

A Comparison of Prenatal Alcohol, Tobacco, and other Drug Use Between San Luis Obispo County and Ventura County

Using San Luis Obispo County 4P's Plus© Screening Data and
Ventura County 4P's Plus© Screening Data

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Abstract

Prenatal substance abuse is a growing issue in America. It can lead to fetal alcohol spectrum disorder, long term growth, behavior, and executive functioning problems, and creates a predisposition for drug use for the child.

This project summarizes the statistical analyses comparing alcohol, tobacco, and other drug use by pregnant women between San Luis Obispo County and Ventura County. The main goal of these analyses is to determine if there is a difference between San Luis Obispo County and Ventura County. This is an interesting comparison because these counties are neighboring counties, and past data have shown that the rate of alcohol abuse during pregnancy is higher in San Luis Obispo than Ventura. The analyses done are based on the 4P's+© screen collected from both counties between the years of 2008 and 2012.

Based on these analyses, there was not a significant difference between San Luis Obispo County and Ventura County in alcohol use in the month before screening, but there was a significant difference in cigarette use dependent on race, in marijuana use, and in drug use dependent on year. This indicates that San Luis Obispo County's focus on alcohol has closed the gap between the two counties for alcohol use. Though there has been progress in reduction of alcohol use, use of other substances is prevalent. In light of this, it is advisable that there be a refocusing onto substance abuse in general.

Introduction

Alcohol, tobacco, and other drug use is a serious problem during pregnancy. These substances can cause an array of issues for the baby such as fetal alcohol spectrum disorder, long term growth, behavior, and executive functioning problems, and creates a predisposition for drug use for the child (Behnke). However, the exact effects of substance abuse are not necessarily widely known. Therefore it is critical that women are screened for substance abuse during pregnancy to provide proper counseling and resources for those with a substance abuse problem. San Luis Obispo County and Ventura County both use the screening tool 4P's Plus©, developed by Ira J Chasnoff, MD. The offices in these counties that do not use the 4P's Plus program provide their own screening method. The data utilized for this project consist of the San Luis Obispo and Ventura 4P's+©from 2008 to 2012.

Question of interest:

The question of interest pertains to the use of alcohol, tobacco, marijuana, and other drugs in San Luis Obispo County and Ventura County. The question is this: is there a difference between San Luis Obispo County and Ventura County in prenatal use of alcohol, tobacco, and other drugs?

Description of Data:

The data were received from the San Luis Obispo County Health Department and the Ventura County Health Department.

The data from both counties contained 30 variables. The variables pertinent to the questions at hand were kept, which include the following:

Ventura Variable	SLO Variable	Description
Screen	Screen	Screen Number
Race	Ethnicity	Caucasian, Hispanic, Other
Date	Date	Date of Screen
Parents	Parents	"Did either of your parents have problems with drugs or alcohol?" (Yes, No, No Response)
Partner	Partner	"Does your partner have any problems with drugs or alcohol?" (Yes, No, No Response)
Temper	Temper	"Is your partner's temper ever a problem for you?"(Yes, No, No Response)
Past	Past	"Have you ever drunk alcohol?" (Yes, No, No Response)
Mthbefsmoke	Mthbefsmoke	"In the month before you knew you were pregnant, how many cigarettes did you smoke?" (None, Any)
Mthbefdrink	Mthbefdrink	"In the month before you knew you were pregnant, how much beer/wine/liquor did you drink?" (None, Any)

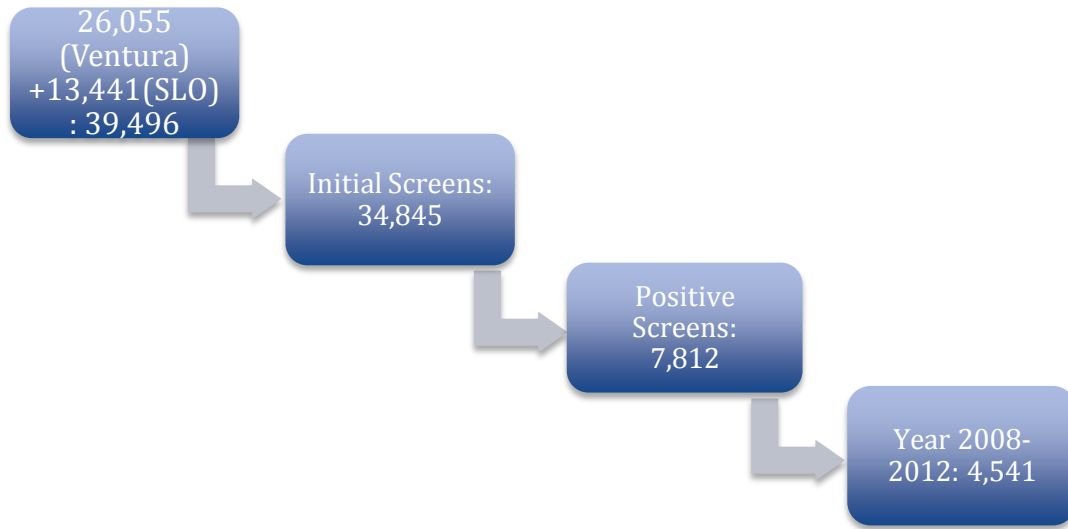
mthbefstreet	mthbefmarySCR	“In the month before you knew you were pregnant, how much marijuana did you smoke?” (None, Any)
Lstmthdrink	Lstmthdrink	“And last month, how many days a week did you usually drink beer, wine, or liquor?” (Did not drink, Every day, 3 to 6 days a week, 1 or 2 days a week, less than 1 day a week)
Lstmthsmoke	Lstmthsmoke	“And last month, how many days a week did you usually smoke a cigarette?” (Did not smoke, Every day, 3 to 6 days a week, 1 or 2 days a week, less than 1 day a week)
mthbefmary	mthbefmaryASS	“During the month before you knew you were pregnant, about how many days a week did you usually use marijuana?” (Did not smoke, Every day, 3 to 6 days a week, 1 or 2 days a week, less than 1 day a week)
mthbefdrug	mthbefdrug	“During the month before you knew you were pregnant, about how many days a week did you usually use methamphetamine, cocaine or opiates such as heroin, OxyContin, or methadone?” (Did not use, Every day, 3 to 6 days a week, 1 or 2 days a week, less than 1 day a week)
lstmthmary	lstmthmary	“And last month, how many days a week did you usually use marijuana?” (Did not smoke, Every day, 3 to 6 days a week, 1 or 2 days a week, less than 1 day a week)
Lstmthdrug	Lstmthdrug	“And last month, how many days a week did you usually use any drug such as methamphetamine, cocaine or opiates such as heroin, OxyContin, or methadone?” (Did not use, Every day, 3 to 6 days a week, 1 or 2 days a week, less than 1 day a week)

Table 1:Data Dictionary

The variables for “lstmth...” were collapsed into 0 for none, 1 for any use. A variable for county San Luis Obispo=1, Ventura=0 was also added to the data set.

Cohort

There were 26,055 observations from Ventura and 13,441 observations from San Luis Obispo. These data sets were combined into one with a total of 39,496 records. From this the data were narrowed down to 34,845 initial screens, due to the fact that there was no way to pair first and second screens for the same woman. The data set was narrowed down further to positive initials, because the questions of interest pertain to the follow-up questions, and only positive screens were asked these questions. Some women who screened positive did not have responses to any of the follow up questions; therefore these observations were also deleted. The final positive initials data set resulted in 7,812 observations. Of these the timeframe of the records had to be considered because Ventura County did not start collecting data on race until 2008, and there were only a few observations from 2013 for Ventura. The final analytic data set was limited to positive initial screens in the years 2008 to 2012 for a total of 4,541 observations.



Statistical Methods

The outcome variables of interest were alcohol, tobacco, marijuana, or other drug use in the month before screening. Logistic regression was used to model each binary outcome separately. These models were analyzed using PROC LOGISTIC in SAS 9.3. All four models (alcohol, tobacco, marijuana, other drugs) included county as a predictor, regardless of significance in the model due to county being the main predictor of interest. Other potential predictors that were included were selected using stepwise selection in PROC LOGISTIC. In the final models, the “missing” option was used to include all missing data as a category in the corresponding variable. This option was used to model whether a non-response to some of the questions indicate higher or lower odds of using alcohol, tobacco, marijuana, or other drugs in the month before screening. Hosmer and Lemeshow Goodness-of-Fit Tests were run for all analyses to check that the models were a good fit for the data. All data management and statistical analyses were done using the statistical software SAS 9.3. Significance was determined at the 0.05 significance level.

