

Evaluating Sensible Tobacco Enforcement and Tobacco 21 Laws in New York City



Shannon M. Farley, DrPH, MPH and John Jasek, MPA
Bureau of Chronic Disease Prevention & Tobacco Control
New York City Department of Health and Mental Hygiene

Outline

- Sensible Tobacco Enforcement (STE) and Tobacco 21
- Why evaluate together?
- Evaluation Plans for STE and Tobacco 21
- Preliminary Evaluation Findings

STE: Cutting Off Sources of Cheap Tobacco

Illicit trade

- Tough and new penalties on cigarette tax evasion
- Minimum price floor of \$10.50 per pack of cigarettes

Discounts

- Discount redemption ban
- BOGO ban
- No incentive tobacco purchases
- No sales below list price

Single Cigars

- 4-pack requirement for cigars < \$3
- Discount ban

Little Cigars and Cigarettes

- 20 pack requirement
- Minimum price floor of \$10.50



Tobacco 21: Reduce Initiation and Prevent Smoking

Prohibit tobacco sales to under 21

- Includes cigarettes, cigars, chewing tobacco, powdered tobacco, any other tobacco products

Prohibit e-cigarette sales to under 21

- Includes all electronic vapor products



Why STE and Tobacco 21?

- New York City (NYC) passed the STE and Tobacco 21 laws in November 2013
- After successfully overcoming a legal challenge about a component of STE, both laws were simultaneously implemented on August 1, 2014
- Due to the concurrent implementation, the impact needs to be considered and evaluated together



STE Evaluation Plan

PURPOSE:

- To preliminarily assess the impact of the law by monitoring
 - 1) price paid for cigarettes,
 - 2) pack size and price paid for little cigars, and
 - 3) pack size and price paid for cigars and cigarillos

METHODS:

- Quasi-experimental
 - Compare sales trends in NYC vs. other NYS counties pre and post law
 - Pre-time period: May 2010-July 2014
 - Post-time period: August 2014-May 2015
 - Nielsen sales data from stores with sales >\$2M
 - Intermittent time series models examined changes at the time of implementation and in the time period after implementation
 - Models accounted for autocorrelation of data and controlled for time
 - Prices were adjusted for inflation



Tobacco 21 Evaluation Plan

PURPOSE:

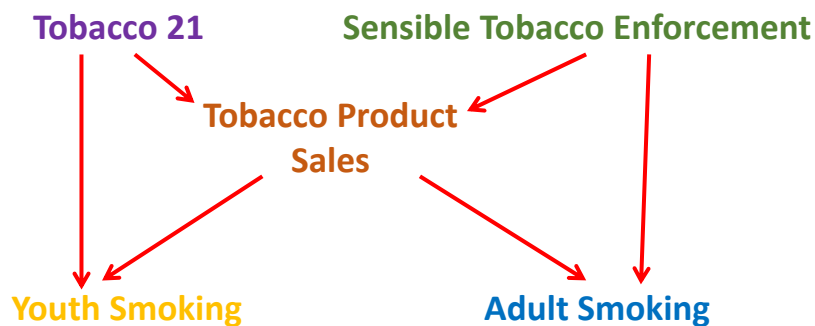
- To preliminarily assess the impact of the law by monitoring youth:
 - 1) smoking prevalence,
 - 2) prevalence of use of other tobacco products, and
 - 3) initiation in the past 12 months

METHODS:

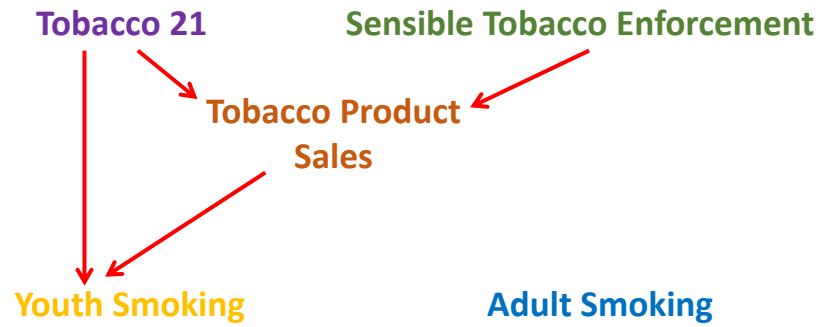
- Quasi-experimental
 - Examine local trends before and after the law
 - Pre-time period: 2013
 - Post-time period: 2015
 - NYC 2013 & 2015 Youth Risk Behavior Survey data
 - Logistic regression models examined changes over time pre and post implementation
 - Adjusted for sex, race/ethnicity, and age



