

# The Bill China Cannot Afford

**HEALTH, ECONOMIC AND SOCIAL COSTS  
OF CHINA'S TOBACCO EPIDEMIC**



*Empowered lives.  
Resilient nations.*

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## CONTENTS

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Foreword	ii
Executive summary	iv
<hr/>	
1. Introduction	1
2. Economic and social costs of tobacco use in China	10
3. Economic and social benefits of tobacco control	16
4. The policy path to reducing tobacco use in China	24
5. Conclusions and recommendations	29
<hr/>	
References	32
<hr/>	
Annexes	35
A. Summary of <i>Economic costs attributable to smoking in China 2014</i>	35
B. Summary of <i>Equity and poverty alleviation benefits of tobacco tax and smoke-free workplaces in China: a modelling study</i>	39
C. Summary of <i>The policy path to reducing tobacco use</i>	42

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## FOREWORD

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Tobacco use kills approximately 6 million people globally every year and is a significant threat to health and development. It is one of the main risk factors driving the growing epidemic of noncommunicable diseases (NCDs). Heart disease, cancer, diabetes, lung diseases and other NCDs are now the world's biggest killers – responsible for over 60% of all deaths and over 80% of deaths in China. Over three quarters of NCD deaths occur in low- and middle-income countries, as do 82% of premature NCD deaths.

Tobacco use hurts families, impoverishes communities, exacerbates inequalities, and damages economies and societies. We will have difficulty reaching the Sustainable Development Goals (SDGs) vision of a more equitable, healthy and sustainable world without seriously tackling the global tobacco threat.

China is the epicentre of this epidemic, and thus lies at the heart of global efforts to stop it. China is the world's largest producer and consumer of tobacco. A staggering 44% of the world's cigarettes are smoked in China. One million people die of tobacco-related diseases in China every year, many of them in the prime of their productive years. The purchase of cigarettes imposes a financial burden on low-income smokers and their families, but the illness, disability and death caused by tobacco use extracts an even greater cost – with such high rates of smoking among Chinese men, tobacco use is killing or disabling the main wage earner in many Chinese families (especially families on low incomes) and plunging those already on the margins into poverty. If nothing is done to slow these trends, smoking-related diseases are on track to claim more than 200 million lives in China this century. This will decrease economic productivity and push tens of millions of people into poverty. It will also place increasing demands on the Chinese social welfare and health systems, as well as the private sector, and will further entrench already growing inequalities. The health and broader (social, economic, environmental) costs of tobacco use add up to a bill that China cannot afford.

Yet, all of this is preventable. This report shows that through implementation of a comprehensive package of strong tobacco control policies, China could avert many millions of preventable deaths, as well as mitigate the impact tobacco use is having on China's society and economy. Increasing the retail price of cigarettes by 50%, for example, would save 20 million lives over 50 years and prevent 8 million people from being plunged into poverty. A well-enforced national policy to make all offices smoke free would avert at least 6 million deaths and avoid 2 million people becoming impoverished. A comprehensive national smoke-free law, including all public places, would deliver even greater health and equity gains.

Strong tobacco control policies are therefore not only pro-health – and thus consistent with the Healthy China vision of the Government are also pro-poor and positive for the economy. Tobacco control will deliver a sustainable return on investment in the form of a healthier, more equitable and productive country.

In the adopting of the SDGs, the international community recognized that tobacco control is a priority issue, for health and for development more broadly. The SDGs commit governments to implement the WHO Framework Convention on Tobacco Control (WHO FCTC), which China ratified in 2005. Scaled-up implementation of the WHO FCTC be constitute a huge step towards delivering on the vision articulated in the 2030 Agenda for Sustainable Development – of a world transformed, with better health, reduced inequality, poverty eradicated and no one left behind. To achieve the SDGs, no country can afford the consequences and costs of tobacco use.

Acknowledging that the growing global burden of NCDs constitutes one of the major challenges to development in the 21st century, the World Health Organization (WHO) and the United Nations Development Programme (UNDP) have joined hands to support realising the commitments set out in the 2011 United Nations *Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases*, and in the goals included in the WHO *Global Action Plan for the Prevention and Control of Noncommunicable Diseases (2013–2020)*. In 2012, the United Nations Economic and Social Council (ECOSOC) agreed to a strengthened United Nations partnership to accelerate multisectoral and interagency responses to support full implementation of the WHO FCTC (1).

This report is the fruit of this important WHO–UNDP partnership. We hope the report will trigger a conversation not only among policy-makers, Government officials and health professionals, but also among economists, academics and civil society – about the need for much stronger tobacco control policies in China, not only for improving health but also for the broader goal of building a more sustainable and inclusive economy and society.

At UNDP and WHO, we are united in an unwavering commitment to further the goals set out in 2003 in the WHO FCTC, the first legally binding international health treaty: “to protect present and future generations from the devastating health, social and economic consequences of tobacco consumption”. We do this in the name of the millions of victims already lost to tobacco, and the millions of lives that still hang in the balance.



Dr Margaret Chan  
Director-General  
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## EXECUTIVE SUMMARY

### Key messages

- With 315 million smokers, China is the world's largest producer and consumer of tobacco. In 2014, 44% of the world's cigarettes were consumed in China.
- Tobacco is on track to claim 200 million lives in China this century – predominately among poorest and most vulnerable people. In other words, current tobacco policies are negatively affecting China's poor the most.
- The total economic cost of tobacco use in China in 2014 was approximately ¥350 billion (Chinese yuan), or about US\$ 57 billion, a 1000% increase in total economic costs since 2000.
- Vigorous tobacco control policies would reduce the negative health and economic impacts of tobacco use – and put China on a path to a healthier, more equitable and more sustainable economic future.
- A 50% increase in the retail price of cigarettes alone could increase Government revenue by approximately ¥442 billion (US\$ 66 billion) each year, prevent 20 million premature deaths over 50 years, and save 8 million people from being plunged into poverty because of tobacco-related medical costs.
- The stronger the overall package of tobacco control policies, the greater the health, economic and social benefits – for example, in reduced inequity. A strong package of tobacco control policies will be fundamentally pro-poor, and help China's leaders to deliver on their goals of improving health and reducing poverty.

### Recommendations

- A comprehensive national smoke-free law should be adopted urgently – building on the success of Beijing's smoke-free law and recently adopted smoke-free laws in Shanghai and Shenzhen; this is a crucial next step for tobacco control in China.
- Building on the tax increase announced in May 2015, tobacco taxes should be raised significantly and future increases entrenched in order to reduce the affordability of tobacco products over time.
- Within two years, a comprehensive package of other tobacco demand-reduction measures should be adopted, including a comprehensive ban on tobacco advertising, promotion and sponsorship; scaled-up and sustained roll-out of mass media campaigns on the dangers and negative impacts of tobacco use; introduction of graphic warnings on the harms of tobacco use covering at least 50% of tobacco packages; and expansion of support for existing smokers to quit.
- Tobacco industry interference should be eliminated from tobacco control policy-making, in line with the requirements of the WHO Framework Convention on Tobacco Control (WHO FCTC).
- To create a "firewall" between the tobacco industry and tobacco control policy, a new body responsible for WHO FCTC implementation and tobacco control policy should be established directly under the State Council, with the National Health and Family Planning Commission as the lead ministry.

### Tobacco is hurting China and its health

China is the tobacco capital of the world: in 2014, 44% of the world's cigarettes were consumed in China – more than the next 29 countries combined. In 2015, there were approximately 315 million smokers in China – around 28% of the adult population, and more than half of all men. Overall smoking rates among women are low, but they may be increasing significantly among young females. Tobacco is taking an enormous toll on China's health, with at least half of all smokers expected to die as a result of their tobacco habit. China's tobacco habit hurts its poor and most vulnerable citizens the most – the health costs and other consequences of tobacco-related illness plunge many people into poverty, and prevent others from escaping it.

As a state-owned enterprise and franchised business, the tobacco industry contributes significant revenue to the Chinese Government each year. This report shows that economic dividends from China's tobacco industry are, however, a false economy – at odds with the Government's vision for China's future. One million people die every year in China – 3000 every day – as a result of tobacco use. This addiction to tobacco is fundamentally inconsistent with President Xi Jinping's goal of a Healthy China, with the Government's agenda for harmonious and human-centred development, and with the Government's goal of eradicating poverty and attaining sustainable development.

### Tobacco use is hurting China's economy

The health impact of tobacco use is enormous. This report shows that the economic costs are also substantial and, consequently, deserving of serious attention by China's policy-makers and political leaders.

In 2014, the direct cost of treating tobacco-related illness in China was approximately ¥53 billion (Chinese yuan), or about US\$ 9 billion – around 1.5% of the total ¥3.5 trillion (US\$ 538 billion) spent on health care in China that year (2). The broader costs to China's economy from tobacco use – including the value of lost productivity from smoking-related illness – amount to more than five times the direct costs: in 2014, these indirect costs equated to around ¥297 billion (US\$ 48 billion).

The total economic cost – that is, direct and indirect costs combined – of tobacco use in China in 2014 amounted to a staggering ¥350 billion (US\$ 57 billion). This equates to 0.55% of China's 2014 total gross domestic product (GDP), averaging ¥1107.15 (US\$ 168) for each smoker. This is also nearly double the ¥217 billion (US\$ 33 billion)<sup>1</sup> that tobacco use was estimated to have cost China's economy in 2008, and represents a 1000% – or tenfold – increase in the estimated economic costs since 2000. The increase is the result of both more people being diagnosed with tobacco-related illness over the last decade and a half and increasing health-care expenditure. These costs, already enormous, will continue to increase rapidly in the future if current smoking rates do not significantly decrease, and quickly.

**The total economic cost – that is, direct and indirect costs combined – of tobacco use in China in 2014 amounted to a staggering ¥350 billion in 2014 (US\$ 57 billion).**

<sup>1</sup> The estimated 2008 costs (in US\$) of smoking were converted into 2014 constant by multiplying by 1.16 based on the Consumer Price Index (CPI) for 2008 and 2014 in China.

President Xi affirmed China's aim to be a “moderately prosperous” society by 2020, with the vision of achieving a decent standard of living for all China's population. Tobacco use is hurting the realization of this ambition: taken together, health-care costs and productivity losses caused by tobacco use represent a significant drain on the Chinese economy. This should be of concern at any time, but especially so when Chinese labour costs are increasing and there is a transition towards a more service-based economy. Not acting to reduce tobacco use will aggravate the economic and social impact of an ageing population, and increase the odds of a future economic slowdown.

### Tobacco entrenches a vicious cycle of poverty

Tobacco is also hurting the very fabric of China's society, both by impoverishing people already on very low incomes, and making it difficult for others to escape poverty, further widening the gap between the rich and the poor, and exasperating the problem of inequality in Chinese society. This happens in a number of ways: expenditure on tobacco in low-income households diverts funds from necessities such as food, education and health care; the costs of treating tobacco-related illness (such as cancer and heart disease) can be catastrophically high for already poor families, especially in the absence of social and health insurance that covers the full cost of treatment; and the early death of a primary income earner from tobacco-related illness can cause a family to lose its primary source of income – from which it takes 10–20 years on average to recover financially.<sup>2</sup> The impact of this is particularly profound in a country such as China, where a primary income earner's dependents may include not only his or her partner and children, but also his parents and parents-in-law.

China has made remarkable progress in lifting 439 million people out of poverty from 1990 to 2011, and President Xi has committed to completely eradicate poverty by 2020. In 2016, when 56 million people in China are living in rural poverty and over 40% of them have been impoverished because of health-care costs, the microeconomic impact of China's high rates of male smoking is a direct threat to the achievement of the President's poverty eradication goal.

### The way forward: accelerate the introduction of stronger tobacco control policies

While the health, economic and social costs of tobacco use in China are colossal, the policy measures contained in the WHO Framework Convention on Tobacco Control (WHO FCTC) – which China ratified in 2005 – provide a clear prescription for reducing tobacco use. Full implementation of the WHO FCTC will avert some of the costs of tobacco use, as well as put China on track to a healthier and more sustainable economic future. China has made some progress in the implementation of its WHO FCTC obligations in recent years. This report, however, shows that already implemented measures – especially tobacco taxation and comprehensive smoke-free laws and regulations – need to be vigorously scaled up and properly enforced in order to mitigate the current, and avert some of the future, health and economic impacts of tobacco use.

<sup>2</sup> Nonnemaker J, Simpson S, Chen Z, RTI International, Effect of head of household death on income: Evidence from a panel of Chinese Households, unpublished paper, April 2015.

A rapid scaling up of tobacco control policies would deliver significant health, economic and social benefits to China – and help realize the vision of a Healthy China. Increasing the retail price of cigarettes by 50%, for example, would increase revenue to Government by approximately US\$ 66 billion annually.<sup>3</sup> Crucially, a price increase in this order of magnitude would prevent as many as 20 million premature deaths over 50 years, and in doing so help to avert nearly 8 million people being plunged into poverty. Around 13 million – mostly poor – people would be saved from facing catastrophically high medical expenditures. The stronger the overall package of tobacco control policies, the greater the health and economic payoffs.

The people who stand to benefit most from effective tobacco control policies are the poor. Tobacco control, therefore, is good not only for China's health, but also for its society and economy; it can help to deliver on national (and international) goals of reducing poverty and inequality.

