



## Tobacco Use

Worldwide, smoking-linked mortality will reach nearly 6.4 million people per year by 2015 and somewhere between 8.3 and 10 million by 2030<sup>1 2</sup> Although men are more than 3 times as likely to die of causes associated with tobacco use as women;<sup>3</sup> the gap in tobacco use by males and females is narrowing which could alter the overall impact of tobacco on mortality.<sup>4 5</sup> In recent years, declines in adult smoking prevalence in the United States have stalled at approximately 20%.<sup>6</sup>

Scientific evidence indicates that there is no risk-free level of exposure to tobacco smoke.<sup>7</sup> Inhaling the complex chemical mixture of combustion compounds in tobacco smoke causes adverse health outcomes, such as cancer, cardiovascular, and pulmonary diseases. Such health problems are manifested through DNA damage, inflammation, and oxidative stress. DNA damage can occur within 30 minutes of smoking a cigarette.<sup>8</sup>

The risk and severity of adverse health outcomes caused by smoking are directly related to the duration and level of exposure to tobacco smoke. Sustained use and long-term exposures are related to the powerfully addicting effects of tobacco products. These effects are mediated by diverse actions of nicotine and other compounds at multiple types of nicotinic receptors in the brain. Low levels of exposure, including exposures to secondhand tobacco smoke, could lead to a rapid and sharp increase in endothelial dysfunction and inflammation. Such complications are implicated in acute cardiovascular events and thrombosis.

There is insufficient evidence that product modification strategies to lower emissions of specific toxicants in tobacco smoke reduce the risk for major adverse health outcomes. For example, cigarettes contain significant doses of carcinogens, including tobacco-specific nitrosamines (TSNA). TSNA are among the most broadly acting and potent carcinogens present in unburned tobacco and tobacco smoke. Also, there are significant global

differences in the level of TSNA in cigarette smoke because of the variation in tobacco blending and curing practices around the world. The United States has high levels of TSNA in cigarettes compared to countries such as Canada and Australia.<sup>9</sup>

Tobacco use remains the number one actual cause of death in the United States.<sup>10 11</sup> Although cigarette consumption in the United States has fallen to its lowest point, nicotine-dependency (Table 18.1) has not decreased. It is theorized that nicotine-dependency may be increasing, in younger birth cohorts, particularly among women.<sup>12 13</sup> In 2008, an estimated 20.6% of the population smoked cigarettes and since 2002, former smokers have outnumbered current smokers.<sup>14</sup> In general, smoking rates in the nation are highest among persons with 9 to 11 years of education and lowest among those with at least 16 years of education.<sup>15</sup> Those living below the poverty level have a higher prevalence of smoking than persons above the poverty level. Longer exposure to tobacco among groups that already are disadvantaged is likely to exacerbate existing health disparities.<sup>16</sup> The prevalence of smoking may be influenced by the amount of sleep a person gets each night; <6 hours and  $\geq$ 9 hours are associated with higher smoking rates.<sup>17</sup>

It is estimated that 8.6 million people have at least one serious illness caused by smoking and exposure to tobacco smoke is projected to contribute to approximately 440,000 deaths each year.<sup>18</sup>

**Table 18.1 Nicotine dependency criteria (dependency classified as  $\geq$ 3 criteria met)**

Criteria	
1	Needing more nicotine to achieve desired results
2	Experiencing nicotine withdrawal syndrome
3	Using cigarettes more than intended
4	Experiencing a persistent desire or unsuccessful efforts to cut down on nicotine use
5	Spending a great deal of time using cigarettes
6	Giving up activities in favor of nicotine use
7	Continuing to use cigarettes despite recurrent physical or psychological problems likely to have been caused by nicotine use

(source: *Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition*. Washington DC: American Psychiatric Association, 1994)

Among current smokers, chronic lung disease accounts for 73% of smoking-related conditions and, among former smokers, 50% of smoking-related conditions. High rates of tobacco-related cancer are found among men, blacks, non-Hispanics, and older adults.<sup>19</sup>

