



Impact of Cigarette Price Increase on Health and Financing Outcomes in Vietnam

World Bank Group
Global Tobacco Control Program
Country Brief

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Executive Summary

Vietnam is an important country for global tobacco control, and currently has about 15 million males who smoke. To support government efforts to strengthen tobacco control policies, most notably through a substantial increase in the excise tax of tobacco, we conducted an extended cost-effectiveness analysis to examine the distributional impact of a 32% and a 62% increase in cigarette prices under Scenario A and Scenario B, respectively.

Under Scenario A with a 32% increase in cigarette price, men in the poorest income quintile would gain about 2.8 more life-years than men in the richest income quintile (2.8 vs 1.0 million). The treatment cost averted for treating tobacco-attributable diseases among the poorest income quintile would be 2.5 times that of the richest income quintile (2,346 vs 1,227 billion Vietnamese Dong (VND)). About 285.2 thousand men would avoid catastrophic health expenditure. As a result, about 94.5 thousand men, more than half of whom in the bottom income group, would avoid falling into extreme poverty. In contrast to the distribution of health benefits, the extra revenue generated from men in the top income group would be about 1.2 times that from the bottom income group (2,039 vs 1,737 billion VND).

Under Scenario B with a 62% increase in cigarette price, men in the poorest income quintile would also gain about 2.8 more life-years than men in the richest income quintile (5.4 vs 1.9 million). The treatment cost averted for treating tobacco-attributable diseases among the poorest income quintile would be 2.5 times that of the richest income quintile (4,545 vs 1,837 billion VND). About 552.5 thousand men would avoid catastrophic health expenditure. As a result, about 183 thousand men, more than half of whom in the bottom income group, would avoid falling into extreme poverty. In contrast to the distribution of health benefits, the extra revenue generated from men in the top income group would be about 3.8 times that from the bottom income group (3,137 vs 827 billion VND).

In conclusion, we found that higher cigarette prices would particularly benefit the poorest income quintile of the population, in terms of deaths averted, life-years saved, out of pocket expenditures for treating tobacco-attributable diseases, catastrophic health expenditures, and extreme poverty averted. The additional tax burden is, however, borne mostly by the top income group in the 62% price increase scenario. Thus, tobacco taxes are an effective way to improve health and reduce poverty in Vietnam.

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Introduction

According to the Global Adult Tobacco Survey (GATS), about 15.3 million adults aged 15 years and over smoked tobacco in Vietnam in 2010 (Ministry of Health of Viet Nam, Hanoi Medical University, General Statistics Office, Centers for Disease Control and Prevention, & World Health Organization, 2010). About 97% of the cigarette smokers were males (Ministry of Health of Viet Nam et al., 2010). To reduce the prevalence of smoking, in 2013, the government of Vietnam launched the *National Strategy on Tobacco Control through 2020* with the target of reducing the rates of smoking from current prevalences by about 40% in youths aged 15-24 (target of 18% in 2020) and by about 20% for adults (target of 39% for men and <1% for women by 2020; World Health Organization, 2018). Vietnam was also one of the first countries in Asia to become a party of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) in 2005 (World Health Organization, 2018). In 2012, the country also enacted the Law on Prevention and Control of Tobacco Harms, which significantly strengthened tobacco control policies. The new law established smoke-free places; increased the size of graphic health-warning labels; instituted a comprehensive ban on tobacco advertising, promotion, and sponsorship; and established the first Vietnam Tobacco Control Fund (WHO Framework Convention on Tobacco Control, 2019). By 2015, though, the prevalence of any tobacco smoking among males had decreased only insignificantly, to 45.3%; it was 1.1% among females (Ministry of Health Of Viet Nam, Hanoi Medical University, General Statistics Office, Centers for Disease Control and Prevention, & World Health Organization, 2016). The majority of the smokers smoke manufactured cigarettes (70%), with the remaining being smokers of traditional bamboo waterpipe (26%), hand-rolled cigarettes (2%), and other tobacco products (2%) (Ministry of Health Of Viet Nam et al., 2016).

Tobacco taxation is the single most effective intervention to increase cessation rates among current smokers and to decrease initiation by young people (Global Tobacco Economics Consortium [GTEC]., 2018). For parties of the WHO FCTC, as Vietnam is, tobacco tax policy should be considered as a health promotion tool, rather than as solely as a fiscal instrument for revenue collection. According to Article 6 of the WHO FCTC, tobacco taxation policy is “an effective and important means of reducing tobacco consumption by various segments of the population, in particular young persons”(World Health Organization, 2019). The Guidelines for Implementation of Article 6 of the WHO FCTC recognize that effective tobacco taxes significantly reduce tobacco consumption and prevalence and are an important source of government revenues (World Health Organization, 2019). This consumption reduction role of tobacco taxation is due to the fact that special consumption or excise taxes increase prices of tobacco products relatively to other consumption products or income; and through this to reduce smokers’

demand. In order to do that, the Guidelines recommends that: “taxes rates should be monitored, increased or adjusted on a regular basis, potentially annually, taking into account inflation and income growth developments in order to reduce consumption of tobacco products”(World Health Organization, 2019). Also, effective tobacco taxation may contribute significantly to state budgets, if increasing tax rate growth outweighs the percentage decline in consumption of tobacco products.

Taxation system on tobacco products in Vietnam

There are two types of excise taxes (officially called Special Consumption Tax (SCT)) in Vietnam: Ad valorem tax which is levied as a percentage of the base price, and specific excise tax which is levied as a specific value per unit of a product (World Health Organization, 2018).

Immediately after the introduction of the SCT, cigarette and tobacco-product tax rates were differentiated, creating a complex and discriminatory system until 2005. Since 2005, the rates have been simplified and discrimination was gradually eliminated. Table 1 presents the evolution of SCT, and other taxes and tariffs on tobacco products since the inception of the SCT in 1990. In 1990, SCT rates on cigarettes were as follows: 50% on filtered cigarettes and 40% on non-filtered cigarette and cigars. Between the end of 1993 and the end of 2005, discrimination against filtered cigarettes produced with imported materials was exacerbated; and tax rates on other type of cigarettes and cigars were eliminated.

The lower tax rates on cigarettes manufactured with domestic raw materials favoured domestic brands and encouraged per adult consumption of cigarettes. As with many tax policies in transition economies, this policy was intended to support domestic tobacco cultivation while discouraging imports of raw materials, and to increase state revenues from smokers of cigarettes made from imported raw materials, who had higher income. In retrospect, these were likely unwise choices as the short term demand generation has only limited impact on the medium term supply of raw tobacco, and because the tax strategy effectively made cheaper cigarettes available that were taken up most by the poor.

