The International Tobacco Control Policy Evaluation Project

# The trend in affordability of tobacco products in Bangladesh 2009-2015: Evidence from ITC Bangladesh Surveys

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# Executive Summary

Affordability, or the price of tobacco products in relation to the income of tobacco users, is recognized as a key determinant of tobacco use behavior. While increasing prices is known to reduce consumption and demand for tobacco products, the effect of income growth on increasing demand can more than offset the negative effect of price increases and the net effect can be an increase in demand. Thus the effectiveness of price increases as a deterrent to tobacco use depends on how much prices increase in relation to income of the potential users. The affordability of tobacco products is widely recognized as an index for benchmarking tobacco taxation in low- and middle- income countries (LMICs), especially in countries that are experiencing rapid economic growth. The aim of the present study is to examine the trend in affordability of tobacco products in Bangladesh, a country that has experienced rapid increases in income and whose World Bank classification has changed from low-income to lower-middle income country in 2015.

The present study uses nationally representative individual level cohort data from the International Tobacco Control (ITC) Bangladesh Survey, conducted in four waves in 2009, 2010, 2011-12 and 2014-15, to measure the affordability of tobacco products in terms of Relative Income Price (RIP). In the existing literature, RIP is defined as the percentage of per capita income needed to purchase 100 packs of cigarettes. We measure RIP based on individual self-reported price and self-reported household income group, which is supplemented by the per capita household income data from the Bangladesh Household Income and Expenditure Survey 2010.

Using univariate analysis, we examine the level and distribution of affordability of cigarette, bidi and smokeless tobacco products across the four waves of the ITC Bangladesh Survey. Due to the individual level measurement of affordability, this study allows us to examine both the level and shift in the distribution of affordability for multiple tobacco products, particularly the cheaper tobacco products consumed by the low-income people. We also observe the variation in affordability across population sub-groups and over time for cigarette, bidi and smokeless tobacco products controlling for individual socio-economic characteristics in multivariate regression analysis.

The results of the analysis show that both cigarettes and bidis became more affordable in Bangladesh over the period from 2009 to 2015 and the affordability of smokeless tobacco products remained unchanged between 2011-12 and 2014-15. While the price of cigarettes increased in real terms and the price of bidis decreased over this period, income growth more than offset the negative effect of the cigarette price increase on cigarette demand, resulting in a shift in preference from bidis to cigarette smoking. The growing trend of affordability of cigarettes both in absolute terms and relative to bidis portends further growth of cigarette smoking in Bangladesh.

Similarly, for smokeless tobacco, despite the increase in price in real terms, affordability did not change due to offsetting income growth of smokeless tobacco users. Again, the growth in affordability of cigarettes relative to smokeless tobacco may have induced switching from smokeless tobacco use to cigarette smoking resulting in the higher prevalence of cigarette smoking and lower prevalence of smokeless tobacco use in recent years in Bangladesh. However, we cannot make statements of causality from changes in affordability to the changing pattern of smoked and smokeless tobacco use based on the findings from the present study.

The current excise tax in Bangladesh is imposed with an ad valorem system based on retail price. It has been observed from global evidence that average cigarette prices are lower under an ad valorem system than under a specific excise system. The consequence is that this lowers the efficiency of the excise to increase the retail price and contributes to greater affordability. It is, therefore, necessary to change the tax system from ad valorem to specific excise to raise the general price level of cigarettes.

Moreover, the current cigarette tax structure is tiered, which favors the consumption of lower priced brands because of lower tax rates. The ad valorem system also encourages switching down to lower-priced brands in the event of tax and price increases. This tendency keeps the average price level down and contributes to increasing affordability. A uniform excise system would remove the incentive of switching down to cheaper cigarettes and encourage quitting behavior.

However, consideration of the multiple types of tobacco products used in Bangladesh is also important, as changing the tax system and increasing the price level of cigarettes in isolation from bidis and smokeless tobacco may induce downward switching from cigarettes to bidis or to smokeless tobacco. Therefore, the excise systems on bidis and smokeless tobacco, which are also ad valorem, must also be changed to a specific system and increased significantly to bring forth simultaneous increases in smokeless tobacco, bidi, and cigarette prices and closing the gap between them.

It can be concluded from this study that the current price and tax policy in Bangladesh falls short of the objective of effective tobacco control through taxation, as is evident from the increasing affordability of tobacco products in the country. It would be important to put into place changes in the tax system that would keep pace with inflation and rising income while also eliminating or greatly reducing the structural features of the tax system (reliance on ad valorem rather than on specific excise) that weakens the impact of the tax system on reducing tobacco use.

# 1. Introduction

Affordability, or the price of tobacco products in relation to the income of tobacco users, is recognized as a key determinant of tobacco use behavior (Blecher and Van Walbeek, 2004). While increasing prices is known to reduce consumption and demand for tobacco products, the effect of income growth on increasing demand can more than offset the negative effect of price increases and the net effect can be an increase in demand. Thus the effectiveness of price increases as a deterrent to tobacco use depends on how much prices increase in relation to income of the potential users. The affordability of tobacco products is widely recognized as an index for benchmarking tobacco taxation in low- and middle- income countries (LMICs), especially in countries that are experiencing rapid economic growth (Blecher, 2010). The aim of the present study is to examine the trend in affordability of tobacco products in Bangladesh, a country that has experienced rapid increases in income and whose World Bank classification has changed from low-income to lower-middle income country in 2015 (World Bank, 2015).

Several different ways of measuring affordability can be identified from the existing literature. One common measure is the Relative Income Price (RIP), defined as the percentage of annual per capita gross domestic product (GDP) required to purchase 100 packs of cigarettes (Blecher, 2009; Blecher and Van Walbeek, 2004). The higher the RIP, the less affordable cigarettes are, and vice versa. In WHO (1998), affordability was defined as the minutes of labor required to purchase the cheapest pack of cigarettes (WHO, 1998). This definition was later applied by Guindon et al (2002). Kan, on the other hand, used the percentage of daily income required to purchase a pack of cigarettes as the measure of affordability (Kan, 2007). Among these three measures, Kan paid attention to the implication of income distribution for affordability by focusing on income earned in lower-paying jobs. Following this, Blecher and van Walbeek used an additional measure of affordability defined as the number of minutes of labor required to buy a pack of cigarettes by a person earning a relatively low wage (Blecher and van Walbeek, 2008).

These aggregate level measures have in general used a single (e.g., cheapest) or weighted average price and annual per capita GDP or average wage to measure the affordability index for a country at a certain point in time. Some studies have compared the affordability measure across countries and over time based on this macro indicator. The limitation of an aggregate level indicator of affordability is that it loses insight into the variation of the indicator across sub-groups of the population and different points of the price and income distribution. The only existing study that used a survey-based approach to measure affordability from individual level data analyzed cross-country data from the Global Adult Tobacco Surveys (GATS) from 15 LMICs (Kostova et al., 2011). In this study, a consumption-weighted average price measure was derived and used along with per capita GDP to measure the affordability index.

The present study uses nationally representative individual level cohort data from the International Tobacco Control (ITC) Bangladesh Survey to measure affordability of tobacco products in terms of RIP. In contrast to the previous study based on GATS data, in this study, we measure affordability based on individual self-reported price and self-reported household income group and summarize the affordability index over the population. Due to the individual level measurement of affordability, this study allows us to examine both the level and shift in the distribution of affordability for multiple tobacco products (cigarette, bidi and smokeless tobacco), particularly the cheaper tobacco products consumed by the low-income people, and analyze the variation in affordability across population sub-groups.

# 2. Background and Rationale for the Study

Bangladesh is characterized by high prevalence of multiple tobacco product use including combustible tobacco products, such as cigarettes and bidis, and smokeless tobacco, such as zarda and gul. According to the Wave 3 of the ITC Bangladesh Survey data, (Nargis et al., 2015), the 2012 prevalence of any type of tobacco use among the adult population was 36.3%. The prevalence of smoked tobacco use was 19.4% and 22.0% used smokeless tobacco. The prevalence of smoking was much higher among adult men (37%) compared to adult women (0.9%); however, use of smokeless tobacco was more balanced—19.5% among adult men and 24.5% among adult women.

In Bangladesh, the prices of cigarettes by brand are determined by the National Board of Revenue and are used as the tax base for calculating the tax liability of the cigarette manufacturers. Based on these administered prices by brands, cigarettes are categorized into four brand tiers—premium, high, medium, and low. The ad valorem excise tax rate (known as supplementary duty), which is based on the administered retail price, varies by these price categories (see Table 1). In addition, there is value-added tax (VAT) at 15% of retail price levied at the point of sale. It is notable that the tax rate for the low-price category is significantly lower than the top three tiers, which is designed to protect domestic low-priced brands and low-income smokers consuming these brands.

The prices of bidis are determined by the bidi manufacturers themselves and their tax liability is calculated based on a pre-determined tariff value per pack of bidis. The VAT is imposed on the tariff value plus the excise tax. The excise tax rate differentiates between unfiltered and filtered bidis. As shown in Table 2, between 2009-10 and 2010-11, the tariff values and tax rates remained unchanged. In 2011-12, the bidi industry was allowed to market both unfiltered and filtered bidis in smaller pack sizes with lower tariff values. This resulted in additional tiers with smaller size and lower value bidi packs. However, according to government source, 98% of total bidi sales are in the form of unfiltered bidis with 25-stick packs.

Table 3 summarizes the excise tax rate on the most widely used smokeless tobacco products (zarda and gul). Despite the increase in tax rate on the ex-factory price of smokeless tobacco products and reduction in prevalence of smokeless tobacco use in Bangladesh from 2009-2012 (Nargis et al., 2015), smokeless tobacco products are still cheaper than cigarettes with evidence of a large degree of substitutability between cigarettes and smokeless tobacco products (Nargis et al., 2014).

**Table 1: Tiered ad valorem excise tax rates for cigarettes in Bangladesh, 2009-2015.**

| Tier | Retail price/pack of 10 sticks (BDT) | Excise tax rate (% of retail price) | Total tax share in retail price (excise + VAT) |
|---|---|---|---|
| **2009-10** | | | |
| Low | 7.25-8.75 | 32% | 47% |
| Medium | 16.25-17.25 | 52% | 67% |
| High | 23.25-29.25 | 55% | 70% |
| Premium | 46.25+ | 57% | 72% |
| **2010-11** | | | |
| Low | 8.40-9.15 | 33% | 48% |
| Medium | 18.40-19.00 | 53% | 68% |
| High | 27.00-32.00 | 56% | 71% |
| Premium | 52.00+ | 58% | 73% |
| **2011-12** | | | |
| Low | 11.00 - 11.30 | 36% | 51% |
| Medium | 22.50 - 23.00 | 55% | 70% |
| High | 32.00 - 36.00 | 58% | 73% |
| Premium | 60.00+ | 60% | 75% |
| **2012-13** | | | |
| Low | 12.10 – 12.30 | 39% | 54% |
| Medium | 24.75 – 25.25 | 56% | 71% |
| High | 35.20 – 39.50 | 59% | 74% |
| Premium | 66.00+ | 61% | 76% |
| **2013-14** | | | |
| Low | 14.00 – 14.20 | 39% | 54% |
| Medium | 28.00 – 30.00 | 56% | 71% |
| High | 42.00 – 45.00 | 59% | 74% |
| Premium | 80.00 + | 61% | 76% |
| **2014-15** | | | |
| Low | 15.00 - 16.50 | 44% | 59% |
| Medium | 32.50 - 35.00 | 61% | 76% |
| High | 50.00 - 54.00 | 62% | 77% |
| Premium | 90.00 + | 62% | 77% |

*Source: National Board of Revenue, Ministry of Finance, Government of Bangladesh.*

