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Cigarette Prices and Smoking Among Youth in 16 African Countries: Evidence From the Global Youth Tobacco Survey

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Abstract

Introduction: African countries have among the lowest excise taxes in the world. This paper provides new evidence on the association between cigarette prices and youth smoking in 16 African countries.

Aims and Methods: We use Global Youth Tobacco Survey (GYTS) cross-country data from approximately 67 500 participants. The relationship between prices and youth smoking in Africa is estimated using probit models for smoking participation and generalized linear models for conditional cigarette demand. Each model is estimated using local-brand and foreign-brand cigarette prices.

Results: Higher prices are associated with lower demand across African countries, for both smoking prevalence and the intensity of cigarette consumption by smokers. The estimated price elasticity of participation is -0.70 [95% CI: -1.28 to -0.12] for local-brand cigarettes and -0.71 [95% CI: -0.98 to -0.44] for foreign-brand cigarettes. The price elasticity of conditional cigarette demand is -0.44 [95% CI: -0.76 to -0.12] for local brands and -0.75 [95% CI: -0.96 to -0.53] for foreign brands. The total price elasticity of demand for youth in our sample is -1.14 for local brands and -1.46 for foreign brands.

The global and African context

- Hundreds of studies have considered the relationship between cigarette prices and demand.
- The estimated price elasticity of demand typically falls in the inelastic region.
- Young people are typically more price sensitive than older people.
- A decrease in consumption is due to two factors:
 - Decrease in smoking prevalence.
 - Decrease in smoking intensity.
- Very few studies have looked at youth smoking in Africa.
- Although smoking prevalence in Africa is low, the continent is vulnerable due to:
 - Rapid economic and population growth.
 - Weak tobacco controls.
 - Desire to attract foreign direct investment.

Context of this study

- Policy implication

- The policy implication for African countries is that excise taxes should be increased to reduce youth smoking to prevent the onset of the epidemic.

- The reality

- Excise tax rates in African countries are among the lowest in the world, and evidence on the impact of prices on tobacco consumption among youth in the region remains limited.

- Research objective

- Using individual-level data on smoking behaviour, environments, and attitudes from the GYTS, we provide new evidence on the association between cigarette prices, smoking participation, and conditional cigarette demand (ie, intensity) among youth in selected African countries.

About the Global Youth Tobacco Survey

- GYTS is a nationally representative, school-based survey that employs a standardized methodology to track tobacco use among young people across countries.
- Data collected:
 - Demographic information.
 - Cigarette use (Y/N) and consumption patterns.
 - Exposure to confounding factors, e.g. cigarette advertising, antismoking messaging, and the ease of purchasing cigarettes.
- GYTS has been conducted in 45 of the 47 WHO-AFRO countries.
- Analysis focused on 16 SSA countries that conducted a GYTS survey in, or after, 2012.

Methods

We used Cragg's (1971) two-part model of estimating demand.

Part 1: Smoking participation

- Estimating an individual's decision to smoke.
- The dependent variable is self-reported current smoking of cigarettes (among all survey respondents).
- We estimate smoking participation with a probit regression.

Part 2: Smoking intensity

- Estimates the covariates of the number of cigarettes consumed among smokers.
- The dependent variable is self-reported average number of cigarettes smoked per day (among smokers only).
- Use a generalized linear model with a normal distribution and log link to estimate the covariates of smoking intensity.

Data

Three types of independent variables used in the regression analysis.

1. Individual-level data

- Age, age squared, school grade, gender, income (“pocket money”), and parental smoking.

2. PSU (Primary Sampling Unit) level data

- Proxies for local antismoking sentiment, exposure to cigarette ads & antismoking messaging, & ease of purchasing cigarettes.

3. Country-level data

- Cigarette prices (a foreign brand and a local brand), the proportion of people living below the poverty line, and the proportion of people living in urban areas.



Interpretation of the results

- Part 1 of Cragg's model:
 - The coefficient on cigarette price yields the price elasticity of smoking participation/smoking prevalence.
- Part 2 of Cragg's model:
 - The coefficient on cigarette price yields the price elasticity of conditional cigarette/ smoking intensity.
- Total price elasticity of demand
 - Sum of the prevalence price elasticity and the conditional price elasticity.