However, in order to meet the requirements to join the World Trade Organization (WTO), in 2005, the National Assembly amended the SCT and approved a new VAT Law. Under this amendment, cigars were taxed at 65%. Cigarettes taxes were 55% in 2006-2007 and were subsequently increased to 65% in 2008. The implementation of non-discriminatory tax rates was a step forward for Vietnam’s international integration policy, although those

excise rates were ad valorem rather than, as recommended in World Bank ((World Bank, 2017) specific.

Following the development of new tobacco products, the SCT Tax Law amendment at the end of 2008 subjected other tobacco products (used for chewing, smelling, and sucking) to an unchanged excise tax rate of 65%.

VAT was introduced in the last decade and was part of the country's tax modernization. VAT is imposed on the added value of goods or services arising during the process from manufacturing up through retail sales. All organizations and individuals engaging in manufacturing and conducting business in tobacco or importing tobacco are required to pay taxes. The VAT taxable price of cigarettes sold or supplied by production or business establishments is the sales price including the excise tax but excluding VAT. For imported tobacco, the VAT taxable price is the import price at the border gate plus import duties and plus excise tax. VAT rates on tobacco products were uniform and maintained constant. There are two overall VAT rates, 5% and 10%, in Vietnam. Tobacco falls in the 10% category. The rate is zero, though, for exports of tobacco products, as for all exports, and VAT paid for inputs of goods and services is refunded.

Table 1: Evolution of Tobacco Special Consumption Tax, VAT and Import Tariffs (%)

| Period | Special Consumption Tax (tax base is pre-tax factory price) | | | | Value added tax | Tariffs |
|-------------------|---|--|--------------|--------|-----------------|-------------------|
| | Cigarettes | | | Cigars | | |
| | Filtered produced from imported material | Filtered produced from domestic material | Non-filtered | | | |
| 10/1990- 8/1993 | 50 | 50 | 40 | 40 | - | NA |
| 9/1993-12/1995 | 70 | 52 | 32 | 32 | - | NA |
| 1/1996-12/1998 | 70 | 52 | 32 | 70 | - | NA |
| 1/1999-11/2001 | 65 | 45 | 25 | 65 | - | NA |
| 11/2001 - 12/2003 | 65 | 45 | 25 | 65 | - | Import prohibited |
| 1/2004- 12/2005 | 65 | 45 | 25 | 65 | 10 | Import prohibited |
| 1/2006-12/2006 | 55 | | | 65 | 10 | Import prohibited |
| 1/2007-12/2007 | 55 | | | 65 | 10 | 100 |
| 1/2008 - 12/2009 | 65 | | | | 10 | 140 |
| 1/2009 -12/2015 | 65 | | | | 10 | 140 |
| Jan.2016-Dec.2017 | 70 | 70 | 70 | 70 | 10 | 135 |
| Jan.2018 -... | 75 | 75 | 75 | 75 | 10 | 135 |

Sources: Tax Policy Department (TPD) – Ministry of Finance (MOF)

Cigarette imports were prohibited in most of the previous two decades. Only tobacco material was permitted to import for domestic cigarette production. Since the accession of Vietnam into the WTO by January 2007, this prohibition has been cleared and replaced by high import tariffs. Under the WTO commitment, import tariffs must be reduced to 135% in 2010, which is currently applied and should remain in the upcoming years. Tariff on other tobacco products ranges from 30% to 145%. Tariffs are applied on Cost, Insurance, and Freight (CIF) price, including all fees and charges to import gate. However, imports have an insignificant impact on consumption (World Bank, 2019a).

Current Tobacco Tax Structure and Rates in Vietnam

SCT- Vietnam levies a uniform ad valorem excise tax on all cigarettes (Chaloupka, Yurekli, & Fong, 2012). The special consumption tax (excise) was unified for all tobacco products from 2006. Since January 2019, the tax rate was 75%. For domestic tobacco products, the tax base is the factory price (without VAT and excise tax).

VAT- The current VAT rate is 10%, and for domestic tobacco products, the tax base is factory price plus the excise tax.

Tariff- The current tariff rate for cigarettes is 135%. The tax base for import tax is the import (CIF) price.

Tobacco Control Fund- The Tobacco Control Fund (TCF) was established on June 18, 2012 under the Vietnam Tobacco Control Law. The TCF receives a compulsory contribution of 1% of the taxable price of all cigarette packs produced locally or imported for local consumption beginning from May 1, 2013. This rate was increased to 2% from May 1, 2019 (Southeast Asia Tobacco Control Alliance, 2014).

The proposed plan to raise tobacco taxes was submitted in August 2017. The draft law suggested amending and supplementing some articles of the Law on the Value Added Tax, the Law on Special Consumption Tax, the Law on the Corporate Income Tax, and the Law on Personal Income Tax. Regarding the tobacco excise tax, it was proposed to apply the mixed excise tax, in addition to the current tax starting from January 1, 2020. This is to be done by either applying a specific tax of Vietnamese Dong (VND) 1,000 per pack of 20 cigarettes (World Health Organization, 2018), or by increasing the ad valorem tax from 75% to 80% of the tobacco's price from 2020 onwards and from 80% to 85% from 2021 onwards (Southeast Asia Tobacco Control Alliance, 2018b). Health officials favour the first option, but strongly argued that the fixed (specific) tax be higher at VND2,000-5,000 (Southeast Asia Tobacco Control Alliance, 2018a).

This paper is part of additional efforts supported by the World Bank Global Tobacco Control Program to inform the Government of Vietnam on options for tobacco taxation by providing estimates of the impact of cigarette price increase across five income groups for the period 2020-2022 under two scenarios:

Scenario A- Increase in ad valorem tax from the current 75% to 90%, plus an introduction of a specific tax at VND3,000 per pack of 20 cigarettes, which, taken together, constitutes a 32% increase in price.

Scenario B- Increase in ad valorem tax from the current 75% to 120%, plus an introduction of a specific tax at VND5,000 per pack of 20 cigarettes, which, taken together, constitutes a 62% increase in price.

Methods

We used the model developed by the Disease Control Priorities Project building on an earlier poverty and tobacco taxation analysis by the Asian Development Bank (Jha et al., 2012; Verguet, Kim, & Jamison, 2016). The analysis was previously used by the Global Tobacco Economics Consortium (GTEC) to estimate the impact of a 50% increase in the price of cigarettes on health, poverty, and financial outcomes in 13 middle-income countries (GTEC, 2018) .

