

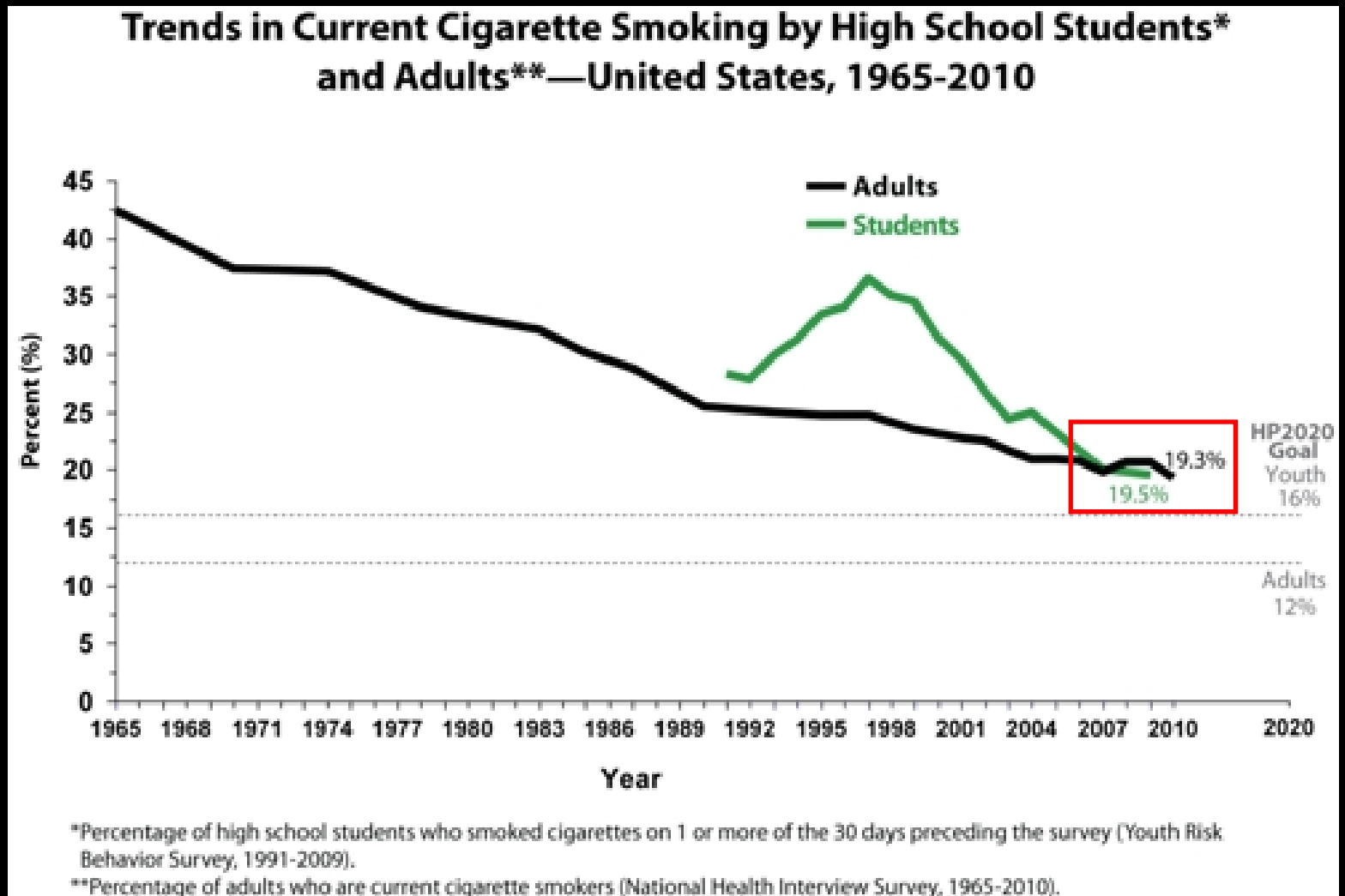
**Does tobacco
retailer availability
influence changes
in smoking from
pregnancy to
postpartum?**

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MPH Candidate
July 10, 2013

Smoking is very, very bad for you

- ▶ The number one preventable cause of death
- ▶ Over 22% of the deaths in Oregon each year are linked to tobacco
- ▶ Approximately 7,000 preventable deaths per year

The downward trend has stalled



Retail environment is not conducive to a smoke free Oregon



Why do retailers matter?

- ▶ **Industry believes retailers matter**
 - ▶ Tobacco industry: \$8.37 billion in advertising and promotion
 - ▶ 90% of marketing dollars directed towards the retail environment

Why do retailers matter?

- ▶ Through
 - ▶ Convenience
 - ▶ Cueing
 - ▶ Social influence

- ▶ **the retail environment can impact choices we make that have health implications**

