Quarantine, isolation and lockdown: in context of COVID-19

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Abstract

Quarantine and lockdown, combined with restriction to the movement of people, along with measures like universal use of masks, social distancing, tracking, testing, isolation and specialized centers to manage COVID-19 patients, have been successful in the control and spread of the virus in China and most Asian countries, unlike in Europe and America. This review is written to provide information on quarantine, isolation and lockdown in the context of COVID-19 management. The quarantine and lockdown from historical, socio-cultural, and its effect on special circumstances, for example, the internal and international migrants, daily wage workers, refugees, and the ways in which countries have managed this issue, including the measures taken by Nepal to manage the quarantine and lockdown is briefly presented in this review.

Keyword: COVID-19, isolation, lockdown, Nepal, quarantine, face masks, social distancing

Introduction

The message from WHO was loud and clear, for the governments and people around the world to seize the window of opportunity to play their part and prepare themselves for COVID-19.[1] This was also echoed in the editorial – 'let us fight together against COVID-19 pandemic.'[2] A millennium ago, Ibn Sina (Avicenna), the Persian father figure of early modern medicine, author of medical encyclopedia "the canon of medicine" published in 1025, recommends Quarantine to control the spread of diseases.[3,4] Today, the world is still struggling to protect itself from COVID-19 with quarantine and lockdown measures.

'Quarantine' is done to separate and restrict the movement of people exposed to a contagious disease, to see if they become sick and to help protect the public by preventing exposure to people who have or may have a contagious disease; whereas, 'isolation' separates sick people with a contagious disease from people who are not sick.[5] A 'contagious disease' refers to contagion (i.e. contact), transmissible by physical contact from objects touched by infected person, by casual contact with secretions or by airborne route and requires quarantine and isolation as a public health response.[6]

A 'cluster' infection is aggregation of cases grouped in a place and time that are suspected to be greater than the number expected (the expected number may not be known). An 'outbreak' is a sudden increase in the number of cases of a disease than what is normally expected in a limited geographic area. When wider area is affected, it is an Epidemic, and it becomes a Pandemic when it spreads over several countries or continents affecting a large number of people.[7]

The Health Commission of Hubei province, China, first announced a cluster of unexplained cases of pneumonia on 31 Dec 2019, which were later found to be positive for a novel coronavirus and was tentatively named '2019 novel coronavirus (2019-nCoV)'.

Finally, it was named COVID-19 by the WHO, and the outbreak was declared as a Public Health Emergency of International Concern (on 30 Jan 2020) and a Pandemic (on 11 March 2020).[8]

This was a historical step in modern day on quarantine, when on 23 January, one day before the most important sociocultural and national event of lunar new year/Chinese new year, Wuhan a city of more than 11 million in Hubei province (of over 50 million) was shut down from rest of China and world, suspending all transports, road, air, and water to prevent the spread of the virus.[9,10] Subsequently, other 15 cities in Hubei were also locked.[11] The phylogenetic analysis of early samples (24 December 2019 to 3 February 2020)[12,13] and the timeline documenting severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spread during November to January 2020,[14] estimates that the virus may have originated between 22-27 November, in Wuhan, China.

The official day by day chronology since the detection in late December 2019 provides data that China did share information internationally.[9] By 2 January, the National Health Commission (NHC) developed guidelines on early discovery, diagnosis and quarantine, and informed WHO. By 10 January testing kits were developed, and primers, probes, and the genome sequence were shared to WHO, and the world- through Global Initiative on Sharing All Influenza Data (GISAID). Epidemiologist and chest specialist, Prof. Zhong Nanshan confirmed 'human-to-human' transmission of the virus in a press conference organized by the NHS on 20 January categorizing it a 'quarantinable' infectious disease as per Frontier Health and quarantine Law (FHQL) of China. This law is formulated to prevent infectious diseases from spreading into or out of the country, carry out frontier health and quarantine inspection.[9]