**Table 2: Tiered excise tax rates for bidis in Bangladesh, 2009-2015.**

| Tier | Tariff value (BDT) | Excise tax rate (% of tariff value) |
|---|---|---|
| **2009-10** | | |
| Unfiltered bidi, 25 stick pack | 3.16 | 20% |
| Filtered bidi, 20 stick pack | 3.43 | 25% |
| **2010-11** | | |
| Unfiltered bidi, 25 stick pack | 3.16 | 20% |
| Filtered bidi, 20 stick pack | 3.43 | 25% |
| **2011-12** | | |
| Unfiltered bidi, 25 stick pack | 3.16 | 20% |
| Unfiltered bidi, 12 stick pack | 1.52 | 20% |
| Unfiltered bidi, 8 stick pack | 1.01 | 20% |
| Filtered bidi, 20 stick pack | 3.43 | 25% |
| Filtered bidi, 10 stick pack | 1.71 | 25% |
| **2012-13** | | |
| Unfiltered bidi, 25 stick pack | 3.16 | 20% |
| Unfiltered bidi, 12 stick pack | 1.52 | 20% |
| Unfiltered bidi, 8 stick pack | 1.01 | 20% |
| Filtered bidi, 20 stick pack | 3.43 | 25% |
| Filtered bidi, 10 stick pack | 1.71 | 25% |
| **2013-14** | | |
| Unfiltered bidi, 25 stick pack | 3.88 | 20% |
| Unfiltered bidi, 12 stick pack | 1.86 | 20% |
| Unfiltered bidi, 8 stick pack | 1.24 | 20% |
| Filtered bidi, 20 stick pack | 4.22 | 25% |
| Filtered bidi, 10 stick pack | 2.11 | 25% |
| **2014-15** | | |
| Unfiltered bidi, 25 stick pack | 4.27 | 25% |
| Unfiltered bidi, 12 stick pack | 2.05 | 25% |
| Unfiltered bidi, 8 stick pack | 1.37 | 25% |
| Filtered bidi, 20 stick pack | 4.64 | 30% |
| Filtered bidi, 10 stick pack | 2.32 | 30% |

*Source: National Board of Revenue, Ministry of Finance, Government of Bangladesh.*

**Table 3: Excise tax rates for smokeless tobacco products (zarda, gul) in Bangladesh, 2009-2015.**

| Year | Excise tax rate (% of ex-factory price) |
|---|---|
| **2009-10** | 10% |
| **2010-11** | 10% |
| **2011-12** | 20% |
| **2012-13** | 30% |
| **2013-14** | 30% |
| **2014-15** | 60% |

*Source: National Board of Revenue, Ministry of Finance, Government of Bangladesh.*

The tax structure for multiple tobacco products in Bangladesh encourages consumption of tobacco products especially for people of lower socio-economic status who are more likely to consume cheaper tobacco products. This has a serious implication for public health as the people with the lowest ability to purchase are also those who can least afford the health expenditures needed to treat the illnesses incurred from tobacco use and the lost productivity and income from consequent morbidity and mortality. In other words, tobacco tax policy in Bangladesh tends to increase the affordability of tobacco products particularly at the lower end of the income distribution. The standard measure of affordability using the price of a particular brand of cigarettes and per capita GDP fails to pick up the ramification of this income distributional aspect of affordability and underestimates affordability among the low-income population. By using the individual level data on the purchase price of multiple tobacco products and household income from the ITC Bangladesh Survey, a cohort study, it enables us to examine rigorously the distributional shifts in affordability by income over time.

# 3. Methods

## 3.1 Source of Data

The data used for the present analysis comes primarily from the International Tobacco Control (ITC) Bangladesh Survey Waves 1-4, a cohort survey with multi-stage complex survey design conducted in 2009, 2010, 2011-12, and 2014-15. The survey includes a nationally representative probability sample and three purposive samples. For the purpose of the present analysis, only the nationally representative probability sample was used. The survey covers both tobacco users and nonusers aged 15 and older. Self-reported data from 6,463 person-year of cigarette smokers and 1,733 person-year of bidi smokers pooled over the four waves and 407 person-year of smokeless tobacco users pooled over the third and the fourth waves were used for the univariate and multivariate analysis. Cross-sectional survey weights calculated at the household level were used for weighted estimation of the affordability index.

Smokers reported the price of cigarettes or bidis they paid in their last purchase and the brands of the purchased cigarettes and bidis. The price of smokeless tobacco products was reported in Waves 3 and 4 only. In addition, all respondents reported individual- and household-level socio-economics characteristics that are used in the present analysis. More details of the survey design and sample characteristics can be found in the ITC Bangladesh Technical Reports for Waves 1, 2, and 3 (available at http://www.itcproject.org/technical-report/).

The information on excise tax rate on cigarette, bidi and smokeless tobacco are obtained from the National Board of Revenue of the Government of Bangladesh. The supplementary data on per capita household income by income categories is derived from the Bangladesh Household Income and Expenditure Survey 2010 conducted by the Bangladesh Bureau of Statistics. Finally, the information on national pay scales are collected from the Ministry of Finance Gazettes on the National Pay Scale of Bangladesh for various years. The data on inflation and per capita GDP growth rates are taken from the World Economic Outlook data base of the International Monetary Fund and the World Development Indicators data base of the World Bank.

## 3.2 Self-reported Price Data

In the present study, individual self-reported price is used to calculate the ratio of the cost of 100 packs of cigarettes to the per capita household income of the individual smoker. The same measure is calculated for 100 packs of bidis as well. To calculate the price per pack of cigarettes, first the price per stick of cigarettes is calculated and then multiplied by 20 to convert it to price per pack. More

specifically, smokers who last purchased cigarettes by stick (i.e., loose) reported the price per stick, whereas smokers who last purchased a pack reported the price per pack and the number of sticks per pack. If the respondent reported pack purchase, in order to obtain standardized prices, the price per stick is calculated by dividing the price per pack by the reported number of cigarettes in a pack, which are usually 10 or 20 in Bangladesh. The prices are in current Bangladeshi Taka (BDT), with 1 BDT equivalent to about 0.0125 USD. The number of sticks in a usual bidi pack is 25, so for bidis, the price per pack is calculated by multiplying the price per stick by 25. Bidis are usually smaller in size and smoke faster than cigarettes. Thus, we are assuming here that 20 cigarettes are equivalent to 25 bidis.

The measurement of prices taking into account both stick and pack purchases is preferred, especially in view of the large proportion of stick purchases occurring in LMICs and typically higher prices associated with stick purchase than with pack purchase. According to the Global Adult Tobacco Survey (GATS) 2009, in Bangladesh, 83.1% of cigarette purchases and 59.7% of bidi purchases were in the form of single sticks (Kostova et al., 2011).

In the next step, we compute the average prices paid by the individual smokers (weighted by cross-sectional weights in the nationally representative ITC Bangladesh data) for each category of cigarettes and bidis, expressed in 2014 BDT using annual inflation data from the World Economic Outlook database. We then observe the trends of prices and affordability by brands and tobacco products (cigarettes and bidis) over the four survey waves conducted between 2009 and 2015.

The price of smokeless tobacco is expressed in 20gms as an equivalent of a 20-cigarette pack. This is based on the assumption that one cigarette typically weighs about 1 gm (OECD, 2015). For smokeless tobacco, prices and affordability are compared between 2011-12 and 2014-15 when data were available.

## 3.3 Per capita income data

The ITC survey collects data on household income categories reported by household head and assigned to the individual respondents within the household. Reported income is an ordinal variable where each category represents a range of income that is continuous. In Bangladesh, the household income variable is coded in all four waves as:

1. 0-5,000 BDT
2. 5,001-10,000 BDT
3. 10,001-15,000 BDT
4. 15,001-20,000 BDT
5. 20,001+ BDT

One limitation of the ITC data is that there is no information on household composition. Hence, per capita income cannot be obtained directly. However, it is possible to use a proxy variable for per capita income from a national level household survey. The first step is to identify the ranking of households in the household survey by household income that can be matched with the income range in the ITC data. In the second step, per capita household income is obtained by dividing the average household income by the average household size corresponding to a particular household income group from the national level household survey. In the third step, per capita household income from the national level household survey is linked to the ITC data using the income range, and along with the price measures is used to create the affordability index for each individual.

The data on per capita income are obtained from the 2010 Bangladesh Household Income and Expenditure Survey stratified by urban and rural area of households as shown in Table A1. The income groups in Table A1 that correspond to the income groups in ITC Bangladesh data have been marked with separate colors. For each income group, the average number of members per household is estimated. Then the average per capita monthly income is calculated by dividing average monthly income per household by the average number of members per household.

In Table A2, the data from Table A1 are consolidated into the five income groups as in the ITC data by calculating the weighted average per capita monthly income of the sub groups (in each color) weighted by the number of households in the Household Income and Expenditure Survey data. This weighted average per capita monthly income is assigned to each individual according to the respective income group and rural-urban strata. The per capita monthly income data is converted to annual income data by multiplying by 12.

Although the four waves of the ITC Bangladesh Survey were conducted in 2009, 2010, 2011-12, and 2014-15, the Household Income and Expenditure Survey data is available only for 2010. The per capita income levels for 2009 are obtained by deflating the 2010 income levels by the per capita GDP growth rate (data source) and annual inflation rate in 2009. Similarly, the per capita income levels for 2011-12 and 2014-15 are obtained by inflating the 2010 income levels by the corresponding per capita GDP growth rate and annual inflation rate compounded over the period in between. The calculated per capita monthly income levels by household income groups are reported in Table A3. These figures are in current BDT.

In using individual level per capita annual household income, this study departs from the convention of using the per capita GDP as an aggregate measure of household purchasing power and living standard. There are three distinct advantages of using per capita household income in place of per capita GDP. First, while per capita GDP takes into account the impact of overall economic condition of the country as a whole, per capita household income is a closer representation of the individual level disposable income and purchasing power. Per capita GDP is generally a broader measure of income as it takes into account both private and public income and expenditures. On the other hand, per capita household

income takes into account only private income and is more sensitive to tax liability. Second, for people making per capita income greater than per capita GDP, the per capita GDP based measure would understate affordability, whereas for those with per capita income below per capita GDP, it would overstate affordability. Thus, the per capita GDP based measure ignores the effect of income distribution on individual level affordability. This point has been well recognized by Blecher and van Walbeek (2008). Third, measuring affordability at the individual level allows one to examine the distributional shift in the affordability of tobacco products over time beyond the average measure.

## 3.4 Relative Income Price (RIP)

The affordability index RIP is given by the ratio 100 X price per unit/per capita annual household income. The lower the value of RIP, the more affordable the tobacco products are. Note that both the measures of price and income are in current BDT and do not need conversion into constant BDT because RIP is a ratio of the two current measures and cancel out the conversion factor in the numerator and the denominator. In ITC surveys, as the price variable is reported by individual respondents and the income variable is reported by the household heads that is converted to per capita income level by linking to external data source as explained above, we are permitted to measure the affordability index at an individual level. This is in sharp contrast with previous studies that were conducted at the aggregate level.

Based on this affordability measure, we are able to undertake the following analyses:

1. The individual specific values of affordability are used to describe the distribution of the affordability index within a country over time to identify the trend in overall affordability of tobacco products.
2. The equality of the distribution of RIP across waves is tested using the Kolmogorov-Smirnov non-parametric test.
3. In order to examine the trend in affordability controlling for individual i's characteristics, such as age (AGE) and time-invariant characteristics reported in year t, including, gender (GEN) , socio-economic status (SES) which is a composite index derived from the characteristics of housing of the respondents, educational categories (EDU), occupational categories (OCC), rural-urban residence status (URB) and village of residence (VILL), we run a pooled cross-sectional ordinary least squares (OLS) regression of affordability as follows:

$$RIP_{it} = \beta_0 + \beta_1 AGE_{it} + \beta_2 GEN_i + \sum_j \beta_{3j} SES_{ijt} + \sum_k \beta_{4k} EDU_{ikt} + \sum_l \beta_{5l} OCC_{ilt} + \beta_6 URB_{it} + \sum_m \beta_{7m} VILL_m + \sum_n \beta_{8n} WAVE_n + u_{it} \quad (1)$$

VILL is the primary sampling unit and controls for the regional variation in price and income. The coefficients of the WAVE variables indicate the time trend of affordability with reference to Wave 1, which is the reference category. Negative sign of the coefficient of each wave variable indicates that affordability increased in that wave compared to wave 1. The magnitudes of the coefficients of consecutive wave variable are compared to determine the time trend of affordability.

For estimating the time trend coefficients of affordability of each of the four tiers of cigarette brands separately, the WAVE variable is interacted with the BRAND variable as follows:

$$RIP_{it} = \beta_0 + \beta_* TAX_{it} + \beta_1 AGE_{it} + \beta_2 GEN_i + \sum_j \beta_{3j} SES_{ijt} + \sum_k \beta_{4k} EDU_{ikt} + \sum_l \beta_{5l} OCC_{ilt} + \beta_6 URB_{it} + \sum_m \beta_{7m} VILL_m + \sum_n \beta_{8n} WAVE_n * BRAND_{int} + u_{it} \quad (2)$$

Equation (2) is estimated for cigarettes only and equation (1) is estimated for bidi and smokeless tobacco. The policy variable TAX is added to equation (2) for identifying the effect of differential rate of excise tax on the affordability of cigarettes. The effect of tax policy variable on the affordability of bidi and smokeless tobacco is not identifiable due to uniform rate of taxation for smokeless tobacco and almost uniform rate of taxation applied to 98% of bidi sales. Hence the tax policy variable is not included in equation (1).

