Compliance and stringency measures in response to COVID-19: A regional study

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Abstract

The COVID-19 outbreak had a severe impact on governance, individual and collective wellbeing, public health, education, and the economy. The progression of infections in every country varied based on every country's response, particularly its early response, and its capacity to enforce compliance. At the same time, country responses were determined by various factors (political climate, economic capability, social response, as well as demographic factors). This regional study looked at the policy response and COVID-19 daily case progression of 13 MENA countries in order to assess the effectiveness of stringency measures in managing the spread of the virus. This study also looks at the results of a pilot survey administered in the Middle East, as well as data released by the authorities of some of the countries under study, to evaluate compliance. The results show that stringent measures, imposed quickly but not for extended time periods, are most effective in lowering the number of daily infections. However, the success of these policies relies on a country's institutional capacity to enforce compliance. The results from the pilot survey show that, while people whose risk perception of the virus is higher are more likely to comply with preventive behaviors, compliance significantly decreases with time. This has important implications in supporting stringent short-term policies that can be rolled back if accompanied by a comprehensive prevention strategy that harnesses behavioral insights to increase voluntary compliance with preventive measures.

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Keywords

compliance — stringency index — enforcement — case management — tradeoff

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Introduction

This regional study is a preliminary outlook on the impact of government-imposed restrictions on stopping the spread of COVID-19 in the Middle East. Building on the stringency index of the Oxford COVID-19 Government Response Tracker, this paper compares restrictions for every country within the scope of this study. The paper also looks at whether the hypothesis stating that there is a negative relationship between stringency and the number of cases per day holds across countries. It is expected that countries that have introduced more stringent measures rapidly have fared better in managing the virus, provided that there has been extensive enforcement and compliance. The case of some Latin American countries is cited for comparison throughout the paper. Finally, this paper cites the results of a pilot survey to evaluate compliance with preventive measures in the Middle East to test for behavioral fatigue (a decrease in compliance overtime) as well as for the relationship between risk perception and compliance. The study sheds light, not only on the different government responses to COVID-19, but also on their ability to manage the

spread of the virus through effective and efficient implementation, as well as levels of compliance with such measures.

Methodology

This paper uses the stringency index and number of cases per day to test for response effectiveness across 13 MENA countries.[1] The stringency, developed by the Oxford COVID-19 Government Response Tracker, is an aggregate of eight indicators on specific government responses measured on a 0-100 scale.[2] The number of cases per day, tied to the level of stringency, is used as a proxy to measure each government's enforcement capacity and compliance by the public, e.g. a decrease in cases per day after the introduction of a series of preventative measures translates into an appropriate delivery

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[1] Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia and UAE.

[2] School closure, workplace closure, cancellation of public events, restrictions on gatherings, closure of public transportation, stay at home requirements, restrictions on internal movement, international travel controls and public information campaigns.

of such policies, their enforcement and compliance with their conditions.

This paper also uses the results from a pilot survey that measures respondents' rates of compliance overtime, and compliance relative to their perception of health and economic risks (Krpan et al., 2020). Responses from the Middle East (n=30) mainly came from Lebanon. Given the small sample size, results were less conclusive, but are insightful to complement the analysis on stringency and cases.

Finally, additional data collected on the number of daily reported violations in both Lebanon and Kuwait were used as a proxy indicator to illustrate trends between compliance and stringency to further test the hypothesis on behavioral fatigue. Among the countries included in this study, Lebanon and Kuwait were the only two whose security apparatus issued daily reports on violations (of quarantine or isolation conditions, curfew, and holding gatherings, among others). As efforts in the field of contact tracing are rolled out in more countries, compliance may become more measurable.

Context

The COVID-19 pandemic presented every country with unprecedented challenges in governance. The MENA region, often mistakenly portrayed as monolithic, presents high variance across the countries that compose it, in terms of socioeconomic, political, and geographical aspects. In the context of COVID-19 such differences become salient as they impact government policies to contain the virus, responding to specific realities. While there are some shared trends across the region, it is often necessary to zoom in and analyze particularities in specific countries. For instance, GCC countries have a high GDP per capita, highly rated institutions and a healthy macroeconomic environment, yet face societal segmentations that make migrant workers particularly vulnerable to the virus (World Economic Forum, 2018). Also, as illustrated in Figure 1, the GCC has some of the highest cases per million people worldwide (Worldometer, 2020). Countries like Lebanon and Jordan have a weaker economic environment and a sizeable refugee population (UNHCR, 2020). Protracted social conflict and weak institutions are embedded in the COVID-19 response efforts of countries like Syria and Iraq (Bowen, 2020). This study deliberately excludes war-torn or occupied countries from observation, as the lack of institutional capacity would fail to accurately depict the behavior of the virus (i.e. no testing or contact tracing policies resulting in underreporting of cases), rendering the impact of the stringency index less meaningful.

