

# The Association between TB and Tobacco: An Evidence Review

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## Introduction

One third of the world's population is known to be infected with TB, and over 8 million people are developing it each year. On the other hand, tobacco is responsible for 3 million deaths worldwide. A relationship between tobacco use and TB has been witnessed for a long time and the two of them together can be a lethal combination. Tobacco use substantially increases the risk of TB and the probability of death from TB. (Mitra Safa, 2011)

The use of tobacco is a risk factor for TB and is often ignored. Smoking is a risk factor for TB, independent of alcohol use and other socioeconomic risk factors. Evidence indicates that smoking (both current and former, passive and active) is associated with: risk of being infected with TB, risk of developing TB, risk of developing more severe TB, and risk of dying of TB. (K.M. Hassmiller, 2006) Definitive evidence of the link between tobacco and TB has been slow in coming. Research has largely focused on other risk factors, including poverty, poor nutrition, alcohol use, overcrowding, and HIV and the impact of tobacco consumption on TB has been largely ignored until recently.

Half of all long-term smokers die prematurely due to smoking, and half of these deaths occur in middle age. It is known that tobacco smoking is a major risk factor for premature mortality from cancer, chronic obstructive pulmonary disease and cardiovascular disease. But as more research is conducted in developing nations, it is becoming evident that smoking is also a major risk factor for respiratory tract and other systemic infections.(K.M. Hassmiller, 2006)

## Association between TB and Tobacco

Smoking has been associated with TB since 1918. However it is only recently that the association has been given widespread attention. Smoking increases the risks of becoming infected with TB, of developing the active form of disease, and of dying from it. (Tobacco and Tuberculosis, 2015) In other words, it increases the risk at each stage of the disease. Alarmingly, children and other non-smokers who are exposed to secondhand smoke share many of those risks.

Along with a greater chance of initial infection, smokers have a poorer prognosis as the disease progresses. Smoking is the most common cause of chronic obstructive pulmonary disorder (COPD) and a major risk factor for bronchitis, and these lung diseases interact in complex ways with TB. People who have either of these diseases are at greater risk for TB, and when COPD or bronchitis occurs in someone with TB, the impact on lung function can be cumulative and dramatic. The

### Key Facts

*Active smoking is significantly associated with TB disease and deaths from TB.*

*Exposure to second-hand smoke is also significantly associated with TB disease, and with TB infection among children and young people.*

*Up to one in five deaths from TB could be avoided if patients were not smokers.*

*Smokers with TB need counseling and help with quitting.*

*Cessation counseling can be set up without detailed or costly training.*

prevalence of smoking is very high in TB patients. Tobacco smoking is associated with a considerably increased risk of advanced and more severe disease in the form of lung cavitation, positive sputum smear and culture results, and slower smear and culture conversion after initiation of treatment. Smoking has a profound negative effect on treatment completion, cure, and relapse rates in patients with pulmonary TB. (Global tuberculosis report 2014, 2014)

As smoking induces coughing and other symptoms consistent with TB, there may be longer delays in the diagnosis of TB among smokers than among non-smokers. TB is a global killer, claiming the lives of more than two million people annually and sickening millions more and tobacco plays an enormous role in this calamity.

Studies have found links between smoking and many aspects of TB. (Tobacco and Tuberculosis, 2015) such as:

- Regular tobacco smoking doubles the risk that people who have been successfully treated for TB will develop TB again - a condition known as "recurrent" TB.
- Smoking increases the risk of TB disease by more than two-and-a-half times
- Smoking and exposure to second-hand smoke are significantly associated with TB disease.
- Smoking is significantly associated with TB infection. The number of cigarettes smoked and the duration of smoking may also influence the risk of infection
- Exposure to second-hand smoke is significantly associated with TB infection in children and young people
- Smoking is associated with recurrent TB disease
- Smoking is associated with TB mortality

