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Pulse-Check

Exploration of Early COVID-19 Pandemic Health Care and Public Health Responses in Select Middle East Nations

On March 11, 2020, after 118,000 cases of coronavirus disease 2019 (COVID-19) infection were reported in 114 countries, the World Health Organization (WHO) declared COVID-19 a pandemic (WHO, 2020a).

The pandemic has created unprecedented stressors for health care systems, governments, and populations around the world, including in the Middle East. Across the region, hospitals have reported running out of beds, and economies have been negatively affected. Addressing the

KEY FINDINGS

- Many of the countries studied had strained health care systems prior to the coronavirus disease 2019 (COVID-19) pandemic.
- All countries studied faced shortages of personal protective equipment either in the beginning or during other periods of the pandemic.
- All countries studied had some challenges related to a lack of standardized protocols for dealing with COVID-19 in health care facilities.
- Although there were some examples of telehealth use, telehealth was not used in a systematic way as a strategy to increase health care capacity in any of the countries studied.
- All countries studied implemented mask mandates, and they all experienced varied degrees of difficulty in enforcing public health measures.
- Some countries in the study faced challenges in rolling out their vaccine campaigns.
- The populations of all countries in the study faced challenges with behavioral health issues, including depression and anxiety. Among health care workers, mental health issues contributed to burnout.
- The majority of countries studied were challenged by politicization of the pandemic and the spread of misinformation about the pandemic and vaccines, especially through social media.

ongoing COVID-19 pandemic—and being better prepared to address future public health emergencies—requires innovation, application of lessons learned, and regional cooperation and collaboration.

Abbreviations	
COVAX	COVID-19 Vaccines Global Access
COVID-19	coronavirus disease 2019
ECMO	extracorporeal membrane oxygenation
EMRO	Regional Office for the Eastern Mediterranean (WHO)
ICU	intensive care unit
MHPSS	mental health and psychosocial support
MOH	Ministry of Health (Ministère de la Santé Publique)
MoHME	Ministry of Health and Medical Education
MOPH	Ministry of Public Health, Republic of Lebanon
MSF	Médecins Sans Frontières (Doctors Without Borders)
NGO	nongovernmental organization
ONME	Tunisian Observatory of New and Emerging Diseases (Observatoire National des Maladies Nouvelles et Émergentes)
PCR	polymerase chain reaction
PPE	personal protective equipment
QAR	Qatari riyal
RHUH	Rafik Hariri University Hospital
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
USD	U.S. dollars
WHO	World Health Organization

Study Approach

The objective of this exploratory study is to examine early health care system and public health responses to the COVID-19 pandemic in a sample of Middle East countries (Iran, Jordan, Lebanon, Qatar, and Tunisia) in order to identify challenges, successes, and innovations that can help to inform an improved response to the COVID-19 pandemic and future public health emergencies in the region. To achieve this objective, we conducted an environmental scan of peer-reviewed and gray literature and conducted focus groups and interviews with health care workers and public health experts in the study countries. This study was deemed exempt from oversight by the RAND Corporation’s Human Subjects Protection Committee.

Sampling Strategy and Countries Sampled

Because of limited resources, we focused our study on a sample of five Middle East countries. We selected countries for inclusion based mainly on two criteria: (1) ability to facilitate participant recruitment for key informant interviews and focus groups through preexisting relationships (our own or with others at RAND), and (2) level of resources (we wanted to include a mix of more-resourced and less-resourced countries).

Using this sampling strategy, we selected Iran, Jordan, Lebanon, Qatar, and Tunisia. These countries represent different geographies, economies, demographics, and health care systems, with some common cultural elements. We acknowledge that, given the diversity along these and other parameters in Middle East countries, our sampling strategy may not capture the breadth of diversity in the region.

This study was conducted over a four-month period between February 2021 and May 2021. We limited our environmental scan of peer-reviewed literature to publications and online resources available between January 2020 and March 2021 and of gray literature published between January 2020 and May 2021. Hence, the results reported here reflect data only from these pandemic time frames.

We recognize that other challenges, successes, and innovations besides those mentioned in this report may have been used either within or subsequent to the study's time frame.

Environmental Scan

We conducted an environmental scan of peer-reviewed and gray literature to gather information about the response of health care systems and public health in the countries studied.

We used PubMed to conduct searches of peer-reviewed literature, limiting our searches to English-language publications from **January 1, 2020, to March 1, 2021**. Our search terms combined the name of the country of interest—Iran, Jordan, Lebanon, Qatar, or Tunisia—with “COVID-19” or “SARS-CoV-2” (severe acute respiratory syndrome coronavirus 2) and variations of the terms “health care,” “hospital,” “vaccine,” “surveillance,” “testing,” “resources,” and “partnership.” Results for the country-specific searches ranged from 143 to 928 peer-reviewed articles. Two researchers split the review of titles and abstracts between them to select articles that were relevant to the study's areas of focus and then abstracted and analyzed data from the relevant articles.

Because relevant information may be captured in non-peer-reviewed platforms, we also conducted a gray literature review; this search did not have the same date constraints as the peer-reviewed literature search and incorporated all relevant materials from **January 1, 2020, to May 1, 2021**. The gray literature search used similar keywords as those used for peer-reviewed literature. We conducted targeted searches in English for all countries studied, using Google and LexisNexis search engines. In the case of Tunisia, we also searched in French; for Lebanon, we also searched in Arabic. These searches led to our identifying four to six websites from each country, including government websites, local news outlets, and academic institutions, each of which were reviewed in depth for content related to our environmental scan. We also reviewed the WHO website for relevant information.

Focus Groups and Key Informant Interviews

Between **March 2021 and May 2021**, we conducted five focus groups (one in each country) and eight key informant interviews across the five countries. The focus groups included four to eight participants and a combination of health care providers and staff, public health experts, scientists, policy experts, and other thought leaders. We recruited participants with the help of academic medical centers in Iran and Lebanon, NAMA (a Jordan-based think tank), the Qatari embassy in the United States, and RAND contacts in Tunisia. Except for one interview participant, all participants in the interviews and focus groups resided in one of the countries studied. We used a semi-structured interview guide (included in the appendix) to help frame each one- to two-hour key informant interview and focus group, which we conducted over Zoom or a similar videoconference platform. We either recorded or transcribed each discussion.

We used a *rapid analysis technique* to analyze the transcripts: This is a team-based method of ethnographic inquiry that uses triangulation and iterative data analysis to develop actionable information from an insider's perspective to inform policy and practice (Beebe, 2001; Hamilton and Finley, 2019). Each of us used a common template to summarize findings and analyses, identify themes, and record illustrative quotes. We conducted all the interviews and focus groups in English, except for the focus group with Iranian participants, which was conducted in Farsi by the project lead, and the focus group with Jordanian participants, which was conducted in Arabic by a project team member.

Recruitment of health care system and public health practitioners allowed us to obtain on-the-ground perspectives from health care providers and public health experts of each country's pandemic response, which complemented the findings from the environmental scan. Given the exploratory nature of the project and limited resources, the number of focus groups and key informant interviews was small.

Overview of the COVID-19 Response and Strategy in Select Middle East Countries

We begin with some brief background on the initial response to and strategy of the five countries during the COVID-19 pandemic. This overview touches on the governance and organization of the national response and then summarizes key restrictions and other policies established during the initial months of the COVID-19 response. Specific features of the countries' responses, including challenges and successes or innovations, are discussed in more detail in later sections of this report.

Governance

Each of the countries in our study established some form of governing structure to lead its pandemic response, although responsibility for pandemic response planning and implementation was often shared with other entities. The main components of each country's governance structure are shown in Table 1.

