

Program Design and Evaluation Services

Assessment of Factors Related to Secondhand Smoke Exposure among Alaskan Households with a Smoker and Children at Home

Final Report

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Introduction

Program Design and Evaluation Service (PDES) has been conducting analysis and review of tobacco-related data from the Alaska Behavioral Risk Factor Surveillance System (BRFSS) in order to assist the Alaska Tobacco Prevention and Control Program in program planning. In addition to overall surveillance-related analyses, PDES has conducted in-depth examinations of factors associated with select tobacco-related indicators. The current project addresses factors related to exposure to secondhand smoke in the home.

Study Questions: What demographic factors are related to children's exposure to secondhand smoke (SHS) in the homes of smokers? What are the implications of these findings for tobacco control in Alaska?

Rational: As documented in a recent surgeon general's report, secondhand smoke causes premature death and disease in children and non-smoking adults (1). The social acceptability of smoking in the home is declining in Alaska, as evidenced by an increasing proportion of the general population having rules against smoking in their homes (2). While having children in the home greatly increases the likelihood of having smoking restrictions in the home, earlier studies have shown that smokers with children do not necessarily have home restrictions at the level of the general population, and certainly not as high as non-smokers with children (3-4).

Earlier studies have also documented socio-demographic disparities with regard to potential and actual SHS exposure in the home in some western states, including differences in rates by racial and ethnic groups, urban density and regionality, income and education, household gender composition and marital status, nicotine addiction level and beliefs in SHS health consequences (2-7). In this report we examine these factors as they may relate to children's SHS exposure in Alaska.

Because potential SHS exposure is so much greater in homes with smokers (3-6), we chose to focus on households with a smoker respondent (known smoking households). Nearly half (46%) of Alaskan adult smokers live with children under the age of 18. Children are a particularly vulnerable subgroup for SHS exposure because adults in the home largely have control over their environments; therefore we further chose to focus in this report on the subset of smoking respondents who also reported that there were children under 18 at home. Smokers with children comprise approximately 11% of the adult Alaskan population and should be a programmatic priority regarding SHS exposure. From a public health viewpoint, the home is the primary source of exposure to SHS for infants and children, and a major source for non-smoking adults (1). A smoke free home not only protects against exposure, but also may encourage smoking cessation and sends a clear message to children and other adults about the harms of smoking and secondhand smoke.

Analytic Methods

The following section outlines the population, dependent and independent variables that are included in the analysis, and addresses general data issues.

Population: Adult smokers in Alaska with children under 18 at home.

For reference, we also compute SHS exposure in the homes of non-smoker respondents with children under 18 in the home. We note that some of those homes may contain smokers.

Data Source: Combined years of 2004, 2005, 2006 BRFSS data (modified survey version). A total of 862 respondents were current smokers (defined by variable XSMOKER = 1) and reported one or more children under 18 at home (defined by variable CHILDREN >=1). The SPSS file AK9106MS.SAV dated 06\01\2007 was used, subset by the variable YEAR >= 2004.

Dependent Variable: Secondhand smoke exposure in the home is defined here as a 'Yes' to the question: "In the past 30 days, has anyone, including yourself, smoked cigarettes, cigars, or pipes anywhere inside your home?" (2006 BRFSS modified version item 5.21). This question was asked only on the modified version of the survey, therefore was presented to approximately one half of the total survey respondents. Only one or fewer target population respondents per year responded 'don't know/unsure' or refused to answer this question (n=2) and those cases were excluded from the analysis.

Independent Variables:

Demographic Subgroups

- Age of respondent in years defined in 5 year age categories (VAGEG5YR) and continuously (AGE).
- Ages for the children in the home, coded as having a child present in 3 age ranges (0 – 4, CHLD04; 5-12, CHLS0512; and 12-17, CHLD1317).
- Gender (SEX). Male or female respondent.
- Race/ethnicity (RACEETH). Defined as primary race: White, American Indian or Alaska Native, Asian Pacific Islander, Black, Hispanic or Other - all non-Hispanic. Hispanic ethnicity was defined a separate category of any race.
- Education and income as socioeconomic status (SES) indicators, as defined in the PDES report on smoking and SES in Alaska (LOWSES = Less than high school OR less than 185% AK poverty level)
- Region (VREGION). Geographic regions of the state defined in the BRFSS sampling strata. The five areas are: Anchorage and vicinity, Fairbanks and vicinity, Gulf Coast, South East, and 'rural'.
- Marital status of respondent. (MARITAL). Coded as married / part of a couple or not.