## **Global Scenario**

Both tobacco smoking and TB are major global public health problems. Globally, nearly 6 million people died from tobacco use in and tobacco use is estimated to be responsible for 16% of deaths among men and 7% of deaths among women each year. In 2012, there were an estimated 8.6 million new TB cases and 1.3 million TB-related deaths worldwide. Smoking is common in the 22 countries categorized by the World Health Organization (WHO) as high-burden countries for TB – which together account for more than 80% of all TB cases. The burden of smoking among patients with TB is poorly defined in most countries. (Global tuberculosis report 2014, 2014)

An understanding of the epidemiological relationship between smoking and TB is important because both smoking and TB cause extensive morbidity and mortality worldwide. Compared with those who have never smoked, it is estimated that people who smoke have approximately twice the risk of both Mycobacterium TB infection and active TB. However, data on the impact of smoking on treatment outcomes among patients with active TB are limited. (Michael N. Bates, Asheena Khalakdina, Madhukar Pai, Lisa Chang, Fernanda Lessa, & Kirk R. Smith, 2007)

The tobacco industry is moving aggressively to expand its markets in the world's poorest countries – many of which also have the highest burden of TB. Eighty percent of the world's TB cases are located in just 22 countries, most of them in Asia (with 55 percent of the world's cases)

and Africa (with 30 percent). Many of those countries also have very high smoking rates. In China, for example, nearly 60 percent of the male population smokes. India and the Russian Federation are also hard-hit by the twin epidemics. (The Deadly Pairing of Tuberculosis, 2011)

## The Global Burden of TB and Tobacco Epidemic

### The TB Epidemic

In 2005, the global incidence of TB was estimated at 8.8 million cases (136 per 100,000), of which 3.9 million (60 per 100 000) were pulmonary cases confirmed by direct sputum microscopy (WHO Report on Global Tuberculosis Control: Surveillance, Planning, Financing, 2007). Asia and sub-Saharan Africa contributed 84% of the estimated number of TB cases. The TB epidemic in sub-Saharan Africa is fuelled by HIV/AIDS epidemic. The global annual TB incidence rate was increasing at 1.5% in the mid-1990s but decreased and reached a 1.0% increase rate in 2003 and 2004, likely due to the slowing down of the HIV epidemics in sub-Sahara Africa. In 2005, the global TB incidence rate became stable or declined in all six WHO regions (African Region, Region of the Americas, South-East Asia Region, European Region, Eastern Mediterranean Region, and Western Pacific Region). However, the total number of new TB cases is still rising slowly. It is estimated that the global incidence rate will be about 150 per 100,000 in 2015, generating more than 10 million new cases (Dye C, 2003). An estimated 1.6 million people (24 per 100 000) died from TB in 2005. Although the global annual incidence rate was increasing over previous years, the prevalence and mortality rates decreased over the period 1990-2005 in the WHO Regions of the Americas, Eastern Mediterranean, South-East Asia and Western Pacific, but increased over the same period in Europe and particularly in sub-Saharan Africa. Several regions of the world are experiencing severe epidemics of multi-drug resistant TB (MDRTB). There are approximately 420,000 MDR-TB cases a year, including new and previously treated cases. The highest prevalence of MDR-TB has been observed in Eastern Europe and some provinces of China. (WHO Report on Global Tuberculosis Control: Surveillance, Planning, Financing, 2007)

#### The TB Epidemic

*2 billion people are infected with the TB bacilli*

*TB is a disease of poverty with the vast majority of deaths occurring in low- and middle-income countries with more than half of all deaths occurring in Asia*

*There were 9.27 million new TB cases in 2007*

*1.75 million people died from TB in 2007*

*5% of all TB cases have multidrug-resistant TB*

### The Tobacco Epidemic

Worldwide, approximately 1.3 billion people currently smoke cigarettes or use other tobacco products, with more than 900 million tobacco users living in developing countries. The total global prevalence in smoking is 29% (47.5% of men and 10.3% of women over 15 years of age smoke) (World Health Report: Shaping the future, Geneva, 2003)