Key Restrictions Established by the Five Countries Early in the Pandemic

All the countries in this study engaged in some form of COVID-19 restrictions and public health interventions, including limits on travel and in-person work and recreation. Such restrictions would typically be removed or lessened as case rates fell and reimposed

TABLE 1
Components of the Five Countries' COVID-19 Response Governance Structure

Country	Key Components
Iran	<ul style="list-style-type: none"> National Committee to Combat Corona was established in February 2020, with participants from the Ministry of Health and Medical Education (MoHME) and the Ministries of Science, Interior, Education, and Culture; national radio and TV; and a government spokesperson, commanders of discipline, and the armed forces (Abdi and Mirzaei, 2020). The committee was charged with overseeing decisions related to curtailing the spread of COVID-19, including imposing pandemic-related restrictions and closures when appropriate. The MoHME was designated as central command center for pandemic response (Seddighi, 2020). The Islamic Consultative Assembly and Planning and Budget Organization (cabinet) also played a key role in pandemic-related policymaking (Seddighi, 2020).
Jordan	<ul style="list-style-type: none"> The government followed recommendations and updates from WHO and implemented a series of preventive strategies at the local and national levels with the help of a collaborative multidisciplinary team at the National Center for Security and Crisis Management (Al-Tammemi, 2020). The Defense Law was activated, which transferred authority to the Minister of Defense to issue directives according to the situation at hand (Alqutob et al., 2020). The Ministry of Health partnered with the disease control and prevention committees to prepare Jordanian frontline doctors to handle COVID-19 and build up the capabilities of health care workers by formulating evidence-based recommendations (Suleiman et al., 2020).
Lebanon	<ul style="list-style-type: none"> On January 31, 2020, the government established a multistakeholder national committee for COVID-19, which took measures to flatten the curve (Makhoul, Kabakian-Khasholian, and Chaiban, 2021). Quarantines occurred in many Lebanese towns with financial support from the government, United Nations (UN), and municipalities. Political parties helped impose quarantines and managed the containment in their areas of influence (Ministry of Public Health, Republic of Lebanon [MOPH], 2021c).
Qatar	<ul style="list-style-type: none"> In March 2020, Qatar formed the Supreme Committee for Crisis Management for the COVID-19 pandemic. The committee was tasked with managing various aspects of the pandemic. The committee was chaired by the Prime Minister and the Minister of Interior ("Duties of the Supreme '10' Committee for Crisis Management," 2020).
Tunisia	<ul style="list-style-type: none"> The National Coronavirus Response Authority coordinated activities among the 24 governorates in Tunisia, coordinating with the Tunisian Observatory of New and Emerging Diseases (ONME), the Response and Relief Organization, and the Regional National Committees for Disaster Prevention. Municipal councils also established local crisis committees that could work with civil society organizations and local governments (Abouzzohour and Mimoune, 2020).

wholly or in part as rates increased again. All the countries required mask wearing at some point early in the pandemic, and each country had launched a vaccine campaign by early 2021.

Iran

In general, Iran's initial pandemic policies favored social distancing over lockdowns (Abdi and Mirzaei, 2020). Where lockdowns were imposed, Iran used "smart distancing," with different sectors opening gradually or on a rotating basis. IranAir also suspended flights in March 2020 because of restrictions on travel by Iranians that had been imposed by other countries ("IranAir Says All Flights to Europe Suspended Due to 'Restrictions' Imposed," 2020).

Jordan

Jordan's initial lockdown rules were particularly strict. These included a ban on large gatherings and a strict curfew (Al-Kazwini et al., 2021; Negev et al., 2021); closure of schools and universities, with remote work encouraged when possible (Abdel Jalil et al., 2020); closure of shopping centers, nightclubs, bars, sports clubs, parks, and pools ("Jordan: Authorities to Extend the Nationwide Nightly Curfew to 1900–0600 Starting March 13," 2021; Al-Kazwini et al., 2021); a prohibition on religious gatherings; a halt on newspaper printing; a ban on travel in and out of the country; and in-hospital mandatory quarantine of asymptomatic and symptomatic COVID-19–infected individuals (Samrah et al., 2020). The Jordanian armed forces and police were called upon to ensure implementation of the mandatory wearing of masks and gloves and social distancing in public spaces (Al-Kazwini et al., 2021). As restrictions began easing at the end of April 2020, including the reopening of borders to neighboring countries with higher outbreak incidences, COVID-19 infection rates began rising. By autumn 2020, COVID-19 positivity rates in Jordan had reached one of the highest rates worldwide (Al-Kazwini et al., 2021).

Lebanon

In Lebanon, a state of emergency was declared at the onset of the pandemic, and the whole country went on full lockdown with the closure of all educational institutions, theaters, gyms, restaurants, pubs, and public and private institutions (Kharroubi and Saleh, 2020). Air travel from endemic areas was banned, and Lebanese citizens abroad were given a four-day period to return before the travel ban took effect (Tuite et al., 2020). All border crossings and seaports of entry were sealed (Kharroubi and Saleh, 2020). Lebanon imposed fees for noncompliance with mask mandates (Felter and Bussemaker, 2020).

Qatar

The Qatari government put a spectrum of policies in place, including restrictions on international travel, cancelation of public events, school closures, closure of public transportation (Miller Canfield, 2020), and isolation of industrial areas where laborers live (a COVID-19 transmission hotspot). On March 9, 2020, the Ministry of Public Health issued a travel policy that classified countries into low-risk and high-risk, establishing a different quarantine policy for each (Ministry of Public Health, State of Qatar, 2021).

Tunisia

During the initial lockdowns, Tunisia restricted people's movements to medical appointments and shopping for necessities. These restrictions were later eased, but ahead of Ramadan in 2021, the government applied a curfew from 7 p.m. until 5 a.m. and banned public and private gatherings for at least the first two weeks of the month ("Tunisia: Empty Streets in Tunis as Ramadan Begins," 2020). However, the government resisted stricter measures out of concern about imposing additional pressures on Tunisia's weak economy ("Coronavirus: Tunisian Hospitals Struggling to Cope with Rise in COVID-19 Cases," 2020).

Common Challenges

We now turn to a discussion of some of the most-common challenges regarding COVID-19 faced by the countries in our study. Some of these challenges are the same as those faced by countries around the world. However, many of the challenges in the Middle East are a product of historically insufficient (i.e., prepandemic) investments in public health and a lack of health care capacity. The pandemic also unearthed new problems that are symptomatic of a lack of capacity for pandemic preparedness and response, signaling potential opportunities for future research, investment, and regional collaboration. For example, interviewees in some countries that we studied noted the need for a central command that oversees and coordinates pandemic response across regions within the country.

Strained Prepandemic Health Care Systems

Many of the countries in our study had strained prepandemic health care systems. Hospitals in the region were historically challenged by lack of staff, beds, and other medical resource capacity—a symptom of the lack of prioritization of health care

systems and public health from both budgetary and policy standpoints (Malek, 2021). Low wages for health care workers, especially in public hospitals, have led to challenges with staff retention. In all the countries studied, critical care is an underdeveloped specialty, with shortages in intensive care unit (ICU) beds, critical care nurses, physicians, and respiratory therapists. Table 2 lists examples of some of the key health care system challenges facing Iran, Lebanon, and Tunisia, whose health care systems experienced significant challenges, especially early in the pandemic.

We note that Jordan and Qatar had relatively stronger prepandemic health care systems. The Jordanian health care system is considered one of the best in the region because of the country's geopolitical stability (Al-Ajlouni and Al Rabayah, 2020), while Qatar has made strides to increase its health care capacity, establishing ten new hospitals and 12 new primary care centers between 2016 and 2019 (Oxford Business Group, 2020a). In spite of this, as with many nations in the region and around the world, both countries' health care systems faced challenges in responding to health care needs during the pandemic (Table 2).

Notably, as evident from our interviews and focus groups, all countries studied were challenged

TABLE 2
Key Prepandemic Health Care System Challenges

Country	Key Challenges
Iran	<ul style="list-style-type: none"> Lack of national policy or guidance led to poor health care cost management (Lankarani, 2020). More than 2 million Afghan nationals live in Iran, of which 36 percent are undocumented and thus cannot get health insurance (Salmani, Seddighi, and Nikfard, 2020).
Jordan	<ul style="list-style-type: none"> There were severe shortages of medical supplies (e.g., personal protective equipment [PPE] and oxygen) and equipment (e.g., beds and ventilators) in public hospitals.^a There was a lack of clear guidelines about COVID-19 treatment.^a
Lebanon	<ul style="list-style-type: none"> The MOPH and National Social Security Fund routinely failed to make payments to public and private hospitals (Kharroubi and Saleh, 2020). Medical equipment was scarce and expensive (Kharroubi and Saleh, 2020). Private hospitals were reluctant to collaborate with public hospitals (Saliba and Taher, 2021). Widespread power outages further restricted hospital capacity (Majzoub, 2020).
Qatar	<ul style="list-style-type: none"> Despite recent expansion of health care system capacity, Qatar's health care system was challenged with the surge in hospital and ICU admissions during the pandemic because of space and supply limitations.^a The lack of knowledge of and experience with COVID-19 was a major challenge.^a
Tunisia	<ul style="list-style-type: none"> Resources are unevenly distributed both geographically and economically (Saidi et al., 2021); the private system owns the majority of medical equipment (Mleyhi et al., 2021; Oxford Business Group, 2020b).

