Excise Tax Incidence: The Inequity of Taxing Obesity and Beauty

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ABSTRACT

The estimation and analysis of the distribution of the negative health impacts of certain commodities subject to excise taxes in Belize and the distribution of the burdens of the excise taxes across households of different income levels are the focus of this article. Particular attention is given to the taxation of soft drinks and cosmetics. We examine the income distribution and tax revenue impacts using the commodity data from the household expenditure survey by and the effective tax rates expressed as a percentage of the value of the final consumption of each item. As in many developing countries, taxes on alcoholic beverages and tobacco products are found to be regressive. The most regressive excise taxes are on soft drinks and cosmetics. Households across the economy pay more in excise taxes on cosmetics than they do on either alcoholic beverages or tobacco products. Relative to the level of household expenditures, the burden of the excise taxes on cosmetics is highest for households in the lowest quintile of total expenditures. The impact of soft drinks in creating obesity is likely to be much greater for high income households whose total consumption per household is twice that of low-income households.
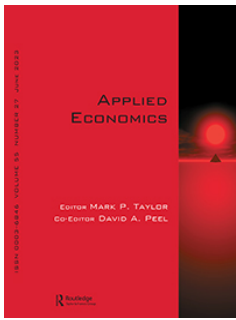
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ABSTRACT

The estimation and analysis of the distribution of the negative health impacts of certain commodities subject to excise taxes in Belize and the distribution of the burdens of the excise taxes across households of different income levels are the focus of this article. Particular attention is given to the taxation of soft drinks and cosmetics. We examine the income distribution and tax revenue impacts using the commodity data from the household expenditure survey by and the effective tax rates expressed as a percentage of the value of the final consumption of each item. As in many developing countries, taxes on alcoholic beverages and tobacco products are found to be regressive. The most regressive excise taxes are on soft drinks and cosmetics. Households across the economy pay more in excise taxes on cosmetics than they do on either alcoholic beverages or tobacco products. Relative to the level of household expenditures, the burden of the excise taxes on cosmetics is highest for households in the lowest quintile of total expenditures. The impact of soft drinks in creating obesity is likely to be much greater for high income households whose total consumption per household is twice that of low-income households.

'A major action for comprehensive programmes aimed at reducing consumption of sugars is taxation of sugary drinks. Just as taxing tobacco helps to reduce tobacco use, taxing sugary drinks can help reduce consumption of sugars'. (World Health Organization 2017)

'A tax on soda and juice drinks would disproportionately increase taxes on low-income families in Philadelphia.' (United States Senator Bernie Sanders, 2016) [1]

I. Introduction

Excise taxes are widespread in both developed and developing economies. These taxes are easy to implement and are often a significant revenue source for governments. Excise taxes have traditionally been levied on a small number of products (alcoholic beverages, tobacco products, gasoline, unhealthy food/drinks) on the grounds that consumption of some of these goods is harmful either to the consumer or to others through negative externalities (Tanzi and Zee 2001). In terms of tax administration, since excise taxes are levied on a small number of goods produced by a few producers, the

administrative and compliance cost of tax collection is usually low. Policymakers target these 'sin goods' with excise/sales taxes in the hope of raising revenue and with the justification that the policies through reducing negative externalities are benefiting all segments of the society. The estimation and analysis of the distribution of the negative health impacts of certain commodities subject to excise taxes in Belize and the distribution of the excise tax burden across households of different income levels is the focus of this article.

One group of a products that have received a lot of attention lately are sugar sweetened beverages (SSBs). Many countries around the world have been implementing excise taxes on these products. For example, in 2012 France implemented a $0.13 per 1.5 L tax on 'drinks with added sugar or artificial sweeteners (Busey 2020). The UK and Ireland have applied a higher tax rate of $0.24 per litre, but only on drinks with more than 5 g sugar per 100 mL (Global Food Research Program 2020). In the United States, several cities in different states

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have levied excise tax on sugary drinks but with different exemption criteria. It is suggested that over 10 years, a tax on sugary drinks of 1 cent per ounce in the U.S.A would result in more than $17 billion in healthcare cost savings (Wang et al. 2012). Taxing drinks with sugar content has been on the rise in the past decade, but the impacts of these taxes on the physical and financial health of consumers are still not fully understood.

Another group of products that has received even less attention in the excise tax literature is beauty products.[2] For example, the European Union and U.S.A charges import tariffs on cosmetics, and several US states levy different sales taxes on cosmetics. However, several less developed countries have excise taxes on cosmetic products.[3] The justification for excise taxes on beauty products cannot easily be explained by public health concerns or negative externalities. Historically the taxation of cosmetic products has been justified on the basis that these commodities were luxury items largely consumed by higher income households (Cnossen 2010, 11). The question of who bears the burden of such excise taxes also deserves more scrutiny.

