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OECD Global Science Forum

Workshop on "Priority setting and coordination of research agendas: lessons learned from COVID-19"

Workshop Summary

4-5 October 2021, via Zoom.

This report is a summary of the virtual GSF workshop organised as part of the activity on "Mobilising science in times of crisis". The workshop was attended by approximately 100 participants including GSF delegates. Note that, rather than providing a full summary of the workshop, the report concentrates on key elements of the presentations and on the discussions that took place during sessions.

Speaker presentations and videos of the sessions are available at: https://www.oecd.org/sti/inno/priority-setting-and-coordination-of-research.htm.

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Virtual workshop on "Priority setting and coordination of research agendas: lessons learned from COVID 19"

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Draft summary

1.   The COVID-19 pandemic has set off a cascade of responses from – and had impacts on – multiple actors across the science, technology and innovation (STI) ecosystem. While there were already established mechanisms to investigate and respond to pandemics, both at national and international levels, these appear in many cases to have been inadequate to respond to the scale, scope and complexity of the current crisis.

2.   Countries have implemented a wide range of measures to define and address research priorities to generate the knowledge and tools necessary to help policy makers effectively respond to the crisis. Priorities have varied both from country to country and over time as the crisis has progressed, challenging both national and international coordination mechanisms.

3.   Whilst medical research, pharmaceutical interventions and vaccine development have understandably been the main research and policy focus in many countries, the reality is that a large variety of non-pharmaceutical interventions (NPIs) or public health and social measures (PHSMs)[1] have also been universally implemented through-out the various phases of the pandemic. These have enabled a small number of countries to effectively control the spread of COVID-19 (at least in the early phases) but the lessons have not been effectively transferred or adopted elsewhere. The reasons for this are complex but it is notable that in most countries the development of a coordinated research agenda on PHSMs has lagged behind that of its biomedical counterpart and the international coordination in this area seems to have been largely absent.

4.   Priority setting, steering and coordination of research efforts has been a major challenge. From the policy perspective, different parts of government have different priorities and different requirements for scientific evidence and research. In the absence of effective cross-government (and cross-agency) coordination, this can lead to fragmentation and/or duplication of research efforts, with insufficient attention being given to some areas (such as PHSMs).

5.   The goal of this workshop was to explore key challenges and good practices from the science response to the COVID-19 pandemic and identify policy actions that can enhance the preparedness of research systems for future crises. It explored practices and challenges in different national contexts and considered what policies can be implemented before, during and after a crisis to optimise the scientific response in crises, using the COVID-19 pandemic as the reference. It examined what are the main challenges that need to be addressed in developing and implementing effective research to respond to crises and what policy actions are required, with a particular focus on PHSM research and policies.

6.   This workshop included case study presentations from research funders, research operators and scientific advisory structures related to different research domains as well as a moderated panel discussion with representatives of research agencies, regulatory authorities, and government's advisory bodies.

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[1] Non-pharmaceutical interventions (NPIs) and public health and social measures (PHSM) are equivalent and were used interchangably during the workshop. For the sake of consistency, the PHSM terminology is has been adopted in this summary report.

Session 1: Priority setting for research and data collection in the early crisis phase (moderator: Trygve Ottersen, Norwegian Institute of Public Health)

 Case study presentations:

- *Initial priority setting at Canadian Institutes of Health Research (CIHR)*
  Steven Hoffman (Scientific Director, Canadian Institutes of Health Research)

- *Adopting an "all-hazards approach" for early response to pandemic and the GloPID-R and UKCDR COVID-19 tracker*
  Virginia Murray (Head of Global Disaster Risk Reduction, UK Health Security Agency (UKHSA))

- *Overcoming hesitancy in the early pandemic phase*
  Charles Wiysonge (Director, Cochrane South Africa, South African Medical Research Council, *SAMRC*):

