

## **APPENDIX I**

# **Literature Review on the Impact of Tobacco Price and Tax Policies on Women**

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## Literature Review: Impact of Tobacco Price and Tax Policies on Women

### Summary

1. Raising taxes and prices on tobacco products in accordance with WHO FCTC Article 6 Guidelines is effective in reducing tobacco consumption and discouraging tobacco use among youth and adults.
2. Tax policies that apply specific taxes (vs. ad valorem) and uniform structures as opposed to more complex tiered structures or mixed tax systems are more effective because they result in lower average prices and less variability in price across brands, which reduces downtrading and other tax-avoidance strategies that weaken the public health impact of tax increases.
3. The impact of tobacco tax and price policies may vary for different subpopulation groups. There is evidence to suggest that socioeconomic status (SES) affects the impact of tax/price measures, with higher responsiveness to price increases among those of lower SES.
4. Evidence on gender differences in the impact of tobacco price and tax measure is inconsistent, which may be due to differences in methods and models used across studies. Most studies have shown that female smokers are more price responsive – that is, price has a stronger impact on female smoking behavior and consumption. However, other studies have found an impact among males only or no gender differences.
5. Evidence from studies in high-income countries also suggests that female smokers may also be more likely to engage in price-minimizing or tax avoidance behaviors in response to tax and price increases, such as purchasing cigarettes from cheaper sources.
6. Research has considered the impact of specific factors relevant to female smokers, such as weight concerns and pregnancy. Increasing tobacco tax and prices may be especially effective in reducing smoking among pregnant women. However, some evidence suggests that the impact of price may be reduced among female smokers with weight concerns.
7. There is a lack of evidence on gender differences in the impact of price and tax measures from low- and middle-income countries (LMICs), where smoking rates tend to be much lower among women but may be increasing with rising incomes, highlighting the need to raise taxes at a level above inflation and income growth in LMICs.
8. In addition, very few studies have examined the impact of tobacco tax and price measures across different types of tobacco products, such as smokeless tobacco – despite the higher prevalence of smokeless tobacco use among women in some LMICs. Evidence from Bangladesh suggests that more smokers may be switching from cheaper products (i.e. bidis and smokeless tobacco) to cigarettes as cigarettes become more affordable, especially for female tobacco users.

### Background

Increasing taxes on tobacco products to raise retail prices is recognized as a key component of a comprehensive tobacco control strategy—indeed, tax increases have been identified as the single most effective tool to reduce tobacco use.[1,2] Global evidence from high-income countries (HICs) and LMICs has shown that a 10% increase in the price of cigarettes results in a decrease in consumption between 2-8%.[1,3] Higher taxes not only helps to reduce tobacco consumption, but also increases quitting among current smokers and discourages the uptake of smoking among non-users.[2]

It is important to determine whether the impact of tobacco taxes may vary across subgroups. Evidence shows that increasing tobacco taxes and prices may be especially effective for youth and those of lower SES.[4] However, studies have found inconsistent results for the impact of cigarette taxes on different population groups, especially between men and women.[5]

Article 6 of the WHO FCTC calls on Parties to implement effective pricing and taxation measures to make tobacco products less affordable and reduce tobacco consumption. Guidelines for the implementation of Article 6 were adopted in 2014, which include recommendations to adjust tobacco tax levels regularly to account for changes in income levels and inflation over time. While there has been some improvement in global implementation of tobacco tax policies over the last ten years, taxation remains one of the least widely implemented tobacco control policies.[6,7] As of 2016, only 10% of the world's population was covered by tobacco taxes that meet the recommendation by the WHO of 75% of the retail price – a rate that has not improved since 2014.[7] Tobacco taxes and prices remain lower in LMICs than HICs – only 8% of LMICs had implemented tax policies at best practice levels in 2016.

### *Types of taxes and their impact*

The effectiveness of increasing excise taxes on tobacco products depends on the type of tax and the tax structure imposed by countries. The simplest type of excise tax is a *specific* tax, which is based on quantity of cigarettes (i.e., per pack or per 1000 cigarettes), and one that is applied uniformly as a single tax rate across all products and brands (*uniform* structure). Other tax systems may be based on the value of the product rather than quantity (*ad valorem* taxes) and may apply different tax rates across products/brands (*tiered* structure). Countries may also apply a mixed system of both specific and ad valorem taxes, with either a uniform or tiered structure.

