

Lessons learnt from the COVID-19 pandemic: Middle East and North Africa regional perspective for future preparedness

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ABSTRACT

The COVID-19 pandemic revealed critical gaps in preparedness and response capacities globally. These gaps were evident in the Middle East and North Africa (MENA) region, as the region faces unique challenges due to ongoing humanitarian crises, political instability and large-scale religious gatherings, which further exacerbate the risk of spread of infectious diseases.

In April 2024, a conference hosted by the US Centres for Disease Control and Prevention MENA Regional Office and National Institutes of Allergy and Infectious Diseases, in collaboration with the Mohammed Bin Rashid University of Medicine and Health Sciences, brought together 200 scientists and public health professionals from 16 countries to discuss lessons learnt from the COVID-19 pandemic and strategies to strengthen future preparedness and response. This report presents the key barriers to regional collaboration and data sharing identified during the conference, along with the proposed solutions, including establishing regional collaboration platforms, increasing public-private partnerships, operationalising the one health approach and leveraging technological advances.

Reflections on the global pandemic response emphasise the need for improved communication, preparedness extending beyond the health sector and distribution of resources. The collective insights and recommendations in this report aim to provide a roadmap for strengthening emergency preparedness and response in the MENA region and globally, ensuring improved readiness for future public health emergencies.

INTRODUCTION

The seasonal resurgence of COVID-19¹ along with detections of H5N1 in dairy cattle and spillover to humans² and post-COVID pandemic rise in cases and hospitalisations caused by respiratory syncytial virus infections³ signals the need to be vigilant and prepared for the next pandemic. In the Middle East

SUMMARY BOX

- ⇒ The COVID-19 pandemic exposed critical gaps in global and regional preparedness, including in the Middle East and North Africa (MENA) region, which faces unique challenges, including humanitarian crises, political instability and large-scale religious gatherings.
- ⇒ Establishing regional collaboration platforms, increasing public-private partnerships, operationalising the one health approach and leveraging technological advances are essential strategies for improving pandemic preparedness and response in the MENA region. Building regional capacities, such as public health emergency management fellowships and genome sequencing hubs, can enhance preparedness and response efforts across the MENA region.
- ⇒ Leveraging technological innovations, including AI-driven early warning systems, digitalised health records and wearable surveillance devices, can significantly improve outbreak prediction, monitoring and response.
- ⇒ Effective communication, evidence-based resource distribution and integration of preparedness into broader government plans are critical for addressing future pandemics and public health emergencies.

and North Africa (MENA) region, these issues are compounded by the protracted humanitarian crises occurring in several countries, including armed conflict, natural disasters and political instability. In 2023, the region suffered from 18 graded emergencies, 9 of which were acute and prolonged. The region hosts 40% of the global internally displaced persons/refugees and is the source of 58% of the global refugee burden (WHO communication, September 2024). In addition, the region hosts the largest religious mass gatherings,⁴ with attendance by millions from across

the globe increasing exposure to infectious pathogens with pandemic potential.

The 2014 Ebola virus outbreak highlighted critical gaps in emergency preparedness and response and, thus, brought renewed attention to focus investments on improving capacities in all countries to prevent, detect and respond to outbreaks. The USA and 28 countries, WHO, Food and Agriculture Organisation and World Organisation for Animal Health, together launched the global health security agenda (GHSA),⁵ bringing together public and private sectors, along with resources and political will to prioritise health security in country preparedness. The COVID-19 pandemic again highlighted the vulnerability of health systems globally. Building on lessons learnt from the COVID-19 pandemic, in 2024, the US government launched the US Global Health Security Strategy that promotes a whole-of-government approach to drive global action towards shared health security goals through bilateral partnerships, catalysing political, financial and leadership investments and increasing links between health security and existing programmes to maximise impact.⁶