Stringency index and case management

The stringency index records the strictness of 'lockdown-style' policies that impose restrictions on people's behavior. Most of the strictest policies in the Middle East were implemented in mid-March, once the first cases had been reported. However, the extent of government responses ranged from strict curfews
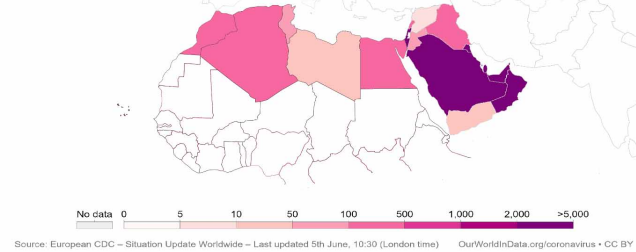

Figure 1. Total confirmed COVID-19 cases
(Source: European CDC)

and entire cities under lockdown to a tradeoff that allowed economic and religious activities to continue. Similarly, the response was gradual in some countries, and sudden in others.

For instance, Bahrain gradually reached a maximum level of stringency of just over 80, the lowest in the Middle East, as it never closed public transport, required people to stay home or restricted internal movement. In contrast, Jordan had a much more hardline approach, going under complete lockdown (scoring 100 on stringency) in the middle of March, way ahead of the peak, while other countries were more gradual in their policy implementation (Figure 2).

The stringency index is not a measure of appropriateness, and in itself, it is not illustrative of whether government measures have delivered results in reducing the number of daily cases. In fact, the index only indicates that a policy has been officially announced but says nothing about enforcement capacity or compliance. A reduction in daily cases following the implementation of policies does, in fact, provide an illustrative outlook on whether and to what extent have government measures delivered. When comparing Jordan and Kuwait, two countries that reached a stage of total lockdown, the evolution of daily cases looks very different.

From these differences one can infer that the delay in the introduction of measures, as it will be further discussed, has a tangible impact on their effectiveness. In other words, a quicker, more hardline approach early on is more impactful than gradual steps towards high stringency. While Kuwait introduced measures before the first case was reported in the country, overall response was gradual and lagging – reactive instead of preventive – as it only went into full lockdown after entering the peak stage (Figure 3). On the other hand, Jordan introduced measures after the first reported case in the country, but it rapidly intensified its stringency far in advance of the peak stage, resulting in a more effective suppression in the number of daily cases. A successful reduction in the number of cases allows for a faster rollback of restrictions. The duration of restrictive measures is also a crucial factor, as compliance is likely to be lower the longer policies that restrict behavior are in place (Ferguson et al., 2020). This is attributed to a substantial reduction overtime in risk perceptions
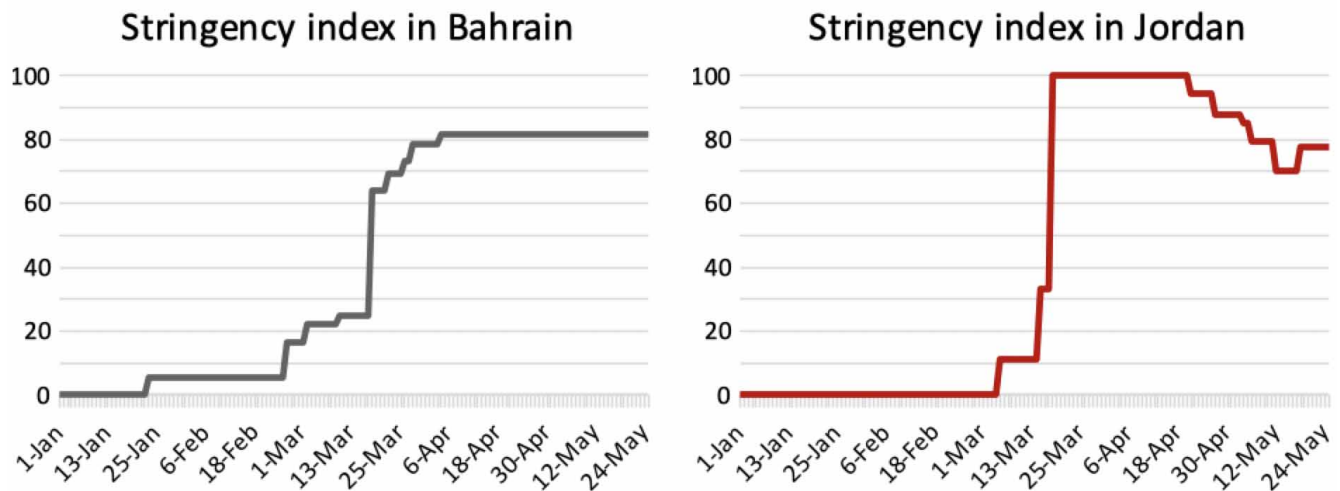
Figure 2. Stringency measures in Bahrain versus Jordan
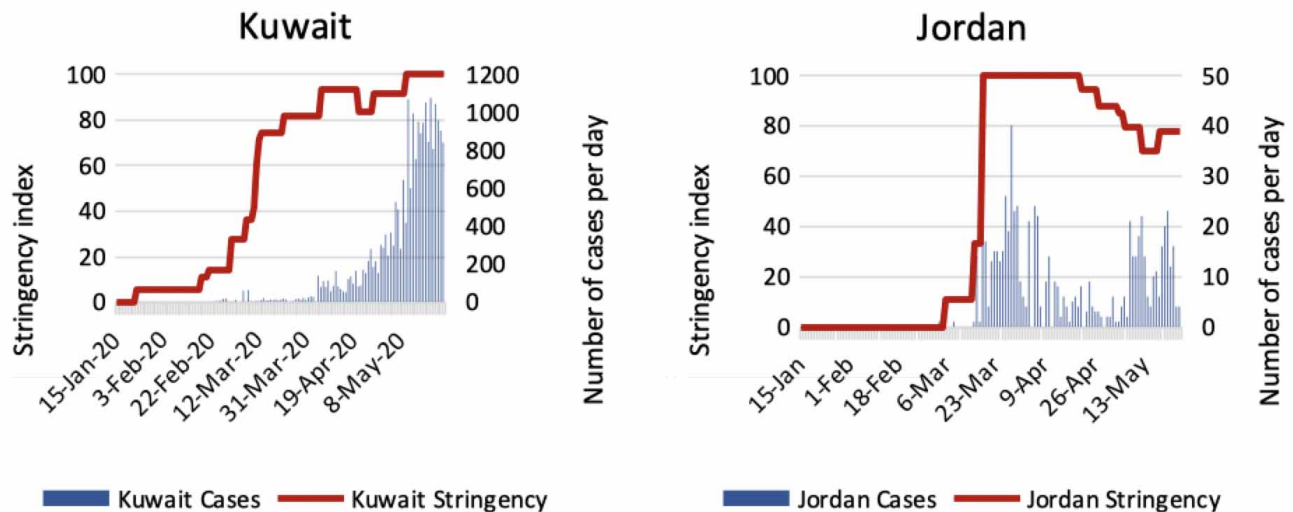(Source: Oxford COVID-19 Government Response Tracker)

