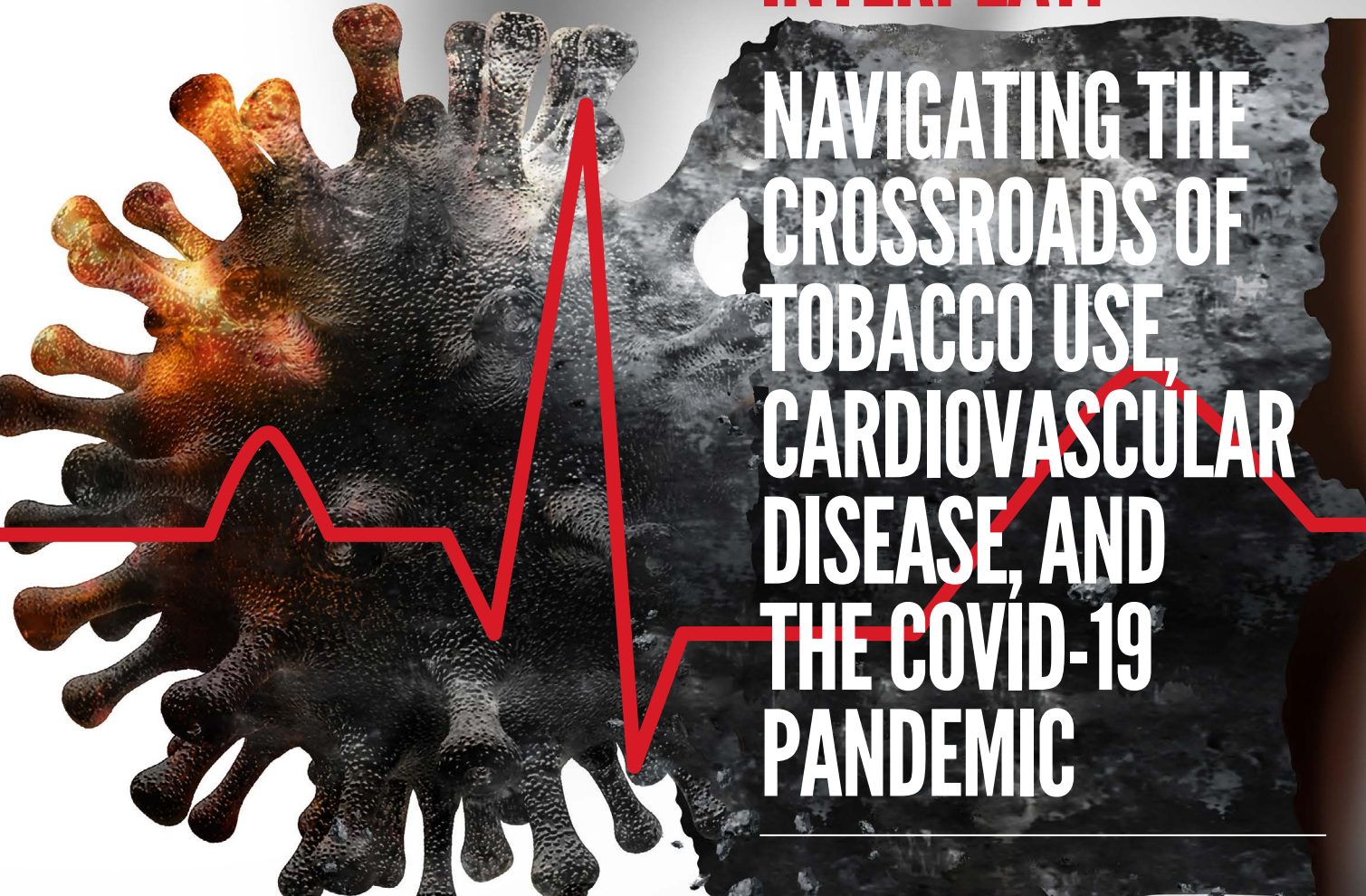


# **A COMPLEX INTERPLAY:**



# **NAVIGATING THE CROSSROADS OF TOBACCO USE, CARDIOVASCULAR DISEASE, AND THE COVID-19 PANDEMIC**

**A WORLD HEART  
FEDERATION  
POLICY BRIEF**



## ACKNOWLEDGEMENTS

This is an official publication of the World Heart Federation (WHF) reviewed by President Prof. Daniel Piñeiro, President-Elect Prof. Jagat Narula, Vice President Ms. Kristina Sparreljung, Vice President-Elect Prof. Amam Mbakwem, Past President Prof. Fausto Pinto, Treasurer Dr. Rick Chazal, Advocacy Committee Chair Prof. Trevor Shilton, Science Committee Chair Prof. Thomas Gaziano, and Chief Executive Officer Dr. Jean-Luc Eiselé.

### WHF would like to thank the following authors for their contributions:

**Dr. Regina Dalmau<sup>1</sup>**, University Hospital La Paz, Madrid, Spain

**Dr. Abdullah M. Alanazi**, King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia; King Abdullah International Medical Research Center, Saudi Arabia

**Prof. Monika Arora**, Public Health Foundation of India, India

**Prof. Amitava Banerjee**, University College London, United Kingdom

**Prof. Eduardo Bianco**, Frank Foundation for International Health, Uruguay

**Dr. Diann E. Gaalema**, University of Texas Medical Branch, United States of America

**Prof. Fastone Goma**, Eden University, Zambia

**Prof. Koji Hasegawa**, National Hospital Organization, Kyoto Medical Center, Japan

**Dr. Maki Komiyama**, National Hospital Organization, Kyoto Medical Center, Japan

**Dr. Mónica Pérez Ríos**, University of Santiago de Compostela, Spain; Health Research Institute of Santiago de Compostela, Spain

**Dr. Jeffrey Willett**, American Heart Association, United States of America

**Mr. Yunshu Wang**, World Heart Federation, Switzerland

<sup>1</sup>Chair of the Writing Group



# CONTENTS

Executive summary	4
Introduction	5
Tobacco, COVID-19, and cardiovascular disease	6
Impact of the COVID-19 pandemic on tobacco consumption	7
Impact of the COVID-19 pandemic on the burden of tobacco-related diseases	9
Smoking as a prognostic factor of COVID-19	14
Tobacco use and risk of severe COVID-19	16
Tobacco control during the COVID-19 crisis	17
Tobacco industry interference	19
Conclusion	20
Policy recommendations	21
References	24



# EXECUTIVE SUMMARY

**The Coronavirus Disease 2019, commonly referred to as COVID-19, is responsible for one of the deadliest pandemics in human history. The direct, indirect, and lasting repercussions of the COVID-19 pandemic on individuals and public health, as well as health systems can still be observed, even today.**



In the midst of the initial chaos, the role of tobacco as a prognostic factor for unfavourable COVID-19 outcomes was largely neglected. As of 2023, numerous studies have confirmed that use of tobacco, a leading risk factor for cardiovascular and other diseases, is intricately associated with increased risks of severe COVID-19 complications (e.g., hospitalization, ICU admission, need for mechanical ventilation, long COVID, etc.) and deaths from COVID-19. In addition, evidence suggests that COVID-19 directly affects multiple organs beyond the respiratory system, disproportionately impacting individuals with comorbidities. Notably, people living with cardiovascular disease are more prone to experiencing worse outcomes as COVID-19 often inherently manifests as thrombotic cardiovascular complications. As such, the triad of tobacco, COVID-19, and cardiovascular disease constitutes a dangerous cocktail.

The lockdowns and social distancing measures imposed by governments have also had adverse effects on our lifestyles (e.g., shifts in diets, physical activity, tobacco consumption patterns, etc.) and mental well-being, all of which affect cardiovascular health. In particular, vulnerable populations are especially susceptible to tobacco use, cardiovascular disease, and the psychological fallout from the pandemic. Therefore, national pandemic responses need to consider health equity as well as the social determinants of health.

The pandemic has also had catastrophic impacts on many health systems, bringing some to the brink of collapse. As a result, many health services, such as services for cardiovascular disease or tobacco cessation, were severely disrupted due to fears of transmission and redirection of resources for COVID-19 care. Unfortunately, the return to pre-pandemic levels of cardiovascular disease care activity has been stagnant. Nevertheless, digital solutions, such as telemedicine and apps flourished, and may help reduce the gaps.

Advancing tobacco control was especially challenging due to interference from the tobacco industry. The industry exploited lingering uncertainties to propagate misleading information on tobacco and COVID-19 in order to promote its products. Regrettably, the links between tobacco use and risk of SARS-CoV-2 infection remain inconclusive. However, a robust body of evidence has, since then, demonstrated that tobacco use is associated with more severe COVID-19 illness and complications. Additionally, the tobacco industry also repeatedly attempted to forge partnerships with governments under the guise of corporate social responsibility. The implementation of the WHO Framework Convention on Tobacco Control could address many of the aforementioned challenges and alleviate the burden of tobacco, COVID-19, and cardiovascular disease. In particular, the implementation of [Article 5.3](#) could protect public health policies from the vested interests of the industry.

The world can learn from the COVID-19 pandemic to better prepare for future health emergencies of international concern. In light of the impact of tobacco on the COVID-19 pandemic, it is imperative that tobacco control remains a central component in pandemic preparedness and response plans. ■

# INTRODUCTION

The COVID-19 pandemic has had, and will continue to have, an immense impact on our daily lives. The public health and social measures imposed by governments worldwide, including social distancing and lockdowns, are bound to leave lasting repercussions on our societies. Undeniably, the health, social, and economic burdens of the pandemic have made us feel more vulnerable than ever.

Tobacco, widely recognized as a major risk factor for cardiovascular morbidity and mortality, contributes to approximately 17% of all cardiovascular deaths globally.<sup>(1)</sup> Exposure to tobacco not only accelerates the progression of atherosclerosis and increases the risk of acute thrombotic events, but also impairs the immune system, weakening its ability to combat infectious agents.<sup>(2)</sup>

Unfortunately, due to the severity of the first pandemic waves and the near collapse of many healthcare systems, the role of tobacco as a prognostic factor was frequently overlooked. In fact, tobacco use was massively underreported in medical records during the early stages of the pandemic.<sup>(3)</sup> Amidst the chaos, the tobacco industry capitalized on lingering uncertainties to disseminate unsubstantiated and misleading information

about purported protective effects of tobacco-smoking against SARS-CoV-2 infections, thereby undermining national responses to the pandemic.<sup>(4)</sup> Nonetheless, the deadly interplays between tobacco and COVID-19 must not be underestimated. Multiple independent studies have confirmed that tobacco smoking is associated with more severe cases of COVID-19, leading to a higher incidence of acute respiratory failure as well as an increased need for mechanical ventilation.<sup>(5)</sup>


A growing body of evidence has demonstrated that both tobacco and COVID-19 critically impact the outcomes of various health conditions and overall quality of life.<sup>(2,5)</sup> A myriad of studies have established that people living with cardiovascular and respiratory conditions and/or associated risk factors tend to develop more severe COVID-19-related illness and experience

worse outcomes<sup>(6)</sup>. Furthermore, emerging data also suggests that SARS-CoV-2 infection significantly increases the risk of thrombotic events.<sup>(7)</sup> As such, the combination of tobacco, COVID-19, and cardiovascular disease constitutes a dangerous cocktail.