- *The emerging role of pathogen genomics in guiding response to a pandemic*
  Gregory Armstrong (Director, Advanced Molecular Detection Programme, Centers for Disease Control and Prevention, USA):

7.   There is no obvious tool box to draw on at the start of a pandemic, and yet researchers as well as policy-makers need to move quickly. For the Canadian Institutes of Health Research (CIHR), the first challenge was to cut down the time for processing funding allocation processes for new COVID-19 related research. They managed to cut down the grant processing time from the usual 6 months to 6 weeks by streamlining procedures. At the same time, one must be aware of the potential negative effects of processes to accelerate research. In the initial emergency funding scheme in Canada, fewer female scientists applied for funding, success rates were lower among women who applied, and a smaller proportion of grants accounted for sex and gender in the research content. Although this was corrected during the later stages, developing an inclusive and balanced funding procedure is important during a crisis and requires careful attention.

8.   Early on in a crisis, defining research priorities is a critical issue. This crisis emphasised the need for a sound process for identifying and prioritizing research gaps in the early stages of a crisis. For global crises, a UN research roadmap may be part of the solution. The good connection with WHO, which identified broad research priorities at the start of the pandemic, was very helpful and the CIHR updated and refined these priorities for the Canadian context.

9.   The importance of the first WHO meeting to define research priorities at the start of the pandemic and the development of a global research roadmap with clear goals was complemented by the development of tools to monitor the implementation of research to address these goals. GlopidR played a critical role and, to date, its tracker has recorded over 13000 research projects representing over 5 billion USD. The tracker covers a broad diversity of funders, with a reasonable amount of funding going to social science projects (nearly 900 million USD). Nevertheless, such a global crisis has a broad range of consequences and not all of these are being been fully addressed by research. There is a need to consider the direct and indirect consequences of crises more broadly. Developing an approach for anticipating and identifying hazards requires a multisector and multidimensional approach. Therefore, a wide range of organisations and experts should come together as a network not only to exchange information about hazard probabilities but also ways to deal with them. The COVID crisis highlighted the need for engaging policymakers and scientists in evidence-based national risk assessment processes and for addressing the cascading and complex nature of global risks. In this context, it was noted that hazard tracking is within the remit of a number of international bodies and is, for

example, a complementary objective to the Sendai framework. There is potential for these bodies to work more closely together.

10.   A persistent challenge when it comes to dealing with major health crises is the reluctance of various populations to accept the threat itself, and the policy measures to respond to it. This concern is reflected in varying degrees of 'hesitancy' as was very evident in the case of South Africa at the onset of Covid-19. Recent studies have shown a diversity of social determinants of vaccine hesitancy, which can vary between social categories and countries and is embedded in a complex and dynamic system. Reasons identified for hesitancy included the sheer speed with which the vaccination programme was launched, doubts about the political interests of different parties that were promoting vaccination programmes and related conspiracy theories, as well as religious beliefs, culture, complacency and inconvenience. This pandemic has shown the importance of determining as early as possible during crises the level and determinants of treatment/solution hesitancy in the population, and the utility of having baseline attitude levels determined prior to a crisis. This can help differentiate between hesitancy and other factors that lead to potentially poor uptake of treatments/solutions and is important for effective policy action.

11.   This crisis also highlighted the critical contribution of new technologies such as mass genome sequencing. A massive increase in sequencing capability has enabled genome tracking to become a major tool in identifying emerging health threats, their sources and potential impacts. It facilitates pandemic monitoring, including mapping patterns of infection and the development of new disease variants. This technology played a major role at both global and local levels:

- at the global level it helped detect and track variants, with obvious consequences for diagnostics, treatment and vaccination as well as epidemiological modelling;

- at local level, it allowed the identification of clusters and investigation of outbreaks that help define public health measures.

