pennsylvania
DEPARTMENT OF HEALTH

2013 ANNUAL SYNAR REPORT
Tobacco Sales to Youth

Introduction

The Synar survey was established in July 1992 when Congress enacted the Alcohol, Drug Abuse and Mental Health Administration (ADAMHA) Reorganization Act (P.L. 102-321), which includes the Synar Amendment (named for its sponsor, former congressman Mike Synar of Oklahoma). Two core requirements of this amendment: 1) enact legislation prohibiting the sale of tobacco products to minors and 2) conduct random, unannounced inspections of outlets that sell tobacco. Pennsylvania's Annual Synar survey is designed to satisfy this federally regulated requirement and is intended to estimate the rate at which outlets sell cigarettes to minors. The rate is also known as the retail violation rate (RVR) because retailers violate Pennsylvania law when they sell cigarettes to minors.

The survey is conducted by youth buyers, age 15-17, who attempt to purchase cigarettes from a sample of Pennsylvania cigarette retailers. The possible outcomes for a survey attempt are: the youth was sold cigarettes, the youth was refused cigarettes or the youth never made an attempt to buy them. For each sampled outlet, one of the three outcomes is recorded, and the violation rate is calculated from the eligible outlets attempted. The 2013 survey was conducted during the summer of 2013.

Statewide Results

In 2013, an estimated 8 to 13 percent of Pennsylvania cigarette retailers sold cigarettes to minors. The estimate was calculated from the results of the 2013 Synar survey and used a 95 percent confidence interval with a standard deviation of 1.2.

Table 1. 2013 Statewide Results

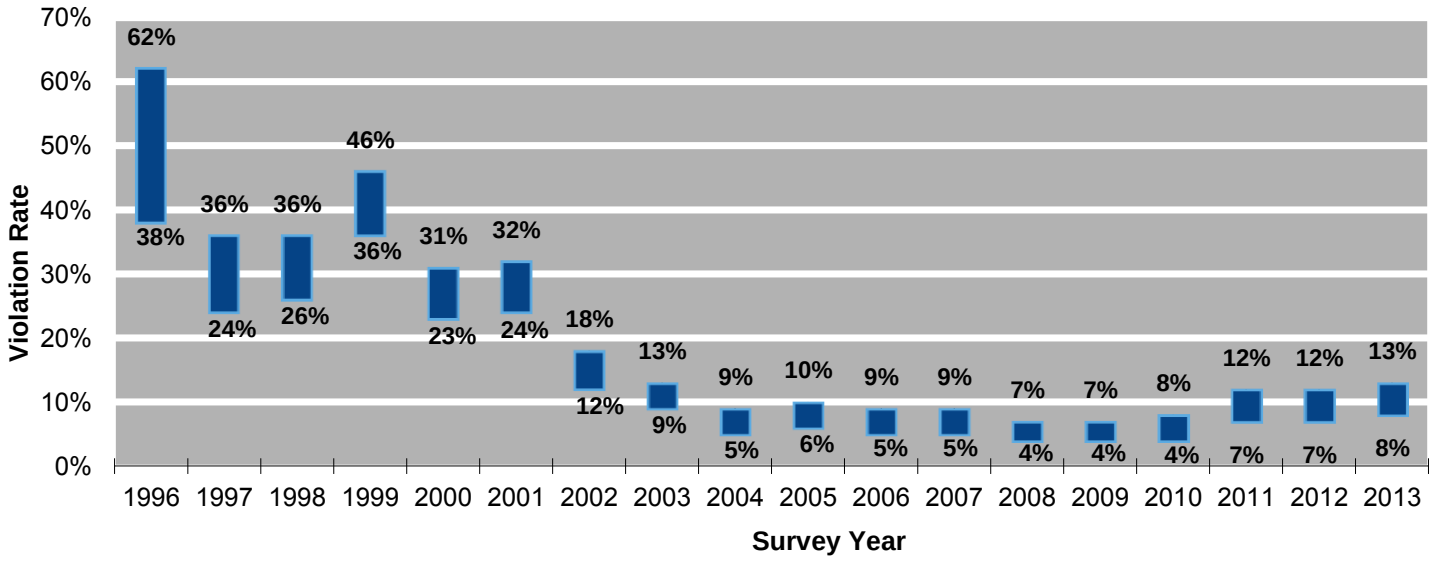
Retail Violation Rate (%)	95% C.I.
11	(8, 13)

Note: The RVR and CI are rounded to the nearest whole number.

Historical Results

Pennsylvania has annually conducted the Synar survey since 1996. The history of the Pennsylvania violation rates are displayed in Graph 1. Significance tests (Rao-Scott chi-square) were used to examine the relationships between the 2013 statewide violation rate and the prior survey violation rates that used the current survey design (2004-2013). The tests demonstrated that the 2013 violation rate is not statistically different from the 2005, 2011 and 2012 violation rates but is statistically different from the 2004, 2006, 2007, 2008, 2009 and 2010 violation rates.

Graph 1. Pennsylvania Retail Violation Rates (1996-2013)



Results by Region

Prior to sampling, every eligible outlet on the sample list is placed into one of 10 mutually exclusive and exhaustive geographical regions (Figure 1). The geographical regions are the Northcentral (NC), Northeast (NE), Northwest (NW), Southcentral (SC), Southeast (SE) and Southwest (SW) of Pennsylvania, in addition to the four individual counties: Allegheny (AL), Delaware (DE), Erie (ER) and Philadelphia (PH). Pennsylvania's sampling methodology allows for valid estimates from each region (Table 2).