This position paper aims to review the intricate interactions between tobacco, COVID-19, and cardiovascular disease from both health and social perspectives. It intends to outline the direct, indirect, and long-term effects of COVID-19 with a specific emphasis on the role of cardiovascular disease and its associated risk factors, notably tobacco, within a learning health system framework.<sup>(8)</sup>

Lastly, the policy brief also seeks to provide guidance on tobacco regulation and control in the post-pandemic era. ■

5



**A GROWING BODY OF EVIDENCE HAS DEMONSTRATED THAT BOTH TOBACCO AND COVID-19 CRITICALLY IMPACT THE OUTCOMES OF VARIOUS HEALTH CONDITIONS AND OVERALL QUALITY OF LIFE.<sup>(2,5)</sup>**

# TOBACCO, COVID-19, AND CARDIOVASCULAR DISEASE

The novel coronavirus disease 2019, commonly referred to as COVID-19, is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Countless studies have shown that the virus adversely affects multiple organs beyond the respiratory system.<sup>(9)</sup>

In particular, it is well-known that the angiotensin-converting enzyme 2 (ACE2) – the receptor for SARS-CoV-2 – is expressed not only in the mucosal epithelial cells and alveolar tissue of the airways, but also widely in the heart and cardiovascular system<sup>(10)</sup>. In fact, COVID-19 mainly manifests as thrombotic cardiovascular complications, in addition to respiratory failure resulting from pneumonia.<sup>(11)</sup>

Risk factors that increase the likelihood of severe illness and death from COVID-19 include smoking, advanced age, cardiovascular disease, hypertension, diabetes, chronic respiratory disease, and malignancy.<sup>(12)</sup> Experts have suggested that smoking stimulates the activation of ACE2, which in turn facilitates the entry of the virus into the cells as well as its spread within the body.<sup>(13)</sup> Myocardial injury, as evidenced by elevated blood troponin levels, has also been shown to be strongly associated with poor prognosis in COVID-19 patients.<sup>(7)</sup>

Possible mechanisms of myocardial injury in COVID-19 include ischemia stemming from circulatory and respiratory failure, small coronary artery thrombotic occlusion in the epicardium or myocardium due to increased coagulation capacity, and systemic inflammation or myocarditis caused by direct binding of the virus to ACE2, which is abundantly expressed in the heart.<sup>(14)</sup> Sustained immune activation during the viral infection is also hypothesised to increase the risk of developing dilated cardiomyopathy in COVID-19 patients.<sup>(15)</sup> The acute inflammatory response triggered by the infection can deteriorate cardiac function and worsen symptoms in heart failure patients<sup>(16)</sup>.



Furthermore, it is known that some cases of myocarditis have recurrent relapses and remissions. Therefore, patients at high risk for myocardial damage should be monitored in the long-term after SARS-CoV-2 infection to track potential progression to heart failure.<sup>(17)</sup> In addition, factors such as smoking, advanced age, and cardiovascular disease are also associated with intravascular dysfunction and increased coagulability, which may be contributing mechanisms to adverse outcomes in COVID-19. As such, treatment of COVID-19-associated hypercoagulability abnormalities (i.e., in coagulation and fibrinolysis) are closely related to the aetiology of COVID-19 and have a significant impact on prognosis. Therefore, it is recommended to measure D-dimer, fibrinogen, prothrombin time, and platelet count in all COVID-19 patients.<sup>(11)</sup>

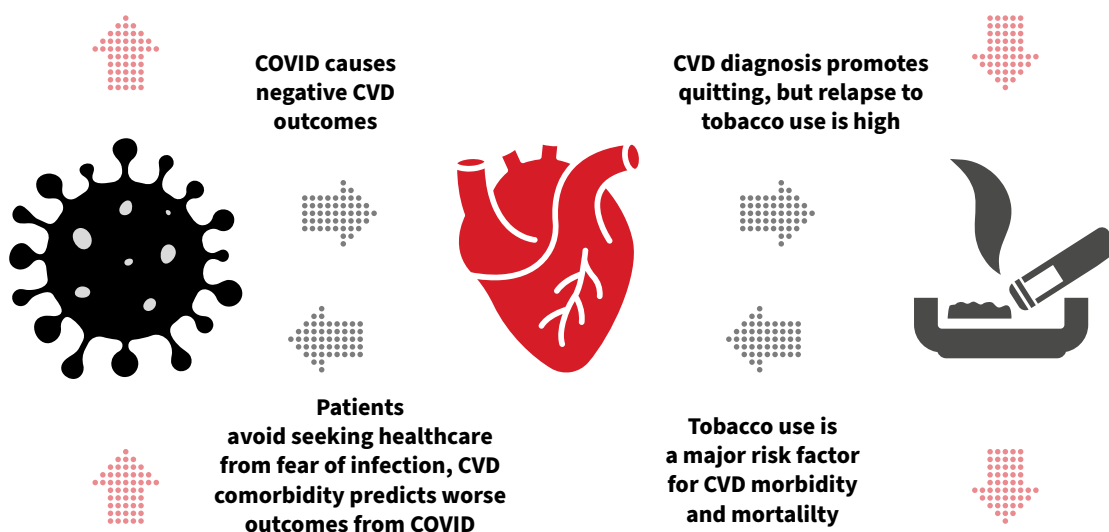
Furthermore, the measures implemented in response to the epidemic, although necessary, have had drastic consequences on our lifestyles. For instance, restrictions or prohibitions on outings often led to significant reductions in physical activity, increased propensities for unhealthy

diets, limited access to health promotion services (e.g., tobacco cessation services, etc.), mental health deterioration, as well as increased use of tobacco and alcohol, all of which are closely associated with cardiovascular diseases, especially coronary artery disease and heart failure.<sup>(18–20)</sup> ■

**Risk factors that increase the likelihood of severe illness and death from COVID-19 include smoking, advanced age, cardiovascular disease, hypertension, diabetes, chronic respiratory disease, and malignancy.<sup>(12)</sup>**

# IMPACT OF THE COVID-19 PANDEMIC ON TOBACCO CONSUMPTION

COVID lockdowns increase psychological stress and isolation, which promote tobacco use. Some countries banned the use of certain products leading to reduced consumption.



Increased transmission rates through shared devices, gathering to smoke together, worse outcomes from infection, susceptibility to long-COVID.

## PANDEMIC RESPONSE AND MENTAL HEALTH

The COVID-19 pandemic compelled countries to enforce strict sanitation regimes and social distancing measures, including lockdowns.

These interventions, alongside fears surrounding SARS-CoV-2 infection, generated large amounts of stress in the population. As a result, the mental health of society as a whole has been severely affected by the global epidemic, to the extent that the term “COVID depression” was coined.<sup>(21)</sup> In fact, the pandemic has led to a substantial increase in the number of people showing signs of depression and cases of suicides worldwide.<sup>(22)</sup>

According to a survey conducted by the United Nations, the percentage of people who felt distress during the COVID-19 pandemic

rose to 35% in China, 45% in the United States, and 60% in Iran.<sup>(23)</sup> In addition, a Centers for Disease Control and Prevention online survey of 5,412 US adults, conducted in June 2020, found that 40.9% of respondents reported experiencing some form of mental disorder, such as symptoms of anxiety or depressive disorders. Of these respondents, 10.7% indicated that they had seriously contemplated suicide in the past 30 days.<sup>(24)</sup>

In Japan, suicide rates increased for four consecutive months from July 2020. In particular, October 2020 reported a staggering 39.9% increase from the previous year, with an alarming 82.6% increase among women in particular.<sup>(25)</sup>

In general, prolonged curfews following major natural disasters are known to have

significant negative impacts on people’s psyche, as exemplified by the surge in incidence of mental illness following lockdown measures.<sup>(26)</sup> The above findings suggest that individuals may be prone to poor and/or irrational decision-making under high-stress circumstances, such as a declared state of emergency.<sup>(27)</sup>

Mental health issues often coincide with the initiation, continuation, and escalation in use of addictive substances (e.g., tobacco, alcohol, drugs, etc.) as well as with negative changes in diet and physical activity, which raise concerns about potential harmful downstream effects, such as an increase in noncommunicable diseases and specifically, cardiovascular disease.<sup>(28)</sup> ■



8

## PANDEMIC RESPONSE AND TOBACCO CONSUMPTION

The COVID-19 pandemic has had a noticeable influence on smoking behaviours.

Factors such as stress and poor mental health are known to increase smoking frequency, quantity, and dependence, as well as trigger relapses in ex-smokers.<sup>(29)</sup> While some countries have reported an increase in cigarette consumption, others have observed varied usage patterns at the population level.<sup>(30)</sup>

A study in the United Kingdom involving current smokers (n=329) reported that 25.2% smoked more cigarettes than usual, 50.9% smoked the same amount, and 20.2% smoked less. The study also found significantly worse mental health, anxiety, stress, and depressed mood among those who smoked more, suggesting a pandemic-induced deterioration in mental health and psychosocial well-being, as well as an associated increase in smoking.<sup>(31)</sup>

In a sample of individuals in the US from vulnerable populations (i.e., those with lower socioeconomic status or with psychiatric conditions, N = 332) current smokers reported smoking more cigarettes during the pandemic compared to the pre-pandemic period, even leaving their homes specifically to purchase cigarettes<sup>(32)</sup>. In Japan, among current smokers (n=1000), 18% smoked more cigarettes than usual, 69.6% smoked the same amount, and 11.4% smoked less.<sup>(33)</sup> Elevated stress due to changes in daily life as well as the social environment was reported as the primary cause of the shift in consumption pattern.

A number of studies have reported no significant change in the total number of cigarettes smoked, as increases in some demographics may have been offset by decreases in others. In fact, it is plausible that disadvantaged populations (e.g., those with mental health disorders, etc.) either continued to smoke or smoked more, while more advantaged groups seized the opportunity to quit tobacco.

Those who smoked less were often motivated by a desire to mitigate the risk of severe COVID-19 illness and to protect family members from second-hand smoke.<sup>(34–36)</sup> ■

**FACTORS SUCH AS STRESS AND POOR MENTAL HEALTH ARE KNOWN TO INCREASE SMOKING FREQUENCY, QUANTITY, AND DEPENDENCE, AS WELL AS TRIGGER RELAPSES IN EX-SMOKERS.<sup>(29)</sup>**

# IMPACT OF THE COVID-19 PANDEMIC ON THE BURDEN OF TOBACCO-RELATED DISEASES

## Access to Health Services During the COVID-19 Pandemic: Delayed Diagnosis and Treatment of Acute and Chronic NCD Conditions.

During the COVID-19 pandemic, and particularly during the first waves, access to health care facilities was severely disrupted. Tobacco use is a risk factor for many of the acute and chronic conditions that are exacerbated by poor access to the health care system, with special implications for vulnerable populations (e.g., homeless, migrants, etc).

According to the *WHO Pulse Survey on the Continuity of Essential Health Services During the COVID-19 Pandemic*, disruptions of essential health services were reported by 90% of countries. These included services for communicable diseases, noncommunicable diseases (with a 69% reduction in diagnosis and treatment), mental health, nutrition, as well as reproductive, maternal, newborn, child, and adolescent health.

