

Tobacco Addiction: Effect on Human Health

Chapter 3

Tobacco and its Ill-Effects

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1. What is Tobacco?

Tobacco is a plant called ‘nicotiana tabacum’, whose dried leaves are used to make different forms of tobacco [1]. All forms of tobacco contain nicotine - the chemical responsible for addiction [2,3]. Although extremely lethal, tobacco is cultivated in many regions of the world and is legally available [1].

Tobacco products can be broadly classified into smoked and smokeless products. Smoked forms of tobacco are those substances which are burnt and the resultant smoke is inhaled or held in the mouth [4]. While on the other hand, smokeless tobacco products are used either orally or nasally without burning the product [5]. The different types of tobacco products have been listed below [4,5,6].

Smoked forms of tobacco
Cigarettes
Cigar
Bidis
Kreteks
Pipes
Hookah
Cheroots
Chuttas
Dhumtis
Hookli
Chillum

Smokeless forms of tobacco	
Gutkha	Snuff
Zarda	Snus
Khaini	Toombak
Khiwam	Chimo
Mawa	Iq'mik
Gul	Maras
Gudhaku	Shammah
Mishri	Tobacco chewing gum
Naswar	Tobacco tablets
Betel quid	Red tooth powder

2. Health Effects of Tobacco Use

Tobacco, both smoked as well as the smokeless variety has been known to cause a number of health hazards. It is the leading preventable risk factor responsible for global burden of deaths [7,8], estimated to kill half of its users [9,10]. Six of the eight leading causes of death in the world are attributed to tobacco use [11] (**Figure 1**).