Figure 3. Stringency index and number of cases in Jordan versus Kuwait
(Source: Oxford COVID-19 Government Response Tracker)

(Ferreira Marques, 2020), which will be further discussed with empirical evidence from the pilot survey conducted.

Stay at home requirements

Looking individually at the indicators that compose the stringency index, the category 'stay at home directives' includes policies that most overtly 'violate' people civil liberties. In some countries, leaving one's house had gone from a non-controversial exercise of freedom to a punishable offence overnight. Stay at home requirements were measured on a four-point scale; from no measures (0), recommendations to stay home (1), requirements to stay home with exceptions (2) and total confinement (3). The graphs in Figure 8 show that daily cases were substantially higher in those countries that

never imposed total confinement. Similarly, countries that rolled back stay home requirements or total confinement too early (before the number of daily cases was brought under control), re-imposed measures days later, prolonging the duration of restrictions, as spikes in daily cases were essentially backward steps in managing the spread of the virus.

Timeliness of stringency measures

As mentioned before, 'when' is just as important as 'what and how'. Countries that lagged in their policy responses saw a more dramatic increase in their number of daily cases compared to their prompt counterparts, which continued even when they eventually imposed stringent measures. Citing the reproduction number, an epidemiological model used to
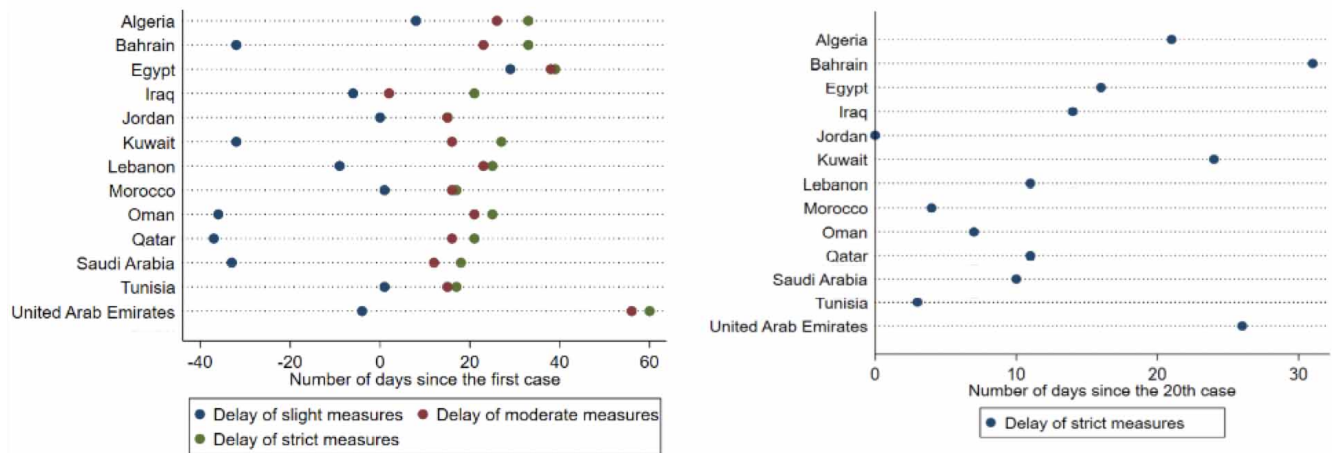
Figure 4. Delay in stringent measures follwing the first case and 20th case in Arab countries (Source: Oxford COVID-19 Government Response Tracker)

determine the ability of COVID-19 to spread from person to person, a R0 value above 1 steadily increases the spread of the virus. Absent any control measures, the estimated R0 value of COVID-19 is 2-2.5 (McFall-Johnsen & Bendix, 2020). This means that for every day preventative measures were delayed, it requires substantially more time and resources to get cases under control.