Studies have shown that taxes other than specific uniform result in lower average prices of cigarettes and greater price variability across brands.[1,8] Tobacco companies tend to use these more complicated tax structures to their advantage, as this allows smokers to avoid tax increases by switching to cheaper products, thus undermining the impact of raising taxes.[1] For this reason, the FCTC Article 6 Guidelines recommend that Parties implement the simplest and most efficient system and should consider implementing specific taxes rather than ad valorem.[9] The Guidelines also state that all tobacco products should be taxed in a comparable way (i.e. uniform taxes) to reduce the risk of substitution between products.

According to the latest WHO Global Report on The Tobacco Epidemic, countries have made progress in moving towards simpler tax structures that rely more on specific taxes. As of 2016, 65 countries had a specific tax system; however, there were still 35 countries with complex tiered taxes.[7] The predominant tax structure varies by WHO region, with countries in the European Union favoring a mixed system (under EU directives), countries in the Western Pacific region favoring specific tax systems, and countries in Africa favoring ad valorem systems.[6] According to WHO data, the African region also had the lowest average and median retail prices of the most sold brand of cigarettes out of all countries in 2016, and the greatest proportion of Parties in which cigarettes became more affordable over the period 2008-2016.[6]

A recent study reported longitudinal analyses from the International Tobacco Control (ITC) Project surveys in 17 countries to examine how changes in cigarette tax structure are related to cigarette consumption.[8] After adjusting for sociodemographic variables (e.g., age, gender, income, country income group classification and economic condition), the results showed that

countries that changed from specific to ad valorem taxes experienced significantly higher cigarette consumption (6-11% higher), and that countries that changed from a uniform to tiered structure experienced even higher cigarette consumption (34-65% higher). While gender was included in the analyses, gender differences were not examined. These findings confirm that specific taxes and uniform tax structure are both more effective tools for reducing tobacco consumption.

## **Evidence on gender differences in the impact of price and tax measures**

### *Impact on smoking consumption, prevalence, and cessation*

The key measure of the impact of tobacco taxes and prices on smoking behavior is price elasticity, which estimates the percentage change in behavior (i.e. consumption, prevalence, or cessation) in response to a change in price. Earlier studies have found mixed results on gender differences in price elasticity or responsiveness, although there is some evidence of greater responsiveness among women:

- A review of studies published between 1990-2004 on the impact of tobacco control policies on vulnerable groups such as women found inconclusive evidence as to whether women or men are more responsive to cigarette tax increases, as some studies found that women are more responsive and other studies found no gender differences.[10]
- A large, nationally representative sample of adults (aged 18 and up) from the US National Health Interview Survey over 14 years (from 1976 to 1993) was used to evaluate the effect of cigarette price increases by sociodemographic groups.[11] Results showed that women are more price-responsive than men – the total price elasticity for women was -0.32 compared to -0.18 for men. This means that increasing the price of cigarettes by 10% would lead to a decrease in total cigarette consumption by 3.2% for women and 1.8% for men. However, most of the decrease in men was due to reductions in daily cigarette consumption, whereas for women, the decrease was equally due to reduced consumption and reduced smoking prevalence. Therefore, women may be more likely to quit smoking in response to a price increase, whereas men may be more likely to reduce their consumption in response to a price increase.
- Longitudinal ITC survey data from the United States (US) and Canada over the period 2002-2004 was used to examine the impact of price on cessation behavior. Higher cigarette prices and taxes were associated with a greater motivation to quit and higher probability of actual quitting among smokers. The probability of intending to quit or actual cessation was lower among older smokers and greater among smokers with higher education. There were no significant gender differences in the impact of price on cessation.
- A quasi-experimental study examined the impact of the introduction of a minimum tax level in Spain in 2006 on smoking prevalence, using the Canary Islands (which was not covered by the legislation) as a control group.[12] The tax increase was effective at raising cigarette prices by 44% from 2006 to 2010 in Spain (compared to an increase of only 10% in Canary Islands). However, the impact of the tax increase on smoking prevalence was not significant for either men or women in the short term (within the first year). After three years, smoking prevalence decreased by 3% among males and 4.3% among females; however, the decrease was only significant for females. The authors suggest that the impact of the new tax legislation may have been reduced by the

availability of cheaper tobacco products such as hand-rolled tobacco, which allowed smokers – especially men – to switch to cheaper brands in response to higher cigarette prices rather than reduce their smoking.