Quarantine, isolation and lockdown measures were practiced as per the public health epidemiology practice once human-to-human

transmission was confirmed in China. The 1st scientific report of person-to-person transmission in settings of hospital, family and travel history to Wuhan was published on 24 January 2020.[15] Infection was confirmed in five of six in a family cluster from Shenzhen, China, with travel history to Wuhan between 29 December 2019 to 4 January 2020. The novel coronavirus RT-PCR was positive in four adults and a child. One member of the family had not travelled to Wuhan. Two positive cases had visited a Wuhan hospital, but none had contact with Wuhan markets or animals.[15] Subsequent family cluster infection was recognized in Shanghai. On 21 January 2020, two patients from the same family unit (from Wuhan who arrived Shanghai on 15 January 2020 to visit a relative) presented with fever, respiratory symptoms, and pulmonary infiltrates. Two days later, the relatives were also hospitalized with fever. Real-time reverse-transcription polymerase chain reaction (RT-PCR) came positive in all four patients.[16]

Quarantine and isolation measures were further emphasized in scientific literatures. The first electron microscope picture of the virus and strain information was released,[17] and "Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China" was published in Lancet on 24 January.[18] Next day, the NHC released six guidelines on public prevention, for general use, tourism, households, public places, public transport and 'home-quarantine' self-observation. The "Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study," was published in the Lancet on 29 January[19] and the "Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia," based on first 425 confirmed cases in NEJM on 30 January.[20] The China CDC analyzed epidemiological characteristics of the 72,314 cases in the publication "Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China" was published in JAMA on 24 February.[21] On 28 February, "The Pathogenicity of SARS-CoV-

2 in hACE2 Transgenic Mice, "an animal model for COVID-19 to help promote the development of vaccines and drugs was published."[22] On 7 March, the NHC released the 6th version of guidelines on the prevention and control of COVID-19. On 11 March "Detection of SARS-CoV-2 in Different Types of Clinical Specimens," was published in JAMA.[23] The drastic measures taken were finally showing results. As of 20 March zero new confirmed or suspected COVID-19 cases were reported on the mainland. On 24 March the joint prevention and control mechanism of the State Council, in a press conference held in Beijing stressed on risks of sporadic COVID-19 and imported cases, with further measures on 'quarantine' for people entering China.[9]

Quarantine began in late January in Taiwan, when the first 1st case was reported on 20 January 2020. A 55-year-old woman who worked in Wuhan, China, arrived at Taiwan Taoyuan International Airport, was found to have symptoms of COVID-19 by an airport medical desk. She was immediately placed in quarantine ward and tested positive for SARS-CoV-2.[24] On 27 January, the Taiwan government began to track individuals with recent travel history from affected areas, and were then home-quarantined.[25]

Quarantine center was setup by Hong Kong (HK) government early on 23 January, in the Lady MacLehose Holiday Village in Sai Kung. This was after the 1st case, a 39-year-old man, who travelled from Shenzhen, China (he lived in Wuhan) to HK a day earlier had tested positive for the virus. The same day, another HK local man of 56 year, who had visited Wuhan the previous week, also tested positive.[26,27]

Singapore confirmed its first imported case of COVID-19 from Wuhan on 23 January 2020. Close contacts were quarantined for 14 days, either at home or at designated government quarantine facilities and their health status was monitored daily. Those who developed symptoms were transferred to hospitals for isolation and testing. Quarantine violators

were tagged with tracking device. Other contacts of low risk were put on phone surveillance or self-monitor and advised to visit clinic if unwell.[28]

Meanwhile, in Nepal, the only designated infectious disease hospital in the country, Sukraraj Tropical & Infectious Disease Hospital, reported its 1st confirmed case on 23 January (a 32 year man who returned from Wuhan on 5 January) was one of the nine cases during early period. He had contracted virus from a relative who did not comply with quarantine rules. The report also mentions extending quarantine as two cases had persistent viral shedding even after 14 days, also reported in other studies.[29]

It was a historic event for Nepal to successfully execute, for the first time in history, the evacuation and quarantine of its students from the epicenter of novel coronavirus (2019-nCoV) breakout in Wuhan, China on 16 February 2020.[30] The pandemic has made people innovate and use available resources, for example, in Nepal local technology has been used to make 'sample collection booth.' [31] Nepal lacks 'double cab ambulances' to transport infected person safely for isolation.[32]