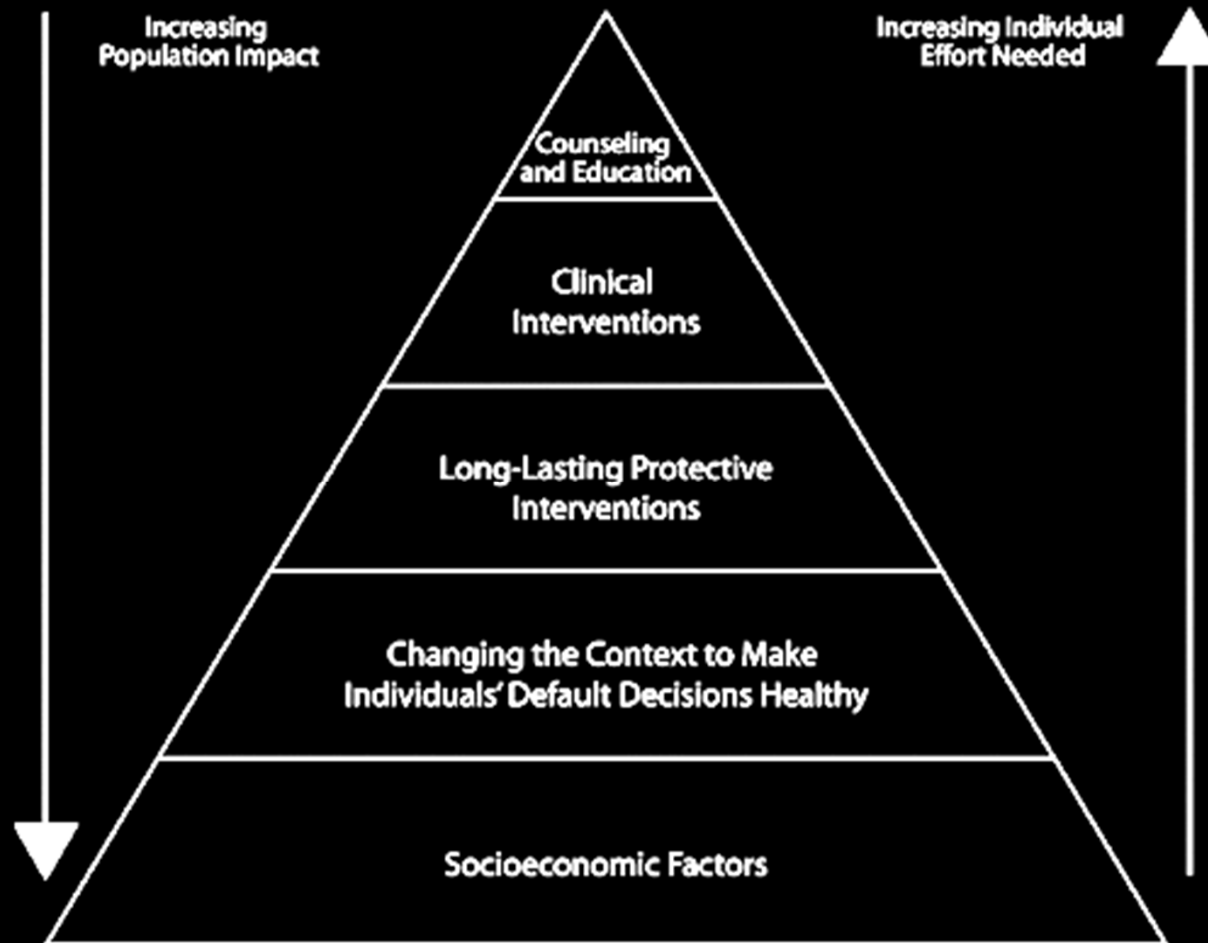


Why do retailers matter?

- ▶ **Retailers are a modifiable factor that can be targeted through public health policy**



Why do retailers matter?



Alcohol retailers

- ▶ Disproportionately concentrated in minority and economically disadvantage communities¹
- ▶ Outlet density associated with initiation of drinking²

▶ 1. Alaniz ML. Alcohol Health Res World. 1998;22(4):286-9. Review.
2. Chen MJ, Grube JW, Gruenewald PJ. Addiction. 2010 Feb;105(2):270-8.

Alcohol retailers

- ▶ Alcohol outlet density positively associated with:
 - ▶ Consumption¹
 - ▶ Car crashes and related injuries²
 - ▶ Domestic abuse³
 - ▶ Violent assault⁴

www.carinsurancehell.com

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1. Schonlau M, Scribner R, Farley TA, Theall K, Bluthenthal RN, Scott M, Cohen DA. Geospat Health. 2008 Nov;3(1):91-101.
 2. Treno AJ, Johnson FW, Remer LG, Gruenewald PJ. Accid Anal Prev. 2007 Sep;39(5):894-901. Epub 2007 Feb 2.
 3. Waller MW, Iritani BJ, Christ SL, Tucker Halpern C, Moracco KE, Flewelling RL. Health Place. 2013 May;21:10-9.. Epub 2013 Jan 17.
 4. Gruenewald PJ, Remer L. Alcohol Clin Exp Res. 2006 Jul;30(7):1184-93.

Tobacco retailers

- ▶ Also disproportionately localized in minority and economically disadvantage communities¹
- ▶ Proximity/density around schools associated with
 - ▶ Experimental smoking²
 - ▶ Smoking initiation³
 - ▶ Consumption levels⁴
 - ▶ Schoolwide smoking rates⁵

1. Fakunle D, Morton CM, Peterson NA. J Ethn Subst Abuse. 2010;9(4):249-59.

2. McCarthy WJ, Mistry R, Lu Y, Patel M, Zheng H, Dietsch B. Am J Public Health 2009;99(11):2006-13.

3. Pokorny SB, Jason LA, Schoeny ME. J Clin Child Adolesc Psychol Off J Soc Clin Child Adolesc Psychol Am Psychol Assoc Div 53 2003;32(2):193-204.

4. West JH, Blumberg EJ, Kelley NJ, et al. J Immigr Minor Heal Cent Minor Public Heal 2010;12(5):626-33.

5. Henriksen L, Feighery EC, Schleicher NC, Cowling DW, Kline RS, Fortmann SP. Prev Med 2008;47(2):210-4.

Tobacco retailers

- ▶ Quantity of smoking has been associated with the proximity and density of convenience stores¹

▶ 1. Chuang Y-C, Cubbin C, Ahn D, Winkleby MA. J Epidemiol Community Health 2005;59(7):568-73.