The analysis is carried out for the set of excise tax rates that Belize had in place in 2022. The households are grouped into quintiles that are ranked according to their total expenditure. As is the common practice, the assumption is made that the total amount of excise tax paid on an item is passed on to consumers (Dubois, Griffith, and O'Connell 2020). This study does not attempt to quantify the behavioural or general equilibrium responses that are likely to arise from changes in excise tax rates or the introduction of new excise taxes. The focus is on assessing the incidence of an existing set of excise taxes.

The actual revenues raised by an excise tax on will depend on several factors. The most important is likely to be the share of total expenditures that households spend on the taxed items. The distribution of the tax burden across a community will depend very much on the income level of the households as well as the income elasticities of demand for the item.

The same consumption patterns apply to the allocation of the impact of any negative health effects that arise from the consumption of items such as cigarettes, and sweetened beverages. These effects will depend on the quantity of the item consumed. Higher income households who have a positive income elasticity of demand for the item will consume more of an unhealthy item and hence are likely to suffer more from these health effects than will poorer households who consumer smaller amounts.

The distribution of the overall burden of the revenues collected from excise taxes will also depend on the quantities of the items purchased by the households that fall into the various quintiles of total household expenditures. From a government revenue perspective, the proportion of total revenue collected from such a tax will be substantially greater for higher quintile households if the income elasticity of demand for the item is positive. Because of the rather unequal distribution of income in developing countries it is expected that the largest share of the excise tax revenues will be borne by higher income groups.

Another issue that is pertinent in tax analysis is the potential unfair impact of specific taxes on households across different income levels. A tax system is said to be 'progressive' if lower-income households end up paying lower rates of taxes than higher-income households. The tax rates here are defined as the amount of taxes paid expressed as a percentage of their total household expenditure. The tax is said to be 'regressive' if the situation is reversed.

From the results of the empirical analysis for Belize, it is found that the tax on SSBs is one of the most regressive of excise taxes. Low-income households spend a larger proportion of their incomes on these items than do those who are better off. However, the damaging health impacts from the consumption of these beverages will be approximately twice as large for families in the top

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[2]These products are listed in detail in Appendix A, Table A1. Cosmetic surgeries are not part of this definition.
[3]For example, some Middle Eastern countries (https://www.cosmeticsbusiness.com/news/article_page/Taxing_times_for_Middle_Eastern_beauty/143281), East African countries (https://citizentv.co.ke/business/price-of-cosmetics-to-rise-after-govt-introduces-tax-129574/), Laos (https://webdev.excise.go.th/aec-law/en/excise-en-lao.php), and India.

40% of the income distribution than for those falling into the bottom 40%. This arises because the demand for these items is so much larger due to the much higher incomes of the households in the top two quintiles.

As cosmetics are purchased mainly to enhance beauty, we can also estimate how the effects of cosmetics are distributed over the population of households. One way to evaluate the effects is to analyse the actual consumption pattern of households for these items. In this way one can estimate the amounts of cosmetic purchases made by different groups of households as a proxy for the quantity of beauty created within each quintile. Furthermore, by estimating how the shares of total household expenditures used to purchase cosmetic items change with the income level of the household groups we can determine the progressivity or regressivity of the excise taxes on cosmetics. From the estimates for households in Belize it is found that the taxation of cosmetics and SSBs are the most regressive of all the excise taxes. Low-income families spend a much larger proportion of their income on beauty products than do those with higher incomes.

In this article we first estimate the levels of expenditures and revenue collections arising from the main excise taxes in Belize, including SSBs and cosmetics. These estimates are made for households in each of the five quintile levels of total household expenditures. Our contribution is threefold: (1) this is the first study that uses Belizean household data, (2) we use a different method than the previous empirical literature, (3) the results on cosmetics are new.

In the next section the relevant literature on excise taxes is reviewed, including the taxation of sugar-sweetened beverages (SSBs) and cosmetic products. The background to the data is then given and the method of calculating effective tax rates on different products discussed. This is followed by the presentation of our results on the distribution of the purchases and incidence of health effects of selected excisable goods, the overall tax burden including the income distribution impacts of excise taxation in Belize. The final section concludes with policy recommendations.

II. Literature review

In a modern tax system, there is usually only a small number of products that attracted excise taxes. In addition to raising revenues the excise taxes on commodities such as alcoholic beverages, and tobacco products have the secondary object to provide an incentive to reduce consumption of these items. In this way, the risks of chronic diseases are reduced, and the revenues raised help to compensate society for the higher costs of public health care. Taxes on fuel and petroleum products have been often justified to pay for transportation infrastructure and for the environmental costs arising from road traffic. SSBs have recently been included in the excisable products list with the main justification of reducing their consumption to eliminate health conditions such as obesity. This list of products is short as compared with that for VAT, but nevertheless, significant revenues are raised through taxing these goods.

The negative effects of SSBs on health outcomes have been widely documented. (Fletcher, Frisvold, and Tefft 2010). It is widely accepted that consumption of drinks with high sugar content increases the risk of obesity. It is also the case that consumers could obtain sugar from other products, and obesity is highly correlated with many individual lifestyle choices (CDC[4]).