Results

Descriptive Statistics:

Alcohol

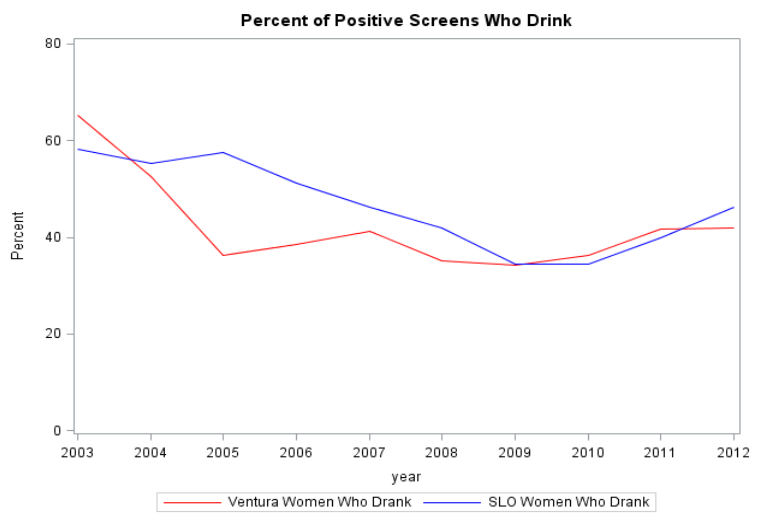


Figure 1: Unadjusted Positive Screens Who Drink

	Last Month Drink	Last Month Drink	Total
County	None	Any	
Ventura	1382 (62.31%)	836 (37.69%)	2218
SLO	1384 (60.57%)	901 (39.43%)	2285
Total	2766	1737	4503

Table 2: Cross Tabulation of Drinking and County

Figure 1 shows the alcohol use from years 2003 to 2012 for each county. This shows that the gap between San Luis Obispo and Ventura has been closed, but that drinking is on the rise overall. Table 2 is a cross tabulation of drinking and county. There does not appear to be a difference in the proportion of women who drank in San Luis Obispo compared to Ventura.

Tobacco

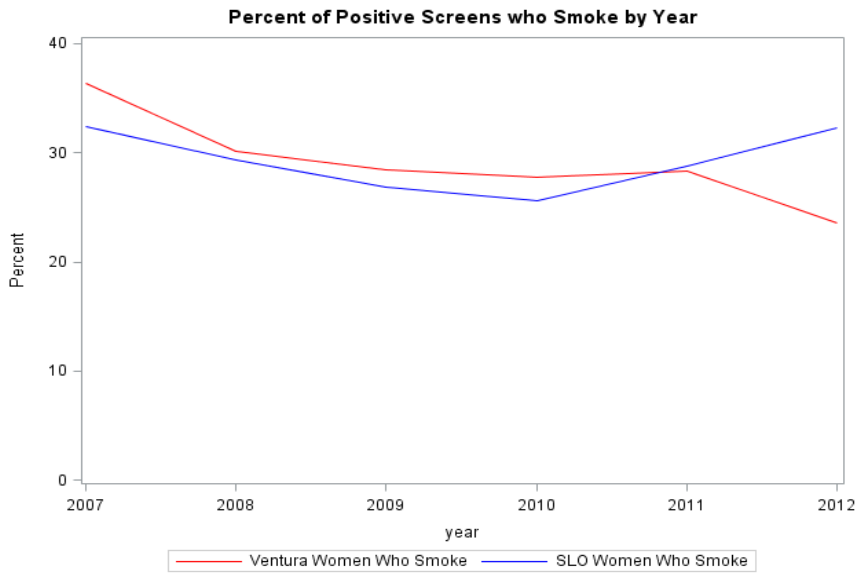


Figure 2: Unadjusted Positive Screens Who Smoked

	Last Month Smoke	Last Month Smoke	Total
County	None	Any	
Ventura	1570 (72.45%)	597 (27.55%)	2167
SLO	1629 (71.42%)	652 (28.58%)	2281
Total	3199	1249	4448

Table 3: Cross Tabulation of Smoking and County

Figure 2 shows the cigarette use for years 2007 to 2012 for each county. There does not appear to be a huge difference in smoking between the two counties overall. Table 3 is a cross tabulation of cigarette use and county. There does not appear to be a difference in the proportion of women who smoked in San Luis Obispo compared to Ventura.

Marijuana

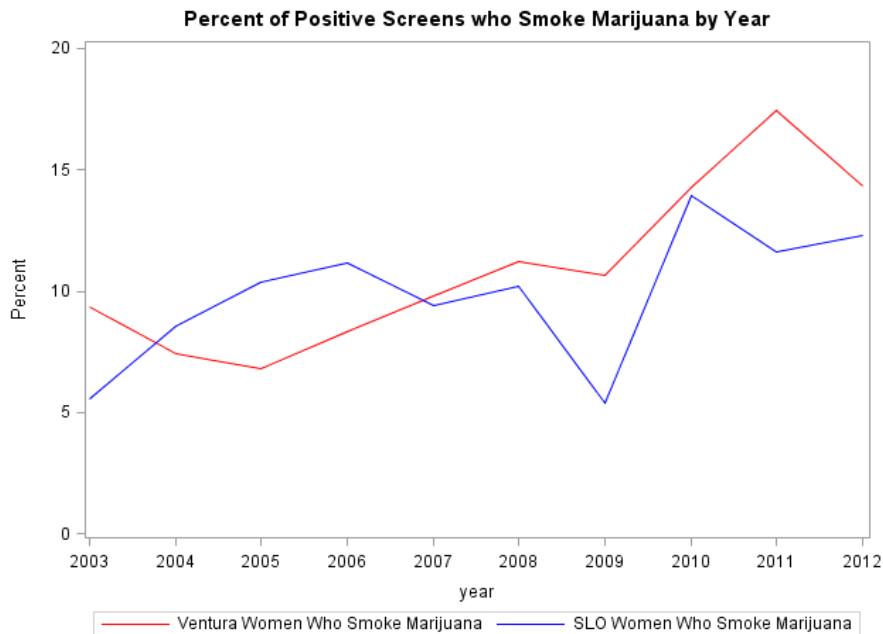


Figure 3: Unadjusted Positive Screens Who Smoked Marijuana

	Last Month Marijuana	Last Month Marijuana	Total
County	None	Any	
Ventura	1897 (86.58%)	294 (13.42%)	2191
SLO	2024 (89.20%)	245 (10.80%)	2269
Total	3921	539	4460

Table 4: Cross Tabulation of Smoking Marijuana and County

Figure 3 shows the marijuana use for years 2003 to 2012 for each county. There does appear to be a difference in marijuana use between the two counties. Table 4 is a cross tabulation of marijuana use and county. There does appear to be a difference in the proportion of women who used marijuana in San Luis Obispo and Ventura.

Street Drugs

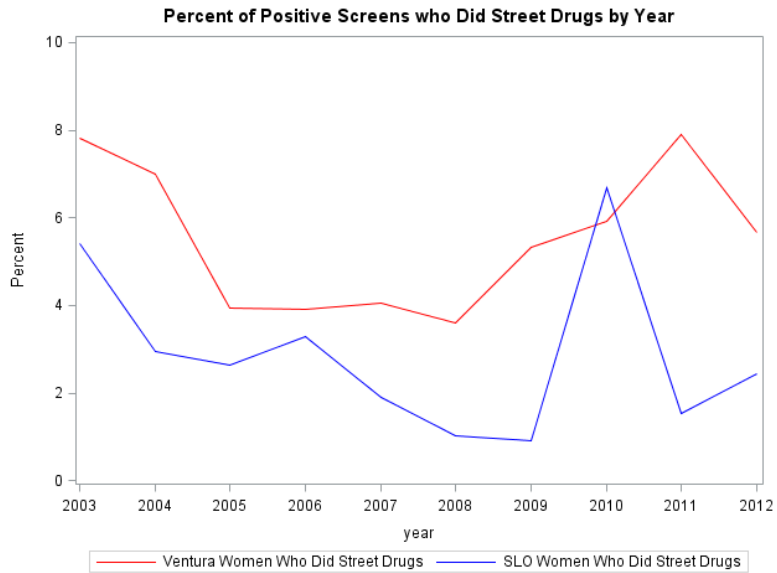


Figure 4: Unadjusted Positive Screens Used Drugs

	Last Month Drug	Last Month Drug	Total
County	None	Any	
Ventura	2067 (94.38%)	123 (5.62%)	2190
SLO	2205 (97.39%)	59 (2.61%)	2264
Total	4272	182	4454

Table 5: Cross Tabulation of Smoking Marijuana and County

Figure 4 shows the drug use for years 2003 to 2012 for each county. There does appear to be a difference in drug use between the two counties. Table 5 is a cross tabulation of drug use and county. There does appear to be a difference in the proportion of women who used drugs in San Luis Obispo and Ventura.

