Supporting Information for

Modeling the Fate and Involuntary Exposure to Tetrahydrocannabinol Emitted from Indoor Cannabis Smoking

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S1. Evaluative environment

Following Zhang et al.[1], we considered an evaluative indoor environment comprised of seven compartments. Each compartment other than indoor air represents a class of indoor articles and the associated mass exchange phenomena that affect indoor fate. Table S1 outlines the dimensions of the evaluative environment's compartments.

Table S1-Dimensions of the compartments comprising the evaluative environment taken from Zhang et al.[1]

Indoor compartment	Surface area (m^2)	Thickness (m)
Air (A)	25 [a]	3 [b]
Polyurethane foam (P)	2	0.05
Vinyl flooring (V)	15	0.0005
Carpet (C)	10	0.005
Upward-facing organic film (fu)	60	1×10^{-7}
Downward-facing organic film (fd)	40	1×10^{-7}
Vertical organic film (fv)	100	1×10^{-7}

[a] room's surface area

[b] wall height

Compartmental volumes V_i (in m^3) are calculated by multiplying surface area A_i (in m^2) by thickness δ_i (in m) for each item listed in Table S1, as given by Equation (S1).

$$V_i = A_i \times \delta_i \quad \text{(S1)}$$

Note that for indoor air A_i and δ_i are equivalent to the room's floor area and wall height, respectively. We assume the volume occupied by indoor objects to be negligible compared to the whole room size making almost the whole room volume available to air.

S2. THC Partitioning Ratios and Fugacity Capacities

The fugacity capacity of the species of interest in compartment i (i.e., Z_i in mol/(Pa·m^3)) is an essential parameter in fugacity modeling. Fugacity capacities are used to convert fugacities to concentrations (see Equation (2) of the main text). Furthermore, as discussed by Mackay[2], fugacity capacities are required to calculate *D*-values that characterize transformation reactions and inter-compartmental mass exchange (see Equation (3) of the main text)[2]. As discussed in details by Li et al.[3], for each indoor compartment i, e.g., carpet, a bulk fugacity capacity BZ_i is obtained by summing the fugacity capacity of the compartment's main matrix Z_i, e.g., carpet's fibers and pad, with that of particulate matter of different sizes accumulated within the compartment of interest, whereby the Z values are weighted by volume fractions.

By definition, the fugacity capacity for compartment i is the ratio of a species' molar concentration to its fugacity in the same compartment. Assuming air behaves as an ideal gas, the definition above yields the fugacity capacity in air Z_A as given in Equation (S2).

$$Z_A = \frac{C_A}{f_A} \approx \frac{\frac{P_A}{RT}}{P_A} = \frac{1}{RT} \quad \text{(S2)}$$

In Equation (S2), C_A is the molar concentration of the species of interest in air. The ideal gas assumption leads to replacing C_A and f_A by $\frac{P_A}{RT}$ and P_A, respectively. P_A is the partial pressure of species of interest in air. R and T refer to the universal gas constant and air temperature, respectively. The partitioning ratio between compartment i and air K_{iA} is defined as the ratio of equilibrium concentrations between the two phases. See Equation (S3).

$$K_{iA} = \frac{C_i^{equilibrium}}{C_A^{equilibrium}} \quad \text{(S3)}$$

Replacing concentration terms in Equation (S3) with fugacity multiplied by fugacity capacity and noting that fugacity values for the two phases in equilibrium must match[4], Equation (S3) simplifies to Equation (S4) which shows that the fugacity capacity of every compartment is readily given when the partitioning ratio K_{iA} is known.

$$K_{iA} = \frac{Z_i f_i}{Z_A f_A} = \frac{Z_i}{Z_A} \quad \text{(S4)}$$

We utilized the BIOVIA COSMOtherm software package[5] (Dassault systems, Paris, France) to predict the equilibrium partitioning ratios between octanol and air K_{OA}, and octanol and water K_{OW}, as well as the liquid-state saturation vapor pressure P_L for tetrahydrocannabinol (THC), which are needed to calculate air-to-surface partitioning ratios (see Li et al.[3] and Zhang et al.[1]). As discussed elsewhere[6], COSMOtherm employs the COSMO-RS (COnductor like Screening MOdel for Real Solvents) method to obtain chemical potentials, which are in turn used to predict activity coefficients and partitioning ratios. Briefly, the method treats the solvent as a continuum dielectric and characterizes the solute chemical potential based on charge density screens around its molecules. Solvation energies from the COSMO-RS method yield ΔG_{ij} (Gibbs Energy change values associated with the transfer of species from compartment i to compartment j), which gives K_{ij} as described by Equation (S5).