Smoking shortens a person's life by 5 to 10 years<sup>20</sup> while smoking cessation lowers smoking-related death rates.<sup>21 22</sup> Heavy smokers cannot simply reduce the number of cigarettes they smoke if they want to minimize their risk of early death; they must stop completely.<sup>23</sup> For recently-quit smokers, it takes approximately 10 years for their arteries to return to the level of stiffness seen in non-smokers.<sup>24</sup> Because of genetics, some former smokers remain at a higher risk for developing lung cancer compared to persons who never smoked.<sup>25</sup> The probability that a smoker will cease smoking is influenced by the dynamics of their social network<sup>26</sup> and persons under greater financial strain are less likely to quit smoking.<sup>27</sup>

Reducing the prevalence of cigarette smoking among adults to 12% or lower is a *Healthy People 2020* objective. Smokers have a higher mortality rate and shorter life expectancy than non-smokers.<sup>28</sup> Reductions in cigarette smoking, therefore, may adversely affect the U.S. Social Security system as a result of declines in smoking-attributable mortality<sup>29 30 31</sup> and increased risk from some chronic diseases.<sup>32</sup> Smoking is a greater source of health inequity than socioeconomic position and nullifies women's survival advantage over men.<sup>33</sup> Among both men and women, persons who never smoked have much better survival rates than smokers in all socioeconomic levels. Given that tobacco consumption raises the risk of premature death in comparison to non-smokers, it can be assigned a death cost for people who do smoke. Using 'Value of a Statistical Life' calculations, various researchers have estimated the true cost of smoking to be between at \$150 to \$222 per pack.<sup>34 35</sup> The estimated costs for women were about a third less than the costs for men.

Secondhand smoke is a complex mixture of particles and gases which includes smoke from burning cigarettes, cigars, and pipe tobacco as well

as exhaled mainstream smoke. Although exposure to secondhand smoke is declining<sup>36</sup>, an estimated 600,000 persons globally die annually from illnesses caused by exposure to secondhand smoke.<sup>37</sup> Bans on smoking in public spaces and workplaces aim to reduce the risk of heart attacks among non-smokers by removing their exposure to secondhand smoke. While exposure to secondhand smoke has been associated with heart attacks, there is no evidence that a relatively brief exposure can precipitate an event.<sup>38</sup>

Secondhand smoke in the home is estimated to add \$415 million to the annual health care expenditures of children. This is due to the fact that children have twice the risk of having emergency department visits and three times the risk of hospitalization for respiratory conditions as compared to children in a non-smoking home.<sup>39</sup> There are data that suggest postnatal exposure to secondhand smoke may increase the risk of attention-deficit/hyperactivity disorder among children of Mexican heritage, but not among non-Hispanic whites and blacks.<sup>40</sup> Pregnant women who are exposed to secondhand smoke are estimated to be 23% more likely to experience stillbirth and 13% more likely to give birth to a child with a congenital malformation<sup>41</sup>. Because the timing and mechanism of this effect is not clear, it is important to prevent secondhand smoke exposure in women before and during pregnancy.

It has been proposed that there is a third category of risk, called "thirdhand smoke," which arises from exposures to tobacco residues on environmental surfaces and clothing. When residual nicotine on indoor surfaces from tobacco smoke reacts with ambient nitrous acid, TSNAs are formed.<sup>42</sup> The health risks, if any, of third-hand smoke remain to be determined.

There are two basic approaches to reducing the prevalence of smoking. One approach is to discourage youth from adopting tobacco usage. Youth who are non-smokers cite health-related reasons for why they choose not to smoke.<sup>43 44</sup> Keeping youth from smoking can be accomplished via a mix of educational and monetary approaches. However, ex-



posure to youth-targeted smoking prevention advertising from tobacco companies generally has no beneficial outcomes for youths.<sup>45</sup>

Studies have shown that a 10% increase in the price of cigarettes reduces smoking by 7% for youth and by 4% for adults, although the effectiveness of this approach has been questioned.<sup>46 47</sup> Missouri has the lowest cigarette tax in the nation, \$0.17 per pack. It also ranks 48<sup>th</sup> among the states in spending on anti-smoking programs, spending only 0.1% of the \$73.2 million recommended by Centers for Disease Control and Prevention (CDC).

