Wyoming Survey & Analysis Center
UNIVERSITY OF WYOMING

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Synar 2016 Coverage Study Report

Results for FFY 2017

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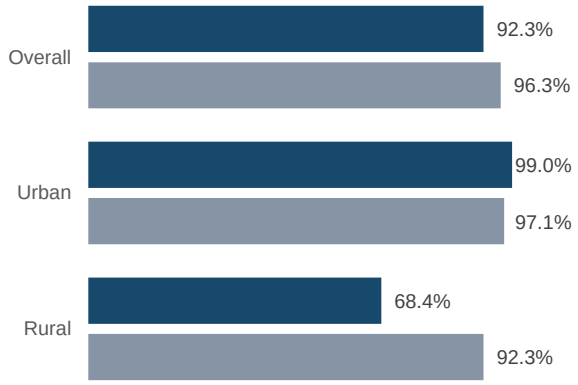
"Activities to increase restrictions on tobacco product sales and availability" are a key part of reducing "availability of tobacco products" and "susceptibility to experimentation with tobacco products" (Centers for Disease Control and Prevention [CDC], 2014, p. 21). Over time, these activities reduce initiation of tobacco use, the prevalence of tobacco use among young people, and the morbidity and mortality that result from tobacco use.

Figure ES-2. Results of the 2016 Synar Coverage Study

Coverage and accuracy rates by stratum



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The Synar amendment and related monitoring of compliance with state laws against selling tobacco products to minors are key parts of tobacco prevention efforts nationally and in Wyoming. This amendment requires states to adopt and enforce state laws prohibiting the sale of tobacco to youth under the age of 18. States like Wyoming that inspect stores selected from a list of outlets across the state must also conduct coverage studies every three years. The purpose of the Synar Coverage Study is to assess how well Wyoming's tobacco retailer list frame (used to draw the sample for the Synar Inspection Study) reflects the full population of youth-accessible tobacco retail stores in the state. SAMHSA requires a coverage rate of at least 80.0% and recommends a coverage rate of at least 90.0% (SAMHSA, 2006). **The 2016 overall weighted coverage rate was 92.3%, above the federally stipulated minimum of 80.0% *and* above the federally recommended 90.0%**

To reduce costs and improve efficiency, the Wyoming Survey & Analysis Center (WYSAC) used a stratified sampling design by dividing Wyoming's census tracts into two strata (or categories): urban or rural. WYSAC defined urban census tracts as those with a population density of at least 100 people per square mile and rural census tracts as those with a population density less than 100 people per square mile. Although the high coverage rate for the urban strata minimizes the impact of the rural coverage rate on the overall rate, the results of the 2016 (FFY 2017) Synar Coverage Study (Figure ES-1) indicate a need to improve the coverage of rural stores in the retailer list frame. Increased involvement of various stakeholders, including current and potential partners, could improve the coverage of the rural portion of the retailer list.

Background

According to the Centers for Disease Control and Prevention (CDC), Office of Smoking and Health (2014, p. 21), "activities to increase restrictions on tobacco product sales and availability" are a key part of reducing "availability of tobacco products" and "susceptibility to experimentation with tobacco products." As highlighted in Figure 1 (following page), such activities reduce the initiation of tobacco use, the prevalence of tobacco use among young people, and the morbidity and mortality that results from tobacco use. The Synar amendment and related monitoring of compliance with state laws against selling tobacco products to minors are key parts of tobacco prevention efforts nationally and in Wyoming.