The US Centres for Disease Control (CDC) and Prevention, as one of the lead implementers for US government's GHSA, works in over 31 countries to support progress towards GHSA targets.⁷ In early 2020, as a part of global health security efforts, the CDC launched four regional offices, including the Middle East/North Africa Regional Office (MENA RO), to bolster CDC technical collaborations.⁸ The MENA RO, based in Muscat, Oman, covers 25 countries/territories and engages in technical collaborations and support with the goal of building strong public health partners in the region in support of GHS. In addition, the National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH) in the USA recently (2020) launched the NIAID Middle East, North Africa and Turkey region (MENAT) initiative to promote collaborative research and capacity building in the MENAT.⁹

In response to the emerging public health threats in the region and globally, during 26–27 April 2024, the US CDC MENA RO and the NIAID/NIH in collaboration with the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU) hosted a conference to discuss the lessons learnt from the COVID-19 pandemic and ways to strengthen future preparedness. The conference brought together approximately 200 scientists and public health professionals from 16 countries across the MENA region and from CDC and NIAID/NIH and global partners to share their experiences and ideas on the way forward. This is the first time these partners have convened in MENA to build on the commitment of MBRU and the expanding roles of CDC MENA and NIH MENAT to support preparedness and response in the region. Over a period of 2 days, panel presentations and discussions laid the groundwork for the culmination of the conference with three breakout sessions to harness ideas for addressing the most critical issues facing the

region, and globally, during the pandemic and discussed opportunities for future preparedness. In the following sections, we share the ideas proposed by conference participants as potential solutions to the problems the region faces. Conference participants included public health leaders in global and regional public health institutes as well as representatives from the Ministries of Health and academia from 16 countries. Insights from conference participants were collected during structured breakout sessions where a set of questions was posed to trigger input on the issues faced during the pandemic, lessons learnt and proposed solutions, including experience with successful implementation in the countries represented. The input was collected, collated and summarised by the authors of this article.

The ideas presented here are not the official positions of any of the participating institutions; they represent outcomes and conclusions from the various discussions that took place among the conference participants.

KEY BARRIERS TO MENA REGIONAL COLLABORATION AND DATA SHARING

The key barriers to regional collaboration and data sharing in the MENA region are multifaceted. Variations in national policy agendas, which may prioritise immediate domestic concerns, make it challenging to harmonise approaches to data sharing and hinder collaboration efforts across countries and the region. Limited financial capacities further restrict investments in public health research initiatives and technologies that could facilitate data sharing. Furthermore, ongoing political instability and humanitarian crises compound these obstacles. Overcoming these challenges requires prioritisation of regional public health collaboration along with dedicated resources and coordinated investment in systems that foster sustainable collaboration.

POTENTIAL SOLUTIONS TO INCREASE REGIONAL COLLABORATION AND DATA SHARING

To overcome these barriers, the conference participants proposed the following solutions, which the authors of this article prioritised based on feasibility, impact and alignment with regional needs as follows.

1. *Establish regional collaboration platforms* with comprehensive representation from MENA countries to connect countries and encourage governments to collaborate and share data. This is the top priority as it lays the foundation for other initiatives. These regional platforms could serve as central bodies to coordinate efforts and establish agreements for data sharing.
 - a. *Create a pandemic preparedness consortium* with representation from countries across the MENA region and from multiple health-related sectors within each country. The consortium's main task is to develop memorandums of understanding (MOUs) with various governments for the establishment of a centralised regional data hub for outbreak ana-

lytics and disease modelling. The consortium will leverage the existing funding entities in the region to support regional activities with wider impact and not focus funding solely on single countries. Including cross-sectoral representation from multiple ministries, industry and academia, the consortium will assist in clarifying the value of the recommendations coming from the consortium and assist in adoption and funding of such recommendations. Since research and development are not among the priorities for most countries in the region, increased funding is hard to advocate for on an individual country level. A consortium could serve as a central regional body to advocate with governments for funding collaborative research across several countries to advance preparedness and response capacities. There is already precedence for successful implementation of this consortium in South America (ECLIPSE), where a community of practice for outbreak analytics and disease modelling has strengthened local capacity for preparedness and response.¹⁰ The consortium leads were among the presenters at the Dubai conference, and there are plans to launch a similar initiative for the MENA region in early 2026.