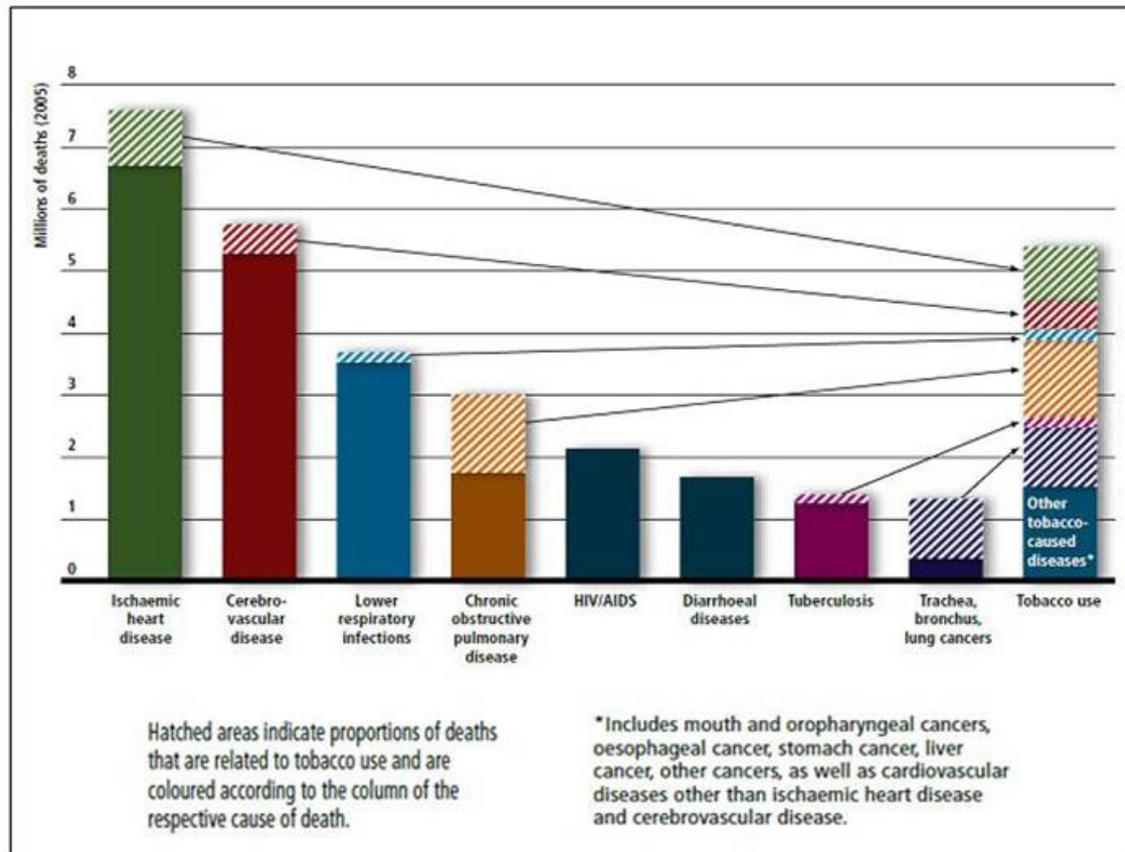


Figure 1: Proportion of deaths related to tobacco use [11]

Tobacco caused an estimated 5.1 million deaths globally in 2004, or almost one in every eight deaths among adults aged 30 years and over [8].

Tobacco in any form is damaging to the human body and almost every organ is affected by its use [12,13] (**Figure 2**). No tobacco product is less harmful than the other – they all have the same consequences, health-related as well as socio-economic. The most vulnerable population groups affected by tobacco are the youth, middle-aged men and even new born infants.

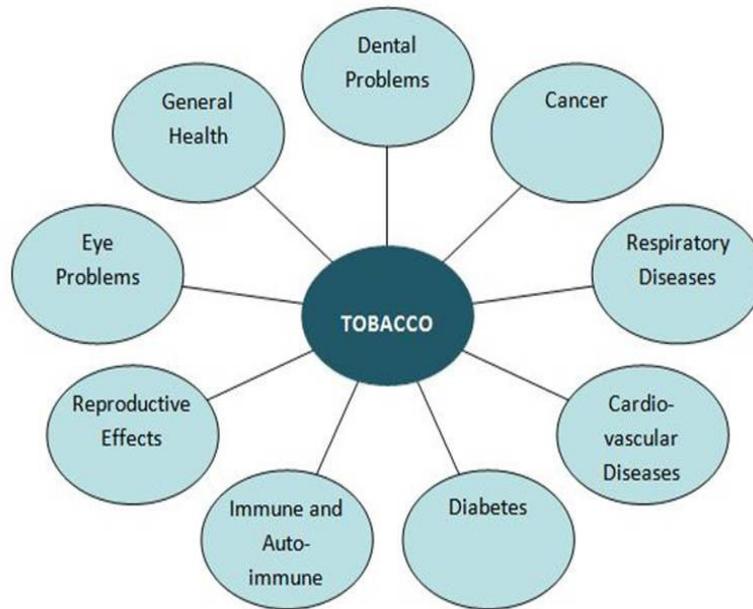


Figure 2: Health Effects of Tobacco Use

2.1. Health effects of smoked tobacco products

Cigarettes are the most commonly used smoked tobacco products across the world [6,10]. Some other forms that are popularly smoked in specific countries, particularly those in the South East Asia region, are pipes, cigars, bidis, kreteks, hookah, cheroots, chuttas, dhumtis, hookli, chillum, etc. [6].

Globally, smoking causes about 71% of lung cancer, 42% of chronic respiratory disease and nearly 10% of cardiovascular disease [8].

2.1.1. Cancer

Population studies have shown a causal link between smoking and lung cancer [8] (**Figure 3**). Among industrialized countries, where smoking has been common, smoking is estimated to cause over 90% of lung cancer in men and about 70% of lung cancer among women [1].

The risk of developing cancer of the lung for the combined group of pipe smokers, cigar smokers, and pipe and cigar smokers is greater than for non-smokers, but much less than for cigarette smokers [14].

Smokers of all ages have death rates two to three times higher compared to non-smokers. Those who smoke cigarettes, lose on average, about 10 years of life compared to non-smokers [15]. The average male cigarette smoker has approximately a 9 to 10 fold risk of developing lung cancer and a heavy smoker has at least a 20 fold risk, in comparison with non-smokers [14].