$$K_{ij} = -ln(\frac{\Delta G_{ij}}{RT}) \quad \text{(S5)}$$

Whereas K_{OA} and K_{OW} were calculated using Equation (S5), an air-water partitioning ratio K_{AW} was subsequently estimated from a thermodynamic triangle as described by Equation (S6).

$$K_{AW} = \frac{C_A^{equilibrium}}{C_W^{equilibrium}} = \frac{C_A^{equilibrium}/C_O^{equilibrium}}{C_W^{equilibrium}/C_O^{equilibrium}} = \frac{K_{OW}}{K_{OA}} \quad \text{(S6)}$$

The liquid vapor pressure of THC, P_L, was obtained from the K_{OA} using Equation (S7).

$$P_L = \frac{RT}{v_o \gamma_o K_{OA}} \quad \text{(S7)}$$

Here, v_o is the molar volume of pure octanol, and γ_O is the Lewis activity coefficient of THC in octanol, which is readily available through the chemical potential determined by COSMOtherm.

Fugacity capacities for indoor compartments and human compartments (i.e., hands, skin, and body) were determined at room and human body temperature, respectively. Table (S2) lists partitioning ratios and liquid vapor pressure values for THC at $25℃$ (i.e., room temperature) and $37℃$ (i.e., body temperature).

Table S2-THC partitioning ratios and liquid vapor pressure at room and body temperatures.

Temperature	$\mathrm{Log}\, K_{OA}$ [a]	$\mathrm{Log}\, K_{OW}$ [b]	$\log K_{AW}$ [c]	$P_L\,(Pa)$ [d]
25℃	12.27	5.42	-6.85	1.73×10^{-5}
37℃	11.59	5.48	-6.11	8.56×10^{-5}

[a] from COSMO-RS method using solvation energies of THC in octanol and air
[b] from COSMO-RS method using solvation energies of THC in octanol and water
[c] from Equation (S6)
[d] from Equation (S7)

S3. THC indoor fate and exposure analysis

S3.1. Material balance equations

A level IV fugacity modeling framework[2] was used to characterize the THC mass balance within the indoor evaluative environment. Table S3 shows mass balance equations for each indoor compartment in the format of Equation (1) of the main text. All N_{ij} terms in Table S3 are calculated using Equations of type (3) of the main text, along with D_{ij} calculations described by Li et al.[3]. Permanent loss terms from the compartment i, R_i, as given in Equation (1) and Equation (4) of the main text and Table S3, are described in Table S4. Note that some of the loss processes outlined in Table S4 are only considered when assessing the effectiveness of mitigation strategies and are not active for the default scenario.

Hands, body skin, and body interior were added to the indoor compartments indexed in Table S1 to assess the passive exposure of indoor occupants to THC from cannabis smoking. The material balance equations associated with the added compartments are outlined in Table S5. The calculation of terms involved in the equations of Table S5 is treated with detail by Zhang et al. through the ICECRM model.[1] The default indoor resident of the ICECRM model is a 70 kg adult. We considered 80 kg as the adult body mas according to trends observed in North America.[7] Following CDC growth charts, we assumed a toddler body mass of 12 kg.[8] Table S6 lists this study's bodily characteristics applied to adults and toddlers. Per frequency of contact with indoor objects and hygienic habits, we took the values suggested by Zhang et al.[1] for adults. The same parameters used for toddlers were from taken from Li et al.[9] Table S7 includes the frequency of contact with indoor objects and hygienic habits for adults and toddlers.

S3.2. THC emissions from cannabis smoking

THC emissions from cannabis smoking depend on the number of cigarettes, the weight of each cigarette, and the THC content of the cannabis product loaded in the cigarette. We assume that every 24 hours, the evaluative indoor environment is subject to one hour of constant THC emissions equivalent to THC released from a single 300 mg cannabis cigarette with 10% of total THC content. These values are arbitrary, but the model is flexible to cover alternative scenarios of other cigarette weight and THC content values (See section S5). Following Berthet et al., we assume 45% of the THC content of a cigarette is emitted through side stream smoke.[10] Based on the values above, the model is run with a uniform emission rate of $E_A = 3.75 \frac{\mu g}{s}$ of THC for one hour, which is integrated into about 5 g of total released mass per year. Equation (S9) shows the THC emission rate as indexed in Table S3.

