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An overlooked market: loose cigarettes, informal vendors and their implications for tobacco taxation

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ABSTRACT

Objective To examine the features of markets for loose cigarettes in several low-income and middle-income countries and their effects on tobacco control policies, particularly taxation.

Design An analysis of survey data targeting people who smoke in two African, one Southeast Asian and two South Asian countries and retailers across 16 African countries to study loose cigarette markets and examine how prices in these markets move relative to the prices for cigarette packs.

Results Markets for loose cigarettes are large, and their consumer base tends to differ from the wider population of people who smoke. Loose cigarette prices are on average higher than those of cigarettes bought in packs, and they respond differently to tax increases, at least partially due to a denomination effect.

Conclusions The features of the loose cigarette markets present a challenge for tobacco control policy, especially tobacco tax policy. One way to overcome this challenge is to aim for large, rather than incremental, tax increases.

INTRODUCTION

In the coming decades, the majority of tobacco-related deaths will occur in low-income and middle-income countries (LMICs).¹ Recent years have seen an expansion of research on tobacco impacts in these countries, expanding data availability and policy analysis that speak to their particular contexts.^{2–5} However, these analyses have overlooked one crucial aspect of cigarette markets in these contexts. While most work on cigarette consumption and taxation assumes that cigarettes are being sold and bought in packs, this often does not capture the reality on the ground. Instead, many cigarettes are bought in the form of single, loose cigarettes, either from legal shops or from informal vendors.

For example, survey evidence from the International Tobacco Control (ITC) Policy Evaluation Project suggests that in India, Kenya and Zambia, more than two-thirds of respondents who smoke bought their last cigarette as a single stick and not as a pack (throughout this article, we use ‘loose cigarettes’ and ‘sticks/single stick cigarettes’ interchangeably). Similarly, Singh *et al*⁶ estimate that 57% of people who smoke in India consume loose cigarettes, which according to Lal *et al*⁷ account for 75% of sales in the country, although recent state-wide bans might be changing this picture⁸; Stillman *et al*,⁹ von Lampe *et al*¹⁰ and Azagba *et al*¹¹ demonstrate that these markets are also prevalent in the USA, with Guillory *et al*¹² pointing out that loose consumption is more common among young people

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ While there is sporadic evidence that markets for loose cigarettes are widespread, especially in low-income and medium-income countries (LMICs), very little is known about the response of these markets to tax policies.
- ⇒ Per-cigarette prices of loose cigarettes tend to be higher than those of cigarettes sold in packs.

WHAT THIS STUDY ADDS

- ⇒ This study uses data on people who smoke cigarettes and cigarette vendors to show that loose cigarettes represent a large share of cigarette purchases across many LMICs, often catering disproportionately to lower-income groups.
- ⇒ It also demonstrates that prices of loose cigarettes move differently, primarily due to clustering of prices around small currency denominations, and postulates that this will impact tax pass through.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Countries with large loose cigarette markets should opt for large rather than incremental tax increases in order to ensure their full effect and to achieve better public health.
- ⇒ We highlight the importance of further investigation and data collection on loose cigarette markets, outlining new areas of research.

and those who do not smoke every day. Studies on Mexico^{13–15} point to the use of single cigarettes as a harm reduction strategy; one on Colombia notes differences in price movements¹⁶; and one in Indonesia argues that banning loose sales should be pursued to deter youth consumption.¹⁷ However, to the best of our knowledge, there is no study that attempts a generalised account of these dynamics and of their effects on tobacco tax policies across as wide a set of countries as that covered here.

We argue that to understand cigarette consumption in LMICs, particularly in Africa, and to devise effective tobacco control policy, the features of this market demand explicit attention. We develop this argument by establishing four aspects of the market for loose cigarettes. First, it is sizeable and widespread. Second, it has a consumer base different from the overall population of people who smoke; people who smoke loose cigarettes tend to be poorer and younger. Third, price dynamics for single-stick cigarettes differ from those for packs,



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as the price for the former is higher than the equivalent per-cigarette price of those in a pack. Furthermore, their prices also respond differently to external changes, partially due to a denomination effect. Finally, we show how the features of loose cigarette markets can affect the effectiveness of tobacco control policy and in particular of taxation. We highlight that small tax increases may have unexpected effects on demand or may not be passed on to the people who consume loose cigarettes at all. Consequently, the prevalence of single-stick markets provides an argument for large, rather than incremental, increases in tobacco taxation in many LMICs.