Figure 1. 2013 Synar Region Map

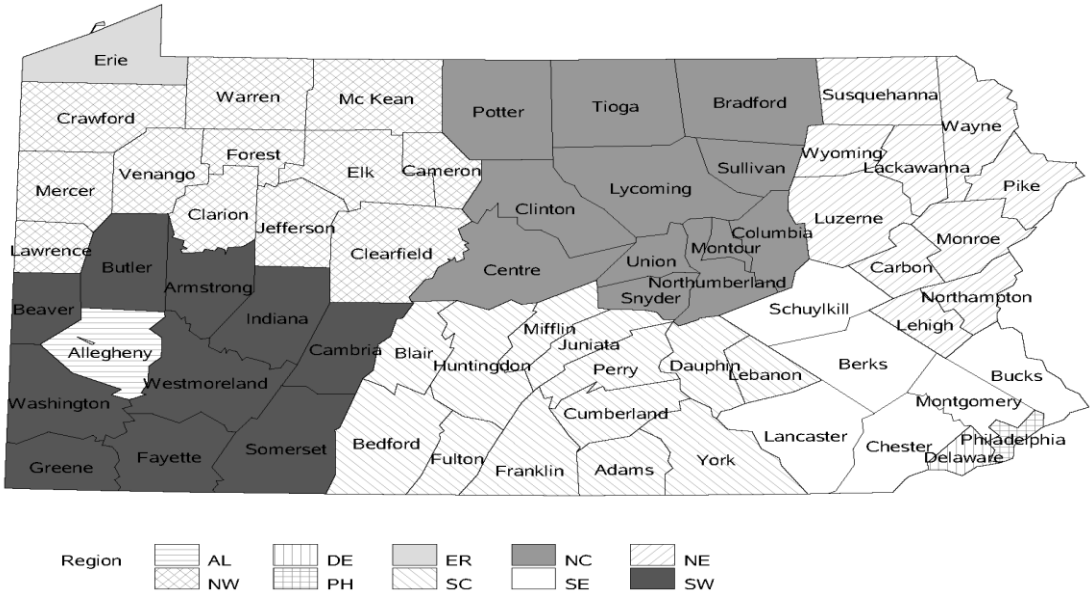


Table 2. 2013 Synar Region Results

Stratum	Outlets Selected	Outlets Completed	PSUs Sampled	Total Violations	Wgted Rate (%)	Standard Error (%)	Lower Limit (%)	Upper Limit (%)
Statewide	1874	1092	576	96	11	1.2	8	13
Northcentral	125	78	6	4	5	2.6	0	10
Northeast	288	156	12	22	14	3.5	7	21
Northwest	133	78	6	3	4	1.7	0	7
Southcentral	218	130	10	11	8	2.9	3	14
Southeast	322	214	16	5	2	1.2	0	5
Southwest	273	144	11	16	11	3.6	4	18
Allegheny	130	65	130	0	0	0.0	0	5
Delaware	60	36	60	5	n/a	n/a	n/a	n/a
Erie	100	57	100	2	4	2.5	0	8
Philadelphia	225	134	225	28	21	3.5	14	28

Note1: Confidence limits were calculated using the t-distribution with the degrees of freedom (df) determined by subtracting the total strata from the total clusters. For example, the df for Northcentral is five because there are six clusters and one stratum.
Note2: The weighted rate takes into account unequal probabilities of selection and non-completions. It is different than the unweighted rate, which is calculated by dividing total violations by outlets completed. The WEIGHTED rate should be used at all times.
Note3: When total violations = 0, the "Rule of Three (3/n)" is used to calculate upper limit.
Note4: The rate was marked n/a if the calculated percentage was deemed to be statistically unreliable. See tech notes for method utilized to determine reliability.

Significance tests (Rao-Scott Chi-Square) and odds ratio calculations were used to examine the relationships between regions with more than 50 completed visits.

- The **Philadelphia** retail violation rate is significantly different from every other region except the Northeast and Southwest.

- The **Northeast region** retail violation rate is statistically different from the rates of the Northwest, Erie and Southeast. A minor is approximately 4.1, 4.5 and 6.6 times more likely to be sold cigarettes in NE, than NW, ER and SE respectively.

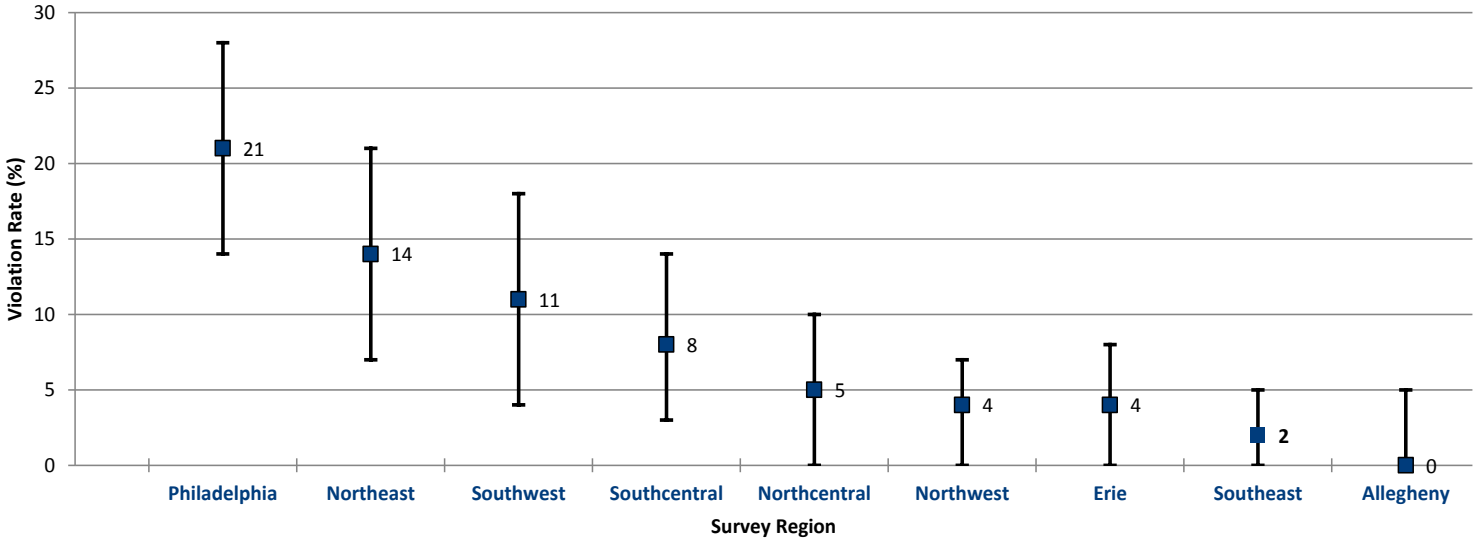
- The **Northwest region** retail violation rate is statistically different from the rates of Philadelphia and the Southwest. A minor is approximately 6.6 times more likely to be sold cigarettes in PH and 3.1 times in SW than in NW.