Figure 4 breaks down policy responses after the first reported case into three categories: slight for a stringency index between 0-49, moderate for a stringency index between 50-79 and strict for an index between 80-100. Most of the GCC countries had quick initial responses – Qatar being the first – far ahead of the first reported case. However, all countries in the Middle East with the exception of Jordan had a significant delay in implementing their strictest measures following the first 20 reported cases. In the case of Bahrain, the delay exceeded 30 days (Figure 4).

Comparing the timeliness of stringency measures in Middle Eastern countries to those in Latin America offers interesting insight. For example, Brazil, considered to be the epicenter of the virus with the highest number of daily cases since June (Globo, 2020), did not implement its most stringent measures for more than 60 days after the 20th case (Figure 5). Moreover, Brazil has not imposed nationwide measures, and begun rolling back restrictions since June 1st (Globo, 2020).

The most cited justification to avoid imposing strict measures or lifting them prematurely is the economic tradeoff (Kahn, 2020). This discourse may be more relevant in Latin America than in wealthier countries in the Middle East that are better suited to provide income support or contract relief to its residents. However, many economists that integrate epidemiological models into their research have discredited this tradeoff, arguing that bypassing preventive measures for the sake of reactivating the economy will prompt a jump in infections that will result in a second, more persistent recession (Eichenbaum et al., 2020). Additionally, the impact on mental
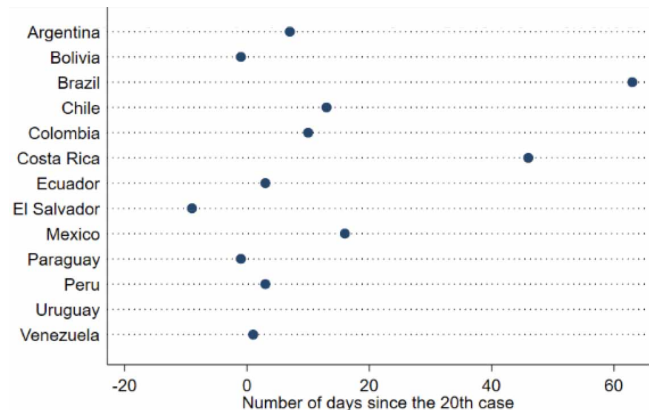

Figure 5. Delay in stringent measures follwing the 20th case in Latin America (Source: Oxford COVID-19 Government Response Tracker)

health is not negligible when considering lifting, tightening or reimposing restrictions. Added to the public health-economic tradeoff is the mental health of people, as several studies have established a link between crises and the deterioration of mental health, with statistically significant correlations found between unemployment and suicide rates (Cummins, 2015); (Inoue, 2007). Mandated confinement, the fear of the deadly virus itself and income loss put unprecedented stress on people by disrupting their livelihoods with an uncertain future. Mental health plays as a determining factor in two fields: worsening in a severely affected economic climate and worsening in a protracted state of intermittent confinement and suspension of activity. In fact, findings show a disastrous impact to wellbeing and mental health resulting from the pandemic (Fujiwara et al., 2020). With this in mind, experts suggest that so called "Circuit Breaker" policies entailing periodic 14-day full lockdowns will inevitably lead to case surges once the

lockdowns are lifted, prompting subsequent lockdown cycles (Costello, 2020). However, if these "Circuit Breakers" are accompanied by comprehensive and more rigorous FTTIS (find, test, trace, isolate and support) reforms, case management could come under control relatively quickly, allowing for gradual normalcy to return and avoiding the reimposition of confinement measures and closure of economic sectors, both of which have serious mental health implications.

Behavioral fatigue

The initial response to an unprecedented pandemic was panic, and with panic came misinformation, anxiety, and a hyperbolized perception of risks associated with the pandemic (Clifford, 2020). This translated into exaggerated, yet short lived compliance to preventive measures, whether evidence based or not. A few months into the pandemic, a lot of people have normalized its ubiquity and therefore revise their initial risk assessment. A 1990 study models changes in risk perception to social problems overtime, observing a bell-shaped trend with a dramatic peak early on in public panic. This model was used and validated in a 2019 study about the chikungunya epidemic, where people became "habituated" to the disease, and still upheld some preventive behaviors (Raude, et al. 2020).
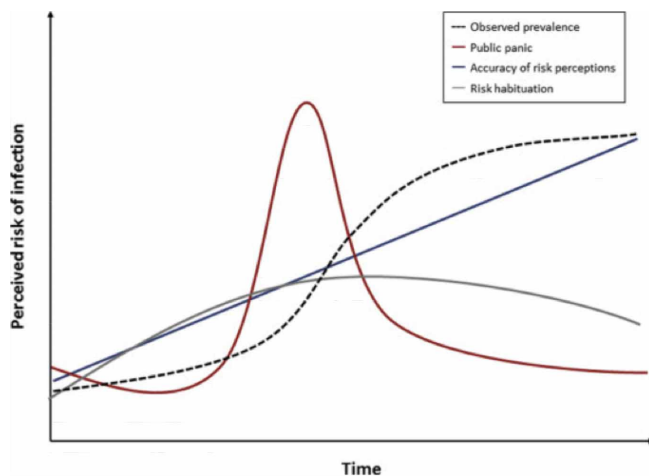