12.   Genome tracking provides multidimensional data but does not need to identify individuals, which enables this data to be made openly available and avoids many of the ethical concerns that would make it more difficult to use it for research. However, this pandemic also revealed a number of research challenges that still need to be overcome: sequencing capacity is not equally distributed worldwide, analytical capacity is often lacking, and there is no consensus on data sharing, which limits international collaboration.

Key lessons

- The early phase of a crisis is necessarily chaotic and setting priorities is therefore a real challenge. The success of science for policy during the COVID crisis depended upon many 'last minute' actions in research programming to address issues as they emerged. As it is very hard to make predictions on the evolution of a crisis, the research system must be very flexible, and able to reassess priorities and reallocate resources quickly.

- In the early phase, it is difficult to have any clear directions from policy makers and establishing research agendas is necessarily a science driven effort: the rapid development of the COVID-19 WHO global research roadmap was very important for all research players. A planned framework process for rapidly establishing and monitoring global priorities could help for future crises. There are a number existing international structures and processes on which to build, including the UNDRR and the Sendai Framework, WHO's disease monitoring activities, the UK's *Hazards*

Information Profile process and CDC's genome tracking and sequencing infrastructure.

- As a crisis evolves, the research community may receive a lot of, sometimes conflicting, requests from policy makers; it is important to identify why a particular research request is important and why it is urgent. In some case this may involve co-designing the research questions with decisions-makers.

- The pervasive issue of 'hesitancy' with regard to preventative measures or treatments can be addressed to some extent by early assessment of the factors resulting in societal distrust and resistance. These assessments have to provide clear and nuanced understanding for different factors and contexts that influence hesitancy. More research must be undertaken to explore hesitancy from various socio-economic, geographical, educational, cultural, gender and religious perspectives.

Session 2: Development of the evidence-base for social interventions (moderator: Tozama Qwebani- Ogunleye, Vaal University of Technology)

Case study presentations:

- ***Developing robust studies on public health and social interventions (non-pharmaceutical interventions) during the COVID-19 pandemic***
  Atle Fretheim (Research Director, Norwegian Institute of Public Health)

- ***Lessons from modelling non-pharmaceutical interventions (NPIs) against COVID-19***
  Jan Brauner (Future of Humanity Institute, University of Oxford, UK)

- ***Is The Cure Worse Than The Disease – COVID-19 And 'Lockdowns'***
  Gideon Meyerowitz-Katz (School of Health and Society, University of *W*ollongong, Wollongong, New South Wales, Australia*)*

- ***Behavioural compliance with government regulations during the COVID-19 pandemic***
  Susan Michie (advisor to the British Government via the SAGE advisory group and UK's Scientific Pandemic Insights Group on Behavioural Science)

13.   A notable feature of the research response to COVID-19 has been the paucity of experimental or robust empirical studies on the effects of social interventions, despite their importance in the public health response to COVID-19. Artle Fretheim observed that the rarity of robust studies was a failure, not a mystery. Practical, political and ethical requirements together with the imperative for rapid governmental action prevented the conduct of most large scale social intervention studies during the crisis. Out of 9 trials that were initially planned by the Norwegian Institute of Public Health, only 2 could actually be conducted and these only addressed simple questions with limited proxy outcomes. 3 new trials will probably not be conducted in Norway because of the complexity of getting individual consent. These difficulties underline the need to map and assess barriers prior to crises and the need for a public debate on consent requirements for some types of social intervention trials. They also emphasise the importance of international cooperation and collaboration, particularly when large sample numbers are required to provide robust results.

14.   Turning to the lessons which may be learnt from observational data, Jan Brauner offered a series of important insights. First, and although this was by no means certain at

the outset, public health and social interventions have been effective overall in mitigating the effects of the pandemic. It follows that the evaluation of the effectiveness of such measures, in order to tease out which are most effective, should be prioritised. Second, their effectiveness has clearly changed over time, reflecting many issues (e.g. progressive improvements in managing spaces safely) and it follows that their effects should be monitored in real time. As described in the Norwegian example, conducting randomised trials is extremely difficult and politically sensitive. Hence the need to use modelling tools. However, the robustness of a model depends on the data and scientific understanding that is available, and much more was available regarding the first epidemic wave than the subsequent ones, emphasising the need to have a good monitoring system over time as the crisis evolves.