### Towards a healthy, ‘moderately prosperous’ China

The evidence presented in this report shows that stronger tobacco control policies are necessary to achieve the Government's vision for a country that is healthy, moderately prosperous and free of poverty. As a Party to the WHO FCTC, China has made clear its commitment to international health laws, norms and standards. It is also poised to play a leading role in the 2030 Agenda for Sustainable Development. But the fact that 1 million citizens die a preventable tobacco-related death every year – and when many more are impoverished by the direct and indirect costs of tobacco-related illness – is at odds with China's aspirations as a global health and development leader.

This report shows that there is another way. Accelerating the implementation of proven tobacco control policies – in particular tax increases and smoke-free laws and regulations – will have far-reaching benefits for China's health, economy and society.

China cannot be a global health and development leader when 1 million of its citizens die a tobacco related, and by definition entirely preventable, death every year.

### Plan 2030

This report provides an analysis of the current health, social and economic costs and impacts of tobacco use and policies in China. It examines the impact of tobacco use on development, focusing particularly on poverty and inequality, and the tremendous burden tobacco represents for the poorest and most vulnerable. It identifies what needs to be done to avert these costs and to reduce poverty and inequity created by tobacco use, and in doing so, achieve considerable health, social and economic benefits over the next 50 years – consistent with China's own vision of its future. As such, this report presents a powerful case for drastically and vigorously scaling up action to reduce tobacco use in China, in line with China's national health and development goals, including the new *Healthy China Plan 2030* and the national goal of eliminating poverty by 2020.

<sup>3</sup> Rose Zheng, WHO TaXSIM modelling, 2016 unpublished data, 2016.

**The fact that 1 million citizens die a preventable tobacco-related death every year is at odds with China's aspirations as a global health and development leader.**

## 1. INTRODUCTION

### Key messages

- More than 1 million people die in China every year as a result of tobacco use – around 3000 people every day (3). This will grow to 2 million annually by 2030, and 3 million annually by 2050 without action to drastically reduce smoking rates (4).
- Tobacco use is a major driver in the rapid increase of noncommunicable diseases (NCDs), which already account for 87% of all deaths in China.
- Beyond health, tobacco use is also taking an enormous toll on China's broader society and economy – in health-care costs, lost productivity and tobacco-related impoverishment.
- While China has made some progress on tobacco control in recent years, much more needs to be done for China to meet global targets for reducing NCD risk factors – and to avert massive tobacco-related health and economic costs in the future.

### 1.1 The tobacco epidemic in China

China is the world's largest tobacco producer, consumer and manufacturer (5). Around 28% of adults (people aged 15 years and older) are current smokers. The smoking prevalence rate has remained more or less stable in recent years, but the number of smokers continues to increase as China's population grows – between 2010 and 2015, the number of smokers in China increased by 15 million to 315 million (6). In 2014, China's smokers consumed 44% of the world's cigarettes – more than the next top 29 cigarette-consuming countries combined, including Indonesia, Japan, the Russian Federation and the United States of America. The average smoker in China smokes around 22 cigarettes a day – a nearly 50% increase since 1980 (5).

More than half of adult men are current smokers, and as many as two thirds of young Chinese men start smoking as young adults. Given that at least half of all smokers will die as a result of tobacco use (and there is emerging evidence to show that an even higher proportion of smokers may be killed by the habit),<sup>4</sup> around one third of young Chinese men alive today – if not more – will eventually be killed by tobacco use (4).

While the current prevalence of smoking among Chinese women is low, there is cause for concern about potential increases in the future as China's economy continues to expand. The Chinese female population is a large untapped market for the tobacco industry, and there is a well-documented association between the female smoking rate and a country's economic development (7–9). Exposure to second-hand smoke is also a particular problem for Chinese women – their rates of exposure in homes and workplaces are among the highest in the

<sup>4</sup> See, for example: Banks E, Joshy G, Weber MF, Liu B, Grenfell R, Egger S, et al. Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Med.* 2015;13:38. doi: 10.1186/s12916-015-0281-z.

world (10) – as well as for the population more generally. More than 700 million people are routinely exposed to deadly second-hand smoke (11); more than half of young people aged 13–15 years are exposed to second-hand smoke inside enclosed public places each week (12), with 100 000 people dying every year as a result.

Fuelling China's ravenous appetite for tobacco products and its tobacco epidemic is the China National Tobacco Corporation (CNTC), the largest tobacco company in the world and one of the Chinese Government's most profitable state-owned enterprises. CNTC's share of the global tobacco market is bigger than several of the leading multinational tobacco companies – Philip Morris International, British American Tobacco and Imperial Tobacco – put together (13). In 2013, CNTC manufactured about 2.5 trillion cigarettes, while its next largest competitor, Philip Morris International, produced 880 billion. China's tobacco production has tripled since 1980 (5). China grows tobacco on more agricultural land than several other large tobacco-producing countries combined (including Brazil, India, Indonesia, Malawi and the United Republic of Tanzania) (5). CNTC controls 98% of the domestic Chinese tobacco market, and the Chinese Government profits financially from every step in the tobacco production chain from plantation and manufacture to the final sale of tobacco products. In 2015, the tobacco industry contributed ¥1.1 trillion (Chinese yuan), or US\$ 170 billion, to the central Government – around 7% of total central Government revenue.

In China and elsewhere, the tobacco industry often uses the magnitude of its economic contribution as an argument against the adoption of stronger tobacco control policies. However, this economic contribution comes from a product that directly leads to more than 1 million Chinese people dying an entirely preventable death every year (3). This issue goes beyond economics to the broader question of whether it is appropriate and ethical for a government to profit directly from an industry that derives its revenue from a product that kills. This situation and the goal of a Healthy China are irreconcilable.

### 1.2 Tobacco's impact on health

Without action to drastically reduce smoking rates, the future impact of tobacco-related illnesses will be catastrophic: the annual number of deaths is projected to grow from 1 million per year currently to 2 million per year by 2030, and 3 million per year by 2050 (4). On this trajectory, tobacco is on track to claim more than 200 million Chinese lives this century.

Tobacco use in China is a major driver of the rapid increase in rates of noncommunicable diseases (NCDs). Illnesses such as cardiovascular disease, cancer, chronic respiratory disease and diabetes have become China's number one health threat (14). NCDs now account for 87% of all deaths and 70% of the total disease burden in China (15,16). Of 8.6 million deaths in China from NCDs in 2012, more than one third of these (36%) were premature – that is, in people under the age of 70. More than 3 million people in China are dying young every year from diseases that are largely caused by preventable risk factors, such as tobacco use (17).

**This issue goes beyond economics to the broader question of whether it is appropriate and ethical for a government to profit directly from an industry that derives its revenue from a product that kills.**

### 1.3 Tobacco's impacts beyond health

Tobacco use in China is not only taking an enormous toll on the country's health, but also on its broader society and economy: in costs to the national health system for treating tobacco-related illnesses; in costs to the economy from lost productivity and reduced workforce participation; and in the costs to millions of Chinese families that are impoverished as a result of tobacco-related illnesses and premature death. Tobacco use and the explosive growth of NCDs in China threaten not only human health, but also development and long-term economic growth (18).

The burden of tobacco use and the related NCDs hits the poorest the hardest. People who get sick are unable to work, and family members may have to stop work or school to care for them. Families on low incomes often struggle to cover the high medical expenses associated with the treatment of diseases like cancer – because while the vast majority (over 95%) of people in China now have health insurance, most health insurance schemes do not cover the full cost of treatment. For some families, the out-of-pocket costs of treatment for conditions such as cancer can be catastrophic – forcing them into poverty (or preventing them from escaping it). Some families simply will choose (or be forced) to forgo treatment – leading to aggravation of existing health inequities. This has the potential to seriously undermine the Government's agenda for harmonious and human-centred development as reflected in its new Five-Year Plan.

The cost of treating the increasing burden of tobacco-related illness also has a major impact on the health system more generally, as outlined in Chapter 2. At a time when the central Government has substantially increased its investment in health insurance and services, the costs of treating increasing rates of preventable tobacco-related illness will divert health resources away from other health priorities.

Finally, large-scale tobacco production and consumption threatens environmental sustainability. Tobacco growing causes biodiversity loss from deforestation and land-clearing, soil degradation as tobacco growing depletes soil nutrients more than other crops, and land and water pollution as pesticides leak into the soil (19). Tobacco manufacturing produces a large amount of manufacturing and chemical waste, and cigarette butts when disposed of improperly are washed into rivers, lakes and the ocean where they are eaten by birds, fish and animals (20). Globally, cigarette butts make up the largest percentage of waste collected during beach cleanups every year (5). Moreover, there is now an overwhelming amount of international evidence that the majority of forest fires around the world are caused by human factors, including smoking (21).

The combined health and broader social, economic, environmental costs of tobacco use in China are clearly substantial: they add up to a bill that China cannot afford.

**The burden of tobacco use and related NCDs hits the poorest the hardest. People who get sick are unable to work, and family members may have to stop work or school to care for them.**

### 1.4 Progress on tobacco control in China to date

While tobacco use is a monumental challenge in China, there have been some important steps forward in recent years. Progress is being made but not fast enough.

The most notable recent achievement is the adoption of a comprehensive, 100% smoke-free law in Beijing, China's capital. The Beijing law, implemented on 1 June 2015, requires all indoor (and some outdoor) public places in the city to be 100% smoke free, without exception. After more than one year, enforcement has been strong with very high rates of compliance. And importantly, the law is very popular with the public: around 90% of people surveyed say they support public places being smoke free (22). Other cities are following suit: Shanghai recently followed Beijing's lead, adopting a strong smoke-free law which takes effect in March 2017. From 1 January 2017, Shenzhen also requires all indoor public places to be 100% smoke free.

As of July 2016, 14 other cities in China have also adopted smoke-free laws. However, many municipal laws or regulations in China are not nearly as effective as they could be because of weaknesses in the laws themselves – for instance, loopholes that allow smoking in some indoor public places – and a lack of sufficient enforcement. And most importantly, China still lacks a national smoke-free law. China's State Council published draft national regulations on making indoor public places smoke free in November 2014, but these had not been adopted at the time of publication of this report.

In May 2015, China's Ministry of Finance announced an increase in tobacco taxation – a crucially important measure for reducing the affordability of tobacco products. Significantly, the increase was passed on for the first time to the retail price of cigarettes – which led to higher average tobacco prices, and overall reduction in volume of cigarettes sold (23). As China accounts for such a large proportion of the global market, the volume decrease in China contributed to a 2.1% decline in the global volume of cigarette sales in 2015 (24) – highlighting the importance of reducing tobacco consumption in China in the overall battle against the global tobacco epidemic. Revenue to the central Government also increased (23). However, cigarettes remain extremely cheap in China – the most sold brand of cigarettes costs ¥10 (US\$ 1.55) for a pack of 20 (25) – and they have become more affordable over time as the economy has expanded and incomes have increased (26). Even with this recent tax increase, tax only accounts for 55% of the retail price of a standard pack of cigarettes<sup>5</sup> – a long way short of the 70% benchmark which WHO recommends in order to reduce affordability of tobacco products.

China has also recently adopted stronger restrictions on tobacco advertising in the National Advertising Law, which came into effect on 1 September 2015. The new law bans tobacco advertising in mass media, public places, outdoors and public transport. Previously, advertising on billboards and in some public places had been permitted (27). However, the ban on advertising at retail points of sale is not well enforced (28), and other forms of tobacco promotion and sponsorship are still allowed.

**The most notable recent achievement is the adoption of a comprehensive, 100% smoke-free law in Beijing, China's capital. The Beijing law requires all indoor (and some outdoor) public places in the city to be 100% smoke free, without exception.**

<sup>5</sup> Rose Zheng, WHO TaXSIM modelling, unpublished data, 2016



An important backdrop to these developments occurred in December 2013 when the General Office of the Central Committee of the Communist Party of China (CPC) and the General Office of the State Council issued a joint notice on promoting smoke-free public places, requiring Government leaders and officials to take the lead in banning smoking in all public places. The policy also directed Government officials to take the lead in ensuring existing smoke-free laws are enforced, to promote awareness about the harms of smoking and the importance of tobacco control, and to ban smoking and tobacco products from all Government functions and events (29). This document was significant both for its content, but also for the fact it represented a strong commitment from China's political leadership to advance tobacco control. In the same year, the CPC Central Party School, the party's internal think tank, published a comprehensive report on tobacco control and strategies for China to reduce smoking rates (30).

While each of these have been important steps forward, much more needs to be done in order for China to meet its own goals on reducing tobacco use, its international legal and political obligations, and most importantly to reduce the enormous health and economic costs already caused by tobacco use, and avoid these costs having a larger negative impact on China's society and economy in the future.

