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Cigarette Purchasing Patterns among New York Smokers: Implications for Health, Price, and Revenue

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# CIGARETTE PURCHASING PATTERNS AMONG NEW YORK SMOKERS:

## IMPLICATIONS FOR HEALTH, PRICE, AND REVENUE



NEW YORK STATE DEPARTMENT  
OF HEALTH  
MARCH 2006



# **Cigarette Purchasing Patterns among New York Smokers: Implications for Health, Price, and Revenue**

**March 2006**

Prepared for

**New York State Department of Health**  
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## Executive Summary

Raising the price of cigarettes is one of the most effective interventions to prevent and reduce cigarette use. Local, state, and federal governments can change the price of cigarettes by raising or lowering cigarette excise taxes and by implementing and enforcing minimum price laws. Smokers can also adjust their behavior by choosing discount or “bargain” brands, buying fewer cigarettes, and avoiding paying cigarette taxes by purchasing from retailers that do not levy all applicable state and local taxes, such as Indian reservations and Internet cigarette vendors.

Purchasing low price or untaxed cigarettes is common among smokers in New York. The most common source of cigarette tax avoidance in New York is purchasing from Indian reservations, especially in the western areas of the state. This behavior undermines the state’s efforts to prevent and reduce tobacco use. Cigarette tax avoidance not only reduces smokers’ incentives to quit smoking or reduce the amount they smoke, but it also results in a significant loss of state tax revenue that could be devoted to public health interventions aimed at reducing smoking. Lost revenue due to unpaid cigarette taxes also deprives the state of resources to address other public health issues.

This report examines smokers’ cigarette purchasing patterns with a focus on quantifying the extent of tax evasion in New York and identifying the characteristics of smokers who most frequently seek out and purchase low price and untaxed cigarettes. This report also examines the overall health and financial impacts of cigarette tax avoidance in New York by calculating the reduction in cessation and quantifying the amount of tax revenue lost due to tax avoidance via specific low price and untaxed sources. Specific findings include the following:

- Thirty-seven percent of New York smokers report purchasing cigarettes from low price (mainly untaxed) sources “all the time” or “sometimes.”
- Purchase of lower price cigarettes is associated with reduced intentions to quit smoking and fewer attempts to quit smoking.
- If all smokers paid the average retail price for cigarettes (including the excise tax), the current prevalence of smoking would be 2 to 3 percent lower, representing between 51,026 and 76,539 fewer adult smokers in New York.
- Revenue lost to the state as a result of purchasing low price (mainly untaxed) cigarettes is estimated to be between \$436 million and \$576 million in 2004.



## **1. Introduction**

### **1.1 Cigarette Taxes and Public Health**

**T**hroughout U.S. history, state and federal governments have increased the prices of tobacco products by imposing higher taxes on those products, which are then passed along to consumers in the form of higher prices. State and federal governments have also enforced minimum price laws and have taken initiatives to counter discounts and other promotions offered by tobacco companies. The first federal tax on cigarettes was imposed in 1864; states did not introduce cigarette taxes until 1921. By 1969, all states had a cigarette excise tax (Orzechowski and Walker, 2003).

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Raising the price of tobacco products through excise tax increases is one of the most effective ways to prevent and reduce tobacco use among adults and adolescents.

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Raising the price of tobacco products is one of the most effective ways to prevent and reduce tobacco use among adults and adolescents. Studies have shown that increases in cigarette excise taxes are an effective way to raise the real price of cigarettes and to reduce cigarette consumption and smoking prevalence. It is estimated that for every dollar increase in cigarette taxes, the average price of cigarettes increases by \$1.25 (Keeler et al., 1996). This increase in price, in turn, leads to greater incentives for smokers to quit or reduce the number of cigarettes they smoke and for nonsmokers to remain nonsmokers.

Among adolescents, it has been estimated that a 10 percent increase in the price of a pack of cigarettes can lead to a 7 percent decline in the prevalence of cigarette smoking (Gruber and Zinman, 2001). Increasing the price of cigarettes also makes it more likely that youth who do not smoke will remain nonsmokers. One study showed that nonsmoking youth who live in states with high cigarette prices are 13 percent more likely to remain nonsmokers than youth who live in states with relatively low cigarette prices (Liang and Chaloupka, 2002). Higher cigarette prices have also been shown to curb youth's progression from experimental to established smoking and can encourage young established smokers to quit (Liang and Chaloupka, 2002; Katzman, Markowitz, and McGeary, 2002; Tauras, 2004).

Increases in cigarette prices and taxes have also been shown to lead to significant declines in smoking among adults. Studies have estimated that a 10 percent increase in cigarette taxes can lead to a 3 to 5 percent decrease in overall cigarette consumption among adult smokers, with approximately half of this decline resulting from smokers quitting altogether (USDHSS, 1994; Chaloupka and Warner, 2000). It has also



been estimated that a 10 percent increase in the price of a pack of cigarettes would lead to a 1.3 percent decline in the prevalence of adult smoking and a 1.5 percent decline in the number of cigarettes smoked per day by adult smokers (Farrelly et al., 2001). Additional studies have estimated that a \$2.00 increase in the federal cigarette tax (from \$0.39 to \$2.39) could lead to as many as 4.7 million smokers quitting (Fiore et al., 2004).

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Studies have estimated that a 10 percent increase in cigarette taxes can lead to a 3 to 5 percent decrease in overall cigarette consumption among adult smokers, with approximately half of this decline resulting from smokers quitting altogether.

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The overall public health benefit of higher cigarette taxes and prices is significant. It has been estimated that a 10 percent increase in state cigarette taxes saves more than 5,000 lives in the United States each year (Moore, 1996). Better health from fewer smoking-related illnesses also translates into reduced health care costs. For example, declines in smoking achieved in Massachusetts through 1998 were estimated to have saved a minimum of \$585 million annually in public and private health care expenditures (Abt, 2000). Between 1990 and 1998, declines in smoking in California were estimated to save more than \$3 billion in smoking-related health care costs (CA DHS, 2000; Lightwood and Glantz, 1997). A significant portion of these savings was found to be from fewer smoking-related heart attacks and strokes (Lightwood and Glantz, 1997) and from fewer low birth weight babies (Lightwood et al., 1999). Based on this body of research, public health agencies have recommended using price increases to reduce tobacco use initiation among young people, reduce the overall level of tobacco consumption, and increase attempts to quit and successful quitting among smokers.

## **1.2 Factors that Undermine the Benefits of Higher Prices**

A number of factors can undermine the public health benefits of higher cigarette prices and taxes. For example, cigarette companies spend significant amounts of money and resources to counter higher prices brought about by cigarette excise taxes. In 2003, the four largest categories of cigarette company expenditures on advertising were price discounts (\$10.8 billion), promotional allowances to retailers to facilitate product placement (\$1.9 billion), bonus cigarette offers such as buy-one-get-one-free (\$677 million), and cigarette coupons (\$651 million) (FTC, 2005). It has been shown that cigarette promotional programs are associated with significantly lower cigarette prices for at least some brands of cigarettes (Loomis et al., forthcoming), suggesting that promotional programs and advertising have been an effective way for the tobacco industry to counter cigarette taxes.

Perhaps the most significant factor that undermines the public health benefits of higher prices and taxes is the problem of cigarette tax

avoidance. By raising cigarette prices, states provide a greater economic incentive for smokers to try to find lower-cost cigarettes. Smokers may therefore seek out stores with lower prices, switch to cheaper brands, buy cigarettes from nearby neighboring states that have lower cigarette tax rates, buy cigarettes informally on the black market (e.g., from street sellers), or buy untaxed cigarettes from Indian reservations or over the Internet. Motivation to use these opportunities has also increased over time, mirroring the increases in state and federal cigarette taxes. A report sponsored by the Centers for Disease Control and Prevention (CDC) estimated that losses in state tax revenue that were due to tax evasion were less than \$170 million in 1990 but increased to more than \$550 million by 2000 (Farrelly et al., 2002).