Logistic Regression Models

Last Month Alcohol Use:

38 observations were deleted due to missing values for the response. There were 2,766 women in the study who had not consumed alcohol in the month before their initial screening, and there were 1,737 that had.

Test	Chi-Square	DF	Pr>ChiSq
Likelihood Ratio	119.26	10	<0.0001
Score	108.28	10	<0.0001
Wald	97.80	10	<0.0001

Table 6: Testing Global Hypothesis $\beta=0$

Chi-Square	DF	Pr>ChiSq
6.45	8	0.5966

Table 7: Hosmer and Lemeshow Goodness-of-Fit Test

The Likelihood Ratio Test, the Score Test, and the Wald Test all indicate that the overall model predicting drinking alcohol in the month before initial screen with past alcohol use, race, county, and year of initial screen is significant (Table 6). The Hosmer and Lemeshow Goodness-of-Fit Test indicates that there is no reason to believe that this model is not a good fit to the data (Table 7).

Effect	DF	Wald Chi-Square	Pr>ChiSq
Past	2	63.86	<0.0001
Race	3	10.31	0.0161
County	1	3.62	0.0570
Year	4	22.19	0.0002

Table 8: Analysis of Effects

As seen in table 8 there is evidence to conclude that past drinking ($p<0.0001$) is a significant predictor of drinking in the month before initial screen, after accounting for race, county, and year of initial screen. In addition, there is significant evidence to conclude that race ($p=0.0161$) and year of initial screen ($p=0.0020$) are also significant predictors of drinking in the month before initial screen in this model. However there is not enough evidence to conclude that county ($p=0.0570$) is a significant predictor of drinking in the month before initial screen, after accounting for past, race, and year.

Effect	Odds Ratio	95% Wald Confidence Interval
Past . vs No	6.299	(2.804, 14.152)
Past Yes vs No	4.028	(2.849, 5.694)
Race . vs Caucasian	1.170	(0.960, 1.426)
Race Hispanic vs Caucasian	1.284	(1.101, 1.497)
Race Other vs Caucasian	1.051	(0.785, 1.406)
County SLO vs Ventura	1.146	(0.996, 1.319)
Year 2009 vs 2008	0.860	(0.706, 1.046)
Year 2010 vs 2008	0.913	(0.751, 1.110)
Year 2011 vs 2008	1.127	(0.922, 1.378)
Year 2012 vs 2008	1.278	(1.054, 1.549)

Table 9: Odds Ratio Estimates

Table 9 shows the odds ratios for the multiple logistic regression model for alcohol use. Women who did not respond to the past question (OR: 2.804, 14.152) and women who responded yes to the past question (OR: 2.849, 5.694) have higher odds of drinking during pregnancy than women who responded no. Hispanic women have higher odds of drinking during pregnancy than Caucasian women (OR: 1.101, 1.497). The odds of drinking during pregnancy are higher for those who were screened in 2012 compared to those who were screened in 2008 (OR: 1.054, 1.549).

Last Month Cigarette Use:

93 observations were deleted due to missing values for the response. There were 3,199 women in the study who had not smoked in the month before their initial screening, and there were 1,249 that had.

Test	Chi-Square	DF	Pr>ChiSq
Likelihood Ratio	389.436	13	<0.0001
Score	395.458	13	<0.0001
Wald	353.259	13	<0.0001

Table 10: Testing Global Hypothesis $\beta=0$

Chi-Square	DF	Pr>ChiSq
12.688	7	0.0801

Table 11: Hosmer and Lemeshow Goodness-of-Fit Test

The Likelihood Ratio Test, the Score Test, and the Wald Test all indicate that the overall model predicting smoking cigarettes in the month before initial screen with

parents, partner, past, race, county, and county by race is significant (Table 10). The Hosmer and Lemeshow Goodness-of-Fit Test indicates that there is no reason to believe that this model is not a good fit to the data (Table 11).

Effect	DF	Wald Chi-Square	Pr>ChiSq
Parents	2	77.196	<0.0001
Partner	2	83.674	<0.0001
Past	2	111.203	<0.0001
Race	3	80.313	<0.0001
County	1	12.582	0.0004
Race*County	3	13.097	0.0044

Table 12: Analysis of Effects

The analysis of effects for the cigarette use model can be seen in table 12. There is significant evidence to conclude that parents having a drug or alcohol problem (<0.0001), partner having a drug or alcohol problem (<0.0001), and past alcohol use (<0.0001) are all predictors of smoking in the month before initial screening.

There is significant evidence to conclude that the interaction between race and county is a predictor of smoking in the month before initial screening (0.0044). This means that the effect of race on smoking in the month before initial screen is different for San Luis Obispo and Ventura, after accounting for parents, partner, and past.

Effect	Odds Ratio	95% Wald Confidence Interval
Parents . vs Yes	0.892	(0.437, 1.822)
Parents No vs Yes	0.525	(0.455, 0.607)
Partner . vs Yes	0.475	(0.281, 0.805)
Partner No vs Yes	0.415	(0.344, 0.501)
Past . vs No	0.430	(0.188, 0.984)
Past Yes vs No	0.248	(0.191, 0.322)
County SLO vs Ventura at race .	1.200	(0.723, 1.992)
County SLO vs Ventura at race Caucasian	0.692	(0.565, 0.848)
County SLO vs Ventura at race Hispanic	1.297	(0.957, 1.757)
County SLO vs Ventura at race Other	0.815	(0.453, 1.466)

Table 13: Odds Ratio Estimates

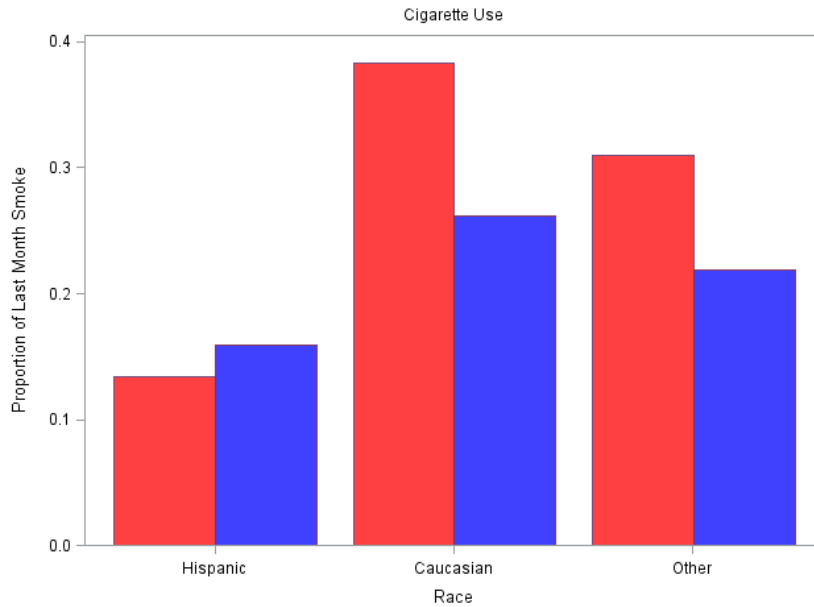


Figure 5: Bar Plot of Cigarette Use, Red: Ventura, Blue: San Luis Obispo

Table 13 shows the odds ratios for the multiple regression model for cigarette use. Women who have parents who did not have problems with alcohol or drugs (OR: 0.455, 0.607) have lower odds of using cigarettes than women who have parents who did have problems with alcohol or drugs. Women who did not respond to the partner question (OR: 0.281, 0.805) and women who had partners who did not have problems with alcohol or drugs (OR: 0.344, 0.501) have lower odds of using cigarettes than women who have partners that do have problems with alcohol and drugs. Women who did not respond to the question about their drinking history (OR: 0.188, 0.984) and women who had drunk at some point in their life (OR: 0.191, 0.322) have lower odds of smoking than women who had never drunk.

The interaction between race and county resulted in a significant relationship for the Caucasian race group. The odds of having smoked in the month before initial screening are between 15.2% and 43.5% lower for Caucasian women in San Luis Obispo compared to Caucasian women in Ventura. This interaction is illustrated in figure 5.

Last Month Marijuana Use:

81 observations were deleted due to missing values for the response. There were 3921 women in the study who had not used marijuana in the month before their initial screening, and there were 539 who had.

Test	Chi-Square	DF	Pr>ChiSq
Likelihood Ratio	160.694	9	<0.0001
Score	175.697	9	<0.0001
Wald	161.684	9	<0.0001

Table 14: Testing Global Hypothesis $\beta=0$

Chi-Square	DF	Pr>ChiSq
8.981	8	0.3439

Table 15: Hosmer and Lemeshow Goodness-of-Fit Test

The Likelihood Ratio Test, the Score Test, and the Wald Test all indicate that the overall model predicting using marijuana in the month before initial screen with Parents, Partner, County, and Year is significant (Table 14). The Hosmer and Lemeshow Goodness-of-Fit Test indicates that there is no reason to believe that this model is not a good fit to the data (Table 15).

