




# Tobacco in hotels: A study of smoke exposure and resident risk

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## ABSTRACT

**OBJECTIVES:** Extended-stay hotels (ESH) are a reliable and accessible housing option for low-income, minoritized renters, who are disproportionately exposed to secondhand and thirdhand cigarette smoke (SHS and THS). This study explores ESH residents' perceptions of their SHS and THS exposure, harms related to this exposure, their willingness to mitigate these harms, and the contextual factors associated with smoking in hotels.

**METHODS:** Eighty ESH renters from the metropolitan Atlanta region were recruited to complete a survey about the perceived harm and persistence of tobacco smoke, exposure experiences, knowledge, attitudes, self-efficacy, and intentions to protect oneself. Eleven of these participants completed semi-structured interviews, during which they discussed their daily SHS and THS exposure at their ESHs in greater detail.

**RESULTS:** Of the survey respondents, 62% reported being bothered by their level of smoke exposure, and 77% said they believed smoke particulates remained in their rooms even after housekeeping cleaned them. Approximately half of survey respondents had attempted to stop smoking in the 3 months prior to the study, and 29 of these individuals were still on their smoking cessation journeys. Most interview participants agreed that SHS and THS exposure exacerbated their existing chronic illnesses and could possibly result in death in the long term. Participants agreed with the benefits of smoke-free policies, but also acknowledged other priorities for ESH living—affordability, safety, and proximity to the workplace—that overshadowed their desires for such policies.

**CONCLUSION:** Overall, study findings suggest that ESH renters understand the dangers of smoking and SHS/THS and want to decrease their exposure, but the persistence of cultural and contextual factors prevents them from fully engaging with 100% smoke-free policies.

**KEYWORDS:** secondhand smoke, thirdhand smoke, extended stay hotels, smoke-free policies, smoking cessation, health belief model, social-ecological model

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## Introduction

Exposure to secondhand and thirdhand smoke (SHS and THS) is a severe public health issue that causes coronary heart disease, stroke, and lung cancer in adult nonsmokers. According to the Centers for Disease Control (CDC), each year more than 34,000 heart disease deaths and 7,000 lung cancer deaths among nonsmokers are caused by SHS exposure.<sup>1</sup> The damage of SHS exposure to adults is estimated to cost the US economy nearly US\$7-US\$10 billion annually,<sup>2</sup> including US\$5 billion in estimated medical care and US\$4.6 billion associated with lost productivity, morbidity, and mortality.<sup>3</sup>

Secondhand smoke is defined as the smoke that can be inhaled by persons in the vicinity of the individual smoking

a cigarette, while thirdhand smoke is the deposition of cigarette smoke particulates on furniture, clothes, and other surfaces in a smoker's environment.<sup>4</sup> Among the 58 million nonsmokers exposed to SHS during 2013-2014, the highest prevalence was among non-Hispanic Black adults (50.3%), renters (38.6%), and people living in poverty (47.9%).<sup>5</sup> State-level analyses also reveal sexual identity disparities with high-level exposures.<sup>6,7</sup> Nearly half of renters in multi-unit dwellings report SHS seeping into their units from elsewhere.<sup>8</sup> Prevalence of serum cotinine, a metabolite of nicotine and biomarker for SHS exposure, is detected at high levels among nonsmoking non-Hispanic Black adults, people in poverty, and renters.<sup>9</sup> Since low-



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income minority renters tend to be diagnosed with other health comorbidities, exposure to SHS hazards can trigger immediate adverse effects, such as heart attacks, even after brief exposure.

Over 7 million low-income households struggle to find long-term housing when past evictions, credit, legal challenges, tragic life events, and underemployment make renting an apartment or buying a home out of reach. Across the state of Georgia, communities rely on extended-stay hotels (ESH) to fill an affordable housing gap. A recent study of residents living in ESHs in Norcross, Georgia, found that 40% lived in a hotel for at least a year, and 22% had resided in these accommodations for at least 3 years.<sup>10</sup> Officials from Cobb County estimate that one-third of the rooms in the county's 30 ESHs are occupied by families using hotel rooms as a form of housing, and some families may also be using standard hotel rooms in an extended-stay capacity as well.<sup>11</sup> Although the numbers of low-income adults living in ESHs are not systematically enumerated, the National Center for Homeless Education reports that nearly 98,000 schoolchildren lived in these hotels with their families during the 2018-2019 school year.<sup>12</sup>

Evidence of unhealthy air in occupied hotel guestrooms has been demonstrated.<sup>13</sup> Although nearly 63% of US hotels had adopted smoke-free policies by 2018, less than 30% of budget hotels have enacted such policies.<sup>14</sup> Smoking-allowed hotels either permit smoking in all guestrooms or smoking-designated rooms. However, non-smokers are affected in these hotels because a smoking neighbor introduces SHS into adjacent non-smoking spaces. The nicotine residue migrates via doors, windows, vents, hallways, electrical outlets, and even plumbing to other rooms, where it accumulates on walls, curtains, and other surfaces. Non-smoking hotel guests are dosed with these nicotine toxins in their living spaces, as evidenced by higher levels of cotinine in their urine samples after checking into hotels.<sup>15</sup>

As of January 2023, 43 states, including Georgia, have no laws prohibiting smoking in hotel and motel rooms.<sup>16,17</sup> Comprehensive policies have been implemented through local ordinances that shift social norms and stimulate public debate and education, gaps in policy coverage for most US states and some localities persist.<sup>18</sup> Despite approximately 75% of Georgia residents being protected by smoke-free workplace policies between 2005-2009, smoking-attributable deaths cost the state an average of US\$5.8 billion in ambulatory, hospital, nursing home, prescription drug, and home-health-related products and services during the same time frame.<sup>19</sup> To complement any state-level policies, advocacy organizations promote the use of private at-home no-smoking rules that completely ban tobacco use inside the home environment. In fact, in 2020, the city of Atlanta passed a smoke-free ordinance that placed restrictions on smoking and vaping in indoor and outdoor public places, which include hotels and motels.<sup>20,21</sup> However, even with smoking bans in place, residents in multi-unit buildings may be subject to neighbor smoke and unaware of

the persistence or harm of smoke particles settling in their home environments. The purpose of this study is to assess residents' exposure experiences, risk perceptions, and beliefs about implementing smoke-free policies in ESHs where they reside.