The problem of cigarette tax evasion has been particularly evident in New York, where cigarette taxes have increased significantly in recent years across the state as a whole and within New York City specifically. As of July 2005, the cigarette excise tax in New York State was \$1.50 per pack with an additional \$1.50 per pack tax in New York City, giving the city a combined tax of \$3.00 per pack. These tax rates are significantly higher than the national average of \$0.89 per pack, providing smokers in New York with a greater incentive to avoid the tax.

Smokers in New York State respond to higher taxes by purchasing cigarettes from a variety of lower cost sources including at 10 Indian reservations located throughout the state. A study conducted in Erie and Niagara Counties in western New York between 2002 and 2003 found that 55 percent of smokers regularly bought cigarettes from Indian reservations, resulting in \$24 million in lost sales and excise taxes for New York State and another \$3 million in lost sales taxes for the county governments (Hyland et al., 2004). Furthermore, when the excise tax is not collected, state and local sales taxes are not collected either.

Tax differences between low or untaxed areas and high tax areas have also dramatically increased the size of potential illegal profits available to those who smuggle cigarettes from low-tax areas, such as low-tax tobacco-producing states and Indian reservations, to high-tax areas, such as New York City. For example, the *Wall Street Journal* reported in 2002 that the street value of smuggled cigarettes nearly doubles when cigarettes cross into Manhattan, where state and city taxes on cigarettes are \$3 combined (Fairclough, 2002). Studies indicate that such organized smuggling of cigarettes accounts for a significant portion of tobacco tax evasion (Farrelly et al., 2002).

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By knowing where smokers most often purchase their cigarettes, what the most common sources of low-tax cigarettes are, what types of smokers avoid taxes, and what the financial impact of tax avoidance is, states may be better able to focus their resources on curbing tax evasion in order to maximize the public health benefits of cigarette taxes and increase state revenue.

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In this report, we seek to better inform the debate over cigarette tax evasion and enforcement of tax collection laws in New York. By knowing where smokers most often purchase their cigarettes, what the most common sources of low-tax cigarettes are, what types of smokers avoid taxes, and what the health and financial impacts of tax avoidance are, states may be better able to focus their resources on curbing tax evasion in order to maximize the public health benefits of cigarette taxes and increase state revenue.

This report relies primarily on data from the 2004 New York Adult Tobacco Survey (ATS). For a more detailed discussion of analytic methods, see Appendix A. The remainder of the report presents detailed findings on the extent of cigarette tax avoidance in New York State (Section 2), the effects of tax avoidance on cigarette prices (Section 3), the characteristics of cigarette tax avoiders (Section 4), the impact of cigarette tax avoidance on public health (Section 5), and the financial implications of cigarette tax avoidance for New York State (Section 6). In Section 7, we discuss the findings and their implications for tobacco control in New York State.

## 2. Cigarette Purchasing Patterns in New York State

In New York State, smokers most frequently purchase cigarettes from convenience stores and gas stations (Exhibit 2-1). In 2004, more than three-fourths of adult smokers in New York purchased cigarettes from convenience stores and gas stations at least once in the past year, while nearly 60 percent of smokers reported purchasing cigarettes frequently (i.e., “all the time” or “sometimes”) at these locations. Other significant retail sources of cigarettes include grocery stores; pharmacies; and discount stores, such as Costco and WalMart. However, the second-most common source of cigarettes in New York is low- and untaxed venues. Exhibit 2-1 indicates that tax avoidance in New York State is quite extensive, with more than half of all smokers in New York purchasing cigarettes from low-tax or untaxed sources at least once during 2004.

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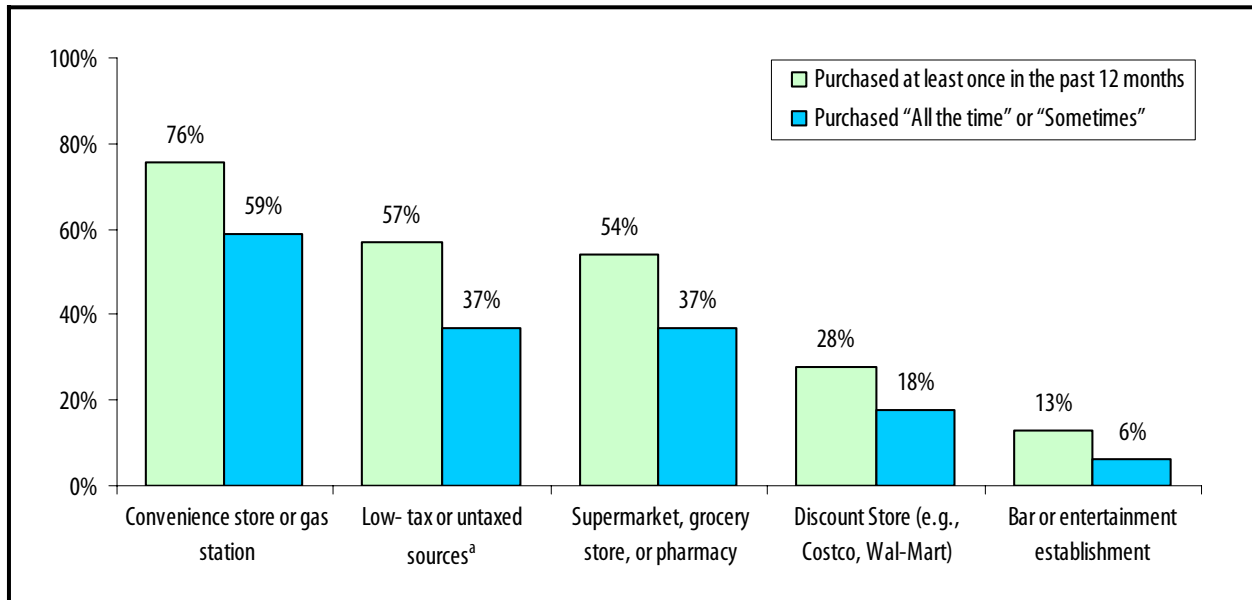
Overall, in 2004, 57 percent of smokers in New York purchased cigarettes at least once from any low-tax or untaxed source, while 37 percent purchased low-tax or untaxed cigarettes regularly.

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Overall, in 2004, 57 percent of smokers in New York purchased cigarettes at least once from any low-tax or untaxed source, while 37 percent purchased low-tax or untaxed cigarettes regularly (Exhibit 2-2). The most common sources for low-tax or untaxed cigarettes were Indian reservations and nearby states with lower cigarette taxes. In 2004, 32 percent of smokers in New York purchased cigarettes from Indian reservations at least once, while 25 percent purchased cigarettes frequently (either all the time or sometimes) from reservations.