Significant reductions in outpatient care attendance were reported by 76% of countries and potentially life-saving emergency services were disrupted in almost a quarter of countries. These disruptions were caused by a combination of demand- and supply-side factors, with 76% of the countries reporting a lower demand in outpatient care attendance due to lockdowns (48%) or financial difficulties (33%). Cancellation of elective services was the most commonly reported issue on the supply side (66%), in addition to staff re distribution to provide COVID-19 care, lack of sufficient personal protective equipment for health care professionals, closures of services or health care facilities, and interruption of supplies for health products.<sup>(37)</sup>



During the first waves, most hospitals were overwhelmed by acute COVID-19 admissions, and primary care nearly collapsed in some countries. Many health care professionals were infected or diverted from their usual activities to provide COVID-19 related care. As a result, the scarcity in human resources had become a major barrier to dealing with the health crisis. For instance, preventive activities, such as smoking cessation programmes, were interrupted for several months. Many surgical services, notably cancer surgeries, were also cancelled or delayed. In addition, the follow-ups of many chronic conditions were interrupted, which led to severe consequences in terms of health outcomes.<sup>(38)</sup>

During the lockdowns, a significant decline in hospitalizations for cardiovascular events was recorded in many countries. Different studies have reported a drop in the number of patients admitted for acute coronary syndromes (ACS) as well as a reduction in the number of cardiac catheterizations.<sup>(39-42)</sup> A retrospective analysis of consecutive patients admitted for ACS performed in 15 hospitals from northern Italy with primary percutaneous coronary intervention programmes during the first months of the pandemic, showed a decline in ACS admissions compared to the same period the previous year (i.e., 13.3 admissions per day versus 18.0, incidence rate ratio, 0.74; 95% confidence interval [CI], 0.66 to 0.82;  $P < 0.001$ ). In addition, a further reduction in ACS admissions was reported after the national



lockdown.<sup>(40)</sup> Even though the exact reasons for such a decrease are difficult to determine, it has been reported that some patients avoided seeking medical attention during the first months of the pandemic due to fear of contagion. Social distancing and avoidance of medical care are potential behavioural explanations, as has been reported in previous pandemics.<sup>(43)</sup>

In a multicentre retrospective observational registry conducted in 75 specific ACS care centres in Spain, comparing patients treated before and after COVID-19, the number of suspected ST-elevation myocardial infarction (STEMI) patients treated decreased by 27,6% after the COVID-19 outbreak, as the number of confirmed STEMI fell by 22,7%. In addition, there were no changes in reperfusion strategy or time from first medical contact to reperfusion, despite patients presenting

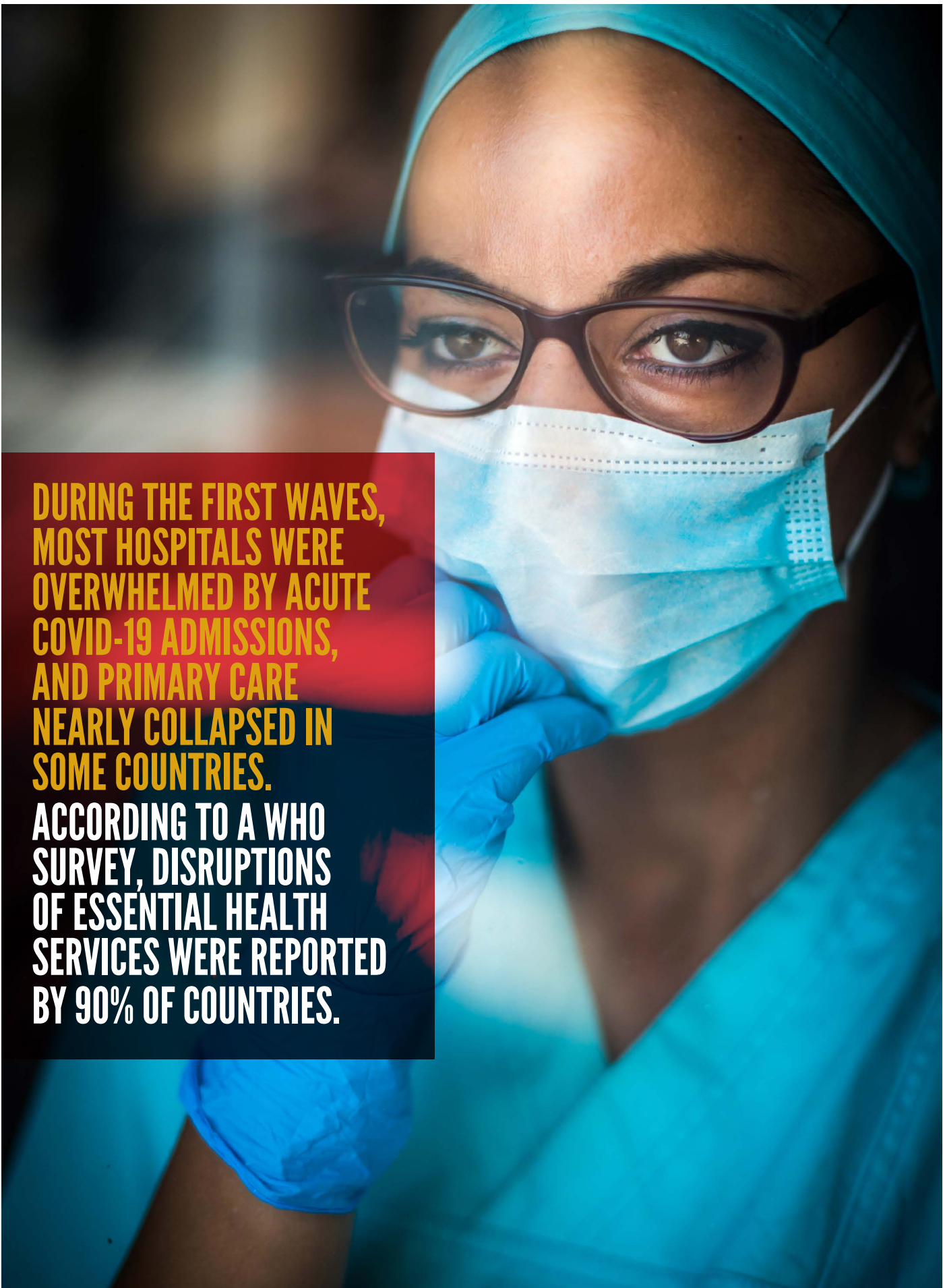
longer ischemic times (233 vs 200 minutes,  $p < 0.001$ ). The belated consultations of health services were presumably the main cause of delay to reperfusion. It is worth noting that early management of acute STEMI is crucial in reducing cardiovascular morbidity and mortality. In fact, in the Spanish study, in-hospital mortality was significantly higher during COVID-19 (7.5% vs 5.1%; unadjusted OR, 1.50; 95%CI, 1.07-2.11;  $P < .001$ ).<sup>(42)</sup> Evidence from the United Kingdom suggests that return to pre-pandemic levels of cardiovascular disease care activity for numerous procedures has been slow.<sup>(39)</sup>

Secondary prevention was also severely impacted. Access to cardiac rehabilitation and structured secondary prevention programmes, were compromised, undermining the recent progress in delivering secondary prevention. In a cross-sectional

study with a survey completed by 1062 cardiac rehabilitation programmes across 70 countries, 75% reported ceasing temporarily their activity or interrupting the admission of new patients.<sup>(44)</sup>

Additionally, many cardiac rehabilitation centres, especially those that served rural and socially vulnerable populations, closed permanently due to interruptions in payments for preventive services (45). Smoking cessation is an important goal in secondary prevention and a core component of cardiac rehabilitation; thus, cessation efforts were further stymied by these closures. The interruption of smoking cessation programmes, coupled with the stressful social and economic conditions of the pandemic, have been a barrier to advancing tobacco cessation efforts. ■





**DURING THE FIRST WAVES, MOST HOSPITALS WERE OVERWHELMED BY ACUTE COVID-19 ADMISSIONS, AND PRIMARY CARE NEARLY COLLAPSED IN SOME COUNTRIES.**

**ACCORDING TO A WHO SURVEY, DISRUPTIONS OF ESSENTIAL HEALTH SERVICES WERE REPORTED BY 90% OF COUNTRIES.**

# INTERRUPTION OF SMOKING CESSATION SERVICES



**FOR THE FIRST TIME  
IN A DECADE THE ANNUAL**

**PAST-YEAR  
QUIT ATTEMPT**

**PREVALENCE DECREASED  
IN THE US, FROM**

**65.2%**

**IN 2019, TO**

**63.2%**

**IN 2020**

12

The COVID-19 pandemic emphasized the importance of preserving respiratory as well as cardiovascular health, providing a unique window of opportunity to further promote tobacco cessation and control. Unfortunately, excessive pressure on health care systems resulted in drastic interruptions to smoking cessation services.

A cross-sectional US study analysing the cessation behaviour of adults aged 18 years and above reported that, for the first time in a decade, the annual past-year quit attempt prevalence decreased (i.e., from 65.2 % in 2019 to 63.2% in 2020), with the largest relative decreases being among individuals aged 45 to 64 years, individuals with two or more comorbidities, Black individuals, individuals with lower educational attainment, and women. Concurrently, retail sales of nicotine replacement therapies across 31 US states decreased by an average of 1% to 13% compared to expected sales. Possible explanations for this decrease include health care disruptions and pandemic-induced stress.<sup>(46)</sup>

In response to the challenges imposed by the pandemic, many health care systems have established or strengthened digital health solutions to facilitate access to health professionals and counterbalance limited

access to health care facilities. In particular, telemedicine has been especially well-integrated into our post-COVID practices. Telehealth can play a crucial role in providing advice and monitoring smoking cessation attempts. It can also facilitate access to smoking cessation interventions for socially disadvantaged populations or individuals living in remote areas. The promotion of tobacco cessation through apps and digital public health campaigns can play a key role in reducing the burden of tobacco in the post-COVID-19 era. According to recent studies, many smokers expressed interest in accessing various forms of cessation assistance during the pandemic.<sup>(47)</sup>

Indeed, the COVID-19 pandemic presumably also provided smokers with additional incentives and motivation to quit tobacco. In fact, a recent study reported a positive effect of the pandemic on smoking cessation rates in patients attending a specialized clinic in Turkey, with successful cessation rates raising from 23% to 31% during the pandemic.<sup>(48)</sup>

Health authorities and regulators worldwide need to provide a synergistic response to the intertwined public health issues of COVID-19 and the tobacco epidemic. Effective smoking cessation programmes, telemedicine tools, and smoking cessation campaigns will play a key role in the post-COVID era. ■



**IN RESPONSE TO THE CHALLENGES IMPOSED BY THE PANDEMIC,  
MANY HEALTH CARE SYSTEMS HAVE ESTABLISHED OR  
STRENGTHENED DIGITAL HEALTH SOLUTIONS TO FACILITATE  
ACCESS TO HEALTH PROFESSIONALS AND COUNTERBALANCE  
LIMITED ACCESS TO HEALTH CARE FACILITIES.**

# SMOKING AND COVID-19 ASSOCIATED MORTALITY

COVID-19 is one of the most devastating pandemics in human history, disproportionately affecting those with co-morbid diseases.<sup>(5,49)</sup>

Data suggest that smokers infected with COVID-19 are at greater risks of longer hospital stays, ICU admission, and need for mechanical ventilation.<sup>(5,49-51)</sup> In fact, several studies have corroborated that patients with COVID-19 who are former or current smokers face significantly higher mortality rates in comparison to never smokers.<sup>(5,49-56)</sup> In addition, smoking was also identified as a risk factor for increased mortality among COVID-19 patients with underlying chronic health condition such as obesity, cancer, chronic obstructive pulmonary disease, and cardiovascular disease.<sup>(5,49,57-59)</sup>

Some studies also illustrated that COVID-19-associated mortality among smokers may vary based on sex, with female smokers exhibiting higher mortality rates than male smokers.<sup>(56)</sup>

Although some reports suggested that smoking was not significantly associated with mortality among patients with COVID-19<sup>(60)</sup>, various meta-analysis collectively demonstrated that mortality rates are statistically higher among current and/or former smokers affected by COVID-19.<sup>(5,57)</sup> It should be evident that smoking remains a risk factor for increased disease severity, morbidity, and mortality. As such, comprehensive preventive and treatment services should be fully utilized to lessen the burden of tobacco and COVID-19, especially among vulnerable patients.<sup>(5,57)</sup> ■

**In fact, several studies have corroborated that patients with COVID-19 who are former or current smokers face significantly higher mortality rates in comparison to never smokers.<sup>(5,49-56)</sup>**



