Arbeitsgemeinschaft
Tabakprävention Schweiz

Association suisse pour
la prévention du tabagisme

Associazione svizzera per
la prevenzione del tabagismo

Secondhand smoke in multiunit housing

- Secondhand smoke is dangerous for health, even in small quantities
- Heart diseases, strokes and lung cancer are possible consequences
- Children are particularly at risk of permanent damage
- Smoke can transfer from one apartment to another through multiple ways such as floors, cracks and shared air spaces
- Older buildings are more prone to secondhand smoke transfer

Background

Secondhand smoke (SHS), the cigarette smoke spread by an individual exhaling and the cigarette itself is a cause of premature death well documented in scientific literature. SHS can come from a variety of sources including apartments in multiunit housing. through floors, ceilings, windows and many other ways. The report will present an up-to-date review of scientific literature about health hazards of SHS and the way it can spread in multiunit housing.

Health hazards

A recent article by Repace (2024) deplores that SHS from infiltration in multiunit apartments remains an unsolved problem in the USA in 2024. Indeed, this major public health problem remains unsolved worldwide. Scientific research has empirically proven through decades of studies that secondhand smoke can cause important illnesses, from heart diseases, lung cancer to strokes (American Lung Association, 2024). It can exacerbate medical conditions in individuals suffering from asthma. It is also very detrimental to children, possibly provoking pneumonia and bronchitis or causing permanent lung damage. Furthermore, it can cause sudden infant death syndrome. Zajac and colleagues (2022) studied New York families during Covid pandemic. In particular, they showed that children living in financially supported public housing suffered more from asthma (37%) than children living in

Haslerstrasse 30, 3008 Bern
Telefon +41 31 599 10 20
info@at-schweiz.ch

private housing (12.9%), due of the presence of passive smoke.
On a daily basis, SHS can already cause disturbing symptomatic effects: sore throat, hoarseness, headache, eye, nose, and throat irritation (Repace, 2024). Short-time exposure can already cause health damage: A cardiology study showed a 30 min of SHS exposition provokes vascular endothelial cell lesions, creating lasting vascular injury (Heiss et al., 2008). This is why there is no noxious threshold highlighted by international research: each quantity, as small as it can be, is detrimental to individuals (OFSP, 2023). Indeed, SHS is easily inhaled into the lungs, as it has a small diameter of less than 2.5 µm.
Research has also demonstrated passive smoke can affect mental health, especially anxiety and depression (Patten et al., 2018; Tan et al., 2022; Wang et al., 2016). Explanatory hypotheses suggest that substances from cigarette smoke can negatively affect brain function. In addition, SHS can also affect the quality of sleep, which influences mental health.

Transfer from one apartment to another

Secondhand smoke can spread from one apartment to another through permeability of building material in walls, ceilings, floors, windows, doorways, HVAC systems (heating, ventilation and air conditioning), cracks, shared air spaces, or shared ventilation. It can also spread through electrical outlets, cable conduits, plumbing ducts and piping. Scientific measurement techniques are now well developed and available. Researchers have even set up real-time measurements, capable of mapping and obtaining the variation in SHS rates over time, as in the seminal article by King et al. (2010), still frequently cited in the literature.

The quality and age of the building has an influence on the permeability which leads to secondhand smoke to travel from apartments to apartments. Bohac et al. (2011) measured bulk air transfer between apartments before and after sealing boundaries. They used passive perfluorocarbon tracer (PFT) gas, which is a flow tracer allowing precise tracking of air movement. The portion of air leaking into an apartment from a new building was 2.1 %, while the leaking of a 1930s building was 35.3%, a very high percentage and difference. Once nicotine reaches the airways in non-smoking apartments, it binds strongly and unpredictably to various surfaces (Dacunto et al., 2013) and creates thirdhand smoke.