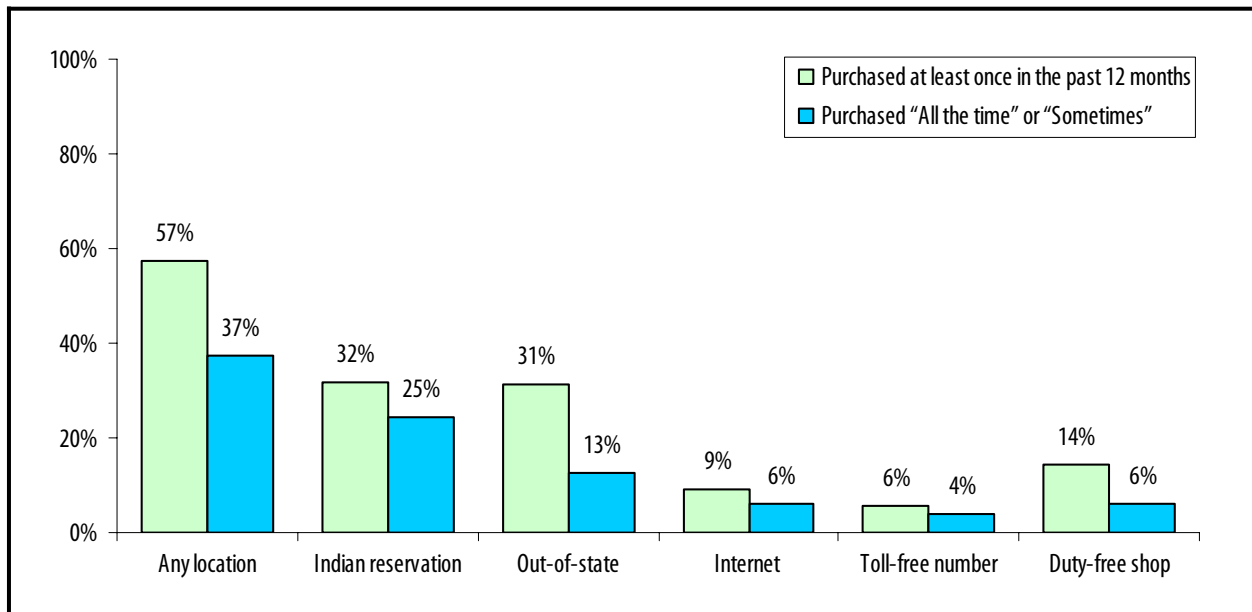
The extent of cigarette tax avoidance in New York State is especially high in the western region of the state given the proximity of Indian reservations. New York State can be categorized into four regions (Western, Central, Capital, and Metropolitan) each of which are divided into two subareas. (See Appendix B for a listing of counties that make up each region and area.) Cigarette tax avoidance is highest in the Western and Central regions of New York. In 2004, 79 percent of smokers in the Western region of New York bought cigarettes at least once from low-tax or untaxed sources, while 70 percent of smokers in the Central region purchased low-tax cigarettes (Exhibit 2-3). In the Capital and Metropolitan regions, 53 and 49 percent of smokers purchased low-tax cigarettes, respectively. The majority of low-tax or untaxed purchasing in these areas is from Indian reservations. In the Western region of New York, 75 percent of smokers purchased low-tax or untaxed cigarettes from Indian reservations, while only 4 percent purchased low- or untaxed cigarettes from other sources. These tax avoidance patterns are primarily due to the high number of Indian reservations located in the Western region of the state.

**Exhibit 2-1. Percentage of Smokers Who Purchased from Various Retail Sources, ATS 2004**

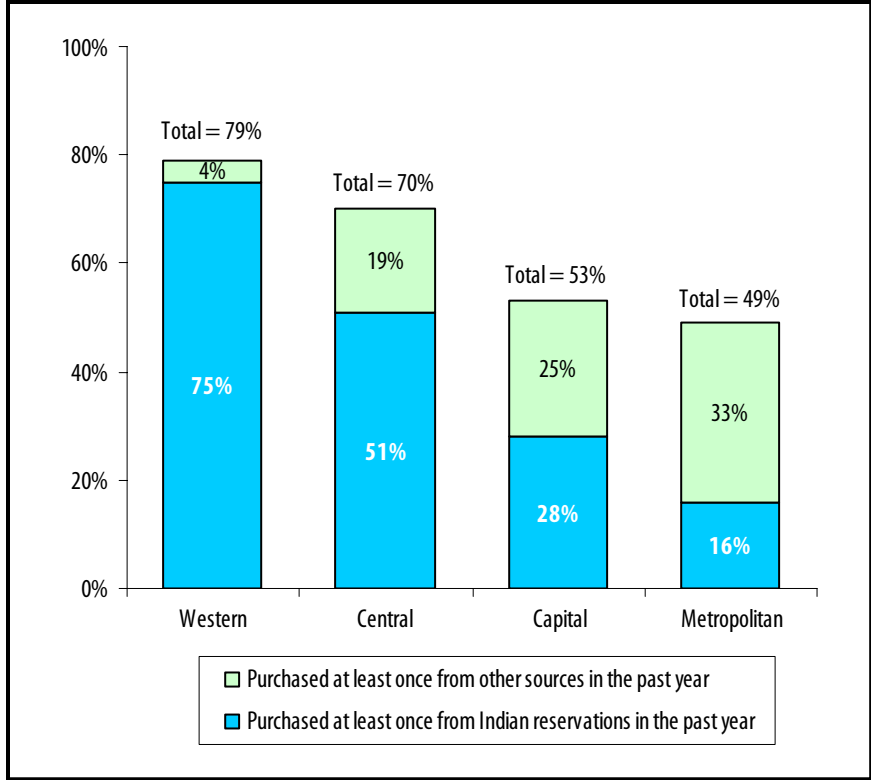


<sup>a</sup>Includes Indian reservations, out-of-state sources, the Internet, toll-free numbers, and duty-free shops.

**Exhibit 2-2. Percentage of Smokers Who Purchased from Low-Tax or Untaxed Sources, ATS 2004**



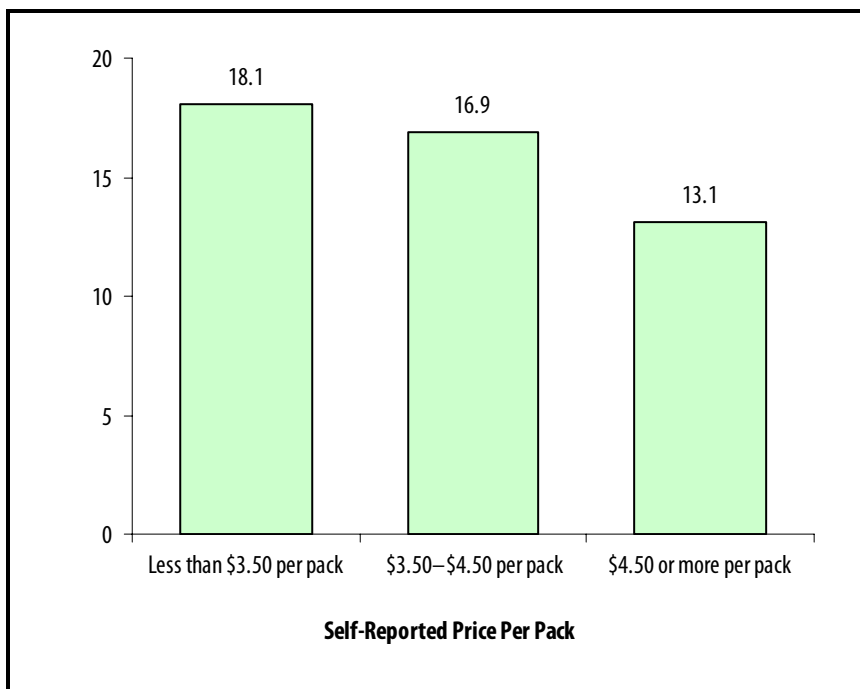
**Exhibit 2-3. Percentage of Smokers Who Purchased from Low-Tax or Untaxed Sources by Region, ATS 2004**



### 3. How Does Price Affect Smoking Behavior in New York?

Studies have shown that increases in cigarette prices can significantly reduce smoking among adults. This relationship between price and smoking behavior exists in New York. Smokers in New York who pay higher prices smoke fewer cigarettes (Exhibit 3-1). On average, smokers who pay less than \$3.50 per pack smoke about 18 cigarettes per day, whereas smokers who pay \$4.50 per pack or more smoke about 13 cigarettes per day. This would suggest that, similar to smokers in other areas of the United States, smokers in New York are sensitive to higher cigarette prices and reduce the number of cigarettes they smoke when prices are increased. These patterns also likely reflect a greater willingness among heavier smokers to seek out lower-priced cigarettes.