Still plenty of unanswered questions

- ▶ Few studies have examined cessation with respect to retailers



The challenges of smoking cessation

- ▶ Quitting smoking is a dynamic process
- ▶ Low success rate



Uniquely motivated

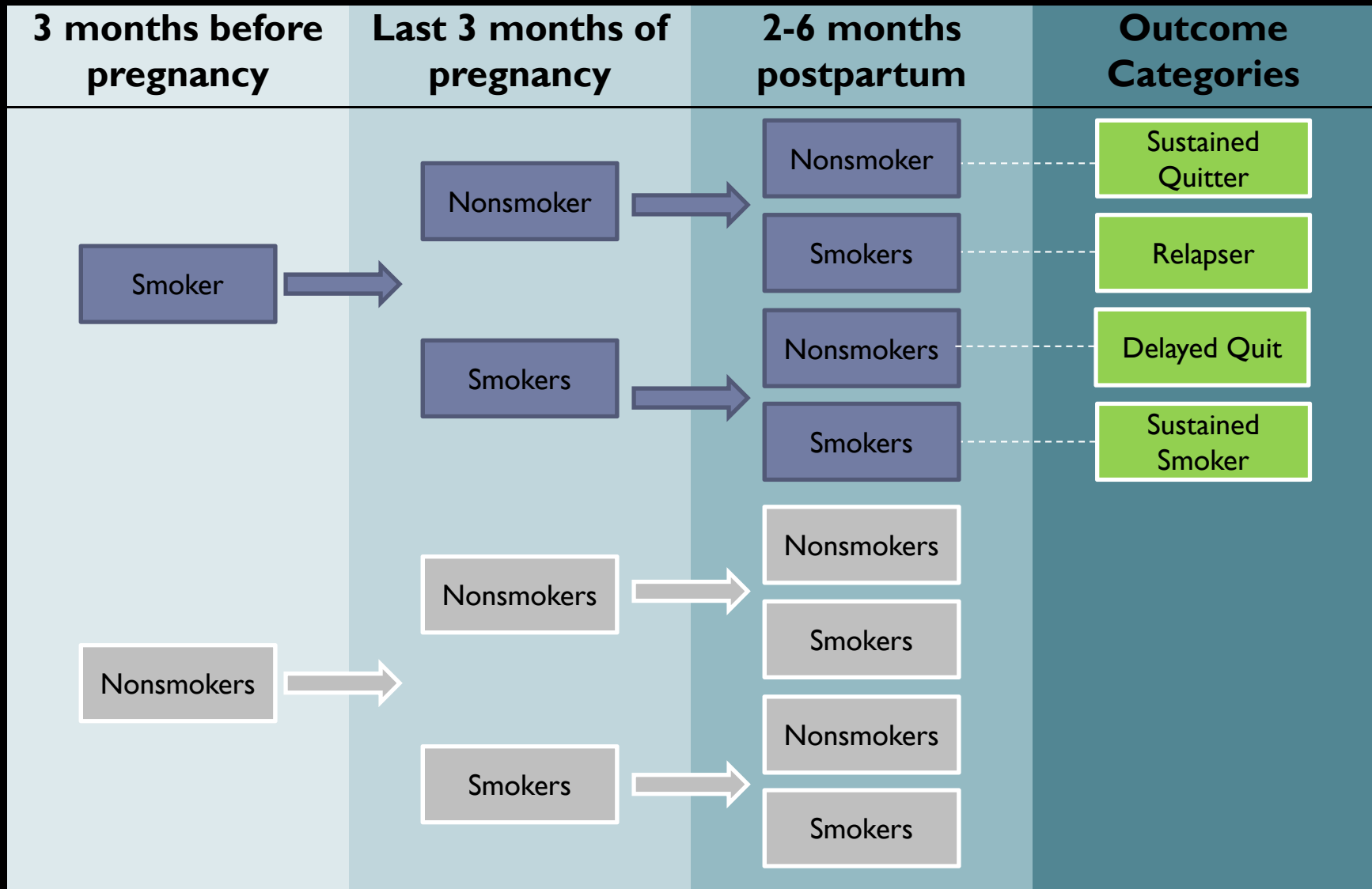
- ▶ Maternal smoking associations:
 - ▶ Poor birth and neonatal outcomes¹
 - ▶ Potential for adverse health events throughout the life course of the child²

▶ 1. Murin S, Rafii R, Bilello K. Clin Chest Med. 2011 Mar;32(1):75-91, viii. doi: 10.1016/j.ccm.2010.11.004.
2. Rogers LK, Velten M. Life Sci 2011;89(13-14):417-21.

Oregon Pregnancy Risk Assessment Monitoring System (PRAMS)

- ▶ Survey concerned with demographics, characteristics, and behaviors of Oregon residing mothers before, during and after pregnancy
- ▶ Administered 2 to 6 months postpartum through a stratified systematic sample of birth certificates
- ▶ Births from 2004 through 2007 for this study

Study



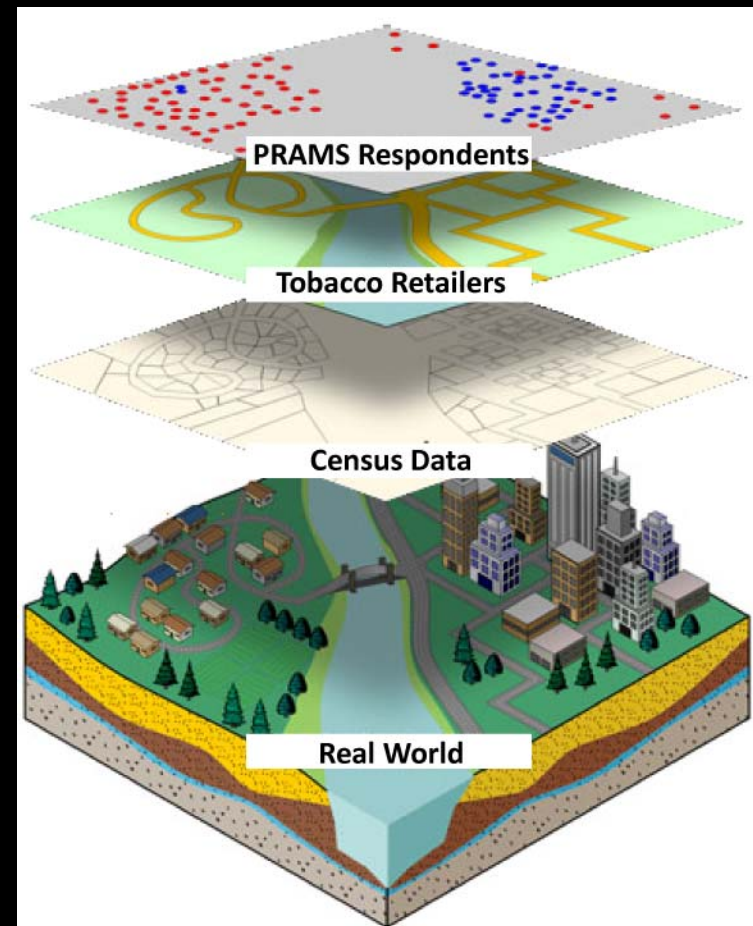
Tobacco retailers

- ▶ Comprehensive list, with addresses, created by combining retailers from
 - ▶ Addiction and Mental Health Division of OHA
 - ▶ Synar program
 - ▶ Oregon Employment Department
 - ▶ Age-restricted