^a Based on the responses of interview participants during key informant interviews and focus groups conducted from March 2021 to May 2021.

If you have money in Lebanon, you can get almost any care at home except for plasma transfusion and intubation.

There's no oversight. If you . . . have the money, you can buy Remdisivir in the black market. I [spent] \$1,000 for two doses.

— Interview participants (Lebanon)

with staffing shortages in the context of pandemic surges and did not have enough critical care-trained nurses and physicians.

The Iranian MoHME worked with WHO and other partners to assess, analyze, and implement changes to strengthen the primary care system to better respond to COVID-19 (“Islamic Republic of Iran Tackles COVID-19 by Enhancing Primary Health Care,” 2021) and to support the country’s health care system in diagnosing and treating patients with COVID-19 (WHO, Regional Office for the Eastern Mediterranean [EMRO], 2020a). However, the country was challenged with addressing the health care needs of the large number of Afghan nationals living in the country who have historically had poor access to health care (Salmani, Seddighi, and Nikfard, 2020).

In Lebanon, the failure of the MOPH and National Social Security Fund to make payments to public and private hospitals prior to the pandemic left hospitals unable to pay salaries and sustain inventories. Medical equipment has long been scarce and expensive (Kharroubi and Saleh, 2020), while widespread power outages—at times lasting longer than 20 hours—forced hospitals to restrict their capacity further as they relied on generators to sustain ICU operations (Majzoub, 2020). In addition, the August 2020 explosion at the Port of Beirut damaged six hospitals and 20 health clinics, facilities much needed for the most-vulnerable populations in Lebanon (“UN and Partners Launch \$565 Million Appeal for Lebanon,” 2020). Interviewees also indicated that access to

health care resources and care at home is dependent on financial resources, a situation that continued during the pandemic (see callout above).

Although Tunisia’s health care system has been ranked among the strongest in the region, investments in public health—the main provider of preventive services in the country, which covers two-thirds of ambulatory care encounters and 90 percent of hospital encounters—have declined in the past 20 years and have been directed instead toward specialty outpatient care and medical tourism, which are typically conducted by the private sector (Oxford Business Group, 2020b). Before the pandemic, Tunisia attracted approximately 15,000 medical tourists annually, many for dermatological treatments (Khanfir and Riabi-Ayari, 2020). The emphasis on financing the private health care system weakened the ability of the public system to manage the pandemic. For example, in Tunisia, ICU beds are unevenly distributed across the country, with the majority located in coastal regions (Hammas, 2020). Moreover, only 410 intensive care physicians work across the public and private hospital systems.

Inadequate Supplies and Resources

All countries faced PPE shortages either in the beginning of the pandemic or during some other periods in the pandemic. In Iran, interviewees indicated that medical supply shortages were particularly notable in small towns: “In small towns there are shortages of medications, ventilators, and some-

Our major problem is manpower, trained respiratory therapists, trained ICU nurses . . . critical care physicians; those are the major challenges that we faced.

— Interview participant (Jordan)

times PPE in hospitals.” Interviewees in Jordan also shared their views regarding challenges related to insufficient critical care supplies and expertise (see callout above).

Shortages of PPE for frontline staff were also reported to be widespread in Tunisia. A survey of available resources found that 57 percent of frontline staff reported a lack of PPE, 58 percent purchased their own, and 60 percent used at least one homemade item (Daghmouri et al., 2020). Interviewees also shared their views on challenges with capacity for COVID-19 patients in public hospitals (see callout below).

If you don't find a bed, you have to go to a private clinic and those are expensive—and you have to pay in advance. Public hospitals have no capacity.

— Interview participant (Tunisia)

Lack of COVID-19 Protocols and Other Operational Challenges in Health Care Settings

All the countries studied had some challenges related to lack of standardized protocols for dealing with COVID-19 in health care facilities. On an operational level, the lack of robust critical care expertise and critical care resources compounded challenges with care for the sickest COVID-19 patients. In addition, health care providers often did not take sufficient precautions to protect themselves against the virus.

In Jordan, an interview participant noted the lack of protocol: “We did not have a clear protocol during the crisis from organizations like the WHO on how to triage, how to deal with those kinds of scenarios.” In Iran, lack of national guidance led to poor health care cost management, and the lack of protocols led many health care providers to contract COVID-19. By July 2020, more than 180 doctors had died, potentially because of “careless use of PPE.” Proper PPE use ranged as low as 3-percent to 26-percent compliance (Lankarani, 2020). Compliance was especially low in outpatient settings.

Many countries were challenged with high infection rates among health care workers because of some combination of poor health care provider PPE compliance, not enough education in proper donning and use of PPE, and/or ineffective (or insufficient) infection control practices:

- During the first few months of the pandemic, many physicians in Jordan did not take sufficient precautions at home and work, which may have increased the risk of contracting the virus (Ramadan et al., 2021).
- In Lebanon, COVID-19 patients sometimes had to wait on the pavement outside hospitals in Beirut, with emergency rooms packed and ICU beds full. Hospitals reached capacity, and the pandemic also led to a decrease in blood supply (Al-Riyami et al., 2021), a 31-percent decrease in childhood immunizations (Mansour et al., 2021), and a 47-percent decrease in daily emergency department visits (Mahmasani et al., 2021).

Interview participants from several countries that we studied commented on the severity of the challenges faced by hospitals and emergency departments (see callout below).

Lack of Telehealth Infrastructure

Although we found examples of telehealth use among the countries studied, telehealth was not used in a systematic way as a strategy to increase health care capacity in any of the countries. Lack of prepandemic investment in telehealth infrastructure, health care provider and population resistance to telehealth, and lack of existing telehealth reimbursement mechanisms contributed to this. For example, interviewees from Jordan indicated that the inability to use telehealth was a missed opportunity during the pandemic (see callout at right). Iranian health care workers also had low acceptance of telehealth, which was reinforced by lack of funding to support the program, as well as lack of organized telehealth networks (Azadnajafabad et al., 2021).

I think telehealth could be very helpful during the peak because we can reach out to more people, but we need to fix the legal and the financial logistics.

— Interview participant (Jordan)

Difficulty Enforcing Public Health Measures Among the Public

Mask Mandates

Although all countries implemented mask mandates, these mandates were not always effectively enforced.

During the peak in Corona [infections], death has become an integral part of every emergency department shift.

— Interview participant (Iran)

Almost all of the nurses I have been working with have caught coronavirus once or twice, even after vaccination.

— Interview participant (Iran)

The situation got so bad that the Ministry of Health forced hospitals to take in COVID-19 patients . . . under the threat of stopping to deal with these hospitals regarding reimbursement from the National [Social] Security fund . . . or taking them out of the health care system.

— Interview participant (Lebanon)

In Tunis, nobody is taking COVID-19 seriously. People don't wear masks. You can go to any mall, and it's crowded.

They have a 7 p.m. curfew, but during the day there is no control on anything. People take public transportation; people mingle in closed areas. . . . People are denouncing the [use] of these measures.

— Interview participants (Tunisia)

For example, although obligatory mask wearing in enclosed public spaces was mandated in Tunisia in August 2020, enforcement was minimal and the requirement was largely ignored by the public and many in leadership positions (“Coronavirus: Tunisian Hospitals Struggling to Cope with Rise in COVID-19 Cases,” 2020). Interviewees explained that the public did not comply with masking requirements (see call-out above). A similar problem was seen in Iran, where only about 64 percent of Iranians surveyed in June 2020 reported complying with mask requirements (Mandavilli, 2020).

Qatar faced problems with noncompliance despite severe penalties. The Qatari government began requiring face coverings in public on May 17, 2020, to be enforced by a fine of \$55,000 U.S. dollars (USD) (200,000 Qatari riyal [QAR]). When many

people did not comply, the government began publicly identifying individuals who violated restrictions on national television (“Coronavirus: Qatar Names and Shames Nationals Who Violated Home Quarantine,” 2020).

Testing Capacity

Lebanon faced constraints on testing early in the pandemic. Initially, only one large public hospital, Rafik Hariri University Hospital (RHUH) was initially approved by WHO and the Ministry of Public Health to conduct polymerase chain reaction (PCR) testing, and PCR testing was reserved for asymptomatic patients from endemic areas, symptomatic patients, and their contacts (Bizri et al., 2021).

Tunisia also had a slow start with testing. The country expanded testing capabilities as more medical center laboratories were approved for COVID-19 testing. However, it lacked the resources to make high-quality PCR testing widely available (Kobia and Gitaka, 2020).