- The **Southcentral region** retail violation rate is statistically different from the rates of Philadelphia and Southeast. A minor is approximately 2.8 times more likely to be sold cigarettes in PH than in SC, but a minor in SC is 3.8 times more likely to be sold cigarettes than in SE.

- The **Southeast region** retail violation rate is statistically different from the rates of Philadelphia and Southwest. A minor is approximately 11 times more likely to be sold cigarettes in PH and five times more likely in SW than in SE.

Rao-Scott chi-square significance tests were not calculated for Allegheny. To determine statistical significance, the confidence interval for Allegheny was compared to the remaining regions. If the confidence interval did not overlap in the comparison, then the Allegheny county violation rate was considered statistically significant. The Allegheny county retail violation rate is significantly different from the rates of Philadelphia and Northeast.

Graph 2. Results by Region



Note1: Weighted violation rates are displayed along with their 95 percent confidence limits.
Note2: Delaware is not displayed because the rate was statistically unreliable.

Results by Youth Gender

Male youth attempted to purchase cigarettes in 525 different outlets, while females attempted this in 567 (Table 3). The relationship between the rate at which cigarettes were sold to males and females was statistically examined. The significance test showed that the rates are statistically different. Moreover, the odds ratio showed that a female minor is two times more likely to be sold cigarettes than a male minor.

Table 3. Results by Youth Gender

Gender	Total Visited	Violations	Wgted Rate (%)	Lower Limit (%)	Upper Limit (%)
M	525	31	7	4	10
F	567	65	13	10	17

Note: The weighted rate (Wgted Rate) takes into account unequal probabilities of selection and non-completions. It is different from the unweighted rate, which is calculated by dividing the violations by the total visited.

Results by Youth Age

The age of the youth surveyors ranged from 15 to 17 years old (Table 4). A significance test and odds ratio calculation was used to examine the relationships between the age of the buyer and the violation rate. There was a significant difference between the rate at which outlets sold cigarettes to 16- and 17-year-olds. There was not a significant difference between the rates at which outlets sold to 15- and 17-year-olds and 15- and 16-year-olds. Based on the odds ratio, a 17-year-old is 2.3 times more likely to be sold cigarettes than a 16-year-old.

Table 4. Results by Youth Age

Age	Total Visited	Violations	Wgted Rate (%)	Lower Limit (%)	Upper Limit (%)
15	377	26	9	6	13
16	449	35	8	5	11
17	266	35	16	10	22

Note: The weighted rate (Wgted Rate) takes into account unequal probabilities of selection and non-completions. It is different from the unweighted rate, which is calculated by dividing the violations by the total visited.

Results by Youth Race/ethnicity

Youth surveyors self-identifying as white attempted to purchase cigarettes in 696 different outlets; surveyors self-identifying as black attempted to purchase cigarettes in 294 different outlets; surveyors self-identifying as Hispanic attempted to purchase cigarettes in 47 outlets; and youth surveyors self-identifying with a race or ethnicity other than white, black or Hispanic attempted to purchase cigarettes in 55 different outlets (Table 5). The relationship between the rates at which cigarettes were sold to surveyors self-identifying as white and black was statistically examined. The significance test showed that the rates are statistically different. Moreover, the odds ratio showed that a minor self-identifying as black is 2.6 times more likely to be sold cigarettes than a minor self-identifying as white. It should be noted that 77 percent of sales to youth self-identifying as black occurred in the Philadelphia region, which is statistically different than six of the other regions.

Table 5. Results by Youth Race/ethnicity

Race/Ethnicity	Total Visited	Violations	Wgted Rate (%)	Lower Limit (%)	Upper Limit (%)
White	696	48	7	5	9
Black	294	36	15	10	21
Hispanic	47	3	n/a	n/a	n/a
Other	55	9	n/a	n/a	n/a

Note1: The weighted rate (Wgted Rate) takes into account unequal probabilities of selection and non-completions. It is different from the unweighted rate, which is calculated by dividing the violations by the total visited.
Note2: The rate was marked n/a if the calculated percentage was deemed to be statistically unreliable. See tech notes for method utilized to determine the reliability.

Contributing Factors

For each attempt to purchase cigarettes by a youth buyer, the following information was collected:

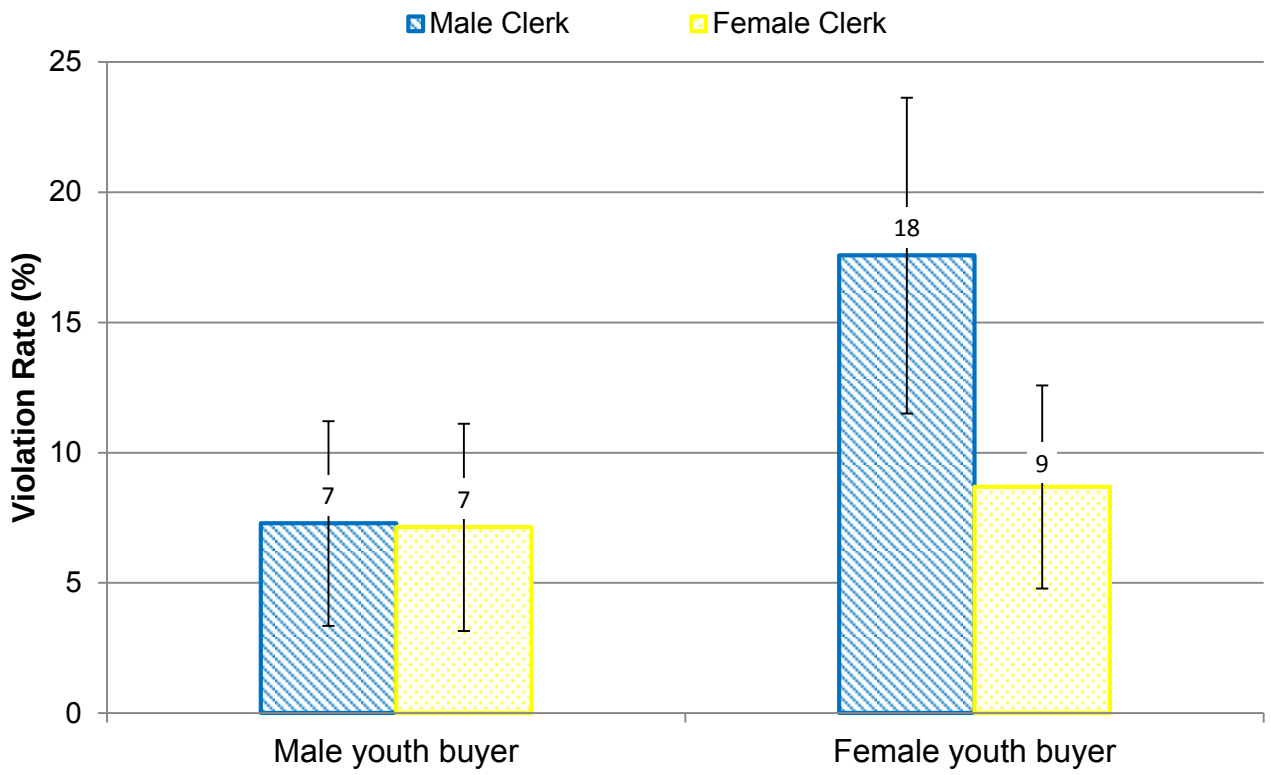
- Was the minor asked to show identification when he/she attempted to buy cigarettes?
- Was the minor asked his or her age when attempting to buy cigarettes?
- Were there warning signs displayed in the store?
- What was the gender of the clerk or cashier?

• Five percent of the cigarette retailer's clerks, who made some effort to determine the youth's age, still sold cigarettes.

• From 84-90 percent of Pennsylvania retailers have visible warning signs.

• The outcome of an attempt is influenced by the gender of the clerk and buyer. A cross tabulation, controlling for the youth buyer's gender, was calculated to determine if there is outcome correlation between the clerk's gender and youth buyer's gender. A male clerk is two times more likely than a female clerk to sell cigarettes to a female youth buyer. The significant difference is displayed in Graph 3.

Graph 3. Violation Analysis for Clerk and Buyer Gender



Note1: Weighted violation rates are displayed along with their 95 percent confidence limits.

Distribution of Outlet Types

Cigarettes are sold by a variety of outlets in Pennsylvania. Surveyors place outlets into one of 13 categories depending on the attributes of the outlet. The 2013 outlet definitions can be found in the technical notes. The distribution of outlets is shown in Table 6. Approximately 70 percent of the surveyed outlets belong to four of the available categories: convenience-grocery, convenience-chain, gas station/auto service or drug store category.

Table 6. Distribution of Sampled Outlets

Outlet Type	Visited	Percent
Bar/tavern	11	1.0%
Beer distributor	54	4.9%
Convenience-chain	251	23.0%
Convenience-grocery	267	24.5%
Deli	36	3.3%
Drug store	84	7.7%
Gas station/auto service	164	15.0%
News outlet	25	2.3%
Restaurant/eat-in	13	1.2%
Restaurant/takeout	19	1.7%
Supermarket	89	8.2%
Tobacco	40	3.7%
Other	39	3.6%
TOTAL	1092	100%

Results by Outlet Type

The rate at which cigarettes were sold by outlet type was statistically examined. Significance tests were performed among each pair of categorized outlets with sufficient sample. The following pairs of outlet types have a statistically different violation rate:

- Beer distributor and convenience-grocery;
- Beer distributor and supermarket;
- Convenience-chain and convenience-grocery;
- Convenience-chain and gas station;
- Convenience-grocery and drug store;
- Convenience-grocery and supermarket; and
- Gas station and supermarket.

The beer distributors in Pennsylvania are eight times more likely to sell cigarettes to minors than the supermarkets. A convenience-grocery outlet is 21 times more likely to sell cigarettes to minors than a supermarket. Lastly, a gas station is 12 times more likely to sell cigarettes to minors than a supermarket.

Table 7. Results by Outlet Type

Outlet Type	Total Visited	Violations	Wgted Rate (%)	Lower Limit (%)	Upper Limit (%)
Bar/tavern	11	0	n/a	n/a	n/a
Beer distributor	54	5	8	1	15
Convenience-chain	251	15	6	3	9
Convenience-grocery	267	41	19	13	25
Deli	36	2	n/a	n/a	n/a
Drug store	84	2	4	0	9
Gas station/auto service	164	17	12	6	17
News outlet	25	1	n/a	n/a	n/a
Restaurant/eat-in	13	2	n/a	n/a	n/a
Restaurant/takeout	19	3	n/a	n/a	n/a
Supermarket	89	1	1	0	3
Tobacco	40	1	n/a	n/a	n/a
Other	39	6	n/a	n/a	n/a

Note1: The weighted rate (Wgted Rate) takes into account unequal probabilities of selection and non-completions. It is different from the unweighted rate, which is calculated by dividing the violations by the total visited.
Note2: The rate was marked n/a if the calculated percentage was deemed to be statistically unreliable. See tech notes for method utilized to determine the reliability.