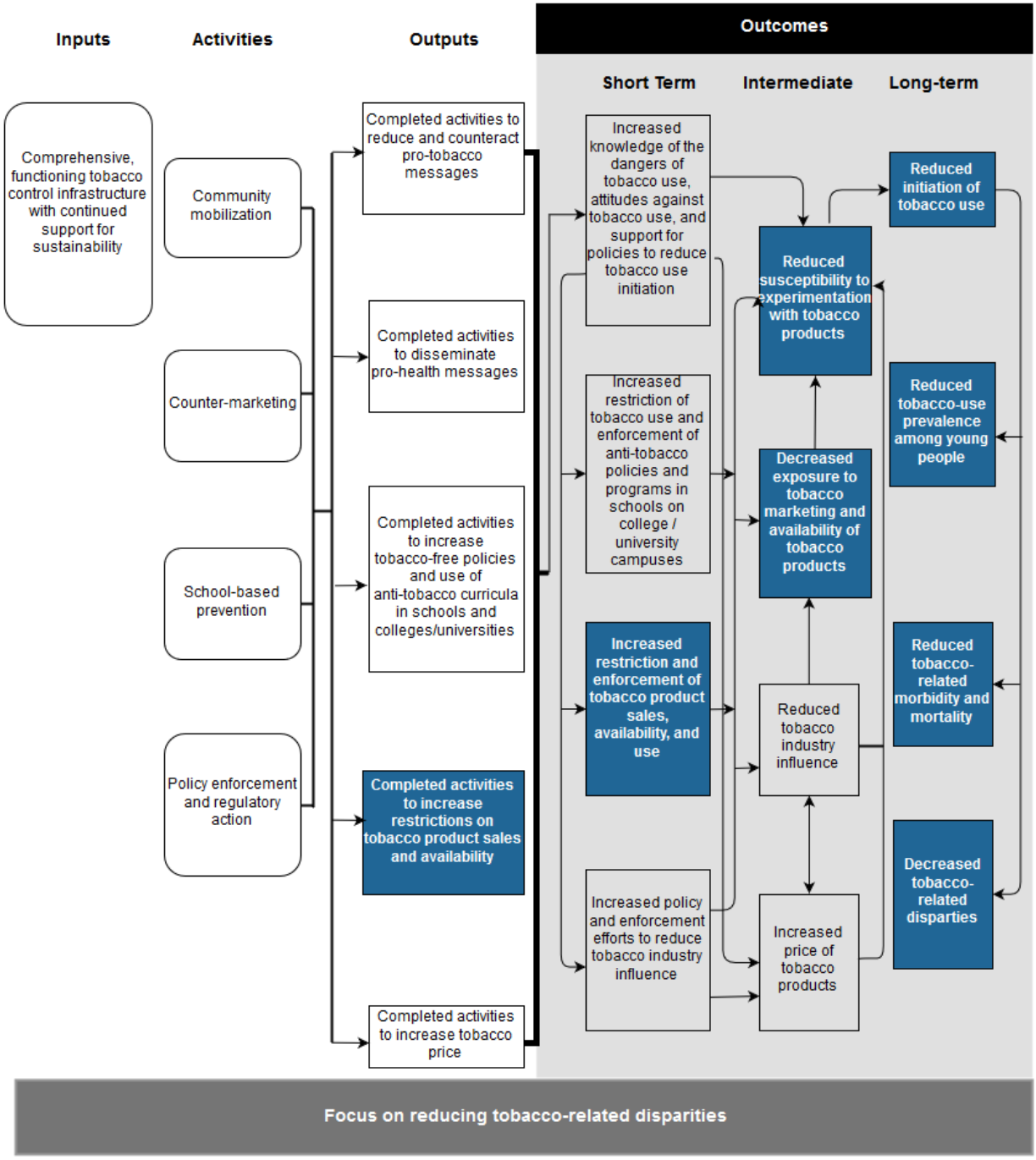
Since 2003, the Wyoming Department of Health (WDH) has contracted with the Wyoming Survey & Analysis Center (WYSAC) at the University of Wyoming to conduct Wyoming's annual Synar Inspection Study to assess tobacco retailers' compliance with the law. Since 2007, WYSAC has also conducted the Synar Coverage Study every three years, as required by the Synar amendment.

In 1992, the United States Congress enacted the Alcohol, Drug Abuse, and Mental Health Administration Reorganization Act, which includes an amendment (section 1926) aimed at decreasing youth access to tobacco. This amendment, named for its sponsor, former Representative Mike Synar (Democrat, Oklahoma), requires states to adopt and enforce state laws prohibiting the sale of tobacco to youth under the age of 18. To be in compliance, states must conduct annual, random, and unannounced inspections to ensure compliance with the state law and develop a strategy for achieving a retailer violation rate (RVR) of less than 20.0% (Substance Abuse and Mental Health Services Administration [SAMHSA], 2010).

