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How air pollution in China is affecting its 21st Century healthcare budget

Air pollution is the release of chemicals or particles into the atmosphere that can be harmful to human health. Particles with a diameter of less than 2.5 micrometres are referred to as particulate matter 2.5 (PM2.5) and are used when describing pollutant levels. For many years, China's air quality index has been one of the worst in the world and although measures have been taken by the Chinese government to improve air quality, PM2.5 concentrations in many cities still exceed the World Health Organisation's (WHO) recommended guidelines (1). This can be linked to China's focus on industrialization and economic growth over several years, starting with the Great Leap Forward in the late 1950s, which saw widespread use of 'backyard furnaces'. Studies have shown that exposure to air pollution may increase the risk of developing certain cancers, respiratory, and cardiovascular diseases (2). Each year, air pollution in China is responsible for more than 1 million premature deaths, with the elderly, children, and individuals with lung and/or heart conditions being the most susceptible (3). Most of these deaths are a result of chronic obstructive pulmonary disease (COPD), Ischaemic heart disease, stroke, and lung cancer (4), which places a huge burden on China's healthcare system. Thus, the substantial impact of air pollution on the healthcare budget is absorbing a significant portion of government spending that could otherwise be allocated to critical areas essential for development, hindering China's rise to become the world's largest economy.

Summary of *Under the Dome*, a Chinese documentary

On 28 February 2015, [*Under the Dome*](#), a documentary on China's air pollution was released on Chinese internet platforms which was viewed millions of times before it was removed and banned in China a week later. This documentary features Chai Jing, an investigative journalist, who presented her research in the form of a TED-style documentary where she answered the following questions: What is smog? Where does smog come from? And what can we do about it? To answer these questions, she narrated her trips to places like steel mills, powerplants, and worksites, where she interviewed workers, factory managers, officials, and doctors on camera. She learned that the major source of pollution comes from coal-burning powerplants, but cars and trucks are also huge contributors. To illustrate the significance of air pollution in China, she interviewed a six-year-old girl from Shanxi where she asked, "Have you ever seen stars?", to which the girl replied, "No, I have not." "Have you ever seen white clouds?" Chai asked. "No." The child replies. Chai even made it personal when she revealed that her daughter was diagnosed with a benign tumour in utero, and blamed China's air pollution as the cause.

The documentary also showed how driving the economy was seen as more important than environmental protection. She revealed that steel producers and coal powerplants often ignore emission regulations as they were not enforced by the government probably because these companies were huge drivers of the economy as an official from the Ministry of Environment Protection (MEP) put it "The production of ten million tons of steel means one hundred thousand people's employment." To conclude her documentary, she drew on the success of other countries in reducing air pollution and explained how its citizens and the government must work cohesively in the "war on pollution".

A personal take on Under the Dome

This documentary was an eye-opener for most people as many did not know the detrimental impact air pollution can have on our health. It was saddening to see how the Chinese government was well aware of the situation but chose to turn a blind eye in the name of economic growth. It even made me question my government as to whether they would ever do anything that is beneficial to the country as a whole but at the expense of a small group of people. In addition, this documentary made me recall the time I travelled to Kunming, the largest city in Yunnan province, 11 years ago. Coming from a 'garden city' that is Singapore, I remembered the air in Kunming had a strong smell of exhaust fumes but did not give much thought to it then. However, after watching the documentary, I realised that this was probably due to the emissions from vehicles and factories nearby. Furthermore, when I travelled to the countryside thinking that the air quality would be better, I was completely wrong as I witnessed how even the mountains were covered in a thick haze (Figure 1). Moreover, my trip was only a week long and the pollution was unlikely to have caused significant damage to my health, but I dare not say the same for the citizens who live there.



Figure 1. Thick haze in the mountainous region of Yunnan province, 2012.