Tobacco is the second major cause of death in the world. Cigarettes kill half of all lifetime users and half of those die in middle age (35–69 years). It is currently responsible for the death of one in ten adults worldwide. Every 6.5 seconds one tobacco user dies from a tobacco-related disease somewhere in the world. (World Health Report: Shaping the future, Geneva, 2003) The death toll from tobacco consumption is now 4.9 million people a year; if action is not taken to curb the spread of tobacco use; annual deaths are expected to reach 8.3 million by 2030, of which more than 80% will be in developing countries. (Mathers C.D, 2006). An estimation of global tobacco deaths calculated in 2000 shows that tobacco-related diseases killed about 100 million persons in the 20th century. If current trends persist, tobacco would kill 150 million persons in the first quarter of the 21st century and 300 million persons in the second quarter. (World Health Report: Shaping the future, Geneva, 2003)

Despite the current knowledge of the harm caused by tobacco, consumption continues to increase and the focus of the tobacco epidemic is shifting from industrialized to developing countries. The key reason for increased consumption and the shifting pattern of consumption are the marketing strategies of the tobacco industry. As some tobacco markets decline in response to effective policies, the tobacco industry has been developing new markets among young people and men and women in developing countries. The costs of tobacco go far beyond the tragic health consequences. Tobacco is also a significant economic burden on families and societies and is a major threat to sustainable and equitable development. Tobacco contributes to the continuing poverty of low-income households and countries because money is spent on tobacco rather than on food, education and health care.

### **The Tobacco Epidemic**

*More than 1 billion people smoke with nearly 70% of them living in low- and middle income countries*

*Tobacco use is the leading preventable cause of death*

*More than 5 million people die per year from tobacco use. If left unchecked, the epidemic is projected to kill more than 8 million people per year by 2030*

### **National Scenario**

In Nepal, tobacco use is a major health problem. It is a major health problem particularly among Nepalese females (28%) and youth (boys 13% and girls 5%) in South Asian region. The burden of diseases due to tobacco use is significant with an estimated 44 deaths due to tobacco related harms, each year. (Mahato, 2012) Nepal has strong policy and strategies for tobacco control including regulating tax, protection from passive smoking, packaging and labeling of tobacco products, education and public awareness, tobacco advertising, promotion and sponsorship, tobacco cessation and monitoring tobacco use. However there are several gaps, which need to be addressed in order to improve the implementation of policies as well as to strengthen current strategies for TB control. Meanwhile, TB particularly affects the lungs along with other body parts such as gland, abdomen, intestine, skin, brain, bone, and joint among others. As TB progresses, it can result in serious infections that, if left untreated and if not prevented from smoke can result in death. In addition, the total number of deaths and cases is rising due in Nepal. A total of 34,121 cases of TB were registered in 2015 and 978 deaths were reported among general TB cases. About 60% of adults and 45% of the general population have been

infected with the disease and nearly 2% of people are infected every year. (NTP Annual Report, 2015)

## WHO Recommended Policies to Combat Tobacco and TB (Tuberculosis and Tobacco, 2009)

Some of the policies to combat tobacco and TB as recommended by WHO are as follows:

- Coordinate tobacco everywhere, but especially where people are at risk of TB infection
- Coordinate national TB and Tobacco control programmes
- Cross train TB and tobacco control health workers
- Register TB patient's tobacco use and offer them counseling and treatment
- Promote and enforce smoke-free policies, particularly where TB services are delivered
- Implement smoking cessation procedures through PAL (the Practical Approach to Lung Health)
- Integrate brief tobacco interventions (*5 'A's and the 5 'R's*) into TB control program activities

The 5 'A's	The 5 'R's
<b>Ask TB patients about their tobacco use</b>	<b>Relevance-</b> Ensure TB patients know their treatment will be more effective if they quit smoking
<b>Advise them to quit</b>	<b>Risks-</b> Point out all the risks of continuing to smoke including the risk of TB relapse
<b>Assess their willingness to attempt to quit</b>	<b>Rewards-</b> Educate the TB patients about the many other benefits of quitting smoking
<b>Assist in their attempt to quit</b>	<b>Roadblocks-</b> Ask the TB patient to identify obstacles to quitting smoking
<b>Arrange follow up with them</b>	<b>Repetition-</b> Continue to encourage the TB patient to quit smoking