- b. *Create regional public health institutes*: the Gulf Centres for Disease Control and Prevention (GCDC), which functions similarly to a National Public Health Institute (NPHI), has proven successful for data sharing and cooperation among countries in the Gulf Cooperation Council. Similarly, Africa CDC, which also functions as a regional public health institute, is making significant progress in supporting stronger collaboration between countries in North Africa. A similar approach that brings together GCDC, Africa CDC and other NPHIs in the region could help capitalise on the knowledge and resources available in each country to benefit the entire region. In addition, this collaboration could promote coordination and information sharing in response to public health emergencies and advance public health across the region.
2. *Operationalise one health approaches* to generate more holistic data from across sectors into an integrated database. A one health approach considers the health of people, animals and the environment to prevent, detect and respond to health threats. The triangulation of data from all sources, including Ministries of Health, Ministries of Agriculture and Ministries of Environment, is critical for generating integrated data and evidence to inform policy decisions. To accomplish this, digitalising health and surveillance records is needed to enable full integration and timely report generation. The regional platforms provide an opportunity to further support implementation of the one health approach on a regional level.
3. *Build new and enhance existing capacities* using a regional approach, capitalising on resources available in countries across the region, including but not limited to the following.
 - a. *Regional public health emergency management (PHEM) fellowship*: PHEM is a US CDC initiative that builds and strengthens PHEM capacity in partner nations' public health authorities. The PHEM fellowship trains midcareer public health professionals involved in preparedness and response and provides hands-on training, mentorship and technical assistance over the course of 12 weeks at US CDC headquarters. Establishing a regional PHEM training programme hosted by one of the countries in MENA to serve as a hub for training of professionals from across the region will help tailor the training to regional needs and leverage resources available across the region.
 - b. *Regional whole genome sequencing and bioinformatics hubs*: sequencing capacities have been strengthened and, in some cases, built from the ground up during the pandemic. Sustaining these capacities and building capacity for data triangulation and interpretation through bioinformatics training is essential. Strengthening regional hubs that can continue to support these capacities, including for specimen and data sharing, is critical. Examples include US CDC investments in building capacities for bioinformatics among staff in Oman Central Public Health Laboratories (CPHL). This was conducted as a train-the-trainer modality in collaboration with the Association for Public Health Laboratories, which also has a Regional Office in Muscat, Oman. The training was consequently rolled out to other staff in the CPHL to build local bioinformatics capacities. Since Oman CPHL is the first and only WHO Collaborating Centre for Emerging Diseases in the region, it serves as a regional resource for capacity building of laboratories in the region on bioinformatics. US CDC is also supporting next generation sequencing and bioinformatics capacity building in two other countries in the region through twinning programmes between Ministries of Health and US State Laboratories. These activities are in direct alignment with Health and Human Services (HHS) priorities (RFK Jr.: We're Restoring Public Trust in the CDC | HHS.gov).
4. *Enhance risk communication and community engagement* through investing in social scientists and ensuring that risk communication and community engagement is a core part of all preparedness and response activities. Communities should be engaged consistently through routine public health activities and not only during outbreaks or a pandemic. Such ongoing engagement fosters trust and ensures effectiveness of public health interventions.
5. *Increase public-private partnerships* to promote innovation and identify areas of mutual collaboration that strengthen public health efforts in the region. These partnerships can make available additional funding

opportunities and connect skilled workforces across research and academic institutions, industry, government and non-governmental institutions. Furthermore, each participating sector plays a different role in addressing public health challenges, and such partnerships can broaden the reach of initiatives.

6. *Promote and enhance collaborative research* among the MENA countries and US investigators, especially in high-priority areas, such as mass gatherings and other relevant areas of investigation for the region. The NIAID/NIH MENAT initiative is a valuable resource for such collaboration. Additionally, there are a number of funding opportunities available through other institutions that could be leveraged to support work in the region, including but not limited to the Wellcome Trust.