The second approach is to get current smokers to stop smoking. While most smoking cessation costs are borne by the smoker, some states (not including Missouri) offer assistance through Medicaid.<sup>48</sup>

The Family Smoking Prevention and Control Act of 2009 gave the Food and Drug Administration (FDA) authority to regulate tobacco products.<sup>49</sup> The law instructs the FDA to not only regulate tobacco products in order to protect the public health but also

to hold a standard more appropriate for inherently dangerous tobacco products than is the “safe and effective” standard used for other FDA-regulated products. While the FDA has broad authority over the manufacture, marketing, distribution, sale, and importation of tobacco products, as well as the flexibility to respond to new information, several limitations on that authority also were imposed. The public health approach to be used has 4 key elements: reducing the rate of initiation of tobacco use, educating the public, applying regulatory science to the control of tobacco products, and engaging actively with public health partners and industry.

The sale of most flavored cigarettes was made illegal but menthol-flavored cigarettes were exempted by the legislation. Menthol-flavored cigarettes currently account for a quarter of cigarette sales in the United States. Many menthol cigarette smokers are from minority populations, which are specifically targeted by the tobacco industry in its marketing campaigns.

## Missouri

Only four states (Kentucky, Mississippi, Oklahoma and West Virginia) had higher 2009 adult smoking prevalence rates than Missouri. In 2009, 23.1% of the adults in Missouri were current smokers (24.3% of men, 21.9% of women).<sup>50</sup> In addition, 5.4% of all Missouri adults used smokeless tobacco products and 7% of Missouri smokers also used smokeless tobacco products. Men were 6-10 times more likely to use smokeless tobacco products than women.

Missouri has neither a statewide smoke-free policy, nor does it provide smoking cessation counseling or medications through its Medicaid program.<sup>51</sup> Missouri also does not require establishments selling tobacco products over the counter or by vending machine to be licensed. Local regulation of tobacco industry promotions, sampling, and display of tobacco products in commercial establishments is allowed. Missouri has no minimum price law for cigarettes, and it ranks well below the na-

tional median for anti-tobacco media campaigns. Additionally, Missouri is 49<sup>th</sup> in the nation in terms of state funding for tobacco control. The American Lung Association gave Missouri a grade of “F” for tobacco prevention and control spending, smoke free air, and cigarette tax, as well as a grade of “B” for youth access to tobacco products.

The health and economic burden of tobacco smoking in Missouri has severe health implications for the state. CDC has a statistical package known as Smoking-Attributable Mortality, Morbidity and Economic Costs (SAMMEC).<sup>52</sup> Based on SAMMEC analyses, during 2003-2007, smoking caused an estimated 9,377 deaths annually among Missouri adults  $\geq 35$  years old. The smoking-attributable mortality rate for blacks was 18% higher than that for whites.<sup>53</sup> Missouri’s smoking-attributable adult mortality rate places it 42<sup>nd</sup> among states.<sup>54</sup> In addition, the rate of smoking-attributable years of potential life lost (YPLL) was 18% higher for blacks. Tobacco

smoking results in the loss to Missouri of more than \$2.4 billion in economic productivity<sup>55</sup> and smoking attributable illnesses annually cost Missouri's Medicaid program an approximated \$514 million.<sup>56</sup>

In Missouri, nearly 25% of adults and 19% of high school students are current smokers.<sup>57</sup> While current smoking prevalence has declined among 6<sup>th</sup>

grade students, there have been no significant changes in the smoking rates of students in grades 7 to 12.<sup>58</sup> Among adults, the prevalence of smoking decreases after age 45, is lower as the level of educational attainment rises, and is higher among minority populations than whites.

## ***Kansas City***

According to 2009 data from the Behavioral Risk Factor Surveillance Survey (BRFSS), 23.6% of persons in the Kansas City, Missouri, region were current smokers.