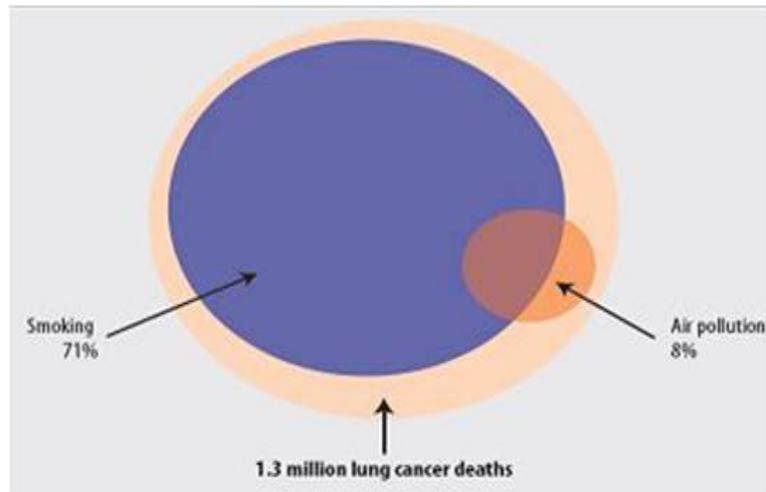


Figure 3: Lung cancer deaths in 2004: proportion attributed to smoking and air pollution [8]

Apart from lung cancer, smokers tend to develop cancer at other sites such as the oral cavity, larynx, oesophagus and urinary bladder [11] (**Figure 4**). Pipe smoking in particular leads to lip cancer [10,12,16].

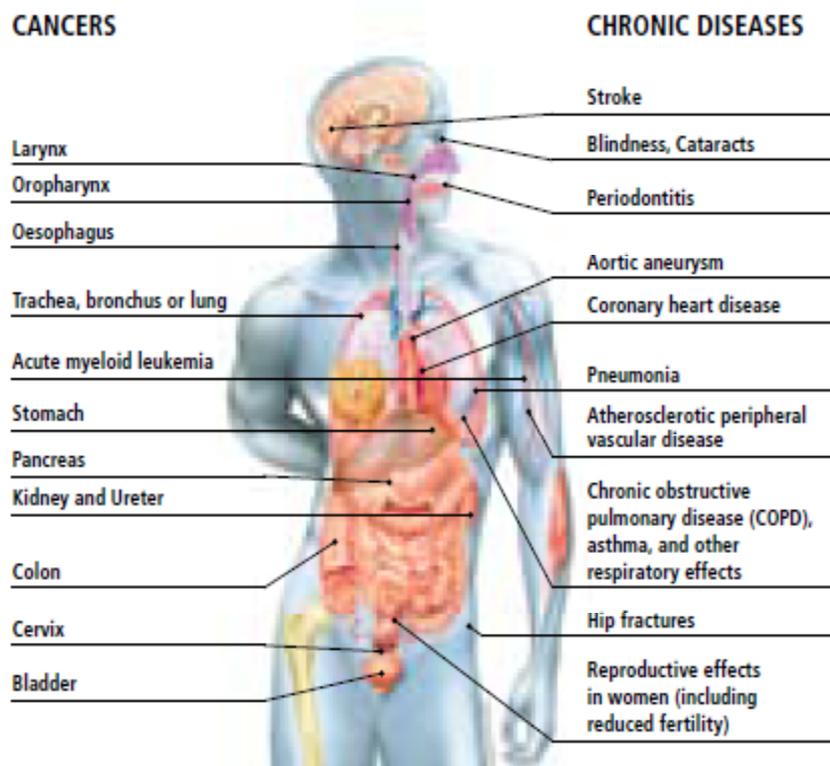


Figure 4: Health Effects of Using Smoked Tobacco Products [11]

2.1.2. Respiratory problems

Inhaled smoke and its components get deposited and absorbed into the lungs, affecting the respiratory system, exacerbating chronic lung diseases, and increasing the risk for respiratory infections [14].

Smokers also particularly suffer from pneumonia and reduced lung function [16].

2.1.3. Cardiovascular disease: [12]

Over the last two decades a considerable number of epidemiologic studies on different populations, employing different techniques, have shown with remarkable consistency a significant relationship between cigarette smoking and an increased death rate from coronary heart disease. Smoking leads to thickening of arteries, there by increasing the cardiovascular disease risk [10].