DATA AND METHODS

Data sources

This paper relies on two sources of data: the African Cigarettes Prices Project from the Economics of Excisable Products Research (REEP) unit and data from LMICs covered by the ITC Policy Evaluation Project, which include information on loose cigarette prices.

REEP collects prices of cigarettes sold by retail outlets and street vendors in a number of African countries since 2016. We use all publicly available data, which include cigarette prices differentiated between loose and packed and information about the brands and the type of store. While these data are not nationally representative, they contain a large number of price observations, which is useful for our purpose.

The ITC data consist of a set of multicountry nationally representative surveys of people who smoke. They include information on gender, age, income, level of education and tobacco use, such as where they last bought tobacco, in which form, of which brand and for which price. We used all data from LMICs, with the exclusion of Malaysia (as loose accounted for less than 5% of consumption) and Vietnam (as we were unable to access some of the relevant variables) and harmonised information on income and education as explained in online supplemental appendix A.

Analysis

More information on the data alongside summary statistics can be found in online supplemental appendix B. We rely primarily on the REEP data to analyse retail and price dynamics for cigarettes sold as sticks and as packs for 16 countries in Africa. We provide descriptive analyses of the relative distribution of loose cigarettes in different shops as well as the movement over time of the price for single cigarettes and packs for major brands. We rely on the ITC data to examine stick buyer demographics. Here, we analyse the demographics of people buying loose cigarettes in five countries using a random-effects logistic regression.

RESULTS

We structure our results around three themes: the proliferation of loose cigarette sales, consumer profiles and prices.

While there are little systematic data on the markets for loose cigarettes, what is available is sufficient to note that, in many LMICs, they are a large market, both with respect to consumption and to retail. In five of the LMICs covered by the ITC survey—Bangladesh, India, Kenya, Thailand and Zambia—at least one-third of consumers in the most recent wave reported that their last purchase was loose cigarettes. Notably, there is substantial variation: the proportion ranges from just under 34% in Thailand to 77% in India and over 80% in Zambia and Kenya. The REEP price data give an indication of how many stores sell loose cigarettes, with [table 1](#) providing an overview by country and seller type. Even though stores are not randomly sampled and do not translate to proportional estimates of market shares, we get a clear sense that, across many African countries, the market for loose cigarettes is substantial, although with significant variation. [Table 1](#) also shows at the proportion of brands sold as both sticks and packs in at least some stores in each country, presenting a partially overlapping and partly segmented market. Aside from Tanzania and Kenya, there are no countries where all brands sold in packs are also sold in single sticks. However, in all cases except Botswana, at least one-third of the brands sold

Table 1 Loose cigarettes supply structure across sub-Saharan Africa

Country	Shops surveyed (n)	Percentage (%) of all shops selling loose cigarettes	Percentage (%) of formal shops selling loose cigarettes	Percentage (%) of informal street vendors selling loose cigarettes	Percentage (%) of brands sold both loose and in packs (brands, n)
Botswana	900	58.2	0.8	97.9	20.9 (41)
Chad	67	31.3	0.0	36.8	62.5 (8)
Ethiopia*	1120	98.4	0.0	98.9	47.6 (21)
Ghana*	103	59.2	17.7	23.5	50.0 (18)
Kenya*	78	92.3	0.0	100.0	100.0 (10)
Lesotho	6135	97.4	65.2	99.9	43.1 (58)
Madagascar	52	75.0	21.4	100.0	70.0 (9)
Malawi	322	6.8	3.9	4.1	38.5 (23)
Mozambique	104	87.5	0.0	98.8	78.6 (14)
Namibia	976	19.8	3.6	100.0	39.4 (31)
Nigeria*	59	54.2	0.0	36.4	38.4 (35)
South Africa	4051	82.0	26.5	97.8	63.9 (109)
Tanzania	185	81.6	41.5	98.3	100.0 (16)
Uganda*	38	71.1	0.0	100.0	42.9 (7)
Zambia	102	47.0	23.3	58.8	55.6 (17)
Zimbabwe	4189	71.2	31.5	79.5	73.5 (34)
Average		64.6	14.7	76.9	57.8 (28)

Source: Authors elaboration on Economics of Excisable Products Research data.