The regression is weighted by cross-sectional weights of the nationally representative sample. Since the regression pools observations from four waves of data, there may be multiple observations (up to a maximum of four) on a single individual that are not independent. The standard errors of estimates are, therefore, corrected for possible autocorrelation of disturbances within repeated observations on a single observational unit. In the Stata regression command, the robust standard errors of correlated observations within a cluster (in this case a person) are estimated using the variance-covariance matrix option vce (cluster uniqid) where uniqid is the identification variable of each person in the sample.

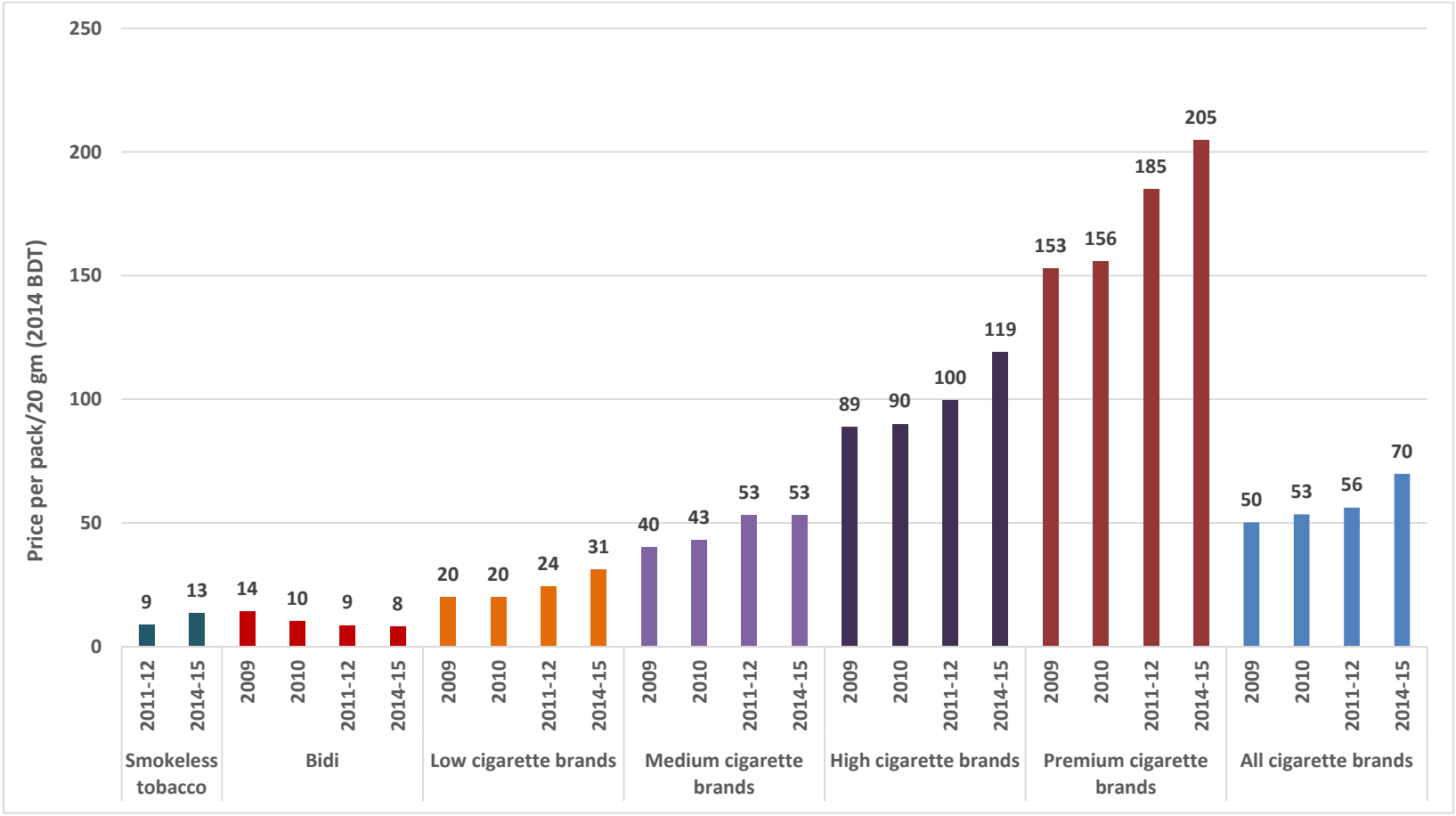
# 4. Results

Figure 1 reflects that cigarette prices in general increased or at least remained at the same level for the four brand tiers (low, medium, high and premium) at each observation point between 2009 and 2015. On average, inflation-adjusted cigarette prices increased by 7% from 2009 to 2010, 5% from 2010 to 2011-12, and 24% from 2011-12 to 2014-15. This increase in real price of cigarettes is attributable to the upward adjustment of the administered price every year over and above the annual rate of inflation along with minor increases in the tax rates by the National Board of Revenue (Table 1). In contrast, bidi prices decreased over this period when the adjustments in the tax rates or the tariff values was minimal (Table 2). Smokeless tobacco product prices increased by 50% between 2011-12 and 2014-15 attributable to the doubling of the tax rate during this period, as shown in Table 3 above.

The increase in the real price of smokeless tobacco is consistent with the declining trend in smokeless tobacco use in Bangladesh observed over 2009-2012 (Nargis et al., 2015). The scenario is, however, different with respect to the change in cigarette and bidi smoking prevalence. The law of demand suggests that the increase in the real price of cigarettes and the decrease in the real price of bidi should lead to a decrease in cigarette smoking and an increase in bidi smoking. To the contrary, prevalence data show that the rate of exclusive cigarette smoking increased from 7.2% to 10.6% between 2009 and 2012 and the rate of exclusive bidi smoking or dual use of cigarette and bidi decreased from 6.6% to 3.7% in the same period (Nargis et al., 2015). There is clearly a shifting of the preference pattern of smokers from bidis to cigarettes, which is likely caused by income growth that occurred at 4-5% on average over this period (World Bank, 2015).

In the ITC Bangladesh Survey, the income distribution has also shifted upward as shown in the changing proportion of monthly household income categories over the four waves (see Table 4). Over time, we observe lower proportion of the respondents reporting income in the lowest two income categories and higher proportion reporting income in the top three income categories. The fact that the response categories of nominal income groups were not changed in the ITC survey during a period of high-income growth and inflation is problematic. There is need for upward adjustment in the nominal income groups of the response categories keeping in pace with inflation and income growth.

**Figure 1: Average price per 20gms of smokeless tobacco, per pack of bidis and cigarettes (by brand types) in Bangladesh, 2009, 2010, 2011-12, and 2014-15 (in 2014 BDT).**




*Source: Authors' calculations from ITC Bangladesh Survey Waves 1-4.*

**Table 4: The proportion of respondents by monthly household income categories in ITC Bangladesh Surveys Waves 1-4.**

| Monthly household income (BDT) | Wave 1 (2009) | Wave 2 (2010) | Wave 3 (2011-12) | Wave 4 (2014-15) |
|---|---|---|---|---|
| 0-5000 | 0.21 | 0.19 | 0.13 | 0.05 |
| 5001-10000 | 0.53 | 0.51 | 0.43 | 0.32 |
| 10001-15000 | 0.16 | 0.17 | 0.25 | 0.25 |
| 15001-20000 | 0.04 | 0.08 | 0.10 | 0.14 |
| 20001+ | 0.05 | 0.05 | 0.09 | 0.24 |

*Source: Author's calculations from the ITC Bangladesh Survey Waves 1-4.*

In order to understand the role of income growth vis-à-vis the change in the prices of cigarettes, bidis and smokeless tobacco on the overall demand of these products, it is essential to look at the pattern of change in the affordability of these products. In this paper, we have used the Relative Income Price (RIP) or the proportion of per capita annual household income required to purchase 100 packs of cigarettes/bidis or 100 times 20gms of smokeless tobacco to measure the change in affordability over time.

As shown in Figure 2(a), bidis and smokeless tobacco are the most affordable tobacco products in Bangladesh with the RIP varying from 5.4% in 2009 to 2.1% in 2014-15 for bidis and from 2.9% in 2011-12 to 2.7% in 2014-15 for smokeless tobacco products. The RIP for bidis in 2009 is much higher than the RIP calculated in Kostova et al. (2011) at 1.2% for 2009 using average price and per capita GDP data. For cigarettes, the RIP varies from 7.1% for low tier brands, to 15.2% for medium brands, 27.1% for high brands and 31.4% for premium brands in 2009. Again, these percentages are much higher than the RIP calculated for cigarettes at 5.0% in Kostova et al. (2011). This divergence is attributable to the facts that the former study used aggregate level measures that fail to take account of price and income distributions and that the per capita GDP used in the former studies is much higher than the per capita household income used in the present study and therefore overstates the affordability of tobacco products.

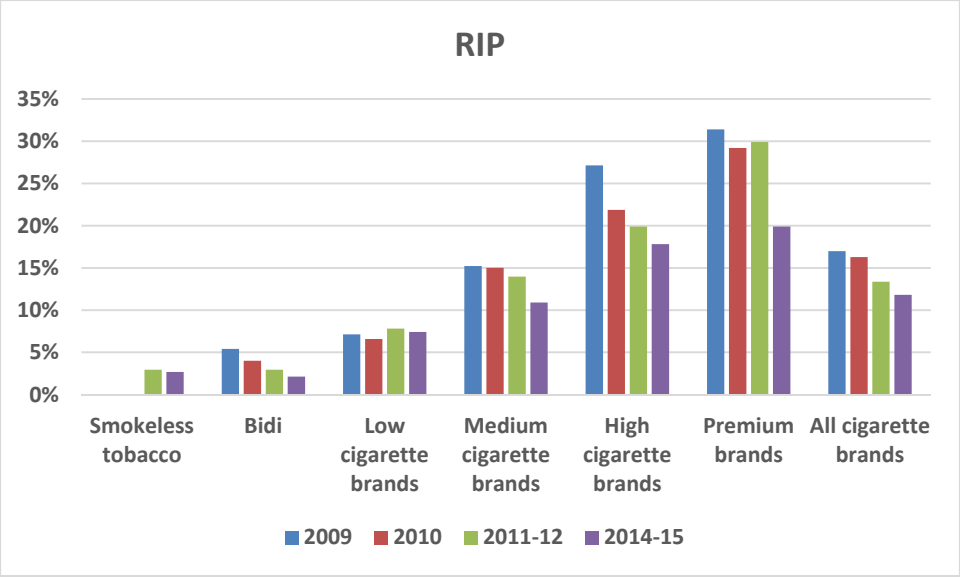
Figure 2(b) reveals that the affordability of smokeless tobacco increased slightly between 2011-12 and 2014-15. The affordability of bidis increased over 2009 through 2014-15. The affordability of cigarettes increased overall, although the affordability of low brand cigarettes decreased slightly. The 2015 WHO Report on the Global Tobacco Epidemic reports that between 2008 and 2014, cigarettes became less affordable in Bangladesh. However, this conclusion is based on the difference between 2008 and 2014 for just the most sold brand, which was within the low-brand category, for which affordability decreased slightly. Because of the possibility that the trend for this single brand may not be representative of the market as a

whole, it is important to assess the trend in affordability across all brands. The analysis presented here does that.

The relative change in affordability in the four tiers of cigarette brands, bidis, and smokeless tobacco is shown in Figure 2(b), which shows that the absolute increase in affordability is greatest for premium cigarette brands by 11.5 percentage points (pp), then for high (9.3 pp) and medium (4.3 pp) brands, followed by bidis (3.3 pp) and smokeless tobacco (0.3 pp). It thus appears that even though bidis and smokeless tobacco became more affordable, the increase in affordability is even greater for higher-priced cigarettes, which led to the shift in preference towards higher-priced cigarette brands from bidis, smokeless tobacco and low-priced cigarette brands. Consistent with this argument, the percentage of smokers smoking low-tier cigarette brands decreased from 36.33% to 20.37% between 2011-12 and 2014-15, while the percentage who smoke the top three brand tiers increased.