STE and Tobacco 21 Impact



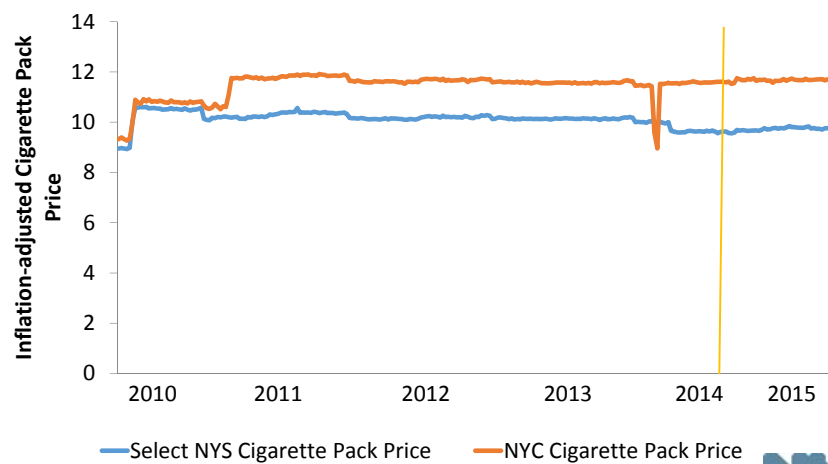
STE and Tobacco 21 Impact



NYC
Health

Sales Data

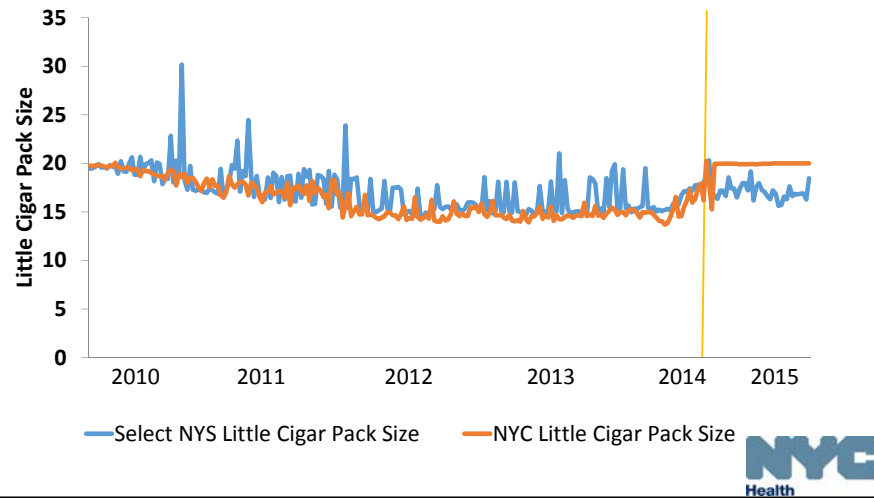
Cigarette Pack Prices Between May 2010-May 2015