### 1.5 International and national commitments on tobacco and NCDs

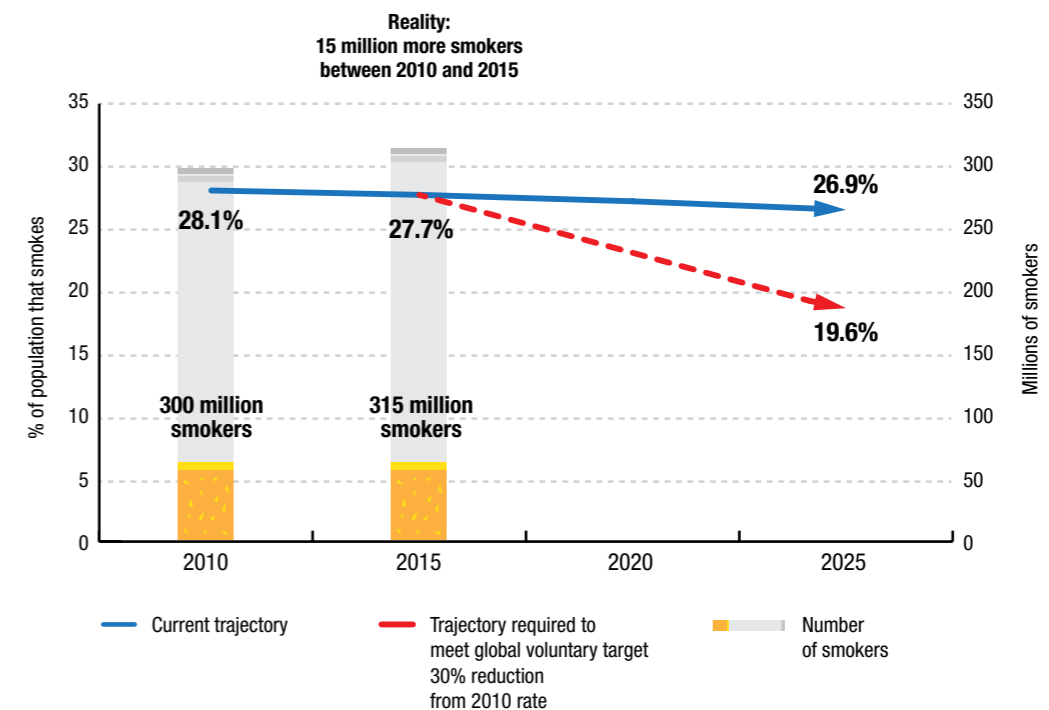
The World Health Assembly adopted the WHO Framework Convention for Tobacco Control (WHO FCTC) in 2003. The WHO FCTC is the world's first global public health treaty, developed in response to the globalization of the tobacco epidemic, and includes a comprehensive set of policies for reducing both demand for and supply of tobacco products. China ratified the WHO FCTC in 2005, and the treaty came into legal force in China in January 2006. This means that China, as a party to the WHO FCTC, has a legal obligation to implement the treaty's provisions. However, while some progress has been made as outlined above, to date China has largely failed to deliver on its WHO FCTC commitments.

The health, development, equity and human rights dimensions of tobacco use and the growing burden of NCDs have now been recognized at the highest levels of the international community. In September 2011, heads of states and governments held a high-level meeting of the United Nations General Assembly on the prevention and control of NCDs, and adopted a political declaration which recognized the threat NCDs pose to health, economies and societies, calling for sustained international commitment to tackle the NCD epidemic (31). Subsequently, in May 2013 the World Health Assembly endorsed the *Global Action Plan for the Prevention and Control of Noncommunicable Diseases (2013–2020)* – developed to operationalize the commitments made in the 2011 political declaration. The global action plan includes specific voluntary targets for countries to achieve by 2025, including a goal of reducing premature mortality from NCDs by 25% by 2025 – the 25 By 25 target – and reducing tobacco use by 30% over the same period.

While some progress has been made, as outlined above, based on the current trajectory of smoking rates, China will not be able to reach the global NCD targets by 2025 unless it dramatically scales up action to reduce smoking rates in the country (Figure 1). In fact, between 2010 and 2015, while the prevalence of smoking in the adult population decreased very slightly (by 0.4%), the actual number of smokers increased from 300 million to 315 million due to an increase in the overall population. Strong policy action is needed just to stabilize the current number of smokers in China, while very aggressive policy action will be required to see sustained reductions in smoking numbers and rates in line with the global targets.

Finally, the Sustainable Development Goals (SDGs) now commit United Nations Member States and governments to reduce premature mortality from NCDs by one third over the next 15 years (SDG 3.4), which is consistent with the global NCD targets, and to strengthen implementation of the WHO FCTC (SDG 3.a). Achievement of these SDG targets would help deliver gains across the broader SDG agenda, given the close relationship between NCDs, poverty, inequalities, and other goals and targets (see box on page 7). This is especially the case for China.

**Figure 1. Current trend in China's smoking rates versus trajectory required to meet and global voluntary target by 2025**



Source: 2010 data are from the 2010 China Global Adult Tobacco Survey (GATS). 2015 data are from the 2015 China Adult Tobacco Survey Report.

The WHO FCTC is the world's first global public health treaty, developed in response to the globalization of the tobacco epidemic, and includes a comprehensive set of policies for reducing both demand for and supply of tobacco products.

## HOW TOBACCO CONTROL CAN ADVANCE THE SDGS

### SDG 1 – End poverty in all its forms everywhere

- Tobacco control policies contribute to poverty reduction by preventing premature deaths and by averting catastrophic health expenditure – both of which can plunge families into poverty. Tax revenues from higher tobacco taxes can be invested in areas that further alleviate poverty, for example, health insurance for low-income families, as well as subsidies for tobacco farmers to shift to alternative forms of livelihood.

### SDG 2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture

- SDG Target 2.3 – Tobacco control policies can improve agricultural productivity and incomes of producers by substituting tobacco production with alternative – often more profitable – crops. Reduced household expenditure on tobacco also frees up household income for other things, such as food.
- SDG Target 2.4 – Tobacco control contributes to maintaining the ecosystem, improving land and soil quality, and ensuring sustainable food production systems by substituting tobacco production with alternative crops.

### SDG 3 – Ensure healthy lives and promote well-being for all at all ages

- SDG Target 3.3 – Tobacco control contributes to ending the tuberculosis (TB) epidemic by reducing smoking and exposure to indoor air pollution (20% of TB deaths are associated with smoking).
- SDG Target 3.4 – Tobacco control reduces premature mortality from NCDs.
- SDG Target 3.8 – A key component of a comprehensive approach to tobacco control is provision of quality essential smoking cessation services and access to essential medicines, such as nicotine replacement therapy.
- SDG Target 3.9 – Tobacco control contributes to reducing the number of deaths and illnesses from air pollution caused by second-hand smoke.

### SDG 5 – Achieve gender equality and empower all women and girls

- SDG Target 5.3 – Tobacco control prevents harmful practices, such as tobacco use, among women and young girls; prevents exposure to second-hand smoke.
- SDG Target 5.c – Tobacco control can empower women and girls through education about the harms of smoking and how to protect against these.

### SDG 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

- SDG Target 8.7 – Tobacco farming can involve child labour; tobacco control can therefore contribute to the goal of eliminating child labour and protecting health and rights by preventing employment of minors on tobacco farms.

- SDG Target 8.8 – Smoke-free public places help to provide a safe and secure working environment for all workers by banning smoking in workplaces.

### SDG 11 – Make cities and human settlements inclusive, safe, resilient and sustainable

- SDG Target 11.1 – Smoke-free public places help contribute to creating healthy cities by prohibiting smoking and preventing indoor air pollution.

### SDG 14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development

- SDG Target 14.1 – Globally, cigarette butts make up the largest percentage of waste collected during beach clean-ups. Reducing smoking can help to prevent and reduce marine pollution caused by tobacco products.

### SDG 16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

- SDG Target 16.4 – Reducing illicit trade of tobacco products can contribute to reducing organized crime.
- SDG Target 16.5 – A key component of tobacco control is reducing tobacco industry interference in policy-making, which can contribute to reducing corruption in the public policy-making process.

### SDG 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development

- SDG Target 17.1 – Increasing tobacco taxes improves domestic capacity for tax and other revenue collection – generating revenue that can be reinvested in other health priorities.
- SDG Target 17.6 – Exchange of tobacco control experiences can contribute to South-South cooperation and knowledge sharing.

## 1.6 Analysis contained in this report

The analysis contained in this report is based on three pieces of independent modelling commissioned by WHO and the United Nations Development Programme (UNDP) in 2014 and 2015. First, Dr Yang Lian (Chengdu University of Traditional Chinese Medicine, China) and colleagues were commissioned to estimate the direct and indirect economic costs of tobacco use in China in 2014 (updating their previous estimates, which were calculated using data from the 2008 China National Health Services Survey). Second, Dr Stéphane Verguet (Harvard University, United States of America) and colleagues modelled the distribution of health (for example, premature deaths averted) and socioeconomic benefits (for example, cases of impoverishment averted and cases of catastrophic health expenditures averted) across income groups from implementing a smoke-free law and higher tobacco taxes in China, using extended cost-effectiveness analysis (ECEA) methods (32–34). Finally, Professor Christopher Millett (Imperial College London) and colleagues modelled the policy action needed, and the pace and level of commitment and implementation required, to achieve reductions in tobacco use in line with the global NCD targets and China's own national anti-tobacco goals. For more details on the methodologies and mathematical models used, please refer to Annexes A, B and C.

## 2. ECONOMIC AND SOCIAL COSTS OF TOBACCO USE IN CHINA

### Key messages

- China's reliance on revenue from the tobacco industry (the industry contributes substantially to Government revenue) is inconsistent with the vision of a Healthy China.
- The total economic cost of tobacco use in China was approximately ¥350 billion (US\$ 57 billion) in 2014 – a tenfold increase since 2000.
- Tobacco use also imposes significant microeconomic costs on Chinese households, in particular low-income households: household expenditure on cigarettes, smoking-related health-care costs and premature mortality increase the risk of impoverishment.
- The poor and less educated are disproportionately affected by tobacco-related harms and bear the greatest burden of disease and deaths.
- The health and economic impacts of tobacco use may prevent China from reaching its own poverty eradication targets if current high rates of smoking are not reduced.

### 2.1 The tobacco industry's economic contribution to China: a false economy

Tobacco is the only legally available consumer product that kills at least half of the people who use it regularly, when used exactly as intended by the manufacturer. And yet, the Chinese Government profits financially from the manufacture and sale of tobacco, as well as from tobacco taxes collected by the Government.

In 2015, the tobacco industry contributed ¥1.1 trillion (US\$ 170 billion) to the central Government. In 2014, the industry's contribution accounted for 6.49% of total state revenues (35). In some provinces where tobacco growing is a major component of the provincial economy, such as Yunnan, the proportion of state revenue that comes from the tobacco industry is much higher (36).

This is a revenue stream derived from corporations whose business model is to create dependence on a lethal substance – in other words, revenue derived from a product that is killing people, and in doing so, hurting China's health and society. As Chapter 1 outlined, this is inconsistent with the vision of a Healthy China articulated in the *13th Five-Year Plan* and with China's other aspirations for its future, such as the eradication of poverty.

Health-care costs associated with tobacco use in China are increasing, together with the total economic costs of tobacco use in China. These costs are chewing up a proportion of the Government's significant additional investment in health – and the state will bear

**In 2015, the tobacco industry contributed ¥1.1 trillion (US\$ 170 billion) to the central Government.**

an increasing share of these costs as China moves toward universal health coverage. Compounding the health-care costs, tobacco-related productivity and other indirect costs erase the important investments the Government makes in human resource development, particularly education and on-the-job training, when people are killed before a full “return” on these investments is delivered (that is, because premature death results in people exiting the workforce earlier than otherwise expected). Therefore, China’s dependence on tobacco revenue is fundamentally at odds with the Government’s agenda of human-centred development – and as such it is not a sustainable economic growth strategy for the long term.

## 2.2 The economic costs of smoking in China

As Chapter 1 outlined, tobacco use takes an enormous toll on China’s health, with more than 1 million deaths per year in 2014, many of these premature. This number is projected to grow to 3 million by 2050 without action to reduce China’s current smoking rates – especially the very high rates of smoking among men. The preventable death and disease caused by China’s very high rates of tobacco use are also exacting a significant – and growing – toll on China’s economy.

The direct costs of tobacco use include health-care expenditures for treating smoking-related diseases, including respiratory diseases, cardiovascular diseases and cancer. Health-care costs incorporate the cost of inpatient hospitalizations, outpatient visits and self-medication – and include both costs borne by the Government through health insurance as well as costs borne by individuals.

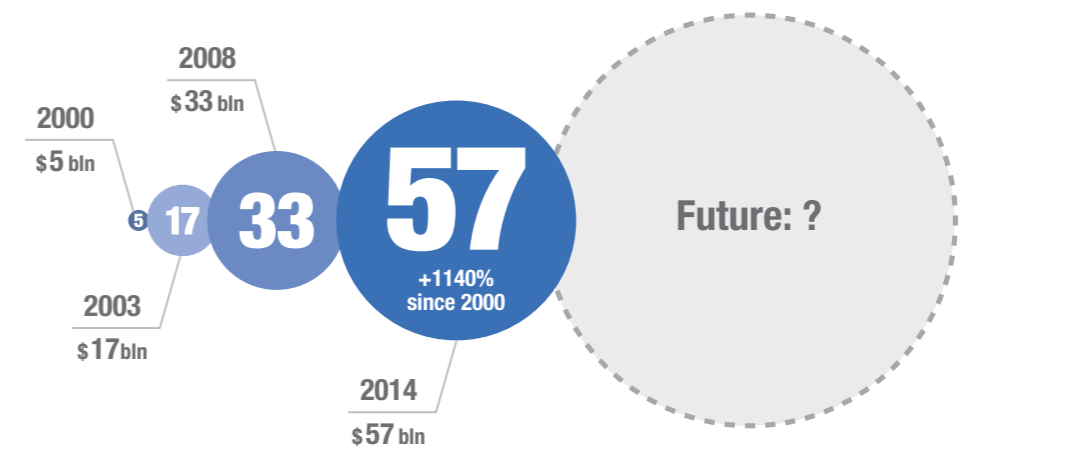
Indirect costs include the costs associated with tobacco-related illness – such as transportation, nutritious supplemental food, and the costs of caregivers incurred during inpatient hospitalizations and outpatient visits, as well as the value of lost productivity caused by smoking-related illness. Indirect economic costs also include the cost of premature deaths caused by smoking-related diseases.