### Conceptual framework

To guide this study, we used the Health Belief Model (HBM) to frame our inquiry of residents' beliefs about their tobacco smoke exposure risk. According to this model, people's actions to protect against risk exposures for improved health are influenced by their beliefs about susceptibility to hazards, severity of health impacts, benefits of acting, and barriers to action.<sup>22</sup> The original parameters in this framework include individuals' perceived susceptibility and severity of a health problem, the barriers and benefits they perceive in relation to a particular health behavior, their overall health motivation, and existing "cues" that may facilitate the individual's health behavior uptake. Demographic factors and psychological characteristics are also included in the model, but they are not shown to directly connect to behavioral uptake because HBM was conceptualized in part to investigate less fixed individual characteristics than demographics and SES that may inform people's likelihood of health behavior uptake (Figure 1).<sup>23</sup> HBM has been used to understand pregnant individuals' perspectives on mitigating physiological effects of tobacco smoke exposure; interventions based on this model have been successful in promoting smoking cessation beliefs and behaviors among adults who regularly smoke.<sup>24,25</sup>

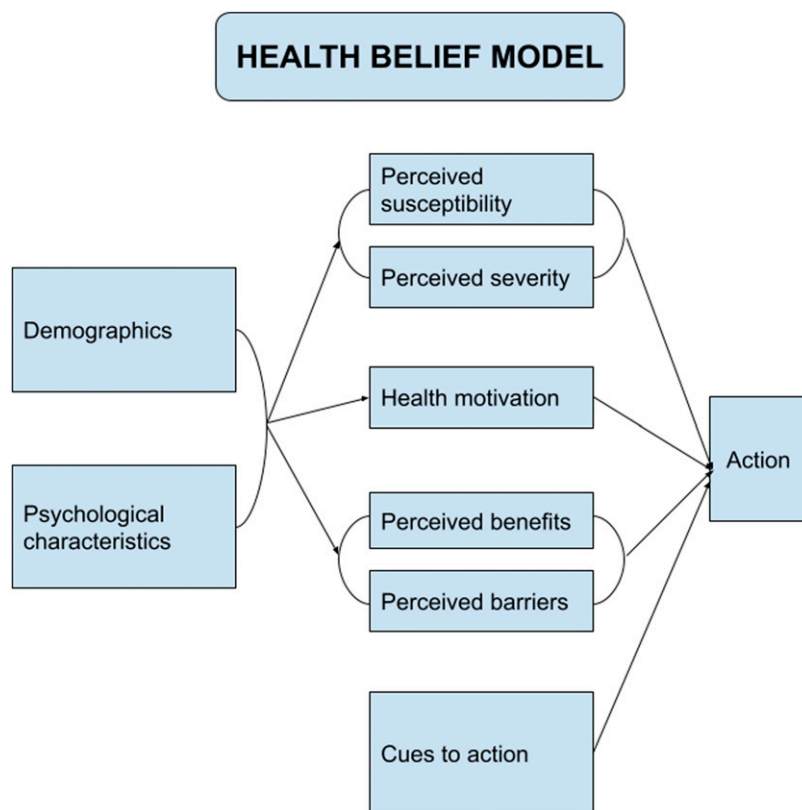
From this theoretical lens, our study sought to answer 3 research questions: (1) What are residents' perceptions of smoke exposure and smoke particulate persistence and harm? (2) How do residents' perspectives inform their willingness to act on measuring and mitigating their risk of smoke exposure? And, (3) What system-level dynamics influence endorsement of smoke-reduction interventions in extended-stay hotels?

### Methods

This explanatory mixed-methods sequential study received approval from the Dartmouth College Institutional Review Board, project #00032432.

#### *Recruitment*

We recruited 80 participants from ESHs in Metropolitan Atlanta, Georgia between January and November 2022 using flier distribution, paid referrals, and snowball sampling methods. The study flier contained information about the study, an email contact to reach the research team for questions, and a QR link to access the survey. Per Title 45 of the Code of Federal Regulations subsection entitled General requirements for informed consent (45 CFR 46.116(f)), the Dartmouth College Committee for the Protection of Human Subjects (CPHS) deemed signed consent unnecessary for completion of this



**Figure 1.** Abraham and Sheeran's (1996) original health belief model parameters.

web-based, anonymous survey.<sup>26</sup> The information sheet detailing the study's scope and participant requirements was the first page of the survey. Participants were notified that continuing with the survey would constitute their consent to participate in the study after being informed of its purpose, scope, risks, etc. Those who did not consent were instructed to close their browser window or navigate away from the survey. Eligible residents were screened in Qualtrics and allowed to proceed with the survey if they met the study inclusion criteria. To be eligible, participants had to be age 18 or older, be English-proficient, be able to consent, and identify as long-term renters in Atlanta ESHs (defined as renting consecutively for at least 3 weeks). There were no specific exclusion criteria, but people who did not meet the eligibility criteria were not allowed to proceed to the survey and were instead provided a resource list with housing and smoke cessation services. At the end of the completed survey, respondents could opt into scheduled phone interviews. Dartmouth CPHS approved a verbal consent procedure for interview participants as these participants had already proceeded through the informed consent process when completing the survey. Prior to interviews, research personnel reviewed the study information sheet with each participant and obtained verbal consent to proceed with the recorded interview. Participant consent was required for the interview to proceed and be recorded, but interview participants' verbal consent itself was not recorded.

### Data collection

*Survey.* In our Qualtrics survey, we collected demographic, socioeconomic, household, health, hotel environment, and rent burden data. This portion of the survey was composed of validated questions adapted from the Calgary Charter on Health Literacy scale and the 2020 Behavioral Risk Factor Surveillance System questionnaire.<sup>27,28</sup> Additionally, the survey included items to measure perceived harm and persistence of tobacco smoke as well as exposure experiences, knowledge, attitudes, self-efficacy, and intentions related to protecting self and measuring exposure.

*Persistence and harm of smoke in hotel rooms.* We used the *Beliefs About Third Hand Smoke (BATHS)* scale, which includes 8 items to measure beliefs about the persistence and harm of tobacco smoke residue in their home spaces. This BATHS scale was found to be reliable, with a strong Cronbach value ( $\alpha = 0.90$ ).<sup>29</sup> Respondents selected on a 5-point Likert scale from "strongly disagree" to "strongly agree" that smoke particles remained in the room for days or weeks, could be absorbed into curtains and furniture, could enter the body through the skin, and could be eliminated by opening windows or turning on the air conditioning unit. Respondents also rated their perceptions about whether inhaled SHS particles could be harmful to children and adults, could cause cancer, and could be transmitted to others through touch.

*Knowledge, attitudes, self-efficacy, and intentions.* We included 14 items from a previous survey from Delgado-Rendon and colleagues that measured the smoke exposure knowledge of Hispanic residents living in multi-unit housing, specifically including topics about exposure health effects, smoking policy awareness, benefits of smoking bans, and protection strategies ( $\alpha = 0.43$ ); attitudes about acting on exposure knowledge ( $\alpha = 0.65$ ), confidence in keeping others' smoke away from them ( $\alpha = 0.75$ ), and intentions to protect themselves ( $\alpha = 0.72$ ).<sup>30</sup> Lastly, we adapted and included 6 items from a scale from Brall and colleagues that measured intentions to engage in personalized health research to capture hotel residents' willingness to act by collecting air and biosamples to measure exposures at home.<sup>31</sup> Sample questions were: *Would you participate in a research project that used your biological samples (eg, saliva, urine, blood, hair, tissue)? And, would you be willing to collect air quality samples from your hotel room using a free at-home testing kit?*

We drew survey items from validated sources with minimal overlap and assessed the interpretation of this new survey instrument by conducting cognitive interviews with 2 participants. In the cognitive interviews, we used a combination of think-aloud and verbal probing approaches, such as asking: (1) *What were you thinking when answering that question?* (2) *How easy or difficult was the question to answer?* (3) *What does this term mean to you?* The cognitive interviews lasted from about 40 minutes to an hour and survey items were clarified where needed.