In Iran, inconsistent approaches to testing were initially used, although five private companies were later approved to produce test kits, and as of January 2021, Iran was running 10,000 tests daily, with plans for further expansion. Its laboratory network to process test results expanded to include 126 facilities (40 of which are in the private sector) (Ghanbari et al., 2021).

Difficulty in Vaccine Rollout

Some countries in the study faced challenges in rolling out their vaccine campaigns. Lebanon had a slow start to its campaign. Lebanon officially launched a national vaccination campaign at RHUH on February 14, 2021 (“Lebanon Starts Its COVID-19 Vaccination Drive, PM Says Will Wait His Turn,” 2021), but the effort slowed because of worldwide vaccine shortages, vaccine hesitancy, concerns about the AstraZeneca-Oxford vaccine, and limited registration by non-Lebanese residents (Saoud, 2021). As of late April 2021, 155,706 people were fully vaccinated (3.3 percent of the population), while 290,281 had received their first vaccine dose (MOPH, 2021b).

Tunisia also struggled with its initial vaccine rollout. Tunisia’s national vaccination campaign started on March 13, 2021, with Tunisia aiming to vaccinate 50 percent of its population by the end of 2021 (“COVID-19: Tunisia to Receive Chinese Donation of 200,000 Vaccine Doses Thursday,” 2021; “Tunisia Receives First Batch of Coronavirus Vaccines,” 2021). Tunisia later received vaccine doses from Russia, COVID-19 Vaccines Global Access (COVAX), China, and other sources (“COVID-19: Tunisia to Receive Chinese Donation of 200,000 Vaccine Doses Thursday,” 2021). However, interviewees expressed frustration with the lack of effective vaccine rollout. One interview participant noted, “There was no awareness campaign from the government because there was no sense of when the vaccine rollout would start.”

Vaccine Hesitancy

Vaccine hesitancy (often a result of a belief in conspiracy theories) and ineffective vaccine rollout campaigns were also common challenges in the region. An interviewee from Jordan noted, “We don’t have a problem in securing vaccines. The major problem is to convince people to register on the vaccine platform.” Syrian refugees in Lebanon without legal documentation feared deportation or incarceration upon registering on the MOPH platform. Furthermore, Palestinian refugees have deep-rooted mistrust in the health care system, which has reportedly discriminated against them and barred them from receiving public social services and health care (Human Rights Watch, 2021).

Furthermore, favoritism or “line-jumping” played a role in vaccine access. Protocols for prioritizing which populations should get vaccinated first based on risk were not always followed. An interviewee from Tunisia expressed frustration with favoritism in vaccine prioritization (see callout at right).

Difficulty in Meeting Behavioral Health Needs

The populations of all the countries in our study faced challenges with behavioral health issues, including depression and anxiety. Among health care workers, mental health issues contributed to burnout.

Some countries experienced a rise in substance abuse and domestic violence. Some key challenges are summarized in Table 3.

In Jordan, the period of national lockdown successfully minimized spread of the virus, but suppressed all economic activities, resulting in quarantine-related psychological distress among the general population and health care workers (Al-Sabbagh et al., 2022; Massad et al., 2020). Interviewees from Jordan were among those who described the psychological impacts of the pandemic (see callout on the next page).

Pandemic Politicization and Misinformation

The majority of the countries studied were challenged by politicization of the pandemic and the spread of misinformation about the pandemic and vaccines, especially through social media. A common theme in discussions with interviewees from all five countries was concern that the politicization of the pandemic hindered effective response to the public health emergency. In Iran, an analysis of social media early in the pandemic found that more than 60 percent of tweets focused on the politics of the pandemic and COVID-19 as an exaggerated threat (Al-Rousan and Al-Najjar, 2020). An interviewee also commented

We’ve seen an exacerbation of favoritism. If you go to a hospital where you know someone, you would get better or unique care. That’s true for vaccine management.

— Interview participant (Tunisia)

Physical burnout. We were only two pulmonologists, and we were too exhausted to work with all the patients, which had a psychological consequence on us when dealing with the disease.

Psychological impact on patients was a big issue. Nobody paid attention to it, and especially that families will leave the patient by him- or herself in the hospital and the patient will be struggling with the stress and psychological negative consequences We missed the psychological support during the pandemic.

— Interview participants (Jordan)

TABLE 3
Key Behavioral Health Challenges

Country	Key Challenges
Iran	<ul style="list-style-type: none"> • Health care workers who tested positive for COVID-19 were more likely to suffer from anxiety and depression, while those who tested negative were more likely to have insomnia (Amra et al., 2021). • The Iranian national COVID-19 response plan did not include mental health care for health care workers as a key consideration (Nahandi et al., 2020). • Rumors spread among the population about homeless people who use drugs being “coronavirus moving bombs” and advocating their arrest and compulsory addiction treatment (Deilamizade and Moghanibashi-Mansourieh, 2020).
Jordan	<ul style="list-style-type: none"> • Both symptomatic and asymptomatic quarantined COVID-19 patients suffered symptoms of depression (Samrah et al., 2020). • Quarantine-related anxiety was most common among the younger population, women, and people with poor social support (Massad et al., 2020). • Jordanian health care workers (sampled in several studies during the pandemic) reported fear, depression, anxiety, and stress (Alnazly et al., 2021; Hawari et al., 2021).
Lebanon	<ul style="list-style-type: none"> • Psychological stress, anxiety, depression, and obsessive-compulsive behaviors increased among the general population during the pandemic (Fawaz and Samaha, 2020; El Othman et al., 2021; Saadeh et al., 2020). • Remote learning was associated with depression and anxiety disorders among undergraduates (Fawaz and Samaha, 2020).
Qatar	<ul style="list-style-type: none"> • Mental health conditions and burnout—as a result of long work hours—were reported among health care workers.^a
Tunisia	<ul style="list-style-type: none"> • During the first six weeks of the pandemic, reports of gender-based violence increased sevenfold from baseline to near 6,700 cases (Yahia and Blunt, 2020). • Frustration with the health care system led to violence against physicians and nurses (Jelassi, 2020).

^a Based on the responses of interview participants during key informant interviews and focus groups conducted from March 2021 to May 2021.

on the lack of trust driving the politicization of the pandemic (see callout at right).

In Lebanon, public concern and panic about the disease quickly peaked and caused an explosion of social media postings that spread rumors, exaggerated the number of infections, and spread conspiracy theories, misguided reassurances, and false information about prevention, medication, vaccination, and symptoms (Melki et al., 2020).

Social media platforms designed to provide COVID-19 guidance sometimes became channels for conspiracy theories and misinformation. In Jordan, for example, social media platforms like WhatsApp and Facebook were the main channels for spreading misinformation, including such claims as the COVID-19 virus causes infertility in men, drinking warm water every 15 minutes stops the virus, and hand dryers are effective in preventing infection (Tal, 2020).

Interviewees from Qatar described the role of social media in spreading misinformation (see callout below).

Successes and Innovations

Despite often limited resources, the countries examined in this study made significant efforts to

A lot of misinformation was promoted by social media about the disease—whether it’s made in the lab and then spread by military acts or whatever—and the conspiracy theory about the vaccines.

— Interview participant (Qatar)

There are issues with a lack of trust in the public health system and believing that COVID-19 and public health guidance is politically driven. In the future, there needs to be trust-building campaigns through media.

— Interview participant (Iran)

address the many challenges posed by the ongoing COVID-19 pandemic. Importantly, many of these successes and innovations happened *in the context of very resource-constrained health care systems and public health described earlier*—signaling that success and innovation (albeit in small pockets) is possible even in highly challenging environments.

Below we highlight successes and innovations in the areas of building capacity, resources and PPE, screening and testing, public health guidelines, vaccines, communication, and behavioral health.

Building Capacity

All the countries studied had some success in increasing health care system capacity to address the pandemic. We highlight some examples from each of the five countries studied in the sections that follow.

Iran

Recruiting and retaining staff to support the health care system surge. Iran developed several effective strategies for managing health care system surge in response to the pandemic. To mitigate staff shortage

and burnout, medical specialists and nursing staff from other divisions of the health care system, such as educational and research medical centers, were temporarily transferred to where they were needed the most. In addition, many retired or nonworking nurses and other health care specialists, as well as nonspecialist volunteers, rejoined the health care workforce (Adeli, Heidari, and Heidari, 2020). Iran also deployed 10,000 public health workers, many to rural areas, to assist in decreasing virus spread. Furthermore, to increase radiology capacity for reading computerized tomography (CT) scans of lungs, radiologists in Tehran used WhatsApp for teleradiology with radiologists in North America.