Conclusions

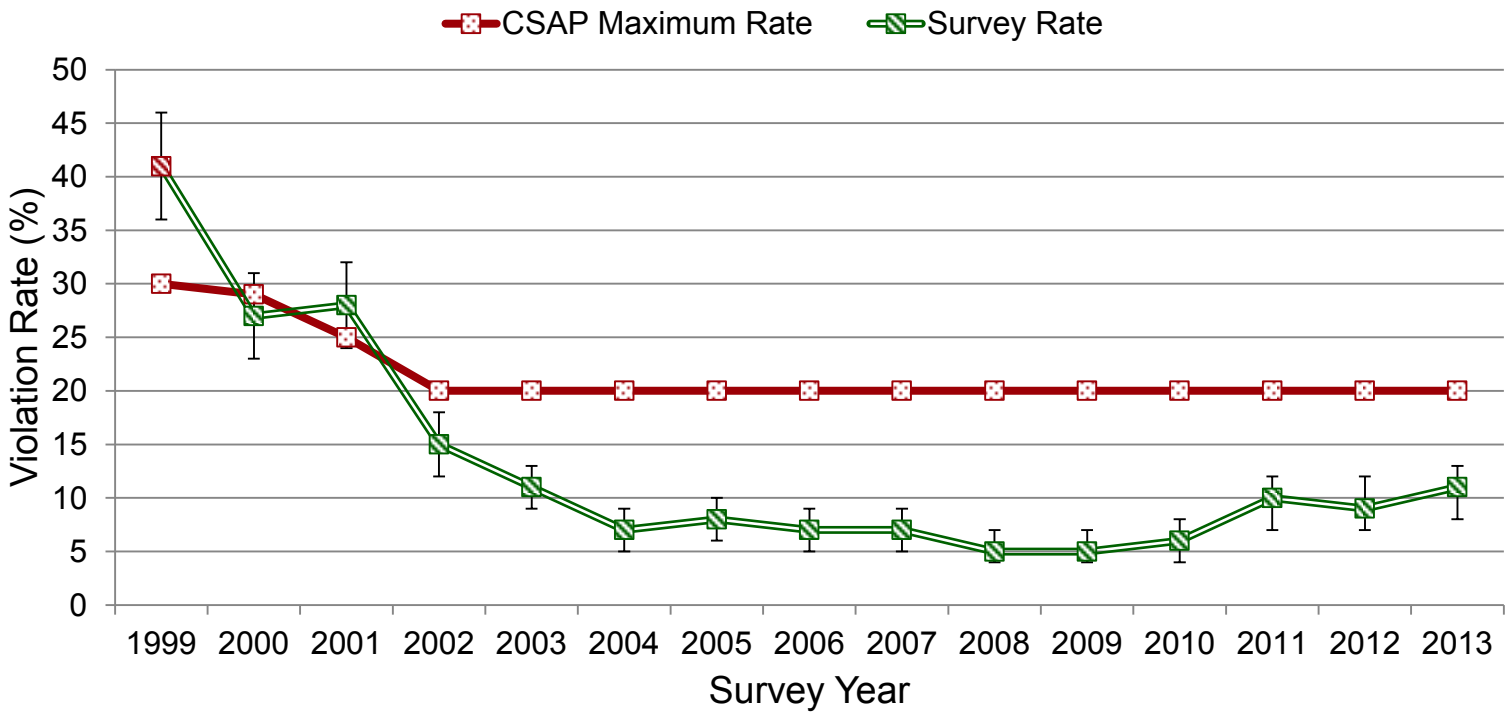
Synar results are not valid for state-to-state or state-to-nation comparisons due to the differences in designs, sampling frames and quality. However, there is merit in comparing Pennsylvania to itself. The federal government sets maximum allowable violation rates for each state, including Pennsylvania. Pennsylvania is expected to be at or below the rates shown in Table 8. The Synar survey only measures the violation rates; it cannot lower them. Violation rates must be lowered through enforcement or other methods. In 1999, Pennsylvania was penalized for exceeding the maximum allowable rate set by the Center for Substance Abuse Prevention (CSAP). The penalty prompted a massive statewide campaign of enforcement, public awareness and education that still continues today. According to the data obtained from the Synar survey, Pennsylvania's prevention efforts appear to be successful. The estimated violation rate dropped significantly after the first few years of the campaign and eventually leveled off well below federal targets. Since 2002, the violation rate has been significantly lower than the federal target rate of 20 percent (Graph 4).

Table 8. Max Rates vs. Actual Survey Rates

Year	Original Max Rate	Revised * Max Rate	Survey Rate	Survey Error
1996	Baseline	n/a	50%	± 12%
1997	42%	n/a	30%	± 6%
1998	31%	n/a	31%	± 5%
1999	25%	30%	41%	± 5%
2000	20%	29%	27%	± 4%
2001	20%	25%	28%	3%
2002	20%	20%	15%	3%
2003	20%	20%	11%	2%
2004	20%	20%	7%	2%
2005	20%	20%	8%	2%
2006	20%	20%	7%	2%
2007	20%	20%	7%	2%
2008	20%	20%	5%	2%
2009	20%	20%	6%	2%
2010	20%	20%	6%	2%
2011	20%	20%	10%	2%
2013	20%	20%	9%	2%
2012	20%	20%	11%	2%

*Revised 3/8/00
Note1: Since 2001, CSAP has required a one-sided 95 percent C.I.
Note2: All rates and errors are rounded to the nearest percent.

Graph 4. Allowable Max Rates vs. Actual Survey Rates



Note1: Weighted violation rates are displayed along with their 95 percent confidence limits.

Background

The U.S. Department of Health and Human Services clarified the Synar Amendment by issuing the Synar Regulation in January of 1996. Substance Abuse and Mental Health Services Administration (SAMHSA), an agency of the U.S. Department of Health and Human Services, was chosen to implement the regulation. The Center for Substance Abuse Prevention (CSAP) is an agency of SAMHSA in charge of this regulation. According to the "Synar Regulation Implementation Report," each state must:

- Have in effect a law prohibiting any manufacturer, retailer or distributor of tobacco products from selling or distributing such products to any individual under the age of 18;
- Enforce such laws in a manner that can reasonably be expected to reduce the illegal sales of tobacco products to individuals under the age of 18;
- Conduct annual, random, unannounced inspections to ensure compliance with the law, with these inspections conducted in such a way as to provide a valid probability sample of outlets accessible to youth;
- Develop a strategy and negotiate with SAMHSA a timeframe for achieving an inspection failure rate of less than 20 percent of outlets accessible to youth; and
- Submit an annual report describing in detail the state's survey methodology and activities to enforce its law.

