Comment on Regulatory Impact Analysis for
HUD Proposed Rule
Instituting Smoke-Free Public Housing
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In their Regulatory Impact Analysis (RIA) of the proposed rule instituting smoke-free public housing, the HUD analysts acknowledge many of the benefits the rule would confer. However, they omit or do not quantify several important benefits. As a result, the RIA substantially underestimates the positive impact the rule would.

***The RIA ignores important and relevant published studies of the cost of secondhand smoke exposure*.** Contrary to what the RIA indicates on page 5 ("measuring the social costs, including medical costs and loss of productivity due to disability or early mortality, of SHS is difficult"), a number of published studies report such estimates. Estimates have been made for the US (Behan, Eriksen, Lin, 2005; Max et al., 2012), Maryland (Waters, 2006), Minnesota (Waters et al., 2009), North Carolina (Plescia et al., 2011), Indiana (Saywell et al., 2013), and China (Yao et al., 2015). Most recently, Max, Sung, and Shi (2015) estimated that in California alone in 2009, the SHS-attributable healthcare costs totaled $241 million, including $217 million for nonsmoking adults and $24 million for children. The most costly conditions were middle ear disease ($5.6 million) and ADHD ($4.5 million) for children and ischaemic heart disease ($131 million) and asthma ($67 million) for nonsmoking adults. (The RIA does not even mention the literature on ADHD.) The benefits associated with reducing these impacts should be included in the analysis.

What little discussion there is of the health effects of smoking and secondhand smoke (Page 13) is focused on cancer, when over half the smoking deaths are heart and noncancer lung disease and 80% of secondhand smoke deaths are heart disease (U.S. Department of Health and Human Services, 2014).

The RIA ignores most of the well-developed literature on immediate benefits of reduced smoking and smoke-free rules. On page 6 (middle paragraph) the analysts completely ignore the rapid changes in hospitalizations for heart disease, stroke and lung disease following smoke-free legislation. This has been documented in multiple studies (see the meta-analysis by Tan and Glantz, 2012, and Kalkoran et al, 2015). Other short-term impacts of smoke-free legislation include fewer ambulance calls (Glantz and Gibbs, 2013), and improved child health and reductions in complications of pregnancy (Been et al., 2014; Been et al., 2015; Wagijo et al., 2015; Lightwood, Phibbs, Glantz, 1999). Also documented are rapid drops in heart attack rates (Lightwood, Fleischman, and Glantz, 2001; Lightwood and Glantz, 1997)) and LBW risk following smoking cessation (Lightwood, Phibbs, and Glantz, 1999). Most of these effects are documented in the 2014 Surgeon General's report (starting on page 434 (US Department of Health and Human Services, 2014). These direct estimates of these effects are all in the range of 15-20%, with drops in events occurring almost immediately. It is surprising that HUD did not look at the most recent Surgeon General report, which came out nearly two years ago.

The benefits of smokefree housing to children are substantially underestimated. Exposure to secondhand smoke (SHS) has been shown to have substantial negative health impacts on children, all of which would be greatly diminished or eliminated should the proposed smoke-free housing rule be adopted. Children who live in poor and low income households -- those most likely to live in public housing -- are most likely to be exposed to SHS at home. In California, children aged 11 and younger from poor families with income below the poverty threshold had significantly higher exposure rates of 4.1% compared to those from high income families whose exposure rate was 2.3%, and adolescents aged 12-17 from poor income families had significantly higher SHS exposure rate (6.8%) than adolescents from middle and high income families (4.2% and 3.2%, respectively) during 2005-2007 (Max, Sung, and Shi, 2013). Similarly, in the U.S., SHS exposure for children aged 3-11 who live in poor and low income households (35.3% and 25.2%, respectively) was significantly higher compared to children from high income families (7.0%), and adolescents aged 12-19 who live in poor and low income families had significantly higher SHS exposure (22.6% and 24.4%, respectively) than adolescents from high income families (10.9%) during 1999-2006 (Max, Sung & Shi, 2009). Children living with smokers have greater school absenteeism rates, resulting in lost wages of caregivers' time valued at $227 million per year, (Levy, Winickoff, and Rigotti, 2011) as well as higher Medicaid emergency department expenditures (Levy, Rigotti, and Winickoff, 2011) than those not living with smokers. Also, among children aged 1-16 who were hospitalized for asthma, those with

detectable serum or salivary cotinine were associated with increased odds of readmission (Howrylak & Spanier, 2014). None of these important benefits are included in the RIA; they should be.