Differences in findings on gender across studies may also depend on the methods used. Stehr (2007) noted that most prior studies from the US (published before 2001) showing that men are more responsive to cigarette taxes than women failed to control for state-specific gender differences in smoking rates, leading to what Stehr called an “erroneous conclusion”.<sup>[5]</sup> When those state effects were controlled for in analyses of 1985-2000 US survey data among adults (18+), women were found to be almost twice as responsive to taxes than men. Men and women with lower income were also found to be more price responsive.

#### *Impact on price-minimizing or tax-avoidance behaviors*

The impact of higher cigarette prices may be reduced if price-sensitive smokers turn to cheaper options instead of reducing their consumption in response to price increases, such as switching to discount brands or finding cheaper sources of cigarettes. The availability and affordability of cheaper cigarettes may in turn reduce motivation to quit and actual cessation.<sup>[13]</sup> Studies on purchasing behaviors from HICs have shown that female smokers are more likely to engage in these price-minimizing or tax avoidance behaviors:

- Data from the ITC surveys in the US over a nine year period (2002-2011) was used to examine trends in smokers’ price-minimizing behavior in response to increasing prices over time, such as purchasing cigarettes in bulk rather than single packs; switching to lower priced brands; purchasing cigarettes from cheaper sources; or decreasing their cigarette consumption.<sup>[14]</sup> Factors associated with price-minimizing behaviors over the study period were also examined, and results showed that females were significantly more likely to purchase in bulk and to avoid taxes by purchasing from cheaper locations than males. Gender differences were not examined for other behaviors, which were less common overall.
- Data from a longitudinal community-based cessation study among US smokers aged 25-64 who were recruited in 1988 and followed up in 1993 and 2001 found high rates of tax avoidance.<sup>[15]</sup> Overall in 2011, 58% of smokers reported using at least one strategy to obtain lower taxed cigarettes, such as purchasing from cheaper sources, smoking a discount brand, and using discount coupons. Factors associated with tax avoidance behaviors were also examined, and female smokers were found to be more likely to engage in each type of strategy.
- A sample of smokers from the state of New York surveyed between 2002-2003 – where cigarette taxes were high at the time and lower taxed cigarettes were readily accessible from Indian reservations – found that about two-thirds of smokers (67%) reported purchasing cigarettes from an Indian reservation as their usual source. Female smokers were significantly more likely than males to report usually purchasing their cigarettes from reservations.<sup>[16]</sup>
- A cross-sectional study of ITC survey data from Canada, US, UK, and Australia in 2006-07 found that 63% of smokers overall reported at least one type of price-minimizing behavior.<sup>[17]</sup> Lower SES smokers were 25% more likely to engage in at least one of these behaviors; however, the types of behaviors differed for low versus high SES groups. Lower SES smokers were much more likely to use discount brands, but less

likely to purchase from lower taxed sources or purchase in bulk (i.e. by the carton instead of packs). Other demographic variables such as age and sex also predicted the likelihood of engaging in price-minimizing behaviors – male smokers were 30% less likely than females to report any tax avoidance behavior overall; and were significantly less likely to use discount brands and to purchase in bulk. There was no gender difference in purchasing cigarettes from lower or untaxed sources. These findings indicate that reducing price differentials across tobacco products and locations may help to reduce tobacco use disparities between SES groups.