Linkage

- ▶ PRAMS responses, home addresses, tobacco retailers and census data were linked in a Geographic Information System
- ▶ Security measures undertaken to protect confidentiality

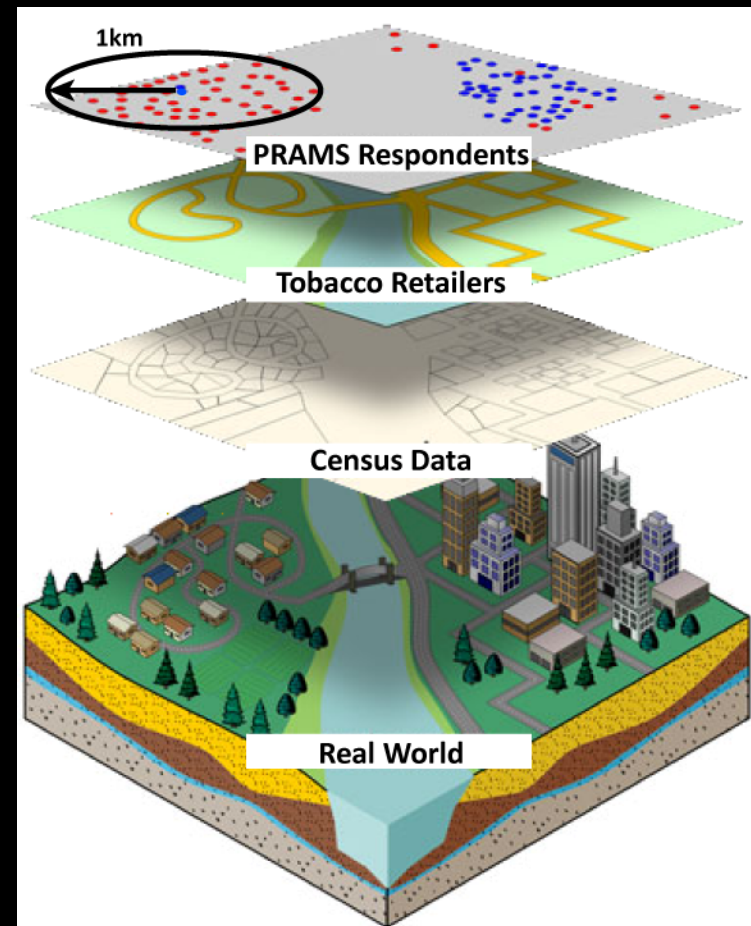


<http://www.townofpalisade.org/gis.htm>



Respondent-specific neighborhoods

- ▶ 1 km radius Euclidean buffers around home addresses
- ▶ Availability of resources within 10 to 20 min walk of home residence



<http://www.townofpalisade.org/gis.htm>



Inclusion criteria

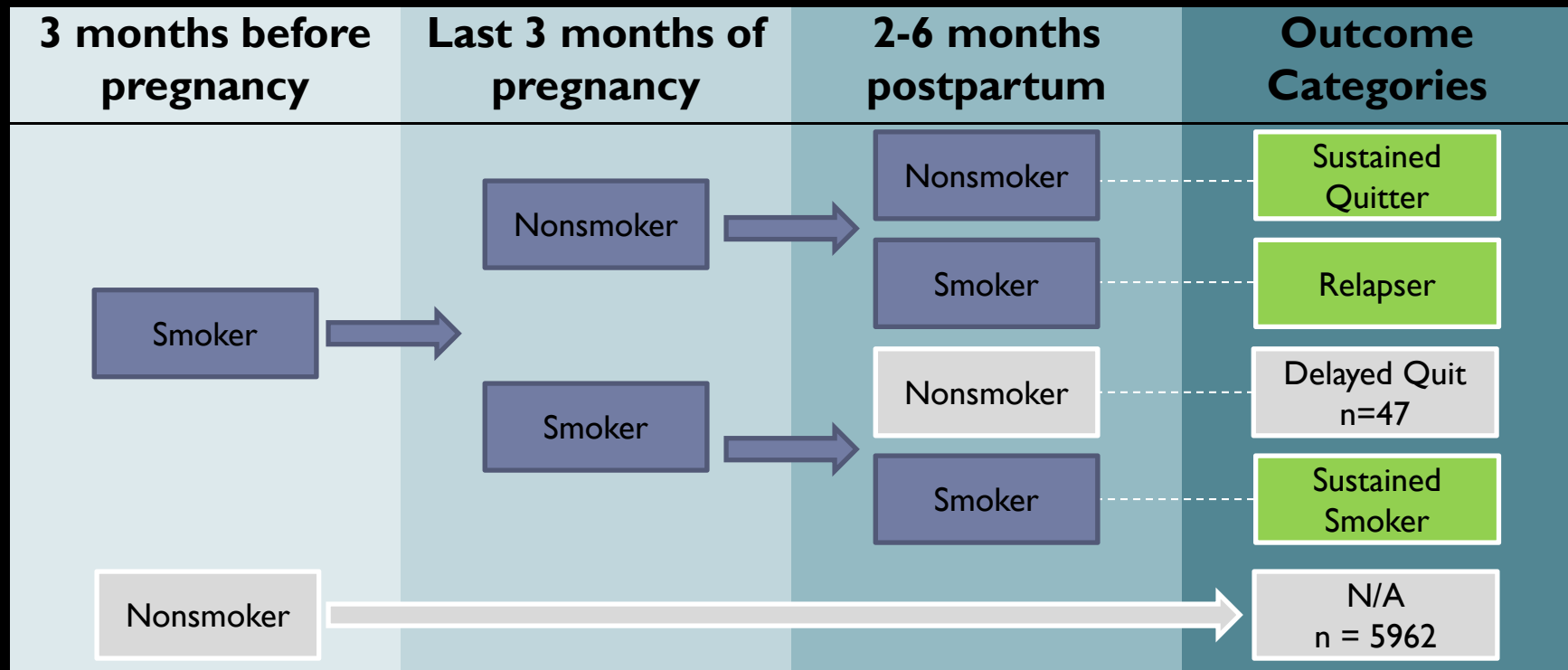
- ▶ Total Oregon PRAMS participants 2004-2007 **N = 7728**



