding to the COVID-19 pandemic; A narrative review, *Frontiers in Emergency Medicine* 4 (2s) (2020).
- [44] B. Durodié, Handling uncertainty and ambiguity in the COVID-19 pandemic, *Psychological Trauma: Theory, Research, Practice, and Policy* 12 (S1) (2020) S61–S62.
- [45] O.F. Norheim, J.M. Abi-Rached, L.K. Bright, K. Børøe, O.L.M. Ferraz, S. Gloppen, A. Voorhoeve, Difficult trade-offs in response to COVID-19: the case for open and inclusive decision making, *Nat. Med.* 27 (1) (2021) 10–13.
- [46] J.S. Esther de Weger, Jaron Harambam, Teun Zuiderent-Jerak, Frank Kupper, Vaccinatiedialogen: Beweegredenen Van Nederlandse Burgers Voor COVID-19 Vaccinaties, 2023.
- [47] M. Setälä, Connecting deliberative mini-publics to representative decision making, *Eur. J. Polit. Res.* 56 (4) (2017) 846–863.
- [48] J.J. Roberts, R. Lightbody, R. Low, S. Elstub, Experts and evidence in deliberation: scrutinising the role of witnesses and evidence in mini-publics, a case study, *Pol. Sci.* 53 (1) (2020) 3–32.
- [49] L. van Beek, N. Mouter, P. Pelzer, M. Hajer, D. van Vuuren, Experts and expertise in practices of citizen engagement in climate policy: a comparative analysis of two contrasting cases, *Climatic Change* 177 (1) (2024) 10.
- [50] M. Leino, K. Kulha, M. Setälä, J. Ylisalo, Expert hearings in mini-publics: how does the field of expertise influence deliberation and its outcomes? *Pol. Sci.* 55 (3) (2022) 429–450.
- [51] L. Muradova, H. Walker, F. Colli, Climate change communication and public engagement in interpersonal deliberative settings: evidence from the Irish citizens' assembly, *Clim. Pol.* 20 (10) (2020) 1322–1335.
- [52] S. Müller, G. Kennedy, T. Maher, Reactions to experts in deliberative democracy: the 2016–2018 Irish Citizens' Assembly, *Ir. Polit. Stud.* 38 (4) (2023) 467–488.
- [53] S. Hügel, A.R. Davies, Public participation, engagement, and climate change adaptation: a review of the research literature, *WIREs Climate Change* 11 (4) (2020) e645.
- [54] A. Fraaije, M.G. van der Meij, F. Kupper, J.E.W. Broerse, Art for public engagement on emerging and controversial technologies: a literature review, *Publ. Understand. Sci.* 31 (6) (2022) 694–710.