

Does Tobacco Smoking Increases the Risk of Coronavirus Disease (Covid-19) Severity? The Case of China

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Since December 2019, when Covid-19 emerged in Wuhan city and subsequently spread across China causing varying degrees of illness, the virus has now infected 92,100 people in at least 70 countries. Data reported from China provide insights into the biology, epidemiology, and clinical characteristics of Covid-19.

Men are at higher risk of Covid-19

When assessing the data on the personal characteristics of affected patients, **the sex distribution of the disease clearly shows a male predominance of Covid-19.** Indeed, as reported by Chinese researchers in the New England Journal of Medicine, (Guan, Ni et al 2020), among a sample of 1099 patients, with laboratory-confirmed disease, from 552 hospitals in 30 provinces, autonomous regions, and municipalities in China through January 29, 2020, **the median age of patients was 47 years and 58.1 percent of the patients were male.** Also, among the initial 425 cases of that occurred in Wuhan, Hubei Province, China, in December 2019 and January 2020, the median age was **59 years and 56 percent were male** (Li, Guan, et al 2020). Moreover, an article published at the Journal of the American Medical Association (JAMA), noted that the **death rates among men infected with the coronavirus, particularly those in their late 40s and older, have exceeded those among women** (del Rio and Malani 2020).

In previous coronavirus outbreaks, such as the SARS and MERS outbreaks, **men were also disproportionately affected.** In Hong Kong in 2003, for example, men with SARS had a 50 percent excess risk of death than females (Leung, Hedley, et al 2004).

What explains this discrepancy?

While that cause is not known, **it is suggested that a higher prevalence of tobacco smoking among Chinese men, often resulting in compromised lung function, may help explain it (del Rio, Milani 2020)**. Tobacco use also contributes to the onset of other co-occurring conditions such as cardiovascular diseases, lung cancer, chronic obstructive pulmonary disease (COPDs), and diabetes, which are more prevalent among males and account for a significant share of the total disease burden in China (Wang, Marquez, Langenbrunner 2011). **The existence of pre-existing conditions increases the risk of disease severity and death among Covid-19 patients, similar to the situation with influenza (Fauci, Lane, Redfield 2020)**.

Data presented in above-mentioned **New England Journal of Medicine article (Guan, Ni, et al 2020)**, further illustrate the relative impact that tobacco smoking has on the spectrum of the Covid-19 progression and mortality in a nationwide sample of 1099 Covid-19 patients, with laboratory-confirmed diseases:

- **12.6% of patients were current smokers**, and 1.9% former smokers.
- Among those that developed a **severe disease (N=173)**, **16.9% were current smokers and 5.2% former smokers**.
- **Among patients with presence of primary composite end point** (admission to an intensive care unit, the use of mechanical ventilation, or death) (N=67), 25.8% were current smokers and 7.6% former smokers.

The epidemic of tobacco use in China

We should not be surprised by the role of tobacco smoking in explaining the difference in the sex distribution and in the severity of Covid-19 in China. China has the largest smoking population in the world, with around **316 million adult smokers**, and accounts for nearly one-third of smokers and 40 percent of tobacco consumption worldwide. While the prevalence of smoking in women is still relatively low at 1.9 percent, among males, the prevalence was estimated at 48.4 percent in 2016 (World Bank Development Indicators). Smoking prevalence also varies across cities and provinces within China.

Since the lung is an organ directly affected by cigarette smoking, various respiratory diseases including lung cancer, chronic obstructive pulmonary disease, interstitial lung diseases, and bronchial asthma, are caused and worsened by cigarette smoking not only in the case of active smoking but also in the case of passive smoking. In 2010, an estimated 1.2 million premature deaths were attributable to smoking in China, and the three leading causes of death (stroke, ischemic heart disease, and chronic obstructive pulmonary disease) were linked to tobacco consumption. As documented in a recent study, China is in the midst of a lung cancer epidemic on an unprecedented scale, and tobacco smoke exposure is the primary factor driving current lung cancer trends (Parascandola and Xiao, 2019). Lung cancer is now the most commonly diagnosed cancer and the leading cause of cancer mortality in China. In 2015, there were an estimated 733,000 new lung cancer cases (17 percent of total cancer incidence) and 610,000 deaths (21.7 percent of total cancer mortality) in China.

How does smoking affect lung health?

Acute respiratory illnesses are divided into those that include the upper respiratory tract (nose and pharynx) and larynx, and those that include the lower respiratory tract (below the larynx). In people with normal immune systems, viruses account for most cases of upper respiratory syndromes (Gwaltney 1995c): acute bronchitis (Gwaltney 1995a, as cited in U.S. Department of Health and Human Services 2004), bronchiolitis (Hall and Hall 1995, as cited U.S. Department of Health and Human Services 2004), and a majority of pneumonia cases (Marrie et al. 1989, as cited in U.S. Department of Health and Human Services 2004). Bacteria can cause pharyngitis (Gwaltney 1995b, as cited in U.S. Department of Health and Human Services 2004) and some pneumonias (Marrie et al. 1989, as cited in U.S. Department of Health and Human Services 2004).