NYC
Health

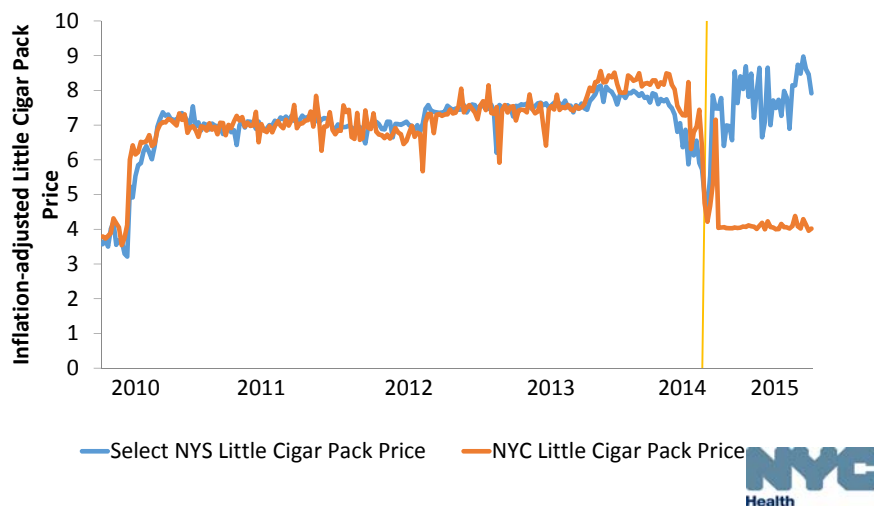
Sales Data

Little Cigar Pack Sizes Between May 2010-May 2015



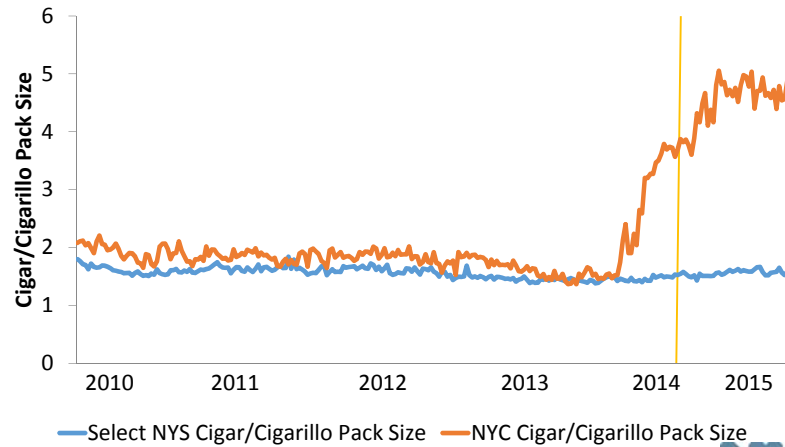
Sales Data

Little Cigar Pack Prices Between May 2010-May 2015



Sales Data

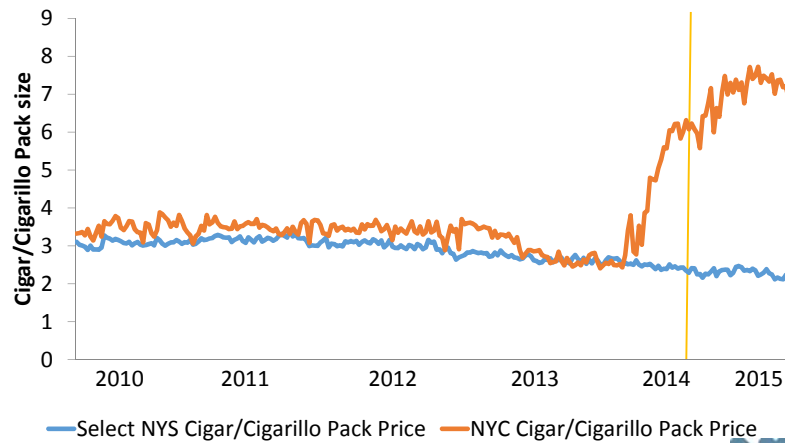
Cigar/Cigarillo Pack Size Between May 2010-May 2015



NYC
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Sales Data

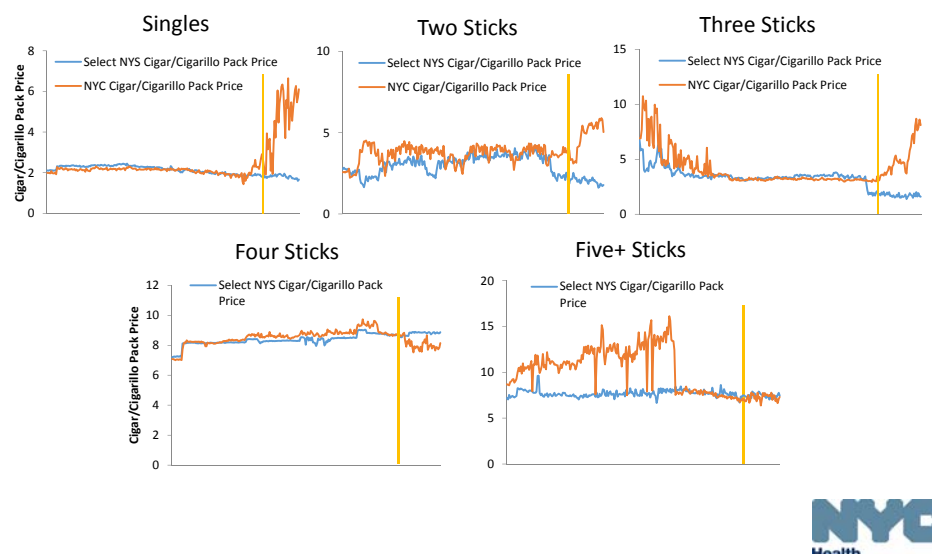
Cigar/Cigarillo Pack Price Between May 2010-May 2015