With regard to external effects, the most convincing argument is the burden of unhealthy diets on health systems (Bahl and Bird 2020). If the consumption of soft drinks leads to obesity, the financial cost for the treatment of obesity in the future will increase unless consumption is curtailed. Putting aside the discussion that such causality is very difficult to establish, the validity of this argument depends on whether the health system is publicly or privately funded. If the former, then one can talk about monetary burden on fiscal authorities. Bahl and Bird (2020) conclude that 'higher externality taxes on SSB may be appropriate in some rich countries with largely publicly funded health care systems.

In the design of excise taxes, policymakers often refer to behaviour correction arguments (Pigouvian

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taxes). Consumers can sometimes consume products, knowingly or otherwise, that not only harm themselves (internal effects) but also could have negative effects on society (external effects). For example, smoking is bad for the consumer but also for people around them (second-hand smoking). It is therefore argued that by making the consumption of such products less attractive (through taxation), government can 'correct' the behaviour and achieve a more socially optimal outcome (Pigou 1932). This simple idea assumes that one can correctly show the negative effects of a product on the consumer as well as on society at large. Furthermore, it assumes that increasing the price of the product by levying taxes will significantly lower its consumption. This, however, may not be the case if the own price elasticity of demand is very small.

O'Donoghue and Rabin (2003) claims that 'increasing taxes substantially on sin goods may be worth doing. Fletcher, Frisvold, and Tefft (2010) shows that adolescents with low self-control are not very sensitive to taxes on cigarettes, and thus will not lower their consumption. The health enhancing argument behind imposing taxes on harmful products largely depends on the type of consumers affected. If there are enough people in the population who have 'high' self-control abilities, then higher taxes mean higher immediate costs and thus they can lower their consumption, which is the intended effect. All these studies suggest that consumers from different backgrounds (gender, education, socioeconomic background) could respond differently to higher prices of unhealthy products because of taxation.

Another issue relating to excise taxes is the possible inequity of their burden among households. It is often alleged that poorer households in general spend a higher portion of their income on goods that are subject to excise taxation (Gruber, Koszegi, and Kőszegi 2004; Allcott, Mullainathan, and Taubinsky 2014). This regressivity argument claims that any increase in prices because of taxation will hurt poorer households relatively more. Poorer households spend a higher proportion of their income on these products due to their lack of knowledge of the health hazards (Allcott, Lockwood, and Taubinsky 2019). A lower consumption of these unhealthy products would avoid these negative externalities for all segments of society. It would also lower the government's bill for public goods (e.g. healthcare services and environmental clean-up costs), and savings could be used to invest in other projects that would benefit all segments of society, including poorer households.

The estimation of the burden of excise taxation on different income groups has not produced consistent and universal results. For example, Ataguba (2012), using 2005 data, finds that alcoholic beverages tax in South Africa is regressive, but Önder and Yürekli (2016) find excise tax on cigarettes in Turkey to be progressive. Razvodovsky (2017) finds that excise taxes on vodka in Russia has a positive effect on unrecorded alcoholic beverages consumption, which implies that taxation of certain products could lead to alternative sales in the underground economy. Vandenberg and Sharma (2016) use Australian data to show that alcoholic beverages taxes are not highly regressive and that any such effects are 'small and concentrated among heavy consumers.

The estimates of the burden of excise taxes on SSBs are not consistent. Bourke and Veerman (2018) found that in Indonesia higher income groups both consume sugary drinks and respond more to higher prices (taxes are less regressive). Ng et al. (2018) found groups with lowest socio-economic status had the greatest reduction in purchases of taxed beverages in Mexico.Evans, Ringel, and Stech (1999) finds that higher-income individuals are less responsive to changes in tobacco products taxes than their counterparts in the U.S.A, and Townsend, Roderick, and Cooper (1994) found socio-economic status is a determinant of response to changes in prices of cigarettes. Madden (2007) find some suggestive evidence that tobacco products taxes in Ireland have been effective in encouraging quitting among the least educated women compared to other education categories among women. Fletcher, Frisvold, and Tefft (2010) found a very small effect of soft drink taxes in the U.S.A. They conclude that the reason is probably due to low tax rates on soft drinks and if the rates were to increase equivalent to rates on tobacco products, the effects could be meaningful.

Taxation of beauty products has received little attention in the academic literature. In the design of excise tax policies, the taxation of cosmetics has

been justified on the basis that these commodities were luxury items largely consumed by higher income households (Cnossen 2010, 11).

It has been shown that perceived beauty is important for several economic and social outcomes in society, and cosmetics are a possible tool to that end. Beauty in general signals a certain status and attractiveness from a biological/psychological perspective and thus manipulates the choices of receivers of such a signal. Beauty, by enhancing status, can lead to advances in employment, and education (Hunter 2005). O'Connor and Gladstone (2018) show that beauty improves an individual's social network, which is another necessary ingredient for advancement in many social and labour outcomes.