## The Way Forward

Tobacco smoking could substantially increase TB cases and deaths worldwide in coming years, undermining progress towards TB mortality targets. Aggressive tobacco control could avert millions of deaths from TB. TB control programs can support tobacco control by promoting policies to apply price and tax increments, providing protection from exposure to tobacco smoke, banning tobacco advertising, promotion and sponsorship, regulation of the packaging and labeling of tobacco products and raising public awareness of tobacco risks. Smoking cessation can be targeted through PAL which is a patient centered approach and promotes symptom based and integrated management which seeks to standardize service delivery through development and implementation of clinical guidelines. The powerful links between TB and smoking highlight the urgency of promoting smoking cessation among people at risk for TB and those who already have the disease. Tax increases, smoke-free environments, mass media campaigns, and other proven tobacco control strategies should now be seen as TB control strategies as well, especially in low-income and middle-income countries. Governments,

policymakers and funders must act now to implement proven strategies that curb smoking and thereby prevent more TB deaths. More research is needed to investigate the relationship between tobacco and TB including an examination of the impact of types of tobacco products, doses and duration of smoking, and exposure to second hand smoke.

## References

- World Health Report: Shaping the future, Geneva.* (2003). Retrieved from World Health Organization: <http://apps.who.int/iris/bitstream/10665/42789/1/9241562439.pdf>
- WHO Report on Global TB Control: Surveillance, Planning, Financing.* (2007). Retrieved from World Health Organization.
- The Deadly Pairing of TB.* (2011). Retrieved from World Lung Foundation: <http://www.worldlungfoundation.org/ht/a/GetDocumentAction/i/15317>
- Global TB report 2014.* (2014). Retrieved from World Health Organization: [http://www.who.int/tb/publications/global\\_report/en/](http://www.who.int/tb/publications/global_report/en/)
- NTP Annual Report.* (2015). Retrieved from NTC Website: [http://www.nepalntp.gov.np/theme/images/uploads/1463382367NNUAL\\_REPORT\\_2015.pdf](http://www.nepalntp.gov.np/theme/images/uploads/1463382367NNUAL_REPORT_2015.pdf)
- Tobacco and TB.* (2015). Retrieved from The Union: <http://www.wctoh.org/media/wctoh-2015-press-kit/document/FS7-Tobacco-and-TB-2015.pdf>
- Dye C, W. C. (2003). *Evolution of TB control and prospects for reducing TB incidence, prevalence and deaths globally.* *JAMA.* Retrieved from The Lancet: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(06\)68384-0/fulltext?version=printerFriendly](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(06)68384-0/fulltext?version=printerFriendly)
- K.M. Hassmiller, M. (2006). *The association between smoking and TB.* Retrieved from SCIELO Public Health: [http://www.scielosp.org/scielo.php?script=sci\\_arttext&pid=S0036-36342006000700024](http://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0036-36342006000700024)
- Mahato, P. K. (2012). *Current Tobacco Control Policies in Nepal: Existing Gaps and Way Forward.* Retrieved from PU Education, JHAS: <http://pu.edu.np/university/wp-content/uploads/2013/03/JHAS-2012-Vol-2-19.pdf>
- Mathers C.D, L. D. (2006). *Projections of Global Mortality and Burden of Diseases from 2002 to 2030.* Retrieved from NCBI: <http://www.ncbi.nlm.nih.gov/pubmed/17132052>
- Michael N. Bates, P., Asheena Khalakdina, P., Madhukar Pai, M. P., Lisa Chang, M., Fernanda Lessa, M. M., & Kirk R. Smith, P. (2007). *Risk of TB from exposure to tobacco smoke: a systematic review and meta-analysis.* Retrieved from JAMA Internal Medicine: <http://archinte.jamanetwork.com/article.aspx?articleid=411801>
- Mitra Safa, P. T. (2011). *Pattern of Tobacco Consumption among TB Patients in a TB Referral Center.* Retrieved from NCBI: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4153150/>