NYC
Health

Sales Data

Cigar/Cigarillo Pack Price Between May 2010-May 2015



Youth Data

NYC YRBS 2013 & 2015 Current Smoker Demographics

	2013		2015		2013 vs 2015
	%	95% CIs	%	95% CIs	p-values
Current smoker	8.2	(6.9, 9.7)	5.8	(4.7, 7.0)	0.0074
Sex					
Female	7.0	(5.8, 8.4)	4.7	(3.9, 5.7)	0.0049
Male	9.2	(7.5, 11.2)	6.6	(5.1, 8.4)	0.0358
Race/Ethnicity					
White	15.2	(11.0, 20.6)	12.6	(9.4, 16.8)	0.4066
Black	4.0	(2.5, 6.2)	3.3	(2.2, 4.8)	0.5422
Hispanic	9.5	(8.0, 11.3)	5.3	(4.1, 6.7)	0.0004
Asian	5.8	(4.3, 7.7)	4.8	(3.5, 6.5)	0.3805
Other	9.8	(6.7, 14.1)	7.0	(4.7, 10.2)	0.2169
Age					
<=14	5.7	(4.3, 7.4)	3.3	(2.0, 5.4)	0.0343
15	8.1	(6.0, 10.7)	4.7	(3.6, 6.1)	0.0119
16	7.9	(6.7, 9.3)	6.2	(3.9, 9.7)	0.2770
17+	11.2	(8.9, 14.1)	9.2	(7.0, 11.9)	0.2422

Youth Data

NYC YRBS 2013 & 2015 Current Cigar User Demographics

	2013		2015		2013 vs 2015
	%	95% CIs	%	95% CIs	p-values
Current cigar user	7.7	(6.7, 8.8)	5.7	(4.9, 6.7)	0.0060
Sex					
Female	6.3	(5.5, 7.3)	3.4	(2.8, 4.2)	<.0001
Male	8.7	(7.3, 10.4)	7.7	(6.5, 9.2)	0.3615
Race/Ethnicity					
White	9.7	(7.2, 12.9)	7.8	(5.6, 10.8)	0.3376
Black	5.9	(4.3, 7.9)	4.2	(3.0, 5.9)	0.1545
Hispanic	8.2	(6.9, 9.7)	6.1	(4.8, 7.7)	0.0432
Asian	5.9	(4.4, 7.8)	4.1	(2.1, 7.9)	0.2704
Other	9.0	(6.2, 13.0)	6.8	(4.6, 9.8)	0.2955
Age					
<=14	6.2	(4.6, 8.3)	4.4	(3.2, 6.2)	0.1319
15	8.2	(6.2, 10.7)	5.6	(4.1, 7.4)	0.0669
16	8.7	(7.6, 10.0)	5.5	(3.6, 8.3)	0.0135
17+	7.6	(6.3, 9.0)	7.5	(5.5, 10.1)	0.9521



Youth Data

NYC YRBS 2013 & 2015 Current Smokeless User Demographics

	2013		2015		2013 vs 2015
	%	95% CIs	%	95% CIs	p-values
Current smokeless user	4.4	(3.6, 5.4)	3.1	(2.7, 3.7)	0.0110
Sex					
Female	3.0	(2.3, 4.1)	1.6	(1.2, 2.1)	0.0036
Male	5.5	(4.3, 6.9)	4.4	(3.6, 5.3)	0.1589
Race/Ethnicity					
White	4.3	(3.0, 6.1)	2.9	(1.7, 5.0)	0.2072
Black	4.2	(2.8, 6.1)	2.1	(1.5, 3.1)	0.0247
Hispanic	4.3	(3.3, 5.7)	3.7	(2.6, 5.1)	0.4556
Asian	2.5	(1.4, 4.3)	1.6	(0.7, 3.3)	0.3182
Other	7.5	(4.6, 11.9)	5.4	(3.6, 7.9)	0.3123
Age					
<=14	4.9	(3.6, 6.7)	3.4	(2.5, 4.7)	0.1200
15	4.7	(3.4, 6.3)	2.8	(1.8, 4.3)	0.0506
16	3.5	(2.1, 5.7)	3.1	(2.2, 4.3)	0.7242
17+	4.5	(3.5, 5.7)	3.2	(2.3, 4.3)	0.0721



