Impact of tobacco tax increases and industry pricing on smoking behaviours and inequalities: a mixed-methods study

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Declared competing interests of authors: Ann McNeill is a National Institute for Health Research Senior Investigator.

Published April 2020
DOI: 10.3310/phr08060

Scientific summary

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Public Health Research 2020; Vol. 8: No. 6
DOI: 10.3310/phr08060

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Background

Since 2010, the UK government has introduced various tobacco tax changes. The aim of this study was to evaluate the effectiveness of these on tobacco use and inequalities in tobacco use, and the extent to which these were influenced by tobacco industry pricing strategies.

Objectives

- Provide up-to-date knowledge of tobacco industry pricing and the extent to which this modifies the impact of tobacco taxation on public health, by examining:
  - how the tobacco industry segments factory-made and roll-your-own cigarettes by price
  - the extent to which the tobacco industry undershifts, overshifts or fully shifts tobacco tax increases to consumers, whether or not this varies by product, price segment and over time, and what proportion of price increases by segment is explained by tobacco industry price increases versus tax increases.
- Explore the impact of tobacco tax increases, as moderated by tobacco industry pricing, on smokers' behaviour, by examining:
  - the impact of price changes and the price range (the difference in price between the most and least expensive products) on quitting, or switching between products/price segments
  - the impact of the price range and price changes on consumption
  - whether or not these behaviours differ by smokers' previous product/price choice.
- Increase understanding of trends in, and the nature of, tax avoidance and evasion, by examining:
  - trends in smokers' tobacco tax avoidance and evasion, their socioeconomic status and other characteristics, and where they acquire tobacco
  - whether or not tax/price increases, particularly larger increases, are linked to tax avoidance and/or evasion
  - products most frequently acquired via tax avoidance/evasion and from which sources.
- Explore the impact of tobacco tax increases, as moderated by tobacco industry pricing, on inequalities in smoking, by examining:
  - smokers' characteristics by product/price segment
  - whether or not behaviours (quitting, switching between segments and reducing consumption) differ by socioeconomic status
  - if the proportion of change in smoking inequalities over time is attributable to cheap tobacco use.
- Synthesise findings and develop recommendations to improve the effectiveness of tobacco taxation.

Methods

There were three main data sources.

Commercial literature (2008–14)

This comprised tobacco industry reports and presentations, analyst reports and trade magazines. A total of 517 articles were identified, providing 1892 extracts: 1700 concerned 347 brands/variants, used for segmentation. Qualitative analyses of 557 quotes explored how the tobacco industry maintains profitability, smokers' reactions and the wider context facing the tobacco industry.

Nielsen data (2008–16)

Nielsen provided tobacco sales data. Nielsen's Scantrak data are based on information obtained when tobacco products are sold (electronic point-of-sale system). Nielsen models the whole UK market using electronic point-of-sale data from 87% of the UK's supermarkets, 15% of its convenience stores and 17% of Northern Ireland stores with grocery sales. The data cover different factory-made and roll-your-own products: the number of units sold, price/unit, total value and volume.

International Tobacco Control Policy Evaluation Project data (2002–14)

This was a longitudinal cohort survey of UK smokers at recruitment, retained for as long as possible even if participants had quit, with replenishment, and administered via computer-aided telephone interviewing or online. Data were mostly from surveys 1–10 (2002–14). For roll-your-own tobacco weight calculations, a comparison was made with three other International Tobacco Control Policy Evaluation Project countries' surveys (2002–15). Stratified random sampling and weights are used to obtain broadly nationally representative samples. Validity checks were carried out and analyses examined prices paid, affordability, purchasing behaviours and consumption, and, when appropriate, examined differences by dependence and socioeconomic status.

Results

Objective 1

Segmentation

Our analysis of the commercial literature and Nielsen data analysis demonstrated four factory-made cigarette price segments (premium, mid-price, value and, from 2012, subvalue) and three roll-your-own tobacco price segments (premium, mid-price and value).

Tobacco industry pricing strategies and what smokers pay for their tobacco

The commercial literature reported smokers down-trading because of increased prices (due to tax/profit generation) and the recession. The tobacco industry implemented various strategies to maintain profitability, including innovation; launching more products in lower price segments, often of the same brand as higher priced products; and using a variety of techniques to promote cheaper products, such as price marking and smaller pack sizes.