Figure 6. Perceived risk of infection over time
(Source: Loewenstein, G., Mather, J. (1990))

To evaluate behavioral fatigue with COVID-19 preventive measures, an online pilot survey to test for compliance was conducted in the Middle East ($n = 30$), with most subjects residing in Lebanon. The survey stemmed from two hypotheses. Firstly, that there is a positive relationship between compliance with preventative behaviors and risk perception. Secondly, that there is a negative relationship between compliance with preventative behaviors and the time spent since participants began undertaking these behaviors. The results showed that participants are more compliant with these behaviors when their perceptions of the risks associated with COVID-19 are higher. This was statistically significant at the

10% level. Additionally, participants were less compliant with preventative behaviors the longer they spent undertaking these behaviors, significant at the 5% level. This evidence supports what is observed in the graphs showing the stringency index and number of daily cases (Figure 8), that despite stringent measures, daily cases may still continue to increase due to, among other factors, low rates of compliance to restrictions. This becomes more problematic overtime, as people are less likely to comply to restrictions that infringe on their most basic civil liberties (like being able to leave their houses and have access to public spaces). Tardiness in implementing effective policies means their impact will also be delayed, potentially compromising rates of compliance and resulting in a counterproductive effect.

Compliance

Measuring compliance was only possible through proxy indicators, like the aforementioned relationship between the stringency index and the daily incidence of cases. However, Kuwait and Lebanon were consistent in reporting violations to preventative measures on a rolling basis, releasing the number of arrests and fines for noncompliance to curfews, quarantine/isolation conditions or holding gatherings since March 20th, onwards. To use violations as a proxy indicator for compliance, a few assumptions have to hold: that stringency measures are enforced equally and consistently, and that all violations are reported transparently.

In the case of Kuwait, there were peaks in violations during the lengthy 21-day lockdown period. There was no significant reduction in the number of reported daily cases, despite a stringency index of 100. In Lebanon, there were significantly more violations by the end of May, despite a lower stringency index, than in the beginning of May. The increase in violations began just as the government announced a reimposition of preventative measures following a resurgence in cases. However, the number of daily cases went up even more drastically after the period of renewed stringency, an opposite outcome of what was intended. The dramatic increase in daily violations ten days before the peak in daily cases may be one of the causing factors.

