Between herd immunity and suppression: a modelling study assessing alternative policy responses to COVID-19 in Jordan

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Context and Introduction

The WHO announced the novel coronavirus disease (COVID-19) as a pandemic on the 11th of March 2020. The Jordanian health authorities responded by adopting a disease suppression strategy where wide closures and long curfew were applied, with the objective of achieving zero cases. The rationale behind this strategy was that the Jordanian health system cannot absorb more than 200 daily cases of COVID-19, and that an uncontrolled outbreak may lead to around 200 thousands deaths, based on unpublished governmental reports. As expected, the adopted approach was associated with catastrophic economic sequel. Jordan is still at risk today of a COVID-19 breakout as it was 6 months ago, before the suppression strategy was implemented, albeit with less resources.

As the number of COVID-19 cases grow, Jordanian policy makers need to revisit the implemented strategies and to assess alternative options to respond to the pandemic. Making well-informed decisions on the COVID-19 responses requires the availability of quantitative and qualitative data to guide the decision making process.

Methodology

A two-phase approach was adopted. In the first phase, the mortality and health resource utilization of an uncontrolled COVID-19 breakout were estimated based on the age and geographic distribution of the Jordanian population. The objective was to measure the actual threat that COVID-19 poses to the Jordanian community.

In the second phase, alternative policies to respond to the COVID-19 breakout were compared using a MARKOV model to estimate the cost-effectiveness, the direct cost on government budget, and the wider societal cost of each policy.

Research results and conclusion

An uncontrolled outbreak of COVID-19 resulting in approximately 1 million COVID-19 cases (10% of the Jordanian population) would lead to a total of 5,214 deaths, 7,867 intensive care unit (ICU) admissions and 17,798 general ward admissions. The COVID-19 infection fatality rate is 0.49%.

The comparison of alternative policies found that a mitigation strategy without quarantine is the cost-effective strategy from a Governmental perspective (incremental cost effectiveness ratio [ICER]: -997 JOD per Life years saved [LYS]) and would result in savings worth 5.4 million JOD, while mitigation with quarantine is the cost-effective strategy from societal perspective (ICER: 41,480.40 JOD per LYS).

The extreme suppression strategy, which is currently implemented in Jordan, was not found to be cost-effective and would be associated with catastrophic costs (Figure 1).

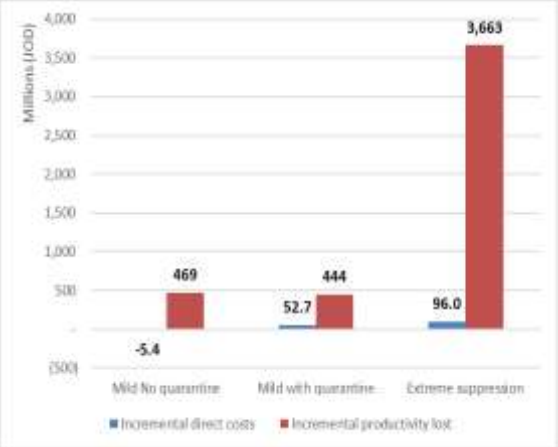

Figure 1: Incremental societal and direct costs associated with the three strategies over 6 months

Policy recommendations

1. **Adoption of a mitigation strategy with preparedness to face an increase in the number of cases, instead of the unrealistic and costly "zero case" suppression strategy.**
   The Jordanian health authorities should adopt a COVID-19 mitigation strategy and refocus the health system away from the current policies of case isolation and tracing, and towards optimal management of COVID-19 cases with the aim of reducing mortality. This can be achieved by adopting preventative measures targeting people at risk (old age and patients with comorbidities) and shifting resources towards hospital care to ensure that there are no unnecessary mortality among the severe patients. The Jordanian public would also need to be prepared for an increase in the number of cases and expected mortality. Social distancing policies, use of face-mask and the banning of public gathering needs to be strengthened.
2. **An urgent increase in the health system capacity in terms of; the number of general ward beds, ICU beds, and trained healthcare professionals, to manage the outbreak of COVID-19 in Jordan.**
   On the short term, this can be achieved by utilizing all the available health resources in the private sector, however further investment would be needed on the long term.
3. **Hospital admission should be restricted to severe patients with COVID-19 while patients with no or mild symptoms are home treated.**
   The current protocol where all COVID-19 patients are hospitalised is not medically justified, and would burden the health system resources when case numbers start to grow. A new protocol should be developed whereby hospital admission is restricted to severe patients only while patients with no or mild symptoms are managed in an out-patient setting.
4. **Institutional quarantine is a high-cost intervention and can be substituted by other cost- saving interventions.**
   Considering the need for investments in the number of ICU and GW beds, adopting a cost-saving intervention by stopping the institutional quarantine would release the scarce funds that are required for increasing the health system capacity.
5. **Curfews and lockdowns need to be used in a timely manner to control the demand of health resources and not as a tool to suppress the outbreak.**
   Curfews and lockdowns are effective interventions, however they are extreme and costly. They need to be used as a last resort option only when the health system reaches its capacity. Thresholds on when to implement curfews and lockdown should be linked to the number of daily hospitalised COVID-19 cases.
6. **The Jordanian health authorities should seek the opinions of health economists and utilize disease and cost-effectiveness techniques in the design of their strategies and interventions.**
   Health economists play a major role in bridging the knowledge gap between health policies and its economic consequences. They can assist health authorities in anticipating the outcomes of health interventions by utilizing disease modelling and cost-effectiveness techniques.