condition were also more likely to have a higher density of tobacco retailing outlets in Missouri. Our finding implies that higher accessibility to tobacco retailing outlets might play an important role in geographic SED disparity in smoking. Future studies should examine the degree to which neighborhood SED effect on smoking behaviors is mediated by higher accessibility to tobacco retailing outlets. This insight can help policy-makers develop appropriate geographic priority to effectively allocate tobacco control programs to reduce cigarette smoking in Missouri.

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The Association Between Post-Diagnosis Health Behaviors and Quality of Life in Survivors of Ductal Carcinoma In Situ

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Background: Survivors of ductal carcinoma in situ (DCIS), an early stage breast cancer, tend to decrease physical activity, gain weight, and maintain alcohol use following treatment. However, the impact of these health behaviors on long-term quality of life (QoL) in DCIS survivors has not been investigated. Methods: We examined the association of post-diagnosis body mass index (BMI), physical activity and smoking with QoL among 1,448 DCIS survivors aged 20–74, who were diagnosed during 1995–2006 and enrolled in the population-based Wisconsin In Situ Cohort. Health behaviors and QoL were self-reported during biennial post- diagnosis interviews. Physical and mental QoL were measured using the validated SF-36 questionnaire (higher scores reflect more positive QoL). Generalized linear regression was used to establish QoL mean scores in cross-sectional analyses, with multivariable adjustment for age, comorbidity status, education, and income. Results: Women reported 3,444 QoL observations over an average 7.9 years of follow-up. Physical health summary scale measures of QoL were significantly higher among women with healthy BMI (46.5 for healthy weight versus 40.5 for obese, $P = 0.02$) and those who were physically active (45.9 for active women versus 42.6 for inactive, $P = 0.03$). Mental health summary scale scores were significantly higher among non-smokers (51.2 for non-smokers versus 47.1 for current smokers, $P < 0.01$). These associations were consistent over increasing time since treatment up to 15 years. Conclusion: Our preliminary analysis suggests that maintaining healthy behaviors following DCIS treatment is associated with improved long-term QoL. Longitudinal analysis using cross-lagged regression is underway to evaluate the temporal association between health behavior and QoL. Understanding factors that impact QoL in DCIS survivors may inform interventions aimed at preventing negative health behaviors and optimizing long term quality of life following a DCIS diagnosis.

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Cigarette Tax Revenues and Consumption under Current and Minimum-Price Regimes

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Because nine out of ten lung cancer deaths are attributable to smoking, significant reductions in smoking are likely to reduce lung cancer death as well. It is well known that cigarette demand and consumption are negatively related to price, and that cigarette smokers use price minimization strategies to maintain their tobacco use patterns at a reasonably low cost when prices go up. Two consumer strategies that have received significant attention are legal tax avoidance and illegal tax evasion. These strategies are most common when there is a price differential in an area such as an adjacent state that imposes a relatively lower excise tax on cigarettes. Their effect is a reduction in the intended public health effect of excise taxes that is expected to occur via a drop in consumption, and a reduction in state tax revenues, which may be used to fund tobacco control efforts. An increasingly discussed solution is a minimum price law. If the price is set high enough, among-state price disparities of cigarettes and other tobacco products can be eliminated along with a prominent consumer price reduction strategy. Purpose: In this study, cigarette consumption data are used to inform a novel model of consumption that incorporates the effect of adjacent state price differentials. The model is then used to (1) estimate lost (or gained) revenues by state, as well as (2) expected changes in consumption in a scenario involving a minimum price law for cigarettes that sets a nationwide price of $10 per pack (approximately the average price in New York state in 2014), which would eliminate an among-state price differential, and therefore much of the incentive to avoid or evade taxes. This scenario also raises the price of cigarettes substantially in almost all states. Methods: We use yearly state-level cigarette consumption and price data from the Tax Burden on Tobacco from the years 2004–2014. The developed model is a log-linear regression model that uses latent variables (i.e., random effects) to capture basic price effects and adjacent-state price differential effects in a mixed effects model framework. The latent variables offer a simple means of allowing both price effects to vary by state. We analyze the fitted model in two ways. First, we compare model-based consumption predictions under a regime of existing state price and border- state price differentials with predictions from a regime in which the differential is removed. This comparison results in estimates of state-specific consumption lost (or gained) due to border state price differentials; the estimates of lost consumption are multiplied by state-level excise tax and interpreted as lost (or gained) state revenues. A second analysis compares the current regime to one in which cigarette packs are set at $10 each nationwide to determine the expected consumption reduction. Results: Overall, the effect of price on demand is negative, statistically significant, and well within range of the price elasticity estimates available in the literature. The effect of border-state price differential is also negative and statistically significant suggesting that a state's consumption is negatively related to the difference between its cigarette price and the average price of its neighboring states. Both effects are heterogeneous across states. In the first analysis of the fitted model, calculation of lost (or gained) revenue relative to what