*Interviews.* Participants who had answered the survey and met the previously mentioned inclusion criteria were contacted by email and phone to participate in semi-structured interviews. Our semi-structured interview guide included 26 questions and additional follow-up prompts related to smoke exposures in hotels. These questions were tiered into intrapersonal, interpersonal, organizational, community, and public policy levels. Example questions included: *What comes to mind when you think about smoke-free housing policies? How important is it to you for your hotel to be smoke-free? Have you heard stories or complaints about experiences with smoke exposure at your hotel?* After obtaining consent, phone interviews lasted between 10-59 minutes and were audio-recorded, then professionally transcribed for data analysis. Two research assistants (JMM and JN), both identifying as male, conducted all the interviews. Both interviewers had MPH degrees and had previously undergone general training in semi-structured interview techniques and specific training on this study's interview guide. All respondents were provided gift cards for completing surveys and interviews.

### Data analysis

*Survey.* To begin, we converted a Qualtrics data file to upload for STATA 17.0 use.<sup>32</sup> In the first phase, we cleaned the data, assigned variable names and definitions, reverse coded values, and developed derived variables where necessary to explore relationships. Likert responses were centered on zero and totals

were summed for cumulative scores during analysis. We report here univariate statistics from the survey that contextualize the qualitative findings.

*Interviews.* After cleaning the transcripts, we began by deductively coding data bits into a priori theoretical categories according to HBM domains. We used NVivo 14 to organize the transcript data then conducted a thematic analysis via open, axial, and selective techniques.<sup>33,34</sup> During coding, we used descriptive and in vivo codes to summarize discrete topics and preserve culturally specific language from the text. Coding progressed iteratively until data saturation was met. Two team members (TL, AD) conducted the analysis and met periodically to check for coding consensus.

## Findings

### Participants

In a sample of 80 survey participants aged 23 to 72, 65% identified as women (trans 1%) and 34% as men (trans 3%). Most selected Black/African American (78%) and White (20%) in available race categories. Sixty-two participants were straight/heterosexual (77.5%), ten participants were LGBTQ+ (12.5%), and 7 participants preferred not to answer about their sexual orientation (8.75%).

Among these renters, 91% earned less than US\$40,000 annually, and 63% were burdened with stress about having enough money for rent. Although most participants lived in their hotel rooms for 6 months or less (66%), some resided there over a year (24%). Most lived in hotels that did not allow smoking (50%) or a non-smoking room in a hotel that did allow smoking in designated rooms (34%). Just over 16% lived in smoking rooms in hotels that allowed smoking. Forty-one percent of respondents were current smokers, and 22% recently quit smoking tobacco, but among these, 16% were still using smokeless tobacco and e-cigarettes. Thirty-seven percent never smoked. Despite their smoking status, up to 56% of respondents allowed the use of tobacco products in their hotel rooms.

From the survey pool, we conducted interviews with a convenience sample of 11 participants aged 35 to 68; 9 were female, and 3 were male (1 participant identified as a trans male). One participant identified as gay. Eight participants identified as Black or African American or African, 2 as White, 1 as Asian, and 1 person declined to self-identify race/ethnicity. The length of hotel stays ranged from 2 weeks (this person had recently moved hotels, so they still met the 3-week duration inclusion criteria) to 18 months. Four participants had never smoked, 6 were current smokers/tobacco users, and 1 participant declined to answer about their smoking status. Five participants lived in hotels that allowed smoking inside while 6 lived in 100% smoke-free properties.

### Hotel renters' risk perceptions of smoke-exposure

Renters perceived high susceptibility to SHS exposure and harms. They reported smelling tobacco smoke daily (31%) or a



few times a week (21%). Most renters believed these tobacco smoke particles sank into the hotel furniture and walls (61%) and persisted in a room for days (69%) or weeks (57%). Most survey respondents (62%) were bothered by this constant exposure. Sixty-one percent believed that opening windows or using air conditioners did not eliminate smoke particles in a room and could be passed on to other people through skin, hair, or clothing. Even more (77%) believed these particles remained after housekeeping cleaned the room. Over half of renters believed these particles could enter the body through the skin and have negative effects, such as causing cancer (42%), harming children (63%) and harming adults (55%). Although 69% of renters preferred to live in smoke-free rooms, protecting their homes from exposure was challenging because they could not control others' actions (66%), avoided confrontation with neighbors (34%), worried about being evicted if they complained (19%), or had more pressing problems to consider (25%).

Consistent with the HBM, during follow-up interviews, we explored perceived susceptibility, perceived severity, and renter's willingness to act.

#### *Perceived susceptibility*

Two main themes emerged relating to participants' perceived likelihood of being exposed to SHS: prevalence of first-hand smoke and long-term SHS and THS exposure.

*People do what they want to do.* Respondents indicated that people smoked inside their rooms in hotels regardless of whether the property had a smoke-free policy. Missy, who lived and worked at a partially smoke-free hotel, noted that renters often do not pay attention to the rules. She stated, "I know that there's a lot of smoking. It doesn't matter if we tell them it's a [non-smoking room]. People are going to smoke in it." At another hotel, one renter, Henry, admitted to smoking inside his room even though he agreed with the hotel's 100% smoke-free policy and acknowledged the dangers of SHS. Despite his endorsement, weather and time of day factored into his decision to smoke indoors. He stated, "Sometimes late at night if it's really cold, I'll just fire up right there in the room to keep from going outside in the cold." Lauren noted that she knew people smoked in their rooms because she could "actually smell people smoking...-through the walls."

*Smoking everywhere, all the time.* All interviewees smelled or saw someone smoking on the hotel property at some point in their stay. The most common location reported was on hotel balconies (39%), just outside guest room doors. Nearly half (49%) of survey respondents rented rooms that opened to a parking lot. Balconies and walkways outside of these rooms were prime locations for people to stand around and smoke. For example, Katie, a guest at a smoke-free hotel stated, "I see people sitting on the balconies and smoking their cigarettes." According to Meka, smoking on the property occurs at all hours of the day. She recalled, "I might not get home until 1 or 2 in the morning, and you'll still see people outside in the smoking area, smoking and stuff."

Missy is on a smoking cessation journey with her partner. They believe the constant smell of cigarettes is a challenge and could lead to a setback. "We stopped smoking cigarettes about 3 years ago. We're in a non-smoking room, and we still smell cigarette smoke or weed smoke coming through the vents in our rooms all the time." These findings confirmed survey participant responses, that indicated indoor smoking was evident in hotel corridors (55%), lobbies/lounges (46%), and laundry rooms (30%).

#### *Perceived severity*

Along with awareness of heightened SHS exposure, participants were also aware of the potential environmental and health consequences of this exposure.

*Smoking is damaging to the hotel environment.* In addition to the lingering smell of cigarette smoke, participants noted that they could see smoke damage left by past tenants who had smoked in their rooms. Henry lived in a 100% smoke-free property and acknowledged the distasteful appearance of rooms in which people smoked. "Secondhand smoke...sticks to the walls, it changes the color of the paint from white to brown and it's really nasty," he said. Linda echoed his statement, saying "Smoke gets into the walls, the curtains, the drapes, the blankets."