States like Wyoming that inspect outlets selected from a list of outlets across the state must also conduct coverage studies every three years. The purpose of the Synar Coverage Study is to assess how well Wyoming's tobacco retailer list frame (used to draw the sample for the Synar Inspection Study) reflects the full population of youth-accessible tobacco retail stores in the state. The coverage rate reflects the proportion of retailers found by drivers looking for all eligible outlets in a geographic sample that are on the existing list of retailers used for inspections. Low coverage list frames may bias the estimate of the retailer violation rate because the unlisted stores may differ from those on the list with respect to their likelihood of selling tobacco to minors. SAMHSA requires a coverage rate of at least 80.0% and recommends a coverage rate of at least 90.0% (SAMHSA, 2006). In compliance with SAMHSA requirements, WYSAC conducted Coverage Studies in 2007, 2010, 2013, and again with this study in 2016.

Figure 3: Synar is part of evaluating a comprehensive tobacco prevention and control program.

CDC Logic Model for Goal Area 1, Preventing Initiation of Tobacco Use



Source

Methods

This section includes descriptions of the sampling design, protocol, and analyses for the 2016 Synar Coverage Study.

Sampling Design[1]

To conduct the Coverage Study, WYSAC followed SAMHSA (2006) protocol as outlined in their *Guide for a Synar Sampling Frame Coverage Study* and standard formulas for calculating stratified sample sizes (Scheaffer, Mendenhall, & Ott, 2006). WYSAC used census tracts (defined by the U.S. Census Bureau) to define the geographical areas for the Coverage Study. WYSAC eliminated one tract (F.E. Warren Air Force Base) from the sampling frame of 132 tracts because it is completely inaccessible to the general public. That left 131 tracts eligible for sampling.

To reduce costs and improve efficiency, WYSAC used a stratified sampling design by dividing the census tracts into two strata (or categories): urban or rural. As in 2013, WYSAC defined urban census tracts as those with a population density of at least 100 people per square mile (based on land area) and rural census tracts as those with a population density lower than 100 people per square mile. One census tract experienced enough population growth to change from a rural classification in 2013 to an urban classification in 2016. Because this tract contains part of a town classified as urban for Synar inspections (the population is greater than 3,000), the change was deemed reasonable. WYSAC sampled 22 of the 80 urban tracts and 9 of the 51 rural tracts. Because rural tracts are more costly to canvass, WYSAC oversampled urban tracts and undersampled rural tracts. As recommended by SAMSHA, WYSAC sampled a total of 31 tracts to include an estimated 120 tobacco retail stores. Further details of the stratification and sampling calculations are in Appendix A.

Protocol

Once WYSAC drew the sample, WYSAC hired six qualified drivers to conduct the Coverage Study. WYSAC trained them on how to canvass each census tract. Canvassing occurred from April 6, 2016, through June 3, 2016. Drivers noted all stores that sold cigarettes or chewing tobacco (the products included in the inspection protocol) and were accessible to minors. Additionally, drivers noted vape shops, stores that sell electronic nicotine delivery systems (ENDS, also known as e-cigarettes), in preparation for future Synar inspections that might

[1] Stores on federal land, such as national parks, are not inspected during the Synar inspections. Stores in the towns of Moose and Moran Junction are considered to be in Grand Teton National Park.

include ENDS as a third type of tobacco product. WYSAC sent two drivers on each Coverage Study trip so that one could navigate and look for stores while the other drove. WYSAC instructed drivers not to canvass graded and earth roads unless there were indications of businesses and the road would be passable to typical passenger vehicles. Drivers also did not canvass areas such as state or national parks where one must pay an entrance fee. These areas are considered inaccessible for the inspection protocol. Per SAMHSA protocol, drivers did not use any lists to identify stores.

Drivers listed 135 stores. Drivers flagged two stores for further investigation after the field work because of questions about youth accessibility. WYSAC called these stores to determine their eligibility and, when appropriate, excluded them from the sample. WYSAC also excluded five vape shops that did not sell cigarettes or chewing tobacco from the coverage list used for analysis. Additionally, one of the census tracts selected for the Coverage Study was on the Wind River Indian Reservation. Stores that are part of reservation jurisdiction are not inspected as part of the Synar Inspection Study. According to protocol and the Wyoming Attorney General, stores in the towns of Arapahoe, Boulder Flats, Burris, Crowheart, Ethete, Fort Washakie, Hudson, Johnstown, and St. Stephens are considered part of the Wind River Indian Reservation. WYSAC removed five stores in these towns. In total, WYSAC removed 12 stores from the original coverage list because, upon further investigation, they were not eligible for the inspections based on a combination of those criteria. The final coverage list contained 123 stores.

