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Commentary

How systems respond to policies: intended and unintended consequences of COVID-19 lockdown policies in Thailand

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The coronavirus disease 2019 (COVID-19) pandemic has revealed the interdependency of health, economic and social systems (Rutter *et al.*, 2020). The COVID-19 lockdown in Thailand and its unintended adverse outcomes illustrate this complexity, providing valuable lessons regarding the use of systems thinking to design successful policies.

At the beginning of the pandemic, Thailand implemented a lockdown in its capital city, Bangkok. Ironically, the policy aimed to reduce new infections, but it unintentionally helped spread the disease nationwide. The lockdown prompted the rapid movement of economically vulnerable populations and drove them out of the city, especially low-income and migrant workers without any welfare support systems. The policy overlooked the dynamic interactions between people's motivations to mitigate the spread of COVID-19 and their economic capacity to survive.

From January to March 2020, new COVID-19 cases in Thailand were mostly clustered in Bangkok (Thailand's Department of Disease Control, 2020a), due partly to the capital's nature of being a hub of inbound international travel. Bangkok's continued tourism and sporting events vastly contributed to the rapid rise of new cases. The increasing number of cases prompted the government to declare a state of emergency on March 26, enforcing strict city lockdowns which closed restaurants, stores and entertainment venues, with exceptions for essential services (Thailand's Department of Disease Control, 2020b).

Many domestic labourers lost their jobs when workplaces were forced to close. At least 80 000 people boarded buses departing from Bangkok over the weekend after the lockdown was announced (Wipatayotin, 2020). The reactionary city departure was sudden and disorganized. Due to the high volume of travellers and lack of public health coordination, adherence to non-pharmaceutical interventions such as physical distancing, face masking and hand washing was low among travellers. With this massive and rapid exeat, COVID-19 infections were exported from high-infection conurbation of Bangkok to other parts of the country and many of travellers' destinations reported upticks in COVID-19 cases in early April—data can be found (Thailand's Department of Disease Control, 2020a).

Dynamics between policy interventions, people's motivations and pandemic outcomes

The city lockdown intended to change behaviours and urge people to stay at home by discouraging travels and family gatherings. Behavioural change is crucial for improving pandemic outcomes (Michie and West, 2020; West *et al.*, 2020) and can be effective if policies are derived from evidence-based principles of implementation science (Michie and Prestwich, 2010; Cane *et al.*, 2012; Hirschhorn *et al.*, 2020; Ghaffar *et al.*, 2020) and informed by systems thinking (Carey *et al.*, 2015; Durski *et al.*, 2020a, 2020b).

The lockdown in Bangkok may have encouraged people to stay at home and reduce contact. The causal pathway of the intended effects is illustrated in Figure 1. However, the response to the lockdown differed among populations. Workplace closures caused financial strain which made it hard to stay in Bangkok, so migrant workers chose to return to their hometowns, where the cost of living is much lower, but mass transit was not prepared for the unexpected travel demand. Therefore, their inability to survive economically outweighed their motivations to stay in Bangkok, and their urgency to travel via underprepared mass transit increased the contact rate from infected travellers to others. The causal pathway of these unintended, adverse policy consequences can be seen in Figure 1.

Had policy-makers anticipated these patterns of behaviours, they could have designed a policy that grants the working class the motivation and capability to stay safely in the city and prepared the transportation system. For instance,

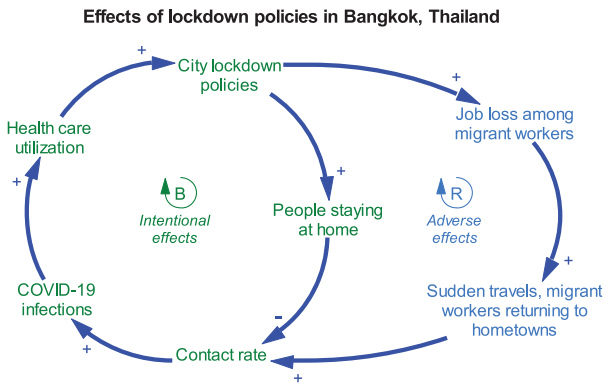

Figure 1. Causal loops of intentional and adverse effects of the city lockdown policies in Bangkok, Thailand

targeted government subsidy along with phased travel plans and mandatory quarantine after travel could have prevented the spread of COVID-19.

Lessons learned

Policy interventions aimed at controlling epidemics have societal impacts which may lead to unintended adverse effects on the targeted population. It is the government's responsibility to design a well-rounded policy package that considers potential behavioural responses and incorporates policy instruments to prevent unintended, adverse effects. Specifically, the three essential conditions of human actions—capability, opportunity and motivation—must be explored before selecting appropriately matched portfolios of policy interventions (Michie *et al.*, 2011). If not, measures such as city lockdowns can drive unexpected behaviours that lead to deadly consequences.

Sustainable health development is not achieved by aiming myopically at the best short-term results, but by designing policies that create desirable long-term outcomes. A policy that intentionally improves short-term outcomes, such as lockdown, can cause long-term harm due to delayed adverse consequences. In contrast, lockdown policies that consider behavioural factors increase cost in the short term, but in the long term they may yield satisfactory results: reducing transmission at lower overall cost.

Policy-makers can effectively change people's behaviours by identifying high-leverage points for effective interventions and by communicating wide-ranging actions across the multiple sectors whose buy-in is needed to control the epidemic. In the early days of the pandemic, when neither empirical data nor complex epidemiological modelling could rapidly inform decision-making, the adverse effects of COVID-19 in Thailand and other countries could have been predicted by adopting basic principles of systems thinking and implementation science.

As the pandemic continues to wreak havoc on health and economic systems, ongoing policy can still be favourably shaped by system dynamics tools such as causal loop diagrams (Darabi and Hosseinichimeh, 2020) and simulation models (e.g. Ghaffarzadegan and Rahmandad, 2020; Struben, 2020) to understand how elements of a problem are interrelated and avoid compounding adverse outcomes.

Data statement

References to data are reported in the article. No additional data were used in this study.

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