Using SAMMEC and mortality data for 2005-2009, the Kansas City Health Department found that 3,129 deaths among persons at least 35 years old were smoking related (Table 18.2). Those deaths represented 17.8% of the 17,547 deaths among persons at least 35 years old and did not include the approximated 400 deaths attributed to secondhand smoke. Directly and indirectly, cigarette smoking contributed to an estimated 20.1% of all deaths among persons at least 35 years old in Kansas City between 2005 and 2009. The estimated deaths were for a 5-year period, which translates to an estimated 706 Kansas City residents dying each year from smoking-attributable causes.

In Missouri, an estimated 9,585 people die annually from smoking-attributable causes.<sup>59</sup> Kansas City accounts for about 7.7% of Missouri's population, but fewer than 7.7% of smoking-attributable deaths in Missouri (700 deaths in Kansas City). This discrepancy is most likely due to the lower smoking rate in Kansas City compared to the rest of Missouri. Over the 5-year period, Kansas City experienced more than \$864 M in smoking-attributable productivity losses and more than 46,000 smoking-attributable YPLL (Table 18.3).

Work by the Kansas City Health Department and its community partners at the Kansas City University of Medicine and Biosciences and Children's Mercy Hospital has examined various issues related

to smoking during pregnancy. Those efforts demonstrated that smoking alone or in combination with alcohol and/or drug use was associated with low birthweight for term<sup>60</sup> and preterm infants<sup>61</sup> as well as infants who were small for their gestational age.<sup>62</sup> Depending on the combination of smoking, alcohol, and drugs, these health compromising behaviors were associated with 11.8-31.4% of preterm births and 5.5-18.5% of low birthweight term births.

The prevalence of smoking during pregnancy for non-Hispanic black women in Kansas City has not changed since 1995 while prevalence among non-Hispanic white women continues to decline.<sup>64</sup> Non-Hispanic black women currently have a higher prevalence of smoking during pregnancy than non-Hispanic whites.

Among women who had two pregnancies, 24.9% of women who smoked during their first pregnancy did not smoke during their second pregnancy, while only 4.8% of the women who did not smoke during the first pregnancy did so in the second pregnancy.<sup>65</sup> However, the prevalence of smoking during pregnancy increased with the number of prior births to women. Infants born to smokers had a risk of dying that was 76% higher than for those born to non-smokers.<sup>66</sup>

Of 1,234 Kansas City residents surveyed in 2006, 70.2% said smoking was not permitted in the home. Of those who allowed smoking in the home, 36.2% permitted it only in designated rooms. Smoking was permitted in designated areas outside of the home by 76.3% of respondents, although 9% of these individuals indicated that permission was condi-

tional. Of the respondents, 74.1% did not permit smoking in their car, van, or truck, while 20.3% indicated that in the prior week they had been a passenger in a vehicle with a person who was smoking.

Reviews of national data show that smoking bans in public places and workplaces are significantly associated with a reduction in heart attacks, angina, stroke, and asthma.<sup>67 68</sup> In Kansas City, smoking

restrictions apply to workplaces, including restaurants and bars, but not casino gaming floors. An independent study found that smoke-free policies have had no negative impact on eating or drinking establishments in Missouri and Kansas.<sup>69</sup>

**Table 18.2. Smoking-Attributable Mortality, Kansas City, MO, 2005-2009** (adults age 35 years and older; does not include burn or second hand smoke deaths)