Youth Data

NYC YRBS 2013 & 2015 Combustible User (Cigarette or Cigar) Demographics

	2013		2015		2013 vs 2015
	%	95% CIs	%	95% CIs	p-values
Combustible user	12.5	(11.1, 14.1)	9.0	(7.8, 10.4)	0.0007
Sex					
Female	10.9	(9.6, 12.4)	6.6	(5.6, 7.7)	<0.0001
Male	13.7	(11.7, 16.0)	11.1	(9.4, 13.0)	0.0618
Race/Ethnicity					
White	18.8	(14.7, 23.7)	16.6	(13.1, 20.7)	0.4607
Black	8.3	(6.2, 11.2)	5.9	(4.4, 7.9)	0.1124
Hispanic	13.8	(11.8, 16.1)	8.9	(7.3, 10.8)	0.0006
Asian	9.0	(7.1, 11.2)	7.0	(5.0, 9.6)	0.1891
Other	14.9	(10.9, 20.1)	10.5	(7.9, 13.9)	0.1170
Age					
<=14	9.3	(7.7, 11.3)	6.3	(4.5, 8.7)	0.0264
15	12.6	(10.1, 15.6)	7.9	(6.4, 9.9)	0.0049
16	13.5	(11.9, 15.2)	9.3	(6.4, 13.3)	0.0298
17+	14.7	(12.3, 17.4)	12.8	(10.0, 16.3)	0.3659



Youth Data

NYC YRBS 2013 & 2015 Ever Tried Cigarettes Demographics

	2013		2015		2013 vs 2015
	%	95% CIs	%	95% CIs	p-values
Ever tried cigarettes	26.8	(24.8, 29.0)	22.0	(20.3, 23.8)	0.0006
Sex					
Female	25.8	(23.5, 28.3)	20.5	(18.3, 22.9)	0.0016
Male	27.6	(25.2, 30.2)	23.3	(21.1, 25.7)	0.0125
Race/Ethnicity					
White	35.8	(32.3, 39.4)	29.5	(24.9, 34.5)	0.0376
Black	21.0	(17.6, 24.8)	17.1	(14.1, 20.7)	0.1233
Hispanic	30.4	(27.9, 33.1)	23.2	(20.4, 26.2)	0.0004
Asian	18.9	(16.8, 21.1)	20.4	(17.2, 24.1)	0.4544
Other	33.8	(27.8, 40.4)	26.8	(19.9, 35.0)	0.1589
Age					
<=14	20.2	(17.4, 23.4)	16.2	(14.2, 18.4)	0.0293
15	25.6	(22.4, 29.2)	18.3	(16.2, 20.6)	0.0004
16	27.3	(24.0, 30.8)	23.2	(19.6, 27.3)	0.1162
17+	34.6	(32.3, 37.0)	31.3	(27.6, 35.3)	0.1504



Youth Data

NYC YRBS 2013 & 2015 Tried Cigarettes in the Past 12 Months Demographics

	2013		2015		2013 vs 2015
	%	95% CIs	%	95% CIs	p-values
Tried cigarettes past 12 mo	11.5	(10.0, 13.1)	10.0	(8.9, 11.1)	0.1291
Sex					
Female	11.6	(9.9, 13.5)	9.1	(7.9, 10.6)	0.0295
Male	11.0	(9.2, 13.2)	10.4	(8.8, 12.2)	0.6337
Race/Ethnicity					
White	14.1	(12.1, 16.3)	13.0	(10.7, 15.8)	0.5256
Black	8.4	(6.2, 11.3)	6.2	(5.2, 7.4)	0.1120
Hispanic	13.7	(12.0, 15.5)	11.0	(9.3, 13.1)	0.0424
Asian	7.0	(5.3, 9.2)	9.1	(6.9, 11.8)	0.1904
Other	14.9	(11.0, 20.1)	13.8	(10.1, 18.6)	0.7129
Age					
<=14	10.6	(8.7, 12.8)	9.0	(7.0, 11.7)	0.3301
15	11.7	(9.1, 14.9)	9.1	(7.4, 11.2)	0.1413
16	11.2	(9.2, 13.6)	10.2	(8.0, 13.0)	0.5685
17+	12.4	(10.7, 14.3)	11.7	(10.1, 13.6)	0.5959