Thus, for households with limited incomes, the choice to signal their status boils down to which method is less costly. In fact, such households have more incentive to move up the social ladder and will thus be more willing to spend on goods that can help them achieve this outcome. Consumption of cosmetic products could be the preferred choice. If cosmetics are considered as part of conspicuous consumption and their taxation is justified under luxury good assumption, we would expect that the income elasticity of demand to be greater than 1. However, if the use of such products is more concentrated in the lower income distribution and income elasticity is less than 1, taxing the consumption of these products will be regressive as the share of total expenditures on these items will fall as incomes increase. Compared to other observable characteristics, such as education and conspicuous consumer products (which can be expensive to obtain), cosmetics could improve one's chances at a much lower monetary cost.[5]

Two recently published theoretical papers support the progressivist view. Allcott, Lockwood, and Taubinsky (2019) develop a general optimal taxation framework that differentiates the corrective from the redistributive motives of excise taxation. Two key results of their theoretical model are that own-price elasticity of demand is an important factor in determining the magnitude of these two motives, and inequality aversion unambiguously reduces optimal taxes on sin goods consumed mainly by poorer households. In their empirical work, Allcott, Lockwood, and Taubinsky (2019) conclude that a household's consumption of SSBs is caused by the lack of knowledge regarding the unhealthy consequences of those products. This suggests that education rather than taxation could be a better use of resources to reduce consumption of these goods. Dubois, Griffith, and O'Connell (2020)'s paper focuses on soda taxes for on-the-go purchases in the UK. They show that these taxes are effective in reducing the sugar intake of younger consumers but not as effective for those who already have high dietary sugar. They also claim that these taxes are unlikely to be regressive if the internality estimates of Allcott, Lockwood, and Taubinsky (2019) are applied to their data. Both studies argue that soda taxes have more of a direct effect on lower-income households because such households are more likely to be the purchasers of these goods, and the reduction in consumption could be offset by the future compensating effect of improvement in health outcomes through lowering current consumption. But this implication relies on the notion that the demand should be relatively price elastic among lower-income households. This, however, is an empirical question that does not yet have a unanimous answer.

III. Data and method

In this article we analyse for Belize the distribution of consumption of excisable goods and relative revenue contributions of excise taxes across households across different quintile levels of total expenditures. Special emphasis will be placed on SSBs and cosmetic products. The rates of excise tax for Belize are those in effect in 2021. We use 2008 household survey data for Belize to determine expenditure weights. Unfortunately, this is the latest available household expenditures survey for Belize Household Expenditure Survey (2008). However, as the excise tax rates have been largely stable from 2008 to 2022 the consumption weights of households across commodities are not likely to change significantly over time. The Belize

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[5]We are not referring to economic costs here, but rather just to the direct cost of purchasing cosmetics. It is also true that putting on make-up requires time and energy and may even cause dermatological issues in the long run. We are simply assuming that these effects are not very large.

household expenditure survey contains 2,187 households, each with an average of four individuals, across different districts, and expenditure information on about 1,430 different commodities.

We calculate the total expenditure for each household by adding up all the spending in various product categories. Households are divided into quintiles according to their total expenditure levels. There are several reasons why expenditure data could be more suitable than income information. First, expenditure is likely to be reported more precisely, while current income is often underreported (Ekici and Besim 2016). Second, household consumption tends to be distributed more evenly over time than current income. Therefore, total expenditure is a good proxy for the level of a household's permanent income and is the preferred way to represent the household's welfare at a particular point in time (Cubero and Hollar 2010)[6]

Belize has the second highest per capita income in Central America. Tax revenues in 2020 were equal to 26.1% of GDP in Belize, and excise taxes made up 16.8% of total tax revenues in that fiscal year. The income distribution in Belize resembles that of other Latin American countries[7] Hence, the analysis of impact of excise taxation on different income categories in Belize is likely to be useful for the design of tax policies in other Latin American countries.

To analyse the distributional impact of excise taxes on different households, we calculate the excise tax payments as a proportion of total expenditure for households within each of the quintiles and product categories. However, instead of using statutory tax rates to estimate tax payments, we calculate 'effective tax rates' as a percentage of the final retail price paid by households. The survey data contains expenditure information based on the final retail expenditures made by the households. The statutory rates of excise tax for 2021 are obtained from the Belize Customs and Excise Department website[8] However, since statutory excise tax rates are levied on the manufacturers' prices for domestically produced goods, or the cost,

insurance, and freight (CIF) prices of imported goods, we need to adjust these so that they can be expressed as percentages of the final retail prices. The trade margins were estimated using the supply and use tables constructed by the Statistical Institute of The Belize Supply and Use Tables (2014). Due to the high proportion of all commodities that are imported and the absence of data on trade margins by sector a trade margin of 33% was used for all commodities. The relationship between final retail price (Pr) and the CIF price is as follows:

$$\mathrm{Pr} = \mathrm{CIF\ price} + \mathrm{excise\ tax} + \mathrm{wholesale\ or\ importer's\ transportation} + \mathrm{retail\ margin} + \mathrm{value-added\ tax\ (VAT)}.$$