In 2000, the total economic costs of smoking in China were estimated at US\$ 5 billion (comprised of US\$ 1.7 billion in direct costs and US\$ 3.3 billion in indirect costs) (37). In 2003, Yang Lian and her colleagues estimated the total economic cost of smoking at US\$ 17.1 billion (comprised of US\$ 4.2 billion in health-care costs and US\$ 12.9 billion in indirect economic costs). In 2008, the total cost of smoking to the Chinese economy had increased by 70% to US\$ 33 billion (comprised of US\$ 7.2 billion in health-care costs and US\$ 26.2 billion in indirect costs) (38).

In their modelling commissioned for this report, Yang Lian and colleagues estimate that in 2014, the total economic cost of tobacco use in China had increased to approximately ¥350 billion (US\$ 57 billion) – a 97% increase over the 2008 costs, and an approximately tenfold increase on the estimated 2000 costs. This increase is the result of both increasing rates of tobacco-related illness, and significantly higher health expenditure overall. The total costs represent around 0.55% of China’s 2014 gross domestic product (GDP). That the aggregate economic costs of tobacco use in China are growing this rapidly should

be of concern at any time, but especially when China’s overall rate of economic growth is slowing. Without a substantial reduction in the smoking rate, these costs are likely to increase exponentially in the future along with increasing rates of tobacco-related illness.

**Figure 2. Total economic costs of tobacco use in China, 2000–2014**



Source: Yang Lian and colleagues.

(bln = billion)

The direct cost of treating tobacco-related illness in China in 2014 was approximately ¥53 billion (US\$ 9 billion). This is equal to around 1.5% of the ¥3.5 trillion (US\$ 538 billion) spent on health care in China in 2014 (2). The increase in health-care costs from 2008 can be accounted for by both an increase in rates of tobacco-related illness (for example, increasing rates of lung cancer) (39), and increasing overall expenditure on health care as a result of the central Government’s investment in expanding health insurance and health services. However, it should be of concern to policy-makers that any proportion of the Government’s additional investment on health is being spent on treating preventable illness caused by tobacco use, and thus diverted from other health-care needs and priorities – and that the proportion is likely to grow in the future as rates of tobacco-related illness continue to increase.

The indirect costs of tobacco use for China’s economy are a multiple of the direct costs: in 2014, these were estimated to have amounted to ¥296.5 billion (US\$ 48.3 billion). The cost of lost productivity from premature deaths caused by smoking is of particular concern. Modelling by Yang Lian and her colleagues shows that the total number of smoking-attributable years of potential life lost (YPLLs) in China in 2014 was 7.67 million person years, or 15 years on average per smoking-related death. In other words, smokers die 15 years earlier than non-smokers on average, which, as well as imposing costs on the health-care system and the families these smokers leave behind, robs the economy of these years of productive contribution to the workforce and the broader society.

While the economic costs smoking imposes on China, as outlined here, are enormous, it is important to note that the costs are likely largely underestimated for several reasons (Annex A).

**In 2014, the total economic cost of tobacco use in China had increased to approximately ¥350 billion (US\$ 57 billion) – a 97% increase over the 2008 costs, and an approximately tenfold increase on the estimated 2000 costs.**

**Without a substantial reduction in the smoking rate, the economic costs of smoking in China are likely to increase exponentially in the future, along with increasing rates of tobacco-related illness.**

### 2.3 The microeconomic impact of tobacco use – exacerbating poverty and inequity

In addition to the macroeconomic impact of tobacco use, smoking-related illness and death, especially premature death, can also hurt families in several ways – especially low-income households for which the financial impact of tobacco-related illness and death is much greater.

Smoking prevalence is highest in China among men in the most economically productive ages of 25 to 64, of whom approximately six in 10 smoke. Smoking rates are also higher in rural areas than urban areas, in particular in the poorer western regions of China, and people living in rural areas of China are more likely to spend a greater proportion of their annual income on cigarettes than those in urban areas (17.3% in rural areas compared to 8.8% in urban areas). Current smoking rates are highest among blue-collar workers, and this group also consumes more cigarettes per day on average than their white-collar counterparts (11).

China's high rates of male smoking prevalence impact allocation of financial resources within households, and thus household financial stability in several ways.

First, spending on tobacco diverts household funds from basic necessities such as food, education, health care, insurance and housing – contributing to increased rates of poverty (40–44). There is also evidence to suggest that the impact of tobacco use on household expenditures may be compounded by alcohol use because individuals who drink are more likely to smoke, and smokers tend to spend more on alcohol. Where this is the case, an even greater proportion of household expenditures gets diverted to serve addictive behaviors – further increasing the risk of impoverishment (45).

Second, smoking-related illness and death results in reduced workforce participation and productivity, which has a direct bearing on household income. Modelling commissioned by WHO found that the death of a head of household from tobacco-related illness results in an average yearly loss of household income of US\$ 137 (¥933.44) for rural households, and US\$ 370 (¥2503.64) for urban households. And significantly, the effect of lost income is long term: households do not start to recover financially until at least 10 years after the death, and it takes almost 20 years before a household returns to their income trajectory.<sup>6</sup> (Yet the converse is also true: an improvement in adult health status can result in a 16% gain in hours worked and a 20% increase in individual income) (14).

Third, when people who get sick are unable to work, family members often have to take time off school or work to care for them. This further diminishes household earnings, and/or other family members' capacity to improve their own financial position – for instance, in the case of children of sick family members who need to take prolonged time off from school. As noted above, the total economic cost of tobacco-related morbidity would be even greater were these costs able to be included.

<sup>6</sup> Nonnemaker J, Simpson S, Chen Z, RTI International, Effect of head of household death on income: Evidence from a panel of Chinese Households, unpublished paper, April 2015.

Fourth, for families on low incomes, the sometimes very high cost of medical expenses associated with treatment for a disease like lung cancer are difficult, if not impossible, to meet – thus increasing the risk of impoverishment, particularly when out-of-pocket costs for health-care services are high. While China has made great progress in expanding health insurance coverage to over 95% of the population in the last decade, for many people health insurance does not cover the full cost of treatment. For example, in the case of a course of cancer treatment – this can include prolonged hospitalization, outpatient care, drugs such as chemotherapy, and the cost of travel to receive specialized care if it is not available close to home. As a result, for many families, the out-of-pocket costs of treatment for conditions such as cancer can be catastrophic – that is, health-care expenditure can cause the family to drop below the poverty line. These costs mean some families will be forced into poverty, or prevented from being lifted out of it. A recent study found that 9.2% of households in rural China were driven into poverty due to health-care expenditure. Households with one or more members with chronic diseases were nearly twice as likely to experience medical impoverishment as compared with households without such members (46).

In this scenario, some families will choose to forgo treatment for their sick family member; as noted above, according to the 2013 National Health Services Survey, 17% of people who needed hospitalization in 2014 were not hospitalized, and of this group 43% did not go to hospital because they could not afford the cost (47). Again, the total economic cost of tobacco-related morbidity would be even greater were these costs included. Further, forgoing medical treatment because of cost can itself be a poverty trap – as it increases the impact of illness on the household (for example, through reduced workforce participation and earnings of the sick family member) and increases the likelihood of death from the disease not being treated, resulting in loss of the “breadwinner”. In other words, many health-care costs associated with tobacco use are hidden and unrecognized.

One group of particularly vulnerable people is the rural-to-urban migrants who move to cities in search of better economic and educational opportunities. This group of Chinese citizens is more likely to smoke. Several studies have shown that smoking levels among migrants are positively associated with migration years, number of cities in which the migrants had worked, living in rental properties and number of jobs held (48,49). In other words, the more migrant workers move around among cities, homes and jobs, the more likely they are to smoke. While recent reforms to China's *hukou*<sup>7</sup> household registration system may improve the capacity of migrant workers to access health care, many in this group may still have inadequate access to social welfare services and thus be particularly vulnerable to smoking-attributable catastrophic medical expenditures.

In each of these ways, tobacco use and the illness and death that result from it compounds existing inequities in China – both in terms of access to health care, as well as income inequalities more broadly. Accordingly, Chapter 3 shows that the potential gains from implementation of strong tobacco control policies are likely to be proportionately greater for the poor.

<sup>7</sup> The official social service registration system in China, which enables citizens to access education and healthcare only in their place of registration and is gradually being reformed and opened up to all rural-urban migrants.

**For many families, the out-of-pocket costs of treatment for conditions such as cancer can be catastrophic - that is, health-care expenditure can cause the family to drop below the poverty line.**

**Smoking prevalence is highest in China among men in the most economically productive ages of 25 to 64, of whom approximately six in 10 smoke.**

## 2.4 Tobacco use will prevent China from achieving its poverty eradication goal by 2020

China has made remarkable progress in poverty alleviation over the last few decades: China was the first developing country to meet the Millennium Development Goals (MDGs) target of halving its poverty rate, ahead of the 2015 deadline. Around 440 million people have been lifted out of poverty in China since 1990. Building on this remarkable achievement, at the Fifth Plenary Session of the 18th CPC Central Committee held in October 2015, President Xi outlined his vision for China to eradicate poverty by 2020 (50). The health and economic impacts of tobacco use are a direct threat to this goal being achieved – by forcing many Chinese families into poverty, and preventing others from escaping it.

## 3. ECONOMIC AND SOCIAL BENEFITS OF TOBACCO CONTROL

### Key messages

- Tobacco control policies are pro-poor and will contribute to alleviating poverty and improving equity, disproportionately benefiting people with the lowest incomes.
- Of all tobacco demand-reduction measures, increasing tobacco taxation would deliver the single greatest benefit to health and the economy. For instance, increasing the retail price of cigarettes by 50% could lead to 47 million fewer male smokers and 20 million fewer premature deaths, a gain in annual excise revenue by US\$ 66 billion, and avert nearly 8 million cases of impoverishment and 13 million cases of catastrophic medical expenditures.
- However, a comprehensive package of tobacco control policies – in particular including a national smoke-free law as a crucial next step – is necessary to deliver sustained reductions in smoking rates over time.

### 3.1 Tobacco control policies benefit poorest people the most

China stands to reap enormous benefits if strong tobacco control measures are urgently and vigorously scaled up. Tobacco control policies save lives, help the economy and are pro-poor. This is contrary to the tobacco industry's claims that: (1) tax increases will lead to loss in tax revenues; (2) that tobacco taxes are regressive (that is, borne mostly by the poor); and (3) that tobacco control will negatively affect employment and income. The modelling commissioned for this report – consistent with a large body of international evidence – shows that tobacco control policies benefit the poorer portions of the populations the most. In particular, increasing taxes on and prices of cigarettes will reduce the number of smokers and premature deaths, with these health benefits accruing disproportionately to lower-income households. In addition, tobacco taxation increases provide significant additional revenue to government, the vast majority of which is contributed by people on higher incomes, rather than the poor. Tobacco control policies could help to avert millions of impoverishments and catastrophic health expenditures.

**Increasing taxes on and prices of cigarettes will reduce the number of smokers and premature deaths.**

### 3.2 Tax increases can save millions of lives

There is now an overwhelming amount of international evidence to show that of all tobacco demand-reduction measures, tobacco tax increases have the single greatest impact on smoking prevalence, volume of tobacco products consumed and premature deaths averted.

In May 2015, China's Ministry of Finance announced an increase to tobacco taxation in China: the tax applied at wholesale was increased from 5% to 11% and a new, specific excise tax of ¥0.005 per stick, or ¥0.1 per pack of 20 cigarettes. Significantly, for the first time in

**Increases in tobacco taxes and prices most benefit the poor and the young. This is because poor people and young people reduce their consumption the most when tobacco prices increase, as they are most sensitive to price changes.**

more than a decade the tax increase was passed on to the retail prices of cigarettes, which increased by around 10% on average, with the price of the cheapest brands increasing by as much as 20%. WHO's analysis of the one-year impact of the tax increase shows that the total number of cigarettes sold fell by 3.3% between April 2015 and March 2016. The decrease in total volume included a 5.5% reduction in total sales in the cheapest class of cigarettes – suggesting that it was low-income smokers who reduced cigarette consumption the most. The tax increase also contributed to approximately ¥70 billion (US\$ 11 billion) in additional tobacco related tax revenue to the central Government in 2015.

However, further sustained tobacco tax and price increases will be necessary if China is to achieve the global NCD target of a 30% relative reduction in current tobacco use prevalence among those 15 years and above by 2025. Chapter 4 will outline in more detail the policy path needed for China to achieve that target.