Sample means of individual-level variables

Country	Survey year	% Current smokers	Cigarettes smoked per month per smoker	Age	% Male	% Receiving pocket money	% With at least one parent that smokes	Number of observations
Algeria	2013	9.1	118.1	14.8	47.1	78.7	29.8	6 049
Cameroon	2014	6.6	53.4	14.2	53.1	78.0	15.9	2 768
Gabon	2014	9.1	37.1	15.0	49.0	78.9	15.5	1 708
The Gambia	2017	8.5	19.4	14.8	47.3	88.2	24.5	11 589
Ghana	2017	3.0	60.1	14.2	50.4	89.6	10.0	5 213
Kenya	2013	5.0	24.4	14.4	50.8	51.7	13.2	1 818
Madagascar	2018	11.2	33.0	14.4	48.0	78.6	18.9	2 580
Mauritania	2018	13.2	92.6	14.0	51.7	77.4	25.1	3 252
Mauritius	2016	15.2	49.2	13.9	48.4	84.5	31.9	3 970
Mozambique	2013	2.3	27.8	15.1	52.8	72.1	7.4	5 086
Senegal	2013	5.6	45.1	14.7	53.0	56.8	12.7	1 619
Seychelles	2015	15.6	42.7	13.9	49.2	93.6	31.0	2 312
Sierra Leone	2017	4.0	25.7	15.1	50.0	60.9	23.3	6 253
Tanzania	2016	1.3	68.9	14.0	48.4	58.7	9.1	3 627
Uganda	2018	4.1	13.5	14.9	50.6	68.3	8.2	3 329
Zimbabwe	2014	17.8	155.5	14.0	48.6	69.5	25.0	5 553

Sample means of country-level and PSU-level variables

Country-level					PSU-level				
Country	% living below the poverty line	% living in urban areas	Local brand PPP adjusted constant 2017 dollars	Foreign brand PPP adjusted constant 2017 dollars	Advertising exposure rate	Antitobacco messaging exposure rate	Anti-smoking sentiment	Ease of access to cigarettes	Number of PSUs
Algeria	0.4	70	2.7	4.6	0.66	0.73	0.92	0.22	43
Cameroon	26.0	54	1.5	5.4	0.70	0.70	0.77	0.32	25
Gabon	3.4	88	2.1	3.7	0.65	0.75	0.83	0.23	24
Gambia	10.3	61	2.6	4.7	0.50	0.52	0.81	0.45	57
Ghana	12.7	55	1.4	5.6	0.52	0.59	0.67	0.41	26
Kenya	37.1	25	1.7	5.6	0.65	0.71	0.46	0.22	25
Madagascar	78.8	37	1.6	5.6	0.72	0.72	0.94	0.30	26
Mauritania	6.0	54	1.2	7.9	0.54	0.67	0.66	0.45	25
Mauritius	0.2	41	6.6	6.9	0.58	0.71	0.67	0.42	75
Mozambique	63.7	33	1.6	5.1	0.63	0.65	0.81	0.41	19
Senegal	38.5	45	2.5	4.3	0.49	0.81	0.76	0.31	35
Seychelles	1.2	55	13.0	16.1	0.64	0.64	0.72	0.39	118
Sierra Leone	54.7	42	1.8	2.2	0.63	0.64	0.82	0.34	25
Tanzania	49.4	32	3.6	–	0.52	0.65	0.76	0.48	26
Uganda	41.3	24	2.0	6.7	0.58	0.63	0.77	0.48	26
Zimbabwe	33.9	23	2.3	3.8	0.65	0.59	0.49	0.40	26