2.2. Other Health Effects of Smoking [10,12,16]:

1. Affected Vision: Smoking affects the vision leading to blindness and cataract.
2. Reproductive System: Smoking also affects the reproductive system of both males and females. In females, it has been known to cause ectopic pregnancy and reduced fertility, while in males it is linked with erectile dysfunction. Smoking during pregnancy can lead to still births and congenital abnormalities in the unborn, growing foetus.
3. Effects on the Oral Cavity: Inhaled smoke leads to bad breath, dark lips, loose teeth and gum problems.
4. Immune and auto-immune disorders: It compromises the equilibrium of the immune system, leading to general adverse effects on the body, altered immune function, and systemic inflammation. It increases the chances of arthritis and hip fractures.
5. Diabetes and Stroke: Smoking reduces the oxygen and blood circulation to vital body parts. Reduced oxygen to the brain leads to stroke. Diabetics who are smokers have trouble regulating their blood sugar levels leading to further complications [17].

The discussion on health effects of smoked tobacco products would be incomplete without a mention of hookah smoking. Hookah or water-pipe smoking has become popular, especially among the youth (**Figures 5 and 6**). It is a relatively new and disturbing trend that has the same dangers as any other smoked tobacco.



Figure 5: Youth Smoking Hookah (Source: AFP)

Hookah or water-pipe smoking is a social activity mostly done in groups, where the pipes are often shared among users [18]. Sharing of hookah carries the risk of transmission of infectious diseases such as tuberculosis. But, the commonly held belief is that, hookah smoking is a safe alternative to cigarette smoking. However, water-pipe and cigarette smoke contain similar toxic agents such as carbon monoxide, tar and nicotine as well as carcinogens such as arsenic, beryllium, chromium, cobalt and lead [18,19].

Most hookah smoking sessions typically last 60 minutes, where in a smoker may take around 200 puffs and inhales approximately a litre of smoke [20]. In contrast, cigarette smoking which lasts 5 to 7 minutes, where the smoker takes 8 to 12 puffs inhaling about 0.5 to 0.6 litres of smoke [21].

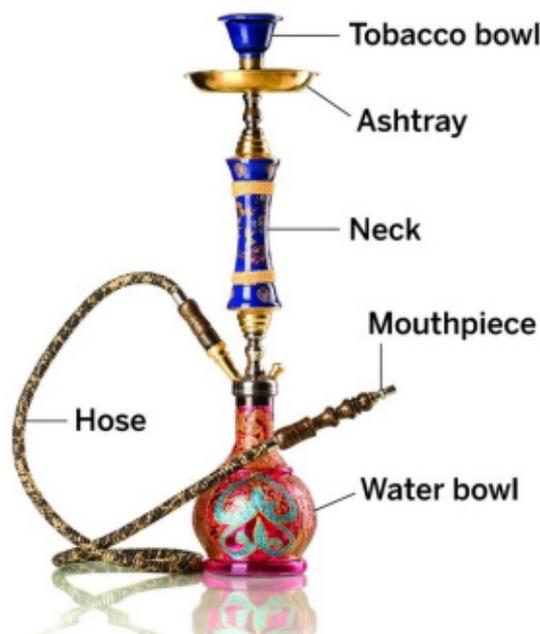


Figure 6: Hookah Components (Source: Shutterstock)

An hour long hookah smoking session involves inhaling 100 to 200 times the volume of smoke inhaled with a single cigarette [22]. Thus the amount of smoke inhaled in one hookah

session is equivalent to smoking around 100 cigarettes [20]. This form of smoking is made appealing to the youth by adding additives and flavours to make it more culturally and socially acceptable [20,23].

Hookah smoking also known as water-pipe tobacco smoking has been declared a public health problem by the World Health Organization and other authorities [23].

2.3. Health effects of smokeless tobacco products

Over 300 million people around the world, most of whom are south asians, use smokeless tobacco products [10]. Smokeless tobacco is consumed without burning the product, and can be used orally or nasally. Tobacco pastes or powders are used in a similar manner and applied to the gums or teeth. Fine tobacco mixtures are usually inhaled and absorbed in the nasal passages [5].