Given the insufficiency of data on violations for other countries, a statistical model could not be used to analyze the extent to which compliance affects the spread of the virus. These insights are preliminary but as more countries realize the importance of verifiable compliance, more thorough statistical analyses will emerge. Nevertheless, measuring compliance comes at a high cost. As more and more countries develop contact tracing apps, analysts become more concerned about data protection, and whether governments will take advantage of the seemingly fair tradeoff between public health and privacy to push for intrusive policies.
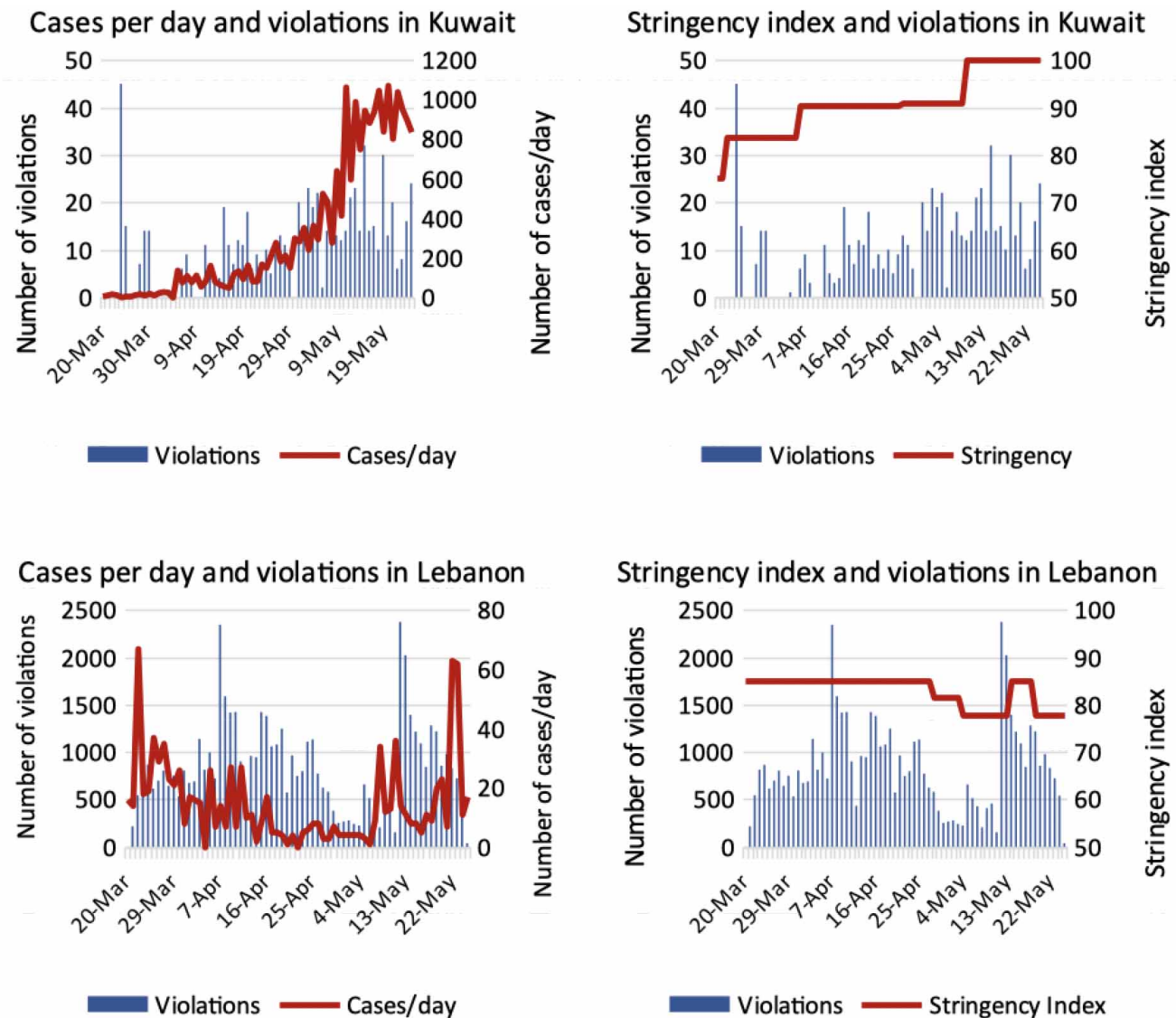
Figure 7. Stringency index, number of cases and number of violations in Kuwait versus Lebanon
(Source: Oxford COVID-19 Government Response Tracker)

Behavioral insights and nudges

The COVID-19 outbreak certainly intensified the role of the government (in early tracing responses, imposing restrictions, and in economic relief measures) (Chen et al., 2020), but policy responses cannot indefinitely bypass civil liberties with hardhanded approaches to contain the virus; the costs are too high and people value their freedoms enough to protest against restrictions they deem draconian (Reuters, 2020). Also, in most cases, governments do not have the institutional capacity for long-term enforceability, emphasizing the importance of society's willing adoption of preventive behaviors. In the early days of the pandemic, individual and institutional courses of action were unclear. As research identified behavioral and structural barriers to compliance and the target behaviors that

are most impactful in reducing the spread of the virus, nudges can become essential to streamline preventive measures and policies. Valuable efforts have shown that it is possible to effectively influence behavior towards handwashing, sanitizing and maintaining social distance, including focalized efforts targeted to identified groups that were generally less compliant with certain measures (World Econonomic Forum & Quartz, 2020; BIT, 2020; Krpan et al., 2020). Behavioral science can also mediate the information overload people are bombarded with daily, often leading to inaction, carelessness, overconfidence, misinformation, fear or anxiety (BIT, 2020). Finally, behavioral science can guide policy responses in several realms, like remote service provision, the gradual return to normality, among many others, backing experts in their fields to maximize the impact of measures.

Readiness to new normal

Nations have been their own judges in deciding what restrictions to lift and when, despite warnings from experts or guidelines by international entities. In fact, the World Health Organization (WHO) issued criteria for lifting COVID-19 restrictions (WHO, 2020), which were used in a working paper to evaluate data on every country from the Oxford COVID-19 Government Response Tracker on the basis of 6 parameters: (1) case control, (2) testing, contact tracing and isolation capacity, (3) vulnerable settings[3], (4) preventive measures in workplaces, (5) management of imported cases, (6) community understanding (Hale et al. 2020). No data is yet widely available for parameters (3) and (4), so the overall score is based on the average of the rest of the metrics (ranging from 0 to 1).

As expected, among the MENA region countries observed throughout this study, Jordan is the readiest to begin lifting restrictions, scoring 0.8; its identified deficiency is a lack of testing, contact tracing and isolation capacity (0.3). Algeria is the lowest scoring country within this study, scoring 0.3 overall, due to its lack of control over cases as well as low testing, contact tracing and isolation capacity. However, data was not available for community understanding for Algeria, skewing its score. Both Iraq and Egypt have a score of 0.5, and all GCC countries score 0.6, with the exception of Kuwait, that scores 0.8 overall, but 0.0 on case management.