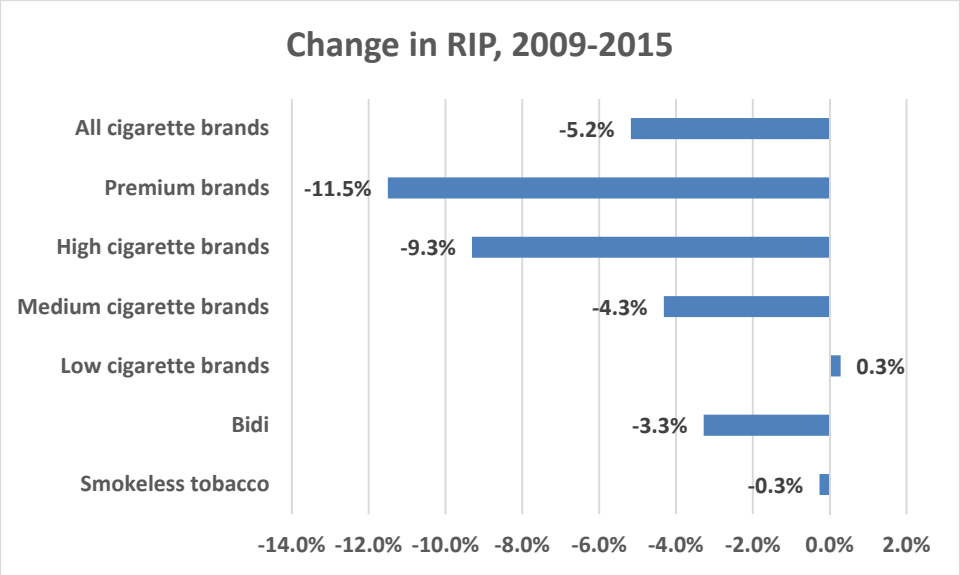
**Figure 2: Relative Income Price (RIP) of cigarettes and bidis in Bangladesh, 2009-2015.**

**(a)**




*Source: Author's calculations from the ITC Bangladesh Survey Waves 1-4.*

**(b)**

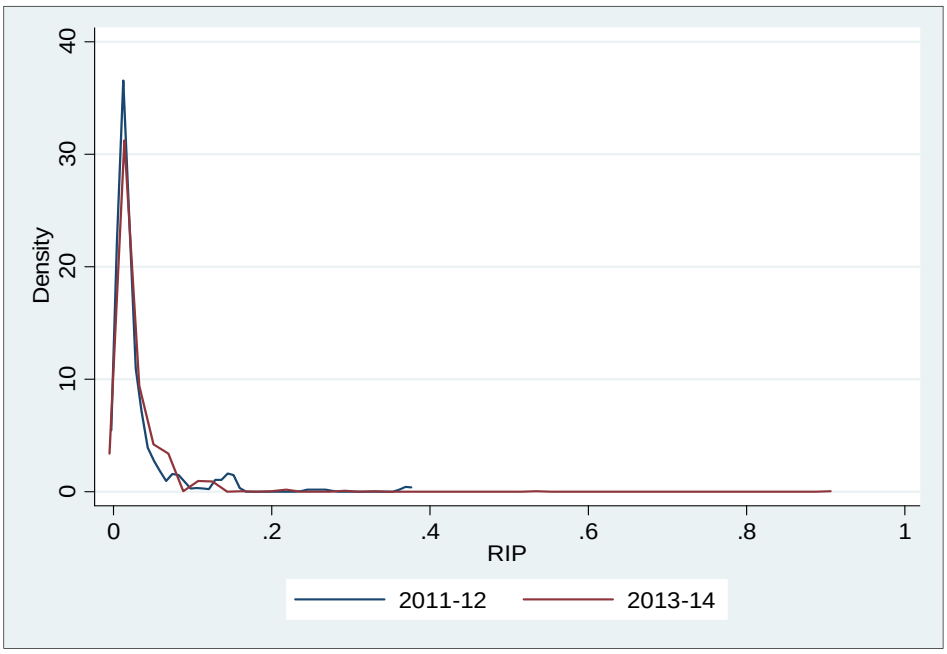



*Note: The change in RIP for smokeless tobacco is for 2011/12-2014/15.*
*Source: Author's calculations from the ITC Bangladesh Survey Waves 1-4.*

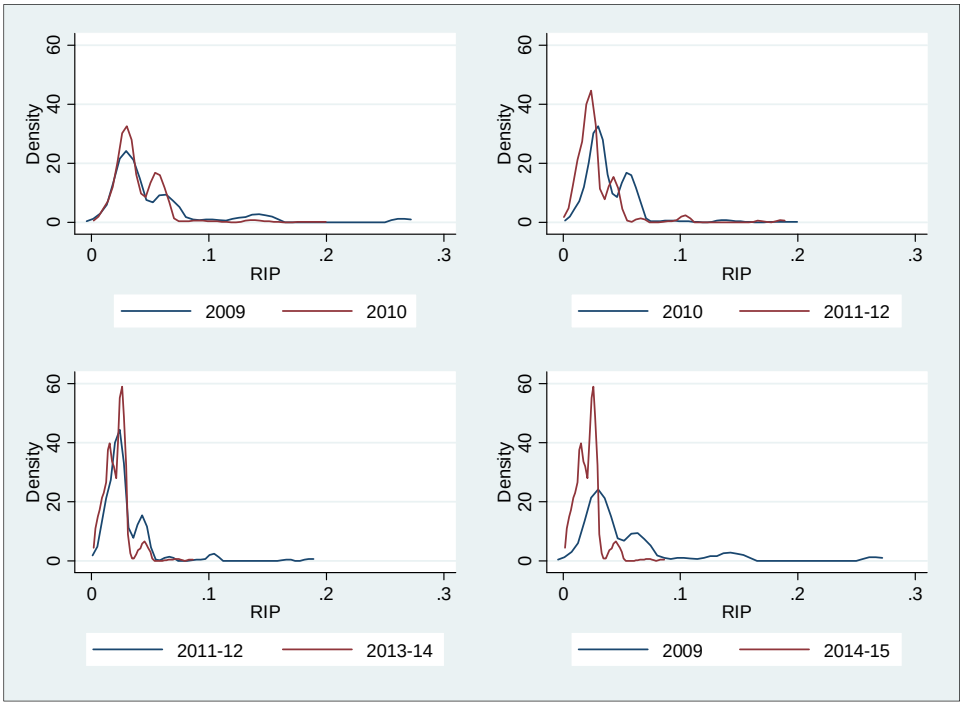
The univariate kernel densities (Epanechnikov) of the RIP of smokeless tobacco, bidis, and cigarettes by brand categories in Figure 3 reveal the overall shift in the distribution of affordability over time. The leftward shift implies greater affordability and the rightward shift implies lower affordability. The rightward shift is evident for low brand cigarettes only. The leftward shift is clearly visible for bidi, medium, high, and premium brands of cigarettes, the shift being more pronounced for higher-priced cigarettes than bidis. For smokeless tobacco, the densities for 2011-12 and 2014-15 tend to coincide.

**Figure 3: Kernel density of Relative Income Price (RIP) of smokeless tobacco, bidis, and cigarettes in Bangladesh, 2009-2015.**