Clergy comprised a large number of volunteers because of their ability to address the psychospiritual needs of patients and end-of-life care. Military organizations, municipalities, nongovernmental organizations (NGOs), and the public set up convalescent centers, which received technical assistance from universities, for COVID-19 patients who were discharged but could not return home (Maher et al., 2020). Imam Khomeini Hospital Complex in Tehran stood up an outdoor triage area and respiratory clinic, with five lines of residents and staff from infectious disease, emergency medicine, internal medicine, and other departments (Allameh et al., 2020). In addition, the MoHME hired 10,000 people to assist with public health efforts, especially in deprived areas (Behzadifar et al., 2020), and it increased the number of students who could be admitted in various fields of medical sciences.

Iran delayed accepting outside support to build its capacity, initially refusing medical and logistical help from Médecins Sans Frontières (MSF; Doctors Without Borders) because it believed that MSF had underestimated Iran's medical capacities in Isfahan for the treatment of severe COVID-19 cases (Blandinier et al., 2020). Later, Iran agreed to accept all offered external help, except from the United States and Israel.

Jordan

Using data to track hospital bed and staff availability and designating quarantine hospitals. To manage health care system surge in response to

the pandemic, Jordan's Ministry of Health (MOH) tracked hospital bed and staff availability centrally. The MOH regularly posts data on hospital bed availability and resource shortages on its website. Collaboration between the private and public health sectors helped create capacity to care for COVID-19 patients.

As part of the national effort to combat the pandemic, the MOH designated select hospitals to quarantine and treat all patients who tested positive for COVID-19 (Saadeh et al., 2020; Al-Kazwini et al., 2021). No visitors were permitted at these facilities, and all nonemergency surgeries and procedures were canceled. The MOH, in partnership with WHO, conducted a series of training workshops to build the capacity of health care workers managing COVID-19 cases in designated hospitals and at ports of entry (WHO EMRO, 2020b; WHO, 2020b).

King Abdullah University Hospital prepared a "closed circuit" model for surgical patients diagnosed with COVID-19. The health care staff, including nurses, anesthesiologists, and surgeons, were supplied with the necessary PPE. After the completion of shifts, health care employees were quarantined for 14 days in designated facilities and were tested before leaving quarantine (Bani Hani et al., 2020).

Lebanon

Caring for patients in their homes and expanding use of online health resources. Lebanon started a community initiative to take care of patients in their homes to reduce stress on hospitals. In addition, grassroots organizations, the International Committee of the Red Cross, and the Lebanese Red Cross supported COVID-19 patients in their homes.

Lebanon does not have a centralized electronic health record system, and telemedicine is not an option for many patients because of poor infrastructure, including the lack of stable electricity and the absence of internet access (Khuri, 2020). Nevertheless, some health care providers resorted to telemedicine to provide services for certain medical conditions. Although telehealth was not used in a systematic way in Lebanon, physicians relied on WhatsApp, Zoom, Microsoft Teams, Skype, and Cisco WebEX, phone calls, and email as ways to provide medical consultations or prescriptions to

We were working on a model that whenever we reach certain occupancy rates, we deploy more resources to enable us to open extra, let's say X number of beds in ICU, X number of beds in acute care, . . . a systemwide command center that was controlling all the activities.

When the staff come, they have already attended the “upskilling” program, and we used to have something [called] a buddy system, where every nurse will come from a non-ICU background, pair with a nurse with an ICU background, then both of them work with a group of patients.

— Interview participants (Qatar)

their patients (Helou et al., 2020). To facilitate drug prescriptions, the Lebanese Orders of Physicians and Pharmacists recommended that providers and third-party payers use and accept electronic prescriptions during the outbreak, despite apprehensions regarding lack of regulation (“Circular for Doctors to Approve All Phones and Applications for Inspection and Prescriptions,” 2020).

International support and partnerships were important in building Lebanon’s COVID-19 capacity. Public hospitals in the nation were almost entirely reliant on WHO, foreign, and local nongovernmental aid to import COVID-19 diagnostic kits, PCR instruments, PPE, and medical supplies and equipment (MOPH, 2021a; MOPH, 2020b). Pfizer-BioNTech vaccines were funded by the World Bank, while AstraZeneca vaccines were provided by the UN-supported COVAX program (Mroue, 2021). Several countries provided medical supplies to support Tunisia’s pandemic response, including China, Germany, Qatar, Turkey, and United Arab Emirates.

Qatar

Using a central command structure to oversee the health care system surge. Qatar uses a central command structure to oversee the health care system surge. Drawing on lessons learned from the first wave of infections, authorities put a resource plan in place to predict resource needs. The infection control measures instituted in hospitals may have been effective, given relatively low levels of health care worker infections in the country. Collaboration between private and public sector hospitals helped create capacity to care for COVID-19 patients.

As noted earlier, Qatar had made previous efforts to build capacity, establishing ten new hospitals and 12 new primary care centers between 2016 and 2019 (Oxford Business Group, 2020a). This infrastructure helped the country respond to the pandemic more efficiently.

To ensure continuity of care and prevent the spread of the virus among the public, the Ministry of Public Health virtually launched the Urgent Consultation Service in March 2020 to expand health care provision. The service is staffed by 150 physicians from over 15 different specialties (“Qatar-New

Urgent Consultation Service Receiving Upwards of 5,000 Calls Each Week,” 2020). The service received 5,000 calls every week, with a call response rate of 95 percent by the service and a patient satisfaction rate of 88 percent.

Qatar encouraged research institutes, universities, and technology startups to help fight the pandemic through innovation. Meddy, a startup, created a web-based appointment-booking platform to facilitate telehealth services during the pandemic (Oxford Business Group, 2020c).

Interviewees discussed strategies that the health care system used to surge in response to the COVID-19 pandemic and to increase critical care capacity (see callout on previous page).

In some instances, Qatar built capacity to help support other nations during the pandemic. For example, Qatar Airways Cargo transported more than 10 million COVID-19 vaccines to 20 countries (“Qatar Airways Cargo Completes Transportation of 10 mn Covid-19 Vaccines,” 2021). Qatar sent six tons of medical supplies to Iran and donated \$150 million to the UN program in Gaza in response to the pandemic (Rozen, 2020; “Qatar Offers \$150 mln to Support Gaza Strip in Coronavirus Battle,” 2020). Furthermore, after the COVID-19 pandemic affected food supply safety among the Gulf Cooperation Council countries, the six members agreed to establish a network to protect food supplies (“Gulf Arab States to Create Food Supply Safety Network over Coronavirus Outbreak: Kuwait News Agency,” 2020).

Tunisia

Establishing a national committee to support case detection, contact tracing, physical distancing, and early treatment. Tunisia quickly established a national committee that emphasized case detection, contact tracing, physical distancing, and early treatment. Clinical trials were streamlined and the scientific societies, Central Pharmacy of Tunisia, Directorate of Pharmacy and Medicines, and the national purchasing office collaborated to create a “medicines of health and strategic interest” formulary to expedite approval of medications. The MOH appealed to local manufacturers to produce hand sanitizer, accelerating the production process from three or four

months to 15 days (Cherif et al., 2020). To expand access to specialty care, such as extracorporeal membrane oxygenation (ECMO), La Rabta teaching hospital experimented with telemedicine, allowing some physicians to advise surgeons and perfusionists on patient care in real time or via Facebook Messenger discussion groups (Mleyhi et al., 2021). Telepsychiatry also showed promise through the use of national hotlines, as well as the provision of individual counseling (Ramalho et al., 2020). To overcome blood supply shortages, Tunisian blood centers arranged donor transportation to facilitate blood donation (Al-Riyami et al., 2021). Interviewees shared creative strategies that helped track medical supply capacity in Tunisia (see callout below).

Tunisia received support from WHO, the World Bank, and the European Union, as well as a \$743 million loan from the International Monetary Fund (“COVID-19: Tunisia to Receive Chinese Donation of 200,000 Vaccine Doses Thursday,” 2021). At the time of this study, the United States had donated PPE and 4 million dollars’ worth of medical equipment, as well as provided \$31 million in grants and loans to support Tunisian businesses hurt by the pandemic (U.S. Embassy Tunis, 2021). Chinese banks in Qatar donated 7,000 sets of PPE and 1 million pairs of medical gloves to Qatar (Hamann, 2020; Fulton, 2020).

We built a monitoring system on the ground with 150 medical observers. We have an online reporting system that allowed us to monitor the availability of PPE in health care facilities and [through] donations.