Study Population

We focussed on male smokers aged 15 years and older, as males comprised the vast majority of cigarette smokers in Vietnam (about 12.1 million out of 12.4 million smokers overall, or 98%). To estimate the number of smokers by age and income groups, we applied the age-specific smoking prevalence for males from the Global Adult Tobacco Survey conducted in Vietnam in 2015 to the number of males in each age group in 2017 (Ministry of Health Of Viet Nam et al., 2016). We estimated the population in each age group by applying the proportion of male population in each age group from the 2009 census of Vietnam to the male population in Vietnam in 2017 obtained from the General Statistics Office of Vietnam (General Statistics Office of Viet Nam, 2019; United Nations, Department of Economic and Social Affairs, Population Division, 2017). As the survey did not collect information on household income, we used education level as a proxy measure of income group, as the Vietnam National Health Survey 2001 showed that prevalence of tobacco use among males is similar when classified by income quintiles and education levels (Pham et al., 2019). We applied the relative prevalence of smoking among illiterate males, and those with completed primary, lower secondary, upper secondary, and college education to the number of smokers in each age group to obtain the number of smokers in each age and income group.

Cigarette price and price increase

The market price of cigarettes used was that of Vinataba, the most-sold brand of cigarettes in Vietnam, as obtained from the World Health Organization Report on the Global Tobacco Epidemic 2017 (World Health Organization, 2017). The same source was used to obtain the ad valorem tax and VAT, as percentage of the final retail price. Using the current factory price of VND8,028, ad valorem rate of 75%, VAT rate of 10% and mandatory contribution to the Tobacco Control Fund of 2%, as per the current tax structure, we calculated the percentage increase in the retail price under two scenarios: Scenario A- Increase in ad valorem tax from the current 75% to 90%, plus an introduction of a specific tax at VND3,000 per pack of 20 cigarettes (corresponding to a retail price increase of 32%), and Scenario B- Increase in ad valorem tax from the current 75% to 120%, plus an introduction of a specific tax at VND5,000 per pack of 20 cigarettes (corresponding to a retail price increase of 62%). We assume, realistically, that the tax increases will be passed on to consumer prices. The industry can delay passing them fully through in the short term but will not do so, at the expense of their bottom line, for any reasonable time. Indeed recent analyses of modest tax hikes and responsiveness across the states of India showed that nearly all tax hikes were more than passed onto smokers (i.e., small tax hikes enabled rent seeking opportunities by the cigarette industry), but the few tax decreases did not lead to reduced consumer prices (Guindon et al, 2019).

Price effects on smoking

To estimate the number of smokers who would quit as a result of the price increase, we used an estimated price elasticity for cigarette demand in Vietnam, as estimated by Eozenou and Fishburn (Eozenou & Fishburn, 2001), of -0.53. As young people and those on low income show greater price sensitivity,(Gallet & List, 2003; International Agency for Research on Cancer (IARC)., 2011; Jha et al, 2012) we used two times the national elasticity for young smokers (15-24 years) and applied this higher price elasticity to future smokers (those below 15 years) who have not yet started to smoke, as done by GTEC (2018). For those in the bottom income group, we used the price elasticity of -0.85 estimated by Van Kinh et al. for Vietnam (Van Kinh, Ross, Levy, Minh, & Ngoc, 2006). We assumed price elasticities of quitting at half of the price-elasticity of cigarette demand.

Effects of cigarette price increase on life-years gained, disease costs, income poverty, and taxes paid

We followed the methodology of the previous analysis of GTEC to estimate the impact of a cigarette price increase on number of deaths averted due to four major tobacco-attributable diseases (chronic obstructive respiratory disease (COPD), stroke, heart

disease and cancer), life-years gained, treatment cost averted due to the four tobacco-attributable diseases, number of men avoiding catastrophic health expenditures and extreme poverty, and additional tax revenues collected (GTEC, 2018). The treatment cost for COPD, stroke, heart disease and cancer were obtained from the Statistics Yearbook of Vietnam 2011 (Ministry of Health of Viet Nam, 2011). The average income in each income quintile was obtained from Statistical Yearbook of Vietnam 2016 (General Statistics Office of Viet Nam, 2017). All costs and prices were converted into International dollars (\$Int, which convert local currencies at exchange rates that account for differences in Purchasing Power Parity). We adjusted the International dollars for inflation using consumer price index and exchange rates obtained from the World Bank Development Indicators (World Bank, 2019b).

The data inputs and sources of data are provided in Appendix Table 1.

Sensitivity Analysis

We conducted sensitivity analyses to examine the impact of a 25%, 50%, and 100% price increase with the cigarette price elasticity of demand in Vietnam of -0.53, and the impact of a 32% (Scenario A) and 62% (Scenario B) price increase with the average price elasticity of demand for cigarettes in both high income and low and middle-income countries of -0.40 (universal elasticity) (International Agency for Research on Cancer (IARC)., 2011; U.S. National Cancer Institute and World Health Organization, 2016). For those on low income, we used a price elasticity of -0.635 as done by GTEC (Global Tobacco Economics Consortium., 2018).

Results

Cigarette smoking among males in Vietnam

In Vietnam, 36.1% of males aged 15 and above smoke cigarettes in 2015 (Table 2). Cigarette smoking prevalence is highest among males 30-44 years and lowest among males older than 70 years (46% vs 19%). By income group, the prevalence is highest among males in the lower-middle income and middle groups, and lowest among those in the top income group (47% vs 30%).

Before the cigarette price increase, an estimated total of about 12.1 million males aged 15 years and older smoked cigarettes in Vietnam (Table 3). Men in the bottom income group (poorest 20% of the population) constitute about 18%, while men in the top income group (richest 20% of the population) constitute about 16% of the total number of male smokers. This is a small difference across income groups by international standards. Men in the lower-middle and middle income groups account for about 50% of the total number smokers.