Countries may use this study and other sources of data as a framework for evidence-based and well-informed policies. Mistakes in lifting restrictions too soon may have a disastrous human and economic cost. Most MENA region countries have begun easing preventive measures, many of them having announced ambitious reopening strategies. Some restrictions will be kept in place, and the new challenge will be to ensure compliance with those measures remains as people's risk perception decreases more quickly than the virus is controlled.

Conclusion

This preliminary study on the impact of policy responses to COVID-19 in the MENA region yielded useful insights that can potentially be developed further. Quick, hardline responses are more effective than gradual, delayed measures. While more stringent measures—assuming their effectiveness and timeliness—are more impactful in reducing the number of daily cases, prolonged measures may be counterproductive as compliance is likely to decrease overtime due to behavioral fatigue. Similarly, easing measures too early may also lead to a dangerous resurgence in cases. There are clear policy implications: first, hardhanded approaches (long-term lockdowns, suspension of economic activities) are unsustainable in the long run and will face strong resistance and opposition.

[3]Outbreak risks in high-vulnerability settings are minimized, which requires all major drivers or amplifiers of COVID-19 transmission to have been identified, with appropriate measures in place to maximize physical distancing and minimize the risk of new outbreaks.

Secondly, tardiness in responding, albeit well-intentioned (to safeguard economic sectors, to appease public demands) may have long lasting and more severe economic, public health and social welfare consequences. Therefore, a 'drastic' response to a surge in cases must come into force as quickly as possible, accompanied by a thorough control strategy (with robust and well-funded tracing, testing and isolation protocols). Similarly, the success of prevention efforts relies on the internalization of certain behaviors like constant handwashing, maintaining social distance and wearing a facemask in public. Behavioral science can be harnessed to sustain and scale-up compliance with behavior that can be extremely effective in lowering the spread of the virus across communities. Evidence and rigorous data collection must guide policies to avoid compromising lives to serve immediate interests. However, the success of any preventive policy relies on its enforcement on one end, and compliance on the receiving end. Amidst a public health crisis, it is crucial to find ways to ensure and verify compliance, while finding a balance with protecting fundamental human rights. Developing a statistical model that tests the impact of compliance or lack thereof on the number of daily cases while controlling for stringency requires additional data which may become more widely available in months to come.