After Wuhan, China, and spread of virus to other countries in Asia, Italy became the new epicenter for COVID-19 in Europe[33] with more serious infection and casualties forcing a countrywide quarantine and lockdown. European CDC published information regarding quarantine on its website.[34] New York, USA has overtaken as a new epicenter,[35] in part due to the reluctant federal government stance on quarantine and lockdown. This has resulted in the greatest casualties of all, with total deaths approximating 41,000 as of 20 April 2020, while still not having reached the peak.[36,37]

Quarantine and isolation together with tracing and treatment has proven to be crucial in preventing transmission of virus. During current COVID-19 outbreak, due to improved laboratory capability and

surveillance network, China was able to scientifically confirm the outbreak within a few weeks, revealing virus genome sequence, developing diagnostic tests and efficient epidemiological control, unlike the 2003 SARS outbreak, reports Lancet.[15]

The world has slowly but painfully come to terms with 'can China's COVID-19 strategy work elsewhere?' The observations and report on 28 February 2020, by a team of 12 Chinese and 13 foreign scientists, organized jointly by WHO and China, to study the state of the COVID-19 epidemic and the effectiveness of the country's response, physically toured five cities (Beijing, Shenzhen, Guangzhou, Chengdu, and epicenter Wuhan) visiting hospitals, laboratories, companies, live animal markets, train stations, and local government offices.[38] The report says, "everywhere you went, anyone you spoke to, there was a sense of responsibility and collective action—and there's a war footing to get things done." The report mentions "China's bold approach to contain the rapid spread of this new respiratory pathogen has changed the course of a rapidly escalating and deadly epidemic," with a huge success and "hundreds of thousands of people in China did not get COVID-19 because of this aggressive response." The task force says "the rest of the world should learn from China." Many public health experts initially had thought it was impossible to contain the spread of a widely circulating respiratory virus. China rolled out the most dramatic—and controversial— measure of lockdown. This effectively prevented exportation of the virus. Most other cities and provinces in China did not face such severe measures. They were asked for voluntary quarantine but were required to practice aggressive 'social distancing' measures throughout the country. Mass gatherings were cancelled, e.g. sporting events and theaters, schools, and businesses. Anyone going outdoors must wear a mask. The color QR-codes "green, yellow, or red" on mobile phones to denote health status were useful at train stations and checkpoints, together with mandatory temperature check.

All these measures were at the cost of reduced public life and economic activities. However, the measures did work in suppressing the outbreak, so the rest of China and world had time to mitigate the response.[38]

Quarantine, isolation and lockdown affects health and wellbeing. This has been observed in a survey of 369 normal adults in 64 cities in China who were in confinement for a month. It reports that 27% worked in office, 38% from home, and 25% had stopped working. Those who stopped working reported worse mental and physical health conditions. Their distress was proportionate to the severity of COVID-19 in their home city. Thus, policymakers and people need to be aware of the importance of physical activities during the implementation of restrictive measures.[39]

The lockdown, has special significance of potential public health concerns for the homeless people (more than 500,000 in USA and 35,000 in Canada) who live without regular access to basic hygiene and facilities, making them particularly vulnerable to COVID-19. The homeless have all-cause mortality of 5-10 times higher than general population, and can increase proportionately.[40] As public spaces are closed during lockdown, emergency plans to provide shelter and transport for homeless, needs to be managed. Possibility of deleterious mental health of these people need to be considered, many of whom may fear involuntary hospitalization and incarceration.[40]

Lockdown due to COVID-19 has special significance for refugees, asylum-seekers, migrants and stateless persons (RAMS) due to closure of borders and travel restrictions.[41] Receiving countries are finding it difficult to provide for the immense influx of RAMS of more than 70.8 million, who have been forced to flee their homes. Around the globe, it is a known fact that only the elite enjoy the resources. The poor and marginalized who live paycheck-to-paycheck face added difficulties of lockdown and cannot possibly maintain social distancing measures.[41]