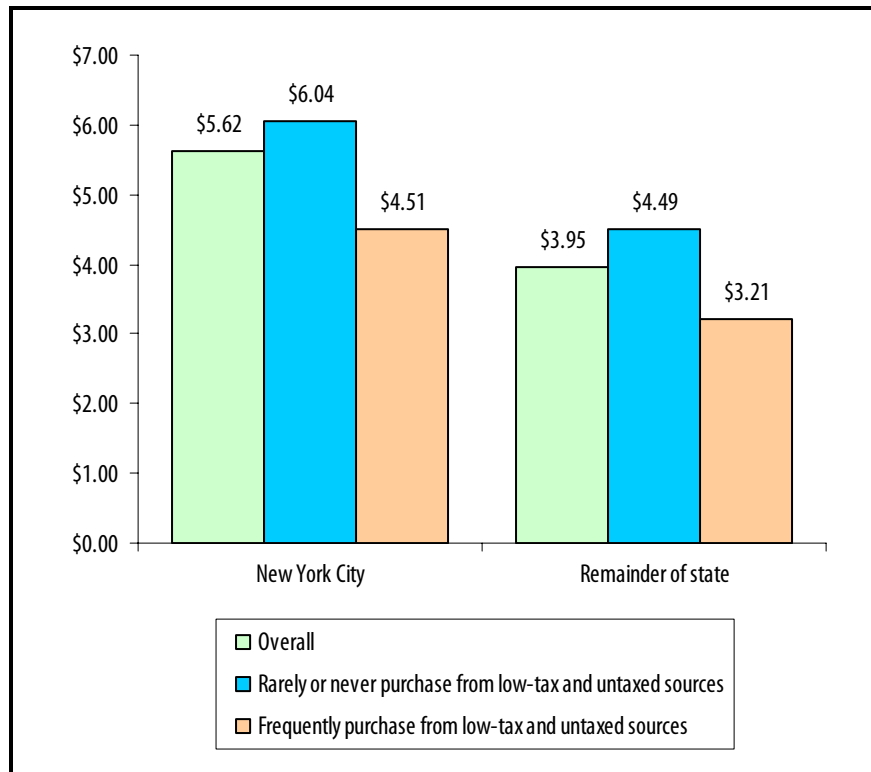
**Exhibit 3-1. Average Number of Cigarettes Smoked Per Day by Self-Reported Cigarette Prices Among Smokers, ATS 2004**



#### 4. How Does Tax Avoidance Affect Cigarette Prices Paid by Smokers?

By avoiding taxes, smokers pay lower prices for cigarettes, which diminishes their incentive to either quit smoking or to reduce the amount they smoke. In New York City, smokers who frequently purchase cigarettes from low-tax and untaxed sources pay, on average, \$1.53 less per pack than those who do not avoid taxes. In areas outside of New York City, smokers who frequently avoid taxes pay about \$1.28 less per pack than smokers who do not avoid taxes (Exhibit 4-1).

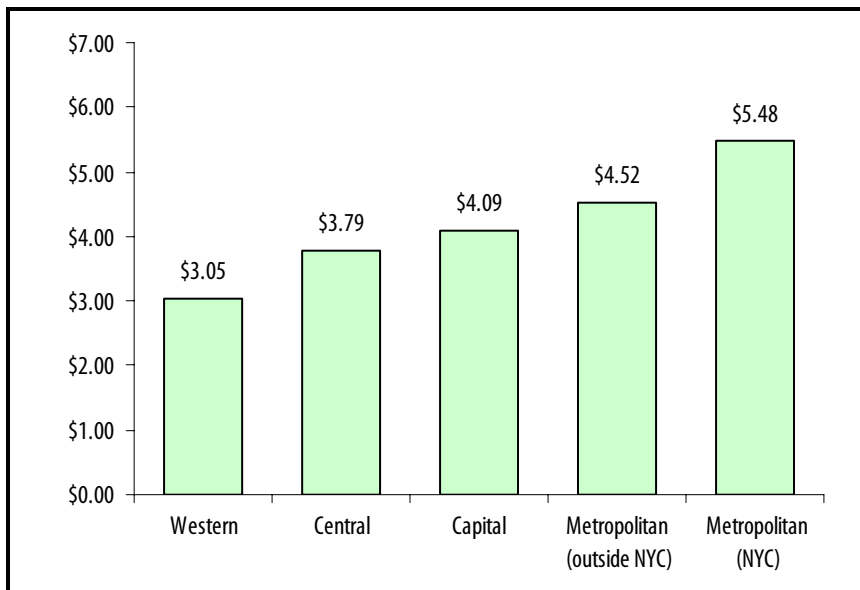
**Exhibit 4-1. Average Price Per Pack of Cigarettes by Smokers' Self-Reported Frequency of Tax Evasion, ATS 2004**



Because cigarette tax evasion occurs more frequently in the Western and Central regions of the state (due to their proximity to Indian reservations), everyday cigarette purchasers pay significantly lower prices in these regions than in other areas of the state. In 2004, the average price paid per pack of cigarettes was \$3.05 in the Western region, \$3.79 in the Central region, \$4.08 in the Capital region, and \$5.00 in the Metropolitan region. Within the Metropolitan region, prices were \$4.52 in areas outside of New York City and \$5.48 inside New York City (Exhibit 4-2).

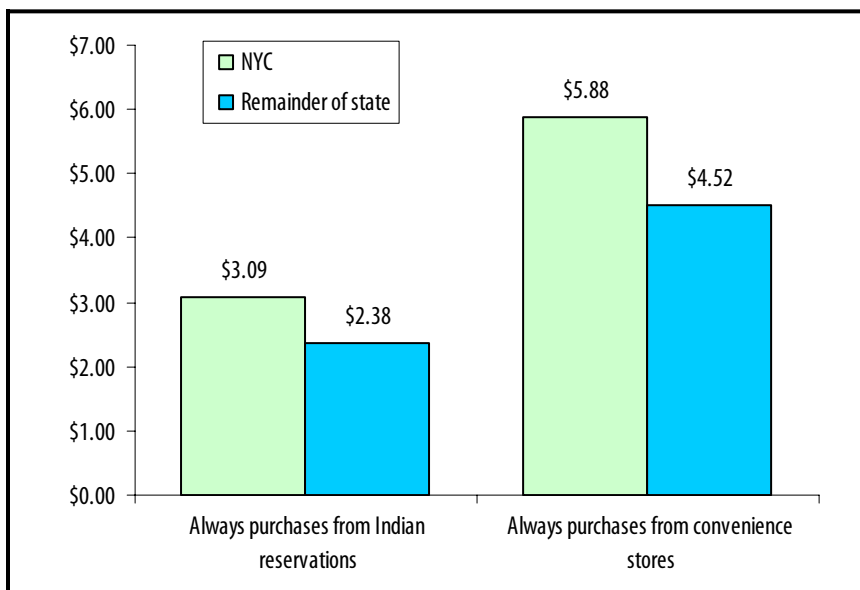


**Exhibit 4-2. Average Self-Reported Price Per Pack of Cigarettes Among Adult Smokers by Region, ATS 2004**



The effect that tax avoidance has on cigarette prices can also be seen by comparing the prices that smokers who frequently purchase from Indian reservations pay with the prices that convenience store purchasers pay. Exhibit 4-3 shows that smokers who frequently purchase their cigarettes from Indian reservations pay significantly lower prices than everyday convenience store purchasers. This price difference also holds true for the comparison between prices paid at convenience stores and prices paid at other low-tax or untaxed outlets, such as out-of-state sources, the Internet, toll-free numbers, and duty-free shops (see Exhibit C-3, Appendix C).