### **Role of socioeconomic factors**

Socioeconomic status (SES) can also affect the likelihood of engaging in price-minimizing behaviors in response to price and tax increases, as well as the different types of behaviors. SES can also interact with gender in smokers' responses to price – in general, women have lower incomes than men, and evidence has shown that smokers with low incomes are more responsive to price changes.[18]

- A study that examined data from the US Current Population Survey – a nationally representative survey of adults (analyses restricted to those aged 18-65) from 1992-1993 found that men and women respond similarly to price increases, as price elasticities did not significantly differ among men and women overall (ranging from -0.4 to -0.6 for reduced cigarette consumption and smoking participation).[19] However, there were differences by income level, with the strongest effect shown for women of low income. For example, an increase in the price of cigarettes by \$1 would result in a decrease in smoking participation by almost 100% (99%) among low income women – almost double the effect on low income men (58%), and three times the effect on the overall sample of women (38%).
- Data from nine European countries from 1990-2007 (during which time many countries implemented stronger tobacco control policies) was used to examine the impact of price and non-price policies on smoking across socioeconomic groups.[20] The index of non-price policies was associated with lower smoking rates among men, but not women. Two different indexes of relative price were used – one for the cheapest brand of cigarettes and one for the most popular brand. Increases in the price of the most popular cigarettes was negatively associated with smoking among men, whereas increases in price of the cheapest cigarettes was negatively associated with smoking among women. The impact of all policies was stronger and statistically significant only among those of lower SES, suggesting that smokers of lower SES are more responsive to price changes.
- A study that examined trends in cigarette smoking in South Africa from 2003-2011 by gender and SES found no change overall in smoking prevalence over this period.[21] However, when trends were examined by educational groups, there was a decline in smoking prevalence among those with low education, and an increase in smoking among women of high education (but not men). These findings suggest that increases in cigarette taxes in South Africa over this period may have helped to reduce smoking for those of low SES; however, increasing incomes over this same period may have also made cigarettes more affordable for those of higher SES. This may be especially true for women in South Africa, who experienced a shift to higher level occupations and higher incomes over this period. These findings highlight the need to implement higher cigarette taxes and adjust rates over time in accordance with increases in income and inflation.

- Data from a large sample of adult women representing four different birth cohorts (aged 16+) from the Spanish National Health Surveys from 2001 to 2011 was used to examine the impact of two tobacco control policies - the price of cigarettes and pictorial health warnings.[18] Results showed that both cigarette prices and pictorial warnings may be effective for reducing female smoking rates. The price of cigarettes was negatively correlated with smoking among the whole sample of women and positively correlated with stopping smoking. However, the impact of price policies alone was no longer significant after taking education into account – price only had a significant impact for women with higher education levels. In addition, when results were examined by age cohort, price had a significant effect on smoking rates only among women from the oldest generation (those born before 1950).

### **Other factors affecting women’s responses to price and tax increases**

#### *Weight concerns*

Previous research has shown that weight concerns may inhibit quitting, and that female smokers are more likely to have weight concerns.[22–24] Evidence from the ITC Four Country Survey (US, UK, Canada, Australia) further suggests that weight concerns among female smokers may impact the effect of tobacco control policies such as price on quitting.[24] In the US and UK, female smokers who believed that smoking helps to control weight (weight control belief) were less responsive to price increases, that is, increases in price led to fewer quit attempts among those who had the weight control belief compared to those without the belief. There was no impact of weight concerns on responsiveness to price increases among male smokers in any country.

These findings indicate that one possible reason why previous studies have found a small or insignificant impact of price policies on female smokers may be related to weight concerns, which can moderate responsiveness to policies such as price. The implication is that policymakers should also focus on strategies to alleviate weight concerns among female smokers in order to enhance the effectiveness of existing tobacco control policies.