*Countries marked with an asterisk have passed some legislation that bans the sale of single-stick cigarettes reflected in lower proportions of formal stores selling them.

Table 2 Stick buyer demographics

	Bangladesh	India	Kenya	Thailand	Zambia
Gender	-0.17 (0.23)	0.84 (0.69)	0.04 (0.37)	0.68‡ (0.21)	-0.18 (0.69)
Medium income	-0.17* (0.10)	-0.01 (0.14)	-0.60‡ (0.22)	-0.54‡ (0.14)	0.60 (0.46)
High income	-0.22† (0.10)	-0.92‡ (0.17)	-1.27‡ (0.28)	-0.74‡ (0.14)	0.34 (0.33)
Primary/lower secondary education	-0.07 (0.07)	-0.50† (0.23)	-0.03 (0.44)	-0.04 (0.19)	1.18 (0.84)
Higher secondary/tertiary education	0.06 (0.09)	-1.09‡ (0.23)	-0.30 (0.44)	-0.92‡ (0.25)	1.10 (0.87)
Age at recruitment	-0.01‡ (0.00)	-0.02‡ (0.01)	-0.00(0.01)	-0.02‡ (0.00)	-0.04† (0.01)
N (obs)	7731	2961	1389	5331	718
N (individuals)	3929	1828	1195	2292	651
Waves	4	3	2	6	2

Source: Random-effects logistic regressions based on International Tobacco Control data. The dependent variable is a dummy variable equal to 1 if a respondent last bought loose cigarettes and 0 if they bought a pack; income is an ordered categorical variable ranging from 1 (low) to 3 (high), with low income used as a benchmark for the coefficients; education is a categorical variable ranging from 1 (illiterate) to 3 (secondary or tertiary education), with illiterate used as a benchmark for the coefficients; gender is a dummy equal to 1 if the respondent is female. Age is indicated at the point of recruitment to the survey.

*Indicates significance at 10%.
†Indicates significance at 5%.
‡Indicates significance at 1%.

as packs are also sold as single sticks. Countries marked with an asterisk have passed some legislation that bans the sale of single-stick cigarettes, reflected in lower proportions of formal stores selling them.

The data also suggest that street vendors are much more likely to have loose cigarettes on offer than formal retail stores. This is not surprising, as street vendors typically operate informally and therefore are less likely to follow regulation on the sale of cigarettes. Similarly, they might have a poorer consumer base or provide the sale of loose cigarettes as an additional service for customers.

With respect to consumers, there are reasons to expect that buyers of loose cigarettes will on average have lower incomes. We know that people on lower incomes typically make routine purchases in smaller quantities despite higher unit costs because of irregular cash flows.^{18 19} Furthermore, they may already purchase other products from the informal vendors who are most likely to sell loose cigarettes.

We can test the relationship between income and loose cigarette consumption in countries for which the relevant ITC data are available. Table 2 summarises the results of a random effects logistic regression on the characteristics of people who smoke, where the dependent variable is a dummy indicating the choice to buy sticks rather than a pack, which show that in all countries except Zambia, a lower income is significantly correlated with this choice. Notably, we also find that in four out of the five countries, a younger age at recruitment is also significantly correlated with this decision, as is a lower level of education, though this is only significant in India and Thailand.

While data availability constricts our ability to add further controls, what is available provides strong support for the hypothesis that the consumer profile of loose cigarettes is substantially different from that of packs, and that in most cases correlates with a lower income and a younger age. While we assume here that each respondent is someone who smokes either packs or sticks, they might have a mixed pattern of consumption. However, the current structure of tobacco use surveys does not allow for any empirical quantification of this phenomenon.

The markets for loose cigarettes and the market for cigarettes sold in packs also differ in their prices. First, unit prices of cigarettes sold as sticks and packs have a different level—the former tend to be more expensive. Second, they tend to move differently over time. Third, stick prices are shaped by a currency

denomination effect—they tend to cluster around steps in the denomination more than per-cigarette prices of cigarettes sold in packs.

In order to conduct this analysis, we have traced the average unit prices for cigarettes sold both as sticks and packs for the most common brands for each country in the REEP dataset with a sample size of over 2000 observations. We present this full analysis in online supplemental appendix C and draw on an illustrative example here.