This documentary highlighted the detrimental effects of air pollution on human health and how this is costing the healthcare system. It used animations to explain and simplify the pathology between the inhalation of polluted air and the diseases it can cause, which was a great way to foster understanding for non-professionals in the field. High blood pressure, myocardial infarction, and lung cancer were some of the diseases mentioned in the documentary and these conditions are relatively serious and require long-term medications, treatments, and even surgeries which are costly to the healthcare system and are a hinderance to China's growth.

The effects of air pollution on public health and government expenditure

China has become an 'aged' population with more than 190 million people over the age of 65. This can be attributed to the one-child policy introduced in 1979 and the economic growth China has experienced over the years which led to reduced fertility rates and increased longevity. As mentioned, the elderly are the most susceptible to the long-term effects of air pollution. This would mean that many patients suffering from diseases related to air pollution would be the elderly whose immune systems are also generally weaker and so are more likely to result in severe complications, thereby requiring extensive treatments and/or medications. Furthermore, as there are fewer young people to care for the elderly due to the "4-2-1 family structure" and the younger generation choosing to migrate to big cities for work, more nursing homes and home-based care are needed to care for these elderly. Thus, while a bulk of the healthcare budget is needed to treat these elderly, additional investments are imperative for the long-term care of this demographic, which involves building more care facilities and the allocation of manpower.

Multiple studies have shown that air pollution has a profound impact on government healthcare expenditure. One study showed that for every $1\mu\text{g}/\text{m}^3$ increase in PM_{2.5}, there is a loss of 5071 million yuan and 8548 million yuan in total hospitalisation cost and social medical care cost respectively (6). A more comprehensive study which analysed the effects of air pollution on healthcare expenditure from a multi-dimensional perspective by superimposing air pollution with social, health, environmental, and policy factors, showed that industrial sulfur dioxide (environmental) made up 52.83% of China's healthcare expenditure (7). Similarly, another study demonstrated that reducing PM_{2.5} levels by $10\mu\text{g}/\text{m}^3$ would help save the annual healthcare spending by more than 60 billion yuan (8). Therefore, it is evident that air pollution in China not only impacts human health but also the government's healthcare budget. This can be simply explained by the fact that as air pollution causes different diseases, there is an increased demand for health services, and so government health expenditure must be increased to meet this demand.

Air pollution and economic growth must be balanced

The increased spending on the healthcare sector would mean a lesser budget allocated to other sectors like trade and investment. China is seeking to become the world's largest economy and one key ingredient to achieving this goal would be through its trade and investments with different countries. Since Reform and Opening in 1978, China has been actively investing in many different infrastructure projects around the globe such as railways, ports, and telecommunications. It even launched the 'Belt and Road Initiative' in 2013 to further connect China with the rest of the world, which was financed by the Asian Infrastructure Investment Bank (AIIB) that was launched in 2014. However, as China has been prioritising industrialisation and economic growth, it is also contributing to air pollution which in turn consumes a huge portion of the country's healthcare budget, thereby reducing the amount of money that could have been invested in other sectors to boost its economy. Hence, China must find a way to balance economic growth with air pollution if it wishes to truly maximize its growth in the long run, and reduce the exhaustive healthcare expenditure caused by air pollution.

To conclude, air pollution in China is not only a threat to public health but it also affects the national healthcare budget. This can be explained by the adverse health effects air pollution has on people, especially the elderly and young children, which significantly increases the demand for healthcare services. The documentary showed how serious air pollution was in

China which sparked my curiosity that is how would the healthcare system and economy be affected by it. It also explained how the elderly are most vulnerable and combined with China's 'aged' population, the entire situation is exacerbated as more resources are needed to care for them. As mentioned, a balance between economic growth and air pollution is imperative for China to bolster its status as a global superpower. By actively mitigating air pollution, substantial savings in the healthcare budget can be realized, redirecting millions of dollars towards pivotal sectors. This strategic reallocation of resources not only enhances public health outcomes but also plays a pivotal role in propelling China's overall advancement on the global stage.

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