Determinants of smoking participation

	Local brand prices (N = 59 447)	Foreign brand prices (N = 55902)
Log of cigarette price	Negative **	Negative ***
Local rate of exposure to cigarette advertising	Positive ***	Not sign.
Local rate of exposure to anti-smoking messages	Not sign.	Negative ***
Anti-smoking sentiment	Not sign	Not sign.
Youth access	Negative ***	Negative *
Age	Negative ***	Negative ***
Age ²	Positive ***	Positive ***
Male	Positive ***	Positive ***
Pocket money	Positive ***	Positive ***
Parental smoking	Positive ***	Positive ***
Grade 8 (relative to grade 7)	Positive **	Positive *
Grade 9 (relative to grade 7)	Not sign.	Not sign.
Grade 10 (relative to grade 7)	Not sign.	Not sign.
Grade 11 (relative to grade 7)	Positive ***	Positive ***
% of the population living below PPP\$ 1.90 poverty line	Not sign.	Negative ***
% of the population living in urban areas	Not sign.	Negative ***
Participation price elasticity	-0.703 **	-0.710 ***

What the
results mean:

Smoking
participation

- **CIGARETTE PRICES**
 - Higher cigarette prices are significantly (at the 5% level for local brands and at the 1% level for international brands) associated with lower smoking prevalence.
 - The estimated price elasticity of participation is -0.70 for local-brand cigarettes and -0.71 for foreign-brand cigarettes.
- **INDIVIDUAL-LEVEL CHARACTERISTICS**
 - Males have a higher probability of smoking than females.
 - The probability of smoking increases with age and education.
 - Receiving pocket money and having at least one parent that smokes are significant predictors of smoking participation.
- **LOCAL TOBACCO-RELATED ENVIRONMENT**
 - More exposure to cigarette advertising is associated with higher youth smoking participation for local brands, but not foreign brands.
 - Youth are less likely to smoke in areas where it is harder for them to purchase cigarettes.

Determinants of smoking intensity

	Local brand prices (N = 4002)	Foreign brand prices (N = 3962)
Log of cigarette price	-0.444 ***	-0.746 ***
Local rate of exposure to cigarette advertising	Not sign.	Not sign.
Local rate of exposure to anti-smoking messages	Negative ***	Negative ***
Anti-smoking sentiment	Not sign.	Not sign.
Youth access	Not sign.	Not sign.
Age	Negative **	Negative ***
Age ²	Positive **	Positive ***
Male	Not sign.	Not sign.
Pocket money	Not sign.	Not sign.
Parental smoking	Positive ***	Positive ***
Grade 8 (relative to grade 7)	Not sign.	Not sign.
Grade 9 (relative to grade 7)	Not sign.	Not sign.
Grade 10 (relative to grade 7)	Not sign.	Not sign.
Grade 11 (relative to grade 7)	Positive ***	Positive ***
% of the population living below PPP\$ 1.90 poverty line	Negative ***	Negative ***
% of the population living in urban areas	Not sign.	Negative ***
Price elasticity of smoking intensity	-0.444 ***	-0.746***

What the
results mean:

Smoking
intensity

- **CIGARETTE PRICES**
 - Higher cigarette price is significantly associated with lower cigarette consumption among smokers.
 - Price elasticity of conditional cigarette demand is -0.44 for local brands, and -0.75 for foreign brands.
- **INDIVIDUAL-LEVEL CHARACTERISTICS**
 - Only parental smoking and age affect the intensity of cigarette consumption.
 - Getting pocket money or being male has no significant effect on the number of cigarettes smoked.
- **LOCAL TOBACCO-RELATED ENVIRONMENT**
 - No evidence that antismoking sentiment, cigarette advertising, or youth access influence the number of cigarettes smoked by current smokers.

Key results and policy implications

- OVERALL INTERPRETATION OF THE RESULTS

- Non-price policy-related variables are not consistently significant covariates, but where they are significant, they align with prior expectations.
- Cigarette prices are negatively associated with smoking participation and smoking intensity.

- PRICE ELASTICITY ESTIMATES

- Total price elasticity of demand by youths is -1.147 for the local-brand specification and -1.456 for the foreign-brand specification.
- Elastic demand: This makes excise tax increases a particularly effective tobacco control intervention to reduce youth smoking.

- PARENTAL SMOKING

- Parental smoking significantly increases smoking participation and smoking.
- Increases in excise tax has both a direct effect on youth smoking, and an indirect effect (through parental smoking).



Thank you!

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