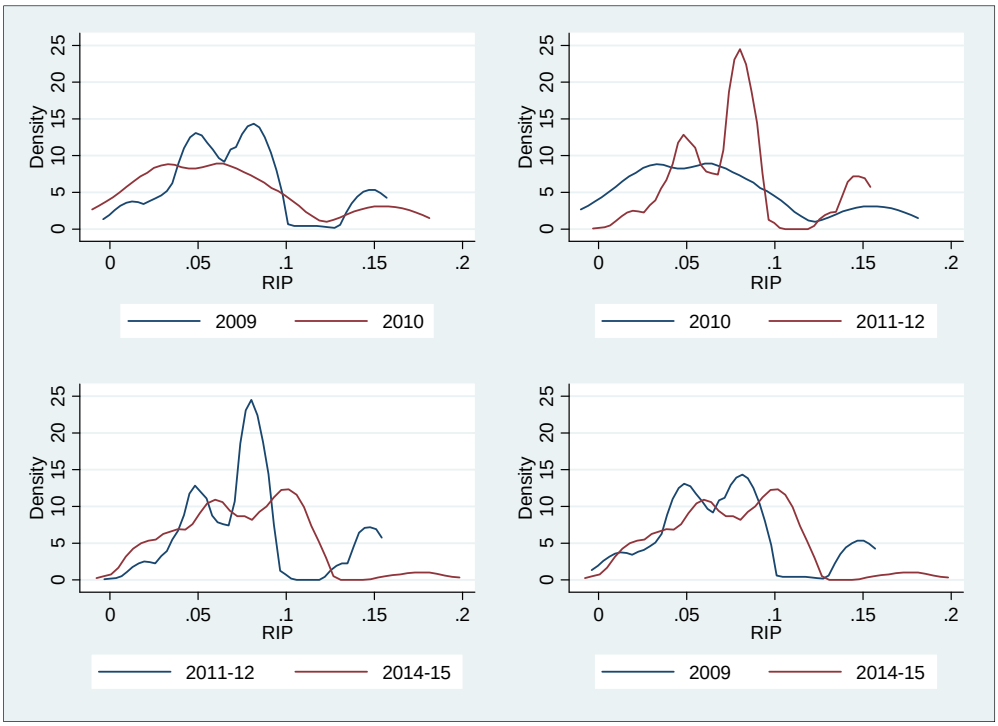
**(a) Smokeless tobacco**



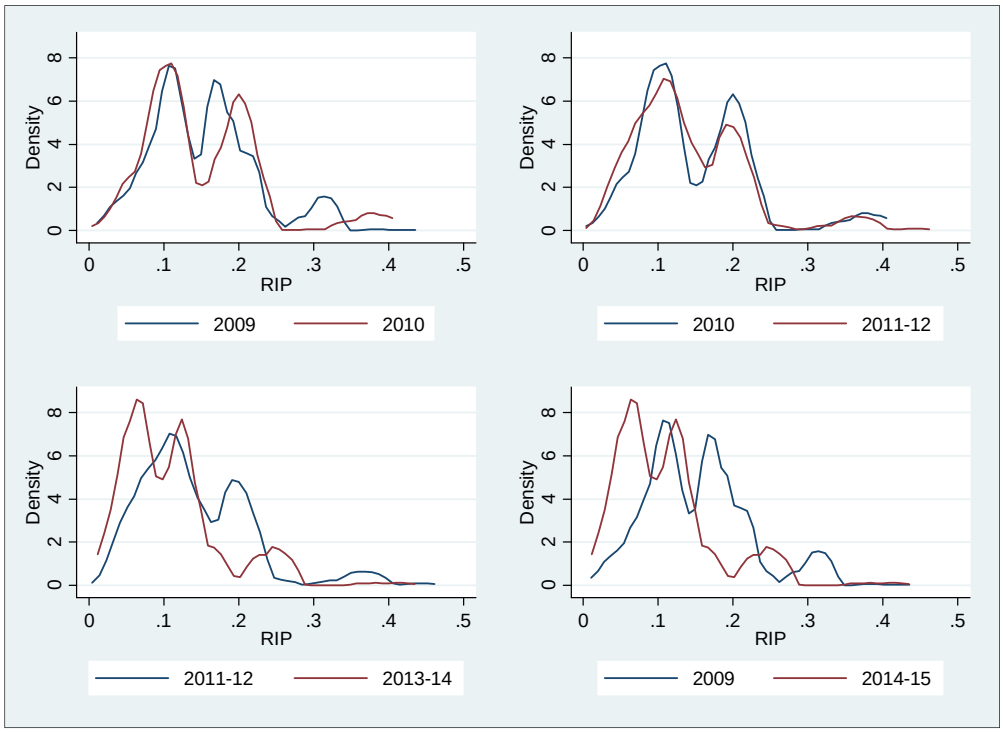

**(b) Bidis**



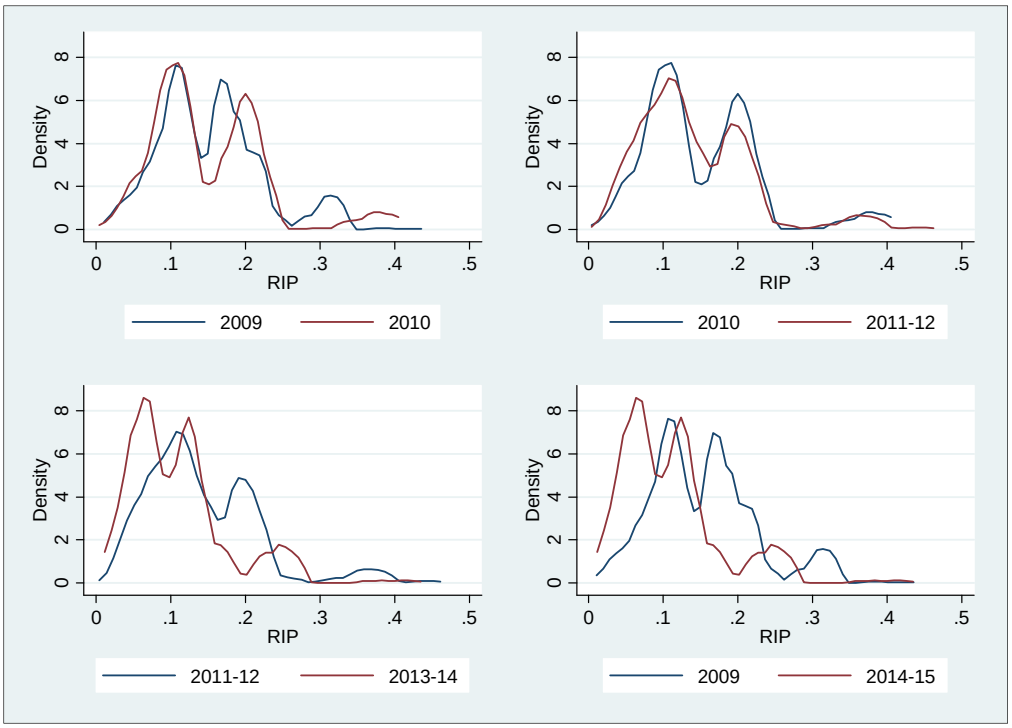
**(b) Low brand cigarettes**



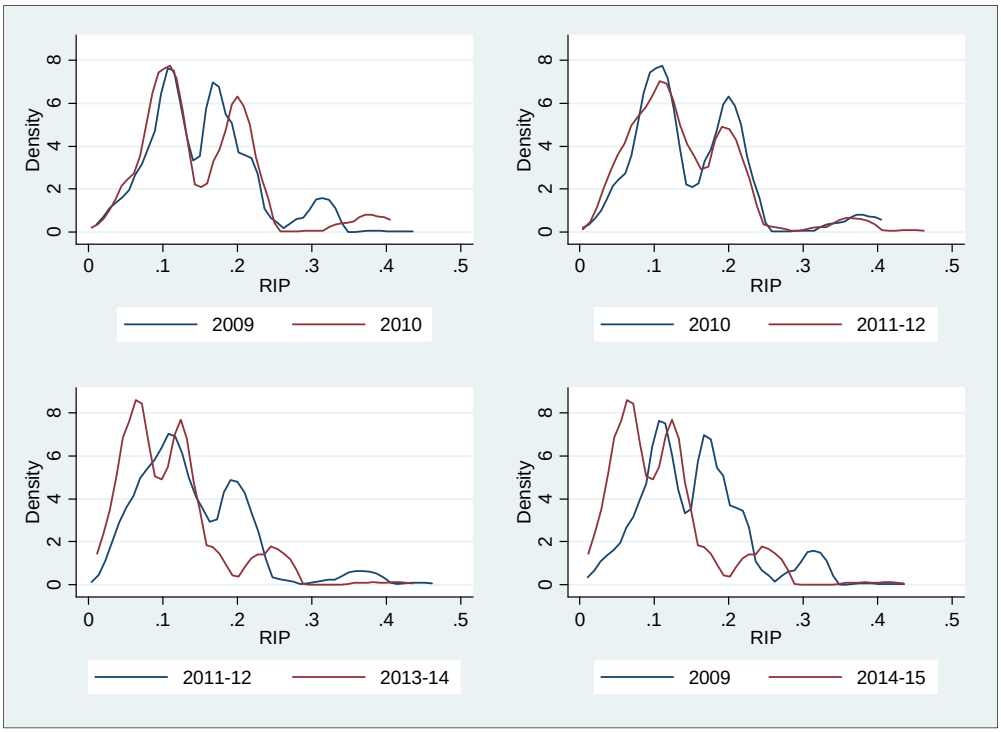

**(c) Medium brand cigarettes**



**(d) High brand cigarettes**




**(e) Premium brand cigarettes**



The Kolmogorov–Smirnov (K-S) test for the equality of distribution functions presented in Table 5 provides an explicit test of the overall shifts in the distribution of RIP. Each row presents a non-parametric test for the comparison of the values of RIP between two survey waves for smokeless tobacco, bidi, or cigarette brand categories. It evaluates whether the two data sets in the two waves come from the same distribution. For example, in the first row for bidis, the first line tests the hypothesis that the RIP for bidis in Wave 1 contains smaller values than in Wave 2. The largest difference between the distribution functions is 0.0235, which is not significant. The second line tests the hypothesis that the RIP for bidi in Wave 2 contains smaller values than in Wave 1. The largest difference between the distribution functions in this direction is -0.2875, which is significant. The third line presents the combined test with the p-value 0.000, which implies that the difference is significant and Wave 2 values are smaller than Wave 1 values. In other words, affordability of bidi is higher in Wave 2. By the same token, affordability got lower for low-brand categories of cigarettes, while it got higher for medium, high, and premium brand categories. For smokeless tobacco, affordability remained unchanged between 2011-12 and 2013-14.

**Table 5: The Kolmogorov-Smirnov (K-S) equality-of-distributions tests of Relative Income Price (RIP) between waves for smokeless tobacco, bidi, and cigarettes in Bangladesh.**

| | Smaller group | Largest difference | P-value | Affordability |
|---|---|---|---|---|
| **Smokeless tobacco** | Wave 3 (2011-12)<br>Wave 4 (2014-15)<br>Combined K-S | -0.0715<br>-0.1102<br>0.1102 | 0.406<br>0.118<br>0.235 | No difference between 2014-15 and 2011-12 |
| **Bidi** | Wave 1 (2009)<br>Wave 2 (2010)<br>Combined K-S | 0.0235<br>-0.2875<br>0.2875 | 0.744<br><0.001<br><0.001 | 2010> 2009 |
| | Wave 2 (2010)<br>Wave 3 (2011-12)<br>Combined K-S | 0.0093<br>-0.5541<br>0.5541 | 0.951<br><0.001<br><0.001 | 2011-12>2010 |
| | Wave 3 (2011-12)<br>Wave 4 (2014-15)<br>Combined K-S | 0.1135<br>-0.1911<br>0.1911 | 0.003<br><0.001<br><0.001 | 2014-15>2011-12 |
| | Wave 1 (2009)<br>Wave 4 (2014-15)<br>Combined K-S | 0.0021<br>-0.7365<br>0.7365 | 0.998<br><0.001<br><0.001 | 2014-15>2009 |
| **Low-brand cigarettes** | Wave 1 (2009)<br>Wave 2 (2010)<br>Combined K-S | 0.2178<br>-0.1748<br>0.2178 | 0.017<br>0.073<br>0.035 | 2010<2009 |
| | Wave 2 (2010)<br>Wave 3 (2011-12)<br>Combined K-S | 0.2481<br>-0.1896<br>0.2481 | 0.001<br>0.015<br>0.002 | 2011-12<2010 |
| | Wave 3 (2011-12)<br>Wave 4 (2014-15)<br>Combined K-S | 0.2705<br>-0.2188<br>0.2705 | <0.001<br><0.001<br><0.001 | 2014-15<2011-12 |
| | Wave 1 (2009) | 0.2880 | <0.001 | 2014-15<2009 |

| | | | | |
|---|---|---|---|---|
| | Wave 4 (2014-15)<br>Combined K-S | -0.0971<br>0.2880 | 0.195<br><0.001 | |
| **Medium-brand cigarettes** | Wave 1 (2009)<br>Wave 2 (2010)<br>Combined K-S | 0.1373<br>-0.1449<br>0.1449 | <0.001<br><0.001<br><0.001 | 2010>2009 |
| | Wave 2 (2010)<br>Wave 3 (2011-12)<br>Combined K-S | 0.0521<br>-0.1847<br>0.1847 | 0.045<br><0.001<br><0.00! | 2011-12>2010 |
| | Wave 3 (2011-12)<br>Wave 4 (2014-15)<br>Combined K-S | 0.0504<br>-0.2562<br>0.2562 | 0.108<br><0.001<br><0.001 | 2014-15> 2011-12 |
| | Wave 1 (2009)<br>Wave 4 (2014-15)<br>Combined K-S | 0.0034<br>-0.3539<br>0.3539 | 0.987<br><0.001<br><0.001 | 2014-15>2009 |
| **High-brand cigarettes** | Wave 1 (2009)<br>Wave 2 (2010)<br>Combined K-S | 0.0084<br>-0.3271<br>0.3271 | 0.971<br><0.001<br><0.001 | 2010>2009 |
| | Wave 2 (2010)<br>Wave 3 (2011-12)<br>Combined K-S | 0.1324<br>-0.1919<br>0.1919 | 0.002<br><0.001<br><0.001 | 2011-12>2010 |
| | Wave 3 (2011-12)<br>Wave 4 (2014-15)<br>Combined K-S | 0.1160<br>-0.2659<br>0.2659 | 0.040<br><0.001<br><0.001 | 2014-15> 2011-12 |
| | Wave 1 (2009)<br>Wave 4 (2014-15)<br>Combined K-S | 0.0865<br>-0.4216<br>0.4216 | 0.141<br><0.001<br><0.001 | 2014-15>2009 |
| **Premium-brand cigarettes** | Wave 1 (2009)<br>Wave 2 (2010)<br>Combined K-S | 0.2201<br>-0.1416<br>0.2201 | <0.001<br>0.031<br><0.001 | 2010>2009 |
| | Wave 2 (2010)<br>Wave 3 (2011-12)<br>Combined K-S | 0.2824<br>-0.1381<br>0.2824 | <0.001<br>0.056<br><0.001 | 2011-12>2010 |
| | Wave 3 (2011-12)<br>Wave 4 (2014-15)<br>Combined K-S | 0.4524<br>-0.2454<br>0.4524 | <0.001<br><0.001<br><0.001 | 2014-15>2011-12 |
| | Wave 1 (2009)<br>Wave 4 (2014-15)<br>Combined K-S | 0.3230<br>-0.4169<br>0.4169 | <0.001<br><0.001<br><0.001 | 2014-15>2009 |

The changes in the univariate distribution of RIP may, however, be influenced by multiple factors including individual demographic and socio-economic characteristics as well as policy variables (e.g. tax). The estimated coefficients of RIP of cigarettes obtained from a multivariate regression after controlling for all these observable characteristics are presented in Table 6. The coefficients of interest for identifying the trend of RIP are those of the wave variables and the interaction terms between brand categories and waves. The negative sign indicates that with the higher level of the variable in question, RIP gets lower and affordability gets higher.

The constant term refers to the low-brand category in Wave 1 for the reference socio-economic groups that include male, illiterate, owner/tenant farmers, low socio-economic status, urban area of residence and the coefficients of the wave variables indicate the time trend of RIP for low brands. As shown in Table 6, the statistical significance of the estimated coefficients for WAVE indicate that the RIP remained at the same level in Wave 2 as in Wave 1, but decreased in Waves 3 and 4 compared to Wave 1 for low-tier brand. The F test of the equality of Wave 2 and Wave 3 coefficients and of the equality of Wave 3 and Wave 4 coefficients in Table 8 indicate that low-tiered brands became more affordable both in Waves 3 and 4 compared to the respective preceding waves.

The interaction terms for BRAND and WAVE in Table 6 show that for premium brands, RIP did not change significantly in Wave 2 compared to Wave 1. The F test of equality of Wave 2 and Wave 3 coefficients and of the equality of Wave 3 and Wave 4 coefficients in Table 8, however, indicate greater affordability of medium, high and premium brands in Waves 3 and 4 compared to the respective preceding waves. Thus, the multivariate analysis shows that all the four brand tiers became more affordable than preceding waves or at least as affordable as previous waves.

Furthermore, in Table 6, policy variable tax appears to significantly affect RIP—the higher the tax, the higher the RIP and the lower the affordability. A 1 BDT increase in tax increases RIP by 0.0045 percentage points ($p<=0.00$). In addition to economic and income growth, affordability increases with age, presumably because income tends to increase with more years of work experience as adults age. Affordability is also higher among women than men are, possibly because women from higher-income households are more likely to smoke cigarettes. Compared to those with 0 years of education, affordability is higher for those with 1-8 years of education or 9 or more years of education. Among different occupational categories, farm wage laborers, non-agricultural wage laborers, unemployed, and housekeepers have lower affordability than owner or tenant farmers. Cigarettes are more affordable for people from medium and high socio-economic status compared to low socio-economic status. There is no significant difference in affordability between rural and urban residents. The rural-urban variation has likely been captured by the village level variation. Finally, compared to low brands, medium, high and premium brands are less affordable.