- Household adult gender composition. Coded as men only, women only, or mixed (based on NUMMEN and NUMWOMEN).
- Number of adults in household. Code as one or two or more (based on NUMMEN and NUMWOMEN) used to capture 'single parent' households.

Quitting and Consumption

- Smoking-related variables: Stage of change (QTINTENT) and consumption per day (CIGNUM). Stage of change was defined as intentions to quit within the next month, the next 2- 6 months, beyond 6 months, and no intentions to quit. The number of cigarettes smoked per day was defined as categorical (by approximately equal response frequencies) and as a continuous count measure.

Attitudes and Beliefs

- Belief in the harmfulness of secondhand smoke generally (SHSHARM, SMKPROT asked in 2004, 2006); and specific to children (SHSRESP, SHSSIDS asked in 2004)
- Mental health indicator (Now thinking about your mental health, which includes stress, depression, and a problem with emotions, for how many days during the past 30 days was your mental health not good?). We use the CDC cutoff of 14 for mentally unhealthy days. (MENTHLTH -> FRQMENTD). We also use the general physical health indicator (XGENHLTH).
- Social Pressure: Although there is no question on other family members' smoking status, a related question was added in 2006: "People close to me are upset with my smoking" (SMUPSET). In prior work in Oregon, this question was more highly related to household smoking ban status than presence of a nonsmoker in the home.

Rules

- Car smoking bans. This item reflects policy for smoking in owned vehicles as no bans, partial bans, or full bans (defined by variable SMKARR, asked in 2004 and 2005 only).
- Home smoking bans: a closely related measure to smoking inside the home is home smoking bans. We do not examine this in a multivariate model as a factor related to exposure, but rather examine the prevalence of household smoking in households with no bans, partial bans, or full bans. This provides information on household policies as they relate to practices. (Defined by variable HOUSSMK2)

Design Variables: Because only the smoking status of the survey respondent is ascertained on the Alaska BRFSS, we are unable to classify households of non-smoking respondents that might contain other smokers, that is, we are unable to fully identify smoking and non-smoking at a household level. Therefore, we are limited to using person weights (defined by variable VFINALWT) rather than household weights to generate (sub) population estimates in these analyses.

Other sampling variables used included in the BRFSS 5 region x 2 phone bank strata (defined by variable STRATA) and the 3 survey years (defined by variable YEAR) .

Model Methods

We used SAS ‘surveyfreq’ and ‘surveylogistic’ procedures to conduct analyses. These procedures take into account the complex survey sampling methodology employed by the BRFSS. Simple cross-tabulations and multiple logistic regressions are used to conduct analyses. Statistical significance is tested at the 10%, 5%, and 1% level.

We first examined the bi-variate associations between household SHS exposure and each of the independent variables listed above. For each variable, we present the raw sample size at each response category level, the weighted percent of the subpopulation at that level, the percent of SHS exposure at that level, the standard error (S.E.) of the percent exposure, and the Wald Chi-Square and its p-value for the test of association between the variable and home SHS exposure.

We next used all of the variables found to be significantly associated at the 10% level with SHS exposure in a multivariate logistic model to predict home SHS exposure. We present the odds ratio and its 95% confidence interval for each predictor in the model. Levels that are significantly above a reference at $p < 0.10$, 0.05, and 0.01 are flagged in the tables.

We constructed two multivariate models – one for variables that were available for all three years (2004, 2005, and 2006) and another for those variables that were available for 2004 and 2005 (adding child age and car rules).

Results and Discussion

Prevalence of Household Exposure to SHS

Table 1 presents the prevalence of SHS exposure estimated in the combined 2004 - 2006 Alaska BRFSS data. In the population of those living in homes with children, approximately 28% of the current smokers reported exposure in their homes in the last month. In contrast, only about 8% of former smokers and 5% of never smokers reported household SHS exposure (displayed at the very end of Table 1). We note that some of the non-smoker respondents may live with other smokers who are producing the 5-8% SHS exposure, rather than it coming strictly from guests.

The remainder of the table examines the sub-populations of smoking respondents living with children in the home.

Demographic Subgroups

Regarding the association between the children’s ages and exposure, we find that fewer of respondents living with children under 5 years old reported home SHS exposure (14%), compared to those living with older children (33-34%). Note that these results are limited to data from 2004 and 2005.