$$S_A = \delta(t) \times E_A, \begin{cases} \delta(t) = 1 \ ; \ t_1^* \le t \le t_2^* \\ \delta(t) = 0 \ ; \ otherwise. \end{cases} \quad \text{(S8)}$$

In Equation S8, t_1^* and t_2^* are two arbitrary, but fixed times separated by one hour from each other which specify the beginning and end of the smoking period, respectively. In every 24 hours within the time domain of the model, the value of S_A alternated between zero and E_A depending on whether the time of interest belongs to the $[t_1^*, t_2^*]$ range.

S3.3. THC bioavailability through different routes of exposure

As discussed in the main text, the effective uptake of THC by passive indoor occupants depends on THC bioavailability for different routes of exposure. Devising a given number or even bounding THC bioavailability values is not straightforward. THC bioavailability varies depending on the cannabis plant smoked and several subjective parameters like level of physical activity, nutritional habits, and substance use, among others.[11,12]

When THC is administered into the body, the drug concentration increases for a while in the bloodstream until it reaches a maximum concentration C_{max} after time t_{max} since the onset of THC occurrence in blood serum. THC concentration starts to decay beyond t_{max} because of elimination through urinal and fecal excretion or biotransformation by liver enzymes. As indicated by Equation (S10), the bioavailability is defined as the dose-corrected ratio of area under the curve (AUC) of bloodstream concentration of drug for the specific route of exposure to that of intravenous drug administration.

$$\phi_{route} = \frac{\left(\frac{AUC}{dose}\right)_{route}}{\left(\frac{AUC}{dose}\right)_{IV}} \quad \text{(S9)}$$

In Equation (S9), the subscripts $route$ and IV refer to the route of exposure of interest (e.g., non-dietary ingestion) and intravenous, respectively. The value of $dose$ which is often reported in mass units indicates the amount of drug administered. Using equation (S9) and the values of AUC and $dose$ reported by Grant et al. yields to THC bioavailabilities of (4-20)% and (1-8)% for inhalation and

ingestion, respectively[11]. We chose $\phi_{inh} = 0.17$ based on pulmonary exposure data and $\phi_{ing} = 0.07$ based on data for ingesting THC tablets from Grant et al.[11]. We could not find reliable data in the literature for estimating ϕ_{derm}. As discussed by Huestis, the rate limiting step for THC absorption into human body when the drug is administered topically is partitioning from lipid structure of the skin to water-dominated tissues mediating between skin subsurface and blood stream.[12] Assuming the same barrier occurs for sublingual THC administration, we used sublingual pharmacokinetic data provided by Grant et al. [11] and estimated ϕ_{derm} to be 0.028.

Table S3-Mass balance equations for indoor compartments following the format of Equation (1) of the main text

Compartment	Mass balance equation
Air (A)	$\frac{dm_A}{dt} = S_A + N_{PA} + N_{CA} + N_{VA} + N_{fuA} - N_{AP} - N_{AC} - N_{AV} - N_{Afu} - N_{Afd} - N_{Afv} - R_A$
Polyurethane foam (P)	$\frac{dm_P}{dt} = N_{AP} - N_{PA} - R_P$
Vinyl flooring (V)	$\frac{dm_V}{dt} = N_{AV} - N_{VA} - R_V$
Carpet (C)	$\frac{dm_C}{dt} = N_{AC} - N_{CA} - R_C$
Upward-facing organic film (fu)	$\frac{dm_{fu}}{dt} = N_{Afu} - N_{fuA} - R_{fu}$
Downward-facing organic film (fd)	$\frac{dm_{fd}}{dt} = N_{Afd} - N_{fdA} - R_{fd}$
Vertical organic film (fv)	$\frac{dm_{fv}}{dt} = N_{Afv} - N_{fvA} - R_{fv}$

Table S4-Detailed calculation of the permanent loss terms for indoor compartments. The terms multiplied by Z_i to calculate R_i are equivalent to $D_{removal,i}$ per Equation (4) of the main text.