Failure to meet the requirements of the Synar Regulation could result in graduated penalties against a state's Substance Abuse Prevention and Treatment (SAPT) Block Grant, as specified in the statute.

The intent of the survey is to assess the effectiveness of Pennsylvania's enforcement programs by measuring the rate at which outlets sell cigarettes to minors. If the rate is high, then enforcement tactics may need to be improved. The survey does not lower the rate, it only measures it.

SAMHSA Detailed Survey Requirements

SAMHSA clarified the Synar regulation and provided specific survey requirements in the "Synar Regulation: Sample Design Guidance (May 2003)." Below is a list of these requirements and how Pennsylvania fared in 2013.

1. **Obtain approval from SAMHSA in writing for any changes in sampling methodology prior to implementation of the Synar survey.**
   There were no methodology changes for the 2013 survey.

2. **Develop a sampling frame that includes both over-the-counter and vending machine locations accessible to youth.**
   Pennsylvania only samples over-the-counter locations. Act 2002-112 restricted the placement of vending machines to locations inaccessible to minors. Since vending machines could only be located in areas inaccessible to minors, SAMHSA approved the exclusion of vending machines from the Pennsylvania survey.

3. **Develop a sampling frame that includes, at a minimum, 80 percent of the tobacco outlets in the state.**
   Pennsylvania develops the sampling frame from the Department of Revenue's Electronic Cigarette Licensing System (ECLS). Pennsylvania requires a license to sell cigarettes, and the ECLS contains a complete list of all locations licensed to sell cigarettes. Current licenses are annually renewed by Jan. 15. The latest coverage survey conducted in 2013, estimated that Pennsylvania's sampling frame included 99.1 percent of the tobacco outlets in the state.

4. **Select a sample of outlets to inspect that is representative of the geographic distribution of all tobacco outlets accessible to youth in the state. Decide whether to use clustering, stratification or both.**
   Pennsylvania used both clustering and stratification and was representative of the geographic distribution. The sample size for each stratum roughly mirrored the population distribution of outlets.

5. **Design a sampling methodology and implementation plan that are based on sound survey sampling methodology. Choose a sample design and decide on a random sampling method for each stage of sampling.**
   Pennsylvania used a sound methodology and implementation plan with a valid probability sample for which the probability of selection for each outlet was nonzero. A two-stage sampling design was used, and the first stage selected PSUs from within each stratum using probability proportionate to size (PPS) sampling technique. Stage two involved randomly selecting a pre-determined number of outlets from each of the sampled PSUs.

6. **Estimate the original sample size before implementing the Synar survey. Base the estimate of the original sample size on the results of calculations of the minimum sample size needed to meet SAMHSA's precision requirement, plus extra sample needed to account for the expected completion rate and the expected accuracy rate.**
   Pennsylvania calculated the sample size by first calculating the effective sample size. According to CSAP requirements, the width (*w*) of the upper limit of the confidence interval (*c.i.*) must be less than or equal to 3 percent. Using the equation for the upper limit of a 95 percent confidence interval of the sample mean $\bar{x}$ gives

$$\bar{x} + w \qquad \text{(S1)}$$

applying the CSAP requirement for *w* gives

$$w \leq 0.03, \qquad \text{(S2)}$$

where *w* is defined as

$$w = z(s.e.) \qquad \text{(S3)}$$

substituting S3 into S2

$$z(s.e.) \leq 3, \qquad \text{(S4)}$$

where *z* is the critical value of the standard normal distribution for a one sided 95 percent *c.i.* and *s.e.* is the standard error or standard deviation estimated from the sample data. Substituting 1.645 for *z* and solving equation S4 for *s.e.* gives

$$s.e. \leq \frac{3}{1.645} \leq 1.82.$$

Therefore, the *s.e.* must be less than or equal to 1.82 to maintain a width of 3 percent or less for a right-sided 95 percent *c.i.*.

Ignoring the finite population correction, the *s.e.* is defined as,

$$s.e. = \frac{\sqrt{p(1-p)}}{\sqrt{n_e}} \qquad \text{(S5)}$$

Substituting S5 into S3 gives

$$w = z\left(\frac{\sqrt{p(1-p)}}{\sqrt{n_e}}\right)$$

Solving for n_e gives the equation for the effective sample size

$$n_e = \left(\frac{z}{w}\right)^2 p(1-p),$$

where z = 1.645, w = 0.03 (both z and w are based on 95 percent one-sided *c.i.* with tolerance of 3 percent) and p = 3 percent over the target rate (20 percent + 3 percent = 23 percent).

Next, the target sample size was calculated using the equation:

$$n_t = \text{Deff}_\text{h} \times n_e,$$

where Deff_h is the highest design effect from historical Synar surveys of a similar design.

Finally, the original sample size is calculated using the combined equation:

$$n_o = \frac{n_t}{r_l r_c} + n_A + n_S;$$

r_l = lowest eligibility rate of historical Synar surveys of similar design;

r_c = lowest completion rate of historical Synar surveys of similar design or 80 percent (whichever is lower);

n_A = sample added or subtracted needed to fit the clustered sample design;

n_S = supplemental sample.

n_A is the number of sample added or subtracted to guarantee that our precision goals are met and the sample size fits the design. The size of n_A is estimated after reviewing output created by a SAS program designed to simulate survey outcomes with varying designs. n_S is the number of supplemental sample allocated to the clustered areas due to sample attrition. Supplemental sample is issued if a cluster does not obtain the minimum number of completions allowed per cluster.