Impact of cigarette price increase under Scenario A

An increase in cigarette price under Scenario A, which would be equivalent of a 32% increase in the retail price, would lead to about 1,485 thousand men quitting smoking, with the bottom income group having 2.8 times as many quitters as the top income group (376,618 vs 132,911) (Table 3). An estimated total of 630 thousand deaths due to COPD, stroke, heart disease, and cancer would be averted among current smokers due to quitting. The number of averted deaths in the bottom income group would be 2.8 times that in the top income group (160 thousand vs 56 thousand). The deaths averted due to quitting would yield an estimated 10,992 thousand life-years, with the bottom income group gaining 2.8 times more life-years than those the top income group (2,787 thousand

vs 984 thousand). In absolute terms, over a quarter of the overall reduced deaths and life years gained would occur in the lowest income group of men.

The cost averted for treating the four major tobacco-attributable diseases would amount to about VND9,746 billion (\$Int 1.3 billion) (Table 4). The treatment cost – and suffering –averted in the bottom income group would be 2.5 times higher than in the top income group (VND2,346 billion vs 949 billion, or \$Int 304 million vs 123 million). About 285,151 men would avoid catastrophic health expenditures, with the number of men in the bottom income group being 5.5 times that in the top income group (72,618 vs 12,878). As a result of the catastrophic health expenditures averted, about 94,479 men would avoid falling into extreme poverty as defined by the World Bank as income of under \$1.90 per day in purchasing power parity. The number of families falling into extreme poverty would be somewhat smaller, depending on earnings by other household members, but would still be large. The increase in excise tax needed to achieve the cigarette price increase would generate more than VND11.7 trillion (\$Int 1.5 billion). In contrast to the distribution of health benefits, the extra revenue generated from men in the top income group would be a modest 1.2 times that from the bottom income group (VND2 trillion vs 1.7 trillion, or \$Int 264 million vs 225 million).

Impact of cigarette price increase under Scenario B

A cigarette price increase under Scenario B which is an equivalent of a 62% increase in the retail price of cigarettes would result in about 2,877,190 men quitting smoking. Of this, the bottom income group will have 2.8 times as many quitters as the top income group (729,298 vs 257,515) (Table 3). Quitting as a result of the price increase would avert about 1,219,849 deaths due to COPD, stroke, heart disease, and cancer among male smokers. The number of deaths averted in the bottom income group would be 2.8 times that in the top income group (309,372 vs 109,179). As a result of the deaths averted, Vietnam would gain about 21,297,960 life-years and avert about VND 18,882 billion (\$Int 2.4 billion) in treatment cost for treating the four major tobacco-attributable diseases (Table 4). The averted treatment cost in the bottom income group would be about 2.5 times that in the top income group (VND4,545 billion vs 1,837 billion, \$Int 589 million vs 238 million). About 552,481 men would avoid catastrophic health expenditures, with the bottom income group avoiding 5.6 times that of the top income group (140,704 vs 24,952). As a result of the catastrophic health expenditures averted, about 183,036 men would avoid falling into extreme poverty. The tax increase would generate about VND12.9 trillion (\$Int 1.7 billion), with contribution from the top income group being about 4 times that from the bottom income group (VND3,137 billion vs VND827 billion, \$Int 407 million

vs \$Int 104 million). The extra tax revenue is particularly progressive in this scenario of a 62% price increase than the smaller increase.

50% price increase in Vietnam vs in Indonesia

To compare the impact of cigarette price increase in Vietnam vs in other southeast Asian countries, we used the findings of GTEC (2018). Table 5 shows the impact of a 50% cigarette price increase on the number of deaths averted, life-years gained, treatment cost averted, number of men avoiding catastrophic health expenditures and extreme poverty, and the additional tax revenue collected in Vietnam and Indonesia, according to GTEC (2018). Compared to Vietnam, with a 50% cigarette price increase, the ratio of the number of quitters, tobacco-attributable deaths averted, and life-years gained between the bottom and the top income group is greater in Indonesia. However, the ratio of the number of men avoiding extreme poverty is substantially higher in Vietnam than in Indonesia.

Table 2. Prevalence of cigarette smoking, overall and by age and income groups, among males aged 15 and above in Vietnam.

| | Cigarette smoking prevalence (%) |
|----------------------|----------------------------------|
| Overall | 36.1 |
| Age groups | |
| 15-29 | 25.7 |
| 30-44 | 46.1 |
| 45-59 | 43.3 |
| 60-69 | 30.9 |
| ≥70 | 18.8 |
| Income groups | |
| First (bottom 20%) | 35.4 |
| Second | 47.8 |
| Third | 47.7 |
| Fourth | 30.9 |
| Fifth (top 20%) | 30.4 |

Table 3. Impact of cigarette price increase in Vietnam under Scenario A and Scenario B on deaths averted due to tobacco-attributable diseases and life-years gained in Vietnam.

| Variables by income groups | Scenario A: 32% price increase [†] | Scenario B: 62% price increase [‡] |
|---|---|---|
| Number of male smokers aged ≥15 years before price increase (in millions) | | |
| First (bottom 20%) | 2.2 | |
| Second | 3.0 | |
| Third | 3.0 | |
| Fourth | 1.9 | |
| Fifth (top 20%) | 1.9 | |
| Total | 12.1 | |
| First: fifth ratio | 1.2 | |
| Total deaths averted due to COPD, stroke, heart disease, and cancer (in thousands) | | |
| First (bottom 20%) | 159.7 | 309.4 |
| Second | 183.9 | 356.2 |
| Third | 151.9 | 294.3 |
| Fourth | 77.8 | 150.7 |
| Fifth (top 20%) | 56.3 | 109.2 |
| Total | 629.6 | 1,219.8 |
| First: fifth ratio | 2.8 | 2.8 |
| Total life-years gained (in millions) | | |
| First (bottom 20%) | 2.8 | 5.4 |
| Second | 3.2 | 6.2 |
| Third | 2.6 | 5.1 |
| Fourth | 1.4 | 2.6 |
| Fifth (top 20%) | 1.0 | 1.9 |
| Total | 10.1 | 21.3 |
| First: fifth ratio | 2.8 | 2.8 |

[†]Scenario A- Increase in ad valorem tax from the current 75% to 90% plus an introduction of a specific tax at VND3,000 per pack (equivalent to 32% increase in retail price).

[‡]Scenario B- Increase in ad valorem tax from the current 75% to 120% plus an introduction of a specific tax at VND5,000 per pack (equivalent to 62% increase in retail price).

*Price elasticity used, by income group: First -0.85, second/third/fourth -0.53, fifth -0.35.