# SMOKING AS A PROGNOSTIC FACTOR OF COVID-19

## BIOLOGICAL EVIDENCE AND PLAUSIBILITY

Biologically plausible pathways suggest that tobacco use could potentially increase susceptibility to, and severity of, COVID-19. Longstanding evidence indicates that smokers, especially current ones, are more susceptible to viral and bacterial respiratory infections, both in mild and more severe forms.<sup>(61)</sup> Cigarette smoking aggravates respiratory infections, leading to an increased risk of susceptibility to, and severity of, pathogens such as influenza and tuberculosis.<sup>(62,63)</sup> The mechanisms connecting cigarette smoking and respiratory illnesses include both immune suppression and physiological changes, such as abnormal cilia function.<sup>(64)</sup>

14

In addition, many of the harmful chemicals present in tobacco products, along with those generated during aerosolization through heating or combustion, have deleterious effects on the respiratory system, thereby potentially increasing both susceptibility to and severity of SARS-CoV-2.<sup>(65)</sup> Conversely, evidence suggests that the immune system starts to recover and reduces vulnerability to infections within just 1 month of quitting tobacco.<sup>(66,67)</sup>

## EPIDEMIOLOGIC EVIDENCE FROM PRIOR CORONAVIRUS OUTBREAKS

Epidemiological studies of prior coronavirus outbreaks, specifically SARS-1 and MERS, found no evidence to support the hypothesis that smoking offers protection against coronaviruses. In fact, the prevailing body of research suggests that smoking contributes to both a greater risk of illness onset and increased severity. Despite rumours that emerged in 2003 suggesting that smokers were less likely to contract SARS-CoV-1, subsequent studies demonstrated no difference between smokers and nonsmokers in their risks of developing the illness.<sup>(68)</sup> In addition, studies of another coronavirus strain, the Middle East Respiratory Syndrome

(MERS-CoV), revealed that smoking significantly increased the probability of contracting the illness.<sup>(69)</sup> Additionally, it was found that the case fatality rate among smokers was twice that of non-smokers.<sup>(70)</sup>

## LIMITATIONS OF CLINICAL RECORDS AND CASE SERIES DESIGNS

Research exploring the relationships between tobacco use and SARS-CoV-2 have primarily relied on clinical data from hospitals and other healthcare settings. Even before the COVID-19 pandemic, multiple studies highlighted significant concerns and gaps regarding accurate documentation of tobacco use in clinical records. For instance, a Finnish study found that only 60 percent of patients admitted to hospital between 2010 and 2016 had tobacco use documented in their clinical records. Furthermore, the likelihood of tobacco use being documented varied based on the patients' illness and disease diagnoses.<sup>(3)</sup>

The COVID-19 pandemic, which overwhelmed many health systems, likely made the collection of accurate clinical data on tobacco use even more challenging for clinicians and other health personnel. For example, a review found that 80 percent (186 out of 233) of studies published between February and August 2020 had "poor" documentation, with more than 20 percent of clinical records lacking information on tobacco use status.<sup>(71)</sup>

These incomplete or inaccurate clinical records pose substantial methodological issues for studying the relationships between tobacco use and COVID-19.

Another methodological concern is the predominant use of, and reliance on, "case series" medical research designs in the majority of published studies on smoking and COVID-19. These studies draw from a pool of subjects engaged in clinical care, without the potential for control or comparison groups. While much of the research regarding smoking and COVID-19 relies on individuals

who are actively engaged in clinical settings, researchers have pointed out that smokers participating in these clinical studies may not be representative of the general population.

For instance, Simons and colleagues suggest that uninfected smokers may be over-represented in SARS-CoV-2 testing data because they are more likely to present with COVID symptoms (e.g., coughing, altered sense of smell or taste, etc.) that meet community criteria for testing.<sup>(71)</sup>

The potential under-reporting of current smoking is evident across many studies using clinical data. For example, out of 74,439 case report forms of patients with COVID-19 submitted to the US Centers for Disease Control and Prevention during the early phase of the pandemic, only 1.3 percent of patients were classified as current smokers, far lower than what would be expected from the general population.<sup>(72)</sup> Studies like this do not provide a clear understanding of the association between smoking and COVID-19. Without study designs that better ensure accurate documentation of tobacco use in clinical records and better represent the general population, it will be challenging to determine the extent to which smoking is a prognostic factor for SARS-CoV-2.

## IS SMOKING PROTECTIVE AGAINST SARS-COV-2 INFECTION?

Despite substantial methodological issues, as outlined above, several studies published in the early stages of the pandemic suggested that smoking decreased the risk of infection from SARS-CoV-2.<sup>(73)</sup> Pro-tobacco constituents amplified these findings, with the media seemingly eager to highlight these potentially counter-intuitive preliminary findings.<sup>(74)</sup>

A rigorous review of the studies that were published from the start of the pandemic through August 2021 found inconsistent and contradictory results with regard to the



relationship between smoking and SARS-CoV-2 infection.<sup>(65)</sup> The review identified 26 studies suggesting that cigarette smoking was associated with reduced SARS-CoV-2 infection rates. However, it also identified 20 studies associating smoking with increased SARS-CoV-2 infection rates, as well as seven studies that found no association between smoking and SARS-CoV-2 infection. Despite presenting inconsistent results pertaining to infection, the review provided clear evidence that smokers were more likely to experience more severe disease outcomes.

While additional research is required to fully understand the exact relationship between smoking and infection from SARS-CoV-2, it has been well-documented that smoking is a major risk factor for the incidence of respiratory infection, including other coronaviruses such as MERS, as well as for the severity of disease progression.<sup>(75,76)</sup>

### TOBACCO AND LONG COVID

Most patients afflicted by COVID-19 will experience symptoms relief within 2–6 weeks. However, in some cases, after recovery from initial infection, various symptoms may persist for 2–3 months, or even longer, as sequelae. These lingering symptoms, often referred to as long COVID, can occur irrespective of age and severity of COVID-19.

Symptoms of long COVID can be diverse, including fatigue, arthralgia, muscle pain, cough, phlegm, shortness of breath, chest pain, hair loss, memory impairment, poor concentration, insomnia, headache,

depression, olfactory disturbance, dysgeusia (i.e., taste disorder), palpitations, diarrhoea, abdominal pain, sleep disturbance, and muscle weakness. Although precise data are not yet available, as diagnostic criteria and methods of investigation vary from country to country, it is estimated that 10–20% of patients experience long COVID.<sup>(77)</sup> Approximately two-thirds of these sequelae will disappear within three months, but in some cases, recovery may extend to years. Concerningly, long COVID has been associated with significant psychiatric issues, including suicidal ideation and behaviour.<sup>(78)</sup>

Various theories have been posited regarding the pathogenic mechanisms of long COVID, including direct damage to virus-infected tissues (especially the lungs), progressive and continued inflammation due to immune dysregulation, vascular damage and tissue ischaemia caused by increased blood coagulation and subsequent thrombus formation, dysregulation of the renin-angiotensin system caused by viral infection, and post-intensive care syndrome in critically ill patients.<sup>(79)</sup>

Notably, smoking and e-cigarettes, apart from being independent risk factors for more severe clinical manifestations and worsening of COVID-19, also contribute to the development of long COVID. These correlations have been reported in several large cohort studies.<sup>(80–82)</sup> The risk of sequelae in smokers is reported to be 8.39 times higher than in individuals who never smoked.<sup>(83)</sup> Furthermore, smoking has also been identified as an independent risk factor

for delayed recovery from long COVID.<sup>(84)</sup> Therefore, implementing tobacco control measures is critical in preventing and managing long COVID effectively. ■

**“SMOKING AND E-CIGARETTES, APART FROM BEING INDEPENDENT RISK FACTORS FOR MORE SEVERE CLINICAL MANIFESTATIONS AND WORSENING OF COVID-19, ALSO CONTRIBUTE TO THE DEVELOPMENT OF LONG COVID.”**

# TOBACCO USE AND RISK OF SEVERE COVID-19

**Risk factors for severe COVID-19 outcomes include smoking, advanced age, and pre-existing conditions, such as cardiovascular disease, diabetes, malignant neoplasms, and chronic respiratory disease.**

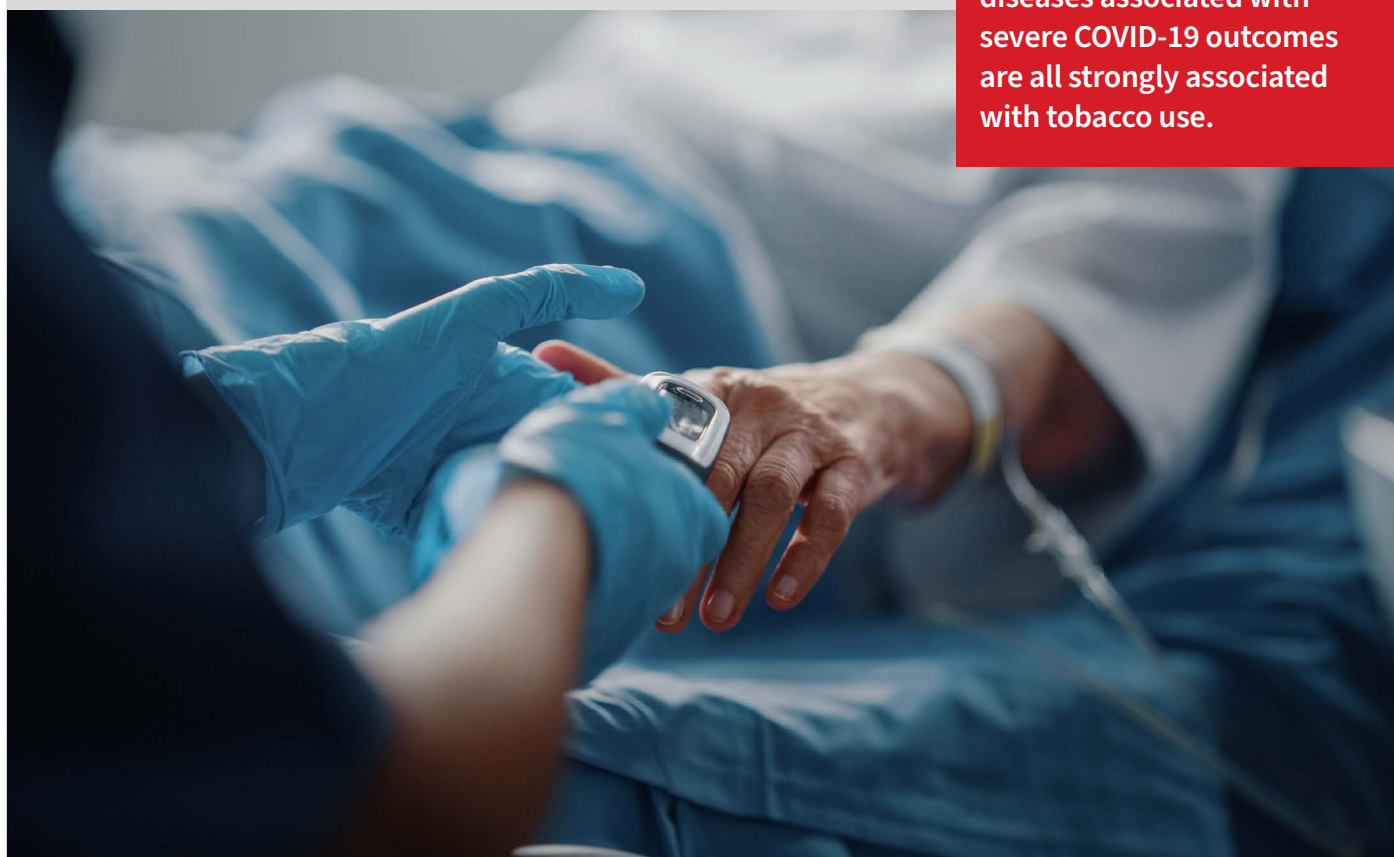
A multivariate study from China identified four key factors contributing to COVID-19 severity: a history of smoking, temperature upon admission, respiratory failure, and age 60 years or older.<sup>(85)</sup>

Of these, the odds ratio associated with smoking history was the largest at 14 (confidence interval [1.6-45];  $p=0.018$ ), surpassing the odds ratios for the other aggravating factors (8.5-9.0). Reports on 1,099 infected individuals in China indicate that 12.4% of current smokers and 23.8% of former smokers experienced severe outcomes, including admission to intensive care units,

ventilator use, or death. In contrast, only 4.7% of nonsmokers experienced similar outcomes<sup>(75)</sup>. Furthermore, the proportion of patients with severe outcomes was 21.2% for current smokers and 42.9% for past smokers, both higher than the 14.5% for nonsmokers.<sup>(75)</sup> The increased severity of COVID-19 symptoms in former smokers could be explained by the fact that they may have been, on average, older than current smokers. Another possibility would be that past smokers may have more comorbidities and, consequently, an increased risk of serious illness compared to current smokers (e.g., quitting tobacco after contracting a disease, etc).