***The RIA ignores benefits of reducing mental health conditions caused by secondhand smoke exposure*.** The costs (and thus potential savings/benefits) extend beyond the healthcare sector and include cognitive development as well as healthcare conditions. This is ignored in the RIA (pages 22 and 23). ADHD, for example, has been associated with SHS exposure (Yolton et al., 2005; Langley et al., 2005). Other cognitive conditions have also been associated with SHS exposure of children, including mental health conditions, neurobehavioral disorder conditions, and developmental delay (Xu et al., 2010; Hamer at al., 2011; Bandiera et al., 2011, Kabir, Connolly, and Alpert, 2011; Miller et al., 2006). The odds of having ADHD for children aged 4-15 exposed to SHS at home compared to those not exposed was 1.5 (95% confidence interval (CI) 1.1-2.0) based on reported exposure and 1.8 (CI = 1.3-2.5) for cotinine measured exposure (Max, Sung, Shi, 2013). Eliminating these mental health costs will have immediate and long-term benefits for children, their families, and society through avoiding the high costs of treating people with mental illness caused by SHS exposure during childhood. These benefits, which are substantial, need to be fully integrated into the RIA.

HUD notes (page 68) that the rule exempts dwellings in mixed-finance developments and includes only HUD's government-owned public housing. It also does not appear to apply to supportive housing for formerly homeless adults as these tend to be in mixed finance buildings or in private rental properties that are contracted with supportive services agencies. These are the people who have among the highest rates of tobacco use, but also the highest burden of mental illness/substance use which may make implementation/enforcement harder. The RIA does not discuss the costs of these exclusions. Such a limitation is discriminatory against people living in other forms of public housing and should be dropped.

***The RIA ignores the large costs to the education system due to secondhand smoke exposure of children*.** The healthcare costs of ADHD attributable to SHS exposure for U.S. school-aged children aged 5-15 was $644 million (reported exposure) and $2.05 billion (cotinine measured exposure) for 2012 (Max, Sung,& Shi, 2014). However, the cost to the education system is even greater than the cost to the healthcare system by a factor of 4.5: $2.9 billion (reported exposure) and $9.2 billion (cotinine measured exposure) per year. Ignoring these costs (as well as most of the healthcare costs) attributable to SHS exposure grossly underestimates the total cost and thus the potential benefit of smokefree housing.

The RIA ignores the fact that these effects of SHS on children are lasting because of effects on long-term cognitive development.

The RIA ignores the substantial and rapid benefits of quitting smoking. On pages 2-3, the RIA treats the "welfare impact on smokers" as negative (i.e. a reduction in benefits) while completely ignoring the welfare benefits of quitting. While not as extreme as the approach used by the FDA, HUD assumes that smokers want to keep smoking and will invest considerable time going outside to smoke cigarettes. The reality is that 90% of smokers regret ever starting (Fong et al., 2004) and 70% indicate that they want to quit (Centers for Disease Control and Prevention, 2011). The welfare benefits of promoting and assisting smoking cessation should be included in the analysis.

Specifically, smokefree housing both motivates and supports quit attempts (Tan & Glantz, 2012; Cheng, Glantz, & Lightwood, 2011; Vijayaraghavan et al., 2013; Hyland et al., 2009). The RIA (page 3) notes that "The health benefits to smokers who are able to quit or reduce consumption may be extensive," but later in the RIA they explicitly declines to estimate those benefits. Quitting smoking before age 40 years avoids more than 90% of the excess mortality caused by continuing smoking (Pirie & Peto et al., 2013) and those who had quit smoking at 25 to 34, 35 to 44, or 45 to 54 years of age gained about 10, 9, and 6 years of life, respectively, as compared with those who continued to smoke (Jha & Ramasundarahettige et al., 2013). Using Monte Carlo simulation, a study estimated that a 1% absolute reduction in smoking prevalence would lead to an immediate reduction of 924 hospitalizations for acute myocardial infarction (AMI) and of 538 hospitalizations for stroke in the first year, resulting in a savings of $44 million (Lightwood & Glantz, 1997).There is ample evidence and research documenting the benefits of quitting smoking, and these benefits should be included in the RIA.

The RIA does not consider benefits to smokers of reduced SHS exposure (page 34). While many studies do not include the health impacts of SHS exposure on smokers due to the difficulties of separating the impact on health from active and passive smoking, it has been shown that smokers exposed to SHS have higher serum cotinine levels than those not exposed regardless of the individual smoking intensity (Lindsay et al., 2014). These benefits need to be included in the analysis.