Malaysia, which has the highest reported COVID-19 cases in Southeast Asia, has nearly 180,000 RAMS. Since the country is not a party to the UN Refugee Convention and lacks a legal framework for refugees, they are considered illegal immigrants.[42] Their plight is echoed by Mai Mai, a refugee in Malaysia, who says "I am afraid to even go out to get groceries. If I contract the virus and need to go to the hospital, I worry I could get arrested or detained."[42] In India, migrant workers have become refugees in their own home country because of poor planning, turning it into a human tragedy. People crammed on whatever transport they could manage to return home, while many simply had no other option but to walk for days to reach home.[43] The chief minister of Delhi, Arvind Kejriwal, said his government would pay the rent, and announced the opening of 568 food distribution centers in the capital. Prime Minister Narendra Modi apologized for the lockdown, adding that tough measures were needed to win this battle of COVID-19.[43] However, Mr. Modi's response to bring back Indian migrant workers stranded abroad in special flights contrasts the government's inadequacy to address the problem of the migrant workers at home. A similar scenario in Nepal has been observed, with hundreds and thousands of migrant workers who had to walk on foot for days from the capital, to reach their homes, some even collapsing on the way. "We thought it is better to go back to our villages rather than stay hungry and with five other people crammed in a room in Kathmandu," the situation so common to all.[44] These unmanaged migrations have the opposite effect to what the lockdown and quarantine is supposed to achieve as these returnees may even be taking the virus back to rural Nepal.

After the successful control of epidemic in Wuhan and China as a whole, the findings from Italy and Spain report quarantine and nation-wide lockdowns have been successful in flattening the curve of COVID-19.[45] Similarly, the UK government which believed in herd-immunity in the earlier days, finally decided to impose stringent restrictions on

people's movement. This came after the advice from medical community and scientists. A joint letter from 600 public health specialists, epidemiologists, scientists, and doctors to the government mentions "lessons learned in terms of public health response from those countries ahead of the UK in the epidemic curve need to be seriously considered and implemented without any further delay. These experiences, along with data, modelling, and international guidance are clearly in favor of a package of enforced social distancing measures, extensive case finding, isolation, and contact tracing." [46] In Australia, the scientific community urged the government to "look after people, not profits." They cautioned the federal government for their mishandling of the COVID-19 pandemic and warned Australia could be in a "worse position than Italy is currently in." [47]

African countries have different degrees of lockdown to deal with the pandemic. With the different age demographics, for example, in Uganda, with 5% of population over 55 years, 2% over 65, and 48% under 14, the people there have been managing the lockdown well.[48,49] The age demographics does have significance for the socioeconomic activities and also when there is increased fatality of COVID-19 seen in people over 55. Thus, cautious approach for lockdown with focused and mixed strategy of physical isolation, restrictions of movement in order to protect the health system by flattening the curve seems appropriate.[49] South Africa on 26 April announced that the country will begin to ease its nationwide lockdown, with phased reopening allowing a maximum of one-third of workers to return to work, still maintaining restrictions to curb the spread of the virus. Furthermore, the borders will remain closed, travel between provinces banned and no large gatherings allowed.[50] Ethiopia with 117 cases as of 24 April has been under a 5-month state of emergency since earlier this month to fight the pandemic, announced a relaxing of the measures on 26 April.[51]

Middle East continues to report rising numbers of Covid-19 cases, and similar to countries in the Gulf, they have been adopting unprecedented measures of border closures, travel restrictions, lockdowns and curfews. As of 26 April, Turkey (107,773 confirmed and 2,706 deaths) and Iran (89,328 confirmed and 5,650 deaths) have been hit the hardest.[52] On 26 March, Iran announced a ban on intercity travel, closure of universities and schools, suspension of gatherings, amid fears of a second wave of coronavirus infections. The early lax attitude in Iran, with celebration of mass demonstrations during the 41th anniversary of its 1979 Islamic Revolution and the parliamentary election contributed to the spread of the virus. President Hassan Rouhani has emphasized on the effect of mass quarantine efforts on the country's already troubled economy due to US sanctions.[52]

