

The Effect of Mandatory Quarantine under the COVID-19 Pandemic

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Abstract: Social distancing is a basic and effective mean to block the spread of the COVID-19. However, mandatory quarantine has implications for the state, society, and individuals on all fronts. Understanding these impacts can help develop quarantine strategies better. In this article, we summarize the impact of mandatory quarantine under the COVID-19 pandemic, both positive and negative, analyze its results and causes, and then propose some recommendations for reference.

1. Introduction

Ever since the COVID-19 pandemic outbreak in 2020, many governments have set rules to keep social distancing between people. Social distancing is a set of non-pharmaceutical interventions or measures intended to prevent the spread of a contagious disease, in our case that's COVID-19, by maintaining a physical distance between people and reducing the number of times people come into close contact with each other. Social distancing has different forms, which have been introduced and promoted in most countries around the world, ranging from mandatory quarantine to voluntary isolations, from restrictions on individual mobility such as limiting the use of public transportation to lockdown of an entire city or region, from the requirement to wear face masks to the requirement of maintaining a certain physical distance from others.

Sometimes people may confuse quarantine with social distancing, but they are actually different. Quarantine is a restriction on the movement of people, animals, and goods that is intended to prevent the spread of disease. The use of quarantine can be traced back to 1918 when people were facing the influenza pandemic, the authorities took many actions including the closing of schools and forbidding mass gatherings, etc. Nowadays, when we are facing COVID-19, many countries choose to implement mandatory quarantine in certain extreme conditions to mitigate the spreading of the virus. Non-medical interventions based on traditional isolation methods can break the chain of virus transmission, especially when there is no vaccine or specific drugs. Therefore, quarantine has become the most basic and effective means to stop the spread of the epidemic. China as the first country that faced and suffered from this virus, used quarantine as an essential tool to stop the virus from spreading as much as possible. For example, after the COVID-19 outbreak in Wuhan, China at the end of 2019, the Chinese government responded rapidly to lock down the whole city on 23rd January 2020. Also, they built an information net to trace any close contacts with the patients, even every car, plane, train, or person who was from Wuhan or passed by. Meanwhile, they required the residents from high-risk communities to quarantine at home; one resident from each family can go outside for purchasing supplies every day at the low-risk communities.

Thus, it is important to understand how mandatory quarantine affected people's lives and how can governments improve this policy under inevitable situations such as the repeated outbreaks of contagious diseases.

2. The benefits of mandatory quarantine

Mandatory quarantine has become the most basic and effective mean to stop the spread of the epidemic. It is reasonable and justifiable for the national government to impose necessary restrictions on the rights of individuals in order to maintain social security and public health.

2.1 Reducing the rate of illness

The importance of social distancing at the time of an epidemic lies mainly in the three principles of infectious disease prevention [1]: first, to control the source of infection, second, to cut off the transmission route, and third, to protect susceptible populations. It is possible to implement these three principles by simply conducting quarantine. Isolating patients from healthy people is a way to control the source of infection and cut off the transmission pathway. And by doing the first two things we can protect a wide range of susceptible people, such as children, pregnant women, and the elderly. So, the biggest advantage of adopting a quarantine policy is quite distinct that it reduces the rate of illness and saves more people from suffering from the disease.

In order to analyze and compare the quarantine policies of 13 countries and their objective situation of the epidemic, researchers combined them with a two-dimensional analysis framework of "scope and intensity" and a bubble chart was drawn based on the big data released by the World Health Organization (WHO) as of November 9, 2020 [2]. The size of the circles represents the size of the number of confirmed cases in each country. It vividly shows the relationship between different epidemic isolation strategies and the number of infected persons. In the first quadrant, all the countries adopt aggressive isolation strategies and are oriented toward a large range of isolated targets. You can find that these countries, like China, Spain, have a relatively small number of patients. While for the countries in the third quadrant, they have a high degree of freedom in the means of isolation and their quarantine object just involves a narrow scope. Thus, accordingly, they suffered a much higher number of confirmed cases.