While HUD's "request [for] comments on costs that would potentially be incurred in conjunction with cessation attempts, such as increasing provision of cessation aids" (page 42) is is a reasonable question, it is one sided since HUD, by fiat, has excluded the benefits of quitting. Most people quit without aids (Chapman and MacKenzie, 2010).

The RIA understates the documented benefits of smoke-free housing. While the RIA acknowledges that tenants of multi-unit housing are willing to pay more to live in smokefree housing units, the papers the RIA lists are not specific to low-income tenants. Vijayaraghavan and colleagues examined attitudes toward smoke-free policies among sheltered homeless adults and found that most were supportive of smoke-free policies. These are the people who

are most likely to transition to low-income housing, thus it is important to include their perspectives under support for smoke-free housing (Vijayaraghavan, Hurst, and Pierce, 2015). Nonsmoking residents of public housing have higher SHS exposure compared to average nonsmoking Americans nationally (Chambers et al., 2015) with geometric mean cotinine levels being 0.52 ng/mL vs. 0.10 ng/mL (Levy & Rigotti et al., 2013). In 2011, an estimated 37,791 never-smoking children and adults who lived in public housing experienced illness and death due to SHS exposure at home, resulting in total societal costs of $450 million per year (Mason & Wheeler et al., 2015). It has been calculated that if smoking were prohibited in all US subsidized housing including public housing, there will be a cost saving of approximately $521 million per year, including $341 million in SHS-related healthcare expenditures, $108 million in renovation expenses, and $72 million in smoking-attributable fire losses (King & Peck et al., 2013).

The HUD RAI says (page 36) that the data on voluntary smoke-free homes focus on younger, healthier individuals not representative of the public housing tenant population. This is incorrect. Vijayaraghavan, et al (2013) present data from the TUS-CPS focusing on individuals living below federal poverty line who may be more likely to live in public housing. The actual data shows that those who had a smoke-free home were more likely to have reduced consumption and increased quitting (3 month abstinence) compared to those without a smoke-free home. In fact the level of quitting was similar to those living above the federal poverty line, so, in effect, smoke-free homes could reduce this disparity in quitting by income level.

The RIA (page 8) does not account for the fact that thirdhand smoke residues persist for a very long time and are very hard to get rid of (including residues from ENDS). Removing this residue is difficult and expensive (Wilbur et al, 2015; Bahl et al, 2014; Quintana et al, 2013; Petrick et al, 2010; Matt et al, 2011). Residents object to this exposure (Lewinson and Bryant, 2015; Drehmer et al, 2014) and there is also evidence of negative health effects (Northrup, et al, 2015; Samet et al, 2015; Sleiman et al, 2014; Kassen et al, 2014; Martins-Green, et al, 2014; Thomas et al, 2014; Schick et al, 2014; Matt et al, 2014; Hang et al, 2013; Protano and Vitali, 2011; Rehan et al, 2011; Thomas et al, 2011; Dreyfuss, 2010; Sleiman et al, 2010). E-cigarettes (ENDS) are also a source of thirdhand exposure to nicotine (Goniewicz and Lee, 2015). Most of this information is relatively new; the RIA needs to integrate it.

***The HUD RIA relies on a seriously criticized FDA model*.** One of the quantitative approaches that the RIA includes is the model developed by the FDA in its analysis of the proposed graphic warning label rule (page 24). The FDA model suffers from many weaknesses and has been the subject of extensive criticism, including underestimation of benefits to non-smokers from reduced SHS exposure resulting from reduction in smoking, omission of the benefits of reduced maternal smoking while pregnant, inclusion of only a limited number of healthcare services, omission of benefits to smokers who reduce smoking even if they don't quit, underestimation

of short-term benefits particularly related to reduced risk of heart attack and stroke, omission of the impact on the use of other tobacco products, reliance on very old estimates of lifetime costs, and the inclusion of a measure of welfare loss due to smokers giving up the pleasure of smoking that in reality might apply to only a very small group of people (Song, et al, 2014; Chaloupka et al., 2015; Song and Glantz, 2015). The FDA model is not an appropriate one to use for this RIA. One component of this model, as applied to the RIA, merits more detailed discussion – the value of lost pleasure from smoking on behalf of those who quit due to smoke-free housing rules.