Some participants who live in smoke-free buildings said they did not notice or smell SHS/THS in their rooms. However, they also acknowledged their past experiences with the persistence of SHS/THS exposure in living spaces that have been smoked in. For example, Meka recalled how her father's smoking habit left physical damage in their house while she was growing up. "[There was] this stench to the house, it always smelled like smoke even when no one was smoking in there. The blinds would get yellow, the walls kind of had the yellowish tint to it and stuff like that," she said. Participants acknowledged some degree of risk regardless of whether they lived in a smoke-free hotel or one that allowed smoking because of the residual damage from previous occupants left in the room.

*Exposure is detrimental to health.* Most (64%) of the 80 surveyed renters self-reported excellent, very good, or good health. However, 28% and 8% of renters reported fair or poor health, respectively. The top diagnosed health conditions were: depression (41%), asthma in childhood (31%), asthma in adulthood (28%), arthritis (28%), diabetes (19%), and skin conditions - eczema (17%). A few renters had been diagnosed with stroke (12%), COPD/Emphysema (9%), health disease (9%), and cancer (8%). Interviewed renters expressed awareness that smoke exposure "triggered health conditions" and could cause "fatal consequences."

*Triggered health conditions.* Renters described skin conditions, asthma, and chronic immune disorders that often flared up after prolonged or even acute exposure to SHS. Lauren stated, "I have a child who has a compromised immune system. So just smoke being

*in the air affects her in a negative way. I know for a fact it does.*" The same was true for Meka, who despite being a smoker herself, acknowledged that nonsmokers who shared an environment with smokers could fall ill if their conditions were "triggered" by SHS.

**Fatal consequences.** Another concern was that long-term SHS exposure could have fatal consequences. Missy, a smoker who has switched to vaping, and Katie, a nonsmoker, both acknowledged that SHS smoke exposure could lead to death even in nonsmokers. *"Everybody knows that secondhand smoke can kill you just as much as firsthand smoke,"* said Missy, while discussing her preference for smoke-free hotel properties. Kendra, a smoker living in a 100% smoke free property, supports the smoke-free policy because she had experiences with family members being gravely injured from SHS exposure. *"I had a brother-in-law who never smoked, yet he ended up getting cancer in his lungs. And his wife used to smoke. So we was just looking at it like, maybe it was secondhand smoke,"* she said.

### Renters' willingness to act on exposure risks

Most survey respondents (77%) believed they could keep themselves and their families safe from SHS by asking people not to smoke near their families and asking family members not to smoke (51%). Aside from these prevention strategies, others believed intervening by leaving a window open when someone is smoking (35%) or vacuuming after a smoker leaves the room (20%) were appropriate actions to mitigate harm. Other active strategies were reporting exposures to hotel managers and seeking medical advice from healthcare professionals. However, several renters noted they would take no action if exposed to smoke in the environment because they did not know what to do or felt actions would not yield any change. Some renters (47%) believed in asking for smoking-free policies in their hotels. During follow-up interviews, we explored renters' motivations for requesting and endorsing smoke-free policies as well as their perceptions of benefits and barriers to acting.

### Health motivation

Three major themes emerged from participants' motivations to endorse smoke-free policies: avoiding SHS-related health problems, supporting cessation journeys, and promoting designs and policies that reduce exposure.

**To avoid SHS-related health problems.** Participants indicated a desire to avoid the serious health consequences of SHS exposure, either for themselves or for family members. Lauren's children have asthma and other chronic conditions that could flare up if they were regularly exposed to SHS. She said, *"[Smoke-free policies are] very important to me. More for the health of my children than anything else."* Similar sentiments were echoed by Tina, who always smoked outside to protect her kids.

She explained, *"I have kids and I don't want them to smoke. So they know I go outside the room and smoke. I don't like to do it where they can have that smell on them and they can be smelling like smoke."* Linda and Katie both live in 100% smoke free hotel properties, but stressed that they would do everything within their power to establish smoke-free environments for themselves wherever they go. Even when she lived in her private home, Linda insisted guests smoke outside. Katie was a bit more extreme. She endorsed smoke-free living and refused to touch people who smoke because, *"You hug [people who smoke] and you smell the nicotine."*

**To support cessation journeys.** Several residents discussed smoking cessation journeys while living in ESHs. Of the 42 renters who attempted to stop smoking over the previous 3 months, 13 were successful and 29 were still trying. Kendra and Missy were further along in their journey to cessation, and both firmly supported smoke-free policies. Kendra and her partner recently joined a smoking cessation program through a behavioral support app, while Missy and her partner switched to electronic cigarettes to minimize harmful smoke exposure. Kendra found it difficult to quit smoking in her extended stay hotel. The constant smell of SHS as well as vapors emanating from cigarette butts during rainy days sometimes made it challenging to continue adhering to her cessation program. From her perspective, implementing a smoke-free policy could be instrumental in individuals' cessation journeys. Kasey acknowledged the benefits of a policy, but was not quite ready. Still, the idea of a policy sparked her to think about changing her smoking behavior. *"I don't know if I'd be comfortable right now at a place with a smoke-free policy. I think it has changed my thinking and I'm looking more deeply into smoking cessation,"* she said.

**To promote enforcement of existing policies and guest separation.** The majority of participants indicated support for hotel policies that would reduce SHS exposure. These policies might augment existing management practices, such as separating smokers and non-smokers in different buildings, establishing safer outdoor smoking areas, and enforcing existing smoke-free policies. Tina, who lived in a hotel that allowed smoking, said, *"This hotel has 2 buildings. So maybe, they have 1 building ... that has smokers and the other building [has] non-smokers."* Meka further contextualized the ineffectiveness of existing policies that do not address neighbor smoke. She explained, *"They're smoking in the room right next to you and then you turn [your AC] on and then it comes through the vent and now you're smelling smoking stuff. So it doesn't really benefit to be in a non-smoking room if the room next to it is a smoking room."*

Participants also discussed the need for safe areas for people to smoke without fear of endangering their families or other residents. Missy, Katie, and Kendra all called for the construction of an outdoor smoking bench or area away from pedestrian traffic.

I think it would be good to do all of the rooms non-smoking, and then have designated smoking areas like in a hospital or a doctor's office. The property is smoke free, but so many feet off the property, they have a designated smoking area where people can go to smoke. (Missy)

Kendra, who already lived in a smoke-free property, indicated that in a perfect world, she would prevent people from smoking anywhere near the hotel's vicinity. *"I would stop people from smoking around here, period. This would be a smoke free premise,"* she said. Meka, whose hotel allowed smoking, echoed the sentiment and added, *"I think all hotels should be smoke free."*

## Perceptions of benefits and barriers and cues to action

### Perceived benefits

Interview participants indicated that they believed smoke-free policies would result in cleaner and less-stigmatizing hotel living conditions. If smoke-free policies were successful, then perhaps policies against other illicit activities occurring at hotels could also be enforced.

*Cleaner, less stigmatizing environments.* Residents thought smoke-free policies would lead to cleaner and healthier living environments for everyone. Meka perceived smoke-free environments to be better than the alternative. *"It's cleaner. I can't explain, the air is cleaner, it's just better,"* she said. Likewise, Missy believed cleaner hotels could reduce shame and stigma often faced by ESH residents. Thus, smoke-free policies could not only help residents' with physical health concerns, but also begin to address mental health concerns.