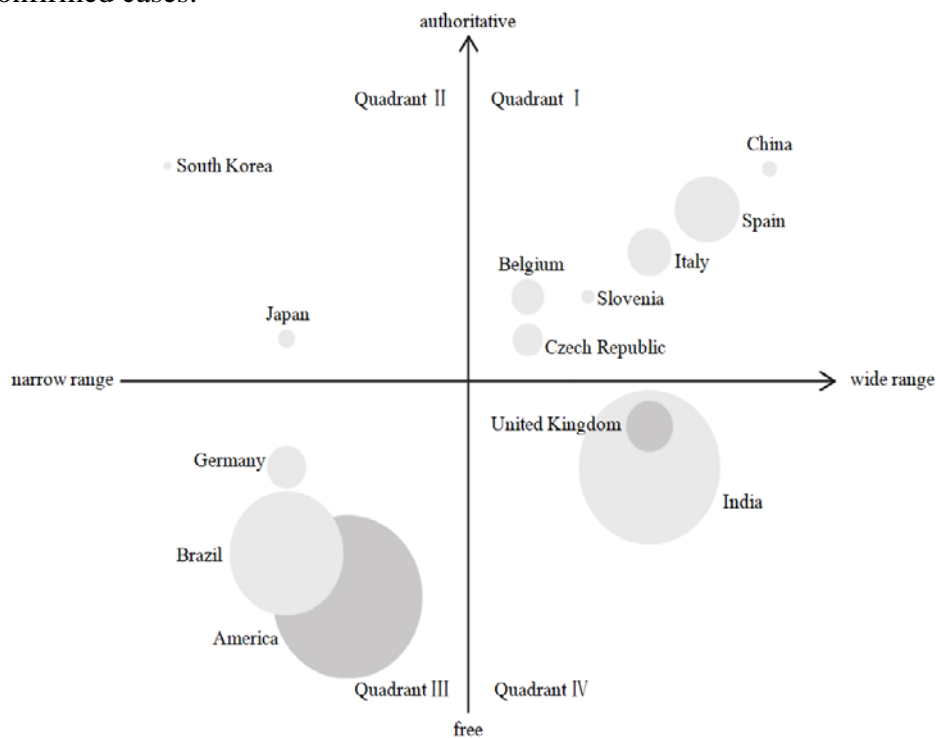


Figure 1. Epidemic isolation strategy and the number of infections [2].

In another study, researchers considered an age-structured SEIRQ model to study the best control measure for the COVID-19 pandemic in Brazil [3]. The result is that appropriate controls can lead to more than 100 times fewer people dying from COVID-19, in comparison to the same period of time without quarantine. It's not the only case, another group of researchers simulated infected populations in two scenarios (isolated and unisolated) by reviewing the epidemiological dynamics of the 2009

H1N1 pandemic [4]. They found that mandatory quarantine helped delay the spread of the 2009 H1N1 pandemic in Beijing by 1.5 months. Without mandatory quarantine in Beijing, the number of infections could have reached 1,553 by October 21, which is 5.6 times higher than the observed number. Hence, mandatory quarantine is the more sensible choice when combined with the lethality and transmissibility of COVID-19.

2.2 Economics

Another strength of quarantine policy lies in economic factors since public health has a close relationship with the national economy. The more effectively an epidemic is controlled, the lower the total cost will be. In contrast, in areas with rapid transmission and a high number of confirmed cases, not only the outbreak will last longer, but also, they would face extremely high treatment cost and social loss.

Recently, a theoretical model of the economic impact of the pandemic was built by Zhang Su [5]. The daily increase in confirmed cases as a function of the number of days implies that the longer the pandemic lasts, the longer people will expect to be isolated, consequently isolated households will consume more or even over-board daily necessities while enterprises will incur more losses due to workers being quarantined. On the contrary, when the scale of transmission is smaller, the epidemic will be controlled, and the cost of treatment will decrease as well. Therefore, strict isolation in the early stages of the outbreak is necessary to minimize the spread of the disease and thus reduce the cost of treatment.

On the other hand, some researches also point out that the pandemic had a creative impact, as evidenced by the growth in revenues of businesses specializing in medical products and the development of new forms of digital economic activity that are beneficial for improving national economic security [6].

The pharmaceutical manufacturing industry is actually facing huge pressure on production, which makes the companies reflect on how to improve their production capacity. As a result, more and more pharmaceutical companies begin to establish automated production lines and strengthen their manufacturing of innovative drugs or medical devices. This process further prompts the transformation and upgrading of the pharmaceutical manufacturing industry [7].

2.3 Others

In many capitalist countries, COVID-19 first manifested itself as a health crisis, and then developed into an economic and social crisis, and even further evolved into a political crisis. Therefore, the ability to properly respond to the epidemic is directly related to the situation of the governing party and its future fate.

Some governments choose to push for an economic restart anxiously since they have been under pressure to ensure the normal functioning of the economy and society. But they did not attach appropriate importance to the risk of an epidemic backlash and such practice may lead to greater difficulties in governance. Just like what Joseph Nye said in the magazine *American Foreign Policy*, "The epidemic has had a lasting impact on American lives, employment, schooling, and attitudes toward society. And that increased polarization could cause social disruption or even paralysis". In effect, GDP growth may not necessarily improve living standards and social welfare. And there is simply no trade-off between health and economics. If local administration did little on mandatory quarantine or crisis management, the public's discontent will finally lead to a return of government control to the public sphere.

The benefits of mandatory quarantine come in a range of forms. The Prime Minister of the UK, Clark, said they intended to further relax the travel restrictions introduced for the control of the outbreak, but Eritrea, Haiti, and some other high-risk countries were added to the "red" list of the UK's most restrictive travel destinations. When the spread of the epidemic is effectively contained, travel restrictions between countries will be relaxed accordingly or even lifted. But if governments just adopt a negative attitude towards quarantine policies, there may be huge changes in domestic policy and possible implications for foreign and geopolitical policy.