— Interview participant (Tunisia)

Resources and PPE

In-Country Production of PPE and Testing Kits

Jordan started producing PPE within the country to the point that it had enough capacity to export PPE (see callout at right). Furthermore, Jordan developed its own COVID-19 test kits. The nation also formed a committee to predict health care resource needs, such as PPE, in advance.

Iran also produced COVID-19 test kits. The Pasteur Institute of Iran, the national reference laboratory for COVID-19, subsequently invited 50 companies to produce test kits, of which five were approved by the government (Ghanbari et al., 2021). As of January 2021, Iran ran 10,000 tests daily and had set a goal of increasing to 20,000 tests per day.

Screening and Testing

Some of the countries in our study were able to ramp up their COVID-19 testing capabilities over time. For example, Jordan began investigating sources of virus spread in 2020 and opted for door-to-door nasopharyngeal swabs for PCR COVID-19 sampling (Al-Kazwini et al., 2021). In fall 2020, Jordanian officials increased testing capabilities and had testing readily available (Alhalaseh et al., 2021). Researchers at local universities developed a cost-effective RNA extraction kit for SARS-CoV-2 detection to circumvent testing reagent supply shortages (WHO EMRO, 2020; Kawabata and Amer, 2020). WHO, in collaboration with European Union Trust Fund Health Emergency Project, gave Jordan an automated analyzer COBAS 6800, capable of processing around 1,300 COVID-19 PCR tests in 24 hours.

Qatar also enhanced its testing capabilities, using the PCR test as the standard. The Ministry of Public Health made multiple public and private sites available for PCR testing, including hospital walk-ins, primary health care centers, and private clinics (“Ministry Updates List of Private Health Facilities for Covid-19 PCR Test,” 2021). All testing was free, and authorities also made drive-through testing centers available in three locations. Furthermore, health care personnel made home visits to conduct tests when

The government started collaborating with companies from the private sector that were incentivized through exemption from taxes, so they started to produce PPE locally . . . to the extent where we started to export those abroad.

— Interview participant (Jordan)

an entire household had been exposed to COVID-19 (Ibrahim and Kilani, 2020).

Qatar also made medical treatment free for all who tested positive. Workers who needed to get treated for COVID-19 or were quarantined received their full salaries (KPMG, 2020). The government allocated \$1.37 billion USD (5 billion QAR) for salary and rent payment. At the onset of the pandemic, the Ministry of Administrative Development, Labour and Social Affairs in Qatar implemented a new wage protection system to monitor compliance with the wage regulations. The government also made online exchange services available to facilitate workers sending and receiving funds.

In Iran, Rebirth Charity Society led a working group to develop an interdisciplinary approach to harm reduction among people who use drugs and homeless populations. They distributed masks, sanitizer, soap, clean water, and food (Alavi et al., 2021).

Contact Tracing

Contact tracing was an important strategy in the countries studied, and some countries developed

tools to support contact tracing, although we note that these efforts did not fully succeed in all cases.

Iran's primary care system helped to create a strategy for contact tracing, and 70 million people out of a population of 80 million registered on the government website aimed at tracking the spread of the disease (Devi, 2020). Iran developed an online self-screening platform as a populationwide strategy to control the massive influx of patients to medical centers. The MoHME used its electronic health record portal for screening and patient identification. However, Iran faced a challenge in tracking COVID-19-related data and in developing a sensitive case definition of the disease (based on presenting symptomology) to detect more cases.

Jordan developed a contact tracing mobile application, called the AMAN app, for Jordan's MOH. This contact tracing app allowed coronavirus-positive patients to use digital technology to anonymously notify their recent person-to-person contacts. Jordanian authorities asked all individuals entering Jordan to download the app ("Jordan: Authorities to Extend the Nationwide Nightly Curfew to 1900–0600 Starting March 13," 2021). However, although the public generally accepted the idea of contact tracing technology for COVID-19 infection, actual use of the technology was relatively low (Abuhammad, Khabour, and Alzoubi, 2020).

The Ministry of Public Health in Qatar used a testing, tracing, and vaccination status system named Ehteraz, which aimed to support pandemic response through early case detection, isolation, and contact tracing. Beginning on May 22, 2020, all citizens and expatriates were required to download and install the application on their mobile phones ("Qatar Makes COVID-19 App Mandatory, Experts Question Efficiency," 2020). All the COVID-19-related information was made available to local health authorities through a central database. Soon after the application was launched, Amnesty International identified security vulnerabilities in the app, which led Qatar to upgrade the system to mitigate its vulnerabilities ("Qatar: Contact Tracing App Security Flaw Exposed Sensitive Personal Details of More Than One Million," 2020).

Tunisia also used technology to support contact tracing. Wizz Labs, a digital marketing company,

developed the E7mi mobile app for this purpose ("Tunisia Launches Contact-Tracing App to Combat Coronavirus," 2020). ONME contacts other users whose cell phones were detected nearby and facilitates follow-up.

Contact tracing was also conducted using non-technological means. In Lebanon, public health officials conducted targeted surveillance and testing of communities where clusters of COVID-19 infections emerged. Local municipalities and communities also assisted the MOPH in tracing cases (Khoury, Azar, and Hitti, 2020).

Public Health Guidelines

Multidisciplinary Teams and Multisector Collaboration

From the beginning of the pandemic, the Jordanian government followed WHO recommendations and updates and implemented a series of preventive strategies at the local and national levels with the help of a collaborative multidisciplinary team at the National Center for Security and Crisis Management (Al-Tammemi, 2020). This crisis task force brought together expert decisionmakers from different ministries, sectors, and organizations to provide evidence-based recommendations for implementation. The government adopted public health measures to curb the pandemic, and the Defense Law was activated, which transferred authority to the Minister of Defense to issue directives according to the situation at hand (Alqutob et al., 2020).

In addition, various authorities in Jordan made efforts to reduce stress and increase the social acceptability of the curfew among the public. Moreover, the MOH partnered with the disease control and prevention committees to prepare Jordanian frontline doctors to handle COVID-19 and build up the capabilities of health care workers by formulating evidence-based recommendations (Suleiman et al., 2020).

The Tunisian government also set up a national committee soon after the pandemic started to coordinate its response and deployed a surveillance heat-detecting robot to interrogate people on the street during lockdowns. Notably, Tunisia was involved

in plans to create a WHO-supported 23-country treaty seeking to ensure equitable access to vaccines, medicines, and diagnostics for future pandemics (“Do We Need an International Treaty for Future Crises? These 23 Leaders Think So,” 2020). Tunisia benefited from the strength of some of its existing institutions, notably ONME, the Response and Relief Organization, and the Regional National Committees for Disaster Prevention. Each worked with the centralized National Coronavirus Response Authority, which coordinated activities between the 24 governorates. Municipal councils also established local crisis committees that could work with civil society organizations and local governments (Abouzzohour and Mimoune, 2020).

Tunisia also took several positive steps to support multisector collaboration and develop partners in the region. Through a mix of public and private donors, the 1818 Fund raised over \$91,000 USD (250,000 Tunisian dinars) to “fight against Coronavirus-19 and minimize its economic and social impact” (Aliriza, 2020). However, several senior officials released conflicting statements on how and whether the funds had been spent, leading to frustration among donors and potential recipients (Aliriza, 2020; Mekki, 2020).

Vaccines

Vaccine Procurement and Development

Iran began administering vaccines in February 2021 (Motamedi, 2021a) and was making efforts to acquire vaccines from other nations (e.g., China, India) and through WHO (WHO EMRO, 2021). Iran also worked with Cuba to secure 100,000 doses of the Cuban vaccine Soberana 02 (“80% of Iran’s Medical Staff Vaccinated Against Coronavirus,” 2021).

Iran subsequently began to develop its own COVID-19 vaccines and had two in development as of this writing. One entered the second phase of clinical trials in March 2021 (Motamedi, 2021b), while the second was set to begin trials as of February 7, 2021 (Motamedi, 2021a). In March 2021, Iran announced that it would start its COVID-19 vaccination program for the general population in May of that year using the domestic vaccine COV-Iran Barekat (“Iran to Start Vaccination with Domestic COVID-19 Vac-

cine in May: Media,” 2021). Iran also worked on a vaccine with Cuba that was expected to be ready by April 2021 (“Iran Receives COVID-19 Vaccine from Cuba,” 2021).