First, the average unit price of cigarettes bought as sticks, both for all popular brands and for the most popular one, is higher than the average unit price of cigarettes bought in packs, the only exception being Tanzania in 2018. There is, at least on the average, a positive—and often substantial—price mark-up for loose cigarettes; although highly variable across countries, we have found average mark-ups ranging from 5.1% in Tanzania to 54.3% in Namibia. Figure 1 illustrates these dynamics for South Africa, where the unit price of the most popular brand, Peter Stuyvesant, is on average almost 50% higher for single sticks. Online supplemental appendix C replicates all brand-specific graphs using the median rather than the average, which yields almost identical results.

Where possible, we calculated average mark-ups by aggregating the differences in prices between cigarettes of the same brand sold as both sticks and packs in the same store. We find that while they are positive in virtually all stores (95.4% of the sample for which the analysis was conducted), there are a few cases where mark-ups can be negative, highlighting the need for further research into mark-ups and market structure. We present further analysis in online supplemental appendix C.

Second, the example of South Africa also illustrates another point visible across all countries: the per-cigarette prices of sticks and packs quite never move in parallel, with the gap between them widening and narrowing over time. While this analysis is primarily descriptive, it does provide some indications of more substantial differences in the internal dynamics of these two markets.

Third, the data provide a strong indication for one of the drivers of these different price movements, what we call the ‘denomination effect’. Looking at frequency distributions for specific price points of per-cigarette prices for major brands, we find those for loose cigarettes to be more concentrated around round values of the currency denomination than per-cigarette

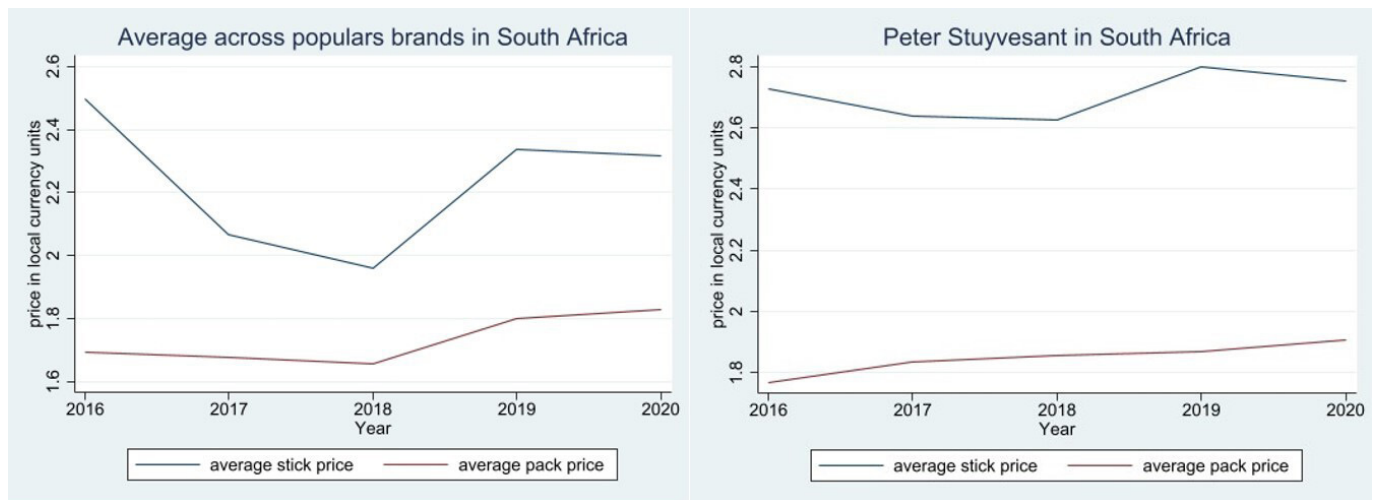


Figure 1 Nominal per-cigarette price of cigarettes sold as sticks and in packs in South Africa, 2016–2020. Source: Authors' elaboration from Economics of Excisable Products Research data, prices in nominal local currency units. 'Average pack price' refers not to a pack but to the average price of a single cigarette sold in a pack. See online supplemental appendix C for further details.

prices for packs. This is intuitive—any increase in pack prices is smoothed over all cigarettes in the pack, leading to a more continuous distribution. Conversely, the price for loose cigarettes is constrained by the availability of small currency denominations; prices can only increase to the next round value.