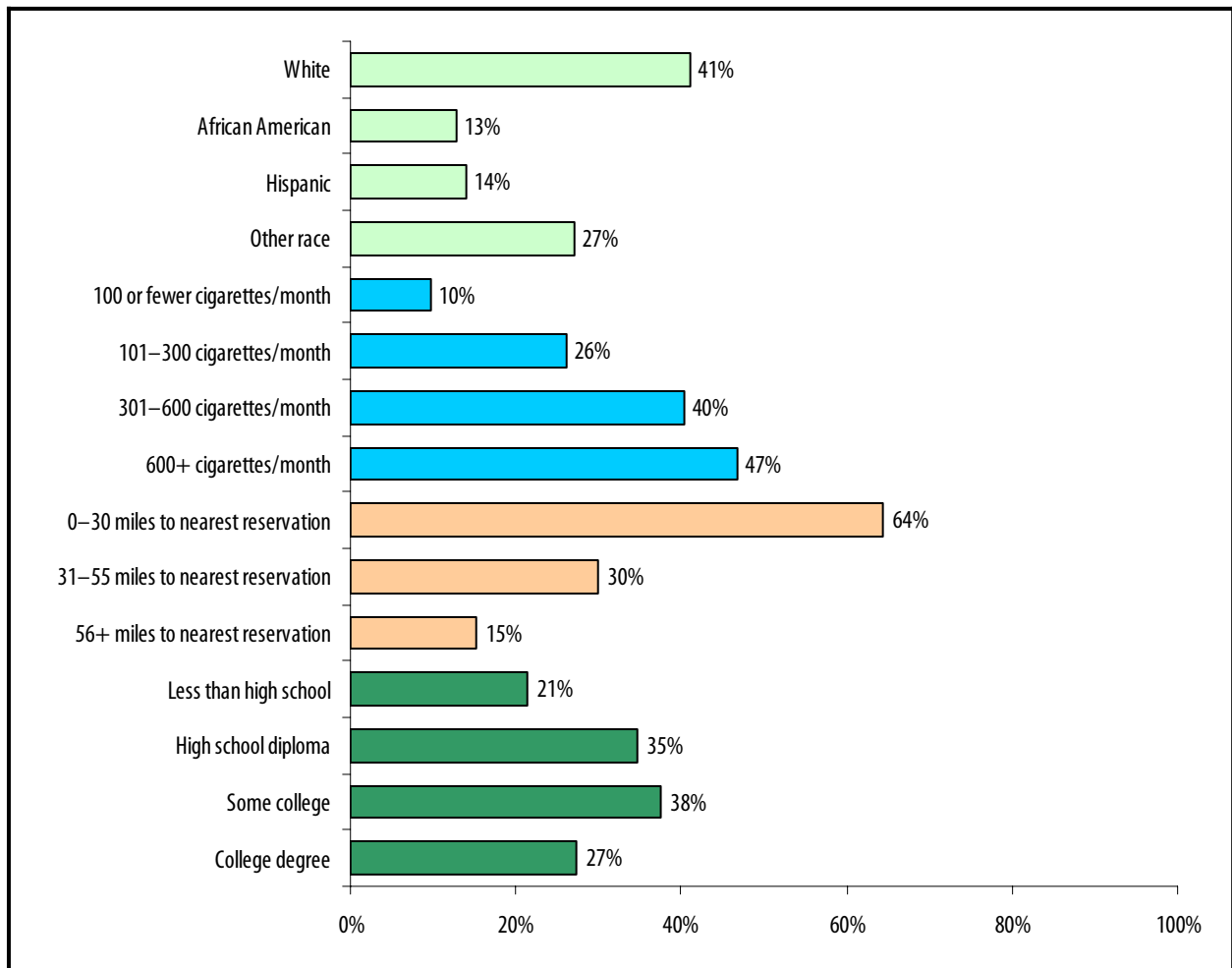
**Exhibit 4-3. Average Price Per Pack of Cigarettes Among Smokers Who Frequently Purchase from Indian Reservations and Convenience Stores**



## 5. Who Avoids Cigarette Taxes?

**T**ax avoidance behaviors are influenced by a number of factors. Predictably, a smoker’s proximity to Indian reservations is one of the strongest predictors of tax avoidance. In 2004, 64 percent of New York smokers who lived within 30 miles of an Indian reservation purchased cigarettes from a reservation at least once compared with 15 percent of smokers who lived more than 55 miles from a reservation (Exhibit 5-1). Heavier smokers are also more likely to purchase cigarettes from Indian reservations. This may reflect the greater financial investment in smoking that heavier smokers have and thus their greater incentive to seek cheaper sources of cigarettes. White and lower-income smokers are also more likely to avoid

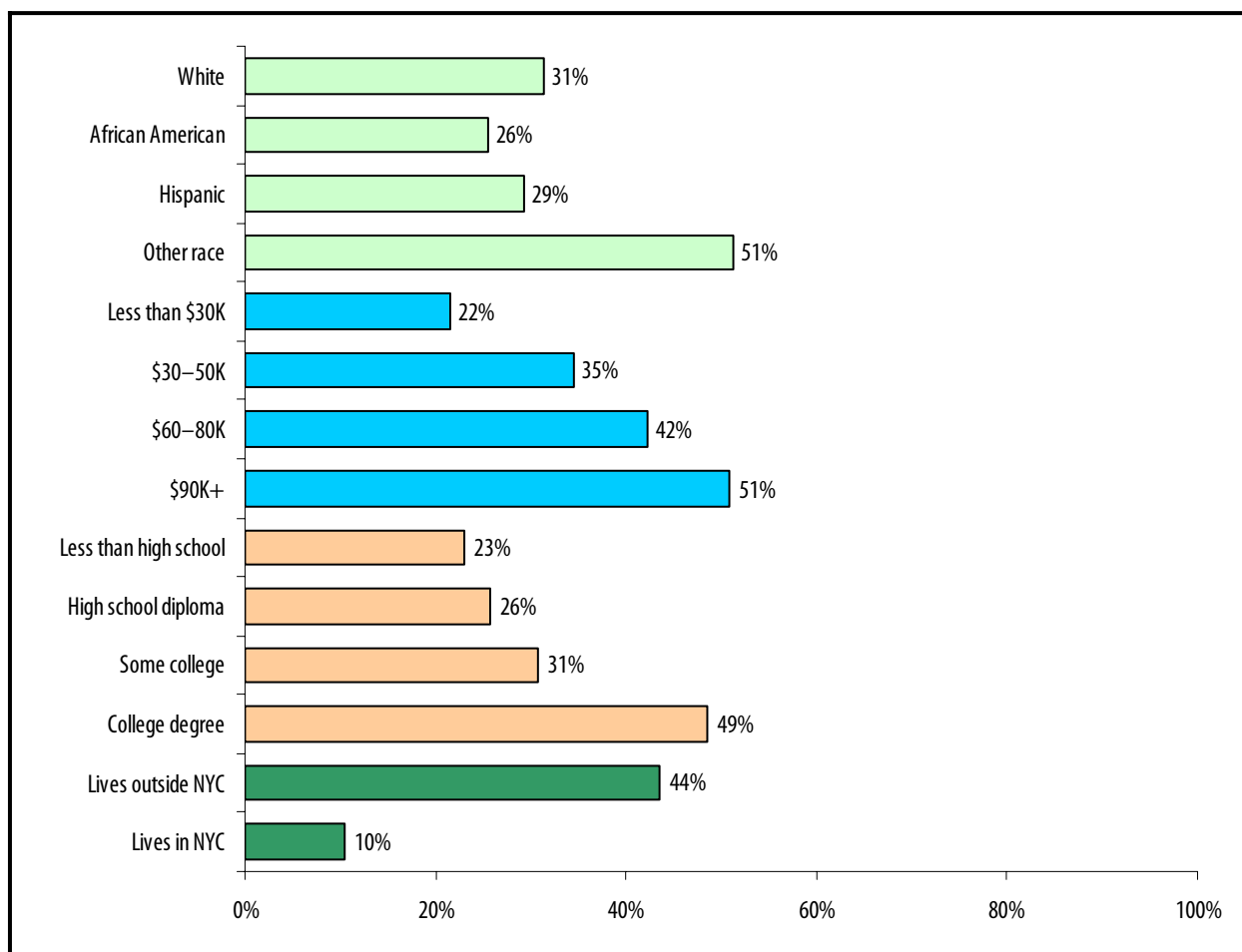
**Exhibit 5-1. Percentage of Smokers Who Purchased Cigarettes from Indian Reservations, by Race/Ethnicity, Monthly Cigarette Consumption, Education, and Distance to Nearest Reservation**



cigarette taxes by purchasing from Indian reservations. However, smokers with a higher level of education are also more likely to purchase cigarettes from Indian reservations. These patterns suggest that both motivation and resources to access cheaper sources of cigarettes are key determinants in tax avoidance.

Smokers who avoid taxes by purchasing their cigarettes from out-of-state sources share many of these characteristics. For example, New York smokers of higher education and income are more likely to purchase cigarettes outside of New York. Smokers who live in New York City are also more likely to purchase cigarettes from out-of-state sources than are smokers who live in other areas of New York State (Exhibit 5-2). For additional details on the characteristics of smokers who avoid taxes, see Exhibit C-1 in Appendix C.