Effect	DF	Wald Chi-Square	Pr>ChiSq
Parents	2	40.861	<0.0001
Partner	2	68.749	<0.0001
County	1	5.429	0.0198
Year	4	26.590	<0.0001

Table 16: Analysis of Effects

As seen in table 16 there is evidence to conclude that parents' having a drug or alcohol problem ($p < 0.0001$) is a significant predictor of marijuana use in the month before initial screen, after accounting for partner, county, and year of initial screen. In addition, there is significant evidence to conclude that partner ($p < 0.0001$) and year of initial screen ($p < 0.0001$) are also significant predictors of marijuana use in the month before initial screen in this model. County ($p\text{-value} = 0.0198$) is also a significant predictor of marijuana use in the month before initial screen.

Effect	Odds Ratio	95% Wald Confidence Interval
Parents . vs Yes	1.275	(0.494, 3.285)
Parents No vs Yes	0.545	(0.451, 0.658)
Partner . vs Yes	0.163	(0.062, 0.430)
Partner No vs Yes	0.404	(0.323, 0.505)
County SLO vs Ventura	0.802	(0.667, 0.966)
Year 2009 vs 2008	0.743	(0.535, 1.031)
Year 2010 vs 2008	1.407	(1.050, 1.887)
Year 2011 vs 2008	1.463	(1.080, 1.981)
Year 2012 vs 2008	1.383	(1.029, 1.860)

Table 17: Odds Ratio Estimates

Table 17 shows the odds ratios for the multiple logistic regression model for marijuana use. Women who have parents who did not have drug or alcohol problems (OR: 0.451, 0.658) have lower odds of marijuana use during pregnancy than women who

have parents who did have problems with drugs or alcohol. Women who did not respond to the partner question (OR: 0.062, 0.430) and women who responded no to the partner question (OR: 0.323, 0.505) have lower odds of using marijuana during pregnancy than women who responded yes. Women in San Luis Obispo have lower odds of marijuana use than women in Ventura (OR: 0.667, 0.966). The odds of marijuana use during pregnancy are higher for those who were screened in 2010 (OR: 1.050, 1.887), 2011 (OR: 1.080, 1.981), and 2012 (OR: 1.029, 1.860) compared to those who were screened in 2008.

Last Month Drug Use:

87 observations were deleted due to missing values for the response. There were 4272 women in the study who had not used street drugs in the month before their initial screening, and there were 182 who had.

Test	Chi-Square	DF	Pr>ChiSq
Likelihood Ratio	201.151	13	<0.0001
Score	242.657	13	<0.0001
Wald	187.439	13	<0.0001

Table 18: Testing Global Hypothesis $\beta=0$

Chi-Square	DF	Pr>ChiSq
7.212	8	0.5140

Table 19: Hosmer and Lemeshow Goodness-of-Fit Test

The Likelihood Ratio Test, the Score Test, and the Wald Test all indicate that the overall model predicting drug use in the month before initial screen with Parents, partner, county, year, county by year (Table 18). The Hosmer and Lemeshow Goodness-of-Fit Test indicates that there is no reason to believe that this model is not a good fit to the data (Table 19).

Effect	DF	Wald Chi-Square	Pr>ChiSq
Parents	2	7.334	0.0256
Partner	2	114.467	<0.0001
County	1	4.534	0.0332
Year	4	8.202	0.0845
County*Year	4	24.749	<0.0001

Table 20: Analysis of Effects

As seen in table 20, there is significant evidence to conclude that parents' having a drug or alcohol problem (p-value: 0.0256) is a predictor of drug use in the month before initial screening, after accounting for partner, county, year, and county by year. There is significant evidence that partner having a drug or alcohol problem (p-

value<0.0001) is a predictor of drug use in the month before initial screening, after accounting for parents, county, year, and county by year.

There is significant evidence to conclude that county*year (p-value<0.0001) is a significant predictor of drug use in the month before screening, after accounting for parents, partner, county, and year. This means that the effect of county on drug use in the month before initial screen depends on the year of pregnancy.

Effect	Odds Ratio	95% Wald Confidence Interval
Parents . vs Yes	0.536	(0.116, 2.490)
Parents No vs Yes	0.650	(0.473, 0.893)
Partner . vs Yes	0.741	(0.339, 1.617)
Partner No vs Yes	0.170	(0.122, 0.236)
County SLO vs Ventura at Year 2008	0.295	(0.096, 0.907)
County SLO vs Ventura at Year 2009	0.182	(0.062, 0.531)
County SLO vs Ventura at Year 2010	1.445	(0.839, 2.488)
County SLO vs Ventura at Year 2011	0.176	(0.075, 0.413)
County SLO vs Ventura at Year 2012	0.423	(0.208, 0.861)

Table 21: Odds Ratio Estimates and Wald Confidence Intervals

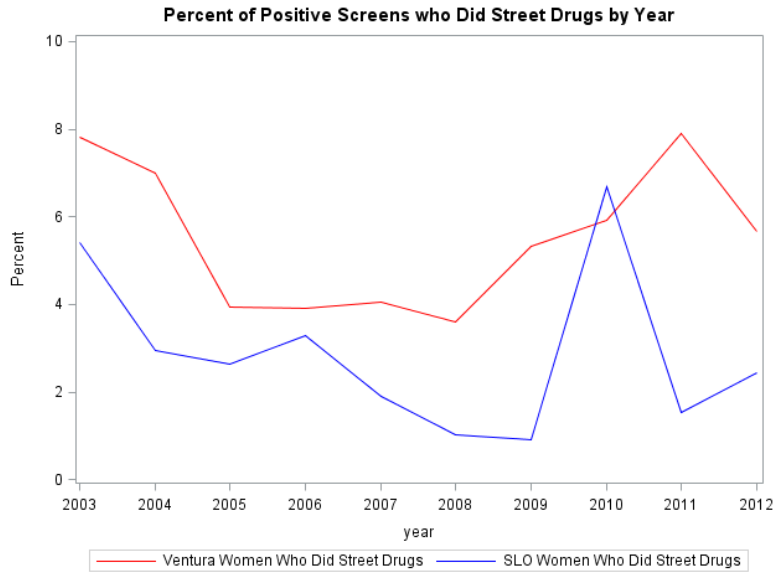


Figure 6: Unadjusted Plot of Drug Use for Each County by Year

Table 21 shows the odds ratios for the multiple logistic regression model for drug use. The odds of using drugs in the month before initial screening are lower for those who had parents who did not have problems with drugs or alcohol (OR: 0.473, 0.893) than those whose parents did. The odds of using drugs in the month before initial screening are lower for those have a partner who did not have alcohol or drugs problems (OR: 0.122, 0.236) than those whose partner did.

The odds of drug use are lower for San Luis Obispo than Ventura in the years 2008 (OR: 0.096, 0.907), 2009 (OR: 0.062, 0.531), 2011 (OR: 0.075, 0.413), and 2012 (OR: 0.208, 0.861). This interaction can be seen in figure 6.

Summary of results

Based on the results, the efforts of San Luis Obispo County to reduce the gap in alcohol use between San Luis Obispo and Ventura has been successful. There is not a significant difference between then counties when it comes to alcohol use, but alcohol use as a whole appears to be on the rise. It is interesting to note that those who did not respond to the past question had higher odds of drinking during pregnancy than women who had not drank. This is interesting because a woman who refuses to indicate that she has drank in the past probably has. San Luis Obispo and Ventura should focus their prevention efforts on substance abuse as a whole, and not put all of their effort into one substance. Marijuana use appears to be on the rise overall in both counties, as well as alcohol use. Drug use appears to be decreasing, and cigarette use does not appear to be changing over time.

County	Value	uti Upstream	Dana
SLO	Any	36.9%	39.43%
	None	61.9%	60.57%
Ventura	Any	31.3%	37.69%

Table 22: A comparison of Numbers

Table 22 shows a comparison of the numbers found though this project and the numbers created by uti Upstream for the alcohol response. These numbers are different enough to consider more exploration as to why they are different.

Limitations

Due to the lack of random sampling in the collection of these data, these conclusions cannot be generalized to any population beyond the women who are represented in the data.

	4P's Plus Data	SLO County
2006	71.54%	10.82%
2007	60.50%	10.87%
2008	54.85%	10.95%
2009	57.25%	11.19%
2010	58.78%	11.80%
2011	66.67%	12.30%
2012	68.62%	12.36%
2013	57.01%	11.26%

Table 23: Data versus San Luis Obispo County

The 4P's+© tool is not used by all doctors in San Luis Obispo County, and those that do use it often only use it for MediCal patients, because it is required by law. This discrepancy can be seen in table 23.