Analysis

At the end of the 2015 (FFY 2016) Synar Inspection Study, WYSAC removed ineligible and closed stores from the tobacco retailer list. In the spring of 2016, WYSAC requested updates to this revised list from all the county-based community prevention specialists (CPSs) working for the Prevention Management Organization of Wyoming (PMO). WYSAC also downloaded the publicly accessible results from inspections conducted by the U.S. Food and Drug Administration (FDA). After eliminating liquor stores from the FDA list, WYSAC integrated the 2015 updated list, PMO updates, and FDA list to form the 2016 Synar retailer list frame.

To determine the coverage rate, WYSAC carefully compared the list of stores discovered during the Coverage Study to the stores on the Synar retailer list frame. If the store found during the Coverage Study was on the tobacco retailer list frame with a matching or similar address, the store was considered covered by the tobacco retailer list frame. WYSAC then determined if the address on the tobacco retailer list frame was totally accurate.

After WYSAC checked all canvassed stores against the list frame, WYSAC determined an overall weighted coverage rate using the procedure outlined by SAMHSA (2006). When

calculating the coverage rate, WYSAC accounted for the use of the stratified sampling design to conduct the Coverage Study. WYSAC used a sampling weight for each sample area (i.e., urban or rural). Detailed calculations are in Appendix B.

WYSAC also calculated a weighted accuracy rate, excluding stores that were not covered by the inspection list, to determine the accuracy of the tobacco retailer list frame. To calculate the accuracy of the tobacco retailer list frame, WYSAC compared the Coverage Study results to the list frame. WYSAC followed SAMHSA's definition of accuracy: a store's information is accurate if the tobacco retailer list frame information would allow field workers to easily locate the store. If the address from the Coverage Study and the address from the list frame were identical, WYSAC determined that the list information on the store was accurate. If the Coverage Study listed a different name than the name on the list frame, WYSAC still considered the information on the store accurate because the name change would not prevent somebody from locating it. Conversely, if an address would likely result in difficulty finding a store (e.g., one store was listed with two different addresses), the store was considered inaccurate. Detailed calculations are in Appendix B.

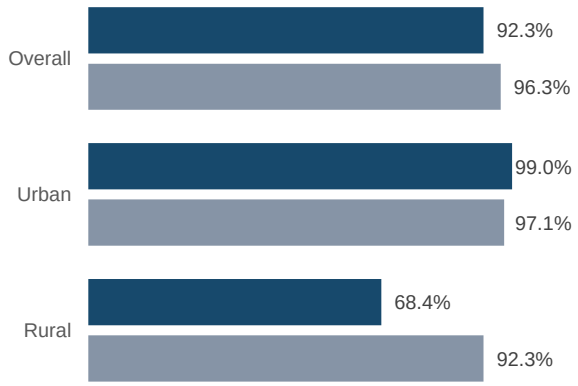
WYSAC conducted two types of crosstab analyses (Pearson's chi-squared test or Fisher's exact test) to examine differences between the urban and rural strata for coverage and accuracy. Depending on the specific analysis, WYSAC used Pearson's chi-squared test or Fisher's exact test to identify statistically significant associations. Fisher's exact test is an alternative to Pearson's chi-squared test. It provides more reliable results than Pearson's chi-squared in analyses where conditions in the crosstabs have few observations (in this report, few covered, inaccurate rural stores; Agresti, 2007).

Key Findings

WYSAC found an overall weighted coverage rate of 92.3% with a 95.0% Wald confidence interval of 90.0% to 94.3%. (See Appendix B for calculations.) The coverage of the tobacco retailer list frame exceeded SAMHSA's required coverage rate of 80.0% *and* the recommended coverage rate of 90.0% (Figure 1). The urban stratum had a coverage rate of 99.0% and the rural stratum had a coverage rate of 68.4%. The coverage rates for each stratum were significantly different, χ^2 (1, N =

Figure 4: Results of the 2016 Coverage Study

The overall and urban coverage rates exceed SAMHSA requirements



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487) = 108.2, $p < .001$. The coverage rate for rural stores was substantially lower than that for the urban stores.