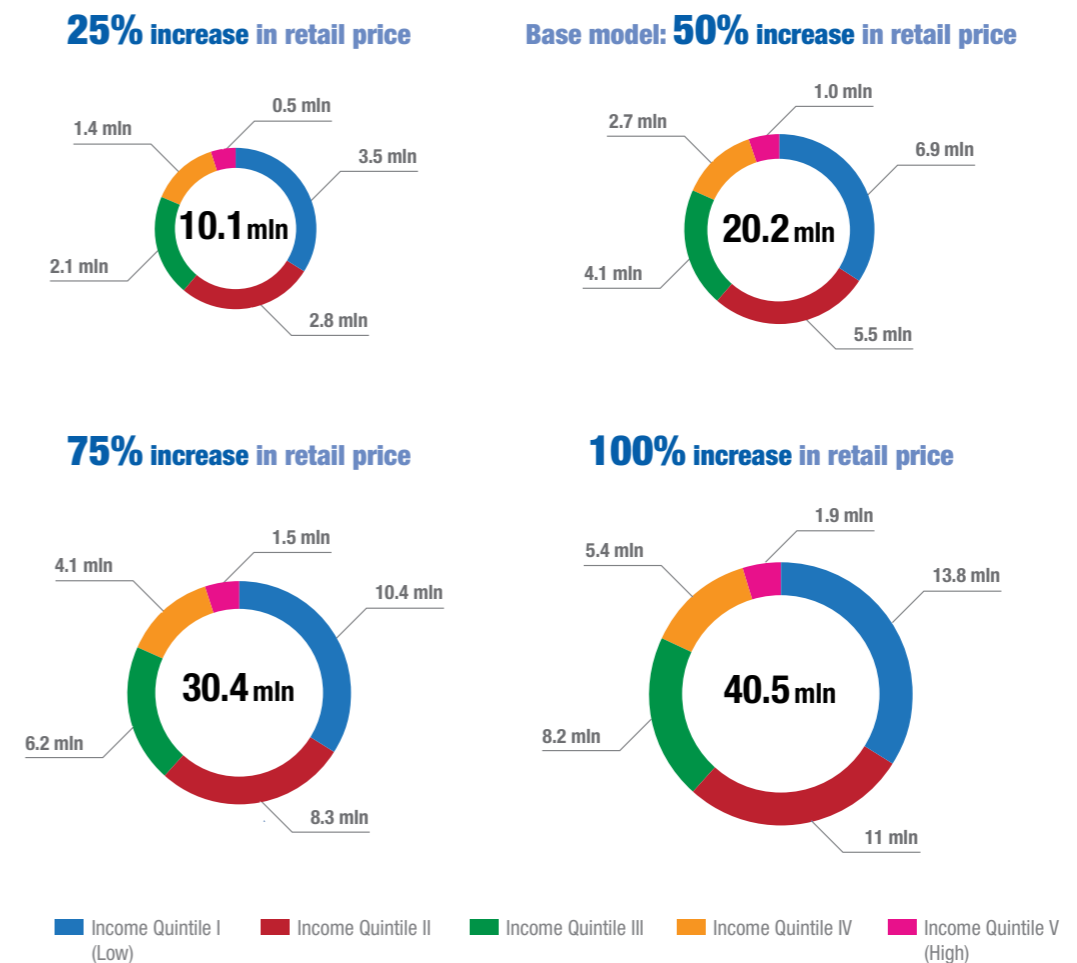
In addition to the substantial health benefits to the population that flow from tobacco tax increases as a result of decreases in tobacco consumption and smoking rates, our analysis also shows that increases in tobacco taxes and prices most benefit the poor and the young. This is because poor people and young people reduce their consumption the most when tobacco prices increase, as they are most sensitive to price changes. Consequently, the health benefits of tobacco tax increases disproportionately accrue to people in these groups.

The modelling commissioned for this report shows that if the Chinese Government increased the average retail price of each pack of cigarettes by 50%, this would reduce the number of male smokers by as much as 47 million, with 20 million premature deaths averted over 50 years as a result. More than half of these averted deaths (12 million) would be in the two lowest income quintiles, compared to 5% of premature deaths averted in income Quintile V – as shown in Figure 3. Among men above 25 years of age who would continue to smoke despite such a price increase, cigarette consumption would be expected to decrease substantially – with the greatest reductions in consumption among the young (25%) followed by the poor (19%) and the rich (3%)<sup>8</sup>.

As Figure 3 also shows, the greater the tax (and price) increase, the greater the number of lives saved: if taxes were increased by 75% or 100%, 30 million to 40 million premature deaths would be prevented over 50 years, again with the vast majority of these in the lowest income groups. Tobacco taxation is thus not only a tobacco control policy, but also a tool for achieving greater equity.

<sup>8</sup> Verguet S, Gauvreau CL, Jha P, Liu L, Mishra S, Tarr G, et al., Equity and poverty alleviation benefits of tobacco tax and smoke-free workplaces in China: A modeling study, unpublished paper, 2015.

**Figure 3. Impact of excise tax rises on premature deaths averted (in millions) in China, over 50 years**



Source: Verguet and colleagues.

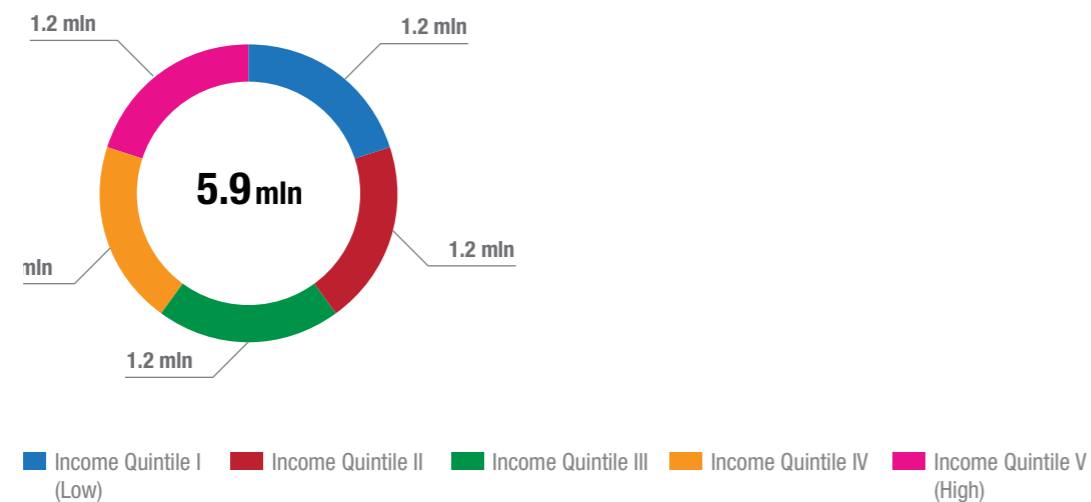
(mIn = million)

### 3.3 Protecting health through smoke-free public places

Tobacco tax and price increases need to be accompanied by other comprehensive and well-enforced smoking reduction policies, as the WHO FCTC makes clear. A crucial next step for tobacco control in China is the adoption and enforcement of a strong national law to make all indoor public places and workplaces in the country 100% smoke free. Exposure to second-hand smoke is a significant health problem in China: more than 700 million people are routinely exposed to deadly second-hand smoke, with an estimated 100 000 people dying every year as a result (3). The WHO FCTC requires that all indoor public places be made completely smoke free, as this is the only way to effectively protect against exposure to second-hand smoke. Governments have an obligation to protect people from exposure to toxic, carcinogenic second-hand smoke.

In addition to the important public health benefit of protecting hundreds of millions of Chinese people from hazardous exposure to second-hand smoke, modelling conducted for this report shows that a complete nationwide ban on smoking in workplaces (that is, offices) alone would reduce prevalence of smoking among Chinese men alive today by 13 million people, and in doing so avert 6 million premature deaths among smokers (Figure 4).<sup>9</sup> Obviously, the number of deaths averted will be even larger for a national ban on smoking in all public places (that is, a ban which extends beyond just offices to include other public places such as restaurants, bars, cafes, hotels, shopping centres, public transport facilities, hospitals and others). Draft national regulations on making all public places in China smoke free were released by the State Council's Legislative Affairs Office in November 2014, but have not been adopted at the time of publication of this report.

**Figure 4. Impact of a smoke-free workplace policy on premature deaths averted (in millions) in China, over 50 years**



Source: Verguet and colleagues.

(mln = million)

These results are consistent with a 2014 study by Levy and his colleagues, which modelled the potential health impact of a comprehensive tobacco control programme in China from 2015–2050 (51). Levy's model, Simsmoke, projects that comprehensive implementation of the all WHO FCTC policies contained in the MPOWER package (smoke-free public places, offering assistance to smokers to quit, warning against the dangers of tobacco consumption through both large graphic warnings on packs and mass media advertising campaigns, comprehensive bans on tobacco advertising, promotion and sponsorship, and raising tobacco taxes and prices)<sup>10</sup> would lead to a 34% relative reduction in male smoking prevalence by 2020, and a 41% reduction by 2050. In line with our modelling, Levy's work shows that tobacco taxation increases are the single most effective policy, but that a comprehensive package of tobacco control policies – especially including measures to

<sup>9</sup> Ibid.

<sup>10</sup> See <http://www.who.int/tobacco/mpower/en/>

make all public places smoke free – will be needed to produce sustained reductions in the prevalence of smoking in China over time.

### 3.4 Tobacco control policies can alleviate poverty

In addition to the significant health benefits, tobacco control measures can also contribute to other important policy objectives – in particular poverty alleviation. Smoking-related health-care costs and premature mortality or disability increase the risk of impoverishment, particularly among the poor and less educated. Thus, tobacco control policies that reduce consumption can actually alleviate poverty.

Modelling commissioned for this report estimated possible cases of impoverishment and catastrophic medical expenditures averted by stronger tobacco control policies, specifically excise tax increases and a smoke-free workplace policy.<sup>11</sup> Averted cases of medical impoverishment were calculated as individuals for whom the simulated income was above US\$ 1.25 per day (the international poverty threshold) but whose annual net income would have decreased to less than US\$ 1.25 per day after paying for tobacco-related disease treatment. Averted cases of catastrophic expenditures were calculated as individuals for whom the averted medical expenses would have totalled 10% or more of their simulated household consumption expenditures.

According to our modelling, increasing the current retail price of cigarettes in China by 50% would avert 8 million cases of impoverishment and 13 million cases of catastrophic medical expenditures over 50 years, primarily among the poor. And the greater the tax increase; the greater the benefits. For example, increasing the excise tax by 75% would increase the benefits by preventing almost 12 million impoverishments and 20 million catastrophic medical expenditures, again with the greatest share of the benefits concentrated among lower-income groups.

Implementing and enforcing a smoke-free workplace policy would avert a further 2 million cases of impoverishment and 4 million cases of catastrophic medical expenditures. As with tobacco taxation increases, the greatest share benefits accrue to people in the lowest income groups (Figure 5).

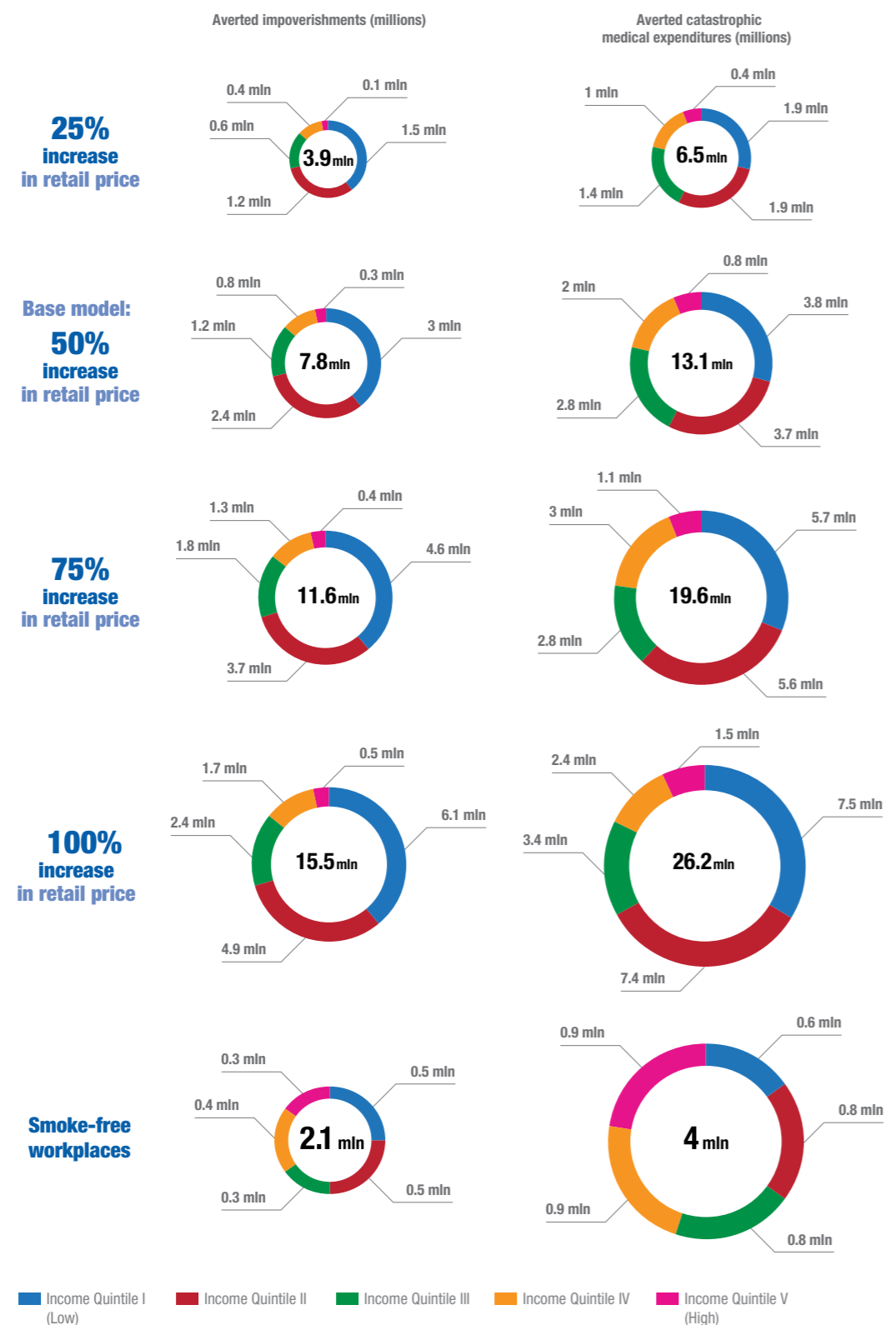
These results show that tobacco tax increases and a national smoke-free law could prevent millions of cases of catastrophic medical expenditures – expenditures that can cause families to fall into a poverty cycle that lasts generations. In helping so many millions of families avoid a medical cost-induced poverty trap, tobacco control policies can help China to achieve its goal of eradicating poverty by 2020.