Youth Data

NYC YRBS Models

Outcomes	Current smoker	Current cigar user	Combustible (cigarette or cigar) user	Current smokeless user	Ever tried cigarettes	Tried cigarettes in the past 12 months
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
2015 v 2013	0.673 (0.559, 0.809)	0.737 (0.610, 0.889)	0.694 (0.596, 0.808)	0.688 (0.543, 0.870)	0.771 (0.692, 0.858)	0.855 (0.737, 0.991)
Sex						
Male v Female	1.371 (1.146, 1.640)	1.754 (1.466, 2.098)	1.469 (1.269, 1.701)	2.206 (1.737, 2.800)	1.140 (1.024, 1.268)	1.037 (0.894, 1.201)
Race/Ethnicity						
Black v White	0.228 (0.166, 0.312)	0.570 (0.427, 0.760)	0.359 (0.283, 0.454)	1.005 (0.686, 1.473)	0.464 (0.390, 0.553)	0.504 (0.396, 0.640)
Hispanic v White	0.501 (0.400, 0.628)	0.827 (0.644, 1.061)	0.609 (0.501, 0.741)	1.254 (0.885, 1.777)	0.752 (0.649, 0.872)	0.897 (0.735, 1.095)
Asian v White	0.341 (0.249, 0.467)	0.558 (0.379, 0.824)	0.405 (0.301, 0.544)	0.624 (0.366, 1.062)	0.495 (0.404, 0.607)	0.558 (0.416, 0.748)
Other v White	0.568 (0.392, 0.824)	0.903 (0.622, 1.310)	0.686 (0.503, 0.936)	2.024 (1.270, 3.226)	0.879 (0.689, 1.121)	1.057 (0.769, 1.455)
Age						
15 v <=14	1.547 (1.148, 2.086)	1.293 (0.974, 1.716)	1.368 (1.079, 1.735)	0.930 (0.669, 1.293)	1.276 (1.081, 1.507)	1.142 (0.921, 1.416)
16 v <=14	1.722 (1.278, 2.321)	1.422 (1.088, 1.858)	1.594 (1.271, 1.999)	0.823 (0.581, 1.165)	1.599 (1.353, 1.889)	1.218 (0.978, 1.518)
17+ <=14	2.890 (2.192, 3.810)	1.605 (1.247, 2.067)	2.141 (1.727, 2.653)	1.013 (0.750, 1.370)	2.341 (1.998, 2.742)	1.357 (1.111, 1.658)

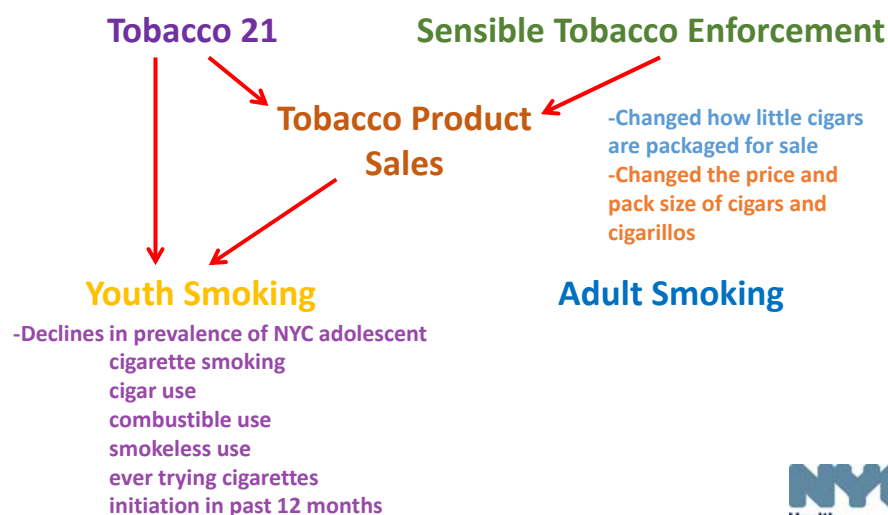


STE and Tobacco 21 Evaluation Limitations

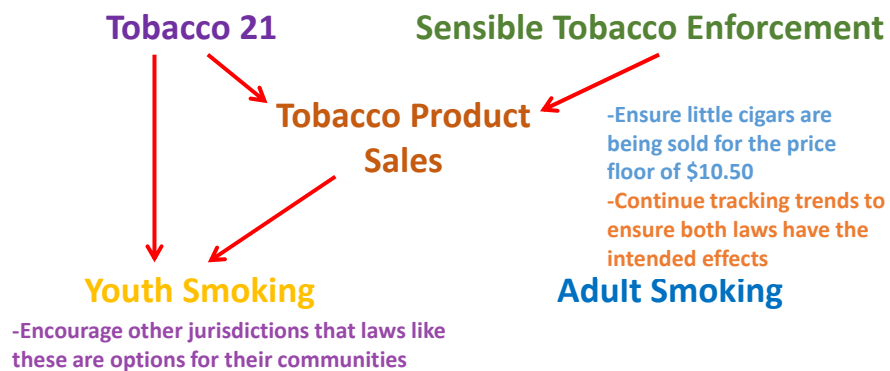
- STE
 - Only includes stores with >\$2M in sales, excludes most convenience stores/bodegas that are the majority of tobacco retailers in NYC, also excludes sales from Native American reservations and the black market
 - Depends on scanner information which may be entered incorrectly and we have no means to account or fix it
 - Sales data are modestly influenced by adolescent tobacco use, as they only represent a small proportion of tobacco users
- Tobacco 21
 - Only includes public high school students
 - Data are cross-sectional, so unable to draw causal inferences
- Both
 - STE and Tobacco 21 were implemented simultaneously so results cannot be attributed to only one law