Permanent removal term	Calculation	Notes
R_A	$\left(k_{OH}[OH]_i + k_{O_3}[O_3]_i\right).V_A.Z_A + CADR \sum_{m=1}^{6} \nu_{Q,m}.Z_{Q,m} + \left[\left(1 - \sum_{m=1}^{6} \nu_{Q,m}\right)\right.$	$k_{OH} = 5.47 \times 10^{-10} \frac{molecule}{cm^3.s}$: reaction rate constant of THC with OH radical at $25°C$ from GECKO-A mechanism[13]

$[OH]_i = 1 \times 10^5 \frac{molecule}{cm^3}$: indoor OH radical concentration, estimated by Weschler and Carslaw[14]

$k_{O_3} = 5.86 \times 10^{-17} \frac{molecule}{cm^3.s}$: reaction rate constant of THC with ozone at $25℃$ from GECKO-A mechanism[13]

$[O_3]_i = 5 \times 10^{11} \frac{molecule}{cm^3}$: indoor ozone concentration, based on 20 ppb estimated by Weschler and Carslaw[14] at atmospheric pressure and room temperature.

$CADR = \eta_f \times Q_{clean}$: clean air delivery rate, calculated based on filter PM removal efficiency η_f and air handling capacity Q_{clean} in $\frac{m^3}{s}$. This parameter is set to zero for basic analysis. Non-zero values were considered to investigate PM filtration as an exposure mitigation strategy (see Figure 4b of the main text).

$\nu_{Q,m}$: volume fraction of particles of size bin m. Following Li et al.[3], six size bins were considered for particulate matter. The concentration of airborne PM was estimated to be 18.0, 17.0, 4.9, and 0.3 μg/m^3 for size bins of 0-1, 1-2.5, 2.5-10, and 10-65 μm, respectively, The airborne concentration of the last two size bins (i.e., 65-150 and 150-2000 μm) were predicted to be less than 0.1 μg/m^3. For more information, see Shin et al.[3] and Zhang et al.

$AER = 0.75\ h^{-1}$: Air Exchange Rate (h^{-1}). Higher values were considered to inspect the effect of enhanced ventilation on as an exposure mitigation strategy (see Figure 4a of the main text).

R_P	$\left(k_{O_3}^{fib}.V_P + D_{rem,P}\right).Z_P$	$k_{O_3}^{fib} = 2.0 \times 10^{-6} s^{-1}$: pseudo first-order reaction rate constant for THC ozonolysis on fibrous surfaces, including PUF and carpet. The value is calculated based on kinetic measurements by Wylie concerning THC ozonolysis on cotton fabrics.[15] $D_{rem,P}$: D-value for permanent lose through dust clean-up from PUF. See Zhang et al.[16]
R_V	$\left(k_{O_3}^{imp}.V_V + D_{rem,V}\right).Z_V$	$k_{O_3}^{imp} = 1.1 \times 10^{-5} s^{-1}$: pseudo first-order reaction rate constant for THC ozonolysis on impregnable surfaces, including organic film and vinyl flooring. The value is calculated based on kinetic measurements by Wylie concerning THC ozonolysis on a glass surface.[15] $D_{rem,V}$: D-value for permanent lose through dust clean-up from vinyl flooring. See Li et al.[3]
R_C	$\left(k_{O_3}^{fib}.V_C + D_{rem,C}\right).Z_C$	$D_{rem,C}$: D-value for permanent lose through dust clean-up from carpet. See Li et al.[3]
R_{fu}	$\left((k_{O_3}^{imp} + CF_{clean} \times \eta_{clean}).V_{fu} + D_{rem,fu}\right).Z_{film}$	$D_{rem,fu}$: D-value for permanent lose through dust clean-up from upward-facing organic films. See Li et al.[3] $CF_{clean} = 1 day^{-1}$: surface cleaning frequency. This parameter is set to zero for basic analysis. The non-zero value mentioned above was considered to investigate surface cleaning as an exposure mitigation strategy (see Figure 5d of the main text). η_{clean}: surface cleaning efficiency
R_{fd}	$\left(k_{O_3}^{imp}.V_{fd} + D_{rem,fd}\right).Z_{film}$	$D_{rem,fd}$: D-value for permanent lose through dust clean-up from downward-facing organic films. See Li et al.[3]

R_{fv}	$\left(k_{O_3}^{imp}.V_{fv} + D_{rem,fv}\right).Z_{film}$	$D_{rem,V}$: D-value for permanent lose through dust clean-up from vertical organic films. See Li et al.[3]

Table S5-Material balance equations associated with three extra body-related compartments used for the THC exposure analysis