Disease category	Males		Females		Total	
	Deaths	Rate <sup>1</sup>	Deaths	Rate	Deaths	Rate
<b>Malignant neoplasms</b>						
Lip, oral cavity, pharynx	25	5.2	11	1.7	36	3.3
Esophagus	68	15.3	15	2.3	83	7.6
Stomach	16	3.8	2	0.3	18	1.6
Pancreas	33	7.3	27	4.1	60	5.5
Larynx	18	3.9	5	0.8	23	2.1
Trachea, lung, bronchus	668	149.8	399	61.9	1,067	97.0
Cervix uteri	0	0.0	2	0.3	2	0.2
Kidney & renal pelvis	18	4.2	0	0.0	18	1.6
Urinary bladder	36	8.7	8	1.2	44	4.0
Acute myeloid leukemia	6	1.3	2	0.3	8	0.7
<b>Sub-total</b>	<b>888</b>	<b>199.5</b>	<b>471</b>	<b>72.9</b>	<b>1,359</b>	<b>123.6</b>
<b>Cardiovascular diseases</b>						
Ischemic heart disease	328	73.5	147	22.2	475	43.3
Other heart disease	111	28.1	75	10.8	186	16.9
Cerebrovascular disease	68	15.4	67	10.6	135	12.3
Atherosclerosis	25	7.4	13	1.7	38	3.5
Aortic aneurysm	25	6.2	14	2.1	39	3.5
Other arterial disease	4	1.1	7	1.0	11	1.0
<b>Sub-total</b>	<b>561</b>	<b>131.7</b>	<b>323</b>	<b>48.4</b>	<b>884</b>	<b>80.5</b>
<b>Respiratory diseases</b>						
Pneumonia, influenza	34	8.8	21	2.8	55	5.0
Bronchitis, emphysema	31	7.5	28	4.3	59	5.4
Chronic airway obstruction	373	93.7	399	58.8	772	70.3
<b>Sub-total</b>	<b>438</b>	<b>110.0</b>	<b>448</b>	<b>65.9</b>	<b>886</b>	<b>80.7</b>
<b>Total</b>	<b>1,887</b>	<b>441.2</b>	<b>1,242</b>	<b>187.2</b>	<b>3,129</b>	<b>284.8</b>

<sup>1</sup> Average annual age-adjusted death rate ; US 2000 standard population

**Table 18.3. Smoking-attributable productivity losses and years of potential life lost, Kansas City, MO, 2005-2009 (adults age 35 years and older; does not include burn or second hand smoke deaths)**

Disease category	Productivity losses (thousands of dollars)			Years of potential life lost		
	Males	Females	Total	Males	Females	Total
<b>Malignant neoplasms</b>						
Lip, oral cavity, pharynx	12,412	3,113	15,525	488	183	671
Esophagus	22,654	3,706	26,360	1,054	230	1,284
Stomach	4,280	0	4,280	218	15	233
Pancreas	12,121	8,239	20,360	539	457	996
Larynx	6,021	1,924	7,945	281	99	380
Trachea, lung, bronchus	193,205	115,077	308,282	9,622	6,681	16,303
Cervix uteri	0	1,789	1,789	0	65	65
Kidney & renal pelvis	5,293	0	5,293	260	0	260
Urinary bladder	7,233	1,698	8,931	431	114	545
Acute myeloid leukemia	1,581	301	1,882	84	25	109
<b>Sub-total</b>	<b>\$264,800</b>	<b>\$135,847</b>	<b>\$400,647</b>	<b>12,977</b>	<b>7,869</b>	<b>20,846</b>
<b>Cardiovascular diseases</b>						
Ischemic heart disease	138,826	45,359	184,185	5,781	2,478	8,259
Other heart disease	31,942	14,424	46,366	1,533	1,004	2,537
Cerebrovascular disease	29,493	30,169	59,662	1,207	1,398	2,605
Atherosclerosis	1,700	301	2,001	201	104	305
Aortic aneurysm	7,782	2,480	10,262	369	189	558
Other arterial disease	528	1,197	1,725	41	93	134
<b>Sub-total</b>	<b>\$210,271</b>	<b>\$93,930</b>	<b>\$304,201</b>	<b>9,132</b>	<b>5,266</b>	<b>14,398</b>
<b>Respiratory diseases</b>						
Pneumonia, influenza	7,736	2,473	10,209	421	226	647
Bronchitis, emphysema	7,496	6,662	14,158	397	433	830
Chronic airway obstruction	65,469	69,454	134,923	4,201	5,287	9,488
<b>Sub-total</b>	<b>\$80,701</b>	<b>\$78,589</b>	<b>\$159,290</b>	<b>5,019</b>	<b>5,946</b>	<b>10,965</b>
<b>Total</b>	<b>\$555,772</b>	<b>\$308,366</b>	<b>\$864,138</b>	<b>27,128</b>	<b>19,081</b>	<b>46,209</b>

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