Table 4. Impact of cigarette price increase in Vietnam under Scenario A and Scenario B on treatment cost averted, number of men avoiding catastrophic health expenditures and extreme poverty, and additional tax revenue collected in Vietnam.

| Variables by income groups | Scenario A: 32% price increase[†] | Scenario B: 62% price increase[‡] |
|---|---|---|
| Treatment cost averted (in LCU, billions (\$Int, millions)) | | |
| First (bottom 20%) | 2,346 (304) | 4,545 (589) |
| Second | 2,901 (376) | 5,618 (728) |
| Third | 2,323 (301) | 4,506 (584) |
| Fourth | 1,227 (159) | 2,377 (308) |
| Fifth (top 20%) | 949 (123) | 1,837 (238) |
| Total | 9,746 (1,263) | 18,882 (2,447) |
| First: fifth ratio | 2.5 | 2.5 |
| Number of men avoiding catastrophic health expenditures (in thousands) | | |
| First (bottom 20%) | 72.6 | 140.7 |
| Second | 89.7 | 173.8 |
| Third | 72.0 | 139.4 |
| Fourth | 38.0 | 73.6 |
| Fifth (top 20%) | 12.9 | 25.0 |
| Total | 285.2 | 552.5 |
| First: fifth ratio | 5.6 | 5.6 |
| Number of men avoiding extreme poverty | | |
| First (bottom 20%) | 72,621 | 140,704 |
| Second | 12,124 | 23,491 |
| Third | 9,734 | 18,841 |
| Fourth | 0 | 0 |
| Fifth (top 20%) | 0 | 0 |
| Total | 94,479 | 183,036 |
| First: fifth ratio | - | - |
| Additional tax revenues (in LCU, billions (\$Int, millions)) | | |
| First (bottom 20%) | 1,737 (225) | 827 (107) |
| Second | 2,780 (360) | 2,444 (317) |
| Third | 3,059 (396) | 3,556 (461) |
| Fourth | 2,149 (279) | 2,955 (383) |
| Fifth (top 20%) | 2,039 (264) | 3,137 (406) |
| Total | 11,764 (1,525) | 12,918 (1,674) |
| First: fifth ratio | 0.85 | 0.26 |

[†]Scenario A- Increase in ad valorem tax from the current 75% to 90% plus an introduction of a specific tax at VND3,000 per pack (equivalent to 32% increase in retail price).

[‡]Scenario B- Increase in ad valorem tax from the current 75% to 120% plus an introduction of a specific tax at VND5,000 per pack (equivalent to 62% increase in retail price).

*Price elasticity used, by income group: First -0.85, second/third/fourth -0.53, fifth -0.35.

Table 5. Cumulative impact of a 50% cigarette price increase in Vietnam and Indonesia (from Global Tobacco Economics Consortium, 2018).

| | Vietnam [§] | Indonesia [§] |
|---|----------------------|------------------------|
| Number of male smokers aged ≥15 years before price increase (in millions) | | |
| First (bottom 20%) | 3.7 | 13.6 |
| Second | 3.3 | 12.0 |
| Third | 2.6 | 9.8 |
| Fourth | 2.6 | 9.7 |
| Fifth (top 20%) | 2.2 | 7.7 |
| Total | 13.2 [¶] | 52.9 |
| First: fifth ratio | 1.5 | 1.8 |
| Total deaths averted due to COPD, stroke, heart disease, and cancer (in thousands) | | |
| First (bottom 20%) | 341.6 | 1,418 |
| Second | 259.1 | 998 |
| Third | 179.0 | 612 |
| Fourth | 112.9 | 399 |
| Fifth (top 20%) | 49.4 | 156 |
| Total | 941.9 | 3,582 |
| First: fifth ratio | 6.9 | 9.1 |
| Total life-years gained (in millions) | | |
| First (bottom 20%) | 5.6 | 22.5 |
| Second | 4.1 | 15.8 |
| Third | 2.4 | 9.7 |
| Fourth | 1.5 | 6.3 |
| Fifth (top 20%) | 0.7 | 2.5 |
| Total | 14.3 | 56.8 |
| First: fifth ratio | 7.9 | 9.1 |
| Treatment cost averted (in LCU, billions (\$Int, millions)) | | |
| First (bottom 20%) | 2,284 (296) | 19,776 (4,120) |
| Second | 1,798 (233) | 15,456 (3,220) |
| Third | 1,536 (199) | 13,296 (2,770) |
| Fourth | 910 (118) | 10,512 (2,190) |
| Fifth (top 20%) | 564 (73) | 5,040 (1,050) |
| Total | 7,092 (919) | 60,080(13,350) |
| First: fifth ratio | 4.0 | 3.9 |
| Number of men avoiding catastrophic health expenditures (in thousands) | | |
| First (bottom 20%) | 112.6 | 637.9 |
| Second | 88.6 | 499.1 |
| Third | 75.7 | 428.6 |
| Fourth | 44.9 | 338.8 |
| Fifth (top 20%) | 27.7 | 163.4 |
| Total | 349.6 | 2,067.9 |
| First: fifth ratio | 4.1 | 3.9 |

| Number of men avoiding extreme poverty | | |
|---|----------------|--------------|
| First (bottom 20%) | 107,418 | 594,663 |
| Second | 77,294 | 499,090 |
| Third | 14,323 | 426,300 |
| Fourth | 3,790 | 84,068 |
| Fifth (top 20%) | 203 | 20,110 |
| Total | 203,028 | 1,624,2231 |
| First: fifth ratio | 529.1 | 29.6 |
| Additional tax revenues (in LCU, billions (\$Int, millions)) | | |
| First (bottom 20%) | 4,213 (546) | 323 (67) |
| Second | 3,464 (449) | 806 (168) |
| Third | 3,395 (440) | 1,181 (246) |
| Fourth | 3,935 (510) | 1,661 (346) |
| Fifth (top 20%) | 3,734 (484) | 2,155 (449) |
| Total | 18,743 (2,429) | 6127 (1,280) |
| First: fifth ratio | 1.1 | 0.2 |

[§]Price elasticity used, by income group: First -0.635, second/third/fourth -0.4, fifth -0.122.

[¶]Number of male smokers aged ≥ 15 years in Vietnam is higher in the GTEC analysis than in our current analysis because the GTEC analysis used the male smoking prevalence in 2010 which is higher than the prevalence in 2015 used in our current analysis (overall male smoking prevalence: 39.1% vs 36.1%).