You don't want to be stuck living in a hotel. Nobody does, but when you are in that situation, whatever you can do to make it a better environment, a healthier environment, a cleaner environment, it's going to make you feel better about the fact that you're living in a hotel. (Missy)

*Prevention of illicit activities.* Several residents seemed to regard the lack of smoke-free policies as a slippery slope to allowing other undesirable behaviors to occur in the ESH setting, such as illicit drug use and dealing. Missy noted, *"I think it would deter some of the...types of people that stay here that are drug users or weed smokers and stuff like that."* Kendra also agreed with Missy, adding that residents smoke marijuana in addition to cigarettes. *"You wouldn't have all the traffic,"* said Kendra. *"You wouldn't have all the standing around and stuff."*

### Perceived barriers

Two overarching themes emerged about renters' perceived barriers to the implementation of a 100% smoke-free policy: poor policy implementation and further marginalization of smokers.

*Poor policy implementation.* Some renters who already lived in smoke-free hotels talked about how their managers did not really care to enforce these policies, because their main priority was filling rooms and ensuring maximum profits. Henry said managers were hands-off and even negligent with implementing policies. They prioritized collecting rent over all else. Due to the prevalence of smoking in his ESH, Henry believed managers would not adopt smoke-free policies which *"would probably hurt [the hotel's] pockets because a lot of people probably wouldn't come there."* In fact, 49% of surveyed renters did not believe they could convince hotel management to pass smoke-free rules in their hotels.

Kris also lived in a smoke-free hotel and added that managers may find their *"hands tied as far as the business perspective,"* in regards to enforcing smoke-free policies. *"Anytime you're dealing with the public, you're supposed to be like, 'The customer's always right.' So certain things, they just overlook,"* he said. Lauren added that she believed managers and staff would be fearful of enforcing smoke-free policies because smokers could get violent and push back against these new policies. Lauren attributed this barrier more to renter noncompliance than managers' negligence, saying *"I foresee (renters) just not following the policy...just continuing to do what they want to do and the policy just being a policy not followed."*

Kris also discussed the potential barrier of renter noncompliance, but seemed to consider smoking in one's room as a matter of autonomy. *"When a person is indoors, they're doing pretty much what they pay their rent to be able to do. Whatever they do in their own room is their personal business,"* he said. Katie echoed, *"Well this is Atlanta, a lot of people don't care about a lot of stuff. So anywhere you go...they feel like 'Oh I pay for my room. I should do what I want in it.'"*

*Further marginalization of smokers.* Despite most participants agreeing with smoke-free policies and acknowledging the harms of SHS exposure, some also expressed concerns about potential negative impacts of smoke-free policies on smokers. Dana worried that 100% smoke-free policies would further stigmatize smokers, saying, *"I don't think (hotel managers and other renters) should necessarily discount a person's worth because they smoke cigarettes."* Kris indicated that smoke-free policies could be perceived as punishment for an addiction. *"Sometimes people want to stop smoking but they can't because of how long they've been smoking. So they're addicted or that urge is too great,"* he said.

Increasing prices could make ESHs prohibitively expensive for smokers who cannot access other forms of housing. For example, Lauren drew connections between smoke-free policies and increasing rent prices when she said, *"I do think that if they were to enforce a smoke free policy, I think that would be a way, or they would find a way, to increase the cost of living there."*

### Cues to action

Two major themes were identified that would make residents likely to accept smoke-free policies: the normalization of



smoke-free policies and the unfairness of SHS exposure for non-smokers.

*Normalization of smoke-free policies.* Several residents discussed how they perceived smoke-free policies to be commonplace in most hotels and other sectors of the hospitality industry. Tina noted that even hotels that do not offer extended-stay options have smoke-free policies because *“out in the world, they’re really trying to ban smoking from people.”* Katie echoed this sentiment and added that some hotels charge fees up to US\$500 if residents do not abide by those rules. Additionally, most residents from smoke-free hotels expressed support for existing smoke-free policies. Meka acknowledged that her hotel and other non-smoking hotels in the area are strict about smoke-free policies. *“If you choose to smoke in the room and they find out that you’re smoking in a non-smoking room, they will charge you and they could possibly even ask you to leave,”* Meka said.

Missy put the prevalence of smoke-free policies in a broader context. She remembered that smoking was much more commonplace in her youth, but over the years, it has become increasingly discouraged in public spaces. *“Years and years ago when I was young, you could smoke inside restaurants and stuff like that and then they made those changes,”* she said. *“It took a little while for people to accept that, but I think that overall, it made going out to eat and stuff like that just an all-around better experience for people.”*

*Unfairness of SHS exposure for non-smokers.* Smokers and non-smokers alike talked about how SHS exposure puts non-smokers at an undue risk for health problems. Henry indicated that he considered it common courtesy to avoid smoking around non-smokers.

I just feel like people have a right to not be around somebody that’s smoking if they choose not to. Me personally, if I’m around somebody that don’t smoke, I try to show them respect and not be close to them or in any vicinity where they can inhale the smoke. (Henry)

Missy acknowledged that people have the right to smoke cigarettes if they so desire, *“but it shouldn’t be your choice to put secondhand smoke around someone who has chosen not to smoke.”* Meka noted the fact that residents are temporary guests in their hotel rooms and therefore people should be mindful of exposing future tenants to indoor SHS/THS. *“That’s not your home for you to make those types of decisions [about smoking] that could possibly impact other customers,”* she said.

### Additional considerations

While the majority of interviewed renters endorsed the benefits of smoke-free policies and mentioned that they would prefer to live in smoke-free surrounds, they also admitted that these policies would not be their main priority for determining where to live. Safety, affordability, and proximity to the workplace were more important qualifications that hotels had to meet for

renters to even consider living there. For example, Kris said his job was his top priority and he had to live close to it because he did not own a vehicle. Dana prioritized *“safety, price, and cleanliness”* in her hotel and even said, *“I feel there’s other things going on in this world that’s putting us all in danger other than someone smoking in a hotel room.”*