The respondent's age is also related to SHS exposure rates, with those in the 40-50 year old range reporting more exposure (38-48%) than others.

The respondent's gender was not significantly related to home SHS exposure, nor was the gender composition of adults in home, although more females and more of those women living with just females tended to report exposure (32-35%). Similarly, persons living with no other adults (aka, single parents, who tended to be female) reported exposure at a higher rate (34%) but they were not significantly higher than others. However, significantly more 'unattached' respondents (35%) reported exposure than those that were married or living as a couple (24%).

We did not find that exposure varied by socio-economic status as defined by education and poverty level, either examined as an index (27-29%) or by its individual components (not shown).

Race / ethnicity was related to reported household SHS exposure, with fewer Natives, Asians, and Hispanics reporting exposure (11-19%); and more Blacks and 'Others' reporting exposure (55-66%), than Whites (31%). Similarly, we found the South East and Rural regions to have fewer reported exposure (20-22%) than other regions of the state (30-33%).

Quitting and Consumption

We found no relationship between the respondent having had recent quit attempt or their intentions to quit in the future and reported SHS exposure in the home ($p= 0.34, 0.33$). However, the level of smoking as measured by average number of cigarettes per day was highly related ($p<.001$), with those with more use per day reporting more exposure.

Attitudes and Beliefs

Somewhat surprisingly, we found little or no relationship between variables measuring beliefs in the harm of SHS and the reports of exposure in the home, either when asked about general harm or harm specific to children (p 's = 0.31 – 0.92). One possibility for this is because of the rather high proportion of the subpopulation that believed that SHS is harmful (80-94%). The exception was a belief in the connection between SHS and SIDS, in which more of those who either did not believe or know of a connection reported home SHS exposure (39-62%) than those who did believe there was connection (23%). Only 38% of the subpopulation believed there was an SHS-SIDS connection.

The belief that loved ones are upset with the respondents smoking did not relate to reports of SHS exposure ($p=0.86$).

The attitude and belief items were asked in only a subset of years.

Physical and Mental Health

Those who reported having many unwell mental days per month more often reported SHS exposure (38%), while physical health did not seem to be related to exposure ($p=0.86$).

Rules

Having rules about smoking in the home or cars were highly related to SHS exposure. Not surprisingly, only 6% of respondents with a 'no smoking' rule reported home SHS exposure, compared to 81 – 91% of those with partial or no rules.

A similar pattern of less SHS exposure in the home was observed for those having car rules: a no smoking rule in the car was associated with 10% reporting of SHS home exposure, compared to 36-74% when there is a partial or no car rule. We note that 72% of respondents had a 'no smoking' home rule, while only 39% had a 'no smoking' car rule.

Models of Exposure to SHS in the Home

All of the variables above that were measured in years 2004, 2005 and 2006 and were found to exhibit a significant bi-variate association with SHS exposure were placed in a multivariate logistic regression model. The results of that model are displayed in Table 2.

Respondent age, race/ethnicity, marital status, and daily consumption remained independently associated with SHS exposure in the home.

In a second model, we added child's age and car rule variables to the equation, in addition to those in the first model. These variables were available only on 2004 and 2005. The results are shown in Table 3. Child's age 0-4 and having a rule against smoking in the car did have independent associations with home SHS exposure in this model, as did most variables from the first model (race/ethnicity, marital status, and daily consumption). Respondent age was no longer independently associated, most likely due to inclusion of children's ages. The mental health indicator was seen to have independent association with home SHS exposure after adjusting for all the other variables in the model.

Summary of Findings

Respondent and child's age are associated with SHS exposure in the home, with older respondents or homes with children over 5 being at risk. Blacks have extraordinarily high exposure risk, while Natives and Hispanics seem to be protective of SHS exposure in their homes. The subpopulation of 'unattached' adults is about 2.5 times more likely to report exposure than those in a couple. Heavier smoking and possibly poor mental health are also risk factors for exposure. Having a full no-smoking rule, be it in the home or in the car greatly lowers the risk of SHS exposure in the home.

Several factors found to be related in SHS exposure in the general populations of other states were unrelated to reported SHS exposure in this subpopulation: Socio-economic status (education and poverty level), gender and number of adults in the home, quit attempts and intentions, SHS knowledge and beliefs, and physical health status.

Rurality (Geographic region) was actually contrary to finding in other states (1, 5), with rural areas in Alaska having lower rather than higher reported SHS exposure. This result was partially explained by other factors in the multivariate model, notably the lower home exposures in Alaska Natives.