Compartment	Mass balance equation
Hand (H)	$\frac{dm_H}{dt} = N_{AH} + N_{PH} + N_{CH} + N_{VH} + N_{fuH} + N_{fvH} + N_{fdH} - R_H$
Body skin (S)	$\frac{dm_S}{dt} = N_{AS} - R_S$
Body interior (B) [a, b]	$\frac{dm_B}{dt} = N_{AB} + N_{fuM} + N_{HB} + N_{SB} - R_B$

[a] The hand to body term includes mouthing fingers and dermal absorption through hand skin $N_{HB} = N_{HM} + N_{H,dermal}$. M refers to mouth. See Zhang et al.[1]

[b] The skin to body term includes dermal absorption through the remainder of skin (i.e., except hands) $N_{SB} = N_{S,dermal}$. See Zhang et al.[1]

Table S6-Bodily characteristics of indoor occupants used to assess involuntary exposure to THC from cannabis smoking

Parameter	Symbol [a]	Unit	Adult value [b]	Toddler value [c]	Notes
Skin surface area	SA_{skin}	m^2	2.3	0.52	
Hands surface area	SA_{hands}	m^2	0.08	0.02	
Body mass	BW	kg	80	12	The toddler value is from the growth chart suggested for a 15-month-old male toddler by Center for Disease Control (CDC).[8]
Frequency of skin turnover	FST	day^{-1}	0.067	0.067	Assumed to be the same for adults and toddlers
Skin lipid volume	$V_{lipid,skin}$	m^3	1.38×10^{-6}	3.6×10^{-7}	
Hands lipid volume	$V_{lipid,hands}$	m^3	4.8×10^{-8}	1.8×10^{-8}	
Growth rate	GR	$m^3.day^{-1}$	1.2×10^{-5}	4.89×10^{-6}	The value for toddlers was found by calculating the slope of the growth charts suggested for the first 36 months by Center for Disease Control (CDC)[8] for toddler's mass. The volumetric growth rate was calculated assuming body density to be 1000 kg/m^3.
Urination rate	UR	$m^3.day^{-1}$	0.002	4.2×10^{-4}	The toddler value was scaled based on body mass from Zhang et al. [1].
Fecal lipid excretion rate	LER	$m^3.day^{-1}$	0.70	0.17	The toddler value scaled based on body mass from Zhang et al. [1].
Inhalation rate	IR	$m^3.day^{-1}$	20.7	13.8	The value for toddlers was calculated based on infant lung volume data reported by Rao et al.[17] and respiratory data from Gagliardi and Rusconi[18] assuming 80% of lung capacity is used during normal breathing.
THC biotransformation rate	BTR	h^{-1}	1.0	1.0	Based on Pharmacokinetic data from Grant et al.[11]

[a] The symbols were selected following Zhang et al.[1]

[b] Scaled based on based on body mass from values estimated by Zhang et al.,[1] unless otherwise is mentioned in the Notes column.

[c] From Li et al.,[9] unless otherwise in mentioned in the Notes column.

Table S7-Frequency of contact with indoor objects and hygienic habits of indoor occupants used to assess involuntary exposure to THC from cannabis smoking

Parameter	Symbol [a]	Unit	Adult value [b]	Toddler value [c]	Notes
Hands-to-PUF frequency of contact	$FC_{hands-PUF}$	day^{-1}	10	600	
Hands-to-floor frequency of contact	$FC_{hands-floor}$	day^{-1}	2	1560	The higher value for toddlers is considered to reflect crawling
Hands-to-carpet frequency of contact	$FC_{hands-carpet}$	day^{-1}	2	600	The higher value for toddlers is considered to reflect crawling
Hands-to-surface (i.e., upward-facing organic film) frequency of contact	$FC_{hands-surface}$	day^{-1}	100	2880	
Mouth-to-hands frequency of contact	$FC_{mouth-hands}$	day^{-1}	10	650	
Mouth-to-surface (i.e., upward-facing organic film) frequency of contact	$FC_{mouth-surface}$	day^{-1}	0	380	
Frequency of handwashing	FHW	day^{-1}	6	6	Assumed to be the same between adults and toddlers
Frequency of bathing	FB	day^{-1}	1	1	Assumed to be the same between adults and toddlers

[a] The symbols were selected following Zhang et al.[1]

[b] Adult values were taken from Zhang et al.[1]

[c] Toddler values were taken from Li et al.[9]

S3.4. THC decay trends from the indoor space following cannabis smoking cessation