Sensitivity Analysis

Figures 1-3 shows the result of our sensitivity analyses of the impact of varying levels of price increase and using the universal price elasticity of -0.40 on life-years gained, treatment costs averted, and catastrophic health expenditures avoided, respectively. Using the price elasticity in Vietnam (-0.53), with a 25%, 50% and 100% price increase, the ratio of the number of life-years gained between the bottom and the top income groups is 2.8 for all price increases (Figure 1). The ratio increases to 6.1 when we apply the universal price elasticity to a price increase of 32% and 62%. Similarly, when the price elasticity is -0.40, the ratio of the treatment cost averted and catastrophic health expenditures avoided by the bottom versus the top income group for all price increases, except for treatment cost averted with 100% price increase, is 2.5 and 5.6 respectively, and increases to 5.3 and 12.1 respectively, when the price elasticity is -0.40 (Figure 2, 3). The additional tax revenue collected from the top income group with a 50% and 25% price increase with -0.53 price elasticity and 62% and 32% price increase with -0.40 price elasticity is between 1-2 times that from the bottom income group. With a 100% price increase, about 95% of the tax burden would be borne by the top income group.

Figures 1-4. Sensitivity analysis for health and financial outcomes by varying degree of cigarette price increase and using universal price elasticity.

Figure 1:

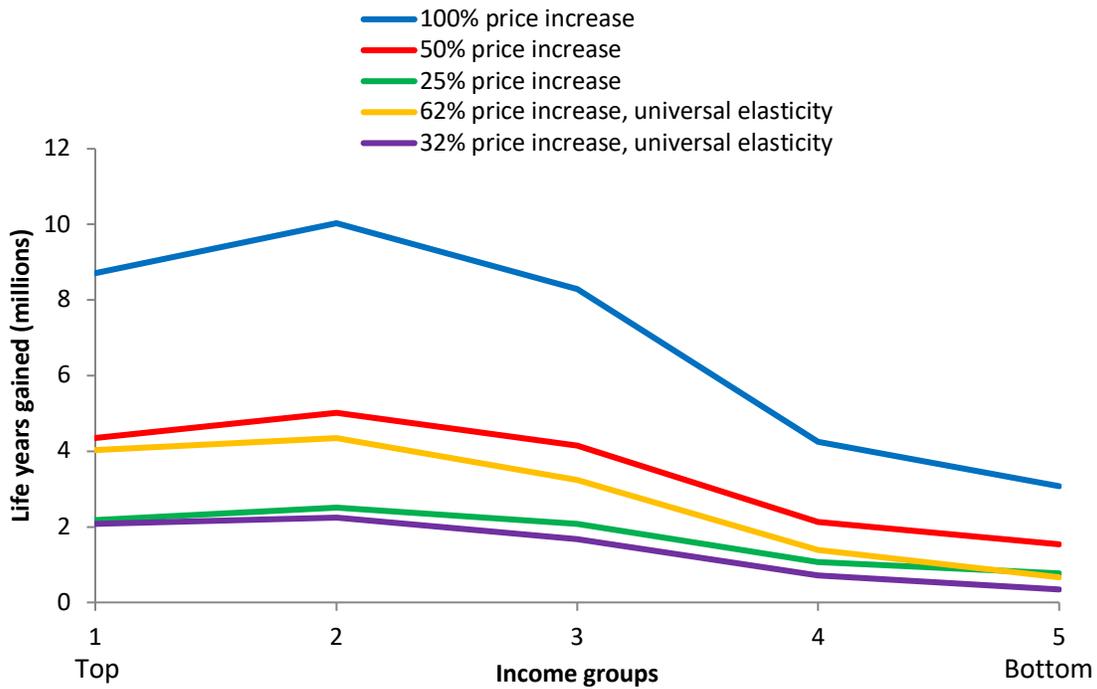


Figure 2:

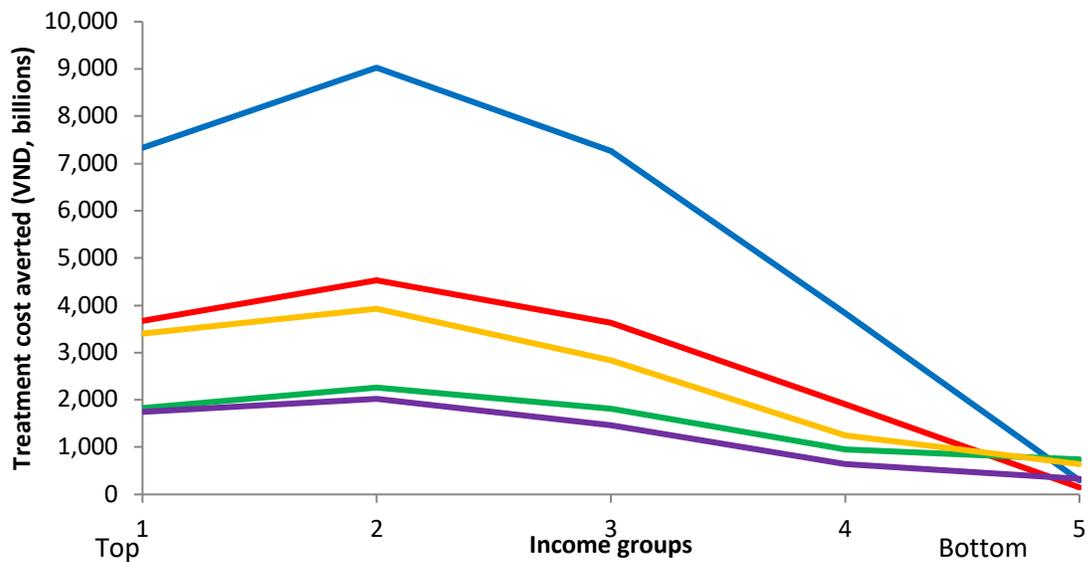


Figure 3:

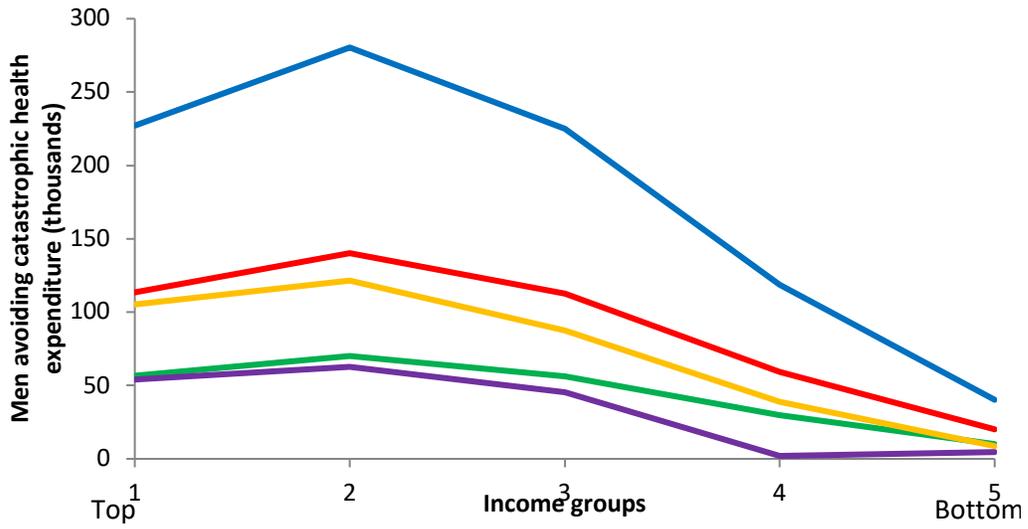
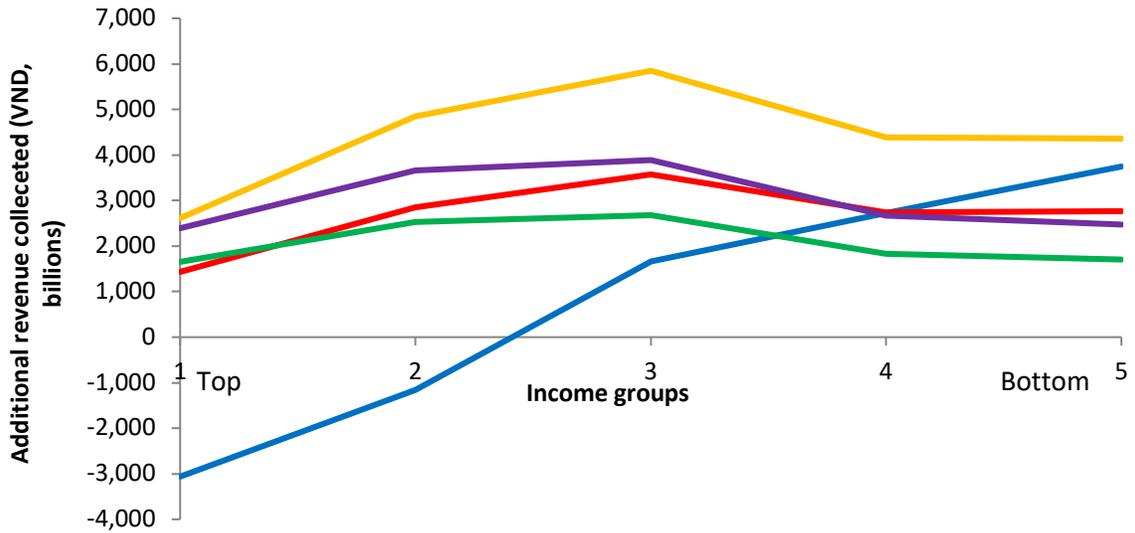


Figure 4:



Discussion

In this assessment, we found that a cigarette price of 32% or 62% under Scenario 1 and 2 respectively, would favour the bottom income group of the population more strongly in terms of deaths averted, life-years saved, out of pocket expenditures for treating tobacco-attributable diseases, catastrophic health expenditures, and extreme poverty averted. Our findings are consistent with the earlier findings of GTEC of the impact of a 50% increase in cigarette price in 13 middle-income countries, which challenges the conventional view that tobacco taxes are more detrimental to people on low versus high income (GTEC, 2018).

Tobacco tax hikes in other countries have shown that when taxes increase, consumption decrease and smoking rates decrease, but government revenue still rises.

Jha et al. (2019) recently showed that higher cigarette prices substantially reduced smoking, even after accounting for illegal cigarette sales, in France and Canada. In Canada, when tobacco tax was lowered in the early 1990s in response to illicit tobacco trade instigated by the tobacco industry, consumption rose. In Thailand, between 1993 and 2012, the special consumption tax on cigarettes was increased 10 separate times, about one tax increase every two years, from 120% to 670% of the factory price (World Health Organization, 2018). As a result of the price increase, the smoking prevalence decreased from 32% in 1991 to 19.9% in 2015, while tobacco tax revenue increased more than four times from US\$ 500 million in 1993 to US\$ 2.1 billion in 2015 (World Health Organization, 2018). The tax increase also did not lead to smuggling, as GATS 2011 in Thailand showed that only 4.8% of smokers used smuggled cigarettes (Department of Disease Control, Ministry of Public Health, Centers for Disease Control and Prevention, & World Health Organization, Regional Office for South-East Asia, 2011). In the Philippines, prior to 2012, a four-tiered excise tax system, with various tax rates ranging from 2.72 Philippine Pesos (PHP) to 28.3 PHP per pack of cigarettes as applicable to tobacco products at different prices, was used (World Health Organization, 2018) In 2012, the four-tiered tax structure was replaced by a two-tiered tax structure and tax rates on cigarettes was steadily increased from 2013 to 2016, reaching a common tax rate of 30 PHP per pack in 2017

(World Health Organization, 2018). As a result of the tax increase, the rate of smoking among adults fell from 29.7% in 2009 to 23.8% in 2015 (Republika Ng Pilipinas, Republic of the Philippines Department of Health, & Philippine Statistics Authority, 2016), while the tobacco tax revenue increased by more than three times from US\$680 million in 2012 to \$2.2 billion in 2016 (World Health Organization, 2018). Compared to Thailand and the Philippines, Vietnam has the highest annual consumption of 3,900 million packs but collects only about one-third of the amount of tobacco tax collected in Thailand or the Philippines due to the current low tax rate. Increase in tobacco taxes could generate substantial revenues that could be used to finance universal health coverage in Vietnam. Although the tax revenue itself would not provide enough to meet the financial needs of universal health coverage, it would make a significant contribution.

One of the criticisms of increased tobacco excise taxes is that it increases smuggling.

However, in Vietnam, cigarettes are smuggled into the country mainly to avoid import tax or due to the fact that smokers prefer well-known, illicit brands, both of which are not affected by the level of excise taxes (World Bank, 2019c).