15.   The pandemic has demonstrated not only the value but also the limitations of current pandemic modelling approaches. Analyses have shown repeatedly that making predictions based solely on statistics is problematic: there are a lot of factors that influence transmission, mortality etc., and human behaviour has a strong influence. Pandemics are complex: a large number of factors influence outcomes. Forecasting outcomes is difficult, but closer engagement of epidemiologists with the 'super-forecasting' community to develop new forecasting methods should be encouraged.

16.   There are lessons that need to be learned and research that should be conducted before the next pandemic. Issues such as the effectiveness of mask wearing as a generic means of controlling the spread of respiratory illnesses — considered an open issue through much of 2020 — could have been assessed prior to the pandemic. Preparedness is essential even if the next crisis will not be a direct repeat of the COVID-19 pandemic! There is a need for more research on methodological modelling and on the acceptance of social interventions (which is essential to inform modelling).

17.   Gideon Meyerowitz-Katz led a rich discussion of the ways in which recognising and responding to gaps in evidence is vital in framing options for public health interventions. Meyerowitz-Katz noted that stay at home orders and related restrictive measures have become associated in public debate with a range of health harms, raising the question of whether infection control benefits may be outweighed by economic, social or mental health costs. He drew attention to the problems involved in gauging the health effects of lockdowns independently from those directly caused by the pandemic, given the absence of clear comparators, and the complexity and diversity of public health responses across even very similar jurisdictions. The difficulties of disentangling the effects of the pandemic from those caused by lockdowns are clearly apparent when we consider the available data on disruptions in health services and in the delivery of global health programmes. Whilst we can assert in relation to mortality and suicide rates, that the available evidence does not suggest increases attributable to lockdowns, it is difficult to go beyond this. It is very difficult to know the ideal 'mix' of interventions; critical 'baseline' evidence on the generic effectiveness of social interventions in different contexts needs to be collected prior to pandemics. To complement this, data collection, in areas such as the secondary harms of lockdowns, needs to be standardised (for example missed cancer screenings are defined differently across jurisdictions).

18.   One key area of variability in public health and social interventions is the degree to which citizens comply with regulations, such as those related to lock-downs systems for testing, tracing and isolating. Susan Michie emphasised that these are matters of human behaviour in context. A simple cross-disciplinary framework for understanding these behaviours can be useful: the COM-B model, for example, sees behaviour as the interaction of capability, motivation and opportunity, all of which are necessary conditions for compliance. Interventions can be evaluated and designed with these factors in view. In the

UK for example, studies showed that less than 50% of people isolated even if they were symptomatic. Whilst over 80% were willing to isolate, those with low income were 3 times less likely to do so in practice as they were 6 times less capable of working from home. These findings shaped policy advice on the forms of financial and tangible support necessary to enable greater compliance. In other situations, the reason for low compliance was motivation as people had a poor understanding of the rationale for a particular policy. Non-compliance is often due to very practical reasons rather than active opposition to what is being proposed. Governments need to understand the barriers to compliance: The UK experience suggests that if non-compliance is miss-identified as a problem of motivation, the imposition of substantial fines for non-compliance is likely to produce the opposite outcome from that intended. Effective policies and interventions to increase compliance depend on understanding behaviour (and one should not assume that non-compliance is solely linked to motivational issues). Building societal trust is essential. There is a science of human behaviour that should be better used during crises.

Key lessons

- Public health and social measures/non pharmaceutical interventions have been shown to be efficient but in very different ways according to the context and to the phase of the crisis.