We analyzed the THC decay trends when THC release from cannabis smoking is stopped after the last smoking interval during one year of periodic indoor smoking (see Figure 2 of the main text). THC decay from each indoor compartment showed an exponential decay behavior as described in Equation (S10).

$$C_i(t) = C_i^0 \exp\left[-k_{decay}(t - t_0)\right] \quad \text{(S10)}$$

In Equation (S10) $C_i(t)$ and C_i^0 refer to THC concentration in the compartment i at a given time t and at t_0, the time when cannabis smoking is stopped, respectively. k_{decay} is the exponential factor associated with the decay. k_{decay} is expected to be comparable with the rate of the dominant loss process for each compartment from the order of magnitude point of view. Table S8 lists the values of k_{decay} for each indoor compartment from fitting THC decay profiles in Figure 2b to the exponential function described in Equation (S10) using a least-square regression. Table S8 also includes the list of dominant loss factors for each compartment based on k_{dacay} order of magnitude.

Table S8-THC exponential decay from rates from different indoor compartments

Compartment	k_{decay} (s^{-1})	Dominant loss process
Air	5.29×10^{-6}	PM deposition
PUF	9.07×10^{-6}	Heterogeneous ozonolysis
Carpet	1.00×10^{-8}	PM removal
Vinyl flooring	7.12×10^{-6}	Heterogeneous ozonolysis
Upward-facing organic films	5.31×10^{-6}	Heterogeneous ozonolysis
Horizontal organic films	3.41×10^{-6}	Heterogeneous ozonolysis
Downward-facing organic films	2.19×10^{-6}	Heterogeneous ozonolysis

S4. Sensitivity analysis

Model input parameters were first screened using the sensitivity index S defined in Equation (7) of the main text. Table S9 lists the sensitivity indices S for each input parameters for both adult and toddlers. Parameters governing the airborne PM concentration (e.g., dust resuspension), reaction rate constants for the gas phase and surfaces, and parameters affecting air-to-surface partitioning (i.e., P_L and K_{OA}) are the most critical inputs for the model used in this study.

Table S9- The sensitivity index S, as given by Equation (7) of the main text for influential input variables for exposure to THC from cannabis smoking. The cells shaded in orange and green are associated with parameters subject to variability and uncertainty, respectively. Significant S values ($S \geq 0.01$) are bolded.

Input parameter	S for adults	S for toddlers
Room temperature	**5.71×10^{0}**	**1.10×10^{0}**
Room pressure	1.83×10^{-4}	1.89×10^{-4}
Room volume	**1.33×10^{0}**	**9.12×10^{-1}**
PUF surface area	2.03×10^{-3}	3.35×10^{-3}
Vinyl flooring surface area	**8.00×10^{-2}**	**1.70×10^{-1}**
Carpet surface area	**6.12×10^{-2}**	**1.69×10^{-1}**
Upward-facing organic films surface area	**3.20×10^{-1}**	**6.65×10^{-1}**
Vertical organic films surface area	3.74×10^{-3}	3.83×10^{-3}
Downward-facing organic films surface area	1.35×10^{-3}	1.39×10^{-3}
Hand-to-PUF contact frequency	8.99×10^{-8}	6.04×10^{-5}
Hand-to-vinyl flooring contact frequency	5.72×10^{-7}	1.02×10^{-4}
Hand-to-carpet contact frequency	7.19×10^{-4}	2.33×10^{-3}
Hand-to-upward-facing surfaces contact frequency	4.37×10^{-8}	6.70×10^{-8}
Object mouthing frequency (not applicable to adults)	-	**1.33×10^{0}**
Hand-to-mouth contact frequency	1.77×10^{-9}	4.15×10^{-7}
Handwashing frequency	3.35×10^{-11}	2.52×10^{-10}
Bathing frequency	9.49×10^{-12}	1.45×10^{-12}
Skin turnover frequency	1.26×10^{-12}	3.64×10^{-12}
Body weight	6.78×10^{-17}	1.89×10^{-14}
Skin surface area	8.56×10^{-5}	1.33×10^{-3}
Hand surface area	7.21×10^{-4}	2.35×10^{-3}
Skin lipid volume	1.03×10^{-11}	1.57×10^{-12}
Hand lipid volume	3.40×10^{-11}	2.55×10^{-10}
Inhalation rate	**2.00×10^{0}**	**6.36×10^{-1}**
Resuspension rate from the surfaces	**9.07×10^{-2}**	**1.10×10^{-2}**
Particle emission rate	**9.27×10^{-1}**	**8.82×10^{-1}**
Deposition velocity on upward-facing surfaces	**4.41×10^{-1}**	**2.56×10^{-1}**
Deposition velocity on vertical surfaces	3.77×10^{-3}	3.95×10^{-3}
Deposition velocity on downward-facing surfaces	1.05×10^{-10}	7.22×10^{-11}
Dust removal rate	**9.54×10^{-2}**	**1.11×10^{-2}**
Air exchange rate	**1.32×10^{0}**	**9.09×10^{-1}**
Heterogeneous ozonolysis rate constant on fibrous surfaces	5.51×10^{-5}	2.90×10^{-4}
Heterogeneous ozonolysis rate constant on impregnable surfaces	6.66×10^{-5}	6.61×10^{-1}
OH oxidation rate constant in air	2.94×10^{-3}	3.04×10^{-3}
Ozone oxidation rate constant in air	1.83×10^{-4}	1.89×10^{-4}
Logarithm of Vapor pressure of the cannabinoid	2.85×10^{-3}	**1.55×10^{-1}**
$\log K_{OA}$ of THC	**8.49×10^{2}**	**8.27×10^{2}**