**Exhibit 5-2. Percentage of Smokers Who Purchased Cigarettes from Out-of-State Sources, by Race/Ethnicity, Income, Education, and New York City Residential Status**

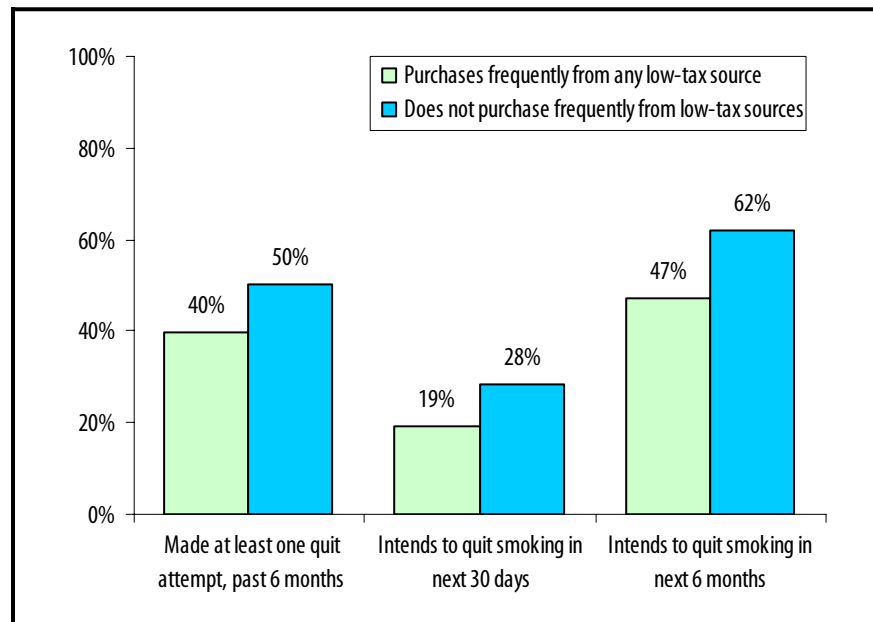


## 6. The Impact of Tax Avoidance on Public Health

If all smokers in New York were prevented from avoiding cigarette taxes and paid the price that nontax-avoiders pay, there would be a 2 to 3 percent reduction in smoking prevalence, representing between 51,026 and 76,539 fewer smokers, and a 2 to 3 percent reduction in the amount of cigarettes that smokers smoke.

Tax evasion decreases incentives for smokers to quit or reduce the amount they smoke and undermines the public health benefit of higher cigarette prices. If all smokers in New York were prevented from avoiding cigarette taxes and paid the price that nontax-avoiders pay, the average statewide price of cigarettes would increase by \$0.58 per pack. Based on prior evidence of smokers' responsiveness to changes in cigarette prices (Chaloupka and Warner, 2000; Farrelly et al., 2001), this would lead to a 2 to 3 percent reduction in smoking prevalence, representing between 51,026 and 76,539 fewer smokers, as well as a 2 to 3 percent reduction in the amount of cigarettes that smokers smoke. Cigarette tax avoidance is also associated with fewer smokers attempting to quit smoking and intending to quit in the future (Exhibit 6-1). For example, 47 percent of smokers who frequently purchase cigarettes from low- or untaxed sources intend to quit smoking in the next 6 months compared with 62 percent of smokers who do not frequently purchase untaxed cigarettes. Furthermore, only 40 percent of smokers who frequently purchase low- or untaxed cigarettes have made a quit attempt in the past year compared with 50 percent of smokers who do not frequently purchase untaxed cigarettes. These patterns also hold true for many specific sources of low- and untaxed purchasing. Additional details on the relationship between tax avoidance and smoking cessation are presented in Exhibit C-4 in Appendix C.

**Exhibit 6-1. Percentage of Smokers Who Made Quit Attempts and Had Intentions to Quit by Tax Avoidance Behavior, ATS 2004**



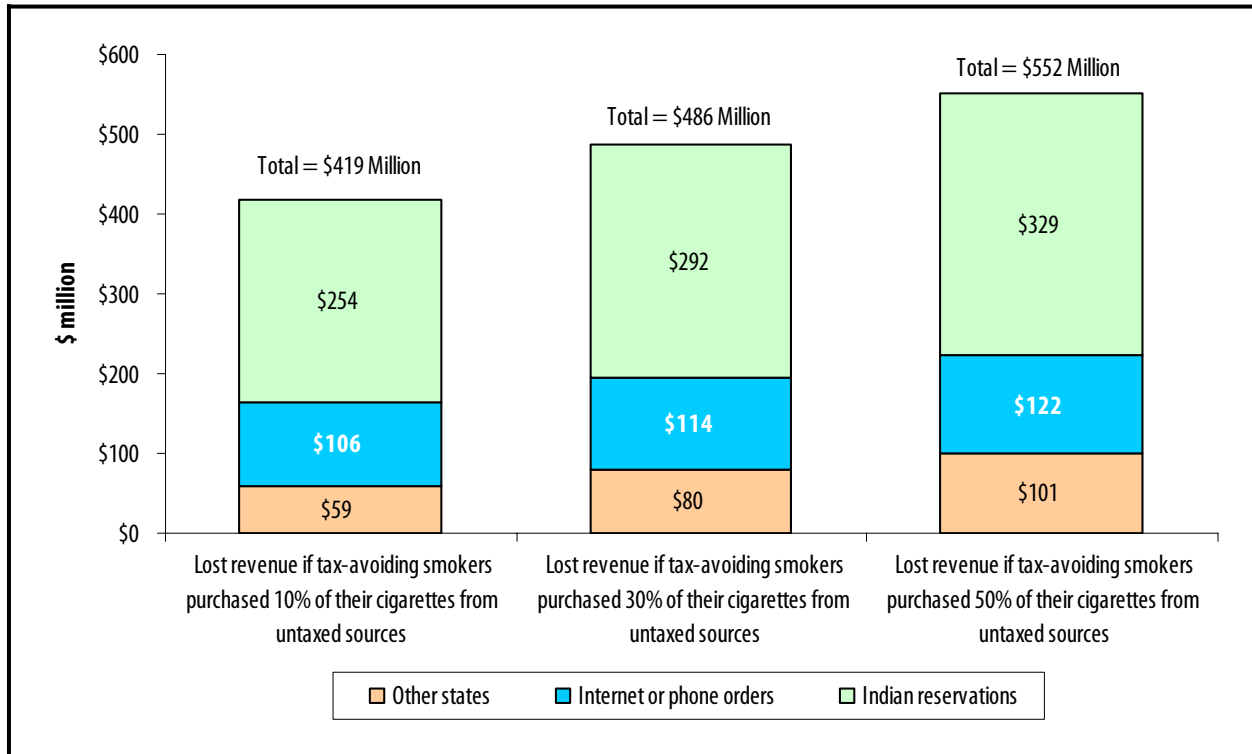
Although cigarette tax avoidance is clearly associated with lower intentions to quit smoking and fewer actual attempts to quit, the direction of causation is not entirely clear. For example, it is possible that smokers who already have no intention to quit smoking are more likely to seek out lower-priced cigarettes. In either case, the public health benefits of smoking cessation are not fully realized when smokers are given ample opportunities to purchase untaxed cigarettes.

## 7. The Financial Impact of Tax Avoidance

The total state revenue loss from each untaxed source combined was estimated to be between \$419 million and \$552 million in 2004.

Cigarette tax evasion leads to significant losses in tax revenue from uncollected excise taxes and uncollected sales taxes. In New York State, cigarette sales on Indian reservations account for the largest portion of these uncollected taxes. If tax-avoiding smokers in New York purchased just 10 percent of their cigarettes from Indian reservations, the state would have lost approximately \$254 million in tax revenue during 2004 (Exhibit 7-1). If tax-avoiding smokers had purchased half of all their cigarettes from Indian reservations, New York State would have lost \$329 million in tax revenue during 2004. Internet and telephone order sales also account for a significant portion of uncollected taxes. In 2004, Internet and telephone sales accounted for between \$106 million and \$122 million in uncollected revenue, while sales from neighboring lower-tax states accounted for between \$59 million and \$101 million in uncollected tax revenue. The total state revenue loss from each untaxed source combined was estimated to be between \$419 million and \$552 million in 2004.