STE and Tobacco 21 Preliminary Conclusions



STE and Tobacco 21 Preliminary Conclusions



Thank you!



Shannon M. Farley, DrPH, MPH
 Director, Research & Evaluation
 Bureau of Chronic Disease Prevention & Tobacco Control
 New York City Department of Health and Mental Hygiene
sfarley@health.nyc.gov

Youth Data

NYC YRBS Models

Outcomes	Current smoker	Current cigar user	Combustible user (cigarette or cigar)	Current smokeless user	Ever tried cigarettes	Tried cigarettes in the past 12 months
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
2015 v 2013	0.597 (0.467, 0.762)	1.026 (0.764, 1.377)	0.723 (0.593, 0.882)	0.650 (0.451, 0.938)	0.792 (0.707, 0.889)	1.044 (0.874, 1.248)
Sex						
Male v Female	1.086 (0.856, 1.377)	1.610 (1.219, 2.125)	1.465 (1.210, 1.774)	1.624 (1.160, 2.274)	1.082 (0.965, 1.213)	0.837 (0.699, 1.003)
Race/Ethnicity						
Black v White	0.244 (0.164, 0.362)	0.807 (0.501, 1.299)	0.309 (0.227, 0.422)	1.225 (0.713, 2.104)	0.500 (0.416, 0.601)	0.668 (0.492, 0.907)
Hispanic v White	0.511 (0.379, 0.689)	0.844 (0.575, 1.240)	0.512 (0.397, 0.660)	1.124 (0.713, 1.774)	0.782 (0.656, 0.956)	1.072 (0.826, 1.391)
Asian v White	0.439 (0.292, 0.659)	0.811 (0.448, 1.469)	0.422 (0.290, 0.615)	0.758 (0.369, 1.562)	0.528 (0.425, 0.656)	0.726 (0.517, 1.021)
Other v White	0.588 (0.355, 0.976)	0.632 (0.370, 1.079)	0.476 (0.305, 0.742)	2.393 (1.243, 4.608)	0.898 (0.693, 1.163)	1.055 (0.684, 1.628)
Age						
15 v <=14	1.427 (0.978, 2.083)	2.089 (1.311, 3.330)	1.732 (1.274, 2.355)	0.677 (0.406, 1.129)	1.228 (1.028, 1.468)	0.899 (0.701, 1.153)
16 v <=14	1.609 (1.115, 2.322)	1.896 (1.229, 2.924)	1.848 (1.370, 2.493)	0.622 (0.378, 1.022)	1.572 (1.317, 1.877)	1.096 (0.841, 1.429)
17+ v <=14	2.844 (1.994, 4.055)	1.877 (1.227, 2.870)	2.877 (2.160, 3.832)	0.695 (0.441, 1.097)	2.323 (1.961, 2.752)	0.972 (0.752, 1.255)
Smoker y v n		26.473 (18.894, 37.091)		3.016 (1.671, 5.442)		12.957 (9.995, 16.798)
Cigars y v n	26.276 (19.048, 36.245)			12.799 (7.615, 21.511)	8.308 (6.481, 10.649)	1.431 (0.988, 2.073)
Smokeless y v n	3.227 (1.880, 5.538)	13.081 (7.896, 21.670)	22.964 (15.316, 34.434)		3.760 (2.587, 5.465)	1.771 (1.064, 2.948)
Initiate past 12m v not	13.014 (10.131, 16.717)	1.634 (1.141, 2.340)	13.519 (10.960, 16.676)	1.932 (1.202, 3.104)		
Smoker y v n		26.473 (18.894, 37.091)		3.016 (1.671, 5.442)		12.957 (9.995, 16.798)