A detailed list of additional solutions proposed by conference participants is included in online supplemental appendix A. In summary, conference participants emphasised the importance of leveraging technological innovations in strengthening regional detection and response capacity, particularly in the context of the unique challenges that the MENA region faces. Key recommendations included leveraging artificial intelligence for early warning systems, building regional manufacturing capacities with a focus on product development, including development of new antivirals and vaccines. Participants also highlighted the need for tailored technological solutions during mass gatherings, including secure digital health verification, wearable surveillance devices and multilingual communication tools, to strengthen real-time monitoring and rapid response.

In addition, the inclusion of mobile populations (migrants, internally displaced persons and refugees) was identified as an essential component of public health planning. Proposed strategies included cross-sectoral data integration, policies that prioritise care over punitive measures and coordinated cross-border service delivery. Finally, participants highlighted the importance of robust collaboration among government agencies, NGOs and international organisations. This included ensuring clear role delineation, transparent data sharing and adoption of human-centred design to ensure that interventions are responsive to community needs.

REFLECTIONS ON THE COVID-19 PANDEMIC RESPONSE: WHAT SHOULD HAVE BEEN DONE DIFFERENTLY

- Improve communication
 - Invest in social sciences for improved communication and messaging.
 - Implement feedback mechanisms for providing timely information to the public and to politicians.
 - Foster transparent and clear communication, adapting format appropriate for each audience, such as decision-makers and the public. Communicate on what is known, unknown and what we are doing to figure it out.

- Strengthen preparedness for future pandemics and outbreaks
 - Define key performance indicators for readiness—need a tool to measure readiness for the next pandemic with clear criteria and index for preparedness.
 - Perform simulation exercises to improve preparedness and be ready with a clear response plan, including a budget.
- Integrate preparedness in the overall government plan, beyond the health sector.
- Speed up reliable and accessible testing capacity.
- Create faster, improved data exchange and ensure that information is used to inform timely decision-making.
- Ensure evidence-based guidance on distribution of supplies, including vaccines.

IMPLEMENTATION CONSIDERATIONS

Strengthening regional capacity for detection and response depends on regional collaboration. Variations in government policies and regulations across the MENA region pose challenges to regional collaboration and data sharing. Countries may have differing levels of comfort with sharing sensitive health data due to privacy concerns, which can hinder the establishment of centralised regional data hubs or integrated surveillance systems. This issue underscores the need for clear MOUs and trust-building measures among participating countries to ensure data security and privacy while promoting collaboration.

There are several examples of successful regional collaboration platforms capable of overcoming data-sharing challenges. Regional bodies, such as the WHO's Eastern Mediterranean Regional Office and European Regional Office, play a major role in supporting detection and response capacities in the region. There are also examples of successful regional collaboration in the MENA region that can be built on. This includes the GCDC that facilitates data sharing, joint research and coordinated responses to health emergencies among member states. Its ability to operate across national boundaries while respecting the sovereignty of its member states highlights the importance of neutral and trusted platforms for collaboration. Expanding this model to include non-GCC countries in the MENA region could help overcome the existing barriers to regional collaboration and data sharing.

Funding constraints are a significant barrier to implementing some of the proposed solutions, including establishing regional public health institutes and genome sequencing hubs. Additionally, only a limited number of countries in the region have the financial capacity to invest in research and development. A regional consortium could help address these gaps by pooling resources and combining financial and technical expertise. Public-private partnerships could help address these funding gaps. The COVID-19 response further demonstrated the

value of collaboration across public and private sectors, highlighting how such partnerships can offset limited public resources and competing domestic priorities.

CONCLUSIONS

The COVID-19 pandemic caused and continues to cause grave losses globally. However, the opportunities that resulted from the global reaction to the lack of adequate preparedness created competencies and capacities that must be harnessed, strengthened and sustained to be better prepared when we are faced with the next pandemic. Additionally, the lessons learnt from the pandemic can only be useful if we act now to implement interventions that improve our preparedness and response for the next regional or global emergency. The collective ideas in this report are a compilation of lessons learnt from regional and global public health partners as they reflected on the pandemic itself and its aftermath. Our aim is to provide a collection of implementable solutions to strengthen emergency preparedness and response in the MENA region.

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