Exhibit 7-1. Estimated Lost Revenue in New York State in 2004 from Tax Avoidance



## 8. Summary and Implications

Smokers in New York State most frequently purchase their cigarettes from convenience stores and gas stations. However, the second-most common source of cigarettes is low-tax and untaxed venues. Tax avoidance in New York is quite extensive, with more than half of all smokers in New York purchasing cigarettes from low-tax or untaxed sources at least once in 2004. The most common sources of cigarettes for New Yorkers who avoid or pay lower taxes are Indian reservations and nearby states. In 2004, 32 percent of smokers in New York purchased cigarettes at least once from Indian reservations, while one quarter of all smokers frequently purchased cigarettes from Indian reservations.

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Tax avoidance in New York is quite extensive, with more than half of all smokers in New York purchasing cigarettes from low-tax or untaxed sources at least once in 2004. It also leads to significant losses in tax revenue.

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Tax avoidance has a significant impact on prices that smokers pay and may undermine the public health benefits of higher cigarettes taxes and prices. By avoiding taxes, smokers pay lower prices for cigarettes, diminishing their incentive to either quit smoking or reduce the amount they smoke. Smokers who avoid taxes in New York pay between \$1.28 (outside of New York City) and \$1.53 (inside New York City) less per pack than smokers who do not avoid taxes. These lower prices translate into fewer smokers who either attempt to quit or intend to quit in the future. For example, 62 percent of smokers in New York who do not frequently purchase untaxed cigarettes intend to quit smoking in the next 6 months, compared with only 47 percent of New York smokers who frequently purchase untaxed cigarettes.

In addition to its direct public health impact, cigarette tax avoidance also leads to significant losses in tax revenue in New York, from uncollected cigarette excise taxes and uncollected sales taxes. In New York, cigarette sales on Indian reservations account for the majority of uncollected taxes. We estimate that if smokers in New York had purchased just 10 percent of their cigarettes from low-tax or untaxed sources in 2004, the state would have lost approximately \$419 million in tax revenue during that year. These circumstances not only undermine the state's efforts to prevent and reduce tobacco use, but they also deprive the state of additional resources to address other public health concerns.

This report also shows that heavy smokers and smokers who live near Indian reservations in New York are the most likely to avoid cigarette taxes. By knowing where smokers most often purchase their cigarettes and what types of smokers avoid taxes, New York may be better able to focus its resources on ways to reduce tax evasion, further increase

revenues, and maximize the public health benefits of cigarette taxes. For example, a new law will require wholesalers to affix the state excise tax stamp prior to selling cigarettes to retailers, including Indian retailers on Indian lands, which should result in the collection of the excise tax on sales made by Indian retailers to New Yorkers who are not members of a state-recognized Indian tribe. The law also provides for coupons to be used by members of state-recognized Indian tribes to avoid paying the state tax. If enforced, this law has the potential to curb sales from the primary source of untaxed cigarettes in New York. Follow-up reports and analyses will assess the extent to which this policy helps curb tax evasion in New York.



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## **Appendix A: Analytic Methods**

In this report, we used multiple data sources to estimate the extent of tax evasion and the associated revenue loss in New York State. The primary data come from the New York State Adult Tobacco Survey (ATS), which has been conducted quarterly since June 2003, with a goal of collecting 2,000 interviews per quarter. Data for the analyses presented in this report include the four quarterly surveys from 2004. ATS' target population is adults aged 18 or older living in residential housing units in the state. During each interview, study participants were asked about their demographic characteristics, smoking behaviors, cigarette purchasing patterns, exposure to secondhand smoke (SHS), and other relevant questions. Below, we briefly describe our methods and analytic approach for answering each of the research questions addressed in this report. Unless otherwise noted, all results discussed in the main text were statistically significant at  $p < .05$ .

### **Estimating the Prevalence and Frequency of Tax Avoidance in New York State**

To quantify the percentage of smokers who purchased cigarettes from low-tax or untaxed sources in New York and the frequency of tax avoidance, we relied on a series of ATS questions that asked adult smokers whether they had purchased cigarettes for their own use from a number of low-tax and untaxed cigarette sources within the past 12 months. These sources include Indian reservations, lower-tax neighboring states or countries, toll-free telephone numbers, the Internet, and duty-free shops. With the exception of the ATS from the third quarter of 2004, all respondents who purchased from any of these sources were asked how often they purchased cigarettes from the sources. Response options were “all the time,” “sometimes,” “rarely,” and “never.” Based on participants' responses, we summarized the percentage of adult smokers who purchased cigarettes from at least one of the low-tax or untaxed sources listed above. We also summarized how frequently smokers purchased cigarettes from these locations.

### **Assessing the Factors that Influence Tax Avoidance**

To understand factors associated with tax avoidance, we performed a series of descriptive and multivariate regressions that explain which demographic and other factors increase the likelihood of tax avoidance. Our multivariate models examined individual characteristics, such as age, gender, race/ethnicity, education, income, and cigarettes smoked per day,

to identify which types of smokers are more likely to engage in tax avoidance. We also considered geographic factors in our models by examining the influence of distance to Indian reservations and distance to neighboring lower-tax states. Each model was estimated in the form of a logistic regression that shows the likelihood of being a tax avoider in relation to each of the individual and geographic factors described above. In the main body of the report, we present descriptive statistics on factors that were found to be associated with tax avoidance.

### **Measuring the Impact of Tax Avoidance on Cigarette Prices Paid by Smokers**

To quantify the impact of tax avoidance on cigarette prices paid by smokers, we relied on the measures of tax avoidance described above and on ATS measures of self-reported cigarette prices among smokers. Self-reported cigarette prices are based on ATS questions that ask smokers to give the price paid for the last pack of cigarettes they purchased. We then summarized self-reported cigarette prices by frequency of tax evasion. Because cigarette excise taxes, and thus overall prices, are significantly higher in New York City, we conducted this analysis separately for New York City and for the remainder of the state.

### **Estimating Lost Revenue Due to Tax Avoidance Behaviors**

We used the 2004 ATS data to estimate the revenue lost due to tax avoidance behaviors in New York State. We first estimated the distance to an Indian reservation and to another state with lower cigarette taxes using ArcView 9.0 (a GIS software system) based on respondents' self-reported zip code. The percentage of smokers who reported buying cigarettes at each of the cheaper cigarette venues (Indian reservations, lower-tax neighboring states, over the Internet, or by telephone orders) was then calculated for those who lived within 30 miles, 30 to 55 miles, and more than 55 miles from these sources. Using these estimates, we finally calculated the cigarette sales (in packs) from each of these lower-taxed venues to determine the revenue lost revenue in New York State due to tax avoidance behaviors.

### **Estimating the Effects of Tax Avoidance Behaviors on Smoking Cessation**

To examine how smoking cessation may be influenced by tax avoidance behaviors, we used data from the 2004 ATS to construct several measures of smoking cessation among current smokers. These measures included intentions to quit smoking within the next 30 days, intentions to quit within the next 6 months, and the prevalence of having made at least one

quit attempt in the past year. A successful quit attempt is defined as being a former smoker (has smoked at least 5 packs lifetime, but does not currently smoke) who is currently quit and has been quit for at least 6 months of the past year. We then present descriptive statistics on the prevalence of quit attempts in the past year and 1- and 6-month intentions to quit, by frequency of cigarette tax avoidance. To more clearly confirm the relationship between cigarette tax evasion and smoking cessation, we also performed a series of multivariable models that estimate smoking cessation as a function of tax avoidance behaviors while controlling for other potentially confounding influences.