In addition to this, the questionnaires used by San Luis Obispo County and Ventura County are slightly different from each other, and the wording of the question may have some effect on the outcome of this study.

Many of the problems faced in this project were due to the limitations of the data. To fix some of these issues, a new survey was created.

New Survey

The limitation of many of the doctor offices in San Luis Obispo not using the 4P's Plus© tool to screen their patients for alcohol, tobacco, and other drug use makes a scientifically sound comparison difficult. This screening tool is used primarily by doctors who see MediCal patients due to the requirement by law that MediCal patients be screened. Interactions with the nurses and office staff who screen patients' revealed that they do not like using this tool for multiple of reasons. They find the questions to be confusing, the survey takes too long, and it is a paper form which conflicts with the electronic medical record system at most offices. To work toward a solution to this problem a new survey method was developed. This new system utilizes decision trees to make the process faster and more user friendly, has clearly worded questions to remove confusion, and is electronic so there is the potential for it to be implemented. The questions for the survey were based on research (Chang) done about predictors of alcohol, tobacco, and other drug use during pregnancy. The new survey can be seen in figures 7-12 on the following pages.

Patient Information

Name: Last First Date: Month (MM) Day (DD) Year (YYYY)

Ethnicity: Visit number: Age:

EDC: Month (MM) Day (DD) Year (YYYY) Due Date: Month (MM) Day (DD) Year (YYYY)

Payor source:

Figure 7: Demographic Information

Initial Screen

Does anyone you currently live with have any problems with drugs and/or alcohol?

Have your parents/guardians ever had problems with drugs and/or alcohol?

Have you ever been or are you currently being exposed to violence?

Have you ever or are you currently being physically or sexually abused?

Have you ever drank any type of alcohol?

Have you ever smoked cigarettes?

Have you ever smoked marijuana?

Have you ever done any street drugs?