**Table 6: Estimated coefficients of the multivariate regression of Relative Income Price (RIP) of cigarettes in Bangladesh, 2009-2015.**

| | Coef. | Robust Std. Err | t | P-value | [95% | CI] |
|---|---|---|---|---|---|---|
| **Tax** | 0.0045 | 0.0003 | 15.06 | <0.001 | 0.0039 | 0.0051 |
| **Age** | -0.0003 | 0.0001 | -3.63 | <0.001 | -0.0004 | -0.0001 |
| **Female (Ref = Male)** | -0.0146 | 0.0070 | -2.08 | 0.038 | -0.0285 | -0.0008 |
| **Years of education (Ref = 0 years of education)** | | | | | | |
| 1-8 years | -0.0062 | 0.0030 | -2.07 | 0.038 | -0.0121 | -0.0003 |
| 9 years or more | -0.0277 | 0.0044 | -6.24 | <0.001 | -0.0365 | -0.0190 |
| **Occupation (Ref = Owner/tenant farmer)** | | | | | | |
| Self-employed in non-farm agriculture | -0.0060 | 0.0067 | -0.89 | 0.372 | -0.0191 | 0.0071 |
| Self-employed in non-agricultural activity | -0.0061 | 0.0038 | -1.61 | 0.108 | -0.0135 | 0.0013 |
| Farm wage laborer | 0.0154 | 0.0045 | 3.45 | <0.001 | 0.0066 | 0.0241 |
| Non-farm agricultural wage laborer | 0.0027 | 0.0068 | 0.40 | 0.688 | -0.0106 | 0.0161 |
| Non-agricultural wage laborer | 0.0162 | 0.0046 | 3.53 | <0.001 | 0.0072 | 0.0251 |
| Professional | -0.0187 | 0.0110 | -1.71 | 0.088 | -0.0402 | 0.0028 |
| Managerial, administrative or clerking | -0.0042 | 0.0073 | -0.58 | 0.561 | -0.0185 | 0.0101 |
| Student | 0.0156 | 0.0129 | 1.21 | 0.225 | -0.0096 | 0.0409 |
| Unemployed | 0.0141 | 0.0067 | 2.09 | 0.036 | 0.0009 | 0.0273 |
| Housewife/Housekeeper/Household manager | 0.0141 | 0.0072 | 1.95 | 0.051 | 0.0000 | 0.0283 |
| Others | 0.0039 | 0.0037 | 1.05 | 0.293 | -0.0033 | 0.0110 |
| **Socio-economic status (Ref = Low)** | | | | | | |
| Moderate | -0.0094 | 0.0030 | -3.19 | <0.001 | -0.0152 | -0.0036 |
| High | -0.0315 | 0.0031 | -10.19 | <0.001 | -0.0376 | -0.0254 |
| **Rural area of residence (Ref = Urban)** | -0.0004 | 0.0102 | -0.04 | 0.968 | -0.0203 | 0.0195 |
| **Cigarette brands (Ref = Low)** | | | | | | |
| Medium | 0.0383 | 0.0055 | 7.02 | <0.001 | 0.0276 | 0.0490 |
| High | 0.1018 | 0.0121 | 8.42 | <0.001 | 0.0781 | 0.1255 |
| Premium | 0.0637 | 0.0239 | 2.67 | 0.008 | 0.0169 | 0.1105 |
| **Waves (Ref = Wave 1)** | | | | | | |
| Wave 2 | 0.0065 | 0.0081 | 0.81 | 0.419 | -0.0093 | 0.0223 |
| Wave 3 | -0.0120 | 0.0047 | -2.55 | 0.011 | -0.0213 | -0.0028 |
| Wave 4 | -0.0376 | 0.0060 | -6.31 | <0.001 | -0.0493 | -0.0259 |
| **Interactions of brands and waves** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Medium brand X Wave 2 | -0.0175 | 0.0087 | -2.01 | 0.045 | -0.0346 | -0.0004 |
| Medium brand X Wave 3 | -0.0411 | 0.0073 | -5.64 | <0.001 | -0.0554 | -0.0268 |
| Medium brand X Wave 4 | -0.0768 | 0.0063 | -12.22 | <0.001 | -0.0892 | -0.0645 |
| High brand X Wave 2 | -0.0655 | 0.0132 | -4.97 | <0.001 | -0.0913 | -0.0397 |
| High brand X Wave 3 | -0.1225 | 0.0124 | -9.87 | <0.001 | -0.1468 | -0.0981 |
| High brand X Wave 4 | -0.2266 | 0.0154 | -14.67 | <0.001 | -0.2569 | -0.1963 |
| Premium brand X Wave 2 | -0.0436 | 0.0260 | -1.68 | 0.094 | -0.0945 | 0.0074 |
| Premium brand X Wave 3 | -0.1827 | 0.0269 | -6.79 | <0.001 | -0.2354 | -0.1299 |
| Premium brand X Wave 4 | -0.3696 | 0.0280 | -13.21 | <0.001 | -0.4244 | -0.3147 |
| **Constant** | 0.1242 | 0.0162 | 7.65 | <0.001 | 0.0924 | 0.1560 |
| Number of observations | 6185 | | | | | |
| Adjusted R-squared | 0.49 | | | | | |

*Notes: Reference categories include male, persons with 0 years of education, owner/tenant farmers, low socio-economic status, urban area of residence, low cigarette brands and Wave 1 (2009). The standard errors are adjusted for auto-correlation of error terms of multiple observations on the same individual. The village effects are suppressed for the brevity of presentation.*

The results of the multivariate regression of the RIP of bidis, presented in Table 7, and the F test of the equality of Wave 2 and Wave 3 coefficients and the equality of Wave 3 and Wave 4 coefficients in Table 8 confirm the earlier finding of the univariate analysis that the RIP decreased over time and affordability increased. This regression drops the tax policy variable. As shown in Table 2, the tax rate for unfiltered bidis with 25-stick packs (which constitutes 98% of total sales) changed slightly from 20% of a tariff value 3.16 BDT during 2009-2012 to 25% of a tariff value 4.27 BDT in 2014-15. Essentially, it turns into a specific tax, which remains more or less constant across observations in a particular wave and thus the wave variable picks up the effect of tax. Most of the variables in this regression are not statistically significant which is indicative of a relatively homogenous population of bidi consumers who are mostly in the low-income group.

The results of the multivariate analysis of the RIP of smokeless tobacco, presented in Table 9, indicate that there was no change in affordability for smokeless tobacco products between Wave 3 and Wave 4. This finding is consistent with the result of the Kolmogorov-Smirnov test presented earlier.

**Table 7: Estimated coefficients of the multivariate regression of Relative Income Price (RIP) of bidis in Bangladesh, 2009-2015.**

| | Coef. | Robust Std. Err. | t | P-value | [95% | CI] |
|---|---|---|---|---|---|---|
| **Age** | 0.0000 | 0.0001 | -0.85 | 0.398 | -0.0001 | 0.0001 |
| **Female (Ref = Male)** | 0.0090 | 0.0054 | 1.66 | 0.097 | -0.0016 | 0.0195 |
| **Years of education (Ref = 0 years of education)** | | | | | | |
| 1-8 years | -0.0030 | 0.0016 | -1.90 | 0.058 | -0.0062 | 0.0001 |
| 9 years or more | -0.0056 | 0.0028 | -2.04 | 0.041 | -0.0111 | -0.0002 |
| **Occupation (Ref = Owner/tenant farmer)** | | | | | | |
| Self-employed in non-farm agriculture | 0.0044 | 0.0081 | 0.54 | 0.587 | -0.0115 | 0.0202 |
| Self-employed in non-agricultural activity | 0.0002 | 0.0025 | 0.10 | 0.923 | -0.0046 | 0.0051 |
| Farm wage laborer | 0.0077 | 0.0025 | 3.10 | 0.002 | 0.0028 | 0.0125 |
| Non-farm agricultural wage laborer | -0.0040 | 0.0032 | -1.24 | 0.214 | -0.0102 | 0.0023 |
| Non-agricultural wage laborer | 0.0052 | 0.0042 | 1.25 | 0.210 | -0.0029 | 0.0134 |
| Professional | 0.0000 | (omitted) | | | | |
| Managerial, administrative or clerking | 0.0010 | 0.0054 | 0.19 | 0.850 | -0.0095 | 0.0116 |
| Student | 0.0146 | 0.0115 | 1.28 | 0.202 | -0.0079 | 0.0371 |
| Unemployed | 0.0018 | 0.0039 | 0.47 | 0.641 | -0.0058 | 0.0094 |
| Housewife/Housekeeper/Household manager | -0.0007 | 0.0042 | -0.15 | 0.877 | -0.0089 | 0.0076 |
| Others | -0.0029 | 0.0021 | -1.34 | 0.182 | -0.0071 | 0.0013 |
| **Socio-economic status (Ref = Low)** | | | | | | |
| Moderate | -0.0030 | 0.0019 | -1.56 | 0.120 | -0.0067 | 0.0008 |
| High | -0.0068 | 0.0020 | -3.48 | 0.001 | -0.0106 | -0.0030 |
| **Rural area of residence (Ref = Urban)** | 0.0073 | 0.0067 | 1.08 | 0.281 | -0.0060 | 0.0205 |
| **Waves (Ref = Wave 1)** | | | | | | |
| Wave 2 | -0.0146 | 0.0030 | -4.86 | <0.001 | -0.0205 | -0.0087 |
| Wave 3 | -0.0255 | 0.0031 | -8.22 | <0.001 | -0.0316 | -0.0194 |
| Wave 4 | -0.0334 | 0.0030 | -11.13 | <0.001 | -0.0393 | -0.0275 |
| **Constant** | 0.0578 | 0.0089 | 6.47 | <0.001 | 0.0402 | 0.0753 |
| Number of observations | 1726 | | | | | |
| Adjusted R-squared | 0.23 | | | | | |

*Notes: Reference categories include male, persons with 0 years of education, owner/tenant farmers, low socio-economic status, urban area of residence and Wave 1 (2009). The standard errors are adjusted for autocorrelation of error terms of multiple observations on the same individual. The village effects are suppressed for the brevity of presentation.*

**Table 8: F-tests of the successive difference between the coefficients of waves of Relative Income Price (RIP) of cigarettes, bidis, and smokeless tobacco in the multivariate regression in Tables 6, 7, and 8.**

| | F-stat (1, 2629) | P-value | Affordability |
|---|---|---|---|
| **Cigarette** | | | |
| **Low** | | | |
| Wave 2 – Wave 3 | 6.12 | 0.014 | Increased |
| Wave 3 – Wave 4 | 45.93 | <0.001 | Increased |
| **Medium** | | | |
| Wave 2 – Wave 3 | 6.66 | 0.010 | Increased |
| Wave 3 – Wave 4 | 36.42 | <0.001 | Increased |
| **High** | | | |
| Wave 2 – Wave 3 | 21.08 | <0.001 | Increased |
| Wave 3 – Wave 4 | 71.68 | <0.001 | Increased |
| **Premium** | | | |
| Wave 2 – Wave 3 | 22.71 | <0.001 | Increased |
| Wave 3 – Wave 4 | 81.28 | <0.001 | Increased |
| **Bidi** | | | |
| Wave 2 – Wave 3 | 42.61 | <0.001 | Increased |
| Wave 3 – Wave 4 | 32.04 | <0.001 | Increased |