Figure 2 illustrates the dynamic for Peter Stuyvesant in South Africa—examples across other countries are presented in online supplemental appendix C. While the per-cigarette price in packs shows a relatively smooth distribution across the average price, the price for the cigarettes is tightly clustered to different round denominations—2.0, 2.5 and 3.0 rands—multiples of extremely commonly used coins in South Africa.

This denomination effect can provide some explanation as to why the size of the mark-up that we observe changes over time, as loose cigarette prices remain 'sticky' around certain denominational values, while per-cigarette prices in packs more smoothly adjust to overall price levels. While we can speculate that, due to underlying inflation denomination effects may weaken over time and even potentially become cyclical, if and when this might happen is highly dependent on the context and inflation levels.

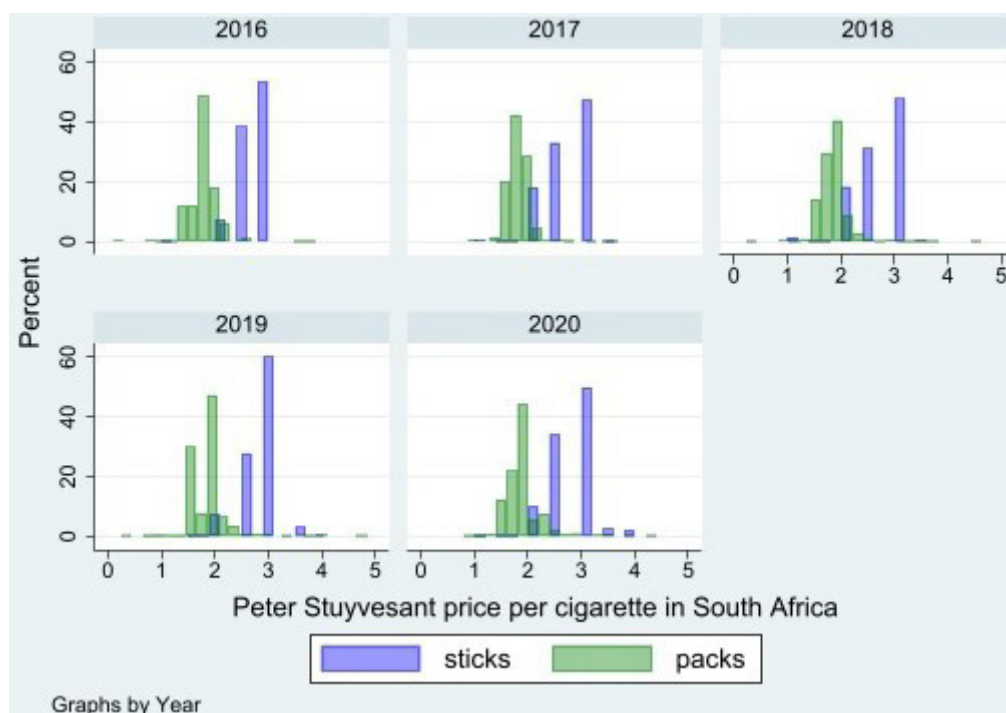


Figure 2 Distributions of nominal prices of loose and packed Peter Stuyvesant cigarettes in South Africa, 2016–2020. Source: Authors' elaboration on Economics of Excisable Products Research data, all prices expressed in nominal local currency unit.