The International Tobacco Control Policy Evaluation Project 2002–14 data (6169 participants, 15,812 responses) show that the real price paid for tobacco products purchased from licit sources (supermarkets and convenience stores) increased significantly over time. The median price per stick for factory-made (cigarettes sold in) packs increased by £0.10 (2002–14), factory-made (cigarettes sold in) cartons were typically £0.01–0.02 cheaper per stick and the median price per stick for roll-your-own tobacco increased by £0.05 (2006–14). Changing between product types saved money, with roll-your-own tobacco per stick being typically less than half the price of one factory-made pack cigarette. Changing within product types (to different brands) also saved money. The price range between the cheapest and most expensive products within each category [factory-made (cigarettes sold in) packs, factory-made (cigarettes sold in) cartons and roll-your-own tobacco] was consistently wide and, for some products, widening since 2010. Thus, smokers in 2014 could buy the same type of product at real prices similar to 2002 for factory-made cigarettes and 2006 for roll-your-own tobacco. There was a greater increase in prices since 2011, when duty was higher than in previous years, but this did not prevent the widening range between the cheapest and most expensive products.

Nielsen data corroborated these findings. From 2013 to 2015, real prices of premium factory-made and roll-your-own packs increased by £1.09 and £1.16, respectively (overshifting, i.e. raising prices above the need to meet taxes), whereas subvalue packs fell by £0.06 and roll-your-own tobacco packs only increased by £0.02 (undershifting). Prices of all three roll-your-own tobacco segments increased by the highest amount post the 2011 Budget, and the range between factory-made premium and value cigarette segments declined. However, subvalue products were then introduced, with falling real prices per pack subsequently leading to a widening of the range between premium and subvalue segments.

Smaller packs (17–19 sticks) were introduced to an increasing number of brands and market share of 20-stick packs declined over the study period. For roll-your-own tobacco, smaller (10-g) packs increased towards the end of the study period and the 50-g pack market share grew slightly. Price increases per stick were seen in every segment, suggesting that the fall in price of subvalue packs was due to the declining number of sticks per pack. Cheaper segments were more likely to be price marked and price marking appeared to increase gradually over time.

Nielsen data indicated that net real revenue was considerably greater for higher than for lower priced segments, with a more marked gap within factory-made than roll-your-own segments. At the 2011 Budget, a cyclical pattern emerged involving a drop in revenue immediately post Budget with increases thereafter, with different patterns across segments and progressively more differentiation in revenue between segments. A significant proportion of price rises was from industry revenue generation, rather than tax increases, with different patterns according to tax increases. Sudden, large tax increases appeared to compromise the tobacco industry's ability to manipulate prices.

Affordability

The commercial literature suggested that tobacco products were becoming less affordable. International Tobacco Control Policy Evaluation Project data (4062 current daily smokers, 8943 observations) indicated an average annual decrease in incomes over the study period. There was an average annual increase of 2.6% in the price of factory-made cigarettes and individualised affordability decreased annually by 0.24% (2002–14). There was an average annual increase of 4.5% in the price of roll-your-own cigarettes and individualised affordability decreased annually by 0.31% (2006–14). Roll-your-own tobacco was significantly more affordable than factory-made cigarettes.

Objective 2

Smokers' responses to taxation and tobacco industry pricing strategies

Nielsen data indicated that although the overall volume of factory-made cigarettes and roll-your-own tobacco sold declined markedly, this was made up of a 17% decline in factory-made cigarettes and a 46% increase in roll-your-own tobacco, although the latter stabilised post 2012. This was reflected in the International Tobacco Control Policy Evaluation Project data (2002–14; 6169 participants, 15,812 responses), which indicated that exclusive roll-your-own tobacco use increased and exclusive factory-made cigarette use decreased. Mixed factory-made cigarettes and roll-your-own tobacco did not show a statistical linear trend across 2002–14, but increased significantly in 2010–13, from 10.2% to 18.2%. Further evidence of down-trading was evident from Nielsen data, which showed that annual volumes of premium and mid-price factory-made products declined over the study period, whereas value factory-made products increased. Similarly, premium roll-your-own tobacco sales declined, whereas roll-your-own mid-price tobacco and value tobacco sales grew, although growth slowed around 2012–13.