WYSAC also calculated the accuracy of the tobacco retailer list frame. The overall accuracy rate for the tobacco retailer list frame was 96.3% with a 95.0% Wald confidence interval of 94.4% to 97.8%. Mirroring results for the weighted coverage rate, the list frame information was significantly less accurate for the rural stratum (92.3%) than for the urban stratum (97.1%), Fisher's exact test, one-tailed, $p = .045$ (Figure 1; see appendix B for calculations).

Conclusions and Recommendations

SAMHSA requires that states have at least an 80.0% coverage rate and recommends that states have at least a 90.0% coverage rate (SAMHSA, 2006). Wyoming's 2016 (FFY 2017) rate of 92.3% met the recommended threshold. According to SAMHSA's guidelines, Wyoming can continue to use the tobacco retailer list frame to conduct the 2016 (FFY 2017) Synar Inspection Study and will not need to conduct another coverage study until 2019 (FFY 2020). The 95.0% Wald confidence interval for the coverage rate overlapped with SAMHSA's recommended threshold, suggesting Wyoming may still benefit from improving the coverage of the list frame.

Direct comparisons to previous coverage studies are problematic because of changes to the definitions of urban and rural tracts. After the 2010 Census (and after the 2010 Coverage Study), the U.S. Census Bureau re-drew the tract maps across the nation. Because of this change, WYSAC switched from defining urban and rural by census tract land area to using tract population density. This approach better matched the urban and rural strata used in the 2013 (and future) inspection studies.

Although direct statistical comparisons are not possible given these changes, examining the differences can guide efforts to improve the Synar list frame. The 2016 coverage rate is higher than the coverage rates of 83.4% in 2013 and 88.6% in 2010. The 2016 urban coverage rate of 99.0% is also higher than the rates of 92.6% in 2013 and 90.4% in 2010 (WYSAC, 2013). However, there is a continuing decline in the coverage rate for rural outlets. In 2010, the coverage rate for rural stores was 88.0%, compared to 72.4% in 2013 (WYSAC, 2013) and 68.4% in 2016. Therefore, Wyoming's coverage rate would most benefit from efforts to improve the list frame's coverage of rural stores.

Several possibilities exist to improve the Synar coverage rate. The Department of Health, WYSAC, and other state agencies might be able to better collaborate on evaluating tax and other records to identify Synar-eligible retailers. Key obstacles to this collaboration in the past have been tracking retailers based on tax stamp sales to wholesalers and eliminating liquor stores and other retailers that do not allow minors to enter.

Another key stakeholder for Synar in Wyoming is the Wyoming Association of Sheriffs and Chiefs of Police (WASCOP). They are contracted to conduct the bulk of education and enforcement work related to tobacco sales to minors in Wyoming. Because of the low rural coverage rate, WYSAC reached out to WASCOP and received permission to integrate the list of stores they inspected into the Synar list frame. This added approximately 20 stores to what was used to analyze the coverage study. WYSAC and WASCOP will explore additional ways to collaborate, such as having member organizations be part of the annual list review.

The PMO works with community coalitions to conduct tobacco prevention programming across the state. Each community conducts its own needs assessment and identifies priorities for local prevention work. Historically, WYSAC has primarily relied on the PMO or functional equivalent to provide updates to the Synar list frame. However, with coalitions and the PMO prioritizing other prevention work over tobacco accessibility (based on their needs assessments), relying on them as the primary source for updates may no longer be an ideal option. As with WASCOP, budgetary constraints are a key obstacle to changing the PMO's role in Synar. Additionally, the philosophical approach of allowing communities autonomy in setting their prevention priorities may limit increased work updating the Synar list frame.

As the agency that conducts the Synar work in Wyoming, WYSAC will also explore publicly and commercially available retailers list as possible cost-effective means of improving the Synar list frame. Integrating these lists and the Synar retailer list will require calling new outlets to verify their eligibility. To avoid biasing the results of the 2016 (FFY 2017) Synar Inspection Study, WYSAC will not make these calls until after the 2016 inspections are completed.

Finally, the FDA inspections being conducted in Wyoming should be using a comprehensive list of tobacco retailers. Efforts to integrate the actual list into the Synar list frame were rebuffed in 2015 because the FDA retailer list is not public information. The low rural coverage rate in 2016, despite integrating the public results of FDA inspections into the Synar list frame, suggests that involving the FDA in maintaining the Synar list frame may have limited immediate benefits to the coverage rate.