Limitations

The study has several limitations, including the assumptions of price elasticities. Variation in price responsiveness has been reported in Vietnam, as recently reviewed by Fuchs et al. (forthcoming 2019). However, various sensitivity analyses suggested that variation in elasticities did not influence the overall conclusions greatly. In addition, the effect of higher price on quitting versus on reduced amount is also less certain in Vietnam than in many other settings (Jha et al., 2012). However, the Vietnam tax structure, with much higher taxes per cigarette on higher prices brands, encourages downward substitution between brands, so reducing quitting and decreased consumption. Similarly, our analyses supports a set of recent analyses that higher tobacco tax need to be substantial so as to avoid downward substitution and prevent the rent seeking opportunities by the cigarette industry. A large tax hike means greater revenue generation for the government versus profits for the industry. A key argument of this

analysis is that to in order to maximize the health benefits, large increases in taxes should preferentially be imposed on the cheapest brands. This is quite consistent with the policy guidance in World Bank (2017) to move to specific (rather than ad valorem) taxes that are equal across cigarette price categories. Reassuringly, the overall results focused here on avoidance of out of pocket expenditures are consistent with a recent analyses by Fuchs et al. (forthcoming 2019) focused on net income gains across declines in Vietnam smokers. Reassuringly, the overall results focused here on avoidance of out of pocket expenditures are consistent with a recent analyses by Fuchs et al. (forthcoming 2019) focused on net income gains across deciles of Vietnam smokers (Fuchs & Icaza, forthcoming 2019). The main differences in details arise in taking the male smoker as the unity of analysis here as compared to the household in Fuchs et al. (forthcoming 2019), as well as in other minor differences in the methodologies applied. Our model is for the entire lifetime of the current cohort of smokers, so might underestimate the effects of future consumption decreases, particularly if the large early price hikes also lead to future price expectations also being raised (GTEC, 2018). Finally, the assumption that the poor are more price responsive was central to our analyses, and while the exact responsiveness to price does likely vary in Vietnam from other settings, there is substantial earlier evidence, in Vietnam as well as globally, to document that the poor are in fact more responsive to price (Fuchs & Icaza, forthcoming 2019).

Conclusions

Vietnam has made substantial progress in reducing tobacco use. Further progress is likely to be possible with large increases in price, particularly those that focus on narrowing the gap between the least and most expensive cigarettes. Higher cigarette taxes would also reduce poverty by reducing out of pocket health expenditures among the poorest smokers.

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Appendix

Appendix Table 1. Data inputs and data sources.

| Indicators | | Source | |
|---|---------|--|--|
| Population (males in thousands) | | General Statistics Office of Vietnam, 2019.(General Statistics Office of Viet Nam, 2019) | |
| 0-4 | 4,178.7 | | |
| 5-9 | 3,888.2 | | |
| 10-14 | 4,149.4 | | |
| 15-19 | 4,882.7 | | |
| 20-24 | 4,279.2 | | |
| 25-29 | 4,102.0 | | |
| 30-34 | 3,721.7 | | |
| 35-39 | 3,578.9 | | |
| 40-44 | 3,254.2 | | |
| 45-49 | 2,909.7 | | |
| 50-54 | 2,332.5 | | |
| 55-59 | 1,538.5 | | |
| 60-64 | 977.5 | | |
| 65-69 | 745.4 | | |
| 70-74 | 651.6 | | |
| Male smoking prevalence, by age | | Global Adult Tobacco Survey, 2015. (Ministry of Health Of Viet Nam et al., 2016) | |
| 15-19 | 12.8% | | |
| 20-24 | 29.2% | | |
| 25-29 | 37.3% | | |
| 30-34 | 43.3% | | |
| 35-39 | 48.6% | | |
| 40-44 | 46.9% | | |
| 45-49 | 44.1% | | |
| 50-54 | 43.7% | | |
| 55-59 | 41.9% | | |
| 60-64 | 29.6% | | |
| 65-69 | 32.7% | | |
| 70-74 | 18.8% | | |
| Male smoking prevalence, by income groups | | | |
| Q1 (poorest) | 35.4% | | |
| Q2 | 47.8% | | |
| Q3 | 47.7% | | |
| Q4 | 30.9% | | |
| Q5 (richest) | 30.3% | | |
| Number of cigarettes consumed daily per person | | | |
| Q1 (poorest) | 14 | | |
| Q2 | 13 | | |
| Q3 | 12 | | |
| Q4 | 12 | | |
| Q5 (richest) | 10 | | |
| Price of a pack of 20 cigarettes (in VND) | | WHO, 2017.(World Health | |
| | 20,000 | | |

| | | |
|--|---------|---|
| | | Organization, 2017) |
| Share to the total deaths | | Institute of Health Metrics and Evaluation, 2019.(Institute for Health Metrics and Evaluation (IHME), 2019) |
| COPD | 17% | |
| Stroke | 31% | |
| Heart disease | 22% | |
| Lung cancer | 29% | |
| Annual treatment cost from tobacco attributable diseases (in VND, millions) | | General Statistics Office of Viet Nam, 2011.(Ministry of Health of Viet Nam, 2011) |
| COPD | 14.5 | |
| Stroke | 16.9 | |
| Heart disease | 41.0 | |
| Lung cancer | 79.2 | |
| Probability of seeking care | | Duong et al., 2019.(Duong, Van Minh, Ngo, & Ellner, 2019) |
| COPD | 39% | |
| Stroke | 64% | |
| Heart disease | 64% | |
| Lung cancer | 22% | |
| Health utilization (relative) | | General Statistics Office of Vietnam, 2017.(General Statistics Office of Viet Nam, 2017) |
| Q1 (poorest) | 0.96 | |
| Q2 | 1.03 | |
| Q3 | 1.00 | |
| Q4 | 1.03 | |
| Q5 (richest) | 1.03 | |
| Insurance coverage rate | | |
| | 81.9% | |
| Financial support | | |
| | 81.9% | |
| GNI per capita (in VND, millions) | | World Bank, 2019.(World Bank, 2019b) |
| | 49.9 | |
| Gini | | General Statistics Office of Vietnam, 2019.(General Statistics Office of Viet Nam, 2019) |
| | 0.4 | |
| Individual monthly income (in VND, thousands) | | General Statistics Office of Vietnam, 2019.(General Statistics Office of Viet Nam, 2017) |
| Q1 (poorest) | 770.6 | |
| Q2 | 1,516.5 | |
| Q3 | 2,300.9 | |
| Q4 | 3,355.7 | |
| Q5 (richest) | 7,547.3 | |
| Price elasticity | | Eozenou and Fishburn, 2001.(Eozenou & Fishburn, 2001) |
| | -0.53 | |