7. **SAMHSA requires the results to be reported with a right-sided 95 percent confidence interval. The precision requirement for the estimate of the violation rate must have the right-side limit within 0.03 or 3 percentage points from the violation rate estimate. Using the normal distribution, the requirement can be translated into the statement that 1.645 times the standard error (s.e.) of the estimate be within 0.03. That is, 1.645 × s.e.≤ 0.03 or** $s.e. \le \frac{0.03}{1.645} = 0.0182$

Pennsylvania is required to report the results of the survey within the Annual Synar Report (ASR). The confidence interval (*c.i.*) reported in the ASR is different than what is reported in this document because of rounding error and the different methods of calculation. The ASR requires a one-sided *c.i.* that assumes a normal distribution. This document employs a two-sided *c.i.*, assuming a t-distribution. Confidence intervals may be either one-sided or two-sided, although a two-sided *c.i.* is most commonly used. In the case of the ASR, where the objective is to determine whether the retailer violation rate is equal to or less than the state target rate (20 percent), the right-sided *c.i.* is used by the federal government, rather than the two-sided interval.

The right-sided 95 percent *c.i.* is always bounded by zero on the left. The right-side limit is given by (violation rate estimate) + (critical value for a normal one-sided 95 percent *c.i.*) × (standard error of the estimate). The two-sided 95 percent *c.i.* used in this report and most publications is calculated by (violation rate estimate) + (critical value for a t-distribution two-sided 95 percent *c.i.*) × (standard error of the estimate). The critical value for a normal one-sided 95 percent *c.i.* is always 1.645, and critical value for a t-distribution two-sided 95 percent *c.i.* approaches 1.96 as the sample size increases. For example, if the violation rate = 10.5, standard error = 1.2 and there is a sufficiently large sample size, then the confidence intervals for the two methods are calculated as follows:

95 percent one-sided c.i. (Normal-dist)	***95 percent two-sided c.i. (t-dist)***
10.5+ (1.645 x 1.2) = [0, 12.5]	10.5 ± (1.96 x 1.2) = [8.1, 12.8]

The precision level was achieved for the 2013 survey. The survey had a standard error of 0.011565, which is less than the required 0.0182.

8. **Determine a method of selecting additional outlets to inspect should it not be possible to reach the required minimum number of completed inspections due to sample attrition.**
   Pennsylvania uses an approved supplemental sample system for which additional outlets are issued when a minimum of 13 outlets aren't completed per cluster. The outlets are randomly selected from the unsampled outlets in the cluster. There were 322 supplemental sample issued in 2013.

9. **Obtain a completion rate of 90 percent or better.**
   Pennsylvania had a 99.7 percent completion rate in 2013.

10. **Record the actual steps of the survey process in the field, and keep records of all sources of sample attrition in the field.**
    Pennsylvania reported the actual steps of the survey process in the Annual Synar Report and kept all records.

11. **Incorporate the complexity of the sample design as a factor when analyzing the survey results.**
    Pennsylvania used the Taylor series (linearization) method to estimate sampling errors of estimators based on complex sample designs. This method takes into account the variances among PSUs.

12. **Weight the results of the Synar survey to account for unequal probabilities of selection, differences in percentages of eligible outlets between strata or clusters, and other deviations from the intended design.**
    A base weight is calculated for each outlet using the inverse of the probability of selection for each outlet divided by the total eligible outlets in the stratum (ELIGN). The base weight gives each sampled outlet a weight such that it sums to the number of eligible outlets in the state.

    First, the probability of selection was calculated. In a complex design, such as this, the overall probability of selecting an outlet is the product of each stage's probability of selection.

    (Probability of selecting a cluster) x (Probability of selecting an outlet within the cluster)

PROBCL = Probability of selecting a cluster
PROBOUT = Probability of selecting an outlet within the cluster
PROBST = Probability of selection for each outlet in the stratum

NCLUST = Number of clusters in the stratum
CPS = Cluster population size
ELIGN = Eligible stratum population size
SAMPSIZE = Sample size of the cluster
SAMPOBS = The number of completed and eligible sample per cluster

$$PROBCL = (NCLUST) \times \left(\frac{CPS}{ELIGN} \right)$$

$$PROBOUT = \left(\frac{SAMPSIZE}{CPS} \right)$$

$$PROBST = (PROBCL) \times (PROBOUT) =$$

$$= (NCLUST) \times \left(\frac{CPS}{ELIGN} \right) \times \left(\frac{SAMPSIZE}{CPS} \right) =$$

$$= (NCLUST) \times \left(\frac{SAMPSIZE}{ELIGN} \right)$$

The base weight (*BASEWGT*) is the inverse of the probability of selection.

$$BASEWGT = \frac{1}{\frac{(NCLIST)(SAMPSIZE)}{(ELIGN)}} \quad \text{or} \quad \frac{(ELIGN)}{(NCLUST)(SAMPSIZE)}$$

The final weight adjusts the base weight for non-completion. The final weight gives each completed eligible outlet a weight such that is sums to the number of eligible outlets in the state. The final weight will always be greater than the base weight unless all sampled outlets are completed and eligible.

$$FINALWGT = BASEWGT \times \left(\frac{SAMPSIZE}{SAMPOBS} \right)$$

13. **Meet Synar Regulation reporting requirements for the survey sampling methodology when completing the Annual Synar Report.**
    Pennsylvania met all methodology reporting requirements.

Survey Design

The population is defined as Pa. outlets that sell cigarettes and are accessible to minors. The survey uses a sampling frame created from the Department of Revenue's Cigarette License File, which contains the name and address of every outlet that purchased a license to sell cigarettes in the state.

The survey employs a stratified and clustered design (**Figure 1**) where every eligible outlet location on the sampling frame is grouped into 10 mutually exclusive and exhaustive geographical strata consisting of the Northcentral Health District, Northeast Health District, Northwest Health District, Southcentral Health District, Southeast Health District, Southwest Health District, Allegheny, Delaware, Erie and Philadelphia.

The outlets within the six "District" strata (NC, NE, NW, SC, SE and SW) are grouped into geographic clusters of adjacent zip codes. Clusters are selected using probability proportional to size sampling, and a predetermined number of outlets within the cluster are selected. The outlets within the four "random" strata (AL, DE, ER and PH) are not clustered but are selected using a simple random selection process.

Survey Procedures

The survey is the result of the combined effort of four different state bureaus, private contractors and youth from across the state. Survey teams consisting of adult supervisors and youth between the ages of 15 and 17 are provided with a list of sampled outlets to visit. The youth enter the outlets, attempt to purchase cigarettes and record the outcome of the attempts. The survey was conducted from 07/01/2013 to 08/15/2013.