As noted above, smoking is an important determinant of COVID-19 severity. It is important to highlight that most underlying diseases associated with severe COVID-19 outcomes, such as cardiovascular disease, chronic obstructive pulmonary disease, and diabetes mellitus, are all strongly associated with tobacco use. ■

**Smoking is an important determinant of COVID-19 severity. Most underlying diseases associated with severe COVID-19 outcomes are all strongly associated with tobacco use.**



# TOBACCO CONTROL DURING THE COVID-19 CRISIS

The COVID-19 pandemic has uncovered a need for greater global emphasis on public health infrastructures, including a stronger focus on tobacco control measures.

Countries with more fragile health systems encountered significant challenges in managing the various COVID-19 outbreaks within their jurisdictions. In many instances, the redeployment of limited public health resources for COVID-19 management led to the disruption or suspension of other essential health services, such as tobacco prevention and cessation interventions.

The COVID-19 crisis led some countries to enforce tobacco bans as a mean to curb the spread of the virus and ease the strain on healthcare systems.<sup>(86,87)</sup> Botswana, India, and South Africa instituted complete, albeit temporary, tobacco sales bans as part of their lockdown measures.<sup>(86,88,89)</sup> Other countries, such as Italy, Pakistan, Saudi Arabia, Spain, and the United Arab Emirates, imposed partial bans on tobacco products to address the escalating healthcare burden.<sup>(86)</sup> These bans were mostly enacted temporarily under essential goods restrictions.<sup>(88,90,91)</sup> However, some countries, including Kenya, classified tobacco products as essential goods.<sup>(92)</sup>

## TOBACCO CONTROL OPPORTUNITIES AND MISSED OPPORTUNITIES

The pandemic has created a unique set of challenges and opportunities for tobacco control efforts. It has spotlighted the importance of preserving respiratory and cardiovascular health, highlighting the urgency of promoting smoking cessation and minimizing tobacco use.

As restrictions eased, some countries implemented measures to protect their populations against exposure to second-hand smoke. For instance, in some cases, policies

were implemented to prohibit smoking in outdoor areas of bars and restaurants, with customers required to smoke at a designated distance. Unfortunately, these protective measures were often withdrawn as the de-escalation of restrictions progressed.

The pandemic has also disrupted ongoing smoking cessation programs, leading to missed opportunities to further alleviate both the burden of COVID-19 and tobacco-related diseases. With healthcare systems overwhelmed by the influx of COVID-19 cases, many healthcare professionals were diverted from their usual responsibilities to manage the pandemic, leaving other health services, such as smoking cessation interventions, neglected.<sup>(38)</sup> However, these obstacles also spurred the development of innovative strategies, including digital solutions such as telemedicine, public health campaigns, and smoking cessation apps, to provide support for individuals trying to quit smoking.<sup>(46)</sup>

Telemedicine and smoking cessation apps can play key roles in providing critical advice and support to individuals trying to quit, especially for those in remote areas or vulnerable populations.

## TOBACCO CONTROL AND LESSONS LEARNT FROM THE COVID-19 PANDEMIC

The correlation between tobacco use and increased severity of, and mortality from, COVID-19 among hospitalized patients highlights an urgent need for countries to accelerate the implementation of the WHO Framework Convention on Tobacco Control (FCTC)<sup>(93)</sup>. In fact, the implementation of the WHO FCTC would reduce fatalities from

tobacco, COVID-19, and potential future pandemics as many articles within the treaty are highly relevant in the context of the COVID-19 pandemic. For instance, Article 5.3 addresses interference from the tobacco industry, Article 8 protects nonsmokers from second-hand exposure, Article 6 outlines taxation measures which could serve to raise income for national pandemic responses, and Article 14 promotes tobacco cessation.<sup>(93-95)</sup>

Many countries have demonstrated both the capacity and political will to enact key tobacco control measure throughout the pandemic. For instance, Spain temporarily expanded its smoke-free policies to include outdoor areas<sup>(93)</sup>. This political resolve was formalized with the quasi-unanimous adoption of a *Declaration on WHO FCTC and Recovery* from the COVID-19 Pandemic at the Ninth Session of the Conference of the Parties to the WHO FCTC in 2021.<sup>(4)</sup> Nevertheless, it is essential that countries maintain and extend these measures beyond the COVID-19 crisis.<sup>(96)</sup>

Furthermore, the pandemic has also exacerbated the health equity and equality issues associated with tobacco use.<sup>(94,97)</sup> Studies indicate that the social determinants of health, particularly education, significantly impact both tobacco consumption as well as cardiovascular disease morbidity and mortality. In fact, disadvantaged groups, such as populations with lower socio-economic status and health literacy, are more susceptible to developing cardiovascular disease<sup>(98,99)</sup> and more prone to using tobacco products<sup>(100,101)</sup>. In the context of the COVID-19 pandemic, families under financial strain and household with lower levels of education experienced worse living conditions (e.g., poor housing, increased exposure to tobacco smoke, etc.) and displayed detrimental health-related





behaviour (e.g., physical inactivity, unhealthy diets, etc.) during lockdowns.<sup>(97)</sup> Therefore, pandemic preparedness and response plans must consider health equity and the social determinants of health.

## 18 CASE STUDY OF INDIA

In India, tobacco-related deaths account for 9.5 percent of all deaths at the country level, with 48 percent of these deaths caused by cardiovascular disease, most commonly due to ischemic heart disease.<sup>(102)</sup> Furthermore, tobacco use is responsible for the development of cardiovascular disease among younger people, accounting for 26 percent of CVD cases in the age group of 30-44 years.<sup>(102)</sup> Studies indicate that smokeless tobacco (ST) use is also a risk factor for cardiovascular disease.<sup>(103)</sup> According to the INTERHEART study estimates, over 6 million disability-adjusted life years (DALYs) and 258,006 lives lost due to ischemic heart disease can be attributed to ST use in 2017.<sup>(103)</sup>

### Prohibition on Spitting

During the COVID-19 pandemic, countries tailored their national responses and tobacco control policies according to their specific contexts. India has a unique tobacco use situation as the primary form of consumption is smokeless, with 21% of adults being ST users and 11% using combusted forms of tobacco.<sup>(104)</sup> ST use is often associated with spitting behaviour, which raised alarm due to the higher risk of transmission linked to spitting.<sup>(105)</sup> As a response, the use of ST in public was prohibited under the National Directive for COVID-19 Management, with fines implemented to discourage spitting, thereby reducing the risk of COVID-19 transmission.

### Quitting Tobacco During COVID-19

A study conducted in two metropolitan cities (i.e., Delhi and Chennai) in India assessed the tobacco cessation behaviour among 801 adult tobacco users, with a history of any form of tobacco use, following a prohibition on the sales and use of tobacco products during the first lockdown in March 2020. The study revealed that 11% of tobacco users managed to quit during the lockdown, with a median of two quit attempts per users. Individuals with higher levels of knowledge about the harmful effects of tobacco use and COVID-19 were significantly more likely to quit tobacco use (OR 2.2) and reported more quit attempts compared to those with poor knowledge on the issue. It was also reported that users who had access to tobacco products were less likely to quit use compared to those who had no access. The study concluded that the access restriction measures introduced by the Government of India, coupled with accurate knowledge about the harmful effects of tobacco use and COVID-19, created a conducive environment to quit tobacco.<sup>(106)</sup>

### Reduced Frequency of Use

During the pandemic, the government implemented a ban on the sales of cigarettes and other tobacco products, while conducting a campaign to raise awareness of the potential connections between tobacco use and severe COVID-19 outcomes. Findings from this study conducted in Delhi and Chennai revealed significant changes in the frequency of smoking (i.e., bidis and cigarettes) and smokeless tobacco use. The data showed a significant decrease in all forms of tobacco use during the lockdown compared to the pre-lockdown period. This reduction may be primarily attributed to reduced access to tobacco products and increased awareness.<sup>(107)</sup> ■

**IN INDIA, TOBACCO RELATED DEATHS ACCOUNT FOR**

**9.5%**

**OF ALL DEATHS IN THE COUNTRY LEVEL, WITH**

**48%**

**OF THESE DEATHS CAUSED BY CARDIOVASCULAR DISEASE, MOST COMMONLY DUE TO ISCHEMIC HEART DISEASE<sup>(102)</sup>**

# TOBACCO INDUSTRY INTERFERENCE

**The tobacco industry continues to be the primary obstacle to the progression of tobacco control globally.<sup>(108)</sup>**

Unfortunately, the advent of the COVID-19 pandemic has done nothing to curtail its tireless efforts to obstruct life-saving policies. Conversely, the industry initiated several misinformation campaigns, throughout the pandemic, to influence public perceptions about the link between tobacco use and COVID-19.<sup>(86)</sup>

In June 2020, the World Health Organization issued a statement linking tobacco smoking with more severe COVID-19 outcomes, urging smokers to quit to mitigate their risk of severe complications.<sup>(86)</sup> The tobacco industry immediately reacted by launching multiple misinformation campaigns, mainly via social media, to sway public opinion on the issue.<sup>(86)</sup> One such campaign propagated the false idea that nicotine had protective effects

against COVID-19.<sup>(86)</sup> As previously noted, the confusion surrounding the association between tobacco use, nicotine, and COVID-19 highlights the need for more robust collection of data on tobacco use in medical records.

As part of its public relations strategy, the tobacco industry donated supplies, ranging from ventilators to personal protective equipment, to various countries worldwide.<sup>(109)</sup> Nevertheless, these so-called corporate social responsibility activities were conducted to improve the image of the tobacco industry and further its commercial interests. In some cases, interference from the tobacco industry influenced governmental decisions. For example, vape shops were deemed essential in Italy after the tobacco industry's lobbying to the government.<sup>(86)</sup>

In Argentina, Brazil, and Russia, the tobacco industry undermined COVID-19 restrictions through media appeals and campaigns to garner public support.<sup>(86)</sup> Such interference by the tobacco industry in public health matters is alarming and highlights the need for government and regulatory bodies to remain vigilant in countering the spread of misinformation. In particular, the WHO Framework Convention on Tobacco Control recognizes a “*fundamental and irreconcilable conflict between the tobacco industry's interests and public health policy interests*”.<sup>(110)</sup>

Notably, Article 5.3 of the FCTC dictates that Parties are required to safeguard tobacco control policies from commercial and other vested interests, particularly those of the tobacco industry.<sup>(95)</sup> Parties to the WHO FCTC have a legal obligation to uphold their commitments to the international treaty.<sup>(111)</sup> ■



# CONCLUSION

The COVID-19 pandemic has had profound direct, indirect, and long-term impacts on individual and public health, as well as health systems.

A myriad of studies have demonstrated that tobacco use, a major risk factor for cardiovascular disease, increases the severity and mortality rates associated with COVID-19, as well as the probability of developing long COVID. Evidence also indicates that people living with cardiovascular disease experience worse outcomes from COVID-19, largely due to its intrinsic thrombotic complications. As such, the triad of tobacco, COVID-19, and cardiovascular disease constitutes a dangerous mix. It will also be essential to closely monitor any shifts in these interplays, as SARS-CoV-2 continues to mutate.