As clearly explained in the 2004 US Surgeon General Report (U.S. Department of Health and Human Services. 2004),

“Toxins in tobacco smoke harm the body from the moment they enter through the mouth and nose. They damage tissue and cells all the way to the lungs. When cigarette smoke is inhaled, chemicals from the smoke are absorbed in the lungs. As a result, smoking causes lung diseases, including the majority of cases of chronic obstructive pulmonary disease (COPD); makes chronic lung diseases more severe; and increases the risk for respiratory infections. Genetic factors make some people more susceptible to lung disease from smoking. Although the lung has ways to protect itself from injury by inhaled agents, these defenses are overwhelmed when cigarette smoke is inhaled repeatedly over time. After years of exposure to cigarette smoke, lung tissue becomes scarred, loses its elasticity, and can no longer exchange air efficiently.”

The evidence is sufficient to infer a causal relationship between smoking and acute respiratory illnesses, including pneumonia, in persons without underlying smoking-related chronic obstructive lung disease. In the case of acute respiratory illnesses, it is presumed an infection is the predominant underlying cause, but smoking might act to increase the frequency or severity of infections. A systematic review and meta-analysis, showed that smoking was consistently associated with higher risk of hospital admissions after influenza infection (Han, Ran, et al 2019).

As reported in the 2004 US Surgeon General report (U.S. Department of Health and Human Services. 2004), there are several U.S. population-based studies that provide evidence of a link between cigarette smoking and acute lower respiratory tract infections. A population based, case-control study of 205 cases of community acquired pneumonia (Almirall et al. 1999a, b) reported an attributable risk of 23.0 percent for a history of ever smoking. The US Centers for Disease Control and Prevention sponsored a case-control study of invasive pneumococcal disease based on a population surveillance system (Nuorti et al. 2000), showed among cases for which pneumonia is likely to have been the main diagnosis, the population attributable risk estimate for smoking was 51 percent, compared with 14 percent for chronic illnesses. The authors estimated that reducing the prevalence of smoking to 15 percent among persons aged 18 through 64

years would prevent 4,000 cases per year of invasive pneumococcal disease in the United States. Of particular interest in this study was the observation that after 10 years of smoking cessation, the risk of invasive pneumococcal disease reached that of nonsmokers.

What to do?

The initial data from the Covid-19 outbreak in China, shows that smoking among men may explain the difference in the sex distribution of the disease, as well as in its severity. This on top of existing evidence on the high human toll and economic impact of tobacco-attributable diseases in China, which as co-occurring conditions further impact negatively Covid-19 patients.

Governments have an obligation and the means to protect their population's wellbeing by adopting population-based disease prevention measures (for example, fiscal and regulatory measures), in addition to providing medical care to those persons who fall ill. In the case of tobacco control, **the most cost-effective policy measure is to control and prevent tobacco use, is tobacco taxation** (Marquez and Moreno-Dodson 2017). On the basis of the Covid-19 experience, and building upon the 2015 tobacco tax increase, it would be of paramount importance for the government in China to act boldly and swiftly to reform tobacco taxation for health and fiscal gains, as well as to promote human capital development.

While the 2015 tobacco tax increase has generated measurable public health and fiscal benefits, the price of cigarettes in China continues to be low and increasingly affordable for a population that enjoys rapid wage increases (Marquez and Zheng 2016; Zheng, Hu, Wang, and Marquez, 2017). If the ultimate goal is to help smokers quit and prevent the next generation from getting addicted to smoking cigarettes and hence significantly reduce health risks, then additional tobacco tax policy reforms are urgently needed in China, especially for re-orienting the excise tax structure towards specific excise taxes at the retail level in the medium-term and towards a uniform tax system at the retail level in the long-term. A recent study estimated that a 50 percent increase in tobacco price through excise taxes would lead over 10 years to 5.3 million years of life gained and would reduce expenditures on tobacco-related disease treatment by US\$2.4 (Verguet, Gauvreau, Mishra, MacLennan, Murphy, Brouwer, Nugent, Zhao, Jha, Jamison 2015).

Looking into the future, as evidenced in a World Bank study **"Toward a Healthy and Harmonious Life in China: Stemming the Rising Tide of Non-Communicable Diseases"** (Wang, Marquez, Langenbrunner 2011), with stronger tobacco control measures including steeper tobacco tax increases, the rapid rise in China's non-communicable diseases, that compound the impact of infectious diseases as we are now witnessing with Covid-19, can be halted, resulting in major gains for people's health and the country's social and economic development.

However, if an effective response is not mounted in China to control and reduce tobacco use after overcoming Covid-19, **the disease burden posed by these conditions will aggravate the economic and social impact of the expected population explosion of older citizens and smaller workforce in China. And, a reduced ratio of healthy workers to sicker, older dependents, will certainly increase the odds of a future economic slowdown and pose a significant social challenge in China.**

Sources of Photos:

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Second Photo: Agence France-Presse, Getty Images, as published in the NYT on March 3 2020