<sup>11</sup> Verguet S, Gauvreau CL, Jha P, Liu L, Mishra S, Tarr G, et al., Equity and poverty alleviation benefits of tobacco tax and smoke-free workplaces in China: A modeling study, unpublished paper, 2015.

Implementing and enforcing a smoke-free workplace policy would avert a further 2 million cases of impoverishment and 4 million cases of catastrophic medical expenditures.



**Figure 5. Impact of tobacco control policies on averted impoverishments in China, over 50 years**



Source: Verguet and colleagues.

(mln = million)

### 3.5 Raising tobacco taxes provides more revenue to government

In addition to extensive health, economic and social benefits of tobacco taxation policies, raising tobacco taxes also delivers significant revenue to government. Hence, tobacco tax increases are the classic win-win policy. And contrary to claims made by opponents of tax increases, such as the tobacco industry, tobacco tax increases are not necessarily regressive – as the tax burden can fall primarily on wealthier smokers (because poor smokers are more price sensitive and thus more likely to quit). Figure 6 shows that the majority of the additional excise tax revenues generated by increasing the retail price of cigarettes would be contributed by people with high and middle incomes in China (income quintiles III, IV and V).<sup>12</sup>

**Figure 6. Impact of tobacco control policies on annual excise tax revenues**



Source: Verguet and colleagues.

Tobacco control policies can therefore benefit the poor and most vulnerable twice: first, by protecting health and averting impoverishment; and second by reinvesting additional government revenue from tobacco taxation increases, together with the longer-term savings in health-care costs, into other tobacco control and health priorities, such as providing support to smokers to quit and resources for enforcement of smoke-free policies, supporting tobacco farmers to move to alternative forms of livelihood, and contributing to health insurance reform and improvements to health service delivery to support the goal of universal health coverage. The Philippines is an excellent case study of this approach – where the revenue from a tobacco tax increase was used to finance expansion of the health-care coverage for the poor and most vulnerable people in the country (see box on page 23).

<sup>12</sup> Ibid.

**Box 1. The Philippines: taxing tobacco and alcohol to reduce inequities (52, 53)**

- In 2013, the Government of the Philippines announced a series of reforms to tax policies on alcohol and tobacco – including an increase to tobacco taxes, which included a legal requirement for future yearly tax increases. As a result, between 2013 and 2016 tobacco taxes increased from 12 Philippine pesos (US\$ 0.25) to 25 Philippine pesos (US\$ 0.53) for cigarettes with a net retail price of 11.50 Philippine pesos (US\$ 0.24) and below; and from 25 Philippine pesos (US\$ 0.53) to 29 Philippine pesos (US\$0.62) for those with a higher retail price. A single tax rate of 30 Philippine pesos per pack will be imposed starting in 2017, rising by 4% every year thereafter.
- The new law requires the Government to allocate 80% of the additional revenue raised by the tax increase to boosting the national health system by expanding the health insurance programme towards universal health coverage, training doctors and nurses, strengthening medical services, especially NCD prevention services in primary care, and upgrading medical facilities. A further 15% of the extra revenue has been allocated to support alternative livelihood programmes for tobacco farmers who want to change their source of income.
- Within the first year, the tax increase raised more than US\$1.2 billion that provided health care to an additional 14 million families or 45 million Filipinos. This increased to US\$2 billion in the following year. To date, US\$3.9 billion have been raised, with 80% of the new revenue coming from tobacco taxes. In 2011, a bit less than three quarters of the population was enrolled in the national health insurance programme, PhilHealth. By 2015, the coverage rate had increased to 82%. At the same time, tobacco smoking rates have been declining. Thus, the additional revenue from tobacco tax increases has benefitted the poorest and most vulnerable Filipinos – both by reducing the likelihood that they will smoke, and supporting access to better health services.

## 4. THE POLICY PATH TO REDUCING TOBACCO USE IN CHINA

### Key messages

- Stronger tobacco control policies are required just to stabilize the current smoking rate in China.
- However, a comprehensive package of tobacco control policies is required to achieve targeted reductions in smoking rates. But the weaker the non-tax interventions, the steeper the tax rises will need to be in order to achieve the same socioeconomic benefits.
- Strong enforcement of non-tax tobacco control policies, especially bans on smoking in public places, is required to achieve the full potential benefit of these policies.
- The stronger the tobacco control policy interventions, the greater the health, social and economic benefits.
- The conflict of interest inherent in the tobacco industry's involvement in China must be removed in order for effective implementation of tobacco control policies to be achieved.

### 4.1 Modelling the policy path to reducing smoking rates in China

Chapter 3 described the socioeconomic benefits that China could reap from the implementation of tobacco control policies. In this chapter, two scenarios for the future are presented: first, the no-change scenario in which no new tobacco control policy measures are implemented; and second, the specific path of strong policy measures that will be required to reduce tobacco use in China in line with the global NCD target of a 30% relative reduction in prevalence by 2025, and in doing so to contribute to meeting China's broader health and poverty elimination goals.

### 4.2 The no-change scenario

In modelling commissioned for this report, Christopher Millett and his colleagues analysed the annual smoking initiation rate among men needed just to maintain over time the current smoking prevalence of 28% (Table 1). In the 15–24 age group, based on current rates of quitting, the number of men starting up smoking needs to be kept to 0.10% (1 in 1000) per year in order for the current smoking rate to stabilize. Given one third of men in this age group smoke already, and that most Chinese male smokers start up when they are young (the mean age of smoking initiation among men in China is 21) (54), this will be very difficult to achieve. The smoking rate among women will also need to be kept low across all ages if the overall adult smoking rate is not to increase.

**The number of men starting up smoking needs to be kept to 0.10% (1 in 1000) per year in order for the current smoking rate to stabilize.**

**Table 1. Annual smoking quit rate and smoking initiation rate needed to maintain constant smoking prevalence**

Age group	Smoking prevalence (%) GATS 2010		Annual smoking quit rate (%) GATS 2010		Smoking initiation rate needed (%)	
	Men	Women	Men	Women	Men	Women
15 to 24	33.6	0.7	0.04	0.00	0.10	-
25 to 44	59.3	1.6	0.52	0.05	0.98	-
45 to 64	63.0	3.2	1.19	0.12	2.27	-
65+	40.2	6.7	1.02	0.10	0.80	-

Source: Global Adult Tobacco Survey (GATS) (2010).

Even if the current smoking rate is maintained, given population projections, the actual number of smokers in China is likely to significantly increase in the future without an vigorous scaling up of tobacco control policies.

Between 2010 and 2015, the adult smoking prevalence rate in China remained fairly stable at around 28% – but because of the growth in China's population, the actual number of smokers increased by some 15 million (from 300 million to 315 million). Should this trajectory continue in the future – that is if smoking rates remain stable at 28% or decrease only very slightly – by 2020, the number of smokers in China will grow to 325 million, and by 2025 the total number of smokers will reach close to 340 million.<sup>13</sup>

In other words, based on current rates of quitting, stronger tobacco control policies will be required to either increase the quitting rate or reduce the rate of new smokers starting up, just to stabilize the current adult smoking rate of 28%. But even if the current smoking rate is maintained, given population projections, the actual number of smokers in China is likely to significantly increase in the future without an vigorous scaling up of tobacco control policies.

If this is the case, annual deaths from tobacco in China will increase to 2 million per year by 2030 and 3 million by 2050. Of the 300 million boys and men currently 29 years old or younger, 100 million will die a tobacco-related death, many of these prematurely. The cost to China of these unnecessary deaths will be enormous: in costs to the national health system for treating tobacco-related illnesses; in the costs to China's economy from lost productivity and reduced workforce participation (particularly of working-age males); and in the costs to millions of Chinese families that will be impoverished as a result of tobacco-related illnesses and premature death – all costs which can be averted by preventing tobacco use.

<sup>13</sup> Analysis based on United Nations projected population figures.

### 4.3 A policy path to sustained reductions in smoking rates in China

The alternative to the no-change scenario outlined above is the implementation of a comprehensive package of tobacco control interventions that will reduce tobacco consumption and also help China avoid some of the catastrophic socioeconomic costs.

The modelling commissioned for this report analysed the likely impact of a range of different combinations of policy packages (Figure 9). Consistent with previous studies, our modelling shows, first, that that tobacco tax and price increases will make the greatest contribution to reducing smoking prevalence, preventable deaths and impoverishments in China. Second, that without a comprehensive package of policies, even greater tobacco tax increases will be needed to achieve sustained reductions in smoking rates. For instance, in the absence of non-tax tobacco control policies, tobacco tax will need to be increased by around 100% in order for smoking rates to be reduced in line with the global NCD target. In other words, the weaker the non-tax interventions, the steeper the tax rises will need to be in order to achieve comparable socioeconomic benefits.

The soundest approach is a comprehensive package of tobacco control policies.

The soundest approach is a comprehensive package of tobacco control policies – including a substantial tax increase (of at least 50%) and sustained future price increases, as well as other demand-reduction measures such as marketing bans, warning labels on packages and mass media campaigns, support for smokers to quit, and, crucially for China, a national law to make all public places smoke free. A strong, well-enforced national smoke-free public places policy is urgently needed to protect non-smokers from the hazards of second-hand smoke exposure – and to help ensure that all Chinese people can exercise the right to clean air. A national smoke-free law is also needed to achieve the social norm change that leads to sustained reductions in the smoking rate over time.

### 4.4. Enforcement of non-tax interventions is key

Implementation of a comprehensive package of tobacco demand-reduction interventions (that is, tax increases, smoke-free public places, tobacco advertising bans, pack warnings, mass media campaigns and brief cessation advice) can reduce smoking prevalence to varying degrees depending on the mix of policies implemented (Figure 9).<sup>14</sup> It is clear that while excise tax policies have the single greatest impact, other policies such as a comprehensive smoke-free law and a complete advertising ban have an important role to play in reaching the targeted reductions in smoking prevalence.<sup>15</sup> And experience the world over has shown that only a comprehensive package of policy measures will achieve the social norm changes needed to reduce smoking rates over the long term.

However, to have the desired impact on smoking rates, strong enforcement of non-tax policies is crucial. Other research has shown that without strong enforcement the impact of non-tax interventions would be weakened by around 50%. Applying these estimates to the smoking reductions modelled here finds that even steeper tax increases would be needed to achieve the same overall effect (51).

<sup>14</sup> Millett C, Basu S, Laverty A, et al., The policy paths for achieving the WHO NCD goal of 30% relative reduction in tobacco use in China by 2025, unpublished paper, 2015

<sup>15</sup> Ibid

**Figure 9. Estimates of smoking prevalence in China in 2015 and 2025 after implementation of WHO FCTC demand-reduction interventions**

	2015 actual prevalence	2025 actual prevalence	relative % reduction
Baseline	28%	28%	0%
2015 tax increase from 41% to 44.43% of retail price	28%	27.2%	-3.2%
50% increase in tax from 44.43% to 66.65% of retail price	28%	22.8%	-19%
66.68% increase in tax to 75% of retail price	28%	20.8%	-26.1%
100% increase in tax from 44.43% to 88.86% of retail price	28%	17.4%	-38%
Smoke free workplaces	28%	27.1%	-3.6%
Comprehensive tobacco advertising ban	28%	26%	-7.5%
Pack warnings on tobacco products in line with Article 11 implementation guidelines	28%	26.9%	-4.3%
Mass media campaigns warning of the dangers of tobacco use	28%	26.7%	-5%
Brief cessation advice from health-care professionals	28%	26.9%	-4.3%
50% increase in tax from 44.43% to 66.65% of retail price plus other policies	28%	17.6%	-37.2%
Tax rise to 75% of retail price plus other policies	28%	16.1%	-42.7%

Source: Millet, Basu & Laverty, The policy path to reducing tobacco use (see Annex C).

### 4.5. Tobacco Industry interference

A critically important issue for the effective implementation of tobacco control policy in China is the role of the tobacco industry. Effective tobacco control is, by definition, antithetical to the economic interests of the tobacco industry, associated industries, and entities or people working to further the tobacco industry's agenda. The tobacco industry has a proven track record of interference in the introduction of strong tobacco control policies – in China, and around the world.