Although the rural coverage rate should be improved, the high coverage rate for the urban strata combined with the weighting process minimizes the impact of the rural coverage rate on the overall rate. For example, had the 2016 coverage rate been as low as 16%, the overall

coverage rate would have been 81%. In a hypothetical scenario with weights similar to those used in 2016 and a low (but reasonable) estimate of a 90% urban coverage rate, the rural coverage rate could approach 50% before tipping the overall coverage rate under 80%.

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Appendices

Appendix A. Coverage Study Sampling Design

WYSAC used the instructions and formulas presented in SAMHSA's *Guide for a Synar Sampling Frame Coverage Study* (2006, p. 13-14) to allocate the sample to two strata and optimize costs:

$$n_{urban} = n\frac{N_{urban} * S_{urban}}{N_{urban} * S_{urban} + \frac{N_{rural}S_{rural}}{\sqrt{a^{-1}}}}$$

and

$$n_{rural} = n - n_{urban}$$

where

$$a^{-1} = \frac{cost_{rural}}{cost_{urban}}$$

In this equation, n is the target sample size, n_{urban} is the sample size for the urban strata, N_{urban} is the estimated population size for the urban stratum, S_{urban} is the standard deviation in the urban stratum, N_{rural} is the estimated population size for the rural stratum, S_{rural} is the standard deviation in the rural stratum, and a^{-1} is the cost ratio of canvassing a rural tract over the cost of canvassing an urban tract.

The standard deviations for each stratum are calculated by taking the square root of the product of the previous coverage rate (P) and undercoverage rate (Q = 1-P). WYSAC used data from the 2013 Coverage Study to estimate P and Q for each strata.

$$S_{urban} = \sqrt{.926(1 - .926)} = .262$$

$$S_{rural} = \sqrt{.724(1 - .724)} = .447$$

Consistent with SAMHSA's guidance on total sample size (2006, p. 11), WYSAC set the target sample size at 120 stores. Substituting the estimated values for the 2016 Coverage Study (based on the list updated after the 2015 inspections), WYSAC found

$$n_{urban} = 120\frac{349 * 0.262}{349 * 0.262 + \frac{154 * 0.447}{\sqrt{\frac{3}{1}}}} = 83.6$$

and

$$n_{rural} = 120 - 83.6 = 36.4$$

Using the 2015 Synar tobacco retailer list frame, WYSAC determined that Wyoming has an average of 3.87 tobacco retail stores per census tract (503 stores / 131 tracts). Extrapolating the above target sample sizes to target sample sizes in census tracts and rounding the number of tracts to whole numbers, WYSAC determined target sample sizes for each stratum: 22 urban tracts and nine rural tracts

$$\frac{83.6\ urban\ outlets}{3.87\ outlets\ per\ tract} \cong 22\ urban\ tracts;\ \frac{36.4\ rural\ outlets}{3.87\ outlets\ per\ tract} \cong 9\ rural\ tracts$$

WYSAC drew a stratified random sample accordingly using SPSS version 22.

Appendix B. Coverage and Accuracy Rate Calculations

COVERAGE RATE CALCULATIONS

The un-weighted coverage formula from the *CSAP Guide for a Synar Sampling Frame Coverage Study* (2006, p. 15) is given by the following general equation:

$$C = 100 \times \frac{b}{n}$$

In this equation, b is the number of stores from the tobacco retailer list frame found by the Coverage Study and n is the total number of stores found by the Coverage Study (regardless of whether they were on the list frame). Because the 2016 Coverage Study used a stratified sample, WYSAC needed to calculate a weighted coverage rate. The equation with weighting is (SAMHSA, 2006, p 15):

$$C = 100 \times \frac{\sum_{i=1}^{k} w_i b_i}{\sum_{i=1}^{k} w_i n_i}$$

In this equation, b_i is the number of stores from the tobacco retailer list frame found in each stratum, n_i is the number of stores found by the Coverage Study in each stratum, and w_i is the stratum weight, calculated by the following equation (SAMHSA, 2006, p 15):

$$w_i = \frac{K_i}{k_i}$$

In this equation, k_i is the number of areas selected for coverage in a stratum, and K_i is the number of areas in the stratum.