National Youth Data

National YTS Models

	Current smoker		Current cigar user		Current smokeless user		Current e-cigarette user		Dual cigarette/e-cig		Tri cigarette/e-cig/cigar		Ever tried Cigarettes		Tried Cigarettes in last 12m	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
2015 v 2013	0.77 (0.6, 0.9)		0.56 (0.5, 0.7)		0.94 (0.8, 1.2)		1.86 (1.5, 2.3)		1.99 (1.6, 2.5)		1.54 (1.2, 2.0)		0.71 (0.6, 0.8)		0.89 (0.8, 1.0)	
Sex																
Male v Female	0.75 (0.6, 0.9)		1.67 (1.4, 1.9)		6.75 (5.1, 8.9)		1.17 (0.9, 1.5)		0.82 (0.6, 1.0)		1.28 (0.9, 1.7)		0.89 (0.8, 1.0)		0.88 (0.8, 1.0)	
Race/Ethnicity																
Black v White	0.56 (0.4, 0.7)		2.99 (2.5, 3.6)		0.18 (0.1, 0.3)		0.35 (0.2, 0.6)		0.27 (0.2, 0.4)		0.60 (0.4, 1.0)		1.12 (1.0, 1.3)		0.93 (0.8, 1.1)	
Hispanic v White	0.91 (0.8, 1.1)		1.22 (1.0, 1.5)		0.34 (0.3, 0.5)		0.88 (0.7, 1.1)		0.85 (0.7, 1.1)		1.26 (0.9, 1.7)		1.47 (1.3, 1.6)		1.43 (0.8, 2.4)	
Asian v White	0.42 (0.3, 0.7)		0.60 (0.4, 1.0)		0.24 (0.1, 0.5)		0.72 (0.4, 1.5)		0.40 (0.2, 0.8)		0.38 (0.1, 1.1)		0.65 (0.5, 0.8)		0.57 (0.4, 0.8)	
Other v White	1.47 (0.7, 2.9)		1.48 (0.8, 2.6)		0.28 (0.1, 0.7)		1.21 (0.6, 2.4)		1.10 (0.5, 2.3)		2.00 (0.9, 4.5)		1.87 (1.3, 2.8)		1.43 (0.8, 2.4)	
Age																
15 v <=14	1.58 (1.1, 2.3)		1.04 (0.8, 1.4)		1.25 (0.8, 2.0)		0.94 (0.6, 1.5)		1.19 (0.8, 1.9)		1.11 (0.6, 2.0)		1.31 (1.1, 1.6)		0.95 (0.8, 1.2)	
16 v <=14	1.90 (1.3, 2.7)		1.57 (1.2, 2.1)		1.81 (1.2, 2.8)		1.08 (0.7, 1.7)		1.53 (1.0, 2.3)		1.38 (0.8, 2.4)		1.75 (1.5, 2.1)		1.05 (0.8, 1.3)	
17+ v <=14	2.71 (2.0, 3.8)		2.34 (1.7, 3.1)		1.70 (1.1, 2.6)		0.96 (0.6, 1.5)		1.72 (1.1, 2.6)		2.05 (1.2, 3.5)		2.18 (1.8, 2.6)		0.95 (0.8, 1.2)	
Smoker y v n			10.69 (8.7, 13.1)		5.86 (4.4, 7.9)		51.94 #####								4.12 (3.3, 5.1)	
Cigars y v n	10.44 (8.5, 12.8)				3.62 (2.7, 4.8)		2.22 (1.7, 2.9)		10.64 (8.2, 13.8)				6.51 (5.5, 7.8)		1.39 (1.1, 1.8)	
Smokeless y v n	5.12 (3.7, 7.1)		3.71 (2.8, 4.9)				1.44 (1.1, 2.0)		3.55 (2.6, 4.9)		10.83 (7.7, 15.1)		5.47 (4.2, 7.2)		0.89 (0.6, 1.2)	
e-cig y v n	43.80 (31.8, 60.3)		2.43 (1.8, 3.2)		1.46 (1.0, 2.0)								27.18 (18.1, 40.9)		0.97 (0.7, 1.3)	
Initiate past 12m v not	3.79 (3.1, 4.7)		1.65 (1.3, 2.1)		1.11 (0.8, 1.5)		1.11 (0.8, 1.5)		1.79 (1.3, 2.4)		1.36 (1.0, 1.9)					

Full Evaluation Plan Metrics

STE

- Changes in price paid for cigarettes
- Prevalence and use of discounts and promotions
- Use of other tobacco products
- Untaxed cigarettes

T21

- Youth and young adult smoking prevalence
- Youth and young adult never smoking prevalence
- Youth and young adult age of initiation
- Youth social sources of cigarettes prevalence
- Youth proof of age prevalence