(1)

Since some excise taxes in Belize are legislated as unit values per unit of quantity, these unit taxes need to be converted into effective (ad valorem) tax rates expressed as a percentage of the gross-of-retail-tax values. To derive the base for the excise tax for cosmetics, the VAT, trade margin and excise tax must be subtracted from retail price according to Equation (2).

$$\mathrm{Retail\ price} = \mathrm{CIF\ Base\ Price} * (1 + t_e) * (1 + m) * (1 + \mathrm{VAT})$$

(2)

Where t_e is the excise tax rate, m is the trade margin, and VAT is the rate of VAT. The VAT rate is 12.5% in Belize, the trade margins combined are estimated at approximately 33%. For cosmetics, there is a single excise tax rate of 30% of the import or producers' sales price. Therefore, the effective tax rate as a percentage of the retail (tax inclusive) price is calculated as 15.42%.

$$\mathrm{Effective\ tax\ rate\ for\ cosmetics}$$
$$= \frac{Excise\ rate\ on\ production\ level}{((1 + t_e) * (1 + m) * (1 + \mathrm{VAT}))} * 100$$
$$= 15.42\%$$

(3)

The excise rates for soft drinks are all expressed in terms of fixed numbers of BZ$

per imperial gallon. However, the unit excise tax needs to be applied in the same unit volumes in which sales are made and for which we have retail prices. We first find the retail prices and quantities in which the item is sold. For example, for mineral and aerated water the average price is 3.50BZ$ per litre container. For beverages containing cocoa, the average price is 6.2BZ$ per litre bottle. The unit excise rate on the retail price for mineral and aerated water is then obtained by expressing the unit tax per litre as:

$$\text{Unit excise tax per litre} = \frac{\text{Legislated Unit Excise Rate/gal}}{4.54609} \quad (4)$$

Hence, the effective excise rate as a percentage of the retail price is calculated as:

$$\text{Effective tax rate} = \frac{\text{Unit excise tax/bottle}}{\text{Average retail price}(BZD\$)} * 100 \quad (5)$$

All the effective excise tax rates for cosmetics and soft drink categories are shown in Table 1. These effective tax rates are multiplied by the expenditure spent by each quintile, which provides an estimation of the tax revenue collected through excise taxes on every excisable commodity. We are now ready to calculate excise duty revenue from different products as a share of total expenditure.

The entire set of statutory effective ad valorem excise tax rates are reported in Appendix A.

IV. Results

The first issue examined is the distribution of purchases of excisable goods by households in the different quintiles of the income distribution. Quintile 1 refers to the 20% of the households who are making the lowest level of expenditures and quintile 5 contains the 20% of the households with the highest level of expenditures.

Belize has designed a system of excise taxes that is modern in that only a few items are selected for taxation. Fuel, alcoholic beverages, tobacco products, cosmetics and SSBs are subject to excise taxes. In Table 1, the percentage of the household income spend on all excisable goods, and on the individual goods are reported in columns 1 to 6. The expenditure on excisable goods makes up 4.3% of total household expenditures (Table 2 col 1, row 6). For all classes of goods, except alcoholic beverages, the low-income groups spend a larger percentage of their total expenditures on excisable goods. These findings support the previous findings from high income countries that lower income households tend to spend a larger proportion of their household incomes on goods that are subject to excise taxes. (Gruber, Koszegi, and Kőszegi 2004; Allcott, Mullainathan, and Taubinsky 2014).

Considering all excise taxed goods, the bottom 20% of the households spend 7.1% of their total

Table 1. Effective tax rates.

Category	Goods	Legislated unit excise rate	Price/Average retail price (BZD$)	Unit conversion	Effective Excise Rate on Retail Price
Cosmetics	All	30.00%	-	(1/(1.3*1.33*1.125))*0.3=	15.42%
SSBs	Mineral & aerated water	$1.75/Imp. gal.	3.5/1L	(1.75/4.54609) =0.385	11.00%
	Beverages containing cocoa	$1.75/Imp. gal.	6.2/1L	(1.75/4.54609) =0.385	6.21%

Imp. gal., Imperial gallon.

Table 2. Excisable expenditure as a percentage of total household expenditure by quintile.