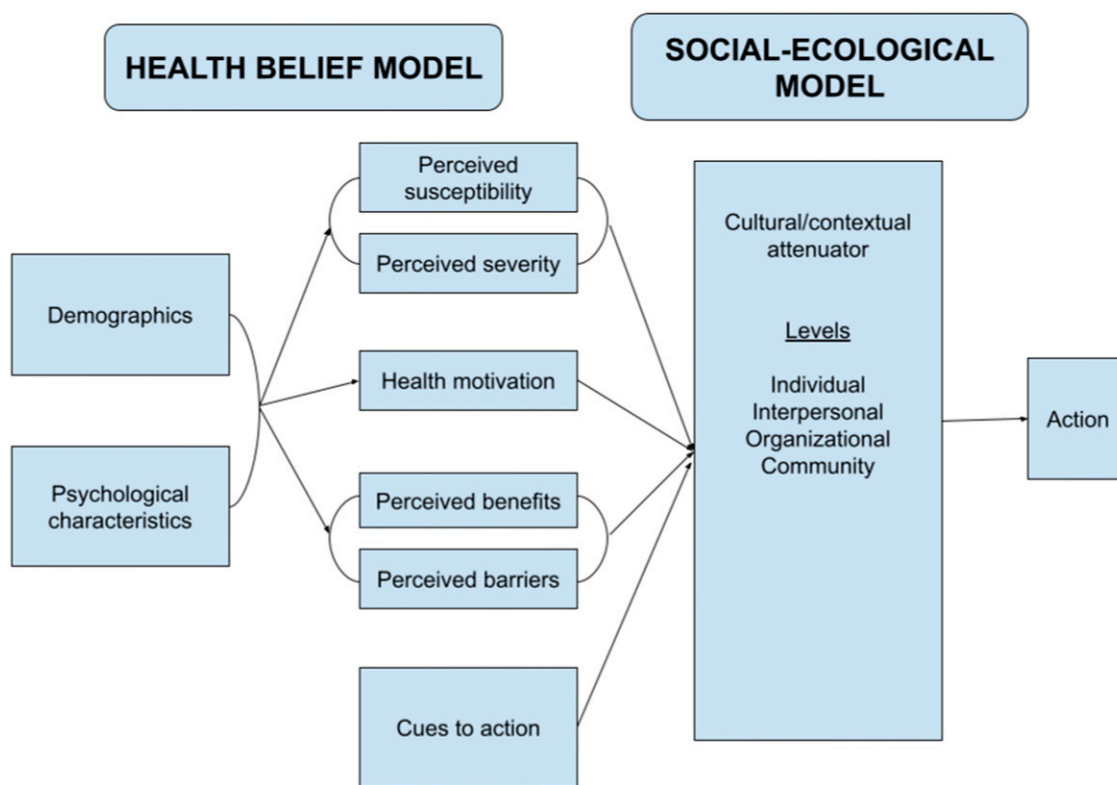
Furthermore, when asked about the things they would change about their living situations, almost all renters discussed factors unrelated to smoking. Henry and Kris wished for less expensive laundry facilities and better kitchen layouts so they could cook their own food. Kasey recounted her experiences living in unhygienic environments. *“There’s pest problems here...so there’s roaches and also bed bugs,”* she said. Linda, Kendra, and Lauren talked about the rampant violence and drug use in the vicinity of their hotels, fearing that this activity would put them and their families at risk. Nearly 70% of ESH residents believed that they would be taken advantage of if they did not remain alert at all times. These context-based distractions can attenuate intentions to act on smoke exposures and have implications for residents’ willingness to engage with smoke-free interventions in hotels.

### Discussion

In this study, we explored hotel residents’ exposure experiences, risk perceptions, and beliefs about smoke-free policies in their living environments. All interviewed participants acknowledged that smoking and being exposed to SHS and THS may lead to adverse health outcomes, exacerbate existing chronic illnesses, and possibly result in death in the long-term. Renters appreciated potential benefits of smoke-free policies, which could lead to cleaner, less stigmatizing living environments for themselves and their families. This endorsement seems to indicate that hotel renters would also be accepting of universal smoke-free policies across all hotels. Other studies have also found that smoke exposure in hotels is a major concern and that renters prefer smoke-free hotels.<sup>14,15,18,35</sup> However, participants of this study did identify potential drawbacks of smoke-free policies in hotels, such as the lack of enforcement by managers and renter non-compliance. Renters were also concerned about the inherent unfairness to smokers who could be targeted and become housing displaced due to a substance addiction. Still, residents were aware of the dangers of exposure and exhibited strong health motivations for smoke reduction. These findings contribute to the debate surrounding tobacco harm reduction, suggesting this approach could simultaneously address exposure concerns of nonsmoking renters and support smokers’ complex smoking cessation journeys without further marginalizing them.<sup>36</sup>

Almost all interview participants noted that smoke-free policies were not their main priority when deciding where to live. While they acknowledged that exposure was dangerous to health, they noted more important housing factors like





**Figure 2.** Modified health belief model and social-ecological model framework.

affordability, safety, and proximity to their workplace. If they had the choice to live in a hotel that had smoke-free policies but lacked the aforementioned criteria, they would likely choose to live elsewhere.

While the HBM begins to explain the connections between residents' perceptions about the dangers of SHS exposure and smoking and their willingness to engage with smoke-free policies in ESHs, it does not adequately address the broad sociological contexts in which residents make these decisions—which are especially important to consider in understudied, marginalized spaces like ESHs. A major criticism of HBM is that some parameters—namely cues to action and health motivation—have broad definitions, thereby limiting the operationalizability of those parameters and the model as a whole.<sup>23</sup> Another critique of the model is that it does not account for population/context level characteristics that impact individuals' choices and health behaviors. For example, Rundall and Wheeler (1979), explored the impact of socioeconomic characteristics on HBM parameters and called for more research into the ways that other factors such as family income, health system inequities, and poverty affect individuals' health behaviors.<sup>37</sup>

One potential method for visualizing the influence of these social and economic variables into the HBM would be to integrate the social-ecological model (SEM). SEM places individuals and their health behaviors in the broader contexts of interpersonal interactions, social institutions, communities, and public policies.<sup>38</sup> This is not a novel approach;

several studies have combined HBM with SEM to understand health behaviors within a cultural context. Authors of a qualitative study about Chinese Americans' attitudes toward obesity risk used this combined framework to identify cultural contributions to obesity prevalence.<sup>39</sup> In that study, they explored social, cultural, and environmental factors from SEM as well as individual health beliefs, benefits, and barriers from HBM. Walker et al (2020) proposed a similar combined framework in their analysis of HPV vaccination decision-making by mothers of young adults, positing that these individual decision-making processes could not fully be understood without examining them in the context of the interpersonal and organizational layers of information-sharing that the mothers were engaged in.<sup>40</sup>

Like these earlier studies, our findings may be better understood within a combined HBM and SEM framework, as shown in Figure 2. We found that cultural and contextual attenuators are perceptions or ideas that do not directly relate to smoking or smoke-free policies, but do inform residents' overall capacity and willingness to engage with smoke-free efforts. SEM helps explain the levels where these attenuators fell and how they interacted with each other. On the individual level, renters described stressors and stigma associated with ESH living and priorities for finding safe, affordable housing that is close to workplaces. On the interpersonal level, the individualistic culture of these hotels came through in interviews when participants described how they mostly kept to themselves and avoided neighbors

because they feared altercations or violence. Some renters also seemed attuned to class differences between themselves and “lower-class” renters who were perceived to cause discord and violence at hotels. On an organizational level, there was substantial variation in participant relationships with hotel management. Some participants indicated favorable interactions with trusted managers with whom they could share personal problems and hotel concerns, whereas other participants had no relationship with managers aside from contracted lodging payments and did not intend to further develop relationships.