Lockdowns and social distancing measures have affected multiple aspects of our lifestyles and mental health, all of which have implications for cardiovascular health. In addition, the disruption of health services, stemming from fears of virus transmission and redirection of essential resources, became a hallmark of the impact of the pandemic on health systems. In particular, services related to cardiovascular disease and tobacco cessation faced significant interruptions.

Advancing tobacco control was especially challenging in the context of the pandemic. Although some countries have commendably enacted a number of COVID-specific tobacco control measures, additional actions could have further

alleviated tobacco and COVID-19-related morbidity and mortality.

The WHO Framework Convention on Tobacco Control provides a range of solutions to many of the challenges encountered during the pandemic, especially in the areas of tobacco cessation and tobacco industry interference. Lessons from the COVID-19 crisis can help the world better prepare for future pandemics. Considering the impact of tobacco on the COVID-19 pandemic, it is crucial for tobacco control to remain a central element of pandemic preparedness and response.

20



# POLICY RECOMMENDATIONS

The COVID-19 pandemic has been an extraordinary event, impacting people’s lives globally.

Although effective vaccines and treatments have eased the burden of the pandemic, tobacco use will continue to cause significant illness and deaths. It is crucial to remain vigilant and use lessons learned from the pandemic to continue to support tobacco control policies <sup>(112)</sup>.

The World Heart Federation recommends adopting the following measures to strengthen tobacco control in the post-COVID-19 era and in anticipation of potential future pandemics, ensuring a robust tobacco control response during health emergencies.



## A. FOR HEALTHCARE PROFESSIONALS AND INSTITUTIONS

### MEASURES

### OBJECTIVES



Document systematically the use of tobacco and nicotine products in medical records

- To generate robust data for measuring the association and impact of tobacco on specific diseases.



Study the interplays between tobacco use, cardiovascular disease, and emerging SARS-CoV-2 variants

- To inform the public, health authorities, and governments of potential additional risks.
- To implement timely and responsive tobacco control policies that further protect the public, including smokers, from emerging variants of interest or concern.



Ensure availability, accessibility, and affordability of tobacco cessation services, including during health emergencies

- To reduce the impact of tobacco on noncommunicable diseases (e.g., cardiovascular disease), communicable diseases (e.g., COVID-19), and potential future pandemics.
- To support individuals seeking to quit tobacco, including during health emergencies.



Leverage digital health solutions to enhance tobacco cessation services

- To improve and ensure availability, accessibility, and affordability of tobacco cessation services at all times.

## B. FOR GOVERNMENTS AND CIVIL SOCIETY

### MEASURES

### OBJECTIVES



Accelerate the implementation and expansion of tobacco control policies

- To capitalize on the momentum and political will to enact tobacco control regulations.
- To minimize the impact of tobacco on future pandemics.



Maintain tobacco control policies instituted during health emergencies

- To sustain progress made to protect public health, even beyond health emergencies.



Prioritize health equity in national pandemic responses

- To promote health equity for marginalized and/or vulnerable populations during health emergencies.
- To promote healthy lifestyles in stressful situations, such as pandemics.
- To address the social determinants of health in national emergency preparedness and response plans.

22



Implement Article 5.3 of the WHO FCTC\*  
*General Obligations: Conflicts of Interests, recognizing that there is an irreconcilable conflict between the tobacco industry's interest and public health policy interest.*

- To prevent tobacco industry interference in national pandemic responses, including through so-called corporate social responsibility activities.
- To protect tobacco control laws, including pandemic-specific policies, from vested and commercial interest of the tobacco industry.



Monitor and oversee the activities of the tobacco industry during health emergencies

- To prevent the dissemination of unsubstantiated information that may lead to avoidable health complications and deaths.
- To prevent the tobacco industry from undermining tobacco control during national pandemic responses.



Implement Article 6 of the WHO FCTC\*  
*Price and Tax Measures to Reduce the Demand for Tobacco.*

- To reduce affordability and thereby discourage the consumption of tobacco and nicotine products in the population.
- To generate revenue for government to allocate towards pandemic recovery initiatives.

MORE

## MEASURES



**Implement Article 8 of the WHO FCTC\***  
*Protection from Exposure to Tobacco Smoke*

## OBJECTIVES

- To protect the population from second-hand smoke.
- To prevent the potential transmission of airborne infectious agents.



**Implement Article 12 of the WHO FCTC\***  
*Education, Communication, Training, and Public Awareness*

- To raise awareness on the interplays between tobacco, cardiovascular disease, and COVID-19 or other infectious pathogens.
- To educate and protect the general population from misinformation.



**Implement Article 14 of the WHO FCTC\***  
*Demand Reduction Measures Concerning Tobacco Dependence and Cessation*

- To reduce the impact of tobacco on noncommunicable diseases (e.g., cardiovascular disease), communicable diseases (e.g., COVID-19), and potential future pandemics.
- To support individuals seeking to quit tobacco, including during health emergencies.

\*Countries that are not signatories to the WHO Framework Convention on Tobacco Control are also able to enact the above measures.

# REFERENCES

1. Institute for Health Metrics and Evaluation. Global Burden of Disease. 2019 [cited 2023 Sep 1]. GBD Compare. Available from: <https://vizhub.healthdata.org/gbd-compare/>
2. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General [Internet]. Atlanta (GA): Centers for Disease Control and Prevention (US); 2014 [cited 2023 Sep 23]. (Reports of the Surgeon General). Available from: <http://www.ncbi.nlm.nih.gov/books/NBK179276/>
3. Hirvonen E, Karlsson A, Saaresranta T, Laitinen T. Documentation of the patient's smoking status in common chronic diseases – analysis of medical narrative reports using the ULMFIT based text classification. *Eur Clin Respir J*. 2021 Jan 1;8(1):2004664.
4. WHO Framework Convention on Tobacco Control, Conference of the Parties, Ninth Session. Decision: Declaration on WHO FCTC and Recovery from the COVID-19 Pandemic [Internet]. World Health Organization; 2021 [cited 2023 Sep 1]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/368415/fctc-cop-9-10-en.pdf?sequence=1&isAllowed=y>
5. Reddy RK, Charles WN, Sklavounos A, Dutt A, Seed PT, Khajuria A. The effect of smoking on COVID-19 severity: A systematic review and meta-analysis. *J Med Virol*. 2021 Feb;93(2):1045–56.
6. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, et al. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. *Int J Infect Dis*. 2020 May;94:91–5.
7. Guo T, Fan Y, Chen M, Wu X, Zhang L, He T, et al. Cardiovascular Implications of Fatal Outcomes of Patients With Coronavirus Disease 2019 (COVID-19). *JAMA Cardiol*. 2020 Jul 1;5(7):811.
8. Mohamed MO, Banerjee A. Long COVID and cardiovascular disease: a learning health system approach. *Nat Rev Cardiol*. 2022 May;19(5):287–8.
9. Jain U. Effect of COVID-19 on the Organs. *Cureus*. 2020 Aug 3;12(8):e9540.
10. Lukassen S, Chua RL, Trefzer T, Kahn NC, Schneider MA, Muley T, et al. SARS-CoV-2 receptor ACE 2 and TMPRSS 2 are primarily expressed in bronchial transient secretory cells. *EMBO J*. 2020 May 18;39(10):e105114.
11. Komiyama M, Hasegawa K. Anticoagulant Therapy for Patients with Coronavirus Disease 2019: Urgent Need for Enhanced Awareness. *Eur Cardiol Rev*. 2020 Aug 7;15:e58.
12. World Health Organization. World Health Organization. 2020 [cited 2023 Sep 1]. Smoking and COVID-19: Scientific Brief. Available from: <https://www.who.int/news-room/commentaries/detail/smoking-and-covid-19>
13. European Centre for Disease Prevention and Control. Coronavirus Disease 2019 (COVID-19) Pandemic: Increased Transmission in the EU/EEA and the UK – Seventh Update [Internet]. ECDC; 2020 [cited 2023 Sep 1]. Available from: <https://www.ecdc.europa.eu/sites/default/files/documents/RRR-seventh-update-Outbreak-of-coronavirus-disease-COVID-19.pdf>
14. Babapoor-Farrokhran S, Gill D, Walker J, Rasekhi RT, Bozorgnia B, Amanullah A. Myocardial injury and COVID-19: Possible mechanisms. *Life Sci*. 2020 Jul 15;253:117723.
15. Malakan Rad E, Momtazmanesh S. COVID-19-induced silent myocarditis and newly developed hypertension in a 3-year-old boy. *Egypt Heart J EHJ Off Bull Egypt Soc Cardiol*. 2022 May 31;74(1):44.
16. Bezati S, Velliou M, Ventoulis I, Simitsis P, Parissis J, Polyzogopoulou E. Infection as an under-recognized precipitant of acute heart failure: prognostic and therapeutic implications. *Heart Fail Rev*. 2023 Jul;28(4):893–904.
17. Komiyama M, Hasegawa K, Matsumori A. Dilated Cardiomyopathy Risk in Patients with Coronavirus Disease 2019: How to Identify and Characterise it Early? *Eur Cardiol Rev*. 2020 May 27;15:e49.
18. Cohen BE, Edmondson D, Kronish IM. State of the Art Review: Depression, Stress, Anxiety, and Cardiovascular Disease. *Am J Hypertens*. 2015 Nov;28(11):1295–302.
19. Perel P, Avezum A, Huffman M, Pais P, Rodgers A, Vedanthan R, et al. Reducing Premature Cardiovascular Morbidity and Mortality in People With Atherosclerotic Vascular Disease: The World Heart Federation Roadmap for Secondary Prevention of Cardiovascular Disease. *Glob Heart*. 2015 Jun 1;10(2):99.
20. Arora M, ElSayed A, Beger B, Naidoo P, Shilton T, Jain N, et al. The Impact of Alcohol Consumption on Cardiovascular Health: Myths and Measures. *Glob Heart*. 2022 Jul 22;17(1):45.
21. Santomauro DF, Mantilla Herrera AM, Shadid J, Zheng P, Ashbaugh C, Pigott DM, et al. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *The Lancet*. 2021 Nov;398(10312):1700–12.
22. United Nations. Policy Brief: COVID-19 and the Need for Action on Mental Health [Internet]. United Nations; 2020 [cited 2023 Sep 1]. Available from: <https://unsdg.un.org/sites/default/files/2020-05/UN-Policy-Brief-COVID-19-and-mental-health.pdf>
23. United Nations. UN News. 2020 [cited 2023 Sep 1]. UN Leads Call to Protect Most Vulnerable From Mental Health Crisis During and After COVID-19. Available from: <https://news.un.org/en/story/2020/05/1063882>
24. Czeisler MÉ, Lane RI, Petrosky E, Wiley JF, Christensen A, Njai R, et al. Mental Health, Substance Use, and Suicidal Ideation During the COVID-19 Pandemic – United States, June 24–30, 2020. *MMWR Morb Mortal Wkly Rep*. 2020 Aug 14;69(32):1049–57.
25. NHK. NHK. 2020 [cited 2023 Sep 1]. Suicide Rates Have Reported a Staggering 40% Increase From the Previous Year, Among Women in Particular. Available from: <https://www3.nhk.or.jp/news/html/20201110/k10012704501000.html>
26. Starcke K, Brand M. Decision making under stress: A selective review. *Neurosci Biobehav Rev*. 2012 Apr;36(4):1228–48.
27. Sinha R. Chronic stress, drug use, and vulnerability to addiction. *Ann N Y Acad Sci*. 2008 Oct;1141:105–30.
28. Komiyama M, Hasegawa K. Coronavirus Disease 2019: Psychological Stress and Cardiovascular Diseases. *Eur Cardiol*. 2021 Feb;16:e33.
29. Patwardhan P. COVID-19: Risk of increase in smoking rates among England's 6 million smokers and relapse among England's 11 million ex-smokers. *BJGP Open*. 2020 Jun;4(2):bjgpopen20X101067.