would be earned if no price differential existed is examined. The analysis reveals that New York and Illinois are, by a large margin, losing the most yearly tax revenue (nearly $140M each) to out-of-state cigarettes. Other top ranking revenue-loss states in order include Florida, Washington, Minnesota, Massachusetts, Arizona, and Ohio. On the other end of the spectrum, states gaining the most revenue under the current price regime are in order, Pennsylvania, New Hampshire, Indiana, West Virginia, Delaware, Missouri, Virginia, and Iowa. When all state gains (or losses) are summed, the net is a loss at $294.6M nationwide. In a second analysis of the fitted model, state-specific consumption estimates are derived under a regime in which a pack of cigarettes always costs the consumer $10 and in which there is no border price differential. The analysis reveals that the 2014 consumption estimate of approximately 13 billion packs of cigarettes drops to just under 8 billion under the nationwide $10 per pack regime. Conclusions: The analysis results suggest that state excise tax revenues are unfairly distributed due to tax avoidance or evasion behavior, and the net effect is a nationwide loss of almost $300 million in state revenues. This is money that could have been spent by high tax states towards their tobacco control goals, but instead went at a discount to states that have a lower excise tax, and likely weaker tobacco control goals. The analysis also revealed that a nationwide minimum price on tobacco could have a very strong effect on cigarette consumption, cutting out over a third of current consumption. These estimates are drawn from a model fitted to real and recent data. Moreover, the nature of the model allows for state specific idiosyncrasies that may affect price and adjacent state price effects to bear on the results, an approach not seen in the literature to date. However, the calculations involve assumptions that may not be realistic. For example, it is not clear that the price effect will remain the same at all price levels (i.e., the price effect may be non-linear). Also, a minimum price on cigarettes would not necessarily remove price differentials as assumed in the 10$ per pack scenario. Thus, the results of this study are best viewed as somewhat stylized views of what we are losing in the current price regime, and what we could achieve under another.

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Effects of Surgical vs. Non-Surgical Weight Loss on Mammary Tumor Burden

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Background: Obesity is associated with increased incidence of basal-like breast cancer (BLBC), the most aggressive and lethal breast cancer subtype. Epidemiological data is conflicting on whether weight loss offers protection against BLBC in obese women; only interventions that typically result in significant sustained weight loss, such as bariatric surgery, produce a consistent anti-cancer benefit. Purpose: We sought to determine the differential effects of surgical and non-surgical weight loss interventions on inflammation, metabolic hormones and tumor burden in a mouse model of pre- menopausal breast cancer. Methods: Mice were fed a low fat control (Con) or high fat diet-induced obesity (DIO) regimen for 15 weeks to model chronic obesity. Obese mice were then randomized to continue the DIO diet (Obese) or receive a surgical or diet weight loss intervention, resulting in formerly obese (FOb)-Surg or FOb-Diet, respectively. FOb-Surg mice were subject to sleeve gastrectomy (~70% of the stomach excised), while FOb-Diet mice received a low fat diet. FOb-Surg and FOb-Diet mice normalized body weight and body fat percentage to levels seen in the Con group. After weights stabilized, all mice were orthotopically injected with E0771 mammary tumor cells, which model BLBC. Results: At study endpoint, the average tumor weight in FOb-Surg mice was statistically equivalent to Con mice that maintained a healthy weight throughout study. However, the average tumor weight in FOb-Diet mice was statistically equivalent to Obese mice, both groups significantly greater than Con mice. Additionally, FOb-Surg had statistically lower serum insulin and interleukin-6 compared to FOb-Diet and Obese mice, suggesting that the sleeve gastrectomy more effectively reduced obesity-associated inflammation. Conclusion: Our results suggest that the anti-cancer benefit seen with bariatric surgery may be related to a significant reduction in systemic inflammation and growth factor signaling, which did not occur with non-surgical weight loss despite an equivalent amount of weight and body fat loss in FOb-Diet mice. Identifying the mechanisms underlying the protective effects of bariatric surgery against breast cancer could help identify new targets and strategies for breaking the obesity-cancer link.

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Childhood Socioeconomic Position and Pubertal Onset: Implications for Breast Cancer

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Higher socioeconomic position (SEP) has been associated with increased risk of breast cancer. Its relationship with the age of menarche, which is inversely associated with risk of breast cancer, and to the age of pubertal onset, is less clear. We studied the relationship of SEP to pubertal onset in a multiethnic cohort of girls aged 6–8 years at baseline and followed for 5–8 years in the Breast Cancer and the Environment Research Program in three study sites across the United States that included annual clinical examinations performed from 2004 to 2012. Analyses were conducted with accelerated failure time models using a Weibull distribution, with left, right and interval censoring. Among 1059 girls, an index of SEP comprised of household family income, mother's education and whether the home was owned or rented was assessed for associations with pubertal onset, measured by breast budding (Tanner Stage B2) and pubic hair development (Tanner Stage PH2). Girl's BMI% at entry to the study and black or Hispanic race/ethnicity were the strongest predictors of age at pubertal onset by both measurements, but the SEP index was an independent predictor in adjusted models. Girls from the lowest quintile of SEP entered puberty on average 6% earlier (6.0–7.5