## Appendix B: New York State Tobacco Control Program Regional Area and County Boundaries

Western Region		Central Region	
Buffalo Area	Rochester Area	Northern Central Area	Southern Central Area
Allegany	Chemung	Cayuga	Broome
Cattaraugus	Livingston	Jefferson	Chenango
Chautauqua	Monroe	Lewis	Cortland
Erie	Ontario	Madison	Herkimer
Genesee	Schuyler	Onondaga	Oneida
Niagara	Seneca	Oswego	Tioga
Orleans	Steuben	St. Lawrence	Tompkins
Wyoming	Wayne		
	Yates		

Capital Region		Metropolitan Region	
Northern Capital Area	Southern Capital Area	Hudson Valley Area	NYC-Long Island Area
Clinton	Albany	Dutchess	Bronx
Essex	Columbia	Orange	Kings
Franklin	Delaware	Putnam	Nassau
Fulton	Greene	Rockland	New York
Hamilton	Otsego	Sullivan	Queens
Montgomery	Rensselaer	Ulster	Richmond
Saratoga	Schenectady	Westchester	Suffolk
Warren	Schoharie		
Washington			

## Appendix C: Descriptive Statistics and Multivariable Model Results

**Exhibit C-1. Percentage of Current Smokers Who Purchased Cigarettes from Various Low-Tax or Untaxed Sources by Demographic and Geographic Characteristics, ATS 2004**

Characteristic	Indian Reservations	Out of State	Toll-Free Number	Internet	Duty-Free Shop	Any Location
<b>Age</b>						
18–24	28.3%	40.1%	4.0%	6.6%	9.9%	62.3%
25–34	25.2%	30.7%	3.0%	9.1%	16.6%	53.0%
35–44	32.3%	28.8%	3.3%	11.6%	15.1%	54.2%
45–54	34.5%	25.7%	5.7%	8.8%	12.7%	55.4%
55–64	39.8%	34.3%	14.3%	11.1%	20.6%	65.2%
65+	45.6%	27.0%	13.6%	5.7%	12.0%	61.3%
<b>Gender</b>						
Male	30.5%	33.8%	5.6%	10.6%	15.6%	58.9%
Female	33.5%	28.7%	5.7%	7.5%	12.6%	55.5%
<b>Race</b>						
White	41.1%	31.4%	7.3%	10.1%	16.5%	63.4%
African American	12.9%	25.6%	2.0%	4.3%	9.3%	38.8%
Hispanic	14.1%	29.3%	4.0%	6.7%	8.0%	44.4%
Other	27.0%	51.3%	1.6%	17.4%	16.6%	72.0%
<b>Education</b>						
Less than high school diploma	21.3%	23.1%	4.6%	2.9%	8.8%	42.6%
High school diploma	34.7%	25.7%	7.9%	9.8%	12.7%	57.5%
Some college	37.5%	30.7%	3.6%	7.5%	16.0%	57.7%
College degree	27.3%	48.5%	5.0%	14.3%	18.4%	66.9%
<b>Annual Income</b>						
Less than \$30,000	34.8%	21.6%	5.7%	7.0%	11.3%	53.9%
\$30,000–\$50,000	32.2%	34.5%	6.1%	10.3%	12.5%	59.7%
\$60,000–\$80,000	37.5%	42.2%	7.2%	14.1%	20.4%	67.2%
\$90,000+	24.2%	50.8%	2.4%	11.3%	25.5%	65.2%
<b>Monthly Cigarette Consumption</b>						
100 or fewer	9.8%	25.5%	3.3%	7.4%	9.4%	39.9%
101–300	26.2%	33.2%	3.9%	8.0%	11.8%	53.4%
301–600	40.3%	32.1%	6.8%	10.8%	16.9%	63.0%
600+	46.7%	34.2%	8.5%	9.5%	17.9%	71.1%
<b>Distance to Nearest Reservation</b>						
0–20 miles	54.9%	24.9%	3.5%	3.8%	15.3%	68.6%
21–40 miles	21.2%	34.5%	6.2%	9.5%	16.0%	51.9%
41–60 miles	34.4%	36.4%	3.8%	13.3%	6.7%	59.7%
60+ miles	25.6%	27.0%	10.9%	19.1%	6.8%	53.7%
<b>New York City</b>						
Live in New York City	10.4%	38.7%	6.1%	9.7%	13.2%	49.0%
Live outside New York City	43.6%	27.5%	5.3%	8.8%	14.7%	61.8%



**Exhibit C-2. Average Price Per Pack of Cigarettes by Smokers' Self-Reported Frequency of Tax Evasion from Low-Tax and Untaxed Venues, ATS 2004**

	Frequency of Purchasing	New York City	Remainder of the State
<b>Indian Reservation</b>	Always	\$3.09 [2.30–3.89]	\$2.38 [2.19–2.57]
	Sometimes	\$4.05 [2.61–5.49]	\$3.86 [3.59–4.13]
	Rarely	\$4.93 [3.81–6.05]	\$4.27 [4.01–4.52]
	Never	\$5.78 [5.59–5.97]	\$4.40 [4.32–4.48]
<b>Out-of-State or Out-of-Country</b>	Always	\$3.86 [2.91–4.81]	\$3.35 [2.91–3.79]
	Sometimes	\$5.38 [4.84–5.92]	\$4.12 [3.81–4.43]
	Rarely	\$6.14 [5.74–6.53]	\$4.12 [3.90–4.34]
	Never	\$5.66 [5.44–5.88]	\$3.87 [3.76–3.97]
<b>Internet</b>	Always	\$3.42 [2.64–4.20]	\$2.55 [2.15–2.94]
	Sometimes	\$3.35 [2.06–4.65]	\$3.74 [2.91–4.57]
	Rarely	\$5.03 [3.63–6.43]	\$4.18 [3.56–4.79]
	Never	\$5.80 [5.63–5.96]	\$3.97 [3.89–4.06]
<b>Toll-Free Number</b>	Always	\$2.86 [2.00–3.72]	\$2.19 [1.79–2.59]
	Sometimes	\$2.84 [2.10–3.58]	\$3.86 [2.87–4.85]
	Rarely	\$5.27 [3.65–6.89]	\$3.43 [2.43–4.43]
	Never	\$5.75 [5.56–5.94]	\$3.96 [3.87–4.04]
<b>Duty-Free Shop</b>	Always	\$3.96 [2.23–5.70]	\$2.13 [1.72–2.54]
	Sometimes	\$3.87 [2.79–4.94]	\$4.07 [3.54–4.61]
	Rarely	\$5.58 [4.83–6.33]	\$3.90 [3.52–4.28]
	Never	\$5.71 [5.51–5.90]	\$3.94 [3.85–4.03]
<b>Convenience Store</b>	Always	\$5.88 [5.26–6.51]	\$4.52 [4.38–4.65]
	Sometimes	\$5.80 [5.32–6.28]	\$4.19 [4.00–4.37]
	Rarely	\$5.56 [4.95–6.17]	\$2.95 [2.66–3.25]
	Never	\$5.54 [4.15–6.93]	\$3.29 [1.78–4.80]

**Exhibit C-3. Descriptive Statistics Showing the Prevalence of Quit Attempts and Intentions to Quit by Tax Avoidance Behaviors Among Current Smokers, ATS 2004**

Tax Avoidance Behavior	Smoking Cessation Outcome		
	Made at Least One Quit Attempt, Past 6 Months	Intends to Quit Smoking in Next 30 Days	Intends to Quit Smoking in Next 6 Months
Purchased from Indian reservation			
Yes	38.9%	17.6%	52.7%
No	49.5%	28.1%	58.5%
Purchased from out-of-state			
Yes	48.6%	21.4%	53.1%
No	45.2%	26.7%	58.4%
Purchased from toll-free number			
Yes	45.4%	29.2%	55.9%
No	46.4%	24.8%	56.8%
Purchased on the Internet			
Yes	33.1%	12.2%	39.1%
No	47.6%	26.2%	58.3%
Purchased from a duty-free shop			
Yes	47.1%	21.4%	50.2%
No	46.3%	25.3%	58.0%
Purchased from any low-tax source			
Yes	44.1%	21.0%	51.4%
No	48.9%	30.0%	63.5%
Purchased frequently from any source <sup>a</sup>			
Yes	39.8%	19.2%	47.3%
No	50.1%	28.4%	62.1%

<sup>a</sup>Defined as having purchased from any low-tax source either “all the time” or “sometimes.”





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