***HUD's substantial discounting of the benefits of quitting because of the "lost pleasure from smoking" ignores a large body of literature on the effects of nicotine addiction, often started by children, on behavior*.** HUD reduced the net benefits of smoking cessation by 33% to account for the lost utility of those who quit smoking (page 41). As mentioned above, a similar calculation performed by the FDA is its RIA was widely criticized. There is no scientific basis for this adjustment to benefits, and the consensus among an expert group of economists is that the literature on which it was based was misinterpreted (Chaloupka et al., 2015). It also ignores the large and relevant behavioral and neuroscience literature on determinants of smoking behavior, including physical changes to the brain that reflect reduced ability to make rational decisions (reviewed in Song, et al, 2014; Song and Glantz, 2015). As noted earlier, no consideration is given to the benefit to smokers who quit, an important component given the number of smokers who indicate that they wish they could quit. This adjustment for lost pleasure should not be included in the RIA.

***The RIA ignores the value of lives saved*.** On pages 40-41, the RIA indicates that "…although the value of longevity and quality of life is difficult to quantify, estimates are usually positive and significant. …HUD is reluctant to include a detailed analysis given that the realization of this indirect benefit depends completely on how smokers elect to comply with the rule". In fact, there is an extensive literature that quantifies the number of lives lost due to SHS exposure (Centers for Disease Control and Prevention, 2008; California Environmental Protection Agency, 2005; Oberg et al., 2011; US Department of Health and Human Services, 2006; Max et al, 2015). Other studies also include the value of those lives lost (Waters, 2006; Saywell et al., 2013; Behan et al, 2005; Max et al., 2012b, Max et al, 2015). A recent study reported that more than 42,000 deaths result from SHS exposure in the US each year, representing $6.6 billion in lost productivity (Max, Sung, Shi, 2012b). Their estimate is likely to be an underestimate of the true costs of SHS exposure because only 6 SHS-associated conditions (heart disease, and lung cancer for adults; low birth weight, sudden infant death syndrome, respiratory distress syndrome, and respiratory conditions of the newborn for infants) were included in the analysis.

After ignoring the substantial literature on short term benefits of ending SHS exposure and quitting smoking, HUD spends 12 pages on a detailed analysis of how long it will take smokers to walk outside and smoke a cigarette *(pages 50-62).* This analysis, which includes an estimate of the average velocity of elevators, concludes that the value of all this lost time adds up to $68 million. This analysis ignores the fact that the proposed rule could help people who want to cut down and quit smoking to do so. This would be funny if it was not forming the basis for government policy.

The rule does not include ENDS (electronic nicotine delivery systems, or e-cigarettes); it should be changed to include ENDS because they pollute the air and will complicate enforcement. Including ENDS would eliminate the problem the RIA discussed on pages 49 and 68. There are also data that bystanders living with people who used ENDS have nicotine levels similar to those living with smokers (Balbe et al, 2014; Fernandez et al, 2015).

HUD should not rely on work by Kip Viscusi, who has taken substantial money from tobacco companies and even prepared papers on risk perception using data collected for him by industry lawyers. Most troubling in terms of whether HUD can rely on Dr. Viscusi's work (directly or indirectly) is the fact that the data which form the basis for the assertion that smokers overestimate the risk of smoking which form the core of the analysis in his book, *Smoking: Making the Risky Decision* (Viscusi, 1992) were collected in September 1985 by a private research firm, Audits & Surveys, Inc. for several law firms retained by the tobacco companies (Arnold and Porter, Jones, Day, Reavis & Pogue and Shook, Hardy & Bacon) "in anticipation of litigation" against the tobacco companies (No author, 1985a; No author, 1985b; No author, 1985c; Jones Day, 1985). In Viscusi's 1997 deposition in the case brought by the Attorney General of Mississippi, Viscusi acknowledges that he knew the 1985 survey was commissioned by the law firm for the purpose of defending the tobacco companies in court (Viscusi, et al, 1997; Viscusi, 1997). Work commissioned by advocates for tobacco industry defendants prepared for legal defense can hardly be considered neutral scientific evidence. (We do not know, for example, what other questions, if any, the tobacco company law firms tested before fielding this survey.)

In any event, the basis for Viscusi's conclusion that smokers underestimate how dangerous smoking is rests on how respondents answered the single question, "Among 100 cigarette smokers, how many of them do you think will get lung cancer because they smoke? (If "don't know," PROBE 'Just your best guess will do.')" (Viscusi, 1992, p. 155). People are notoriously bad at estimating such abstract low probability events. The fact that the survey company instructed interviewers to "probe" if the respondent did not know the answer makes the result even more unreliable.

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