Yet in China, the State Tobacco Monopoly Authority (STMA) sits on the Government committee that oversees implementation of the WHO FCTC<sup>16</sup> and is the lead agency on

<sup>16</sup> The Ministry of Industry and Information Technology (MIIT), which oversees the STMA, is the chair of China's WHO FCTC Implementation Coordination Committee.

several areas of tobacco control policy directly relevant to WHO FCTC requirements, such as tobacco prices, packaging requirements and point-of-sale regulations. This is a fundamental conflict of interest, and it is clearly in violation of Article 5.3 of the WHO FCTC – which requires that “in setting and implementing their public health policies with respect to tobacco control, Parties [to the WHO FCTC] shall act to protect these policies from commercial and other vested interests of the tobacco industry in accordance with national law”. China will need to address this conflict of interest – by removing the STMA from all links with the tobacco industry and WHO FCTC implementation – if it wants to successfully combat the impact of tobacco use in the country over the long term.

The evidence in this report refutes many of the false claims about the impact of strong tobacco control policy made by the tobacco industry both in China and internationally (Table 2).

**Table 2. Rebutting tobacco industry myths**

Tobacco industry's false claims	Our findings
1) <b>Raising tobacco taxes is a regressive tax measure and unfairly burdens the poorer portions of the population.</b>	Taxes on health-harming products are not regressive, contrary to industry claims. Their multiple benefits – in health, poverty, education and opportunity – accrue mostly to the poor. People with the lowest incomes benefit disproportionately as they are most sensitive to price changes and will reduce their consumption of tobacco in response to tax and price increases, which will in turn reduce the health and socioeconomic impact of tobacco on these groups by preventing them from becoming impoverished and dying prematurely. Meanwhile, wealthier users, whose use typically declines less relative to price increases, wind up paying the majority share.
2) <b>Tobacco control measures lead to loss in tax revenues.</b>	Increasing tobacco taxes leads to additional tax revenue to government, which can be reinvested in other health priorities such as health reform.
3) <b>Tobacco control measures result in loss of livelihoods for tobacco farmers.</b>	Moving away from tobacco production towards alternative forms of livelihood such as food crops can increase income for farmers (55), as well as prevent environmental degradation thereby protecting agricultural land and the food production system.
4) <b>Tobacco control measures are bad for the economy, particularly during an economic slowdown.</b>	The right mix of tobacco control policies supports economic growth by lowering long-term health and socioeconomic costs of smoking, improving productivity and workforce participation, and increasing the disposable income of low-income families.

Experience the world over has shown that only a comprehensive package of policy measures will achieve the social norm changes needed to reduce smoking rates over the long term.

## 5. CONCLUSIONS AND RECOMMENDATIONS

Chinese Premier Li Keqiang said that “health is at the root of happiness”. But to realize the vision set out in the *Healthy China 2030* Plan, the country must break its current addiction to tobacco use.

China has taken some important steps forward on tobacco control in recent years. However, this report makes clear that far more needs to be done – first, to reduce the enormous health, economic and social costs caused by tobacco use and to avoid these costs becoming catastrophic in the future; second, in order for China to meet the agreed global NCD target for reducing tobacco use, to meet its international legal obligations as a Party to the WHO FCTC, and to become a global leader in implementation of the SDGs; and third, for the country to meet its own national goals of eradicating poverty, achieving sustainable economic growth and attaining the highest possible standard of health for all its people. If adopted, the following recommendations will help to set China on the path to realizing these ambitions.

The massive health and economic costs of tobacco use in China have increased tenfold in the last decade and a half. The future rate of increase will be exponential if current smoking rates do not decrease sharply. In addition to the macroeconomic impact of lost productivity and avoidable health-care and social welfare costs, the high burden of tobacco-related illness is aggravating existing inequalities in Chinese society – in terms of access to health care and income inequality more broadly – with millions of people and families impoverished as a result. The poor and the less educated are disproportionately affected by tobacco use, and consequently bear the greatest burden of disease and death.

Yet it is possible for China to chart a new course: by rapidly scaling up strong tobacco control policies, not only can China improve health outcomes for its people, it can also alleviate poverty and reduce existing inequities and social disparities. Steep increases in tobacco taxation will have the single greatest impact in terms of premature deaths avoided, health-care costs saved and impoverishments averted, and would also deliver a financial windfall to the central Government in the form of significant additional tax revenue. However, a comprehensive package of tobacco control policies – starting with the adoption of a strong, 100% national smoke-free law – is also necessary, both to protect the health of non-smokers and achieve the changes in social norms and attitudes that will be required for sustained reductions in smoking rates over time. China’s poorest and most vulnerable citizens would be the greatest beneficiaries of such an approach.

China led the way in the achievement of many of the MDGs. China also played a leading role in the adoption of the 2030 Agenda for Sustainable Development. For the world to achieve its new goals of improving health, eradicating poverty and reducing inequality – and deliver on the promise of a better world encapsulated in the SDGs – China will need to lead again. Through the adoption of a bold policy agenda to reduce tobacco use, China has a chance to do this – and in doing so, to show the international community what can be achieved for the people’s benefit when evidence-based decision-making and leadership come together.

**It is possible for China to chart a new course: by rapidly scaling up strong tobacco control policies, not only can China improve health outcomes for its people, it can also alleviate poverty and reduce existing inequities and social disparities.**

## RECOMMENDATIONS

### 1. Adopt a strong, comprehensive national smoke-free law urgently

The adoption of a strong, national smoke-free law is a crucial next step for tobacco control in China. Building on the success of Beijing and other cities, a strong national law, fully compliant with Article 8 of the WHO FCTC, and accompanied by a robust, well-resourced national enforcement plan, is necessary to protect China’s 1.3 billion citizens from the serious health hazards of exposure to second-hand smoke. This report shows that such a law would also deliver significant benefits to China’s economy – in terms of lives saved, economic productivity gained and impoverishments averted.

The right of every Chinese citizen to enjoy the highest attainable standard of health will never be realized without effective protection from involuntary exposure to second-hand smoke. A partial smoking ban (that is, a law which provides exemptions from the requirement for all indoor public places to be 100% smoke free) will not achieve this. International experience shows that strong smoke-free laws are also crucially important in shifting social norms around the acceptability of tobacco use.

The State Council’s 2014 draft national smoke-free regulations should be adopted and implemented in full, without exemptions or loopholes, and without delay.

### 2. Increase tobacco taxes further, and entrench future increases to reduce affordability over time

In line with a very strong body of international evidence, we find that increasing tobacco taxes and prices is the policy measure that will have the single biggest impact on reducing tobacco consumption. Increasing tobacco taxes and prices will also make the single greatest contribution to mitigating the devastating socioeconomic consequences of China’s current high rates of tobacco use. Increasing tobacco taxes and prices is a “win-win” for governments: it not only delivers the public health benefit of reduced tobacco consumption, but also leads to increased revenue that can be reinvested in other health or government priorities.

Building on the tobacco tax and price increase announced in May 2015, China should move to increase tobacco taxes and prices by at least 50%, with further, structured increases in subsequent years so that tobacco taxation accounts for at least 70% of the retail price of all tobacco products, with the objective of continually decreasing affordability of tobacco products over time.

### 3. Adopt a comprehensive package of other demand-reduction measures

The most effective approach to reducing smoking rates over the long term is a comprehensive package of effective demand-reduction measures. A comprehensive approach is necessary both for decreasing smoking rates and the volume of tobacco consumption in the short and medium terms, but also for changing social norms and attitudes towards smoking over the medium-long term in order to achieve sustained reductions in smoking rates.

Accordingly, before the end of 2018 China should move to devise and implement a comprehensive package of other tobacco demand-reduction measures – a comprehensive ban on tobacco advertising, promotion and sponsorship (building on strengthened restrictions on tobacco advertising that have been in place since September 2015); scaled-up roll-out of sustained mass media campaigns on the dangers of tobacco use; introduction of graphic warnings on the harms of tobacco use covering at least 50% of tobacco packages; and expanded support for existing smokers to quit – including through providing support for cessation products and therapies in national health insurance schemes and by introducing innovative approaches such as use of mobile and digital technology (mHealth) that will enable support for quitting to be provided on a large scale.

### 4. Eliminate tobacco industry interference from tobacco control policy-making, in line with the WHO FCTC

The successful implementation of the recommendations outlined above will only be possible by removing the conflict of interest that currently exists in China. To prevent the tobacco industry from having a direct role in tobacco control policy-making, a “firewall” between the tobacco industry and tobacco control policy in China must be established and monitored.

The State Tobacco Monopoly Authority (STMA) and the Ministry of Industry and Information Technology (MIIT) should be removed from having any responsibility for tobacco control policy. A new body responsible for WHO FCTC implementation and tobacco control policy should be established directly under the State Council, with the National Health and Family Planning Commission as the lead ministry. All regulatory responsibilities relating to tobacco control currently sitting with the STMA and MIIT should be transferred to the new State Council body, or delegated by the new body to other ministries.

This arrangement would maintain China's current multisectoral, whole-of-government approach to tobacco control policy, but ensure greater transparency, accountability and effectiveness by ensuring tobacco control policy is free of interference from the vested interests of the tobacco industry.

The Government of China should immediately establish a cross-ministerial working mechanism to design the detail of the new governance arrangements, and a staged transition plan to their implementation.

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## ANNEXES

### Annex A. Summary of Economic costs attributable to smoking in China 2014

By Yang Lian, Tehwei Hu, Zhongzheng Mao, and Qun Sun

#### Data sources

The primary data used in this paper were drawn from the fourth wave of the National Health Services Survey (NHSS) conducted by the Ministry of Health in China in 2008. We calculated the adjustment factor by dividing the out-of-pocket health expenditure for 2008 by the out-of-pocket health expenditure for 2014 and then applied this adjustment factor to the estimated the direct costs in 2014 from the direct costs in 2008. The relative risk of mortality for smoking came from a study by Gu and colleagues (1). GDP per capita and population numbers by age were from *China Statistical Yearbook* 2014. Death rates by rural/urban district, gender, age and diseases came from the *China Health and Family Planning Yearbook* 2014. Expectancy life years by age were from the WHO website (2).

#### Methodology

We divided the economic costs of smoking into two components: direct costs and indirect costs. We used the prevalence-based, disease-specific approach to measure the costs of smoking-related diseases and deaths in a given year (2008) caused by current and past smoking. Three kinds of smoking-related diseases were included: cancer (ICD-10: C00–C97); cardiovascular diseases (ICD-10: I00–I99); and respiratory diseases (ICD-10: J00–J99).

#### Smoking-attributable Fraction (SAF)

We calculated the SAF for each component of the economic burden of smoking by disease category, rural/urban district, gender and age. The SAF is specified by the following epidemiological formula:

$$SAF_{irsa} = \frac{(PN_{rsa} + PS_{rsa} \times RR_{rsa}) - 1}{(PN_{rsa} + PS_{rsa} \times RR_{rsa})} \quad (1)$$

where *PN* and *PS* denote the prevalence rate of never smokers and smokers, respectively; *RR* denotes the relative risk of mortality for smokers compared to never smokers; the subscript *i* is for disease category, *r* is for rural or urban district, *s* is for gender, and *a* is for age, which is classified into two groups: ages 35–64 and ages 65+.

#### Direct costs

Direct costs include all the health-care expenditures for treating smoking-related diseases. The two types of health-care expenditures were inpatient hospitalizations and outpatient visits. The smoking-attributable expenditure (SAE) for each subgroup stratified by disease category, urban/rural district, gender, and age was estimated by multiplying the SAF by the corresponding total health-care expenditures according to the following formula:

$$SAE_{irsa} = [PH_{irsa} \times QH_{irsa} + PV_{irsa} \times QV_{irsa} \times 26] \times POP_{rsa} \times SAF_{irsa} \quad (2)$$

where *PH* is the average expenditure per inpatient hospitalization; *QH* is the average number of hospitalizations per person in 12 months; *PV* is the average expenditure per outpatient visit; *QV* is the average number of outpatient visits per person in two weeks; and *POP* is the population in 2008. The definition of subscripts is the same as with equation 1. We calculated the adjustment factor by dividing the out-of-pocket health expenditure for 2008 by the out-of-pocket health expenditure for 2014 and then applied this adjustment factor to the estimated the direct costs in 2014 from the direct costs in 2008.

#### Indirect morbidity costs

Smoking-attributable indirect morbidity costs (SAI) include transportation, nutritious supplemental food, and caregiver costs during the inpatient hospitalizations and outpatient visits due to treating smoking-related diseases, and the value of lost productivity caused by smoking-related illness. The formula to estimate the SAI is as follows:

$$SAI_{irsa} = [PHI_{irsa} \times QH_{irsa} + PVI_{irsa} \times QV_{irsa} \times 26 + IDAY_{irsa} \times E_{rsa} \times Yr] \times POP_{rsa} \times SAF_{irsa} \quad (3)$$

where *PHI* is the average expenditures for transportation, nutritious supplemental food, and caregivers per inpatient hospitalization; *PVI* is the average expenditure for transportation per outpatient visit; *IDAY* is the average number of annual inpatient days due to treating disease “I” per employed person; *E* is the proportion of the total population currently employed; and *Y* is daily earnings measured by per-capita family income in 2008. Other notations are the same as in equations 1 and 2. We calculated the adjustment factor by dividing the per-capita family income in 2008 by the per-capita family income in 2014 and then applied this adjustment factor to the estimated the indirect costs in 2014 from the indirect costs in 2008.