Jordan launched a countrywide COVID-19 vaccination campaign in mid-January 2021 (Medical Xpress, 2021). The government committed to a nationwide vaccine for Jordanians, expatriate residents, and refugees free of charge with prioritization criteria based on profession, age, and health status (Al-Kazwini et al., 2021; United Nations High Commissioner for Refugees [UNHCR], undated). Jordan contracted with three major COVID-19 vaccine production companies and also has a membership in COVAX. As of March 2021, Jordan expected COVID-19 vaccine deliveries to include 2.2 million doses from the Pfizer-BioNTech, 2 million doses from Sinopharm, 2 million from AstraZeneca, 2 million from COVAX, and 2 million from Sputnik (“Jordan to Receive 10.2 Million Doses of Coronavirus Vaccines This Year,” 2021). WHO, through the European Union Regional Trust Fund, provided two refrigerated vehicles and 15 pickups to support the Jordanian MOH’s transportation and delivery of routine and COVID-19 vaccines (WHO EMRO, 2020c).

UNHCR reported that Jordan showed “exemplary leadership” by including refugees in all aspects of its public health response to the pandemic, including the national vaccination campaign (“Refugees Receive COVID-19 Vaccinations in Jordan,” 2021). Jordan was among the first countries to start a comprehensive vaccination program for all refugees in multiple camps (Ravelo and Jerving, 2021).

Qatar approved use of the Pfizer-BioNTech vaccine on December 23, 2020 (“Qatar Begins COVID Vaccination Campaign,” 2020) and of the Moderna vaccine on February 10, 2021 (“Qatar Approves Emergency Use of Moderna’s COVID-19 Vaccine,” 2021). Distribution of vaccines expanded as of February 2021. Priority groups for vaccination included people aged 50 years and older, younger patients with moderate chronic diseases, health care professionals, and key workers and essential services support in the various ministries (Ministry of Public Health, State of Qatar, 2022). To motivate individuals to get vaccinated, authorities exempted vaccinated individuals

from quarantine requirements when traveling abroad and when entering the country.

Vaccination Status Tracking

In Lebanon, the MOPH uses an app to register people for vaccination. The system sends users the time and place of vaccination appointments via text messages.

Jordan uses a centralized online system to track vaccinated residents and a platform to facilitate vaccine access. Testing and vaccinations are free for all in Jordan. The National Center for Security and Crisis Management sends appointment details via text messages to every individual interested in getting the vaccine (UNHCR, undated). Furthermore, Jordan was one of the first countries to launch a vaccination campaign in multiple refugee camps. As of May 14, 2021, Jordan had administered 1,091,048 doses of COVID-19 vaccines, including to refugees, and 3 percent of Jordanians had been fully vaccinated (Center for Systems Science and Engineering, Johns Hopkins University, 2022; Al-Tamimi et al., 2020).

Interviewees in Jordan indicated that an electronic platform helped with getting the population vaccinated. However, they noted that a parallel effort was needed to raise awareness about the platform (see callout at right).

Communication

Social Media

In many countries in the study, social media were used to facilitate rapid communication about the pandemic and also to support online schooling and telehealth efforts. However, as noted in the “Common Challenges” section, social media were also used to disseminate misinformation and conspiracy theories. In addition, fact-checking is not typically conducted in the region, and social media platforms did not collaborate with third-party fact-checkers (Alimardani and Elswah, 2020).

Nonetheless, social media remained a key means of helping people protect themselves against COVID-19. For example, authorities in Jordan used social media in spreading the news about the danger of the disease and to alert groups at high risk of contracting COVID-19 (Alqutob et al., 2020). Also,

the majority of the Syrian refugee mothers living in Jordan who relied on Facebook and WhatsApp as their main sources of information were knowledgeable about COVID-19 transmission and prevention (Hamadneh et al., 2021). In addition, many people shared humor in memes and caricatures related to the COVID-19 pandemic on Jordanian social media websites to try to alleviate its psychological impact (Hussein and Aljamili, 2020).

Some studies have reported that use of social media platforms had a significant positive influence on public health protection against COVID-19 (Al-Dmour et al., 2020). For example, Jordanian parents who relied on social media and news channels for COVID-19 updates had a good understanding of its clinical signs, mode of transmission, and protection measures, and they were satisfied with governmental measures (Abuhammad, Khabour, and Alzoubi, 2020). Similarly, Jordanian adolescents and university students, who reported television, social media

They have an electronic platform—they encourage people to register on it and the MOH, when your turn comes, they send a message on your mobile with place, date, and time for getting [your] vaccination. Then [they send] a second message for your second dose. If you can't go during that time, they will send you another appointment.

— Interview participant (Jordan)

and/or MOH as their main sources of information on COVID-19, showed a good base of knowledge of virus transmission and tended to hold positive attitudes toward the country's curfew and other protective measures (Dardas et al., 2020; Sallam et al., 2020; Mustafa et al., 2020; Samrah et al., 2020).

Digital coverage and use in Tunisia is also high, with an estimated 7.3 million Facebook accounts, 8 million internet subscribers, and 12.5 million mobile phone users (Dahmani, Iraqi, and Hamdi, 2020).

Press Conferences

Many governments in the region held regular press conferences, often sharing information from the conferences on various online platforms. For example, in Tunisia, ONME held daily press conferences, starting March 24, 2020, and provided regular updates on its website, Twitter feed, and two Facebook pages (Jrad, 2020). The Jordanian government took steps to keep the public informed through daily press briefings and a dedicated webpage with updates about the pandemic (Tal, 2020). Religious leaders, educators, public figures, and opinion leaders in Jordan were all heavily involved in educating people about the importance of social distancing and infection prevention measures (Alqutob et al., 2020).

Integrated Communication Campaigns

We also found examples of cross-platform communication campaigns. For example, Iranian Red Crescent and the MoHME implemented several measures for public awareness, such as research, training and planning workshops; infographics in Farsi, Arabic, and Turkish; public awareness posters; text messages; media training; and materials for the deaf and other marginalized groups (Peykari et al., 2020). The MoHME also used phone messages to counter social media-induced panic.

MOPH launched a comprehensive communication campaign for COVID-19 and vaccination in collaboration with the Ministry of Information and WHO. It uses websites to disseminate information and exposure risks based on GPS technology, provides training for media personnel, distributes health information through media outlets, provides media outlets with information from health care profes-

sionals, runs a hotline, and publishes fact-checking reports to counter rumors and misinformation (WHO EMRO, 2020b).

Qatar created multilanguage communication media channels to educate residents about measures to prevent, detect, and report the spread of the virus. Qatar also established a hotline service in several languages to receive worker complaints about their living conditions during the pandemic (Ahmad and Hillman, 2021).

Behavioral Health Care

Telephone Hotlines

Hotline 1480, developed by the Iranian government, offered psychological counseling services for the general population. The Jordanian Psychiatrists Association also initiated a phone-based hotline (El Hayek et al., 2020). Digital mental health resources evolved rapidly and became the preferred method of consulting with mental health professionals while complying with social distancing rules. The Tunisian government also set up a mental health hotline and issued amnesty for people who overstayed their visas so they would feel comfortable seeking medical care.

Online Consultations and Webinars

A group of Lebanese mental health professionals provided pro bono support for frontline health care workers. Mental health professionals provided online consultations to continue mental health care delivery despite the lockdown (Khoury, Azar, and Hitti, 2020). At the same time, most mental health professionals in Lebanon ensured continuity of care, including in-person services, to serve individuals for whom remote services were not an option because of their clinical presentations, poor internet access, or lack of privacy in their homes (Khoury, El-Khoury, and Ammar, 2020).

Other initiatives targeted caregivers through online support groups and webinars delivered by academic centers and NGOs. The Institute for Development, Research, Advocacy and Applied Care in Lebanon held weekly public webinars about mental disorders (Khoury and Karam, 2020). The Department of Psychiatry, as part of the pandemic evalua-

tion clinic and center at the American University of Beirut Medical Center, led two initiatives to address the mental health needs of patients and frontline health care workers (Khoury, Azar, and Hitti, 2020). Patients were offered individual online or group support sessions to cope with anxiety and depression, social isolation, quarantine, and negative emotions.

Other Efforts

The countries studied also made other efforts to address behavioral health issues. For example, the MOPH, working with WHO, UNICEF, and local stakeholders, developed a mental health and psychosocial support (MHPSS) action plan (El Chammay and Roberts, 2020; MOPH, 2020a) to address its population's mental health needs and provide support (Fawaz and Samaha, 2020). The implications of this program are yet to be seen because mental health services capacity and access are low.

To support psychological well-being during quarantine, Jordan initiated a home delivery system of psychotropics for its geriatric population (El Hayek et al., 2020). The Lebanese Psychiatric Society published tips on social media targeting health care workers and the public. Furthermore, there were grassroots efforts in Iran to address mental health issues among health care workers, as described by one interviewee: “[Health care workers] have tried to form groups for mental health and financial assistance.”