	Quintile	All excisable goods (1)	Fuel (2)	Alcoholic Beverages (3)	Tobacco Products (4)	SBBs (5)	Cosmetics (6)
1	Quintile 1	7.1%	3.3%	0.6%	0.3%	1.6%	1.3%
2	Quintile 2	5.5%	3.2%	0.5%	0.1%	1.0%	0.7%
3	Quintile 3	6.0%	4.1%	0.4%	0.1%	0.8%	0.5%
4	Quintile 4	5.2%	3.4%	0.8%	0.2%	0.5%	0.2%
5	Quintile 5	3.2%	2.2%	0.6%	0.1%	0.2%	0.1%
6	**Total Expenditure**	**4.3%**	**2.8%**	**0.6%**	**0.1%**	**0.5%**	**0.3%**

expenditures on excisable goods which is more than twice as large as the expenditures made by households in the top 20%. This high-income group spends only 3.2% of their total expenditures on these items. For tobacco products, SSBs and cosmetics, the findings are more dramatic. The ratios of the percentages of the total expenditures made on these excisable goods by the bottom 20% to the total expenditures made by the top 20% of the households on these excisable categories are 3, 8, and 13 times, respectively. As the shares of per household expenditures spent on these excisable goods are falling as one moves from lower to higher expenditure quintiles, it must be the case that the income elasticities of demand for these items are less than one. The extreme case is cosmetics which has been generally thought of as luxury goods.

Table 3 reports on the distribution of expenditures on excisable items across the quintile categories of households. Overall, 67% of all excisable goods are purchased by those in to top two quintiles while only 14.71% of all excisable goods are purchased by those in the bottom two quintiles. For the three items, alcoholic beverages, tobacco and SSBs that have harmful health effects the burden of disease is clearly placed on the high-expenditure households. While the results reported in Table 2 indicates that the high-income households spend less as a proportion of their total expenditures on these items, when we take into consideration highly skewed income distribution towards the high expenditure quintiles, we find that the high-income families as a group consume most of these harmful commodities. For alcoholic beverages the purchases by those in the top two quintiles is 81.2%, for tobacco products it is 71.18% and for SSBs it is 50.43% of the total purchases of each of these commodities. Hence, if there is a beneficial behavioural response to the imposition of the

excise taxes to give people an incentive to reduce their consumption of the items, it is the high-income groups that will potentially benefit most.

The number of households in each of the quintile groups is the same. Hence, the finding that the share of the total expenditures of each of these commodity categories increases from the lowest quintile group to the highest quintile group indicates that it must be the case that the overall income elasticity of demand for these excisable goods is positive. Combining the findings from the results reported in Tables 2 and 3, one can conclude that for all the excisable commodities except for cosmetics, the income elasticities of demand are all larger than zero but less than one.

For the case of cosmetics, the allocation of expenditures towards the poorer household is much larger than for the other commodities, with 32.92% of the expenditures being made in the bottom two quintiles of households while 45.35% of total purchases are made by those in the top two quintiles. Because the share of total expenditures on cosmetics purchased by households in quintile 4 is less than in quintile 3, it must be the case that for the category 4 quintile group overall the income elasticity of demand is less than one.

Considering the effect of cosmetics to enhance beauty, one can conclude that the allocation of the positive effects of cosmetics is far more equally distributed across the population on a per capita basis than are the harmful effects of alcoholic drinks, tobacco products or SSBs.

By applying the effective tax rates reported in Appendix A to each of excisable items purchased by households the total excise tax revenues paid by the sample of households is estimated. These tax payments are then aggregated by household quintile and reported as a percentage of total revenue collected for each taxable item by quintile. These distributions are reported in Table 4. For this set of

Table 3. Percentage of expenditure on excisable category by household expenditure quintiles.

	Quintile	All excisable goods (1)	Fuel (2)	Alcoholic Beverages (3)	Tobacco Products (4)	SSBs (5)	Cosmetics (6)
1	Quintile 1	4.88%	3.43%	2.90%	6.02%	10.57%	13.48%
2	Quintile 2	9.83%	8.67%	6.14%	8.78%	15.84%	19.43%
3	Quintile 3	18.05%	18.89%	9.66%	14.02%	23.16%	20.74%
4	Quintile 4	26.77%	26.87%	29.92%	36.04%	24.48%	18.91%
5	Quintile 5	40.47%	42.13%	51.37%	35.14%	25.95%	27.44%
6	Total Excisable Expenditure	100%	100%	100%	100%	100%	100%
7	**Proportion of Total Excisable Expenditure**	**100.00%**	**65.7%**	**13.8%**	**2.9%**	**10.7%**	**6.8%**

Table 4. Percentage of excise duty revenue by quintile.

	Quintile	All excisable goods (1)	Fuel (2)	Alcoholic Beverages (3)	Tobacco Products (4)	SSBs (5)	Cosmetics (6)
1	Quintile 1	4.1%	3.5%	3.9%	6.0%	10.5%	13.5%
2	Quintile 2	9.3%	8.7%	6.7%	8.8%	15.8%	19.4%
3	Quintile 3	18.6%	18.9%	10.1%	14.0%	23.3%	20.7%
4	Quintile 4	26.7%	26.7%	27.3%	36.0%	24.5%	18.9%
5	Quintile 5	41.3%	42.2%	52.0%	35.1%	25.9%	27.4%
6	Total excise duty revenue	100%	100%	100%	100%	100%	100%
7	**Proportion of total revenue**	**100.00%**	**86.0%**	**3.9%**	**3.7%**	**2.5%**	**3.9%**

excises the revenues are collected mainly from fuel and petroleum products, which account for 86% of total revenues. The taxes on alcoholic beverages, tobacco products, and cosmetics each account for between 3.7% and 3.9% of total tax collections, while taxes on SSBs yield 2.5% of total excise tax revenues. (Table 4, row 7).