#### *Pregnancy*

Evidence from several studies in HICs has shown that pregnant women are responsive to tobacco tax increases, and that higher cigarette taxes and prices significantly reduce the prevalence of smoking among pregnant women.[2]

- For example, studies using US data from the 1990s found that increases in cigarette taxes were associated with decreases in smoking rates among pregnant women across different subpopulations (i.e. age groups, education level, ethnicity).[25,26]
- More recently, two studies that used US data from the early 2000s found that an increase in cigarette taxes was associated with an increase in quitting smoking by 4-5% among pregnant women and a decrease in the average maternal smoking rate by 5%.[27,28] However, one study did find ethnic and educational disparities: higher taxes had the greatest impact among those subgroups of women with the highest levels of maternal smoking (low-educated White and Black mothers).[28]

### **Challenges in examining the impact of price and tax policies on women**

#### *Lack of data from smokers in LMICs*

Despite the importance of raising tobacco prices in LMICs to make tobacco use less affordable - especially for female smokers who may be increasingly targeted by tobacco companies, there are difficulties with estimating the impact of price and tax measures on female smokers in some LMICs due to low smoking rates among women or the lack of data from household expenditure surveys.[2] As a result, few studies from LMICs have examined gender differences in price responsiveness, or some studies report only on males. For example:

- China is the world's largest tobacco producer and consumer, with over 315 million smokers and low cigarette prices by international standards. While over half of Chinese men smoke, smoking is much less common among women (less than 5%).[29] Evidence from the ITC China Survey shows that cigarettes have become increasingly affordable for smokers.[30] For example, the most common reason reported by smokers in 2013-15 for choosing their current brand of cigarettes was affordable price, and the price of cigarettes was the least common reason for thinking about quitting. In contrast, smokers are generally more likely to report that the price of cigarettes led them to think about quitting in countries where tobacco taxes and prices are high, such as Australia and Canada. China also has the second-lowest percentage of male smokers (15%) out of 19 ITC countries who said they "often" or "very often" thought about the financial cost of smoking in the last month. However, cross-country data was not available for females.
- Despite the low prevalence of smoking among women in China, prevalence data has still been used to simulate the impact of price and tax policies using the SimSmoke model. Results showed that raising taxes on cigarettes to the recommended 75% of the retail price in China would result in a relative decrease in smoking prevalence by 13% among males and 12% among females and would prevent 3.5 million total deaths by the year 2050.[31] In addition, a reduction in smoking rates among Chinese males would significantly benefit the health of millions of non-smoking women who are exposed to tobacco smoke in China.
- India employs a complex tax system where different tobacco products are taxed at different rates (i.e. bidis have lower taxes than cigarettes). Data from two large scale surveys in India - the 2009-10 India Global Adult Tobacco Survey (GATS) and two waves of the TCP India Survey (2010-11 and 2012-13) - was used to examine the association between smoking and state level taxes on bidis and cigarettes.[32] Higher state taxes on cigarettes were significantly associated with lower cigarette smoking and a decrease in dual use of cigarettes and bidis among adults overall. When the results were analyzed separately by gender, higher cigarette taxes were significantly associated with lower cigarette and dual smoking among males, but not among females, due to their low smoking prevalence. There was also no effect of bidi taxes on bidi smoking prevalence, which may be because bidis remained much cheaper than cigarettes. Therefore, bidi taxes and prices need to be much higher in order to reduce bidi smoking. This is especially important for female tobacco users in India, who are more likely to smoke bidis than cigarettes.
- Cigarette smoking rates are also low among females in Bangladesh, who are more likely to use smokeless tobacco. A study that used data from the ITC Bangladesh surveys from 2009-2012 examined the impact of changes in price and income on smoking behavior.[33] Results showed that the tiered tax structure in Bangladesh allows for smokers to switch between brands in response to price and income changes. However,

the analyses were conducted only among male smokers, as the prevalence of smoking among females in the study was too low (less than 2%).