Programmatic Recommendations

1. Encourage adults with children in their homes to have full and formal no-smoking rules in their homes and cars.
2. Educate adults with older (> 5 years old) children about the importance of protecting their older children.
3. Most (but not all) adults believe that SHS is harmful. Find a mechanism to convert those beliefs into actions that protect their children.
4. Target those smoking more than ½ pack of cigarettes a day with messages regarding their children's increased risk of SHS exposure in the home.
5. Work with mental health providers to educate them about potential child SHS exposure in their clients that smoke and have children.
6. Conduct a study to determine how Natives (and Hispanics) have been able to minimize their child exposure rates (although they are still far from zero!). Consider targeting Black populations for further study as well.
7. Target single parents with messages to help motivate them to protect their children from home SHS exposure.
8. Add an item to future BRFSS administrations to assess the smoking status of other household members.

References

References

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Tables

Table 1. Bivariate associations of respondent characteristics with secondhand smoke exposure

<u>Characteristic</u>	<u>N</u> (% of Sub population)	<u>Exposure %</u> (S.E.)	<u>Chisq. P</u>
Smokers w/children	862 (100)	27.8 (2.40)	-
Child Age (04,05)			
0 - 4	273 (46.8)	13.7 (2.6)	30.81 <.001
5 - 12	355 (55.5)	32.7 (3.5)	
13-17	295 (44.2)	34.1 (3.8)	
Respondent Age			
18 - 24	113 (19.1)	24.5 (8.2)	19.86 0.003
25 - 29	118 (14.3)	18.7 (5.2)	
30 - 34	135 (14.3)	22.3 (4.5)	
35 - 39	137 (16.6)	20.7 (4.7)	
40 - 45	139 (15.5)	37.8 (5.6)	
45 - 50	139 (13.9)	48.1 (5.8)	
50 +	69 (6.0)	23.0 (6.2)	
Respondent Gender			
Male	379 (56.2)	25.0 (2.9)	1.81 0.178
Female	481 (43.7)	31.5 (3.8)	
Race/Ethnicity			
White	453 (57.2)	30.8 (3.0)	15.45 0.009
Native	347 (31.0)	19.2 (2.8)	
Hispanic	25 (3.7)	11.0 (5.4)	
Asian/Pacific	15 (2.7)	11.4 (8.6)	
Black	10 (1.1)	66.3 (17.7)	
Other	15 (2.2)	55.2 (21.3)	
SES			
Higher	404 (44.5)	29.0 (3.0)	0.184 0.667
Low	456 (55.4)	26.9 (3.6)	
Region			
Anchorage	144 (46.0)	31.0 (4.7)	9.39 0.053
Fairbanks	140 (11.5)	29.5 (4.2)	
Gulf	148 (11.3)	33.3 (3.8)	
South East	122 (9.1)	22.1 (3.8)	
Rural	306 (21.9)	19.9 (2.9)	
Marital Status			
Married/Couple	500 (64.2)	23.9 (2.6)	4.08 0.043
Unattached	355 (35.7)	34.9 (4.6)	

Table 1 . Bivariate associations of respondent characteristics with secondhand smoke exposure (Continued)

<u>Characteristic</u>	<u>N</u> (% of Sub population)	<u>Exposure %</u> (S.E.)	<u>Chisq.</u> <u>P</u>
Household Adult Gender Composition			
Males Only	62 (4.3)	29.6 (6.8)	1.78 0.409
Females Only	177 (10.7)	34.7 (5.0)	
Mixed	621 (84.9)	26.9 (2.7)	
Number of Adults			
One	208 (11.7)	34.3 (4.2)	2.06 0.151
Two or more	652 (88.2)	27.0 (2.6)	
Quit Attempts			
In last year	522 (64.0)	29.5 (3.3)	0.88 0.346
Not in last year	327 (35.9)	25.2 (3.0)	
Stage of Change (Quit Intentions)			
Quit w/in 1 month	256 (32.5)	22.1 (3.6)	4.59 0.334
Quit 2-6 months	312 (37.8)	33.2 (4.6)	
Quit 6 + months	114 (10.6)	32.6 (6.2)	
No Quit Intentions	126 (13.2)	25.0 (4.9)	
Consumption (Cigarettes per day)			
1 - 4	201 (24.5)	11.0 (3.3)	34.82 <.001
5 - 9	169 (20.4)	23.0 (5.2)	
10	166 (20.9)	27.7 (4.8)	
11-19	97 (11.7)	35.0 (7.1)	
20	135 (17.9)	41.1 (6.1)	
> 20	37 (4.2)	66.0 (8.9)	
Need for ETS Protection *('04, '06)			
Agree	426 (80.8)	31.1 (3.7)	1.01 0.314
Disagree	93 (19.1)	39.3 (7.2)	
Belief in harm from SHS *('04, '06)			
Yes	467 (88.9)	32.8 (3.5)	0.16 0.923
No	54 (11.0)	30.2 (10.1)	
DK	17 (2.7)	36.9 (12.9)	
Belief in SHS effect on children respiration * (04)			
Yes	276 (94.4)	36.2 (4.3)	1.63 0.443
No	8 (1.8)	52.8 (18.8)	
DK	7 (1.9)	52.5 (14.8)	
<u>Characteristic</u>	<u>N</u> (% of Sub population)	<u>Exposure %</u> (<u>S.E.</u>)	<u>Chisq.</u> <u>P</u>