Figure 8: Initial Screen

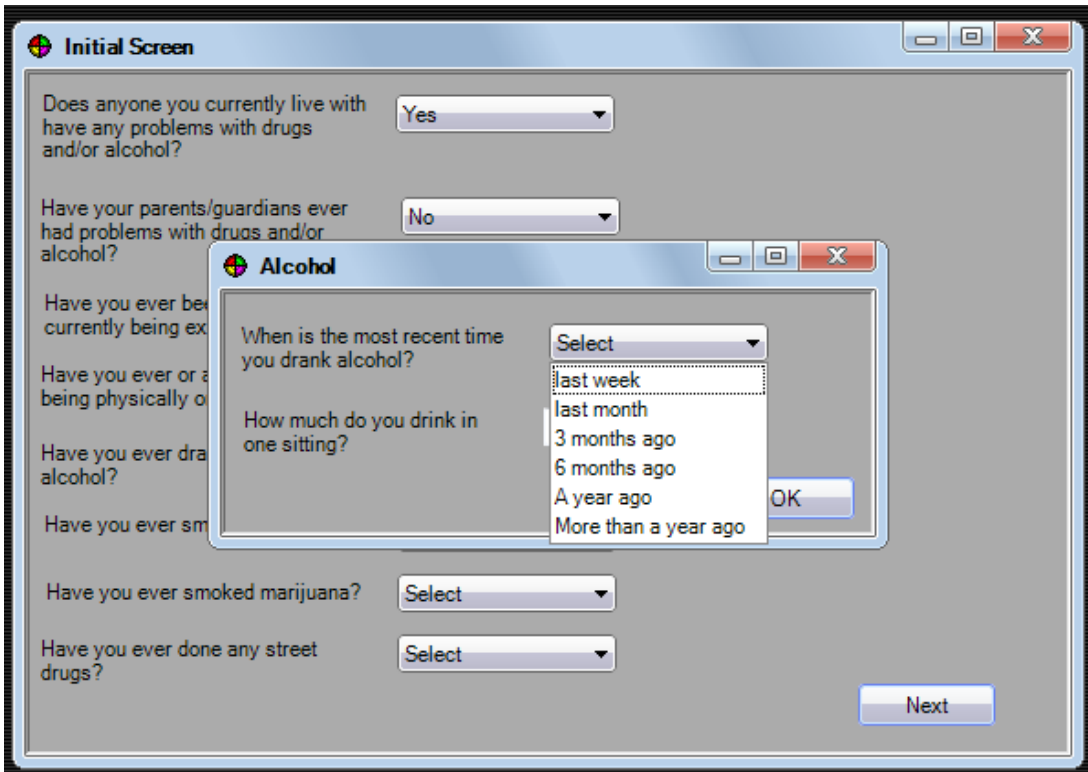


Figure 9: Yes Response to Alcohol Use

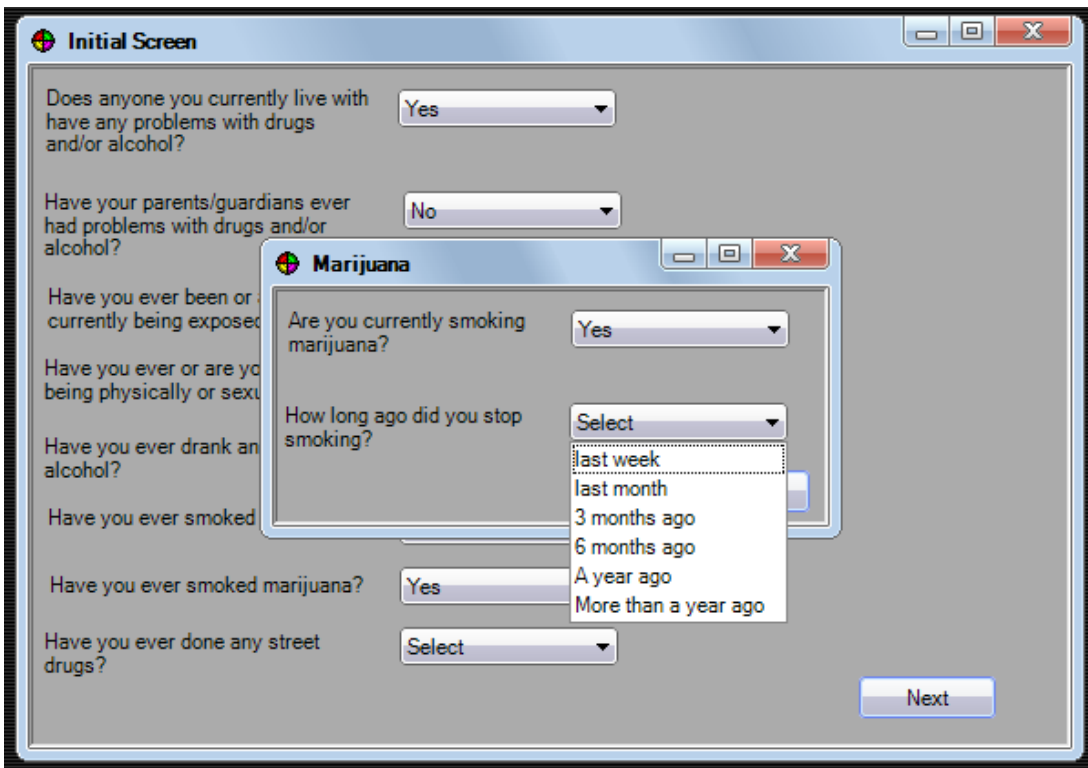


Figure 10: Yes Response to Marijuana Use

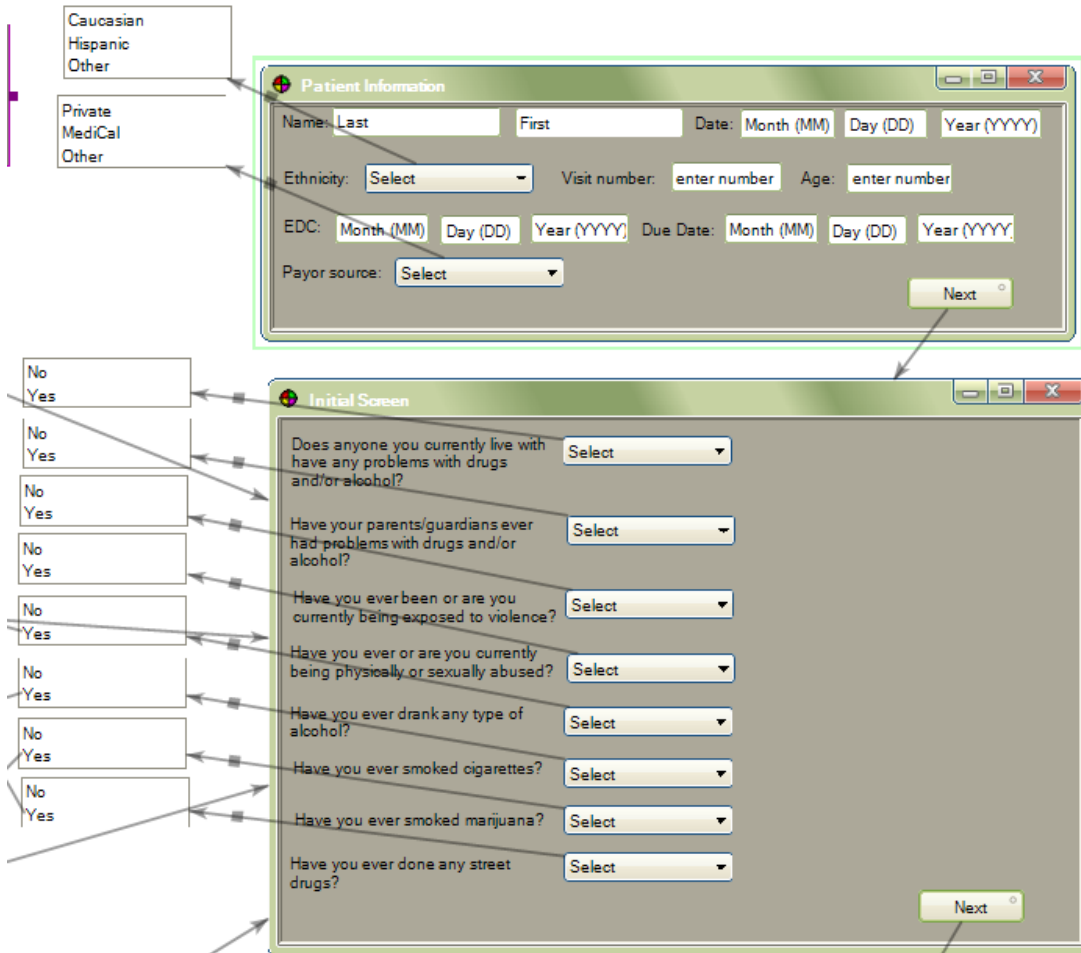


Figure 11: Decision Trees

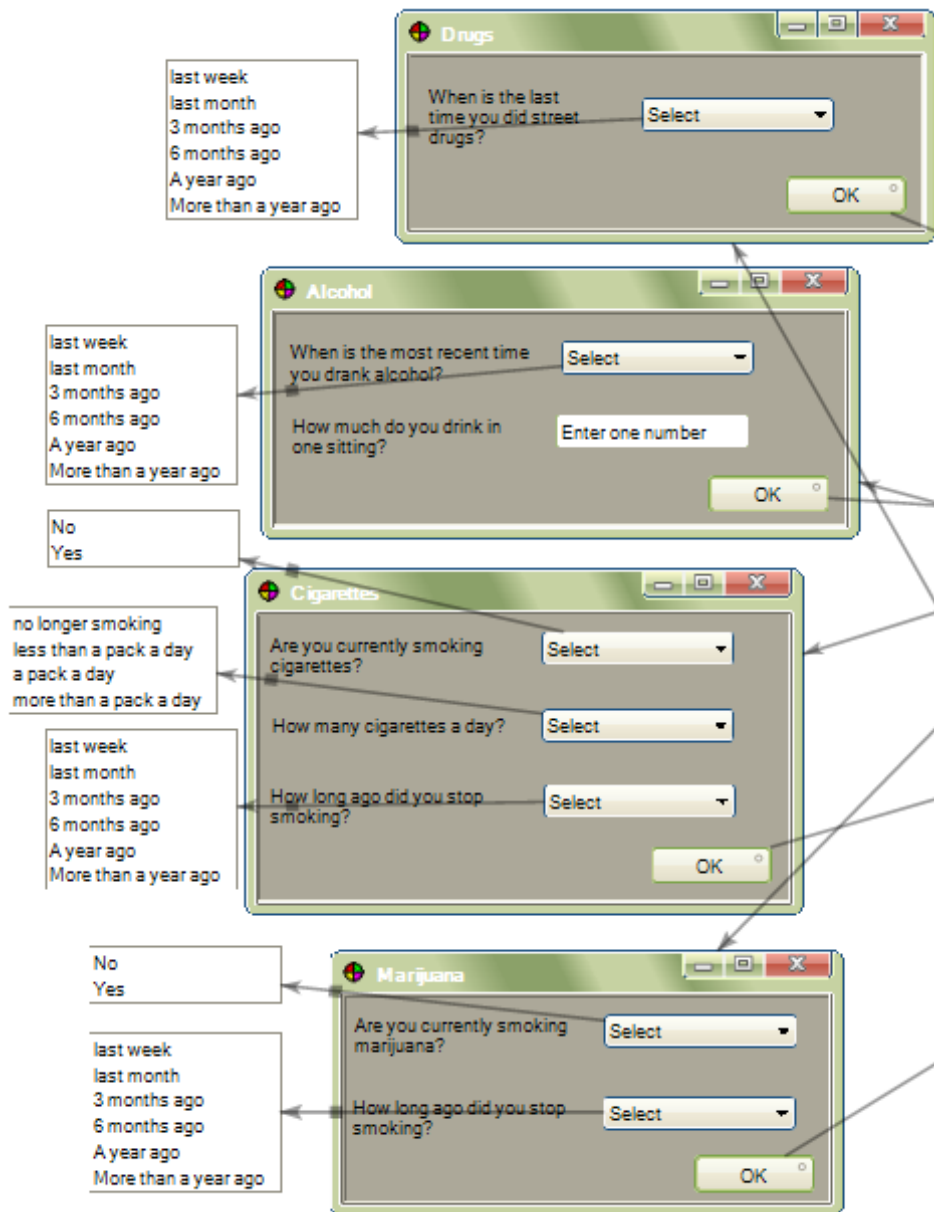


Figure 12: Decision Trees

Future Directions

The next steps for this project would be to explore the process of programming and implementing the web based survey for prenatal screening. Sections of the web based survey could be added to link to applicable resources based on the results of the screen. Reports could be generated that could be provided to the physician offices to see their patient screening profile and how they compare to other de-identified offices in the area. Data could be captured in a consistent and real-time way at the point of care. Most importantly, if implemented, this tool would streamline the data capture process by allowing the office staff to spend more time concentrating on counseling their patients.

Appendix

Code

```
options nodate;
/*create libraries for sasdata and formats*/
libname sasdata "E:\final";

/*import 4P's+ year 2003-2013 (total database) data excel sheet
from
    senior project folder*/
/*create permanent data set of all 4ps in seniorproject library
*/
PROC IMPORT OUT= sasdata.updatedraw4ps
DATAFILE= "E:\rawdata\AllSLO.xlsx"
DBMS=xlsx REPLACE;
RANGE="'AllSLO$'";
GETNAMES=YES;
MIXED=NO;
RUN;

/*change #NULL! to '.' for date variables, fix dates, create
county
    indicator, create race*/
data sasdata.cleanslodata;
set sasdata.updatedraw4ps;
keep screen date ethnicity
    parents partner temper past mthbefsmoke mthbefdrink
mthbefmarySCR
    lstmthdrink lstmthsmoke mthbefmaryASS mthbefdrug
lstmthmary lstmthdrug
    race datel County;
if date= '#NULL!' then date=".";
datel= input(date,9.)-21916;
format datel mmddy8.;
County=1;

if ethnicity = 1 then race = "Caucasian ";
if ethnicity = 2 then race = "Hispanic";
if ethnicity = 3 then race = "A.American";
if ethnicity = 4 then race = "Asian";
if ethnicity = 5 then race = "N.American";
if ethnicity = 6 then race = "Other";

run;

/*import 4P's+ year 2003-2013 (total database) data excel sheet
from
    senior project folder*/
/*create permanent data set of all 4ps in seniorproject library
*/
```

```

PROC IMPORT OUT= sasdata.venturadata
DATAFILE= "E:\rawdata\Ventura Database.xlsx"
DBMS=xlsx REPLACE;
RANGE="'Ventura Database$'";
GETNAMES=YES;
MIXED=NO;

RUN;

/*change #NULL! to '.' for date variables, fix dates, create
county indicator,
create race, rename variables*/
data sasdata.cleanventuradata;
    set sasdata.venturadata;
    keep screen date race
        parents partner temper past mthbefsmoke mthbefdrink
mthbefstreet
        lstmthdrink lstmthsmoke mthbefmary mthbefdrug
lstmthmary lstmthdrug
        ethnic datel County;
    if Date= '#NULL!' then Date='.';
    date1= input(Date,9.)-21916;
    County=0;
    if Race = 3 then ethnic = "Caucasian ";
    if Race = 4 then ethnic = "Hispanic";
    if Race = 1 then ethnic = "A.American";
    if Race = 2 then ethnic = "Asian";
    if Race = 5 then ethnic = "Other";
    rename race=ethnicity;
    rename ethnic=race;
    rename mthbefstreet=mthbefmarySCR;
    rename mthbefmary=mthbefmaryASS;
run;

*Combine data sets;
data sasdata.combined;
    set sasdata.cleanventuradata sasdata.cleanslodata ;
    keep screen date
        parents partner temper past mthbefsmoke mthbefdrink
mthbefmarySCR
        lstmthdrink lstmthsmoke mthbefmaryASS mthbefdrug
lstmthmary lstmthdrug
        race datel County;
run;

*create data set of initial screens,create indicator for positive
screens;
data sasdata.combinedinitials;
    set sasdata.combined ;
    where Screen = 1;