Households in the top 40% of the income distribution paid about 68% of the taxes. More interestingly, the bottom quintile of households paid more excise taxes on purchases of either cosmetics or soft drinks than they paid on purchases of alcoholic beverages and tobacco products combined. Considering the excise taxes paid on fuel, alcoholic beverages, and tobacco products, the households in the top two quintile groups pay 68.9%, 79.3%, and 71.1% in each of these respective categories. However, for SSBs and cosmetics this share of total excises paid on these items drops to 50.4% and 46.3%, respectively. Nevertheless, it is clear that the burden of the revenue collected by the government from the excise tax falls primarily on the households in the top 40% of the income distribution.

Table 5 includes our results on the distributional impacts of excise taxes in Belize relative to the level of expenditures of the individual households. If we focus on all excisable goods (column 1), tax collections can be categorized as regressive except in relation to middle-level households (quintile 3). The main finding is that the most regressive excise taxes are those on cosmetics and soft drinks. For

soft drinks (column 6), the lowest quintile has a ratio of excise payments to total household expenditures of 0.1%, while for the top quintile the ratio is only 0.01%. For cosmetics (column 5), the percentages for the lowest and highest quintiles are, respectively, 0.2% and 0.02%. Measuring in this way we find that they are both equally regressive as the share of total expenditures paid in excise taxes by quintile 1 households for both of these commodities is 10 times as large as the share of excise taxes paid on these commodities by those in the highest expenditure quintile of 40%. We also see a descending trend across the other quintiles for both products, which supports the regressivity argument in this literature. Excise taxes on tobacco products are also regressive, with 0.09% for the lowest quintile and 0.03% for the top quintile. Alcoholic beverages excise tax rates vary from the lowest quintile (0.06%) to the top quintile (0.04%). Fuel taxes are also regressive, the bottom quintile households pay 1.16% of their expenditures on fuel taxes while the top quintile of households have a substantially lower tax rate of 0.77% of total expenditures. The average tax burden for fuel of all households is 0.99% of total household expenditures.

The excise tax system in Belize (except for alcoholic beverages) tends to be quite regressive (Table 4). Excises on (luxury) goods and services (where cosmetics are often included) have been justified as 'instruments to improve the

Table 5. The burden of excise taxes on different quintiles for different good categories.

	Quintile	Excise duty revenue as a percentage of total household expenditure					
		All excisable goods (1)	Fuel (2)	Alcoholic Beverages (3)	Tobacco Products (4)	SSBs (5)	Cosmetics (6)
1	Quintile 1	1.61%	1.16%	0.06%	0.09%	0.10%	0.21%
2	Quintile 2	1.41%	1.14%	0.04%	0.05%	0.06%	0.12%
3	Quintile 3	1.65%	1.45%	0.03%	0.05%	0.05%	0.07%
4	Quintile 4	1.39%	1.19%	0.06%	0.07%	0.03%	0.04%
5	Quintile 5	0.88%	0.77%	0.04%	0.03%	0.01%	0.02%
6	**All quintiles**	**1.16%**	**0.99%**	**0.04%**	**0.04%**	**0.03%**	**0.05%**

progressivity of the tax system' (Cnossen 2010, 11). This is clearly not the situation for the taxation of cosmetics in Belize.

V. Conclusions and policy implications

In this article, we analyse the revenue effects and distributional impacts of excise taxation in Belize. For the traditional excise taxes on fuels, alcoholic beverages, and tobacco products the results are broadly consistent with much of the literature. The traditional justification for imposing excise taxes on alcoholic beverages and tobacco products is that they correct the behaviour of consumers and prevent them from consuming products that are potentially harmful to both them and society at large. For tobacco products the excise taxes are regressive with the households in the bottom two quintile levels of household expenditures spending a larger proportion of expenditures on tobacco taxes than households in the higher quintiles. For alcoholic beverages the regressivity is not as consistently regressive over the quintiles of household expenditures.

When we consider the total amount of revenues raised by the excise taxes on alcoholic beverages and tobacco products the total burden of the excise taxes tends to fall largely on the high income households. This occurs because the underlying positive income elasticity of demand causes the per household consumption of these goods to increase with income causing the absolute amount spent on these items to increase as income increases. As the negative health effects will also be largely borne by households in proportion to the per capita consumption of these commodities, it will be the high-income individuals who will be suffering most from the long-term health effects of consumption of alcoholic beverages and tobacco products.