Smokeless tobacco contains carcinogens such as tobacco specific nitrosamines, cadmium, polonium, formaldehyde, lead and formaldehyde [29].

Oral smokeless tobacco products are placed in the mouth, cheek or lip and sucked or chewed [5]. These sites are thus common sites for development of oral cancers [29]. (**Figure 7**).

Red and white coloured lesions (called precancerous lesions) occur in the mouth of smokeless tobacco users. Failure to stop using tobacco can lead to progression of these lesions to cancer [5]. The presence of these lesions usually occurs in the location of the mouth where the smokeless tobacco product is kept. Oral cancer risk and severity increases with duration and intensity of tobacco use [5].



Figure 7: Oral Cancer caused by Smokeless Tobacco [29]

Apart from oral and oro-pharyngeal cancers, smokeless tobacco use increases the risk of cancer of the oesophagus and cardiovascular disease. It can also lead to gum problems [13].

Aesthetically, smokeless tobacco stains teeth and causes bad breath. It can also cause

cancer of the head and neck [30].

2.4. Health effects of passive smoking

Environmental Tobacco Smoke (ETS) or second hand smoke is the combination of smoke emitted from the burning end of a cigarette or other tobacco products and smoke exhaled by the smoker [24]. ETS causes disease not only in smokers but also in those who do not use any tobacco product. ETS contains the same toxic components that are released during active smoking [25]. It affects both adults and children [11] (**Figure 8**).

Exposure to tobacco smoke causes lung cancer in healthy non-smoking adults [12,24,25]. Breathing other people's smoke is also a cause of ischaemic heart disease, increasing a person's risk by a quarter [26].

Children who involuntarily and unknowingly get exposed to tobacco smoke emitted in the environment face an increased risk for developing pneumonia, bronchitis, respiratory irritation and ear problems. In children who suffer from asthma, passive smoking exacerbates the disease [24,25].

