The health, financial and distributional consequences of increases in the tobacco excise tax among smokers in Lebanon

Nisreen Salti [a, *], Elizabeth Brouwer [b], Stéphane Verguet [c]

[a] Department of Economics, American University of Beirut, Beirut, Lebanon
[b] Department of Global Health, University of Washington, Seattle, WA, USA
[c] Department of Global Health and Population, Harvard T.H. Chan School of Public Health, Boston, MA, USA

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ABSTRACT

Tobacco use is a significant risk factor for the leading causes of death worldwide, including cancer, heart disease and stroke. Most of these deaths occur in low- and middle-income countries, where tobacco-related deaths are also rising rapidly. Taxation is one of the most effective tobacco control measures, yet evidence on the distributional impact of tobacco taxation in low- and middle-income countries remains scant. This paper considers the financial and health effects, by socio-economic class, of increasing tobacco taxes in Lebanon, a middle-income country.

An Almost Ideal Demand System is used to estimate price elasticities of demand for tobacco products. Extended cost-effectiveness analysis (ECEA) methods are applied to quantify, across quintiles of socio-economic status, the health benefits gained, the additional tax revenues raised, and the net financial consequences for households from a 50% increase in the price of tobacco through excise taxes. We find that demand for tobacco is price inelastic with elasticities ranging from −0.32 for the poorest quintile to −0.22 for the richest quintile. The increase in tobacco tax is estimated to result in 65,000 (95% CI: 37,000−93,000) premature deaths averted, 25% of them in the poorest quintile, $300M ($256−340M) of additional tax revenues, 12% borne by the poorest quintile, $23M ($13−33M) of out-of-pocket spending on healthcare averted, 36% of which accrue to the poorest quintile, 9% to the richest. These savings would be associated with 23,000 (13,000−33,000) poverty cases averted (63% in the poorest quintile). Increasing tobacco taxes would lead to large financial and health benefits, and would be pro-poor in health gains, savings on healthcare, and poverty reduction.

1. Introduction

Non-communicable diseases (NCDs) are the leading cause of death worldwide, and the vast majority of NCD deaths now occur in low- and middle-income countries (Alwan et al., 2010; Murray et al., 2015). Half of NCD-related deaths occur during the prime productive years of adulthood, resulting in substantial societal costs that extend beyond health service delivery (Bloom et al., 2011).

Tobacco is a significant risk factor for NCDs including cardiovascular disease, cancer and stroke. The World Health Organization (WHO) puts an estimate of the annual economic burden of tobacco-related illnesses at over $500 billion, which exceeds total annual health expenditures in low- and middle-income countries (WHO, 2014b). Without significant intervention, the number of tobacco-related deaths in low- and middle-income countries is projected to reach 7 million deaths per year by 2030, doubling the level of 2010 (NCD Alliance, 2011).

As a middle-income country, Lebanon is no exception to these trends. NCDs are the country's main killer, with ischemic heart disease alone accounting for over 30% of all deaths (IHME, 2013). Lebanon's disease burden is undoubtedly related to its smoking prevalence and intensity, which are among the highest in the Middle East and the highest for women in the Arab world (Salti et al., 2014; WHO, 2013). Average smoking prevalence rates are around 43% for men and 28% for women, and these rates have been consistently rising for decades (Sibai and Hwalla, 2010). Tobacco consumption increased by an alarming 475% between 1990 and 2012, which ultimately put annual consumption of cigarettes at 2400 per capita, three times the world average (Al-Akhbar English, 2013). In 2008, studies estimated that tobacco consumption cost

the Lebanese economy an annual minimum of $325 million, close to 1% of the country's gross domestic product (GDP) in that year (Salti et al., 2014). We estimate that total spending on tobacco products in the Lebanese market is even larger at $850 million (CAS, 2005; National Customs Authority, 2012), just under 2% of GDP.

Despite tobacco's negative impact on both population health and the economy, the Lebanese government has not fully used the policy tools at its disposal to stem the epidemic. In 2011, pursuant to its ratification of the Framework Convention on Tobacco Control in 2005, the Lebanese parliament passed Law 174 to control the consumption of tobacco products. Specifically, the law prohibits smoking in indoor public spaces, bans advertising of tobacco products, and mandates the inclusion of text and pictorial warnings on tobacco packaging. Unfortunately, the enforcement of the law has been patchy at best, particularly in the area of the control of smoking in public places (Al-Akhbar English, 2014). Tobacco tax rates in Lebanon are also suboptimal at about 47% of the retail price for imported cigarettes; the World Health Organization recommends tobacco taxes be at least 70% of the retail price (WHO, 2010). Tobacco products are also comparatively affordable in Lebanon. Using the fraction of GDP per capita required to purchase 100 packs of the most sold brand of cigarettes as an indicator, tobacco products are more affordable in Lebanon than in neighboring or regional countries, including Jordan, Egypt, Turkey, or the West Bank and Gaza (WHO, 2015).