Belief in SHS effect on SIDS* ('04)					
Yes	110	(37.6)	22.8	(5.4)	11.95 0.002
No	52	(19.7)	61.2	(8.5)	
DK	137	(42.5)	38.8	(6.4)	
Receive Social Pressure* ('06)					
Agree	139	(66.9)	27.8	(7.5)	0.02 0.864
Disagree	78	(33.0)	26.1	(6.3)	
Mental Health Indicator (unwell days)					
0 – 13 days	726	(86.4)	24.6	(2.2)	3.11 0.077
14 – 30 days	107	(13.5)	37.5	(6.7)	
Physical Health Indicator					
Good/Excellent	726	(85.3)	27.7	(2.6)	0.02 0.863
Fair/Poor	132	(14.6)	28.7	(5.5)	
Car Rules (04,05)					
Not allowed	222	(38.9)	9.5	(2.6)	47.26 <.001
Sometimes	279	(53.4)	35.6	(4.1)	
Allowed	45	(7.6)	74.1	(8.5)	
House rules					
Not allowed	613	(71.6)	5.5	(1.1)	182.54 <.001
Sometimes	183	(19.9)	81.4	(4.4)	
Allowed	63	(8.4)	91.1	(3.0)	

Smoking status (Population with children)					
Smoker	860	(24.4)	27.8	(2.4)	68.24 <.001
Former	769	(24.3)	7.8	(1.4)	
Never	1600	(51.1)	5.2	(0.9)	

Table 2. Logistic regression results for predicting SHS exposure in the homes of smokers with children. Alaska BRFSS data 2004, 2005, 2006.

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Respondent Age (Odds per year) *	1.029	1.004	1.054
Race / Ethnicity (Odds vs. White)			
American Indian/Alaskan Native +	0.632	0.335	1.192
Asian Pacific Islander	0.385	0.064	2.317
African American **	6.967	1.720	28.228
Hispanic +	0.318	0.091	1.111
Other *	4.461	1.300	15.305
Region (Odds vs. Anchorage & Vicinity)			
Fairbanks & Vicinity	0.885	0.484	1.615
Gulf Coast	1.077	0.561	2.067
Rural Alaska	0.881	0.436	1.780
Southeast	0.636	0.329	1.226
Marital Status (Odds for Married/Couple) **	0.396	0.239	0.658
Cigarettes Per Day (Odds per Cigarette) **	1.081	1.044	1.119
Mental Health Indicator (Odds for 14+ unwell days)	1.752	0.902	3.401
Year of Survey (Odds vs. 2004)			
2005 *	0.385	0.218	0.680
2006	0.584	0.324	1.052

Note: + = $p < 0.10$, * = $p < 0.05$, ** = $p < 0.01$

Table 3. Logistic regression results for predicting SHS exposure in the homes of smokers with children. Alaska BRFSS data 2004, 2005 (Continued).

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
0 – 4 **	0.357	0.151	0.841
5 – 12	2.056	1.100	3.840
13 - 17	1.283	0.603	2.730
Car Rules (Odds vs. Allowed)			
Not Allowed **	0.048	0.012	0.189
Sometimes Allowed **	0.250	0.072	0.864
Year of Survey (Odds vs. 2004)			
2005 **	0.4135	0.216	0.789

Note: + = $p < 0.10$, * = $p < 0.05$, ** = $p < 0.01$