Inclusion criteria

- ▶ Total Oregon PRAMS participants 2004-2007
- ▶ Smoked before pregnancy

N = 1484



Inclusion criteria

- ▶ Total Oregon PRAMS participants 2004-2007
- ▶ Smoked before pregnancy
- ▶ Within Portland Tri-county Area
- ▶ Outside Tricounty area, n = 898

N = 586



Inclusion criteria

- ▶ Total Oregon PRAMS participants 2004-2007
- ▶ Smoked before pregnancy
- ▶ Within Portland Tri-county Area
- ▶ Complete Covariate information
 - ▶ Missing Income, n = 37
 - ▶ Missing depression, n = 5
 - ▶ Missing reside with other smoker, n = 2
 - ▶ Missing race/ethnicity, n = 1

N = 538



Density Matters

- ▶ Mid and high density population residing participants
 - ▶ ≥ 3200 persons/mi² \approx Houses on lots of 0.2 to 0.5 acres
 - ▶ “Urban”
 - ▶ Tobacco Retailers per 10,000 persons **N = 399**

 - ▶ Low density population residing participants
 - ▶ < 3200 persons/mi² \approx Houses on lots of 0.5 acre or bigger
 - ▶ “Low density”
 - ▶ Presence/Absence of Tobacco Retailers **N = 139**
- N = 538**

Descriptives

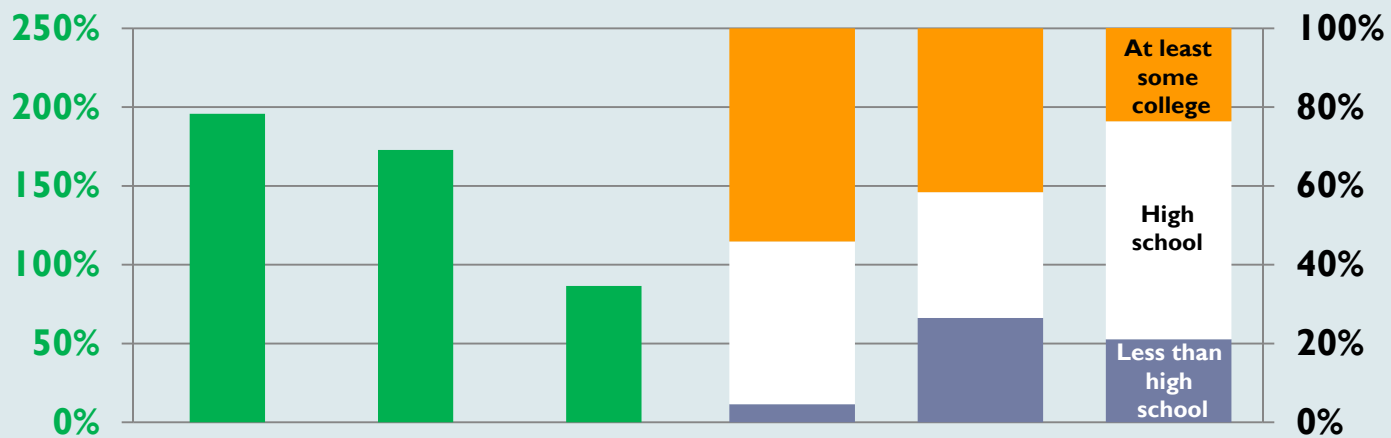
- ▶ 20% of women smoked before pregnancy
- ▶ 55% of women quit smoking during pregnancy
- ▶ 41% of the women that quit smoking during pregnancy were smoking 2-6 months postpartum



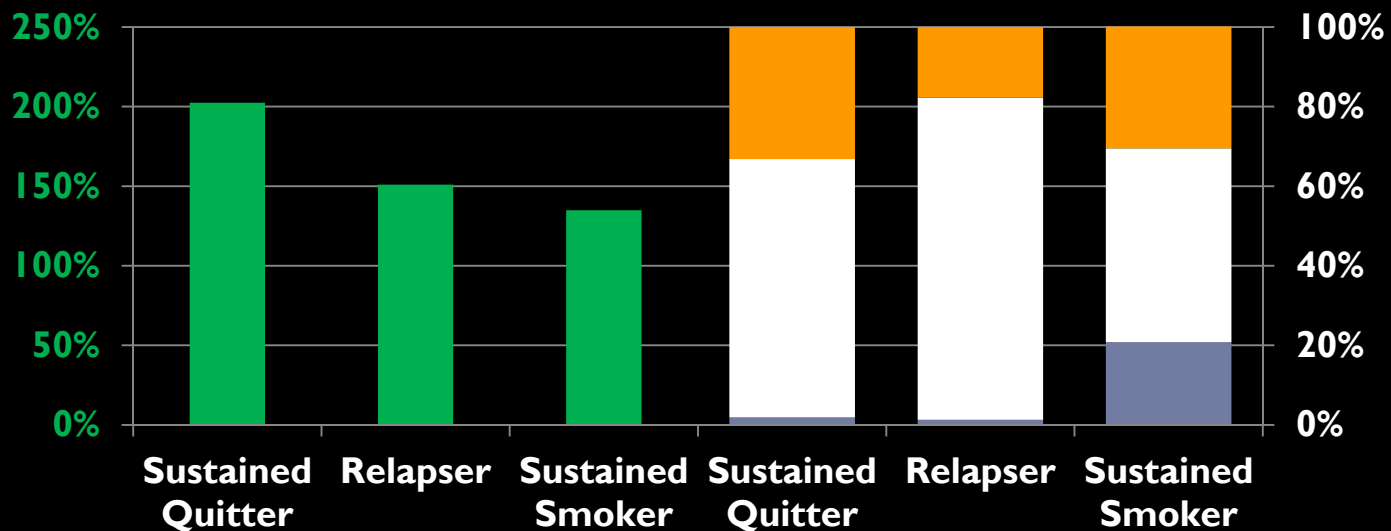
Income (% of Fed poverty line)