References

American Lung Association. (2024). *Is Secondhand Smoke Infiltrating Your Apartment or Condominium*. https://www.lung.org/policy-advocacy/tobacco/smokefree-environments/multi-unit-housing/secondhand-smoke-apartments

Bohac, D. L., Hewett, M. J., Hammond, S. K., & Grimsrud, D. T. (2011). Secondhand smoke transfer and reductions by air sealing and ventilation in multiunit buildings : PFT and nicotine verification: Secondhand smoke transfer and reductions by air sealing and ventilation. *Indoor Air*, *21*(1), 36-44. https://doi.org/10.1111/j.1600-0668.2010.00680.x

Dacunto, P. J., Cheng, K.-C., Acevedo-Bolton, V., Klepeis, N. E., Repace, J. L., Ott, W. R., & Hildemann, L. M. (2013). Identifying and quantifying secondhand smoke in multiunit homes with tobacco smoke odor complaints. *Atmospheric Environment*, *71*, 399-407. https://doi.org/10.1016/j.atmosenv.2013.02.018

Heiss, C., Amabile, N., Lee, A. C., Real, W. M., Schick, S. F., Lao, D., Wong, M. L., Jahn, S., Angeli, F. S., Minasi, P., Springer, M. L., Hammond, S. K., Glantz, S. A., Grossman, W., Balmes, J. R., & Yeghiazarians, Y. (2008). Brief Secondhand Smoke Exposure Depresses Endothelial Progenitor Cells Activity and Endothelial Function. *Journal of the American College of Cardiology*, *51*(18), 1760-1771. https://doi.org/10.1016/j.jacc.2008.01.040

King, B. A., Travers, M. J., Cummings, K. M., Mahoney, M. C., & Hyland, A. J. (2010). Secondhand smoke transfer in multiunit housing. *Nicotine & tobacco research*, *12*(11), 1133-1141.

OFSP, O. fédéral de la santé publique. (2023). *Lutte contre le tabagisme passif : Les avancées*. https://www.bag.admin.ch/bag/fr/home/strategie-und-politik/politische-auftraege-und-aktionsplaene/politische-auftraege-zur-tabakpraevention/tabakpolitik-schweiz/schutz-vor-passivrauchen.html

Haslerstrasse 30, 3008 Bern
Telefon +41 31 599 10 20
info@at-schweiz.ch

Patten, S. B., Williams, J. V. A., Lavorato, D. H., Woolf, B., Wang, J. L., Bulloch, A. G. M., & Sajobi, T. (2018). Major depression and secondhand smoke exposure. *Journal of Affective Disorders*, *225*, 260-264. https://doi.org/10.1016/j.jad.2017.08.006

Repace, J. L. (2024). Secondhand smoke Infiltration in multiunit housing : Health effects and nicotine levels. *Indoor Environments*, *1*(2), 100013. https://doi.org/10.1016/j.indenv.2024.100013

Tan, G. P. P., Teo, O., & Van Der Eijk, Y. (2022). Residential secondhand smoke in a densely populated urban setting : A qualitative exploration of psychosocial impacts, views and experiences. *BMC Public Health*, *22*(1), 1168. https://doi.org/10.1186/s12889-022-13561-7

Wang, R., Zhang, P., Lv, X., Gao, C., Song, Y., Li, Z., Yu, Y., & Li, B. (2016). Association between passive smoking and mental distress in adult never-smokers : A cross-sectional study. *BMJ Open*, *6*(7), e011671. https://doi.org/10.1136/bmjopen-2016-011671

Zajac, L., Gallate, X., Gu, G., Liu, B., Elaiho, C., Lin, E., Mogilner, L., Oliver, K., Vangeepuram, N., & Wilson, K. (2022). Disparities in Marijuana and Tobacco Smoke Incursions Among New York City Families During Early Months of the COVID-19 Pandemic. *Journal of Public Health Management and Practice*, *28*(3), 248. https://doi.org/10.1097/PHH.0000000000001440

Haslerstrasse 30, 3008 Bern
Telefon +41 31 599 10 20
info@at-schweiz.ch