Hotel finances as a priority was discussed as an organizational factor. Residents suggested that they were more worried about making rent than any other concern because they knew hotel managers would not hesitate to evict them and fill the vacancy. Lastly, on a community level, residents described the stigmatizing, unstable context of ESHs, which can include violence, drug use, and illicit activities. These problems exacerbated the stigma of hotel living, which is characterized by the lack of housing resources available to these residents. All of these factors work in tandem and contribute to an ecological context in hotels that is stressful, unstable, and discordant. These attenuators act as a blunting or muffling force that interrupts individuals’ health perceptions about smoking and their willingness to engage with smoke-free interventions. Thus, targeted behavioral interventions focused on increasing smoke-free policy implementation and promoting smoking cessation may not find success if they do not make efforts to address these higher-order concerns. Other studies of smoking cessation programs in different populations, such as pregnant women, new mothers, and South Asian immigrants, also indicate the importance of examining individuals’ perceptions of smoking and smoking cessation in their broader cultural and environmental contexts.<sup>41,42</sup>

Our analysis had limitations, including a small sample size for both the surveys and the semi-structured renter interviews. No power analysis calculations were conducted to determine adequate sample size for this study; as such, this dataset cannot be used to measure significant differences between smokers and non-smokers living in ESHs and should only be consulted for preliminary, descriptive statistics. Black individuals and cisgender women made up the majority of the sample. More research may be needed to explore the experiences of LGBTQ+ people living in hotels, as 12.5% of survey participants identified as LGBTQ+ and 8.75% preferred not to answer regarding sexual orientation. This small sample of Atlanta hotel renters may not fully represent the perspectives and preferences surrounding smoking and smoke-free policies of larger, more diverse populations of ESH renters in Atlanta, in Georgia, and in the United States.

## Conclusion

Our findings suggest that smoke-free policies, like those mandated by Atlanta’s 2020 smoke-free ordinance,<sup>20,21</sup> must be

able to address the environmental circumstances of the ESH itself in order to be successful in this context, as the characteristics of this unique housing modality impact residents’ willingness to engage with smoke-free policies. Although most participants were regularly exposed to SHS/THS and endorsed the potential benefits of smoke-free policies, some were hesitant about the potential further marginalization of smokers who cannot afford or access alternative housing options. Individual awareness of the dangers of smoking and exposure to SHS was attenuated by the social and economic instability inherent in the ESH context. Thus, smoking cessation interventions or policies intended to reduce SHS/THS exposure may be most successful when integrated with broader social support, safety surveillance aimed at preventing interpersonal violence and illicit activities, and job aid programs that engage ESH residents specifically. Participants indicated support for more incremental, harm-reduction based policies—separation of smoking and non-smoking buildings and outdoor smoking areas—that would protect nonsmokers without fully disenfranchising smokers. Coproduction of smoke-free policies between hotel residents and managers may be successful in creating coalitions between residents and establishing trust between residents and managers, which could curb the isolation and interpersonal distrust that participants noted as a key characteristic of ESH living and also increase adherence to smoke-free policies by residents. Further research should be conducted on the implementation of smoking cessation support programs in ESHs, social supports for smokers in ESHs, and potential applications of the harm reduction model in conceptualizing future SHS reduction policies in ESHs in Atlanta and across the US.

## Author contribution

Terri Lewinson, MSW, Ph.D. a. Lewinson was the principal investigator for this study. She led the conceptualization, development, data collection, and analysis portions of this study. She wrote the majority of the introduction and methods section of this manuscript.

Abhirupa Dasgupta, MPH a. Dasgupta primarily conducted the qualitative analysis for this study. She wrote the majority of the results, discussion, and conclusion sections of this manuscript.

James M. Murphey, MPH a. Murphey contributed to the conceptualization, development, and data collection portions of this study as a project manager. He and Nagovich conducted the semi-structured interviews with hotel renters for the qualitative component of this manuscript. Murphey also assisted with revisions to the manuscript based on reviewer and editor comments.

Wambui Moraa Onsando, MD, MPH a. Onsando contributed to the conceptualization and development of this study. She primarily created the survey distributed to participants.

Justice Nagovich, MPH a. Nagovich contributed to this study by participating in survey development, co-creating the semi-structured interview guide, conducting cognitive interviews for survey development, and conducting participant interviews.