Education

Urban



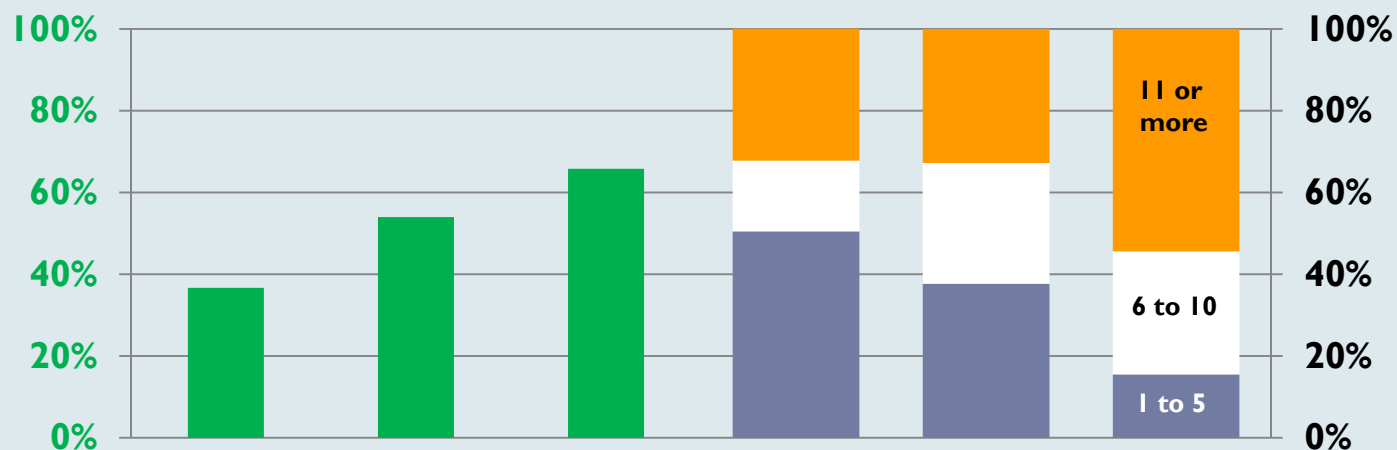
Low Density



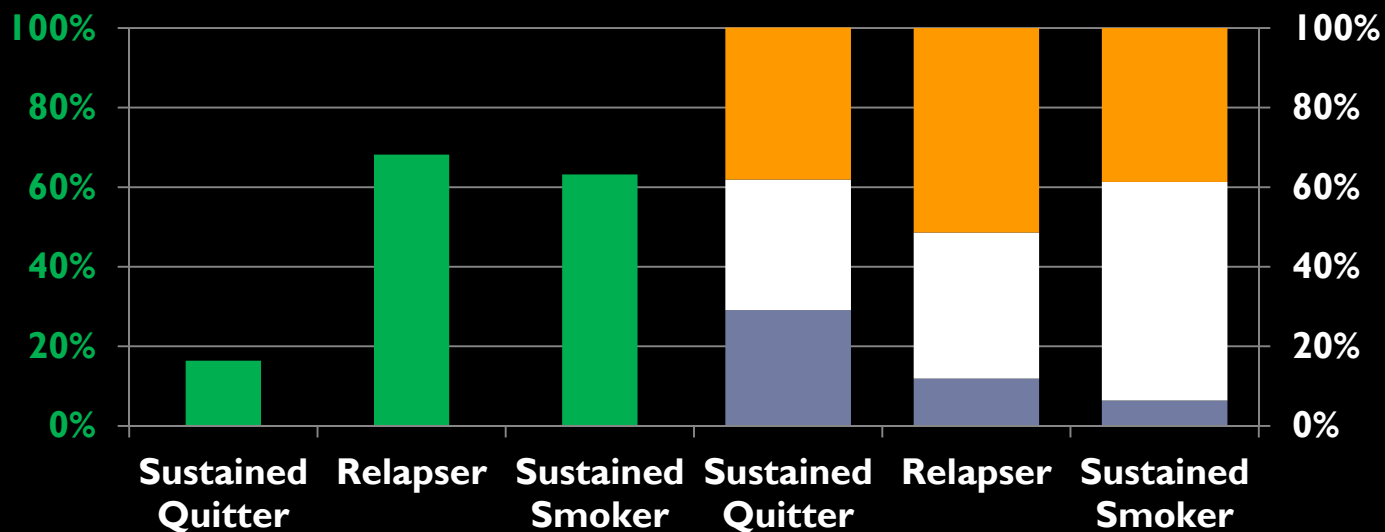
Reside with smoker

Cigarettes smoked per day

Urban



Low
Density



Multinomial logistic regression

- ▶ Assess relationship between tobacco retailers and smoking
 - ▶ **Stratified by pop density:**
 - ▶ Urban
 - ▶ Low density
 - ▶ **Exposure:**
 - ▶ Urban:
 - Retailer per 10,000 persons
 - ▶ Low density:
 - Retailer presence / absence
 - ▶ **Outcomes:**
 - ▶ Sustained Quit (YNN)
 - ▶ Relapse (YNY)
 - ▶ Smoker (YYY)
- ▶ **Potential Confounders:**
 - ▶ Residence with a smoker
 - ▶ Age
 - ▶ Race/Ethnicity
 - ▶ Income
 - ▶ Maternal Education
 - ▶ Deprivation Index
 - ▶ Marital Status
 - ▶ Trimester of 1st prenatal care
 - ▶ Birth Order
 - ▶ Depression
 - ▶ Average number of cigarettes smoked before pregnancy