30. Bommelé J, Hopman P, Hipple Walters B, Geboers C, Croes E, Fong G, et al. The double-edged relationship between COVID-19 stress and smoking: Implications for smoking cessation. *Tob Induc Dis* [Internet]. 2020 Jul 27 [cited 2023 Sep 2];18(July). Available from: <http://www.journalssystem.com/tid/The-double-edged-relationship-between-COVID-19-stress-and-smoking-r-nImplications,125580,0,2.html>
31. Chen D. The psychosocial impact of the COVID-19 pandemic on changes in smoking behavior: Evidence from a nationwide survey in the UK. *Tob Prev Cessat*. 2020 Oct 23;6(October):1–5.
32. Wiley RC, Oliver AC, Snow MB, Bunn JY, Barrows AJ, Tidey JW, et al. The Impact of the Covid-19 Pandemic on Smoking Among Vulnerable Populations. *Nicotine Tob Res*. 2023 Jan 5;25(2):282–90.
33. National Research and Development Agency, National Cancer Center. Survey Report on the New Coronavirus and Tobacco [Internet]. National Cancer Center; 2021 [cited 2023 Sep 1]. Available from: [https://www.ncc.go.jp/jp/information/pr\\_release/2021/0531/20210531\\_report.pdf](https://www.ncc.go.jp/jp/information/pr_release/2021/0531/20210531_report.pdf)
34. Rigotti NA, Chang Y, Regan S, Lee S, Kelley JHK, Davis E, et al. Cigarette Smoking and Risk Perceptions During the COVID-19 Pandemic Reported by Recently Hospitalized Participants in a Smoking Cessation Trial. *J Gen Intern Med*. 2021 Dec;36(12):3786–93.
35. Nyman AL, Spears CA, Churchill V, Do VV, Henderson KC, Massey ZB, et al. Associations between COVID-19 risk perceptions and smoking and quitting behavior among U.S. adults. *Addict Behav Rep*. 2021 Dec;14:100394.
36. Gold AK, Hoyt DL, Milligan M, Hiserodt ML, Samora J, Leyro TM, et al. The role of fear of COVID-19 in motivation to quit smoking and reductions in cigarette smoking: a preliminary investigation of at-risk cigarette smokers. *Cogn Behav Ther*. 2021 Jul 4;50(4):295–304.
37. World Health Organization. Pulse Survey on Continuity of Essential Health Services During the COVID-19 Pandemic - Interim Report: 27 August 2020 [Internet]. Geneva, Switzerland: World Health Organization; 2020 Aug [cited 2023 Sep 1]. Available from: [https://www.who.int/publications/i/item/WHO-2019-nCoV-EHS\\_continuity-survey-2020.1](https://www.who.int/publications/i/item/WHO-2019-nCoV-EHS_continuity-survey-2020.1)
38. Baggio S, Vernaz N, Spechbach H, J, Jacquieroz F, Stringhini S, et al. Vulnerable patients forgo health care during the first wave of the Covid-19 pandemic. *Prev Med*. 2021 Sep;150:106696.
39. Mafham MM, Spata E, Goldacre R, Gair D, Curnow P, Bray M, et al. COVID-19 pandemic and admission rates for and management of acute coronary syndromes in England. *The Lancet*. 2020 Aug;396(10248):381–9.
40. De Filippo O, D'Ascenzo F, Angelini F, Bocchino PP, Conrotto F, Saglietto A, et al. Reduced Rate of Hospital Admissions for ACS during Covid-19 Outbreak in Northern Italy. *N Engl J Med*. 2020 Jul 2;383(1):88–9.
41. De Luca G, Algowhary M, Uguz B, Oliveira DC, Ganyukov V, Zimbakov Z, et al. COVID-19 pandemic, mechanical reperfusion and 30-day mortality in ST elevation myocardial infarction. *Heart Br Card Soc*. 2022 Mar;108(6):458–66.
42. Rodríguez-Leor O, Cid-Álvarez B, Pérez de Prado A, Rossello X, Ojeda S, Serrador A, et al. Impact of COVID-19 on ST-segment elevation myocardial infarction care. The Spanish experience. *Rev Espanola Cardiol Engl Ed*. 2020 Dec;73(12):994–1002.
43. Lau JT, Griffiths S, Choi KC, Tsui HY. Avoidance behaviors and negative psychological responses in the general population in the initial stage of the H1N1 pandemic in Hong Kong. *BMC Infect Dis*. 2010 Dec;10(1):139.
44. Ghisi GL de M, Xu Z, Liu X, Mola A, Gallagher R, Babu AS, et al. Impacts of the COVID-19 Pandemic on Cardiac Rehabilitation Delivery around the World. *Glob Heart*. 2021 Jun 10;16(1):43.
45. Varghese MS, Beatty AL, Song Y, Xu J, Sperling LS, Fonarow GC, et al. Cardiac Rehabilitation and the COVID-19 Pandemic: Persistent Declines in Cardiac Rehabilitation Participation and Access Among US Medicare Beneficiaries. *Circ Cardiovasc Qual Outcomes* [Internet]. 2022 Dec [cited 2023 Sep 2];15(12). Available from: <https://www.ahajournals.org/doi/10.1161/CIRCOUTCOMES.122.009618>
46. Bandi P, Asare S, Majmundar A, Xue Z, Han X, Westmaas JL, et al. Changes in Smoking Cessation-Related Behaviors Among US Adults During the COVID-19 Pandemic. *JAMA Netw Open*. 2022 Aug 1;5(8):e2225149.
47. Pettigrew S, Jun M, Roberts I, Bullen C, Nallaiah K, Rodgers A. Preferences for Tobacco Cessation Information and Support During Covid-19. *J Addict Med*. 2020 Nov;14(6):e362–5.
48. Kayhan Tetik B, Gedik Tekinemre I, Taş S. The Effect of the COVID-19 Pandemic on Smoking Cessation Success. *J Community Health*. 2021 Jun;46(3):471–5.
49. Aboueshia M, Hussein MH, Attia AS, Swinford A, Miller P, Omar M, et al. Cancer and COVID-19: analysis of patient outcomes. *Future Oncol*. 2021 Sep;17(26):3499–510.
50. Bellan M, Patti G, Hayden E, Azzolina D, Pirisi M, Acquaviva A, et al. Fatality rate and predictors of mortality in an Italian cohort of hospitalized COVID-19 patients. *Sci Rep*. 2020 Nov 26;10(1):20731.
51. Alharthy A, Aletreby W, Faqihi F, Balhamar A, Alaklobi F, Alanezi K, et al. Clinical Characteristics and Predictors of 28-Day Mortality in 352 Critically Ill Patients with COVID-19: A Retrospective Study. *J Epidemiol Glob Health*. 2020;11(1):98.
52. Kelly G, Petti S, Noah N. Covid-19, non-Covid-19 and excess mortality rates not comparable across countries. *Epidemiol Infect*. 2021;149:e176.
53. Monteiro AC, Suri R, Emeruwa IO, Stretch RJ, Cortes-Lopez RY, Sherman A, et al. Obesity and smoking as risk factors for invasive mechanical ventilation in COVID-19: A retrospective, observational cohort study. Madeddu G, editor. *PLOS ONE*. 2020 Dec 22;15(12):e0238552.
54. Ferrari BL, Ferreira CG, Menezes M, De Marchi P, Canedo J, Melo ACD, et al. Determinants of COVID-19 Mortality in Patients With Cancer From a Community Oncology Practice in Brazil. *JCO Glob Oncol*. 2021 Dec;7(7):46–55.
55. Ayhan M, Odabas H, Turan N, Ozyukseler DT, Kostek O, Alkan G, et al. Factors affecting the mortality rate of patients with cancer hospitalized with COVID-19: a single center's experience. *J Chemother*. 2021 Oct 3;33(7):499–508.
56. Khalil A, Dhingra R, Al-Mulki J, Hassoun M, Alexis N. Questioning the sex-specific differences in the association of smoking on the survival rate of hospitalized COVID-19 patients. Kou YR, editor. *PLOS ONE*. 2021 Aug 5;16(8):e0255692.
57. Alqahtani JS, Oyelade T, Aldhahir AM, Alghamdi SM, Almeahmadi M, Alqahtani AS, et al. Prevalence, Severity and Mortality associated with COPD and Smoking in patients with COVID-19: A Rapid Systematic Review and Meta-Analysis. Bhatt GC, editor. *PLOS ONE*. 2020 May 11;15(5):e0233147.
58. Lacedonia D, Scioscia G, Santomasi C, Fuso P, Carpagnano GE, Portacci A, et al. Impact of smoking, COPD and comorbidities on the mortality of COVID-19 patients. *Sci Rep*. 2021 Sep 28;11(1):19251.