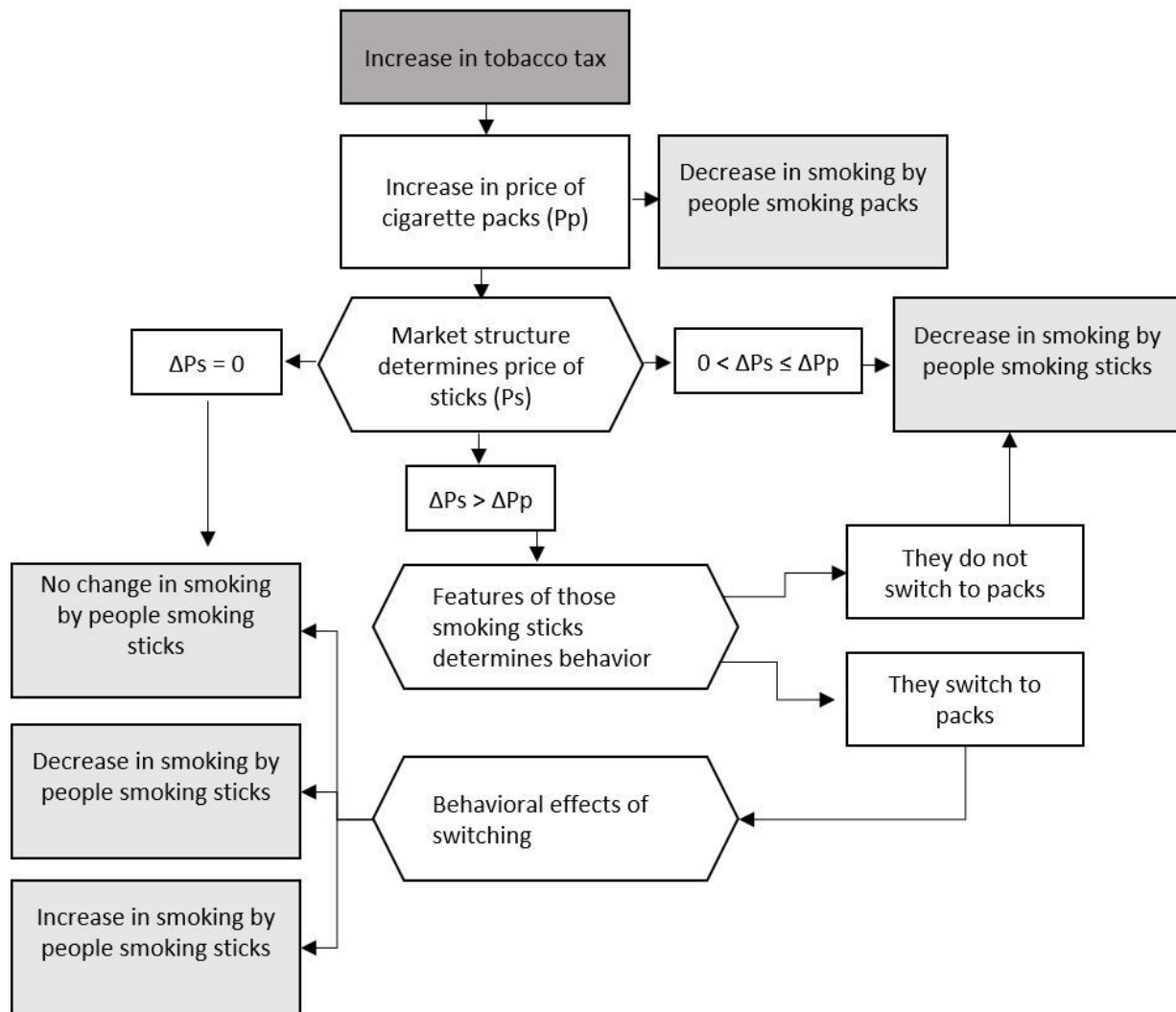


Figure 3 Potential impact of tobacco tax changes on overall cigarette consumption as mediated by the existence of loose cigarettes markets. Source: Authors elaboration.

DISCUSSION

The argument for tobacco taxation relies on the idea that increasing taxes lead to higher prices, which in turn decrease the overall smoking prevalence by leading to cessation, lowering smoking uptake and smoking intensities.^{20 21} There is substantial evidence for these relationships, and it is unlikely that our considerations around the market for loose cigarettes will negate them. However, we argue that markets for loose cigarettes can have a direct effect on the outcomes and effectiveness of tobacco tax increases.

Figure 3 summarises the effects of a tax increase in a simple model, assuming the existence of a single brand and a negative price elasticity of demand for both people who smoke sticks and people who smoke packs. First, an increase in tobacco taxation affects the price of cigarette packs, which we assume will lead to some reduction in consumption among those who smoke packs. However, the effect on the price of loose cigarettes is less certain. As we have outlined, loose cigarettes tend to be sold at a mark-up, which varies across time and space according to unobserved market features. The unit price for loose cigarettes could increase more or less relative to the unit price for packed cigarettes following tax increases, depending on how much the mark-up can shrink. Crucially, the ‘stickiness’ in loose prices

connected with the denomination effect implies that a small increase in tobacco taxation, and a subsequent small increase in packs’ prices, may not be passed on to loose cigarettes at all, with consequences on their consumption.