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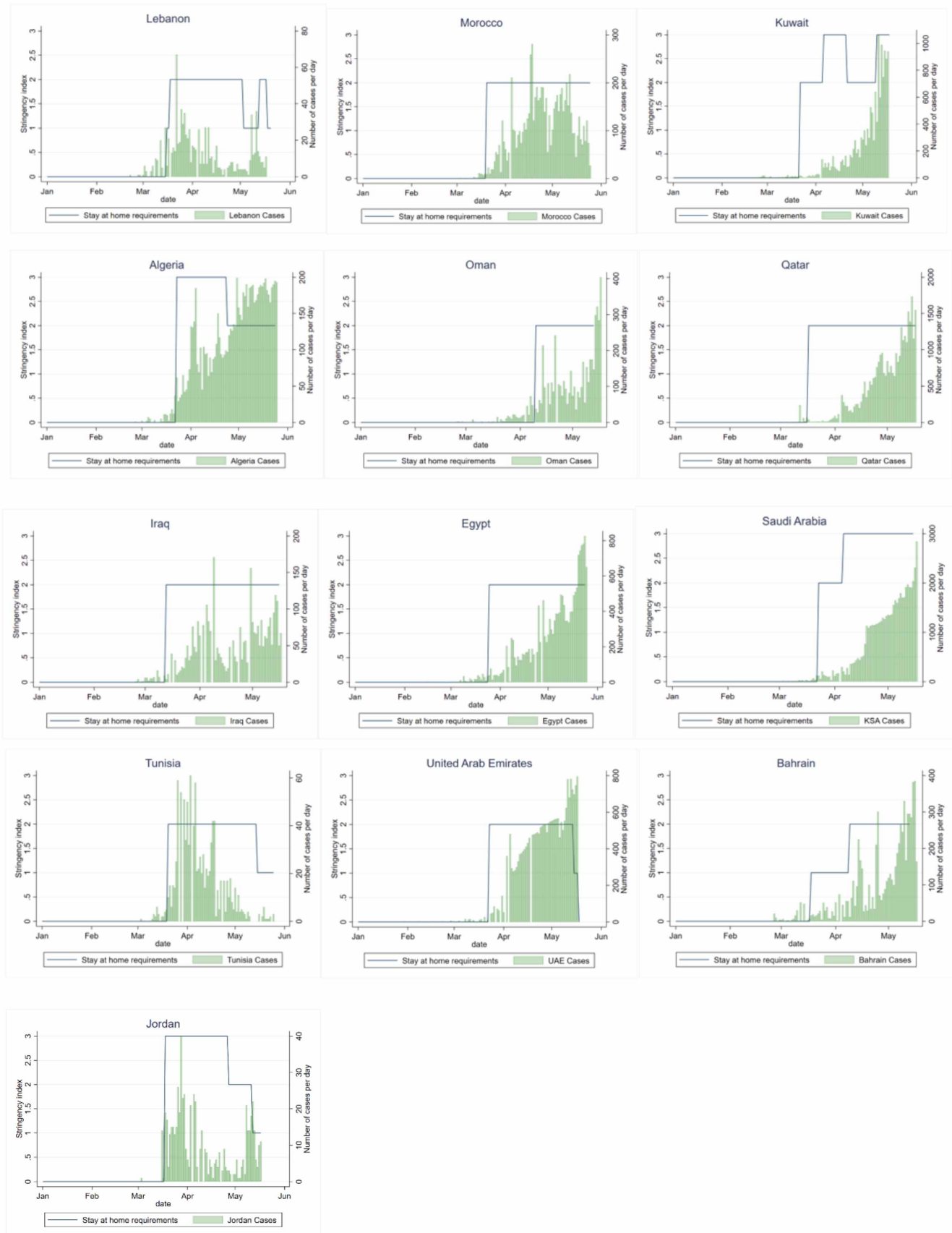Worldometers (2020, June 21). Coronavirus Cases. Retrieved June 21, 2020, from worldometers.info/coronavirus/
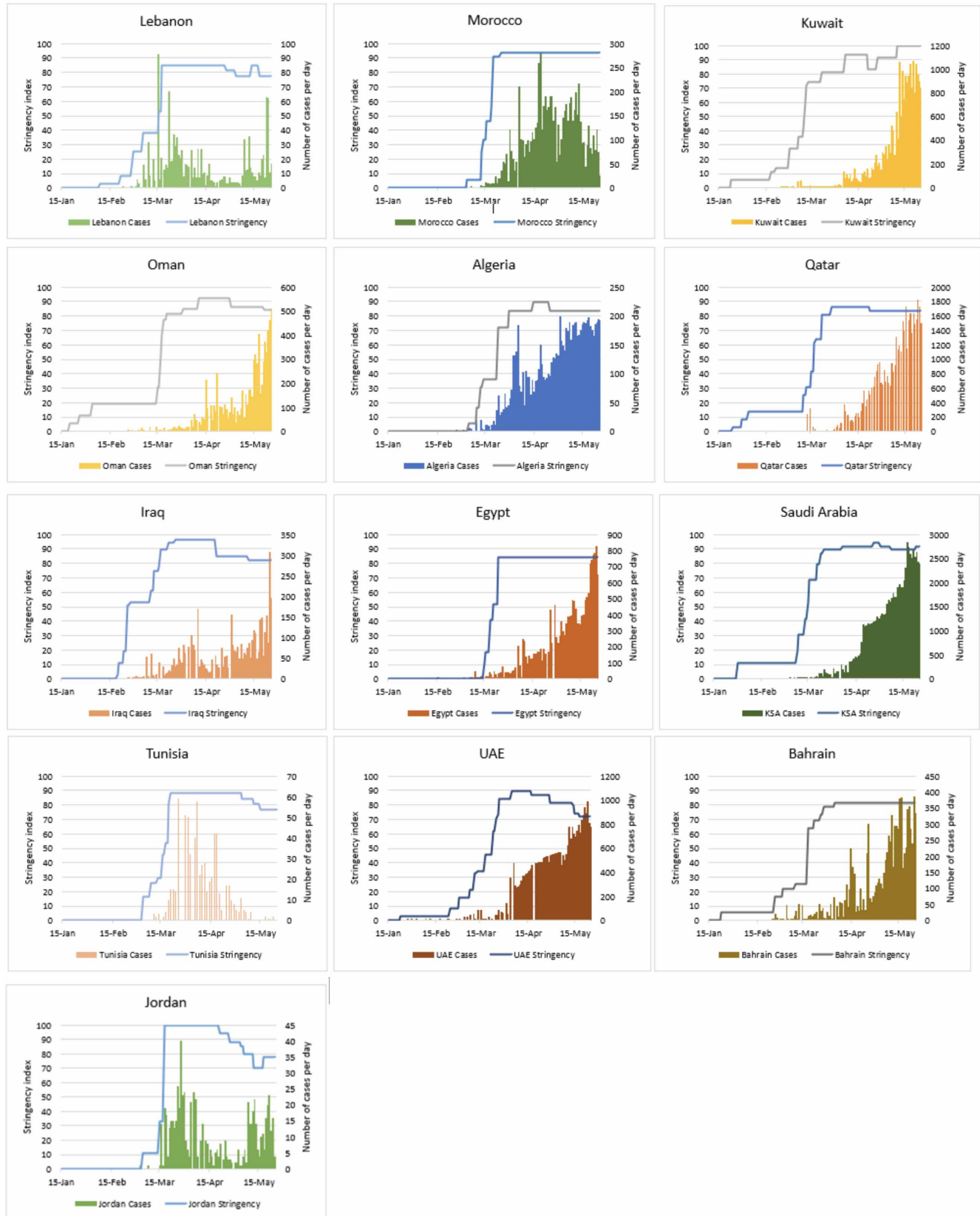
Figure 8.

Figure 9.