```

```

        if mthbefsmoke=1 or mthbefdrink=1 or mthbefmarySCR=1 then
positive=1;
        else positive=0;
        year=year(date1);

run;

*data set of just positive initial screens;
data sasdata.positive_initialsyrs;
    set sasdata.combinedinitials;
    WHERE positive=1;
    where year >=2008 and year <2013;
    *create indicators for any drinking during pregnancy;
    if lstmthdrink=1 then lastmthdrink=0;
    if lstmthdrink=2 or lstmthdrink=3 or lstmthdrink=4 or
lstmthdrink=5
        then lastmthdrink=1;
    *create indicators for any smoking during pregnancy;
    if lstmthsmoke=1 then lastmthsmoke=0;
    if lstmthsmoke=2 or lstmthsmoke=3 or lstmthsmoke=4 or
lstmthsmoke=5
        then lastmthsmoke=1;
    *create indicators for any marijuana use during pregnancy;
    if lstmthmary=2 or lstmthmary=3 or lstmthmary=4 or
lstmthmary=5
        then lastmthmary=1;
    if lstmthmary=1 then lastmthmary=0;
    *create indicators for any drug use during pregnancy;
    if lstmthdrug=2 or lstmthdrug=3 or lstmthdrug=4 or
lstmthdrug=5
        then lastmthdrug=1;
    if lstmthdrug=1 then lastmthdrug=0;
    *create indicator for any use during pregnancy;
    if lastmthdrink=1 or lastmthsmoke=1 or lastmthmary=1 or
lstmthdrug=1
        then anyuse=1;
    else anyuse=0;
    *delete those who have no response for all follow up
questions;
    if lstmthdrink=. and lstmthsmoke=. and lstmthmary=. and
lstmthdrug=.
        then delete;
    *Combine N.American, Asian, A.American into other because
they have
        small counts;
    if race="N.American" or race="Asian" or race="A.American"
        then race="Other";

run;

*format for 1-5 indicators;
proc format ;
value amount

```

```

1="Did not use"
2="Every day"
3="3 th 6 days a week"
4="1 to 2 days a week"
5="Less than 1 day a week";
run;

*format for y/n variables;
proc format ;
value yn
1="Yes"
2="No";
run;

*format for indicator variables;
proc format ;
value any
1="Any"
0="None";
run;

*format for county indicator;
proc format ;
value county
0="Ventura"
1="SLO";
run;

*stepwise selection for lastmthdrink;
proc logistic data=sasdata.positive_initialsyrs noprint;
class race(ref="Caucasian") county(ref="Ventura") parents partner
temper
past year(ref="2008")/param=ref /*missing*/;
model lastmthdrink(event='None')=parents partner temper
past race year
county partner*County past*County race*County
year*County
/ selection=stepwise
slentry=0.25
slstay=0.05
details
lackfit;
output out=pred p=phat lower=lcl upper=ucl
predprob=(individual crossvalidate);
format past yn. county county. lastmthdrink any.;
run;

*logistic regression for drinking during pregnancy of positive
screens;
proc logistic data=sasdata.positive_initialsyrs descending;
class race(ref="Caucasian") county(ref="Ventura") parents
partner temper
past(ref="No") year(ref="2008")/param=ref missing;

```

```

        model lastmthdrink(ref="None")= past race county year/
lackfit;
        format past yn. county county. lastmthdrink any.;
run;

*stepwise selection for lastmthsmoke;
proc logistic data=sasdata.positive_initialsyrs noprint;
class race(ref="Caucasian") county(ref="Ventura") parents partner
temper
        past year(ref="2008")/param=ref; missing;
        model lastmthsmoke(ref="None")=parents partner past race
county
                county*race county*parents county*past
                / selection=stepwise
                slentry=0.25
                slstay=0.05
                details
                lackfit;
        output out=pred p=phat lower=lcl upper=ucl
                predprob=(individual crossvalidate);
format past yn. county county. lastmthsmoke any.;
run;
*logistic regression for smoking during pregnancy of positive
screens;
proc logistic data=sasdata.positive_initialsyrs descending;
        class race(ref="Caucasian") county(ref="Ventura") parents
partner temper
                past(ref="No") year(ref="2008")/param=ref missing;
        model lastmthsmoke(ref="None")=parents partner past race
county
                county*race / lackfit;
        oddsratio county /at (county="SLO");
        format parents yn. partner yn. past yn. county county.
lastmthsmoke any.;
run;

*bar plot of cigarette useby county*race;
proc template;
define statgraph Graph;
dynamic _RACE _LASTMTHSMOKE _COUNTY;
beginningraph / DataColors=(CXFF0000 CX0000FF);
        layout lattice / rowdatarange=data columndatarange=data rowgutter=10
columngutter=10;
                layout overlay / xaxisopts=( label=('Race') discreteopts=(
tickvaluefitpolicy=splitrotate)) yaxisopts=( label=('Proportion of Last
Month Smoke'));
                entry halign=center 'Cigarette Use' / valign=top
location=outside;
                barchart category= RACE response= LASTMTHSMOKE / group=_COUNTY
name='bar' datatransparency=0.25 stat=mean barwidth=1.0
groupdisplay=Cluster clusterwidth=0.85;
                endlayout;
end;

```



```

    endlayout;
endgraph;
end;
run;

proc sgrender data=SASDATA.POSITIVE_INITIALSYRS template=Graph;
dynamic _RACE="RACE" _LASTMTHSMOKE="LASTMTHSMOKE" _COUNTY="COUNTY";
run;

*stepwise selection for lastmthmary;
proc logistic data=sasdata.positive_initialsyrs noprint;
class race(ref="Caucasian") county(ref="Ventura") parents partner
temper past
    year(ref="2008")/param=ref missing;
model lastmthmary(event='None')=parents partner past race
county year
    parents*county partner*county past*county
race*county year*county
    / selection=stepwise
    slentry=0.25
    slstay=0.05
    details
    lackfit;
output out=pred p=phat lower=lcl upper=ucl
    predprob=(individual crossvalidate);
format parents yn. partner yn. past yn. county county.
lastmthmary any.;
run;

*logistic regression for smoking marijuana during pregnancy of
positive screens;
proc logistic data=sasdata.positive_initialsyrs descending;
class race(ref="Caucasian") county(ref="Ventura") parents
partner
    temper past year(ref="2008")/param=ref missing;
model lastmthmary(ref="None")=parents partner county year /
lackfit ;
format parents yn. past yn. partner yn. county county.
lastmthmary any.;
run;

*stepwise selection for lastmthdrug;
proc logistic data=sasdata.positive_initialsyrs noprint;
class race(ref="Caucasian") county(ref="Ventura") parents partner
temper past
    year(ref="2008")/param=ref missing;
model lastmthdrug(event='None')=parents partner past race
county year
    parents*county partner*county past*county
race*county year*county
    / selection=stepwise
    slentry=0.25

```

```

                                slstay=0.05
                                details
                                lackfit;
        output out=pred p=phat lower=lcl upper=ucl
                predprob=(individual crossvalidate);
format  parents yn. partner yn. past yn. county county.
lastmthdrug any.;
run;
*logistic regression for street drugs during pregnancy of
positive screens;
proc logistic data=sasdata.positive_initialsyrs descending;
    class race(ref="Caucasian") county(ref="Ventura") parents
partner
        temper past year(ref="2008")/param=ref missing;
    model lastmthdrug (ref="None")=parents partner county year
        county*year/ lackfit;
    oddsratio county/at(county="SLO");
    format parents yn. partner yn. county county. lastmthdrug
any.;
run;

```

Output

Alcohol Model:

Number of Observations Read	4541
Number of Observations Used	4503

Response Profile		
Ordered Value	lastmthdrink	Total Frequency
1	None	2766
2	Any	1737