59. Altschul DJ, Esenwa C, Haranhalli N, Unda SR, De La Garza Ramos R, Dardick J, et al. Predictors of mortality for patients with COVID-19 and large vessel occlusion. *Interv Neuroradiol*. 2020 Oct;26(5):623–8.
60. Ho KS, Narasimhan B, Sheehan J, Wu L, Fung JY. Controversy over smoking in COVID-19—A real world experience in New York city. *J Med Virol*. 2021 Jul;93(7):4537–43.
61. Baskaran V, Murray RL, Hunter A, Lim WS, McKeever TM. Effect of tobacco smoking on the risk of developing community acquired pneumonia: A systematic review and meta-analysis. Ho PL, editor. *PLOS ONE*. 2019 Jul 18;14(7):e0220204.
62. Han L, Ran J, Mak YW, Suen LKP, Lee PH, Peiris JSM, et al. Smoking and Influenza-associated Morbidity and Mortality: A Systematic Review and Meta-analysis. *Epidemiology*. 2019 May;30(3):405–17.
63. López-Hernández Y, Rivas-Santiago CE, López JA, Mendoza-Almanza G, Hernandez-Pando R. Tuberculosis and cigarette smoke exposure: An update of in vitro and in vivo studies. *Exp Lung Res*. 2018 Feb 7;44(2):113–26.
64. Nyunoya T, Mebratu Y, Contreras A, Delgado M, Chand HS, Tesfaigzi Y. Molecular Processes that Drive Cigarette Smoke-Induced Epithelial Cell Fate of the Lung. *Am J Respir Cell Mol Biol*. 2014 Mar;50(3):471–82.
65. Benowitz NL, Goniewicz ML, Halpern-Felsher B, Krishnan-Sarin S, Ling PM, O'Connor RJ, et al. Tobacco product use and the risks of SARS-CoV-2 infection and COVID-19: current understanding and recommendations for future research. *Lancet Respir Med*. 2022 Sep;10(9):900–15.
66. Ministry of Health, Labour and Welfare of Japan. E-HealthNet. 2020 [cited 2023 Oct 3]. Benefits of Quitting Smoking. Available from: <https://www.e-healthnet.mhlw.go.jp/information/tobacco/t-08-001.html>
67. Lung Foundation Australia. Lung Foundation Australia. [cited 2023 Oct 3]. Quitting Smoking. Available from: <https://lungfoundation.com.au/lung-health/protecting-your-lungs/quitting-smoking/>
68. Rainer T, Smit D, Cameron P. Smoking and Severe Acute Respiratory Syndrome. *Hong Kong J Emerg Med*. 2004 Jul;11(3):143–5.
69. Alraddadi BM, Watson JT, Almarashi A, Abedi GR, Turkistani A, Sadran M, et al. Risk Factors for Primary Middle East Respiratory Syndrome Coronavirus Illness in Humans, Saudi Arabia, 2014. *Emerg Infect Dis*. 2016 Jan;22(1):49–55.
70. Nam HS, Park JW, Ki M, Yeon MY, Kim J, Kim SW. High fatality rates and associated factors in two hospital outbreaks of MERS in Daejeon, the Republic of Korea. *Int J Infect Dis*. 2017 May;58:37–42.
71. Simons D, Shahab L, Brown J, Perski O. The association of smoking status with SARS-CoV-2 infection, hospitalization and mortality from COVID-19: a living rapid evidence review with Bayesian meta-analyses (version 7). *Addiction*. 2021 Jun;116(6):1319–68.
72. CDC COVID-19 Response Team, CDC COVID-19 Response Team, Chow N, Fleming-Dutra K, Gierke R, Hall A, et al. Preliminary Estimates of the Prevalence of Selected Underlying Health Conditions Among Patients with Coronavirus Disease 2019 — United States, February 12–March 28, 2020. *MMWR Morb Mortal Wkly Rep*. 2020 Apr 3;69(13):382–6.
73. Samet JM. Tobacco Products and the Risks of SARS-CoV-2 Infection and COVID-19. *Nicotine Tob Res*. 2020 Dec 15;22(Supplement\_1):S93–5.
74. Van Westen-Lagerweij NA, Meijer E, Meeuwse EG, Chavannes NH, Willemsen MC, Croes EA. Are smokers protected against SARS-CoV-2 infection (COVID-19)? The origins of the myth. *Npj Prim Care Respir Med*. 2021 Feb 26;31(1):10.
75. Guan Wjie, Ni Z yi, Hu Y, Liang W hua, Ou C quan, He J xing, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*. 2020 Apr 30;382(18):1708–20.
76. Miyara M, Tubach F, Pourcher V, Morélot-Panzini C, Pernet J, Haroche J, et al. Lower Rate of Daily Smokers With Symptomatic COVID-19: A Monocentric Self-Report of Smoking Habit Study. *Front Med*. 2022 Jan 5;8:668995.
77. World Health Organization. World Health Organization. 2022 [cited 2023 Sep 1]. Post COVID-19 Condition (Long COVID). Available from: <https://www.who.int/europe/news-room/fact-sheets/item/post-covid-19-condition#:~:text=Definition,months%20with%20no%20other%20explanation>
78. Xie Y, Xu E, Al-Aly Z. Risks of mental health outcomes in people with covid-19: cohort study. *BMJ*. 2022 Feb 16;376:e068993.
79. Yong SJ. Long COVID or post-COVID-19 syndrome: putative pathophysiology, risk factors, and treatments. *Infect Dis Lond Engl*. 2021 Oct;53(10):737–54.
80. Subramanian A, Nirantharakumar K, Hughes S, Myles P, Williams T, Gokhale KM, et al. Symptoms and risk factors for long COVID in non-hospitalized adults. *Nat Med*. 2022 Aug;28(8):1706–14.
81. Hossain MA, Hossain KMA, Saunders K, Uddin Z, Walton LM, Raigarang V, et al. Prevalence of Long COVID symptoms in Bangladesh: a prospective Inception Cohort Study of COVID-19 survivors. *BMJ Glob Health*. 2021 Dec;6(12):e006838.
82. Whitaker M, Elliott J, Chadeau-Hyam M, Riley S, Darzi A, Cooke G, et al. Persistent COVID-19 symptoms in a community study of 606,434 people in England. *Nat Commun*. 2022 Apr 12;13(1):1957.
83. Paul E, Fancourt D. Health behaviours the month prior to COVID-19 infection and the development of self-reported long COVID and specific long COVID symptoms: a longitudinal analysis of 1581 UK adults. *BMC Public Health*. 2022 Sep 9;22(1):1716.
84. Takakura K, Suka M, Kajihara M, Koido S. Clinical features, therapeutic outcomes, and recovery period of long COVID. *J Med Virol*. 2023 Jan;95(1):e28316.
85. Liu W, Tao ZW, Wang L, Yuan ML, Liu K, Zhou L, et al. Analysis of factors associated with disease outcomes in hospitalized patients with 2019 novel coronavirus disease. *Chin Med J (Engl)*. 2020 May 5;133(9):1032–8.
86. Egbe CO, Ngobese SP, Barca H, Crosbie E. “Are they trying to control us people?”: News media coverage of COVID-19 lockdown tobacco sales ban in South Africa. Mahmoud AB, editor. *PLOS ONE*. 2022 Dec 12;17(12):e0278888.
87. Chen Z, Peto R, Zhou M, Iona A, Smith M, Yang L, et al. Contrasting male and female trends in tobacco-attributed mortality in China: evidence from successive nationwide prospective cohort studies. *The Lancet*. 2015 Oct;386(10002):1447–56.
88. The Tobacco Atlas. The Tobacco Atlas. 2022 [cited 2023 Sep 1]. Challenges: COVID-19. Available from: <https://tobaccoatlas.org/challenges/covid-19/>
89. Vardavas C, Nikitara K. COVID-19 and smoking: A systematic review of the evidence. *Tob Induc Dis [Internet]*. 2020 Mar 20 [cited 2023 Sep 3];18(March). Available from: <http://www.journalssystem.com/tid/COVID-19-and-smoking-A-systematic-review-of-the-evidence,119324,0,2.html>
90. Tobacco Reporter. Tobacco Reporter. 2020 [cited 2023 Sep 1]. BAT Unaffected by Virus Outbreak. Available from: <https://tobaccoreporter.com/2020/03/19/bat-unaffected-by-outbreak/>

91. Williams S. Nasdaq. 2020 [cited 2023 Sep 1]. Coronavirus Income Stocks: 7 High-Yield Dividend Stocks to Buy Right Now. Available from: <https://www.nasdaq.com/articles/coronavirus-income-stocks%3A-7-high-yield-dividend-stocks-to-buy-right-now-2020-03-23>
92. Tobacco Tactics. Tobacco Tactics. 2021 [cited 2023 Sep 1]. Kenya- Country Profile. Available from: <https://tobaccotactics.org/article/kenya-country-profile/>
93. Huber L, Cuadrado U, Fernandez-Megina R, Raw M, Marquizo AB, Romeo-Stuppy K. The impact of COVID-19 on the WHO FCTC, cessation, and tobacco policy. *Tob Induc Dis.* 2020;18:102.
94. Chen DTH. Tobacco control measures in COVID-19 recovery: an opportune time to restore equity and planetary health. *Environ Health Prev Med.* 2022;27:15.
95. WHO Framework Convention on Tobacco Control, World Health Organization. WHO Framework Convention on Tobacco Control. 2003;36.
96. El-Awa F, Fraser CP, Adib K, Hammerich A, Abdel Latif N, Fayokun R, et al. The necessity of continuing to ban tobacco use in public places post-COVID-19. *East Mediterr Health J Rev Sante Mediterr Orient Al-Majallah Al-Sihhiyah Li-Sharq Al-Mutawassit.* 2020 Jun 24;26(6):630–2.
97. González-Rábago Y, Cabezas-Rodríguez A, Martín U. Social Inequalities in Health Determinants in Spanish Children during the COVID-19 Lockdown. *Int J Environ Res Public Health.* 2021 Apr 13;18(8):4087.
98. Havranek EP, Mujahid MS, Barr DA, Blair IV, Cohen MS, Cruz-Flores S, et al. Social Determinants of Risk and Outcomes for Cardiovascular Disease: A Scientific Statement From the American Heart Association. *Circulation.* 2015 Sep 1;132(9):873–98.
99. Roger VL. Medicine and society: social determinants of health and cardiovascular disease. *Eur Heart J.* 2020 Mar 14;41(11):1179–81.
100. Tee GH, Aris T, Rarick J, Irimie S. Social Determinants of Health and Tobacco Use in Five Low and Middle-Income Countries - Results from the Global Adult Tobacco Survey (GATS), 2011 - 2012. *Asian Pac J Cancer Prev APJCP.* 2016;17(3):1269–76.
101. Abdulrahim S, Jawad M. Socioeconomic differences in smoking in Jordan, Lebanon, Syria, and Palestine: A cross-sectional analysis of national surveys. *PLoS One.* 2018;13(1):e0189829.
102. World Health Organization Regional Office for South-East Asia. Factsheet 2018: India [Internet]. World Health Organization Regional Office for South-East Asia; 2018 [cited 2023 Sep 1]. Available from: [https://apps.who.int/iris/bitstream/handle/10665/272672/wntd\\_2018\\_india\\_fs.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/272672/wntd_2018_india_fs.pdf?sequence=1&isAllowed=y)
103. Siddiqi K, Husain S, Vidyasagar A, Readshaw A, Mishu MP, Sheikh A. Global burden of disease due to smokeless tobacco consumption in adults: an updated analysis of data from 127 countries. *BMC Med.* 2020 Dec;18(1):222.
104. Tata Institute of Social Sciences, Ministry of Health and Family Welfare of India. Global Adult Tobacco Survey - Second Round - India 2016-17 Report [Internet]. New Delhi: Ministry of Health and Family Welfare of India; 2018 [cited 2023 Sep 1]. (GATS). Report No.: 2. Available from: <https://ntcp.mohfw.gov.in/assets/document/surveys-reports-publications/Global-Adult-Tobacco-Survey-Second-Round-India-2016-2017.pdf>
105. World Health Organization. World Health Organization. 2022 [cited 2023 Sep 1]. Coronavirus Disease (COVID-19): Tobacco. Available from: <https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-covid-19-tobacco>
106. Arora M, Nazar GP, Sharma N, Jain N, Davidson F, Mohan S, et al. COVID-19 and tobacco cessation: lessons from India. *Public Health.* 2022 Jan;202:93–9.
107. Sharma N, Chopra M, Bauld L, Nazar G, Joshi N, Chugh A, et al. Impact of a tobacco sales ban on the frequency of tobacco consumption in India during the COVID-19 pandemic. *Tob Induc Dis.* 2023 Apr 28;21(April):1–6.
108. WHO Framework Convention on Tobacco Control. 2021 Global Progress Report on Implementation of the WHO Framework Convention on Tobacco Control [Internet]. Geneva: World Health Organization; 2022 [cited 2023 Sep 24]. Available from: <https://iris.who.int/bitstream/handle/10665/351735/9789240041769-eng.pdf?sequence=1>
109. Burki TK. Tobacco industry influence during the COVID-19 pandemic. *Lancet Oncol.* 2021 Dec;22(12):1658.
110. WHO Framework Convention on Tobacco Control. Guidelines for Implementation of Article 5.3 [Internet]. WHO Framework Convention on Tobacco Control; 2013 [cited 2023 Sep 1]. Available from: <https://fctc.who.int/publications/m/item/guidelines-for-implementation-of-article-5.3>
111. WHO Framework Convention on Tobacco Control. WHO Framework Convention on Tobacco Control. 2023 [cited 2023 Sep 1]. FCTC - Overview. Available from: <https://fctc.who.int/who-fctc/overview>
112. Lee JJ, Wang MP, Yang SC. Will the tobacco industry ultimately triumph in the midst of COVID-19 pandemic?: A call for nurses' action in tobacco control. *Int J Nurs Stud.* 2021 Mar;115:103726.

**A COMPLEX INTERPLAY:  
NAVIGATING THE CROSSROADS OF TOBACCO USE,  
CARDIOVASCULAR DISEASE, AND THE  
COVID-19 PANDEMIC**

**A WORLD HEART FEDERATION POLICY BRIEF**



**WORLD HEART FEDERATION**  
32, rue de Malatrex, 1201 Geneva, Switzerland  
(+41 22) 807 03 20  
[info@worldheart.org](mailto:info@worldheart.org)  
[www.worldheart.org](http://www.worldheart.org)



World Heart Federation

@worldheartfed

World Heart Federation

@worldheartfederation