International Tobacco Control Policy Evaluation Project data from 2008 to 2014 (2418 participants, 4339 observations) demonstrated that, overall, the use of cheap tobacco (mid-price factory made, value factory made and roll your own) increased modestly from 72.4% to 77.6%, with a corresponding drop in premium factory-made tobacco. Value factory-made cigarettes and/or roll-your-own cigarettes were more likely to be used than premium factory-made cigarettes when there was a higher tobacco tax increase rate.

In longitudinal analyses (1304 participants, 2202 observations), the most common outcome between the baseline and outcome surveys was trading up (5.5%) and no change (66.5%), 13.5% traded down to cheaper factory-made cigarettes, 6.2% switched from factory-made cigarettes to roll-your-own cigarettes and 8.3% stopped purchasing tobacco products for at least 6 months. A high tobacco tax increase at the outcome survey was the only significant predictor of all these behaviours. We also assessed quit attempts (1304 participants, 2202 observations) and 6 months' sustained quitting (1194 participants, 2017 observations). Just over one-third (39.4%) of smokers made a quit attempt: overall, baseline tobacco type was a predictor of attempting to quit, with those smoking mid-price factory-made cigarettes and value factory-made cigarettes significantly more likely to try quitting than those using roll-your-own cigarettes. Quit attempts at outcome survey were also more likely with a 2% tax increase rate above inflation than 1% (5% consistent with 2% but non-significant). Just under 1 in 10 smokers (9.7%) sustained quitting for at least 6 months and this outcome was significantly more likely among smokers of mid-price factory-made cigarettes, value factory-made cigarettes and roll-your-own cigarettes compared with premium factory-made cigarettes at baseline, and higher tax increase rate at the outcome survey.

In the International Tobacco Control Policy Evaluation Project affordability analysis (4062 current daily smokers, 8943 observations), factory-made cigarette smokers slightly, but significantly, reduced their cigarette consumption over time; there was no significant change for roll-your-own tobacco smokers. International Tobacco Control Policy Evaluation Project data (2006–15) assessed the weight of roll-your-own tobacco/cigarettes and changes over time, in the UK, the USA, Canada and Australia (1639 participants, 3176 observations). Just over one-quarter of UK participants (25.8%) smoked roll-your-own tobacco/cigarettes (compared with 3.5% in the USA, 6.0% in Canada and 13.8% in Australia). Mean roll-your-own tobacco/cigarettes weight was lowest in the UK [0.51 g (standard deviation 0.32 g)] and Australia [0.53 g (standard deviation 0.28 g)], compared with Canada [0.76 g (standard deviation 0.45 g)] and the USA [1.07 g (standard deviation 0.51 g)]. For the UK and Australia (1349 participants, 2705 observations) there was a significant decrease equivalent to a 2% per year decrease in average weight per cigarette. Thus, for both factory-made cigarette smokers and roll-your-own tobacco smokers in the UK, tobacco consumption was reducing over time, implying that the decrease in affordability was not attributable to increasing cigarette consumption.

Objective 3

Purchasing from possible tax evasion/tax avoidance sources

Purchasing from non-UK/non-store sources (6169 participants, 15,812 responses) constituted ≤ 20% of purchases and reduced significantly over time (2002–14). If missing data were assumed to be non-UK/non-store, then the decrease was no longer significant, but there was no evidence of an increase.

Among non-UK/non-store purchases, purchasing outside the UK was most common (≥ 40%), although this decreased significantly over time, as did purchasing from informal sellers (≤ 17%). Purchasing from duty-free outlets and friends/relatives significantly increased over time. Factory-made cigarettes in cartons were the most popular purchase from non-UK/non-store sources, followed by roll-your-own cigarettes, with very few factory-made cigarettes sold in packs. Median prices for factory-made cigarettes in cartons and roll-your-own cigarettes from non-UK/non-store sources significantly increased during the study. For all product types, median prices from non-UK/non-store sources were often lower than the lowest prices in UK store-based sources. Thus, factory-made cigarettes and roll-your-own cigarettes were significantly more affordable when purchased from non-UK/non-store sources than from UK stores [International Tobacco Control Policy Evaluation Project affordability analysis (4062 current daily smokers, 8943 observations)].