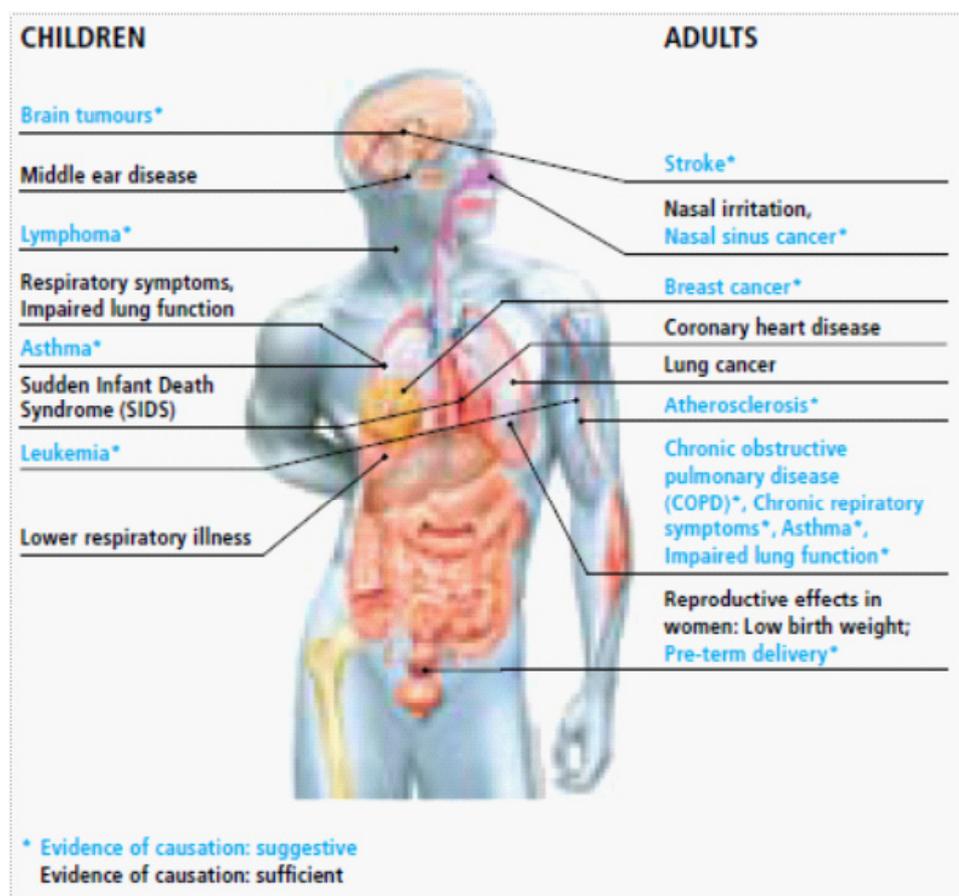


Figure 8: Health Consequences of Second-hand Smoke Exposure [11]

Unborn foetuses are also susceptible to the dangers of tobacco smoke. Smoking during pregnancy is not only dangerous for the mother but also for the growing unborn foetus [10] (**Figure 9**).

Maternal smoking during pregnancy results in passive smoke exposure for the foetus (referred to as tertiary smoke). This exposure results in an increased risk of low birth weight and foetal and infant deaths [24,25].

Tobacco use in pregnancy affects the intrauterine foetal development. The risk of Sudden Infant Death Syndrome (SIDS - death of an infant less than one year of age) is three times more when mothers smoke [27]. Nicotine exposure changes the intensity and timing of brain cell development of the growing foetus [28].

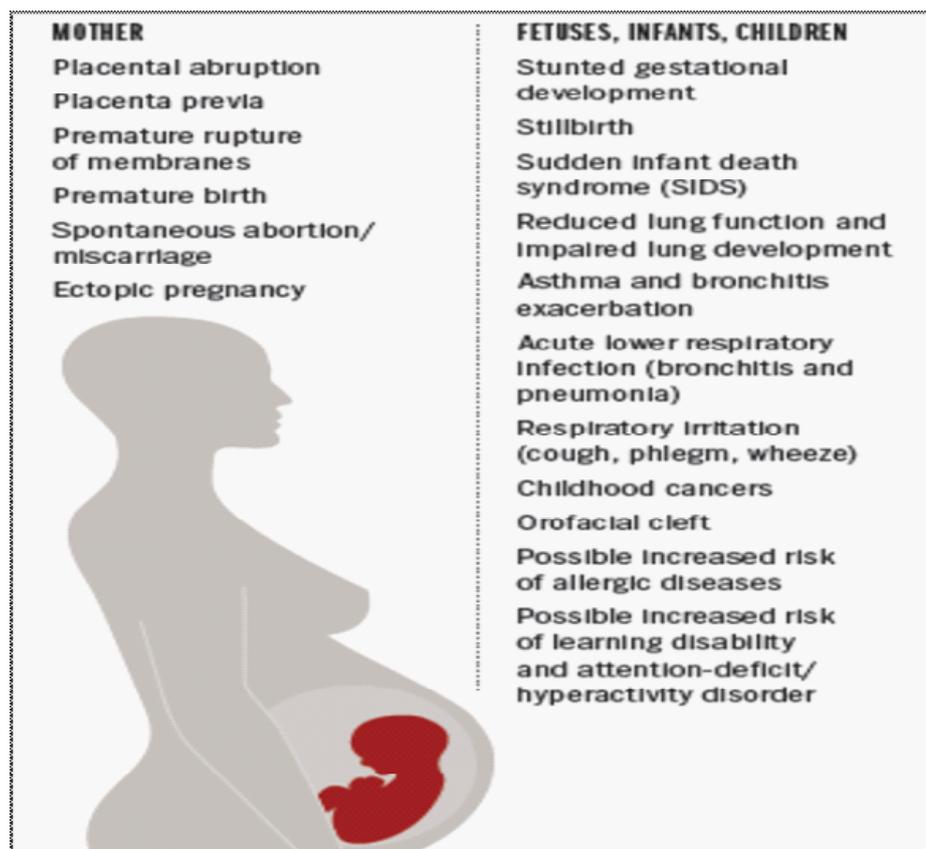


Figure 9: Effects of smoking mothers on their children [10]

3. Social Consequences of Tobacco Use

Apart from affecting the body, tobacco has an impact on human development and the environment. Addicted users spend more money on tobacco products than on household essentials. Discarded cigarette butts and tobacco wrappers are a source of waste. It is estimated that 1.69 billion pounds of cigarette butts wind up as toxic trash, which is roughly equivalent to the weight of 177,895 endangered African elephants [10].