- Stronger financial support for research on public health and social measures (PHSMs) is required. Work in this domain, which proved crucial in controlling the effects of the pandemic, comprised a very small proportion of global public research expenditure related to COVID-19. Undertaking PHSM trials/studies is very difficult during a crisis, hence a lot of issues need to be addressed during normal time (methodologies, regulatory acceptance, standardisation…) and experimental studies are required to provide a baseline/standard on which to compare policy effectiveness during crisis

- There may be conflicting demand and acceptance of PHSMs by different social groups. This needs to be taken into account using scientific knowledge of human behaviour and requires institutional support for different kinds of research to inform the foundational contexts and variabilities of intervention design as well as undertaking longitudinal population level studies.

- Whilst modelling has its limitations, particularly with regards to human behaviour, there is considerable potential to develop models that integrate insights from a diverse range of disciplines and approaches. Investment and support for model development and testing should be an ongoing priority.

Session 3. Priority setting and coordination as a crisis evolves (moderator: Tozama Qwebani- Ogunleye, Vaal University of Technology)

Case study presentations:

- ***Lessons learned from epidemiological studies and the evolution of priority setting as the COVID-19 crisis evolved in Portugal***
  Balthazar Nunes (National Institutes of Health, Portugal)

- ***Research for policy advice: lessons from Norway's experience***
  Camilla Stoltenberg (Director General, Norwegian Institute of Public Health, Oslo, Norway)

- *Now-casting COVID epidemics to inform policy priority setting in Hong Kong* Joseph Wu (School of Public Health, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong, China)

- *Policy priority setting during extreme events: the case of Covid-19 in Korea* Byeongwon Park (Research Fellow at STEPI, Korea)

19.   As presented by Balthazar Nunes, the COVID-19 pandemic developed in three phases in Portugal, as in many other countries:

- A first phase when only PHSM policies could be implemented (this included 3 lockdown periods)

- A second mixed phase which combined PHSMs and vaccination

- A third phase with a high vaccination coverage (over 85% in Portugal) which included residual implementation of PHSMs

20.   There were very different priorities for epidemiological research during the three phases. Modelling tools proved to be critically important to assess the impact of PHSMs (and inform policy makers), for example during the lockdown periods, although it is very difficult to assess each PHSM individually (as described in session 2). Similarly, models enabled assessment of the impact of vaccines (number of doses, effectiveness…) and the relationship between vaccination rate and PHSM policies. PHSMs are very important since they are the only available interventions in the early phase of a new infectious disease pandemic, but to deploy them optimally requires a lot of research and capacity-building. There is a need for better connection between research and decision-makers: the research community needs to anticipate the questions that will arise in a crisis (since it cannot conduct research and provide results instantly), which means co-developing a research agenda.

21.   The situation in Norway proved to be fairly similar to the one in Portugal; Camilla Stoltenberg indicated that policy advisers struggled with a shortage of relevant research evidence and therefore there is a need for better foresight and planning. As indicated in session 2, retrospective analysis has confirmed the beneficial effects of PHSMs but also highlighted that this type of research is hard to carry out during a crisis (due mainly to regulatory barriers and attitudes), at least in high-income countries. The pandemic highlighted the need for rigorous cost/benefit analyses for PHSMs to identify the best policies for specific contexts.

22.   Overall, the lack of coordination between researchers and government authorities impeded the efficiency of the policy (and research) response. On the other hand, Norway was fortunate in that it has a very comprehensive nation-wide data registry which facilitated research and policy assessment.