Model Building

- ▶ Assessed linearity of the relationships between the log odds of the smoking behaviors (with Sustained Quitters as the referent) for each continuous variable

- ▶ Utilized manual, forward, step-wise change in estimate methodology to build models (as described by S. Greenland)
 1. Bivariate multinomial logistic regressions with primary exposure variable and each covariate
 2. Utilized 10% rule for determination of potential confounders
 3. Potential confounders added in decreasing order of the percent change produced in the coefficient of the primary predictor.
 4. Repeated for each potential confounder identified in step 2



Model Building

- ▶ Collinearity assessed with standard errors
- ▶ Interaction effects
 - ▶ **Income and tobacco retailers**



Multivariate model: Urban

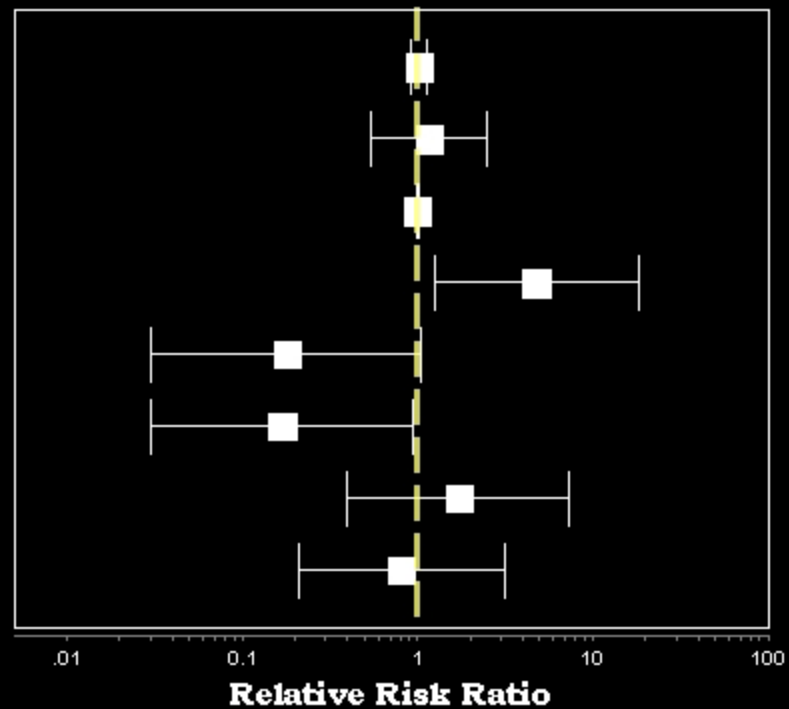
- ▶ Primary exposure:
 - ▶ Tobacco retailers/10,000 persons
- ▶ Confounders:
 - ▶ Deprivation Index
 - ▶ Income
 - ▶ Marital Status
 - ▶ Maternal Education
 - ▶ Trimester of first prenatal care
 - ▶ Depression during pregnancy



Multivariate results: Urban

Relapsers compared to Sustained Quitters

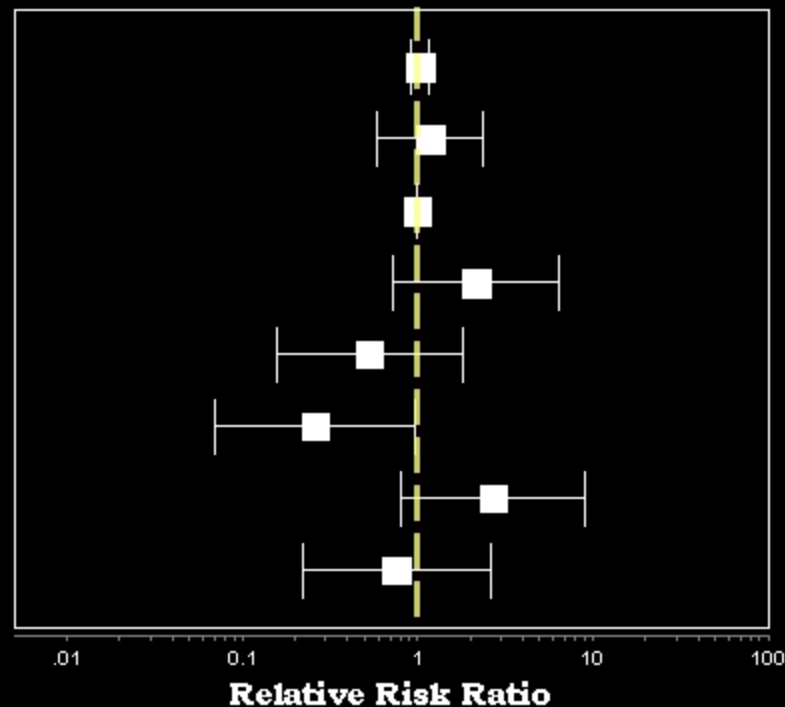
Reference	Maternal Characteristic
n/a	Retailers/10,000 persons
n/a	Deprivation Index
n/a	Income
Married	Unmarried
< HS Diploma	High School Diploma
< HS Diploma	At least some college
1st Trimester	2nd or 3rd Trimester
Sometimes/Rarely	Always/Often Depressed



Multivariate results: Urban

Sustained Smokers compared to Sustained Quitters

Reference	Maternal Characteristic
n/a	Retailers/10,000 persons
n/a	Deprivation Index
n/a	Income
Married	Unmarried
< HS Diploma	High School Diploma
< HS Diploma	At least some college
1st Trimester	2nd or 3rd Trimester
Sometimes/Rarely	Always/Often Depressed