Outlet Definitions (2013)

Bar/tavern - The primary purpose of a bar or tavern is to sell alcoholic beverages for on-site consumption. Some bars or taverns provide snacks or entire meals, and some don't.

Beer distributor - A beer distributor sells beer by the case, providing either walk-in or drive-thru service or both. A distributor does not allow on-site consumption, and it may also sell other items such as soda or snacks.

Convenience-chain – This is a store selling a limited variety of food and an assortment of convenience items for the house and vehicle. It is part of a regional or national chain of stores and has multiple outlets in Pennsylvania. The store is usually open long hours for the convenience of customers. Some stores have a self-service microwave oven for heating purchased food. It may sell gasoline, over-the-counter drugs or provide take-out foods, but its major sales items are food. In 2013, dollar store chains such as Dollar General and Family Dollar began selling cigarettes. The surveyors were asked to categorize all dollar stores that were part of a regional chain in this category. Here is a list of the more popular outlets that should be placed in this category: 7-Eleven, AmPm, A-Plus, Circle K, Cogo's, Convenient Food Marts, Crossroads, E-Z mart, GetGo, Git N Go, Go-Mart, Kwik Fill, QuickStop, Rutters, Sheetz, Stop-N-Go, Stuckey's, Town and Country Food Stores, Turkey Hill, Uni-Mart, Wawa.

Convenience-grocery- This type of store sells a limited variety of food and an assortment of convenience items for the house and vehicle but is independently owned; it does not belong to a regional or national chain. These outlets are sometimes referred to as country stores, corner stores, general stores, local markets, mini markets, convenience stores, grocery stores or "Mom and Pop" establishments. These outlets may or may not be open for long hours, and they may or may not sell gas. Include outdoor produce markets in this category.

Deli - A delicatessen is a shop that sells cooked or prepared foods ready for consumption, such as cheeses, cold cooked meats, sandwiches and salads. Most delicatessens offer sandwiches, most of which are made to order behind the counter at the time of sale. In addition to made-to-order sandwiches, many delicatessens offer made-to-order green salads. Equally common is a selection of pre-made pasta, potato, chicken, tuna, shrimp or other variety of salads. Delicatessens also offer a variety of beverages, chips and snacks.

Drug store - Drug stores sell prescription and over-the-counter medications. They may be part of a national or regional chain of outlets or may be owned and operated by an independent pharmacist. They may sell other items, but their major image is as a pharmacy.

Gas station/auto service - Two types of outlets fit into this category: 1) a gas station that sells gasoline as its major product (it may sell a few snacks) and usually has facilities for car repair; and 2) an auto repair or service station that repairs automobiles but does not sell gasoline. Included in this category are Giant kiosks, mechanic's garages, oil change outlets and gas stations with little booths that sell a few snacks.

News outlet - News outlets sell newspapers and magazines. They usually sell other items like candy, but their main purpose is selling newspapers and magazines. Include outdoor newsstands in this category.

Restaurant/eat-in - The primary purpose of an eat-in restaurant is the preparation and service of food for on-site consumption. It may offer alcoholic beverages and meals for take-out, but its major focus is food service for on-site consumption. Diners are included in this category.

Restaurant /take-Out - Restaurant /take-out establishments offer prepared foods primarily for consumption off the premises. Some may not offer entire meals (donut and bagel shops). Examples: pizza/sub shops, Chinese take-out, bagel shops, and donut/coffee shops.

Supermarket - Supermarkets sell food and household items in a large facility. It is a departmentalized self-service store offering a wide variety of food and household merchandise. It is larger in size and has a wider selection than a traditional grocery store. The supermarket typically has meat, produce, dairy and baked goods departments. Along with the items for sale in the various departments, additional items for sale may include canned and packaged goods, as well as various nonfood items such as household cleaners, pharmacy products and pet supplies. This category will include the major chains such as ACME, Food Lion, Giant, Giant Eagle, Karns, KMART, Save-A-Lot, Shop 'n Save and Weis.

Tobacco - The tobacco category covers all tobacco outlets, cigarette outlets and cigar shops. These outlets sell tobacco (cigarettes, cigars and/or smokeless tobacco) as their main product.

Other - This is a last-resort category. Use this category for locations that do not fit in any of the above categories. Describe the type of outlet in the space provided next to the "other" category. Category examples: check cashing outlets, laundromats, hotels, motels, record outlets, clothing outlets, book stores, hardware stores, video stores, campgrounds, prisons, bowling lanes (not in the bar), fire halls, The Gateway Clipper (boat), train stations, auto auctions, bait shops, car dealerships, etc.

Reliability of estimates

The validity of an estimate is defined as how well a survey measures what it sets out to measure, and reliability refers to the stability exhibited when a measurement is repeated under identical survey conditions. The method used to quantify how well the Synar survey measured outcomes by region, sex, age and race/ethnicity from the sample was a comparison of the relative standard error of the calculated outcome, compared to the relative standard error of the same percentage outcome for a simple random sample of 50. If the relative standard error was smaller for the percentage being tested compared to the relative standard error of the same percentage outcome for the simple random sample of 50, then the calculated outcome was considered reliable.

Coverage Survey

The Synar sample is drawn from a sampling list created from the Department of Revenue's Cigarette License File (CLF) which contains the name and address of every outlet that purchased a license to sell cigarettes in Pennsylvania. Since the survey uses a list to draw the sample, SAMHSA requires that Pennsylvania test that list. Federal regulations require that Pennsylvania conduct a coverage survey to test the quality of sampling frame list. In 2013, Pennsylvania carried out a coverage survey during the month of June. It is estimated that 99.1 percent of outlets that sell cigarettes in Pennsylvania are accounted for on the sampling frame.

Rounding estimates

All weighted rates, upper limits and lower limits have been rounded to the nearest percent.

Technical Notes

The Bureau of Health Statistics and Research welcomes comments and suggestions on the content and format of this report. Staff is available to answer questions regarding the report, including utilization and limitations of the data. Please address all comments and questions to:

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