23.   Another crucial element that emerged during the pandemic was the need for openness and community involvement. The typical emergency communication framework had been devised with military crises in mind, and this has proven to be the wrong approach for a public health crisis. It is traditionally recommended that authorities should speak with one voice during a crisis and the many disagreements that emerged within the scientific community to some extent muddled the message to the public. However scientific consensus is sometimes difficult to achieve, scientific evidence evolves and uncertainty is real. The COVID-19 crisis showed the need for a more transparent process where divergent opinions can be expressed openly but in a constructive manner. While this may create some confusion at first, the alternative is worse: if information and divergent views are concealed, they can almost always be exposed nowadays and this undermines trust and

harms the whole system. There is a need to re-consider how openness and transparency in research can be achieved, whilst improving societal trust, during crises. Open discussion of uncertainties combined with constructive public and media engagement can contribute to better understanding of, and trust in, scientific evidence.

24.   Epidemic now-casting broadly refers to the process for assessing the current state of the epidemic by understanding its key pathogenic, epidemiologic, clinical and socio-behavioural characteristics. The primary objective is to provide situational awareness and inform decisions on control responses. The models developed by the University of Hong-Kong, described by Joseph Wu, provided information to decision makers regarding the potential spread of the virus in various conditions and were used to help design PHSM policies, such as quarantine measures and lockdowns. For example, analysis of international data regarding new variants with higher transmissibility led to temporary flight bans. However, looking retrospectively at the pandemic, there is a feeling that, while some very good research was carried out, there was a lack of international coordination and inconsistent risk communication that has undermined the pandemic response. As such, perhaps the most important lesson learned from the experience with COVID-19 is that the disconnect among policymakers, practitioners and scientists must be remedied. It is important to align evidence synthesis with public health operations and policies.

25.   The experience in Korea presented by Byeongwon Park showed that extreme events require fast and effective response. However, they present a lot of unknowns, which puts a lot of pressure on decision makers. Korea is used to managing traditional disasters and has developed since 2004 an "emergency and safety management basic act" which was updated in 2015. Nevertheless, the COVID-19 challenged that system: Who is in charge of the overall response? Who are the true experts? How to manage communication between field medical teams and authorities? How do you provide the necessary information and resources to all stakeholders involved? At the end of the day, the Korean response was characterised by strong top-down mobilisation, flexibility and reflexivity of medical authorities, and agility/active learning from relevant decision-making structures. However, it was also a somewhat siloed and fragmented approach, with a tendency towards avoidance of uncertainty and a lack of foresight, all of which could be improved for addressing future crisis events.

Key lessons

- Epidemics go through different phases and PHSMs are often the sole preventative measures that can be taken early on (before effective medical treatment is identified). Hence the need for modelling tools to assess their efficacy/cost-benefit and for a properly supported PHSM research agenda in-between crises.

- The research system needs to anticipate the questions that are likely to be raised by decision-makers (and to include them in a research agenda) since it is not possible to conduct research on the spot to respond to their questions in emergency

- Decision-makers struggled with a shortage of relevant scientific information/research during the pandemic. There is a need for better planning and coordination between research actors and authorities with responsibility for policy making and crisis management.

- It can be difficult to reconcile the need to speak with one voice during a crisis with the principle of academic freedom. While a diversity of scientific views may potentially generate confusion, it is important to conduct scientific debate in a transparent and open way. This requires proactive engagement with the public and media, in order to

promote trust and facilitate public acceptance of evidence-based policies, even in the face of scientific uncertainty.

Session 4 International cooperation and priority-setting: improving preparedness for the next crisis (moderator: Trygve Ottersen, Norwegian Institute of Public Health)

 <u>Panel discussion:</u>

- Boitumelo Semete-Makokotlela (CEO, South African Health Product Regulatory Authority)

- Devi Sridhar (Professor of Global Public Health, University of Edinburgh, and adviser to the Scottish government on COVID-19)

- Yazdan Yazdanpanah (Head, French national agency for emerging diseases)

- Osamu Aruga (Director for International affairs, Secretariat of STI Policy, Cabinet Office, Japan)

- Ezekiel Emanuel (Vice-Provost, University of Pennsylvania, former adviser to President Biden on Covid-19)

26.   The COVID-19 pandemic yielded important lessons for responding to future crises. For Boitumelo Semete-Makokotlela of the South African Health Product Regulatory Authority, it demonstrated the need for agility to accommodate rapid and unexpected change. It also demonstrated the importance of engaging multiple stakeholders to promote the data sharing and access that is necessary for science-based decisions. Although some processes were stream-lined and accelerated, stringent regulatory decisions are nevertheless required to ensure the trust and safety of the public. There is an outstanding need in some places for international/global standards to be translated into local regulatory and/or operational contexts in a way that ensures both efficiency and acceptability.