If the increase in the price of cigarette packs is not passed on to loose cigarettes, it is reasonable to suggest that there will also be no decrease in consumption among people who smoke sticks. If the goal of tobacco taxation is a direct and immediate effect across actual and potential cigarette consumption of different population segments, then the existence of loose cigarette markets provides a direct argument for larger tobacco tax increases in LMIC contexts.

However, if the price of loose cigarettes increases relatively more than the per-cigarette price of packed cigarettes, another complication emerges. Depending on the behaviour of people who smoke loose cigarettes, we could see a large reduction in aggregate consumption or, instead, a large proportion of consumers switching to buying packs due to their comparatively lower per-cigarette price. We do have some evidence of consumers switching from loose cigarettes to pack, although limited by data availability (see online supplemental appendix D). The effect on total consumption among former buyers of loose cigarettes then becomes difficult to estimate. Here, the key

question is whether buying cigarettes in a now larger quantity affects smoking behaviour. We could imagine that high up-front costs at every pack's purchase could motivate people to quit smoking. However, we can also imagine that the large number of cigarettes in a pack could lead people who had previously only smoked occasionally to increase smoking intensity. This is particularly relevant as some literature notes that the consumption of loose cigarettes is intended by many as a harm reduction or cessation strategy.^{6 13–15} However, much of this literature is based on high-income countries rather than on LMICs, in which users' demographics, presented in table 2, seem to indicate that lower unitary cost might be the main driver. Depending on the nature of these behavioural effects of switching to packs, the total consumption among people who were originally consuming loose cigarettes can decrease, stay the same, or even increase compared with before the tax rise.

We include this admittedly simplified model in order to illustrate two points. First, to show that the large markets for loose cigarettes that this paper discusses are not merely of academic relevance but can substantially dampen the effect of tobacco control policies such as taxation, shaping its distributional outcomes. One consequence of this discussion is that small and incremental changes in tobacco taxation are less likely to be passed on to loose cigarettes. As noted previously, inflation may over time lead to a passing on of tax increases to stick buyers despite the denomination effect; however, this may only be in the medium to long run and may also depend on the actual structure of tobacco excises, that is, ad valorem or specific.

Second, this model provides a more precise sense of the dynamics that we need to understand in order to estimate the effects of tobacco taxation on actual cigarette markets prevailing in most LMICs. Here, the model suggests focusing on three areas of which we currently only have a very limited understanding and consequently provides a roadmap for a research agenda on this issue. First, how do market structures shape the size of the price mark-up between loose cigarettes and packs, and how does it change in reaction to price shocks such as high inflation or taxation? We could imagine a wide variety of features of these markets that could play a role: the relative size of the consumer base for loose cigarettes, government policy towards their sale, the prevalence of street vendors, the level of diversification and competition, and the nature of the denomination effect, to name just a few. However, we currently do not have sufficient data to examine these relationships in detail or predict market reactions based on pre-existing factors.

Third, we have limited information on the likelihood of people who consume loose cigarettes switching to buying packs and its determinants. Again, features of the market such as competition and the availability of alternative brands, as well as consumer demographics, could play a role here. As summarised in online supplemental appendix D, we find some indication that switching does happen and is connected to price dynamics. However, the available data does not allow us to explore this any further. Fourth, we have no information on the effects of switching towards packs on consumption intensity among former buyers of loose cigarettes, nor on the existence of consumers indifferent between acquiring sticks or packs.

What these areas have in common is a dire need for more large-scale and systematic data collection. To the best of our knowledge, the surveys used in this paper are the only sources of data on tobacco consumption or pricing which also systematically cover loose cigarettes. The country coverage in this paper is notably a substantial but still limited and not representative subset of LMIC cases. While we argue that they are sufficient

for the main arguments in this paper, exploring critical questions in more detail and drawing more attention to this issue will require the mainstreaming of this issue in data collection on cigarettes. First, there is the need for more data on the price of loose cigarettes, alongside features of the respective sellers, such as whether they also sell packs, whether they are stores or informal vendors, and where they are located. Aside from the data collected by REEP and used in this article, we are not aware of any price data for prices of loose cigarettes with a sufficiently high number of observations in order to allow sophisticated analysis. Second, the inclusion of data on smoking loose cigarettes in long-term panels on the behaviour of people who smoke would allow more research on switching between sticks and packs and on its effects on smoking intensity without requiring a dedicated survey. Third, both of these data should be complemented with qualitative evidence to help us better understand the social and cultural aspects associated with loose cigarette consumption in LMICs.

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