After the lifting of lockdowns in Wuhan/Hubei, in an effort to curb the imported cases and resurge in outbreak, a strict screening and quarantine of 14-day for all travelers entering China have been put in place. Flight crews must wear masks, gloves and goggles. It is also mandatory for passengers to wear masks throughout the flight. Health workers in hazmat suits check the passengers' temperatures and guide them to halls cleared for routing services by Shuttle buses (passengers must be seated one meter apart).[53]

After a month of nationwide lockdown, India says it has done three key things, 1st - cut transmission, minimize spread and increase the doubling time for Covid-19 cases, 2nd - ramped up testing, and 3rd -prepare for the future if the virus spreads.[54] The lockdown has impacted the livelihoods of nearly 40 million internal migrants, prompting a chaotic and painful process of mass return. Poor planning may contribute to the spread of epidemic. Governments need to address the challenges facing them, by including them in health services, cash transfer, social programs, and protection from discrimination. The coronavirus crisis has affected both international and internal migration, says

World Bank.[55] Also, the daily wage workers have been among the most affected due to lockdown.[56]

The quarantine facilities built by Nepali government at the Nepal-India border have been overwhelmed by large number of migrant workers returning home (about two million Nepalese who live and work in India are mostly low wage laborers). Most of the people, who had to walk home, got stranded at the borders after Indian Prime Minister Narendra Modi imposed a complete lockdown on March 24.[57] In Nepal, vulnerable daily wage workers are falling prey to unemployment due to lockdown. For daily wage workers, it's a struggle for survival as they do not have the means to purchase the essential goods made available by the government. The government has requested the house owners to not charge rent for the time being.[58] The local government in province-2 of Nepal has decided to provide food rations to the poor and daily wage workers who need immediate help during lockdown.[59]

Given the increasing number of COVID-19 patients in neighboring India, for the isolation and management, Patan Hospital, Kathmandu, Nepal began outbreak preparedness in reference to WHO interim guidance utilizing best available resources.[60] Together with the decision of country-wide lock-down, other specialized hospitals have been made available in Kathmandu, and in other provinces by the government of Nepal.[61] Nepal scaled up from partial (18 March) to countrywide lockdown (24 March), together with other non-pharmacological interventions (NPI), like social distancing, personal habits, and quarantine, similar to the measures planned by India.[30,62]

The quarantine, lockdown combined with other measures have seen cases in China drop to single-digit. By Thursday 23 April 2020, no new case or death have been reported in the last few days in Wuhan and Hubei.[63] Meanwhile, other provinces are slowly returning to work and normal life, but more conservative approaches have been adopted to open schools. For example, ahead of the reopening of schools in Guangzhou, tests on 208,000 teachers, staff and students in their final year of junior and senior high schools have been launched, and as of Thursday 23 April 193,000 teachers and students in graduating classes in high schools completed nucleic acid tests.[63]

Finally, following 76 days of lockdown, on midnight 7th April, Wuhan lifted its restrictive quarantine and lockdown to gradually bring life to normalcy.[64] China focused on quarantine, community containment, social distancing, closure of schools and cancellation of public gatherings to reduce the mixing of susceptible and infectious people with healthy communities. These strategies have been successful to prevent the outbreaks as there is no specific pharmaceutical treatment yet.[65]

As of now, 24 April, Nepal continues with 'home-quarantine' and countrywide lockdown which came into force on 24 March and was extended until 27 April.[66] This was in reciprocation to the Indian extension of its lockdown till 3 May which began on 25 March 2020.[67] Only time will tell how the measures of NPI, like quarantine, isolation, lockdown and disaster preparedness will see Nepal and the world through this pandemic of COVID-19.

Conclusion

The quarantine and lockdown, even though painful and challenging to manage, has been one of the major undertakings, starting from unprecedented lockdown of Wuhan in China to the countries around the globe. The non-pharmaceutical-interventions like social distancing, closure of schools and cancellation of public gatherings, movement restrictions and community containment have been the mainstay of combating the spread of COVID-19 infection around the world.

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All authors have read and agreed to the final manuscript; JNS- concept, design and writing, I the guarantor; Jenifei- concept, revision, correction of draft; Jesifei- concept, revision, correction of draft.

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