In longitudinal International Tobacco Control Policy Evaluation Project analyses (854 participants, 1397 observations), overall, 7.6% reported a high frequency of buying from sources likely to be illicit. Those reporting a high frequency of illicit purchases were significantly less likely to use mid-price or value factory-made cigarettes, and significantly more likely to use roll-your-own cigarettes than premium factory-made cigarettes, than those with a low frequency. There was no significant difference in trading down, switching to roll-your-own cigarettes or in quit attempts/success between high- and low-frequency illicit purchasers.

Objective 4

Socioeconomic status differences

In the International Tobacco Control Policy Evaluation Project individualised affordability analysis (4062 current daily smokers, 8943 observations), women, older smokers, more disadvantaged smokers (as measured by education and region) and more dependent smokers, found smoking less affordable. This was similar for factory-made cigarette and roll-your-own cigarette smokers, although roll-your-own cigarettes were uniformly cheap and there was less differentiation by socioeconomic factors and dependence compared with factory-made cigarette smokers.

In the International Tobacco Control Policy Evaluation Project data, overall, more disadvantaged smokers were more likely to smoke cheap products. In the longitudinal analyses, younger smokers, single smokers and smokers with low levels of education were more likely to trade down to cheaper factory-made products. Switching to roll-your-own cigarettes was significantly more common among younger and low-income smokers. More dependent, more disadvantaged and younger smokers were more likely to roll cigarettes with less tobacco. After controlling for price segment and product smoked, there was no clear relationship between socioeconomic status and quit attempts or quitting. Thus, low socioeconomic status smokers and other vulnerable groups may have been avoiding quitting by taking advantage of the availability of cheap tobacco products.

Conclusions

Overall, the tobacco industry continues to be able to overshift taxes, thereby increasing its revenues, even when tax increases are high. Recently, in the cheapest price segments, the tobacco industry has been overshifting to a greater extent and making more revenue on roll-your-own tobacco than cheap factory-made cigarettes. There is therefore scope to increase tobacco taxes further, particularly for roll-your-own cigarettes, to reduce price differentials and recoup the public health costs of smoking. We found no evidence of illicit increases, suggesting that the government's anti-illicit strategies have been successful and need maintaining. The tobacco industry smooths the impact of tax increases by cutting profits initially and then increasing profits thereafter, but large, sudden tax increases reduce the tobacco industry's ability to manipulate prices. The tobacco industry has a variety of strategies to keep some products cheap. Some of these (e.g. price marking, small pack sizes) are now outlawed by recent legislation, but the tobacco industry can still introduce much cheaper variants for its brands (unlike in Uruguay, for example).

High above-inflation tax rises decreased affordability and increased quitting behaviours. However, the growing availability of cheap tobacco products encourages trading down to cheap factory-made products and switching to roll-your-own cigarettes rather than quitting. Thus, despite more disadvantaged smokers struggling with affordability, they were not more likely to quit than other smokers. The ability of the tobacco industry to bring cheap products to the market therefore undermined the public health gains.

Research recommendations

1. Impact of changing how tax changes are introduced (e.g. sudden intermittent or smaller continuous) on smoking prevalence and illicit sales.
2. The effectiveness of minimum pack sizes, price-marking ban and a minimum excise tax in limiting cheap products.
3. Impact of tax on initiation.
4. Impact of novel nicotine products on prices.

Funding

This project was funded by the National Institute for Health Research (NIHR) Public Health Research programme and will be published in full in *Public Health Research*; Vol. 8, No. 6. See the NIHR Journals Library website for further project information.

Public Health Research

ISSN 2050-4381 (Print)

ISSN 2050-439X (Online)

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This report

The research reported in this issue of the journal was funded by the PHR programme as project number 13/43/58. The contractual start date was in September 2014. The final report began editorial review in September 2018 and was accepted for publication in July 2019. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The PHR editors and production house have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the final report document. However, they do not accept liability for damages or losses arising from material published in this report.

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