For the 2016 Coverage Study, the equation expanded as follows:

$$C = 100 \times \frac{w_{urban} b_{urban} + w_{rural} b_{rural}}{w_{urban} n_{urban} + w_{rural} n_{rural}}$$

or

$$C = 100 \times \frac{\frac{K_{urban}}{k_{urban}} \times b_{urban} + \frac{K_{rural}}{k_{rural}} \times b_{rural}}{\frac{K_{urban}}{k_{urban}} \times n_{urban} + \frac{K_{rural}}{k_{rural}} \times n_{rural}}$$

WYSAC calculated the 2016 weighted coverage rate:

$$C = 100 \times \frac{\frac{80}{22} \times 103 + \frac{51}{9} \times 13}{\frac{80}{22} \times 104 + \frac{51}{9} \times 19} = 92.3\%$$

This equation gave a final weighted coverage rate of 92.3%, with a 95.0% Wald confidence interval of 90.0% to 94.5%, above the SAMHSA required threshold of 80.0% *and* above the SAMHSA recommended threshold of 90.0% (SAMHSA, 2006).

WYSAC also calculated separate coverage rates for each stratum:

$$C_{urban} = 100 \times \frac{b_{urban}}{n_{urban}} = \frac{103}{104} = 99.0\%$$

$$C_{rural} = 100 \times \frac{b_{rural}}{n_{rural}} = \frac{13}{19} = 68.4\%$$

The coverage rate for the urban stratum was above the SAMHSA required threshold of 80.0% *and* above the SAMHSA recommended threshold of 90.0%, but the coverage rate for the rural stratum did not meet either threshold. The rates for the two strata were significantly different, χ^2 (1, N = 487) = 108.2, p < .001. The coverage rate for rural stores was substantially lower than that for the urban stores.

ACCURACY RATE CALCULATIONS

To calculate the accuracy of the tobacco retailer list frame, WYSAC compared the Coverage Study results to the list frame. WYSAC followed SAMHSA's (2006) definition of accuracy: WYSAC considered a store's information totally accurate if the tobacco retailer list frame information would allow field workers to easily locate the store. While calculating accuracy, WYSAC only included stores covered by the inspection list frame. If the Coverage Study address and the list frame address were identical, the store was accurate. If the Coverage Study listed a different *name* than the list frame, WYSAC still considered the store accurate because the name change would not prevent somebody from locating it. The un-weighted accuracy is given by the following equation:

$$A = 100 \times \frac{a}{b}$$

In this equation, A is the un-weighted accuracy of tobacco retailer list frame addresses, a is the number of stores found by the Coverage Study with accurate addresses, and b is the number of stores from the tobacco retailer list frame found by the Coverage Study (the coverage rate formulas above). Because the Coverage Study used a stratified sample, WYSAC needed to calculate a weighted accuracy rate. Thus, WYSAC calculated a weighted accuracy for the list frame addresses with the following equation, based on the weighted coverage rate equation for the Coverage Study (above):

$$A = 100 \times \frac{w_{urban}a_{urban} + w_{rural}a_{rural}}{w_{urban}b_{urban} + w_{rural}b_{rural}} = 100 \times \frac{\frac{K_{urban}}{k_{urban}} \times a_{urban} + \frac{K_{rural}}{k_{rural}} \times a_{rural}}{\frac{K_{urban}}{k_{urban}} \times b_{urban} + \frac{K_{rural}}{k_{rural}} \times b_{rural}}$$

In this fully expanded equation, k_i is the number of areas selected for coverage in a stratum, K_i is the number of areas in the stratum, a_i is the number of stores with accurate list frame addresses

found by the Coverage Study in each stratum, and b_i is the number of stores from the tobacco retailer list frame found in each stratum. Substituting the values for the Coverage Study, WYSAC found:

$$A = 100 \times \frac{\frac{80}{22}100? + \frac{51}{9}12}{\frac{80}{22} \times 103 + \frac{51}{9} \times 13} = 96.3\%$$

Thus, the weighted accuracy for the list frame was 96.3%, with a 95.0% Wald confidence interval of 94.4% to 97.8%. WYSAC also calculated accuracy rates specific to each stratum using the following equations:

$$A_{urban} = 100 \times \frac{a_{urban}}{b_{urban}} = \frac{100}{103} = 97.1\%$$

$$A_{rural} = 100 \times \frac{a_{rural}}{b_{rural}} = \frac{12}{13} = 92.3\%$$

Mirroring results for the weighted coverage rate, the list frame information was less accurate for the rural stratum, Fisher's exact test, $p = .045$.