### Indirect mortality costs

The indirect mortality costs were estimated by the full income approach. The full income approach was initially used to measure the development of national economy. The growth of full income included the growth of total income and the improvement of people's health. In our study, we only estimated the value of changes in mortality (the value of improvement of people's health). There were two main equations: one equation was to translate the changes of mortality risk into the changes of expectancy life years (equation 4); the other equation was to estimate the value of changes in mortality (equation 5).

$$\begin{aligned} \Delta \text{life expectancy} &= \frac{1}{s(a^*)} \int_{a^*}^{\infty} s(a) da - \frac{1}{s(a^*)} \left[ \int_{a^*}^{\infty} (1-m)s(a) da \right] \\ &= e(a^*) + me(a^*) - e(a^*) = me(a^*) \end{aligned} \quad (4)$$

$$V(e_i, e_j, y) = 0.018y \int_0^{\infty} n(a) \Delta \text{SMU}(e_i, e_j) \frac{e(a)}{e(35)} da \quad (5)$$

In this equation,  $s(a)$  gives the probability of survival to age  $(a)$ .  $s(a)$  is the inverse cumulative of the distribution of age of death.  $s(a^*)$  is the survival curve at age  $a$ .  $e(a^*)$  is the life expectancy at age  $a$ .  $m$  is the mortality risk of smoker stratified by disease category, urban/rural district, gender and age.  $n(a)$  is age distribution of its population.  $\Delta \text{SMU}(e_i, e_j)$  is the difference between the mortality for smoking population and general population.  $y$  is GDP per capita.

### Costs are likely underestimated

As the report explains, while the economic costs smoking imposes on China as outlined here are enormous, it is important to note that the costs are likely largely underestimated for several reasons.

First, the modelling includes only the cost of three major categories of smoking-related disease: cancer, cardiovascular disease and respiratory disease. Smoking also increases the risk of many other diseases including dental disease, reproductive and erectile dysfunction problems, ulcers, and eye and vision problems. If these diseases were included in the model, the estimated cost would be higher.

Second, the model does not include the economic burden imposed by death and disease that is caused by second-hand smoke exposure, because of methodological

difficulties in including these costs in the current model. As outlined in Chapter 1, this is an enormous problem in China – responsible for approximately 100 000 deaths each year, and many more cases of illness and hospitalization. Including the economic costs of second-hand smoke exposure would also result in a higher estimate of the total economic cost of tobacco use: given second-hand smoke exposure causes approximately 100 000 deaths each year on top of the 1 million causes by smoking, it is fair to assume that including the economic costs of second-hand smoke exposure in the economic costs estimate would add around 10% to the total economic cost, bringing the total cost to around ¥385 billion (385 billion Chinese yuan), which is approximately US\$55 billion.

Third, the relative risk or risk ratio (RR) of mortality used in the modelling done on China is lower than other countries such as India, and substantially lower than the United States of America. The higher the RR value, the larger the smoking-attributable fraction (the proportion of disease that can be attributed to tobacco) and subsequently the higher the associated costs. Should future Chinese studies show an RR of mortality in line with that of other countries, the estimated costs in modelling such as that conducted for this report will increase.

Fourth, it is worth noting that according to the 2014 NHSS data, 17% of Chinese citizens who reported a need for hospitalization during the previous year were not hospitalized. These data suggest that smoking-attributable diseases might have occurred among this group of people, yet they did not use health-care services. If unmet demand for health-care services is transformed into real demand, this would result in an even greater economic cost.

Finally, the modelling conducted for this report did not consider days lost from work by relatives or informal caregivers who took care of the patients with smoking-related illness. In addition, due to the lack of work-loss data, the productivity losses due to smoking-caused disability other than inpatient hospitalization days were not considered. Therefore, the actual indirect morbidity costs of smoking-attributable diseases are likely to be significantly higher than the estimates outlined above.

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## Annex B – Summary of Equity and poverty alleviation benefits of tobacco tax and smoke-free workplaces in China: A modelling study

By Stéphane Verguet (Harvard University) and his colleagues Cindy L. Gauvreau, Prabhat Jha, Lingrui Liu, Sujata Mishra, Gillian Tarr, Yue Xiao, Qiu Yingpeng and Kun Zhao

The model applied builds on a previously validated extended cost-effectiveness analysis (ECEA) (1-4) model that unifies the estimation of health benefits, excise taxes and financial risk protection per income quintile (4). The model simulates two policies independently: (a) a 50% increase in the retail price of cigarettes due to an excise tax increase; and (b) the implementation of a nationwide workplace smoking ban – and the impact of these policies on the number of premature deaths averted, excise tax revenue gained or lost, impoverishments averted and catastrophic medical expenditure averted. These are further described below:

1. Changes in annual excise tax revenues were calculated based on changes in smoking prevalence and consumption of continuing smokers. Excise tax revenue before policy was calculated based on the average number of cigarettes consumed per day, the average price per pack, the current excise tax rate and the baseline number of smokers. Excise tax revenue after policy implementation was calculated using the number of non-quitting smokers and estimated reduction in consumption.
2. Smoking-attributable premature deaths were calculated for all Chinese male smokers. The model assumes that 50% of deaths among smokers are attributable to smoking, and among former smokers, the risk of smoking-attributable death varies depending on the age at which they quit. In the absence of policy, assuming that no current smokers would quit, the number of premature deaths is calculated as half of the baseline smoker population and those currently below 20 years who are anticipated to initiate smoking. After policy implementation, the number of premature deaths is calculated as 50% of continuing smokers and the cessation age-attenuated percentage of smokers quitting.
3. Averted impoverishments and averted catastrophic expenditure were then determined using estimated medical expenses. First, averted premature deaths were apportioned among the four main causes of smoking-related deaths: stroke, heart disease, neoplasms and chronic obstructive pulmonary disease. Health-care utilization for each condition and a utilization adjustment for income quintile were then applied to determine how many of those with an averted premature death would have incurred medical expenses. The cost to treat each condition was reduced by the average inpatient insurance reimbursement to determine the amount an individual would have paid in medical expenses. Simulations then generated a

household income and consumption expenditure for each averted premature death that would have incurred medical expenses, at the income quintile level:

- Averted cases of medical impoverishment were calculated as individuals for whom the simulated income was above US\$ 1.25 per day (the international poverty threshold) but whose annual net income would have decreased to less than US\$ 1.25 per day after paying for disease treatment.
- Averted cases of catastrophic expenditure were calculated as individuals for whom the averted medical expenses would have totaled  $\geq 10\%$  of their simulated household consumption expenditure.

### 1. Modelling excise tax policy

To determine the impact of a policy on averted premature deaths, excise tax revenue, averted impoverishments and averted catastrophic medical expenditure, the model needs to assess the extent of changes in smoking behavior. Changes in smoking behavior impact smoking participation (i.e. whether people smoke at all), consumption and initiation, and these have an effect on the health, social and economic components studied in this model.

#### Price elasticity of demand

Price elasticity of demand for cigarettes varies across the five income quintiles and by age group (see table below). That is, when there is a change in the price of cigarettes, this has an effect on whether someone smokes, how many cigarettes they smoke and whether a non-smoker initiates smoking. Elasticity is greater among poorer smokers and lesser among richer smokers, and among youth than among older smokers. That is, when there is a change in the price of cigarettes, poor smokers and youth smokers are more likely to react and alter their demand compared to richer and older smokers.

Age group	Average	Income quintile 1	Income quintile 2	Income quintile 3	Income quintile 4	Income quintile 5
$\geq 25$ years	-0.38	-0.64	-0.51	-0.38	-0.25	-0.12
15-24 years	-0.76	-1.28	-1.02	-0.76	-0.50	-0.24
Future smokers, i.e. < 15 years	-0.76	-1.28	-1.02	-0.76	-0.50	-0.24

The model assumes that tax increase is fully borne by consumers and impacts smoking participation, consumption and initiation. The model applies an average price elasticity of -0.38 and assigns a twofold price elasticity modifier for youth aged 15–24 years across all income quintiles. The same price elasticity modifier was also assigned to current 0–14 year olds as increases in the price of cigarettes are said to impact smoking initiation.

## 2. Modelling smoke-free workplace policy

Based on a meta-analysis (5), the model assumes a smoke-free workplace policy will result in a 3.8% absolute reduction in smoking prevalence and a decrease in consumption of 3.1 cigarettes per day among workers. However, as the 2010 Global Adult Tobacco Survey (GATS) found that only 31% of workplaces in China had fully enforced smoking bans, the reduction in smoking prevalence was correspondingly reduced to 2.6%. As a smoke-free workplace policy will only affect those in the workforce, the model estimated reductions in prevalence and consumption only on men who are employed and under the age of 60. For age groups  $\geq 60$ , no men would quit smoking as a result of smoke-free workplace policies.

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## Annex C. Summary of The policy path to reducing tobacco use

By Christopher Millett, Sanjay Basu and Anthony Laverly

### Methodology

This project analysed the policy action needed – and the pace and level of commitment and implementation required – to achieve reductions in tobacco use in line with the global NCD targets developed by the World Health Organization alongside China's *National Tobacco Control Plan* (NTCP) goals. The WHO *Noncommunicable Diseases Global Monitoring Framework (2013–2020)* recommends that countries achieve a 30% reduction in smoking prevalence by 2025. This would require reducing smoking prevalence from 28.1% in 2010 to 19.6% in 2025 in China. The NTCP aims to reduce smoking prevalence from 28.1% in 2010 to 25.0% by 2015.

The analysis is constructed from data on the age, sex and smoking breakdown of the Chinese population in 2010 and projects forward to 2025 in order to assess the optimal strategy to meet the “25 By 25” target, which calls for a 25% reduction in premature deaths by 2025, in line with global NCD targets. Annual smoking prevalence is constructed from rates of people initiating smoking and quitting smoking, and mortality among those smoking compared to non-smokers. This then provides information on baseline trends in tobacco smoking in China and what we can expect to occur without any policy action in the area. This then estimates the effects of implementation of the six key WHO FCTC interventions (MPOWER) individually, as well as synergistically. Synergistic effect estimates are based on an assumption that combining tobacco control interventions produces a greater impact on tobacco use than simply adding together the impact of individual interventions, i.e. the sum is greater than the parts, and are estimated using the equation  $\text{total risk reduction} = 1 - [(1 - \text{risk reduction from intervention A}) * (1 - \text{risk reduction from intervention B})]$ , etc. (1)

The impact of six key WHO FCTC interventions were assessed individually and combined:

- (1) a 50% increase in tax, a 100% increase in tax, and an increase in tax up to 75% of pack price;
- (2) 100% smoke-free public places (referred to here as clean air laws);
- (3) an advertising ban;
- (4) pictorial health warnings on tobacco products;
- (5) mass media campaigns warning of the dangers of tobacco use; and
- (6) cessation advice from health care professionals.

Effects of interventions on smoking prevalence are constructed from changes to initiation and quit rates for smoking, against background trends in mortality differentials between smokers and non-smokers.

In 2015, the tax levied on tobacco in China was increased from 41% (the 2010 figure) to 44.43%. Baseline scenarios include the projected impact of this tax change on future smoking prevalence rates, and 44.43% is used as the baseline level of tax.

#### Data sources

*Smoking prevalence:* Estimates of smoking prevalence come from the Global Adult Tobacco Survey (GATS) 2010 China. (2)

*Quit rates:* Estimates of quit rate come from the Global Adult Tobacco Survey (GATS) 2010 China report. They are derived from the percentage of ever-smokers who reported quitting, and those who reported quitting in the last two years, to give an annual quit rate for Chinese smokers by age and sex.

Crude mortality rate (of 7 per 1000 people annually) taken from data from the World Bank (3, 4) and the relative risks of mortality (1.23, 1.18 to 1.27) from smoking come from this Chinese cohort study of 1.2 million person-years follow up. (5)

Scenario	Estimate	Achieved through
<b>Baseline scenario</b> including 2015 tax rise from 41% to 44.43% of pack price	Elasticity of -0.38 (6)	Impact on both cessation and initiation
<b>Intervention 1.1:</b> A 50% tax rise from 44.43% to 66.65%	Elasticity of -0.38	Impact on both cessation and initiation
<b>Intervention 1.2:</b> a 100% tax rise from 44.43% to 88.86%	Elasticity of -0.38	Impact on both cessation and initiation
<b>Intervention 1.3:</b> a 68.8% tax rise to 75% of pack price	Elasticity of -0.38	Impact on both cessation and initiation
<b>Intervention 2:</b> Clean air laws	A 1% decline in absolute prevalence (7)	Impact on cessation and initiation
<b>Intervention 3:</b> Tobacco Advertising ban	12% reduction in initiation 6% increase in cessation (8)	Impact on both cessation and initiation
<b>Intervention 4:</b> Mass media campaign	-5% reduction in probability of smoking (9, 10)	Impact on both cessation and initiation
<b>Intervention 5:</b> Pack warnings implemented in line with WHO FCTC Article 11	X1.82 increase in quitting after pack warnings (estimate from implementation in Malaysia) (11)	Impact on cessation only
<b>Intervention 6:</b> Brief cessation advice	-1% reduction in probability of smoking (12)	Impact on cessation only
<b>Intervention 7:</b> Implementation of interventions 1.1 and 2 through 6	Estimates from total risk reduction equation (1)	Impact on both cessation and initiation

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