$\log K_{OW}$ of THC	2.75×10^{-13}	1.82×10^{-13}

A Monte-Carlo simulation was done by running the model with alternative combinations of input parameters listed in Table S9. For each combination, the parameter values were sampled from Normal distributions. Table S10 lists the references that we consulted with to find means and standard deviations of each Normal distribution. Since outputs of a Normal distribution can theoretically be negative or yield unreasonably large positive numbers, we truncated the distributions by forcing the distribution values to fall between given bounds. As Table S10 indicates, the minimum and maximum were often chosen to be one order of magnitude lower and higher than the mean, respectively. Note that Table S10 does not have a row for vapor pressure of THC because its value is not independent from K_{OA} (see Equation (S7)). We started the Monte-Carlo simulation with 50 scenarios. In the next iteration, we increased the number of scenarios to 100 and checked if the mean and median of the results match the previous iteration by less than 1%. If this criterion was not met, we started a new iteration with 150 scenarios and continued adding 50 scenarios during each iteration. We used the MATLAB R2021 (MathWorks, US) software to conduct the Monte-Carlo simulation. All the simulations converged to final results per the criterion mentioned above with less than 350 scenarios.

Table S10- List of references used to specify the Normal distributions from which the values of each crucial important parameter were sampled for the Monte-Carlo simulation along with imposed minimum and maximum values for each truncated Normal distribution

Parameter name	Mean reference	Standard deviation reference	min	max
Temperature	Booten et al.[19]	Booten et al.[19]	18°C	30°C
Room volume	ICC assessment[20]	ICC assessment[20]	20 m^3	100 m^3
Fraction of floor area uncovered by carpet[a,b]	0.6	0.2	0.1	0.9
Fraction of floor area covered by carpet[a,b]	0.4	0.2	0.1	0.9
Ratio of upward-facing surface area to total floor area[a]	0.9	0.2	0.2	1.5
Deposition velocity on upward-facing surfaces	Zhang et al.[1]	Bennett and Furtaw [21]	Mean × 0.1	Mean × 10
Resuspension rate from the surfaces	Zhang et al.[1]	Bennett and Furtaw[21]	Mean × 0.1	Mean × 10
Dust removal rate	Zhang et al.[1]	Shin et al.[22]	0	Mean × 10
Inhalation rate	Zachariah et al.[23]	Zachariah et al.[23]	Mean × 0.4	Mean × 0.6
Air exchange rate	Murray & Burmaster[24]	Murray & Burmaster[24]	Mean × 0.1	Mean × 10
$\log K_{OA}$ of THC[c]	Values listed in Table S1	Baskaran et al.[25]	Mean × 0.1	Mean × 10

[a] We could not find reliable resources in literature discussing the surface area of carpet, indoor objects, and bare flooring compared to the total house area. The values listed above are based on authors' guess and may not cover all possible scenarios properly.

[b] Room area was derived from room volume assuming a constant wall height of 3 meters. The floor was assumed to be either covered by caret or to be represented by vinyl flooring otherwise.

[c] Among the $\log K_{OA}$ and $\log P_L$ pair, only the former was varied during the Monte Carlo analysis while the latter was determined from Equation (S7).

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