Multivariate model: Low Density

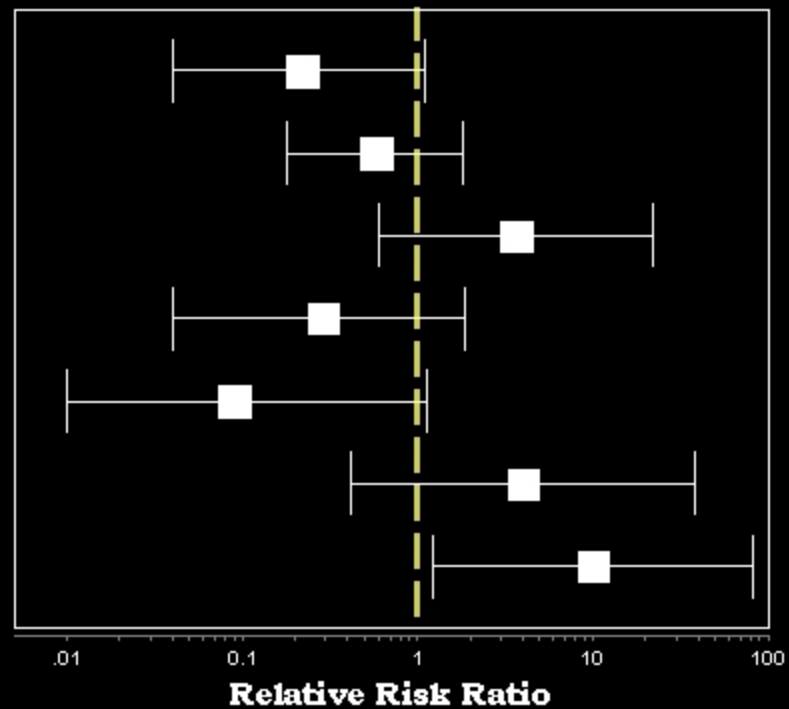
- ▶ Primary exposure:
 - ▶ Tobacco retailers, Presence/Absence
- ▶ Confounders:
 - ▶ Deprivation Index
 - ▶ Marital Status
 - ▶ Birth Order
 - ▶ Average cigarettes smoked



Multivariate results: Low Density

Relapsers compared to Sustained Quitters

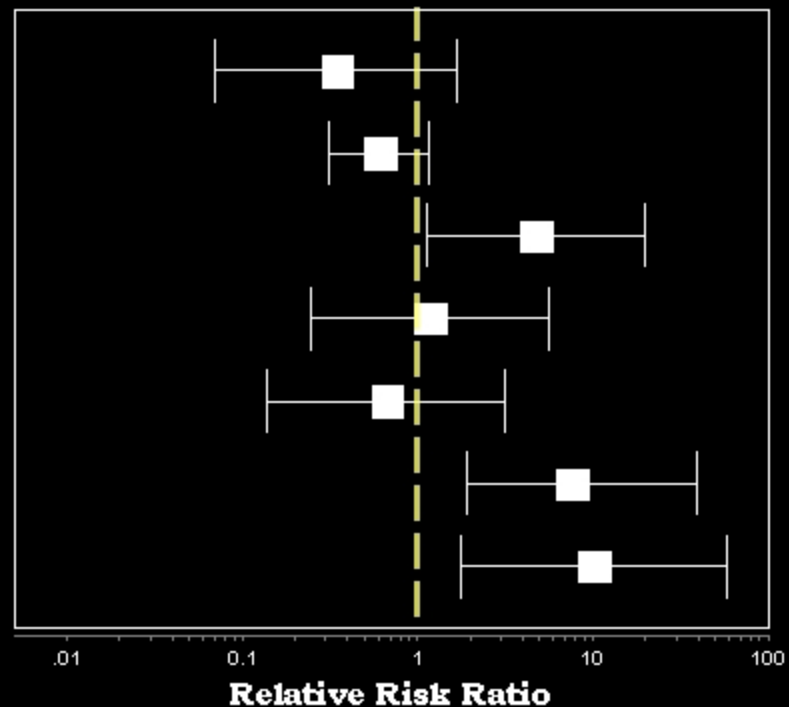
Reference	Maternal Characteristic
Absent	Tobacco Retailer Present
n/a	Deprivation Index
Married	Unmarried
First Birth	Second Birth
First Birth	Third or Higher Birth
1 to 5	6 to 10 cigarettes
1 to 5	11 or more cigarettes



Multivariate results: Low Density

Sustained Smokers compared to Sustained Quitters

Reference	Maternal Characteristic
Absent	Tobacco Retailer Present
n/a	Deprivation Index
Married	Unmarried
First Birth	Second Birth
First Birth	Third or Higher Birth
1 to 5	6 to 10 cigarettes
1 to 5	11 or more cigarettes



Summary

- ▶ Tobacco retail density does **NOT** appear to be associated with relapsing or sustained smoking through pregnancy and postpartum in women residing in mid to high population density areas of Clackamas, Multnomah, and Washington counties
- ▶ The presence of tobacco retailers does **NOT** appear to be associated with relapsing or sustained smoking through pregnancy and postpartum in women residing in low population density areas of Clackamas, Multnomah, and Washington counties

Discussion

- ▶ Prior work identified a significant association with retailer proximity but not retailer density¹
 - ▶ One retailer within a minimum distance may be sufficient to affect behavior
 - ▶ High level of availability in “urban” Tri-county area
 - ▶ 9 retailers/10,000 within participant-specific neighborhoods
- ▶ Purchasing patterns may depend more on price than location or number of retailers

▶ Reitzel LR, Cromley EK, Li Y, et al. The effect of tobacco outlet density and proximity on smoking cessation. *Am J Public Health* 2011;101(2):315–20.

Limitations

- ▶ Important aspects of the retail and social environment not captured
 - ▶ Storefront and point-of-sale advertising
 - ▶ Smoking habits of social networks
- ▶ The primary motivation for quitting
 - ▶ for the baby or for oneself
- ▶ Residential selection
- ▶ Retail selection
- ▶ Residential movement

Policy Implications

- ▶ Tobacco retail may not be a good target for promoting smoking cessation in pregnant women
- ▶ More promising targets for research and policy include:
 - ▶ Marketing
 - ▶ Social network, family influences

Research Implications

- ▶ Measurement?
 - ▶ What aspect of availability is important?
- ▶ Identifying subgroups that may be most sensitive to environmental cues, i.e. light smokers



Thanks to

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