Many SSBs are known for their high sugar content and have been cited as one cause of obesity, particularly of children. Because low income families do spend a larger proportion of their incomes on SSBs than do high income families the excise tax on SSBs is highly regressive. On the other hand, because the total amount of expenditures on SSBs per low-income family (bottom 40% of expenditure distribution) is only half as much as the per family purchases by high income households (top 40% of the expenditure distribution), the relative contribution of SSBs to obesity of low-income households is likely to be modest. The excise taxes on SSBs are a reduction in the resources that would otherwise have been available to poor households to purchase other basic needs, including nutritious foods. The impact of SSBs on creating obesity is likely to be a much larger factor with higher income households.

The taxation of SSBs in low-income countries does not appear to be an instrument that has positive tax policy attributes from either an income distribution or poverty alleviation perspective. Other methods of behavioural economics might be used, such as libertarian paternalism to address the problem of obesity amongst the high income households (Thaler and Sunstein 2003). This involves informing the public about the negative health effects of the consumption of SSBs and allowing them to decide their consumption on their own terms.

The use of cosmetics as an input into the creation of beauty gives pleasure to the users and creates positive externalities to others. They create neither negative internal nor negative external effects on the economy. Because the purchases of cosmetics make up a larger share of the budgets of lower income households than they do of higher income household, the excise tax paid on these commodities is highly regressive. Furthermore, the total excise taxes paid on cosmetic purchases the tax by the households in quintiles 1 and 2 is 71% of the amount of cosmetic excise taxes paid by the households in quintiles 4 and 5. Hence, the overall burden of cosmetic taxes collected on the purchases by low income households relative to the burden of such taxes paid by higher income households is much greater than for any other of the excise taxes levied in Belize.

These results are of importance to policymakers. Imposing excise taxes, or any kind of taxes for that matter, has potential political implications; thus, justifying it to the public is very important in any democratic society. Imposing taxes on alcoholic beverages, tobacco products, and fuel has been justified under externality arguments, but such an argument is

hard to justify for soft drinks, and impossible for cosmetics. As the income distribution impacts of imposing excise taxes on the purchases of SSBs and cosmetics are highly regressive, policymakers should exercise caution when considering taxing or raising the tax rates on these two groups of commodities.

Data availability statement

The data used in this study is available by contacting the corresponding author.

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Appendix A

Table A1. Different products under cosmetics and soft drinks and corresponding effective tax rates.

Category	Harmonized code	Name of goods as in consumer expenditure survey	Effective excise tax rate as % of retail sales value
Cosmetics	3304.91.00	Foot Powder	15.42%
	3306	Mouth Wash (Antistatic Solution)	15.42%
	3304.91.00	Baby Powder	15.42%
	3307.10.00	Shaving Cream/Foam	15.42%
	3304.10.00	Lipstick	15.42%
	3304.30.00	Nail Polish (Varnish)	15.42%
	3304	Make-up	15.42%
	3304	Make-up Removal Products	15.42%
	3305.30.00	Hair Lotion	15.42%
	3307.10.00	After Shave Lotion	15.42%
	3304.99.10	Sunscreen	15.42%
	3305.30.00	Hair Remover	15.42%
	3307.90.00	Perfumes/Toilet Water	15.42%
	3307.90.00	Deodorants	15.42%
	3305.30.00	Hair Relaxer	15.42%
	3303.00.90	Cologne	15.42%
	3305.30.00	Hair Gel	15.42%
	3304	Lotion (Hand/Body)	15.42%
	3305.30.00	Hair Dye	15.42%
	3304	Nail Polish Remover	15.42%
	3305.30.00	Hair Grease	15.42%
	3305.30.00	Hair Conditioner	15.42%
	3304	Body Wash	15.42%
Soft drinks	2201.10.10	Mineral Water	11.00%
	22.02	Soft Drink (Soda, Lemonades)	6.21%
	22.02	Energy Drink	6.21%

Table A2. Effective excise tax rates.

Excisable good category	Excisable goods	Legislated unit excise rate	Effective excise rate on retail price
Alcoholic beverages	Beer and Stout	$7.62/Imp. Gal.	6.52%
	Wine	$20/Imp. Gal.	4.27%
	Spirits and Ethyl Alcohol (less than 80% Alcohol)	$90/Imp. Gal.	15.33%
Cigarettes and tobacco	All	$65.00 per 1,000	33.59%
Fuels	Regular Gasoline	$3.95/Imp. Gal.	35.75%
	Premium Gasoline	$4.35/Imp. Gal.	37.37%
	Diesel Fuel	$3.26/Imp. Gal.	32.12%
	Aviation Fuel	$1.27/Imp. Gal.	18.73%
	Kerosene	$1.27/Imp Gal	18.73%
Cosmetics	All	30.00%	15.42%
Soft drinks	Mineral and Aerated Water	$1.75/Imp. Gal.	11.00%
	Beverages Containing Cocoa	$1.75/Imp. Gal.	6.21%