**Table 9: Estimated coefficients of the multivariate regression of Relative Income Price (RIP) of smokeless tobacco in Bangladesh, 2009-2015.**

| | Coef. | Robust Std. Err. | t | P-value | [95% | CI] |
|---|---|---|---|---|---|---|
| **Age** | -0.0002 | 0.0001 | -1.56 | 0.119 | -0.0005 | 0.0001 |
| **Female (Ref = Male)** | -0.0009 | 0.0062 | -0.15 | 0.883 | -0.0130 | 0.0112 |
| **Years of education (Ref = 0 years of education)** | | | | | | |
| 1-8 years | -0.0017 | 0.0054 | -0.31 | 0.753 | -0.0124 | 0.0090 |
| 9 years or more | 0.0112 | 0.0105 | 1.06 | 0.290 | -0.0096 | 0.0319 |
| **Occupation (Ref = Owner/tenant farmer)** | | | | | | |
| Self-employed in non-farm agriculture | -0.0150 | 0.0089 | -1.68 | 0.094 | -0.0326 | 0.0026 |
| Self-employed in non-agricultural activity | -0.0137 | 0.0092 | -1.49 | 0.136 | -0.0317 | 0.0043 |
| Farm wage laborer | 0.0050 | 0.0157 | 0.31 | 0.753 | -0.0260 | 0.0359 |
| Non-farm agricultural wage laborer | -0.0280 | 0.0139 | -2.02 | 0.044 | -0.0553 | -0.0007 |
| Non-agricultural wage laborer | -0.0107 | 0.0104 | -1.03 | 0.305 | -0.0311 | 0.0098 |
| Professional | -0.0281 | 0.0137 | -2.04 | 0.042 | -0.0551 | -0.0011 |
| Managerial, administrative or clerking | 0.0007 | 0.0100 | 0.07 | 0.942 | -0.0190 | 0.0204 |
| Student | 0.0000 | (omitted) | | | | |
| Unemployed | -0.0129 | 0.0103 | -1.25 | 0.212 | -0.0331 | 0.0074 |
| Housewife/Housekeeper/Household manager | -0.0059 | 0.0101 | -0.59 | 0.558 | -0.0258 | 0.0139 |
| Others | 0.0002 | 0.0121 | 0.01 | 0.988 | -0.0236 | 0.0240 |
| **Socio-economic status (Ref = Low)** | | | | | | |
| Moderate | -0.0046 | 0.0052 | -0.89 | 0.375 | -0.0148 | 0.0056 |
| High | -0.0060 | 0.0056 | -1.06 | 0.288 | -0.0170 | 0.0051 |
| **Rural area of residence (Ref = Urban)** | -0.0387 | 0.0089 | -4.37 | 0.000 | -0.0562 | -0.0213 |
| **Waves (Ref = Wave 3)** | | | | | | |
| Wave 4 | 0.0029 | 0.0053 | 0.54 | 0.590 | -0.0076 | 0.0133 |
| **Constant** | 0.0742 | 0.0218 | 3.40 | 0.001 | 0.0313 | 0.1170 |
| Number of observations | 399 | | | | | |
| Adjusted R-squared | 0.29 | | | | | |

*Notes: Reference categories include male, persons with 0 years of education, owner/tenant farmers, low socio-economic status, urban area of residence and Wave 3 (2011-12). The standard errors are adjusted for autocorrelation of error terms of multiple observations on the same individual. The village effects are suppressed for the brevity of presentation.*

# 5. Discussion and Conclusions

Using data from Waves 1-4 of the ITC Bangladesh Survey, this paper demonstrates that both cigarettes and bidis became more affordable in Bangladesh over the period from 2009 to 2015 and the affordability of smokeless tobacco products remained unchanged between 2011-12 and 2014-15. While the price of cigarettes increased in real terms and the price of bidis decreased over this period, income growth more than offset the effect of the cigarette price increase on cigarette demand, resulting in a shift in preference from bidis to cigarette smoking. The growing trend of affordability of cigarettes both in absolute terms and relative to bidis portends further growth of cigarette smoking in Bangladesh. Similarly, for smokeless tobacco, despite the increase in price in real terms, affordability did not change due to offsetting income growth of smokeless tobacco users. Again, the growth in affordability of cigarettes relative to smokeless tobacco may have induced switching from smokeless tobacco use to cigarette smoking resulting in the higher prevalence of cigarette smoking and lower prevalence of smokeless tobacco use in recent years in Bangladesh. However, we cannot make statements of causality from changes in affordability to the changing pattern of smoked and smokeless tobacco use based on the findings from the present study.

The government of Bangladesh implemented three consecutive national pay scales in 2005, 2009, and 2015 with a significant increase in the salary of government sector employees. The Seventh Pay Scale, introduced on July 1, 2009, increased the minimum basic annual pay from 2,400 BDT to 4,100 BDT and the highest basic pay from 23,000 BDT to 40,000 BDT. This pay scale hike implied a 10-22% increase in salaries in real terms. The Eighth Pay Scale, introduced on July 1, 2015, increased the minimum basic pay from 4,100 BDT to 8,250 BDT and the highest basic pay from 40,000 BDT to 78,000 BDT, implying a 20-29% increase in the real salary. The increase in salary in the public sector is expected to create more demand for higher wages and salaries in the private and informal sectors as well. It should be noted that the period under observation in this study is encompassed by two successive pay scale hikes in 2009 and 2015 as mentioned above followed by a substantial increase in the average salary level.

The overall increase in the real salary from the 2005 pay scale (the end part of this pay scale period coincides with the survey period of the ITC Bangladesh Survey Wave 1) to the 2015 pay scale (that coincides with the end of the survey period for the ITC Bangladesh Survey Wave 4) ranges from 38% to 62%. With an average annual rate of population growth at 1.2%, the increase in per capita income over this period ranges from 30% to 54%. This upward adjustment in the pay scale clearly contributed to increased purchasing power of the population, particularly those who are employed in the formal sector.

Over this period, the average real price of cigarettes increased by 39% (from 50 BDT to 70 BDT in 2015 prices as shown in Figure 1). Therefore, it is understandable, even at the aggregate level, that the affordability of cigarettes went up over this period for some people who experienced income growth at a higher rate (>39%) than the price increase. In order to curb the upward trend in the affordability of cigarettes, it is essential to increase the price level – specifically through increases in excise taxes – at a rate faster than the inflation and income growth.

The current excise tax in Bangladesh is imposed with an ad valorem system based on retail price. It has been observed from global evidence that average cigarette prices are lower under an ad valorem system than under a specific excise system (WHO, 2010). The consequence is that this lowers the efficiency of the excise to increase the retail price and contributes to greater affordability. It is, therefore, necessary to change the tax system from ad valorem to specific excise to raise the general price level of cigarettes. Moreover, the current cigarette tax structure is tiered, which favors the consumption of lower priced brands because of lower tax rates. The ad valorem system also encourages switching down to lower-priced brands in the event of tax and price increases. This tendency keeps the average price level down and contributes to the increasing affordability. A uniform excise system would remove the incentive of switching down to cheaper cigarettes and encourage quitting behavior. The importance and impacts of introducing a uniform specific excise on the average price, consumption and tax revenue of cigarettes in Bangladesh have been emphasized in Nargis et al. (2014).

However, consideration of the multiple types of tobacco products used in Bangladesh is also important, as changing the tax system and increasing the price level of cigarettes in isolation from bidis and smokeless tobacco may induce downward switching from cigarettes to bidis or to smokeless tobacco. Therefore, the excise systems on bidis and smokeless tobacco, which are also ad valorem, must also be changed to a specific system and increased significantly to bring forth simultaneous increases in smokeless tobacco, bidi, and cigarette prices and closing the gap between them.

It can be concluded from this study that the current price and tax policy in Bangladesh falls short of the objective of effective tobacco control through taxation, as is evident from the increasing affordability of tobacco products in the country. It would be important to put into place changes in the tax system that would keep pace with inflation and rising income while also eliminating or greatly reducing the structural features of the tax system (reliance on ad valorem rather than on specific excise) that weakens the impact of the tax system on reducing tobacco use.

**Table A1: Distribution of households, average number of members, average monthly income per household by monthly household income groups, 2010.**

| Monthly household income group (BDT) | | | No. of households | Total number of members | Average number of members per household | % of members | Cumulative % of members | Average monthly income per household (BDT) | Average per capita monthly income (BDT) |
|---|---|---|---|---|---|---|---|---|---|
| National | | | | | | | | | |
| | < | 1500 | 899708 | 2085078 | 2.32 | 1.40% | 1.40% | 981.81 | 423.65 |
| 1500 | - | 1999 | 722085 | 2225429 | 3.08 | 1.50% | 2.90% | 1758.07 | 570.44 |
| 2000 | - | 2499 | 1001584 | 3599210 | 3.59 | 2.42% | 5.33% | 2252.71 | 626.88 |
| 2500 | - | 2999 | 1243259 | 4668858 | 3.76 | 3.14% | 8.47% | 2754.59 | 733.51 |
| 3000 | - | 3999 | 3058604 | 12054364 | 3.94 | 8.12% | 16.59% | 3490.23 | 885.59 |
| 4000 | - | 4999 | 3248717 | 13485979 | 4.15 | 9.08% | 25.67% | 4497.96 | 1083.54 |
| 5000 | - | 5999 | 2848093 | 12087953 | 4.24 | 8.14% | 33.81% | 5459.85 | 1286.42 |
| 6000 | - | 6999 | 2616635 | 11587112 | 4.43 | 7.80% | 41.62% | 6478.93 | 1463.09 |
| 7000 | - | 7999 | 2124357 | 9510419 | 4.48 | 6.40% | 48.02% | 7472.24 | 1669.09 |
| 8000 | - | 8999 | 1729835 | 8187025 | 4.73 | 5.51% | 53.53% | 8455.53 | 1786.57 |
| 9000 | - | 9999 | 1498640 | 7293140 | 4.87 | 4.91% | 58.45% | 9489.98 | 1950.06 |
| 10000 | - | 12499 | 3200563 | 15286174 | 4.78 | 10.29% | 68.74% | 11158.30 | 2336.28 |
| 12500 | - | 14999 | 2052878 | 10079446 | 4.91 | 6.79% | 75.53% | 13630.33 | 2776.09 |
| 15000 | - | 17499 | 1490295 | 7368396 | 4.94 | 4.96% | 80.49% | 16179.75 | 3272.44 |
| 17500 | - | 19999 | 1081676 | 5600565 | 5.18 | 3.77% | 84.26% | 18627.74 | 3597.70 |
| 20000 | - | 24999 | 1393177 | 7387448 | 5.30 | 4.98% | 89.24% | 22089.56 | 4165.80 |
| 25000 | - | 29999 | 776071 | 4320806 | 5.57 | 2.91% | 92.15% | 27275.93 | 4899.10 |
| 30000 | - | 34999 | 630548 | 3421991 | 5.43 | 2.30% | 94.45% | 32146.44 | 5923.42 |
| 35000 | + | | 1411289 | 8239138 | 5.84 | 5.55% | 100.00% | 62799.55 | 10756.99 |
| **All groups** | | | 33028014 | 148488532 | 4.50 | 100.00% | | 11479.47 | 2553.36 |

*Source: Bangladesh Household Income and Expenditure Survey 2010, Bangladesh Bureau of Statistics.*

| Monthly household income group (BDT) | | | No. of households | Total number of members | Average number of members per household | % of members | Cumulative % of members | Average monthly income per household (BDT) | Average per capita monthly income (BDT) |
|---|---|---|---|---|---|---|---|---|---|
| **Urban** | | | | | | | | | |
| | < | 1500 | 115015 | 297519 | 2.59 | 0.76% | 0.76% | 1078.65 | 416.98 |
| 1500 | - | 1999 | 70656 | 200558 | 2.84 | 0.51% | 1.28% | 1704.04 | 600.33 |
| 2000 | - | 2499 | 93652 | 325949 | 3.48 | 0.84% | 2.11% | 2207.56 | 634.28 |
| 2500 | - | 2999 | 126083 | 424310 | 3.37 | 1.09% | 3.20% | 2747.40 | 816.39 |
| 3000 | - | 3999 | 447165 | 1692230 | 3.78 | 4.34% | 7.53% | 3476.33 | 918.61 |
| 4000 | - | 4999 | 508763 | 1943567 | 3.82 | 4.98% | 12.51% | 4513.44 | 1181.47 |
| 5000 | - | 5999 | 611053 | 2383985 | 3.90 | 6.11% | 18.62% | 5427.71 | 1391.21 |
| 6000 | - | 6999 | 595452 | 2411865 | 4.05 | 6.18% | 24.80% | 6432.77 | 1588.15 |
| 7000 | - | 7999 | 529232 | 2168873 | 4.10 | 5.56% | 30.36% | 7435.65 | 1814.39 |
| 8000 | - | 8999 | 486583 | 2074786 | 4.26 | 5.32% | 35.67% | 8429.74 | 1976.96 |
| 9000 | - | 9999 | 424911 | 1908366 | 4.49 | 4.89% | 40.56% | 9492.16 | 2113.50 |
| 10000 | - | 12499 | 1019803 | 4380723 | 4.30 | 11.22% | 51.79% | 11158.39 | 2597.60 |
| 12500 | - | 14999 | 731016 | 3253377 | 4.45 | 8.34% | 60.12% | 13581.59 | 3051.71 |
| 15000 | - | 17499 | 604300 | 2766807 | 4.58 | 7.09% | 67.21% | 16179.89 | 3533.86 |
| 17500 | - | 19999 | 410360 | 1988874 | 4.85 | 5.10% | 72.31% | 18690.41 | 3856.35 |
| 20000 | - | 24999 | 591088 | 2844288 | 4.81 | 7.29% | 79.60% | 21936.69 | 4558.79 |
| 25000 | - | 29999 | 347883 | 1822191 | 5.24 | 4.67% | 84.27% | 27497.13 | 5249.61 |
| 30000 | - | 34999 | 316866 | 1530105 | 4.83 | 3.92% | 88.19% | 32035.60 | 6634.18 |
| 35000 | + | | 830265 | 4610879 | 5.55 | 11.81% | 100.00% | 61024.43 | 10988.46 |
| **All groups** | | | 8860147 | 39029250 | 4.41 | 100.00% | | 16474.94 | 3740.03 |