Tobacco related illnesses cost billions of dollars each year, imposing a heavy economic toll on countries, both in terms of direct medical care for adults and lost productivity. Tobacco use also affects the poorest people. More than 80% of the world's smokers live in low- and middle income countries, harming health, incomes, earning potential, labour productivity, and undermining human capital accumulation – a critical factor for sustainable economic growth

and social development [31,32] (**Figure 10**).

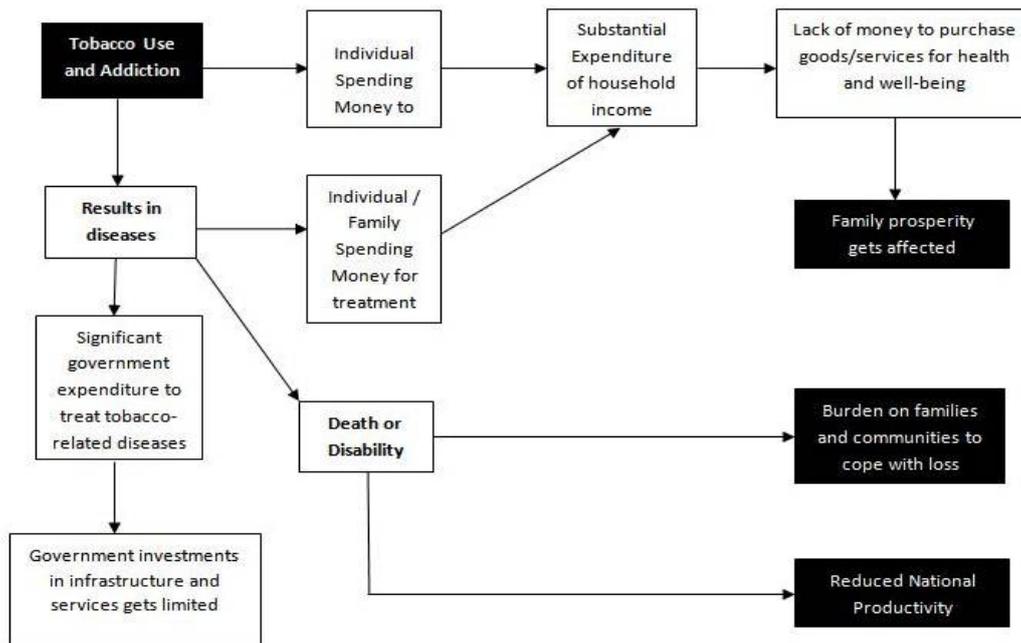


Figure 10: Social Consequences of Tobacco Use

4. What Makes Tobacco Products So Harmful?

According to the U.S. Food and Drug Administration, tobacco contains harmful and potentially harmful substances including more than 50 cancer causing substances [33]. In fact, the cigarette is actually an elaborately designed miniature chemical factory [34]. Some of the substances present in tobacco are nicotine, acids, pesticides, coal tar, carbon monoxide, carbon dioxide, hydrogen cyanide, phenols, benzopyrene, nitrogen dioxide, hydrogen cyanide, chromium, arsenic, acids, etc. [5,14,25,29].

These harmful substances which when inhaled, ingested or absorbed in the body cause direct or indirect harm to tobacco users or non-users [35]. All tobacco products contain a complex mixture of toxic, carcinogenic and addictive substances that are responsible for majority of the harmful effects. Additionally, substances which facilitate product initiation, make cessation difficult and increase the urge to use are also present.

5. Why is it Difficult to Curb this Menace?

In spite of the fact that tobacco products in any form are harmful, millions of people the world over continue to use these deadly products. Apart from the presence of nicotine that makes tobacco consumption an addictive habit which is difficult to get rid of, the tobacco industry has a strong market presence to counter the anti-tobacco activities of governments and non-government organizations.