There is also a study investigating citizens' lifestyles during the mandatory quarantine [8] showing that a small percentage of people took full advantage of the period of social isolation to improve their daily habits. It is said that people can take this mandatory quarantine period as a short vacation from their busy schedule and use this time to do some things they've always meant to do but haven't had time to do, such as lose weight, spend time with family, and so on.

3. The risks of mandatory quarantine: mental health

Researchers built a model in which the agent's loneliness is measured by a real variable (degree of loneliness). It determines the agent's tendency to initiate social interactions (or conversations) and terminate ongoing interactions [9]. The model describes the number of social connections and the impact of the quality of these connections on loneliness, where the quality is measured by the speed at which the degree of loneliness decreases during social interactions. They compared and analyzed the data research results and the community sampling results that implemented social distancing into the formula, and found that the mental state of community residents has decreased to varying degrees. They all revolve around "loneliness" unfolding, community dynamics show a kind of burnout mechanism. In addition to loneliness, past research reports also showed that the negative psychological reactions reported by people affected by social distancing policies and isolation include sadness and depression [10, 11], confused, scared [11-13], anger [14].

3.1 Groups

3.1.1 Children and adolescents

It is worth noting that children and adolescents are at a critical stage of development, which makes them more vulnerable to the negative impact of the COVID-19 pandemic and response measures on mental health [11, 13]. Studies confirmed that 30% of quarantined children and 25% of quarantined parents (based on self-reporting) meet the criteria for PTSD [15]. Some teenagers even overate due to psychological problems. In one study, 33% of people said that social distancing made them feel disconnected from society. Almost average people showed they once overate after the mandatory quarantine policy was implemented, and 29% of people thought it was social distancing that brought this situation to them [16].

3.1.2 Medical personnel

The post-traumatic stress symptoms of the quarantined are more serious than those of the general public, and their scores in all aspects are significantly higher [17]. But health care workers also feel greater stigma than the general public, show more avoidance behaviors after isolation, report greater loss of income, and have a greater psychological impact: anger, annoyance, fear, Frustration, guilt, helplessness, isolation, loneliness, nervousness, sadness, worry and not so happy. Health care workers are also more likely to think they are infected and worry about infecting others.

3.1.3 Homeless

In view of the particularity of the content of the policy itself, mandatory quarantine strongly recommends that everyone stay in designated places (such as homes, hotels, etc.) and close some public places (such as movie theaters, restaurants, etc.). However, for the homeless living in poverty, these public places, emergency shelters, etc. are inaccessible, which also brings them a great sense of insecurity [18].

3.2 Reasons

3.2.1 Quarantine time is too long

Studies found that the longer the quarantine period, the greater the psychological impact on people affected by the social distancing policy. In research on the overeating reaction of quarantined people, it was also found that the longer the quarantine, the more likely they are to have a more serious

tendency to overeating, and the food is more likely to become the object of their vent. At the same time, as the research time increases (the time to implement the social distancing policy increases), residents living in the community will feel lonelier [9].

3.2.2 Decrease in social contact

Social distancing policies directly reduce the opportunities for people to communicate face-to-face and increase the distance between people. People who lose their social life become lonelier and more restless over time, which also creates an increasing negative impact on their mental health [9]. In the research and prediction research on fixed communities, it is found that the decline in social quantity and social quality caused by the social distancing policy has seriously affected people's mental state, and caused boredom, loneliness, depression, and mental state in the studied group.

3.2.3 Fear of infection

Especially for families with children and medical staff groups, parents are always afraid that they and their children will be infected [15] at the same time, medical staff are afraid of being infected and are prone to feel guilt [17].

3.2.4 Economic factors

Affected by the pandemic and social distancing policies, the socio-economic status is not good, which makes the income of most people fall. Among them, the homeless are more severely affected. A report showed that 77% of the homeless said that they encountered severe mental stress and financial difficulties during the lockdown, and their risk of facing financial difficulties had tripled, which brought them serious life pressures and difficulties [18].

3.3 Suggestions

Based on these realities, some people suggested that perhaps we should attach importance to the estrangement of physical distance between people instead of estrangement from other people. In other words, with the development of the Internet today, online communication forms including video communication should be adopted.

Professional community nutritionists should be hired, and community staff should regularly check the health of residents, formulate a reasonable diet plan, and help people with bad eating habits to avoid some health problems caused by overeating. At the same time, the government should formulate policies to provide specific shelters for people like the homeless in the short term, and contact some social organizations to provide them with some necessary supplies.

4. Conclusion

Social distancing has both positive and negative effects on our society. On the positive side, the effectiveness of this measure against the transmission of contagious diseases is considerable. On the negative side, it can cause mental illness to individuals, especially for those vulnerable groups.

Accordingly, it is reasonable to use this method under emergency circumstances such as the pandemic of COVID-19 to protect the health of the public. But the government should also be prepared to help the public to face the possible side effects of the mandatory quarantine by promoting online communication, etc.

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