Considerations for Improving Public Health and Health Care System Pandemic Response in the Middle East

Using findings from this study's environmental scan and qualitative analysis, we offer the following considerations for improving public health and health care system pandemic response in the Middle East nations included in this study. Given the regional (and global) burden of the COVID-19 pandemic, many of these recommendations will also be informative for other countries in the Middle East.

Engage in Advance Planning

Although the COVID-19 pandemic has not concluded as of this writing, it is not too early for policymakers to engage in the development of evidence-based national pandemic response plans or to update existing plans informed by challenges and successes over the past two years. A pandemic response can be streamlined through a central command structure responsible for coordinating countrywide response (or response across regions within a country) as specified in the plan. Also critical is to use the plan to promote separation of politics from public health. Plans should also draw upon up-to-date science and clinical guidelines to health care workers around the treatment of COVID-19 and emerging pathogens. Consideration should also be given to the strengthening of regional medical supply chains through partnerships around the manufacturing of raw materials or finished products and the stockpiling of medicines, medical devices, and antiseptics.

Develop Telehealth Infrastructure

The COVID-19 pandemic has shown the importance of resilient health care systems that can respond to both routine surges in demand for health care services and a public health emergency. Although wholesale change in health care and public health infrastructure requires long-term planning, as well as major investments, a feasible near-term consideration might be for Middle East policymakers to consider how existing health care infrastructure might be adapted for future emergencies and to identify where future investments, including growth of telehealth platforms, would be valuable. As we discussed in this report, there are some examples of successful telehealth use in the countries studied that helped with continuity of care, access, and the prevention of patients going to overwhelmed hospitals. Looking to (and building on) such successes, investment in telehealth by Middle East nations is one potentially cost-effective strategy through which countries can help expand routine and emergency health care access and capacity both within country and through cross-country collaboration. Research could also help identify gaps and prioritize future developments or might

explore legal and payment barriers to the expanded use of telehealth platforms.

Ensure That Public Health Measures Incorporate Data, Training, and Enforcement Considerations

Decisions to implement or relax public health measures should be based on scientific data (e.g., test positivity rates). However, such data can be difficult to obtain and track, and even with a strong scientific foundation, public health measures can be challenging to implement because of lack of knowledge or training about how to implement among staff, public mistrust, individual assessments of personal risk, or other reasons. As a next step, policymakers might consider developing a framework to be used in developing and disseminating future public health policies, both during public health emergencies and in other situations. This framework might include consideration of (1) the scientific data on which the measure is based, (2) the information and training necessary to ensure proper implementation and acceptance of the policy, and (3) a clear and feasible enforcement strategy to ensure population compliance.

Support the Health Care Workforce

The COVID-19 pandemic has emphasized the criticality of the health care workforce in effective health care system surge response; however, low pay and difficult working conditions have often led to burnout and staffing gaps. Although significant staffing increases—to ensure that both routine and catastrophic surge needs are met—are not always feasible, policymakers can consider options for retaining existing staff and developing their skills by, for example, improving pay for health care workers in the public sector, investing in training programs to help existing staff perform critical care functions, or building capacity to treat behavioral health-related conditions. Such investments may help secure a more robust workforce that can be leveraged to help meet health care demands during future public health emergencies.

Build Communication Strategies into Public Health Planning

Communication strategies, including how to disseminate information, what platforms to use, and how to combat disinformation, should be an integral consideration in implementing public health measures. Although development of online or app-based platforms can support public health (e.g., by facilitating contact tracing or scheduling of vaccinations), it can also be important to conduct a parallel public information campaign to encourage use of such platforms and to provide training in how to do so. Other communication means, such as regular press briefings and updates to official government websites, can also be important elements of a communications campaign. Consideration should also be given to how to combat misinformation and conspiracy theories on social media and other platforms. In addition, policymakers might consider joining regional multinational and/or international pandemic response efforts to share best practices and to foster partnerships and collaboration around preparedness, response, and critical care.

Areas of Future Research

The insights from this study's findings can inform more in-depth research to improve pandemic response in the Middle East region in the following areas:

- identification of strategies for regional collaboration and coordination on public health emergency preparedness and response
- development of educational and training platforms to expand critical care capability and capacity in the region
- development of within and cross-country telehealth platforms in the Middle East
- identification of strategies and policies to build a robust health care workforce through increasing the pipeline of health care workers and retaining health care staff
- development of policy decision tools to help weigh the trade-offs between public health measures and economic considerations
- identification of effective strategies for tracking and combating misinformation.

Closing Thoughts

The considerations described above might imply explicit financial investments into developing robust public health and health care system infrastructures in Middle East countries. Additional investments may be part of the solution; however, given the economic realities in some Middle East countries, solutions could, perhaps, include a combination of *more* investment and *reprioritization of where existing resources should be invested* and *how those resources can be more efficiently used* both within countries and through cross-regional collaboration. Such collaboration could be especially important in the areas of sharing expertise, technology, and education platforms and the strengthening of regional medical supply chains through mutual agreements.

Appendix. Interview Guide

1. What were/are the top three health care system challenges during the COVID-19 pandemic in your country?
2. How has the health care system responded to these challenges? And how quickly did the system take to respond? Where has it been successful? What contributed to the successes? Where hasn't it been successful? What contributed to the lack of success?
 - a. Are there innovations that have been particularly successful (e.g., technology, telehealth, etc.)?
3. Are there things you think the health care system could have done differently?
4. How did you handle increased patient volume?
 - a. Did you have enough PPE? How did you manage any short supplies of PPE? What were the trade-offs? Were certain populations affected more than others?
5. How did you handle COVID-19 testing?
6. How did you handle contact tracing for COVID-19–positive patients?
 - a. Who managed the contact tracing? Who were the tracers? How were data recorded and shared?
7. How did you handle treatment (vent, ECMO, monoclonal antibody [mAb] therapy, Remdesivir)?
8. How did you approach public education (e.g., for mask wearing, social distancing, vaccination)?
9. How are you approaching COVID-19 vaccination?
 - a. Which populations are you prioritizing? Where has it been successful? What contributed to the successes? Where hasn't it been successful? How can the system be improved?
10. What resources did you need that you didn't have (staff, stuff, space, systems)?
 - a. What strategies did you use to increase resources or to more efficiently use existing resources?
11. Are there partnerships between Middle East countries that did or would have helped you respond to the pandemic?
12. Are there partnerships within your country or with other Middle East countries or with countries outside the Middle East that did or would have helped you respond to the pandemic?
 - a. Did these partnerships exist before the pandemic? If no, why and how were they stood up?
13. Do you think that the health care needs of poor and minority communities in your country were adequately addressed during the pandemic?
14. If you had to give pandemic advice to staff in health care systems in other Middle East countries,
 - a. what three things would you tell them not to do?
 - b. what three things would you tell them to do?
15. If you had a pandemic response wish list for your country's health care system, what three things would you ask for?
 - a. How can your country better prepare for the next pandemic?
16. Is there anything else you'd like to discuss with respect to the health care system's pandemic response in your country?

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About This Report

This report presents the findings of a quick-turn study conducted between February 2021 and May 2021. During this time frame, the coronavirus disease 2019 (COVID-19) pandemic had resulted in 83 million confirmed infections and more than 1.8 million deaths worldwide. In the Middle East, there were close to 21 million cases reported and 336,000 COVID-19 deaths. Many countries in the Middle East struggled with health care capacity and access prior to the pandemic, and this crisis has placed significant additional strain on health care delivery in the region. Evaluating strategies used by health care systems and public health and policies implemented by governments in the Middle East during the ongoing pandemic is critical to understanding and disseminating successful approaches to meeting the health care demands of populations in the region. Furthermore, through identifying strategies for strengthening internal infrastructure and regional cooperation between countries, Middle East response to future public health emergencies can be improved.

This report outlines the results of an exploratory analysis of five countries—Iran, Jordan, Lebanon, Qatar, and Tunisia—to identify strategies and innovations used by health care systems and public health and policies implemented or attempted by governments during the ongoing COVID-19 pandemic. We performed an environmental scan of relevant peer-reviewed and gray literature from January 2020 through March 2021 and collected qualitative data from focus groups and one-on-one interviews conducted from March through May 2021. Hence, the results reported here reflect data only from these specific time frames during the COVID-19 pandemic. Furthermore, the amount of available information for each country varied: Some countries had more information than others. This work should be of interest to regional and international stakeholders as they continue to combat the pandemic, and the findings could inform future research around pandemic response.

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