Some studies have looked at the consumption and revenue effects of raising tobacco taxes in Lebanon (Salti et al., 2015) and other LMICs (Levy et al., 2006; Blecher, 2011a), however these analyses fail to capture broader economic and health benefits. In this paper, we conduct an extended cost-effectiveness analysis (ECEA) (Verguet et al., 2015a, 2015b, 2015c) to examine the distributional consequences and household financial and health benefits (per socio-economic group) of a hypothetical increase in the excise tax on tobacco in Lebanon.

2. Methods

ECEA methods are described in Verguet et al. (2015b), and particularly in the context of tobacco tax in Verguet et al. (2015a). Health policy instruments such as public finance or taxation of tobacco products entail consequences in multiple domains. Fundamentally, they aim at leading to better health benefits (e.g. mortality averted), but these policies can also provide non-health benefits. For instance, tobacco taxes can prevent illness-related impoverishment and provide financial risk protection. Furthermore, they can improve the distribution of health in the population. ECEA is meant to evaluate the health and financial consequences of policies in the following three domains: the health gains, the financial risk protection benefits, and the distributional (e.g. across socio-economic groups) benefits. In this study, we draw closely on the approach used by Verguet et al. (2015a) and conduct an ECEA to examine the household health and financial benefits, and overall distributional consequences of increasing the tobacco excise tax in Lebanon.

First, we identify the price elasticities by age and income groups. We simulate the effect of an increase in the tobacco excise tax on: i) the change in out-of-pocket (OOP) expenditures on cigarettes, ii) the change in government revenue, iii) premature deaths averted, iv) the change in OOP expenditures on tobacco-related diseases, and v) associated poverty cases averted. All of these outcomes are estimated for the current population of smokers. We then use sensitivity analysis to test our findings with regards to potential substitute tobacco products. In Appendix 5 of the supplementary materials, we also translate the result on premature deaths averted into life years gained.

2.1. Group-based price elasticities

The price of most tobacco products is regulated by the *Régie*, the state-run monopoly in charge of regulating the market for tobacco, and the Ministry of Finance (Tobacco Fact in Lebanon, (2001)). Using $2.15 as the average price of a pack of imported cigarettes (Mahdi, 2014), we estimate the effect on current smokers of an increase in the excise tax that results in a 50% increase in the retail price of imported cigarettes. The analysis focuses solely on imported cigarettes as they represented about 90% of household spending on tobacco in 2005, and 75% of total cigarettes smoked (Chaaban et al., 2010).

The magnitude of the price increase of 50% is chosen because it would be a politically feasible change in tax. Because, as stated above, the *Régie* sets the retail price, the excise tax, and the profit margins of the distributors and retailers, the *Régie* also effectively controls the pass-through rates. At the current ratio of taxes to price for imported cigarettes (which is 47%), for instance, the Régie could decide to increase the price by 50% by increasing taxes. At the average price of $2.15 per pack, if the price increase of $1.075 were collected in additional taxes, the resulting tax would be closer to 65% of the new price. In the sensitivity analysis reported in Appendix 4 of the supplementary materials, we also look at the outcomes under different scenarios of price increases.

We use data from the Ministry of Public Health from 2011 to summarize population size and the relative sizes of age cohorts, focusing on individuals 15 and older (Ministry of Public Health of Lebanon (2011)). We have prevalence data by 10-year age groups (IHME, 2013; Sibai and Hwalla, 2010; Global Youth Tobacco Survey Country Factsheet for Lebanon, 2011) and by income quintile (National Household Health Expenditure and Use Survey, 1999). In order to obtain prevalence figures by both quintile and age group, we use prevalence by age group to calculate the total number of smokers in each age group. For each age group, we then allocate these smokers to quintiles by assuming that the distribution of smokers across quintiles is the same for each age group.

Demand elasticity for tobacco is estimated using primary data on household consumption from a nationally representative survey from 2005 (CAS, 2005), and an Almost Ideal Demand System (AIDS). The methodology is described in detail in Deaton and Muellbauer (1980) and Deaton (1990). We use spatial variation in relative prices to estimate elasticities: the Central Administration for Statistics releases price indexes for each of a number of consumables by district. Price variation in the AIDS model comes from geographical differences in these price indexes (Deaton, 1990). The AIDS model consists in running a constrained regression of the share of imported cigarettes in total household expenditures on a vector of prices. Elasticities are computed as nonlinear functions of the regression coefficients. The standard errors of the elasticities are then calculated using the delta method (by taking a first order Taylor series approximation) (Hosmer et al., 2008). These elasticities are estimated separately for each quintile. Appendix 7 of the supplementary materials shows the detailed regression results that yield these elasticity estimates. Quintiles are defined using household annual expenditures per adult equivalent, using data from the same household survey (CAS, 2005). The cutoffs for quintiles are reported in Table 1.

The results, with elasticities ranging between -0.32 and -0.22 over the five quintiles, are in line with the elasticity of demand for imported cigarettes estimated at -0.22 in Salti et al. (2015). While we are able to use our AIDS model to estimate demand elasticities by quintile, we do not have the data needed to estimate elasticity by age group or by gender. We assume that the elasticity for those under 24-years old is twice as large as the elasticity calculated for the whole population, which is consistent with the evidence