Probability modeled is lastmthdrink='Any'.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	6007.252	5907.993
SC	6013.664	5978.531
-2 Log L	6005.252	5885.993

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	119.2587	10	<.0001
Score	108.2822	10	<.0001
Wald	97.7984	10	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Past	2	63.8580	<.0001
race	3	10.3149	0.0161
County	1	3.6239	0.0570
year	4	22.1888	0.0002

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-1.9920	0.1980	101.2532	<.0001
Past	.	1	1.8404	0.4130	19.8621	<.0001
Past	Yes	1	1.3932	0.1767	62.1962	<.0001
race		1	0.1570	0.1010	2.4185	0.1199
race	Hispanic	1	0.2498	0.0785	10.1282	0.0015
race	Other	1	0.0494	0.1487	0.1103	0.7398
County	SLO	1	0.1363	0.0716	3.6239	0.0570
year	2009	1	-0.1514	0.1002	2.2816	0.1309
year	2010	1	-0.0910	0.0997	0.8341	0.3611
year	2011	1	0.1194	0.1026	1.3537	0.2446
year	2012	1	0.2452	0.0982	6.2375	0.0125

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Past . vs No	6.299	2.804	14.152
Past Yes vs No	4.028	2.849	5.694
race vs Caucasian	1.170	0.960	1.426
race Hispanic vs Caucasian	1.284	1.101	1.497
race Other vs Caucasian	1.051	0.785	1.406
County SLO vs Ventura	1.146	0.996	1.319
year 2009 vs 2008	0.860	0.706	1.046
year 2010 vs 2008	0.913	0.751	1.110
year 2011 vs 2008	1.127	0.922	1.378
year 2012 vs 2008	1.278	1.054	1.549

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
6.4530	8	0.5966

Smoking Model:

Number of Observations Read	4541
Number of Observations Used	4448

Response Profile		
Ordered Value	lastmthsmoke	Total Frequency
1	None	3199
2	Any	1249

Probability modeled is lastmthsmoke='Any'.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	5283.623	4920.187
SC	5290.023	5009.790
-2 Log L	5281.623	4892.187

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	389.4358	13	<.0001
Score	395.4580	13	<.0001
Wald	353.2587	13	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Parents	2	77.1959	<.0001
Partner	2	83.6737	<.0001
Past	2	111.2029	<.0001
race	3	80.3133	<.0001
County	1	12.5822	0.0004
race*County	3	13.0972	0.0044

Analysis of Maximum Likelihood Estimates							
Parameter			DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept			1	2.0092	0.1808	123.5515	<.0001
Parents	.		1	-0.1138	0.3642	0.0976	0.7548
Parents	No		1	-0.6440	0.0735	76.7723	<.0001
Partner	.		1	-0.7437	0.2685	7.6710	0.0056
Partner	No		1	-0.8791	0.0961	83.6655	<.0001
Past	.		1	-0.8446	0.4226	3.9936	0.0457
Past	Yes		1	-1.3947	0.1330	109.9614	<.0001
race			1	-0.6233	0.1324	22.1492	<.0001
race	Hispanic		1	-1.1018	0.1251	77.6149	<.0001
race	Other		1	-0.2528	0.2318	1.1889	0.2755
County	SLO		1	-0.3683	0.1038	12.5822	0.0004
race*County		SLO	1	0.5508	0.2788	3.9019	0.0482
race*County	Hispanic	SLO	1	0.6282	0.1864	11.3570	0.0008
race*County	Other	SLO	1	0.1634	0.3172	0.2654	0.6065

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Parents . vs Yes	0.892	0.437	1.822
Parents No vs Yes	0.525	0.455	0.607
Partner . vs Yes	0.475	0.281	0.805
Partner No vs Yes	0.415	0.344	0.501
Past . vs No	0.430	0.188	0.984
Past Yes vs No	0.248	0.191	0.322

Odds Ratio Estimates and Wald Confidence Intervals			
Label	Estimate	95% Confidence Limits	
County SLO vs Ventura at race=	1.200	0.723	1.992
County SLO vs Ventura at race=Caucasian	0.692	0.565	0.848
County SLO vs Ventura at race=Hispanic	1.297	0.957	1.757
County SLO vs Ventura at race=Other	0.815	0.453	1.466

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
12.6877	7	0.0801

Marijuana Model:

Number of Observations Read	4541
Number of Observations Used	4460

Response Profile		
Ordered Value	lastmthmary	Total Frequency
1	None	3921
2	Any	539

Probability modeled is lastmthmary='Any'.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	3290.083	3147.389
SC	3296.486	3211.418
-2 Log L	3288.083	3127.389

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	160.6940	9	<.0001
Score	175.6968	9	<.0001
Wald	161.6844	9	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Parents	2	40.8608	<.0001
Partner	2	68.7489	<.0001
County	1	5.4291	0.0198
year	4	26.5900	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-0.9410	0.1499	39.4205	<.0001
Parents	.	1	0.2426	0.4831	0.2522	0.6155
Parents	No	1	-0.6075	0.0966	39.5691	<.0001
Partner	.	1	-1.8112	0.4937	13.4594	0.0002
Partner	No	1	-0.9057	0.1138	63.2909	<.0001
County	SLO	1	-0.2203	0.0945	5.4291	0.0198
year	2009	1	-0.2975	0.1674	3.1573	0.0756

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
year	2010	1	0.3418	0.1497	5.2147	0.0224
year	2011	1	0.3802	0.1549	6.0261	0.0141
year	2012	1	0.3243	0.1511	4.6084	0.0318

Odds Ratio Estimates			
Effect		Point Estimate	95% Wald Confidence Limits
Parents	. vs Yes	1.275	0.494 3.285
Parents	No vs Yes	0.545	0.451 0.658
Partner	. vs Yes	0.163	0.062 0.430
Partner	No vs Yes	0.404	0.323 0.505
County	SLO vs Ventura	0.802	0.667 0.966
year	2009 vs 2008	0.743	0.535 1.031
year	2010 vs 2008	1.407	1.050 1.887
year	2011 vs 2008	1.463	1.080 1.981
year	2012 vs 2008	1.383	1.029 1.860

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
8.9806	8	0.3439

Drugs Model:

Number of Observations Read	4541
Number of Observations Used	4454

Response Profile		
Ordered Value	lastmthdrug	Total Frequency
1	None	4272
2	Any	182

Probability modeled is lastmthdrug='Any'.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	1522.368	1347.218
SC	1528.770	1436.840
-2 Log L	1520.368	1319.218

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	201.1505	13	<.0001
Score	242.6565	13	<.0001
Wald	187.4393	13	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Parents	2	7.3336	0.0256
Partner	2	114.4672	<.0001
County	1	4.5358	0.0332
year	4	8.2016	0.0845
County*year	4	24.7488	<.0001

Analysis of Maximum Likelihood Estimates							
Parameter			DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept			1	-1.8617	0.2860	42.3622	<.0001
Parents	.		1	-0.6231	0.7833	0.6327	0.4264
Parents	No		1	-0.4308	0.1623	7.0446	0.0080
Partner	.		1	-0.3002	0.3984	0.5678	0.4511
Partner	No		1	-1.7745	0.1684	111.0451	<.0001
County	SLO		1	-1.2195	0.5726	4.5358	0.0332

Analysis of Maximum Likelihood Estimates							
Parameter			DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
year	2009		1	0.4253	0.3391	1.5728	0.2098
year	2010		1	0.4897	0.3352	2.1341	0.1441
year	2011		1	0.9304	0.3383	7.5638	0.0060
year	2012		1	0.6324	0.3403	3.4537	0.0631
County*year	SLO	2009	1	-0.4843	0.7910	0.3750	0.5403
County*year	SLO	2010	1	1.5875	0.6358	6.2346	0.0125
County*year	SLO	2011	1	-0.5194	0.7197	0.5209	0.4705
County*year	SLO	2012	1	0.3595	0.6778	0.2814	0.5958

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Parents . vs Yes	0.536	0.116	2.490
Parents No vs Yes	0.650	0.473	0.893
Partner . vs Yes	0.741	0.339	1.617
Partner No vs Yes	0.170	0.122	0.236

Odds Ratio Estimates and Wald Confidence Intervals			
Label	Estimate	95% Confidence Limits	
County SLO vs Ventura at year=2008	0.295	0.096	0.907
County SLO vs Ventura at year=2009	0.182	0.062	0.531
County SLO vs Ventura at year=2010	1.445	0.839	2.488
County SLO vs Ventura at year=2011	0.176	0.075	0.413
County SLO vs Ventura at year=2012	0.423	0.208	0.861

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
7.2115	8	0.5140

References

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