As part of their marketing, the tobacco industry indulges in social responsibility initia-

tives and public relations campaigns to gain a respectable position in society [36]. The industry also finances research to create an evidence base against the proven harmful effects of their products. All of this creates a favourable image of the tobacco industry in the minds of the people, thereby leading them to believe that the products manufactured are supposedly free of harm.

The industry is constantly manoeuvring and interfering in the political and legislative processes, by getting access to government officials, funding political campaigns, and negotiating seats at policy-making forums [37]. There have been numerous examples from across the world of how the industry weakens and delays anti-tobacco legislations [38].

In the guise of protecting the interests of tobacco cultivators and consumers, the tobacco industry introduces special interest groups to governments to show that they are fighting for the economic rights of farmers and human rights of consumers to smoke. Moreover, the farmers and consumers are manoeuvred into believing that the industry supports their welfare [37, 38].

Another tactic that the industry utilizes is creating new customers by targeting children, youth and women through attractive packaging, misleading advertisements and nomenclatures.

A classic example of misleading promotions is from India, where smokeless tobacco products such as gutkha and a non-tobacco product called paan masala are sold under the same brand name with identical packaging [39] (**Figure 11**). Since advertising of tobacco products is banned in India [40], promotion of paan masala creates a recall value for the said brand and for the tobacco based product that it is barred from being directly promoted.



Figure 11: Similar looking tobacco and non-tobacco products

Newer and ‘safer’ alternatives are introduced by the tobacco companies such as e-cigarettes and products such as paan masala which although do not contain tobacco, are equally harmful due to the presence of betelnut / areca nut (supari). The International Agency for Research on Cancer (IARC) has reported that areca nut chewed without tobacco is carcinogenic [41,42]. The industry cleverly packages this product to appeal to children through attractive pictures of cartoon characters and movie personalities (**Figure 12**).



Figure 12: Non-tobacco products marketed at children [43]

Tobacco companies constantly engage in product innovation and trap customers who are trying to quit smoking. As a result, users switch to supposedly ‘less harmful’ substances based on claims that these products reduce the risks caused by cigarette smoking.

Products such as smokeless tobacco and nicotine delivery devices (electronic cigarettes or personal vaporizers, etc.) have long been marketed as a ‘safe alternative to cigarettes’. Electronic cigarettes (e-cigarettes) are hand held battery-operated items which when heated create emissions that are inhaled by the user and later exhaled into the environment [44,45]. Nonusers can be exposed to these emissions, which contain toxic substances and carcinogens [46,47].

The newest entrant in this list of products are the ‘heat-not-burn’ tobacco products (smokeless or non-burning cigarettes), where in the tobacco is heated to release nicotine, but combustion and smoke is prevented [45,48].

The US Family Smoking Prevention and Tobacco Control Act of 2009 describe such products as ‘modified risk tobacco product’ (MRTP). They are sold or distributed for use to reduce harm or the risk of tobacco-related disease associated with commercially marketed tobacco products [45,49].

Tobacco companies claim that these products reduce the number and the levels of harmful substances generated by tobacco products. However, their potential benefits as a smoking cessation aid or as safe alternatives to cigarettes have not been substantiated by research. In fact the little data that exists, points towards greater harm caused by such products than the intended benefits.

Moreover, these products can lead to nicotine addiction and can serve as a gateway to experimenting with other deadly forms of tobacco.

Tobacco companies claim to manufacture newer and safe products. However, there is no epidemiological evidence to prove so. Tobacco in any form is unsafe (34).

Regulating tobacco products, offering cessation help to tobacco users and strong anti-

tobacco government policies and stringent laws are the only treatments to control this rapidly spreading and deadly epidemic.

6. Conclusion

Tobacco use is projected to kill 1 billion people during the 21st Century [4]. If current trends continue, by 2030 tobacco will kill more than 8 million people worldwide each year, with 80% of these premature deaths among people living in low- and middle-income countries [9]. The tobacco industry finds new ways to deceive people, serving as a disease vector and spreading the tobacco epidemic [5,35].

Tobacco companies claim to manufacture newer and safe products. However, there is no epidemiological evidence to prove so. Tobacco in any form is unsafe [34].

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