27.   Devi Sridhar underlined the need for more collaboration on PHSMs: this requires a lot of observational data and could potentially be facilitated by a global policy observatory linked to national policy tracking systems. There is also a global strategic coordination challenge: many countries implemented different strategies with different goals. This led to a patchwork of policies, such as lock-downs, with no coordination or exchange of information between countries (or within countries). Furthermore, there has been competition within and between countries for limited resources such as PCR tests, drugs and vaccines. There is a need to consider the whole supply chain and, where necessary, develop regional hubs that can supply all the affected countries in a region.

28.   Priority setting early on for any global crisis must be determined by a trusted and mandated organisation and the crucial role of WHO early in the pandemic was again highlighted by Yazdan Yazdanpanah. What emerged also is the difficulty in coordinating research priorities among the various research funders and operators. For example, during the pandemic, most institutions wanted to focus on vaccines and treatments and very few were interested in transmission. There is a clear need for better sharing of priorities at the international level and development of complementary funding processes. At the same time, priorities at global level do not necessarily match those at local or regional level, hence the need for a complementary approach. Some of the necessary coordination could involve regional hubs with a remit to facilitate regional preparedness and response mechanisms, as indicated earlier.

29.   Osamu Aruga underlined what worked well and what required additional work from the Japanese perspective. Japan, based on its considerable past experience with crises,

had already developed flexible response mechanisms as well as funding schemes for emergency research. Pre-existing collaborations with other countries greatly facilitated exchange of data and research priorities during the crisis. However, it was difficult to align different emergency research response mechanisms at national and international level. Hence the need for a disaster-ready international network. Similarly, the crisis showed the need for the integration of comprehensive knowledge, which includes social sciences, at both the local and international scales.

30.   From a US perspective, Ezekiel Emanuel underlined some of the challenges that emerged during the pandemic. For example, there was a lot of duplication and inefficiency during the initial response and a lack of standardised procedures which led to as many as 90% of the initial trials having flawed designs that generated inconclusive results. On the other hand, vaccine development and innovative large scale testing mechanisms, such as the UK Recovery trial, proved to be a great success. A more effective global coordination mechanism for research prioritisation and funding, which brings together relevant institutions, would be very useful.

31.   Beyond this, what emerged is the need for priority setting in the allocation of medical interventions and products. COVAX proved to be deficient, demonstrating that political and ethical considerations do not necessarily fit well together in emergency situations. The ethical imperative was for a vaccine allocation model based on disease impact, a "fair priority model" that still needs to be agreed upon. There is a need for greater transparency and accountability in the system.

32.   During the discussion, the panel agreed that it is essential to have pre-existing agreements between institutions in place before a crisis and that all urgent research needs should be met with adequate funding rather than having to rely solely on the priorities and competitive allocation processes of funding agencies. There should be close coordination and two-way communication between global institutions and regional bodies to adapt priority setting to different contexts.

33.   The role of the various players in the innovation value chain is very important: technology transfer proved to be an issue even when patents were temporarily waived, as this also requires trained people, equipment and know-how.

34.   The need for more transparency and coordination between science advisory structures was underlined. This can help, to circumvent decision-makers operating in isolation and ensure buy-in from society, which is essential for effective crisis response.

35.   Finally, the panel agreed that better international collaboration on research, particularly on PHSMs, is required and should be supported in-between crises, which may require new collaborative mechanisms.