*Source: Bangladesh Household Income and Expenditure Survey 2010, Bangladesh Bureau of Statistics.*

| Monthly household income group (BDT) | | | No. of households | Total number of members | Average number of members per household | % of members | Cumulative % of members | Average monthly income per household (BDT) | Average per capita monthly income (BDT) |
|---|---|---|---|---|---|---|---|---|---|
| **Rural** | | | | | | | | | |
| | < | 1500 | 784693 | 1787559 | 2.28 | 1.63% | 1.63% | 967.62 | 424.76 |
| 1500 | - | 1999 | 651428 | 2024872 | 3.11 | 1.85% | 3.48% | 1763.93 | 567.48 |
| 2000 | - | 2499 | 907933 | 3273260 | 3.61 | 2.99% | 6.47% | 2257.37 | 626.15 |
| 2500 | - | 2999 | 1117175 | 4244548 | 3.80 | 3.88% | 10.35% | 2755.41 | 725.23 |
| 3000 | - | 3999 | 2611439 | 10362134 | 3.97 | 9.47% | 19.82% | 3492.61 | 880.20 |
| 4000 | - | 4999 | 2739954 | 11542412 | 4.21 | 10.54% | 30.36% | 4495.09 | 1067.05 |
| 5000 | - | 5999 | 2237040 | 9703968 | 4.34 | 8.87% | 39.23% | 5486.63 | 1264.82 |
| 6000 | - | 6999 | 2021182 | 9175247 | 4.54 | 8.38% | 47.61% | 6492.53 | 1430.22 |
| 7000 | - | 7999 | 1595125 | 7341546 | 4.60 | 6.71% | 54.32% | 7484.37 | 1626.16 |
| 8000 | - | 8999 | 1243252 | 6112239 | 4.92 | 5.58% | 59.90% | 8465.62 | 1721.94 |
| 9000 | - | 9999 | 1073729 | 5384774 | 5.02 | 4.92% | 64.82% | 9489.11 | 1892.14 |
| 10000 | - | 12499 | 2180760 | 10905451 | 5.00 | 9.96% | 74.78% | 11158.26 | 2231.31 |
| 12500 | - | 14999 | 1321862 | 6826069 | 5.16 | 6.24% | 81.02% | 13657.29 | 2644.72 |
| 15000 | - | 17499 | 885995 | 4601589 | 5.19 | 4.20% | 85.22% | 16179.66 | 3115.25 |
| 17500 | - | 19999 | 671316 | 3611691 | 5.38 | 3.30% | 88.52% | 18589.43 | 3455.27 |
| 20000 | - | 24999 | 802089 | 4543161 | 5.66 | 4.15% | 92.67% | 22202.22 | 3919.77 |
| 25000 | - | 29999 | 428188 | 2498615 | 5.84 | 2.28% | 94.96% | 27096.22 | 4643.48 |
| 30000 | - | 34999 | 313681 | 1891886 | 6.03 | 1.73% | 96.69% | 32258.40 | 5348.55 |
| 35000 | + | | 581024 | 3628259 | 6.24 | 3.31% | 100.00% | 65336.14 | 10462.83 |
| **All groups** | | | 24167867 | 109459281 | 4.53 | 100.00% | | 9648.09 | 2130.23 |

*Source: Bangladesh Household Income and Expenditure Survey 2010, Bangladesh Bureau of Statistics.*

**Table A2: Consolidated distribution of households, average number of members, average monthly income per household by monthly household income groups, 2010.**

| Monthly household income group (BDT) | | | No. of households | Total number of members | Average number of members per household | % of members | Cumulative % of members | Average monthly income per household (BDT) | Average per capita monthly income (BDT), 2010 |
|---|---|---|---|---|---|---|---|---|---|
| **National** | | | | | | | | | |
| | < | 4999 | 10173957 | 38118918 | 3.75 | 25.67% | 25.67% | 3255.53 | 868.90 |
| 5000 | - | 9999 | 10817560 | 48665649 | 4.50 | 32.77% | 58.45% | 7138.91 | 1586.86 |
| 10000 | - | 14999 | 5253441 | 25365620 | 4.83 | 17.08% | 75.53% | 12124.29 | 2511.05 |
| 15000 | - | 19999 | 2571971 | 12968961 | 5.04 | 8.73% | 84.26% | 17209.28 | 3412.90 |
| 20000 | + | | 4211085 | 23369383 | 5.55 | 15.74% | 100.00% | 38194.65 | 6882.55 |
| **Urban** | | | | | | | | | |
| | < | 4999 | 1361334 | 4884133 | 3.59 | 12.51% | 12.51% | 3414.57 | 951.73 |
| 5000 | - | 9999 | 2647231 | 10947875 | 4.14 | 28.05% | 40.56% | 7259.40 | 1755.35 |
| 10000 | - | 14999 | 1750819 | 7634100 | 4.36 | 19.56% | 60.12% | 12170.14 | 2791.12 |
| 15000 | - | 19999 | 1014660 | 4755681 | 4.69 | 12.18% | 72.31% | 17195.22 | 3668.73 |
| 20000 | + | | 2086102 | 10807463 | 5.18 | 27.69% | 100.00% | 39954.78 | 7712.24 |
| **Rural** | | | | | | | | | |
| | < | 4999 | 8812622 | 33234785 | 3.77 | 30.36% | 30.36% | 3230.96 | 856.73 |
| 5000 | - | 9999 | 8170328 | 37717774 | 4.62 | 34.46% | 64.82% | 7104.80 | 1539.02 |
| 10000 | - | 14999 | 3502622 | 17731520 | 5.06 | 16.20% | 81.02% | 12101.37 | 2390.46 |
| 15000 | - | 19999 | 1557311 | 8213280 | 5.27 | 7.50% | 88.52% | 17218.45 | 3264.77 |
| 20000 | + | | 2124982 | 12561921 | 5.91 | 11.48% | 100.00% | 36466.73 | 6168.73 |

**Table A3: Per capita monthly income adjusted for inflation and income growth, 2009, 2010, 2012, 2014.**

| Monthly household income group (BDT) | | | | Average per capita monthly income (BDT), 2009 | Average per capita monthly income (BDT), 2010 | Average per capita monthly income (BDT), 2012 | Average per capita monthly income (BDT), 2014 |
|---|---|---|---|---|---|---|---|
| **National** | | | | | | | |
| | | < | 4999 | 797.22 | 868.90 | 1139.42 | 1439.65 |
| | 5000 | - | 9999 | 1455.95 | 1586.86 | 2080.91 | 2629.21 |
| | 10000 | - | 14999 | 2303.89 | 2511.05 | 3292.83 | 4160.47 |
| | 15000 | - | 19999 | 3131.35 | 3412.90 | 4475.46 | 5654.72 |
| | 20000 | + | | 6314.76 | 6882.55 | 9025.34 | 11403.46 |
| **Urban** | | | | | | | |
| | | < | 4999 | 873.21 | 951.73 | 1248.04 | 1576.89 |
| | 5000 | - | 9999 | 1610.53 | 1755.35 | 2301.85 | 2908.37 |
| | 10000 | - | 14999 | 2560.86 | 2791.12 | 3660.10 | 4624.52 |
| | 15000 | - | 19999 | 3366.07 | 3668.73 | 4810.94 | 6078.59 |
| | 20000 | + | | 7076.00 | 7712.24 | 10113.34 | 12778.14 |
| **Rural** | | | | | | | |
| | | < | 4999 | 786.05 | 856.73 | 1123.46 | 1419.49 |
| | 5000 | - | 9999 | 1412.06 | 1539.02 | 2018.18 | 2549.95 |
| | 10000 | - | 14999 | 2193.26 | 2390.46 | 3134.70 | 3960.67 |
| | 15000 | - | 19999 | 2995.44 | 3264.77 | 4281.21 | 5409.29 |
| | 20000 | + | | 5659.83 | 6168.73 | 8089.28 | 10220.76 |

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| PGDP growth rate (%) | 3.89 | 4.38 | 5.22 | 5.25 | 4.73 | 4.84 |
| Inflation (%) | 4.91 | 9.37 | 11.46 | 6.23 | 7.54 | 7.01 |

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The International Tobacco Control Policy Evaluation Project

# The ITC Project

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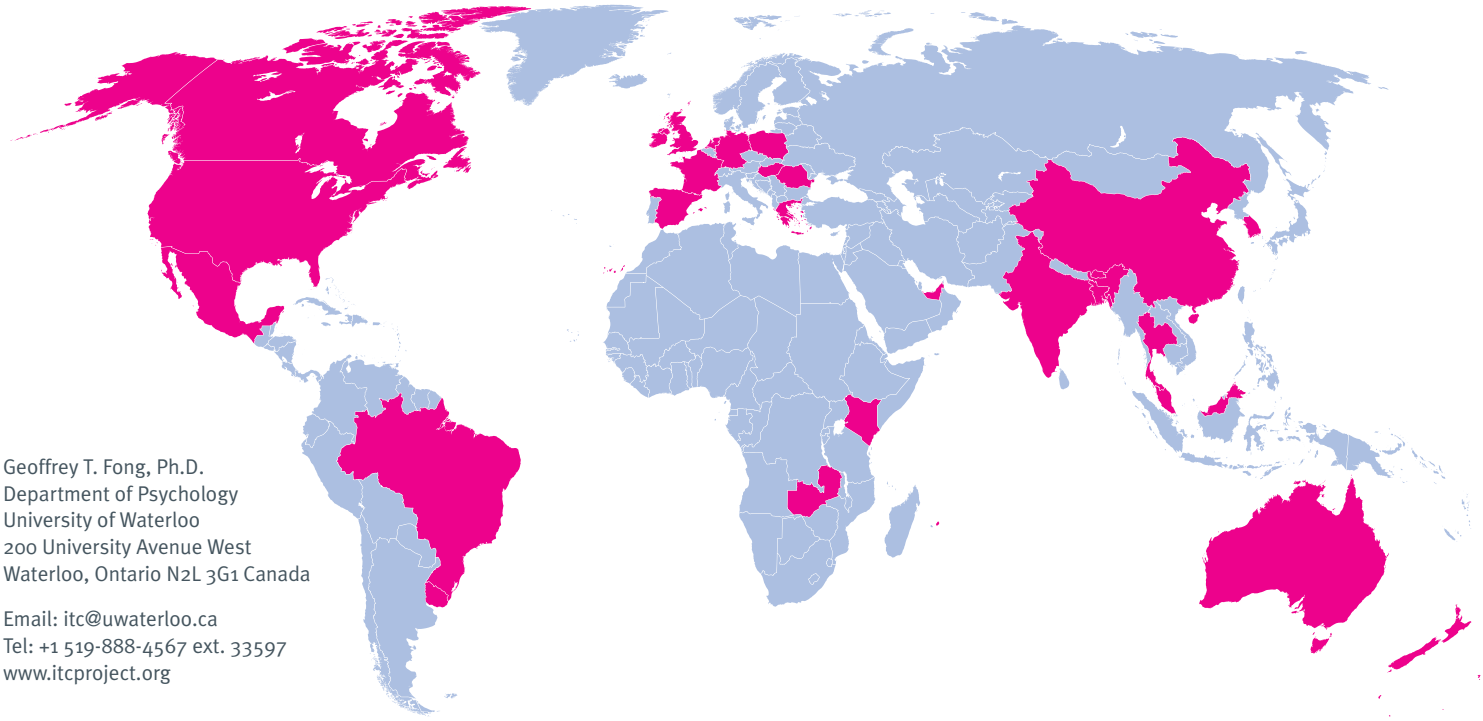

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