#### *Difficulties in isolating price from other tobacco control measures*

Tobacco price and tax measures are often implemented as part of a broader tobacco control approach within a country. Therefore, as with other types of tobacco control policies, it may be difficult to examine the impact of price measures separately from other policies (i.e. smoke-free laws, media campaigns) that are implemented at the same time. For example:

- A study using data from the Spanish National Health Surveys and the consumer price index from 1993-2012 examined the impact of cigarette prices on quitting among adults (aged 25-64) across socioeconomic groups.[34] The study did not find a clear relationship between tobacco prices and quit ratio at the national level among either men or women. The only significant association was found for women with low education, whereby contrary to expectations, increasing tobacco prices was significantly associated with a decrease in quit ratio over time. However, quit ratios may not accurately reflect the impact of policies on cessation behavior, and the study only measured successful quitting – it did not evaluate other quitting-related behaviors such as quit attempts or quit intentions. In addition, changes in smoking patterns and quit ratios were also impacted by the introduction of smoke-free laws partway through the study period, which was associated with an increase in quit ratios in the period immediately following the new law.
- Another study from Netherlands also highlights the difficulties in examining the impact of price policies on quitting in conjunction with other tobacco control measures in a country.[35] In the Netherlands, three main tobacco control interventions were introduced simultaneously in 2008 – a tax increase, a smoke-free law, and a cessation campaign. Longitudinal data from smokers in the ITC Netherlands Survey from 2008-2010 examined quit attempts and successful quitting. Results showed that after adjusting for other variables, only the smoke-free law was significantly associated with quit attempts, and the price increase was not significant. Interactions with age and education showed that the price increase was significantly related to successful smoking cessation only among younger respondents. There were no significant differences by education, and gender differences in policy impact were not examined.
- In Mauritius, tobacco control legislation was strengthened beginning in 2008 under the new National Action Plan on Tobacco Control. Data from the ITC Mauritius Surveys from 2009 to 2011 was used to examine the impact of tobacco control policies on consumption.[36] Results showed that smoking prevalence and consumption significantly declined between 2010 and 2011, after a national anti-tobacco media campaign and an increase in excise tax rates by 25% were implemented. The study concluded that these tobacco control measures were effective, but it was not possible to separate the effect of the tax increase since the media campaign was introduced at the same time. However, the findings support prior research showing that media campaigns are more effective when combined with other tobacco control measures.

## Evidence on the impact of smokeless tobacco price and tax policies

Few studies have examined price elasticity of demand for other types of tobacco products, such as smokeless tobacco, and how changes in price may affect substitution across tobacco products in LMICs.[2]

- There is one study that used data from the GATS India 2009-10 to estimate the effects of both tobacco prices and exposure to advertising on smokeless tobacco use among adults, and whether there are gender differences in the impact of price on smokeless tobacco demand.[37] Results showed that both policies had an impact on smokeless use, but the impact varied by gender. After adjusting for socioeconomic factors, higher smokeless tobacco prices were significantly associated with a lower likelihood of smokeless use overall; however, the impact was only significant among males. There was also a significant impact of advertising – exposure to smokeless advertising was associated with a higher probability of smokeless use among all adults, although further analyses revealed that the impact was only significant for females. Therefore, the study suggests that in India, advertising policies may be more effective for females, while price policies may be more effective for males.
- In Bangladesh, tobacco excise taxes are based on an ad valorem system, with a tiered structure that allows for variation in prices across brands and lower prices overall for tobacco products. The tax system is further complicated by the prevalence of multiple tobacco product use – cigarettes, bidis, and smokeless tobacco, which are taxed at different rates. Data from the ITC Bangladesh Survey from 2009 to 2015 shows that although the real price of cigarettes and smokeless tobacco increased, income growth over this same period was greater, which more than offset the impact of the price increase; this resulted in a net greater affordability of tobacco products, especially for cigarettes.[38,39] An increase in cigarette smoking prevalence was also observed over this same period; therefore, the growing affordability of cigarettes may have promoted switching among tobacco users from bidis and smokeless tobacco to cigarettes. Further examination of factors predicting the affordability of cigarettes from 2009 to 2015 showed that cigarettes became more affordable for women than men, which the authors note may be because women from higher-income households are more likely to smoke cigarettes.[38] However, updated analyses using revised methods found that the gender difference was no longer significant.[39] There were also no significant gender differences in affordability of bidis and smokeless tobacco over this period.

These findings demonstrate that in LMICS such as Bangladesh where income is increasing, there is a need to increase prices on all types of tobacco products through higher excise taxes, at a rate that is faster than inflation and income growth. Taxes should be uniform and specific in order to discourage substitution and switching to lower priced brands and products.

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