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## REFERENCES

- Centers for Disease Control and Prevention (CDC). General information about secondhand smoke. Published November 28, 2022. <https://www.cdc.gov/tobacco/secondhand-smoke/about.html>. Accessed 26 August 2023.
- Behan D, Eriksen E, Lin Y. Economic effects of environmental tobacco smoke. *Claims J*. Published online March 21, 2005.
- Yao T, Sung HY, Wang Y, Lightwood J, Max W. Healthcare costs attributable to secondhand smoke exposure at home for U.S. adults. *Prev Med*. 2018;108:41-46. doi:10.1016/j.ypmed.2017.12.028.
- Arfaenia H, Ghaemi M, Jahantigh A, Soleimani F, Hashemi H. Secondhand and thirdhand smoke: a review on chemical contents, exposure routes, and protective strategies. *Environ Sci Pollut Res Int*. 2023;30(32):78017-78029. doi:10.1007/s11356-023-28128-1.
- Tsai J, Homa D, Gentzke A et al. Exposure to secondhand smoke among nonsmokers — United States, 1988–2014. *MMWR Morb Mortal Wkly Rep*. 2018; 67:1342-1346. doi:10.15585/mmwr.mm6748a3.
- Max WB, Stark B, Sung HY, Offen N. Sexual identity disparities in smoking and secondhand smoke exposure in California: 2003-2013. *Am J Public Health*. 2016; 106(6):1136-1142. doi:10.2105/AJPH.2016.303071.
- Barnhill MM, Lee JGL, Rafferty AP. Health inequities among lesbian, gay, and bisexual adults in North Carolina, 2011-2014. *Int J Environ Res Public Health*. 2017; 14(8):835. doi:10.3390/ijerph14080835.
- Hahn EJ, Rayens MK, Kercsmar SE, et al. Dual home screening and tailored environmental feedback to reduce radon and secondhand smoke: an exploratory study. *J Environ Health*. 2014;76(6):156-161.
- Homa D, Neff L, King B, Caraballo R. *Vital Signs: Disparities in Nonsmokers' Exposure to Secondhand Smoke — United States, 1999–2012*. Centers for Disease Control and Prevention. Published February 6, 2015. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6404a7.html>. Accessed 26 August 2023.
- Allen K, Pascual A, Prljaca L, Watkins M. *When Extended-Stay Becomes Home*. Published online May 2019.
- Lewinson T, Carrion IV. "They don't know who they have in here": sense of community in budget hotels. *J Community Psychol*. 2020;48(8):2552-2570. doi:10.1002/jcop.22448.
- Frazier M. When no landlord will rent to you, where do you go? *The New York Times*. Published May 20, 2021. <https://www.nytimes.com/2021/05/20/magazine/extended-stay-hotels.html>. Accessed 26 August 2023.
- Chang H, Huh C, Legendre T, Simpson J. Exploring particulate matter pollution in hotel guestrooms. *Int J Contemp Hospit Manag*. 2020;32(3):1131-1162. doi:10.1108/IJCHM-05-2019-0481.
- Weigel EA, Matt GE. When hotel guests complain about tobacco, electronic cigarettes, and cannabis: lessons for implementing smoking bans. *Tob Use Insights*. 2022;15:1179173X221124900. doi:10.1177/1179173X221124900.
- Matt GE, Quintana PJE, Fortmann AL, et al. Thirdhand smoke and exposure in California hotels: non-smoking rooms fail to protect non-smoking hotel guests from tobacco smoke exposure. *Tob Control*. 2014;23(3):264-272. doi:10.1136/tobaccocontrol-2012-050824.
- Tynan MA, Holmes CB, Promoff G, Hallett C, Hopkins M, Frick B. State and local comprehensive smoke-free laws for worksites, restaurants, and bars — United States, 2015. *Morb Mortal Wkly Rep*. 2016;65:623-626. doi:10.15585/mmwr.mm6524a4.
- American Nonsmokers' Rights Foundation. State and local 100% smokefree hotel and motel guest room laws. Published online 2023. <https://no-smoke.org/wp-content/uploads/pdf/statelocalawshotelrooms.pdf>
- McDaniel PA, Malone RE. "You want your guests to be happy in this business": hoteliers' decisions to adopt voluntary smoke-free guest-room policies. *Am J Health Promot*. Published online March 2018. [https://www.researchgate.net/publication/323967781\\_You\\_Want\\_Your\\_Guests\\_to\\_Be\\_Happy\\_in\\_This\\_Business\\_Hoteliers'\\_Decisions\\_to\\_Adopt\\_Voluntary\\_Smoke-Free\\_Guest-Room\\_Policies](https://www.researchgate.net/publication/323967781_You_Want_Your_Guests_to_Be_Happy_in_This_Business_Hoteliers'_Decisions_to_Adopt_Voluntary_Smoke-Free_Guest-Room_Policies). Accessed 26 August 2023.
- Centers for Disease Control and Prevention. State tobacco activities tracking and evaluation (STATE) system: state highlights. Published April 3, 2018. [https://nccd.cdc.gov/STATESystem/rdPage.aspx?rdReport=OSH\\_STATE.Highlights&rdRequestForwarding=Form](https://nccd.cdc.gov/STATESystem/rdPage.aspx?rdReport=OSH_STATE.Highlights&rdRequestForwarding=Form). Accessed 28 August 2023.
- Atlanta City Council. Smoke free ordinance now in effect in Atlanta. Published January 2, 2020 <https://citycouncil.atlantaga.gov/Home/Components/News/News/912/175>. Accessed 30 May 2024.
- Smoke-free Atlanta Coalition. Smoke-free ATL – everyone in ATL has the right to breathe smoke-free air. Published 2020. <https://smokefreeatla.org/>. Accessed 30 May 2024.
- Jones CL, Jensen JD, Scherr CL, Brown NR, Christy K, Weaver J. The health belief model as an explanatory framework in communication research: exploring parallel, serial, and moderated mediation. *Health Commun*. 2015;30(6):566-576. doi:10.1080/10410236.2013.873363.
- Sheeran P, Abraham C. The health belief model. In: *Predicting Health Behaviour: Research and Practice with Social Cognition Models*. Open University Press; 1996:23-61.
- Ravi K, Indrapriyadarshini K, Madankumar PD. Application of health behavioral models in smoking cessation - a systematic review. *Indian J Public Health*. 2021; 65(2):103-109. doi:10.4103/ijph.IJPH\_1351\_20.
- Kazemi A, Ehsanpour S, Zahraei NSN, Hasanzadeh A, Beigi NMA, Malverdi Z. Impact of health belief modification on intention to make smoke free home among pregnant women. *J Res Med Sci*. 2011;16(6):724-732.
- Office of Management and Budget. *General Requirements for Informed Consent*. 45 CFR 46.116. Code of Federal Regulations (eCFR). Published July 3, 2024. <https://www.ecfr.gov/current/title-45/subtitle-A/subchapter-A/part-46/subpart-A/section-46.1164-732>. Accessed 7 July 2024.
- Pleasant A, Maish C, O'Leary C, Carmona RH. A theory-based self-report measure of health literacy: the Calgary Charter on Health Literacy scale. *Methodological Innovations*. 2018;11(3):205979911881439. doi:10.1177/2059799118814394.
- National Center for Chronic Disease Prevention and Health Promotion. Behavioral risk factor surveillance system (BRFSS). 2022. Published online August 29, 2023. <https://www.cdc.gov/brfss/questionnaires/pdf-ques/2022-BRFSS-Questionnaire-508.pdf>
- Haardörfer R, Berg CJ, Escoffery C, Bundy ET, Hovell M, Kegler MC. Development of a scale assessing beliefs about ThirdHand smoke (BATHS). *Tob Induc Dis*. 2017;15:4. doi:10.1186/s12971-017-0112-4.
- Delgado-Rendon A, Cruz TB, Soto D, Baezconde-Garbanati L, Unger JB. Second and thirdhand smoke exposure, attitudes and protective practices: results from a survey of Hispanic residents in multi-unit housing. *J Immigr Minor Health*. 2017; 19(5):1148-1155. doi:10.1007/s10903-016-0540-x.
- Brall C, Berlin C, Zwahlen M, Ormond KE, Egger M, Vayena E. Public willingness to participate in personalized health research and biobanking: a large-scale Swiss survey. In: Kerasidou A, ed. *PLoS One*. 2021;16(4):e0249141. doi:10.1371/journal.pone.0249141.
- StataCorp. *Stata Statistical Software: Release 17*; 2023. Published online.
- Strauss A, Corbin J. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 2nd ed. Sage Publications, Inc; 1998:xxiii-312.
- Lumivero. *NVivo 14*. Published online 2023.
- Lewinson T, Bryant LO. There's no fresh air there: narratives of smoke exposure among residents of extended-stay hotels. *Health Soc Work*. 2015;40(2):77-83. doi:10.1093/hsw/hv016.
- Hatsukami DK, Carroll DM. Tobacco harm reduction: past history, current controversies and a proposed approach for the future. *Prev Med*. 2020;140:106099. doi:10.1016/j.ypmed.2020.106099.
- Rundall TG, Wheeler JR. The effect of income on use of preventive care: an evaluation of alternative explanations. *J Health Soc Behav*. 1979;20(4):397-406.
- Lee BC, Bendixsen C, Liebman AK, Gallagher SS. Using the socio-ecological model to frame agricultural safety and health interventions. *J Agromedicine*. 2017;22: 298-303. doi:10.1080/1059924X.2017.1356780. Published online August 2017.
- Liou D, Bauer KD. Exploratory investigation of obesity risk and prevention in Chinese Americans. *J Nutr Educ Behav*. 2007;39(3):134-141. doi:10.1016/j.jneb.2006.07.007.
- Walker KK, Owens H, Zimet G. "We fear the unknown": emergence, route and transfer of hesitancy and misinformation among HPV vaccine accepting mothers. *Prev Med Rep*. 2020;20:101240. doi:10.1016/j.pmedr.2020.101240.
- Bauld L, Graham H, Sinclair L, et al. Barriers to and facilitators of smoking cessation in pregnancy and following childbirth: literature review and qualitative study. *Health Technol Assess*. 2017;21(36):1-158. doi:10.3310/hta21360.
- Mukherjee A, Modayil MV. Culturally specific tobacco use and South Asians in the United States: a review of the literature and promising strategies for intervention. *Health Promot Pract*. 2013;14(5 Suppl):48S-60S. doi:10.1177/1524839913485585.