

**Table S1: Explanatory variables used in analysis**

Variable Name	Variable label
ID_SPT	Child Identity
Area	Original pollen areas (4)
pollen_Area	Mean total pollen by Area
pollen_nearest_code	Nearest pollen station to child home location
pollen_totalmean	mean pollen total mean by station
DateOfBirth	Date of birth: Day (dd) of birth
Age	Age reported
Gender	Gender
School_ID	School Identification Number
control_pos	SPT wheal size result: (+) Control/Histamine (mm)
control_neg	SPT wheal size result: (-) Control (mm)
Trees	SPT wheal size result: Trees mixtures (mm)
Birch	SPT wheal size result: Birch (mm)
Hazel	SPT wheal size result: Hazel (mm)
Grass	SPT wheal size result: Grasses mix (mm)
Amb	SPT wheal size result: Ambrosia (mm)
Dog	SPT wheal size result: Dog hair (mm)
Cat	SPT wheal size result: Cat fur (mm)
Dustmite	SPT wheal size result: D Pteronyssinus (mm)
Clado	SPT wheal size result: Cladosporium (mm)
Pine	SPT wheal size result: Pine (mm)
Olive	SPT wheal size result: Olive (mm)
Parietaria	SPT wheal size result: Parietaria (mm)
resp_infect_y1	How often has your child had respiratory infections during the first year of life?
resp_infect_y2	How often has your child had respiratory infections during the second and third year of life?
fever_y1	How often, during the first year of life, has your child had fever (higher than 38.5 °C)?
fever1	Child had fever higher than 38.5 °C during 1 year of live
med_temp	When do you give your child medicine for lowering body temperature?
anti_y1	How often, during the first year of life, did your child take antibiotics for more than 3 days in a row?
anti_y23	How often, during the second and third year of life, did your child take antibiotics for more than 3 days in a row?
anti1	Child had taken antibiotic s for more than 3 days in a row during 1 year of life
worms	Has your child ever been treated by the doctor because of abdominal pain caused by worm infection?
nursery	Did your child ever go to a child care facility or nursery school?
nursery_start	If yes (Q39), from ____ years of age? (in months)
nursery_end	If yes (Q39), till ____ years of age? (in months)
kinder	Did your child ever go to a kindergarten?
kinder_start	If yes (Q40), from ____years of age? (in months)
kinder_end	If yes (Q40), till ____ years of age? (in months)
nurs_kind_length	Length of time (months) in nursery / kindergarten
nurs_kind	Percentage of life (or first seven years if older than 84 months) spent in either nursery or kindergarten
multibirth	Is your child a twin, or a triplet/quadruplet?
multibirth_num	If yes (Q41), a twin, triplet, quadruplet?
sibling_count	How many brothers and sisters does your child have?
brothers	How many brothers?
sisters	How many sisters?
child_order	Where does your child come in the family (firstborn, second....)?
siblings	number of siblings the child has ( 0, 1 or more)
atopic_fam	Did any of your close family members had/s/ll have any atopic diseases, like asthma, allergic rhinitis or atopic dermatitis?

<b>atopic_fam_adj</b>	Did any of your close family members had/s/ll have any atopic diseases, like asthma, allergic rhinitis or atopic dermatitis?
<b>atopic_mem</b>	If yes (Q44), which family members?
<b>asth_bro</b>	How many brothers do/did suffer from asthma?
<b>rhin_bro</b>	How many brothers do/did suffer from allergic rhinitis?
<b>ecz_bro</b>	How many brothers do/did suffer from atopic dermatitis?
<b>atopic_bro</b>	Has brother with asthma or allergic rhinitis or atopic dermatitis
<b>asth_sis</b>	How many sisters do/did suffer from asthma?
<b>rhin_sis</b>	How many sisters do/did suffer from allergic rhinitis?
<b>ecz_sis</b>	How many sisters do/did suffer from atopic dermatitis?
<b>atopic_sis</b>	Has sister with asthma or allergic rhinitis or atopic dermatitis
<b>asth_mum</b>	Has the child's mother ever had asthma?
<b>rhin_mum</b>	Has the child's mother ever had allergic rhinitis?
<b>ecz_mum</b>	Has the child's mother ever had atopic dermatitis (neurodermatitis, eczema)?
<b>atopic_mum</b>	Has mother with asthma or allergic rhinitis or atopic dermatitis
<b>asth_dad</b>	Has the child's father ever had asthma?
<b>rhin_dad</b>	Has the child's father ever had allergic rhinitis?
<b>ecz_dad</b>	Has the child's father ever had atopic dermatitis (neurodermatitis, eczema)?
<b>atopic_dad</b>	Has father with asthma or allergic rhinitis or atopic dermatitis
<b>atopic_parent</b>	Has atopic father or mother?
<b>atopic_parent2</b>	Has atopic father or mother?
<b>Asth_PARENT</b>	Any parent has/had asthma
<b>Rhin_PARENT</b>	Any parent has/had Rhinitis
<b>Ecz_PARENT</b>	Any parent has/had Eczema
<b>dog_home</b>	Do/did you keep a dog as a pet in your home?
<b>cat_home</b>	Do/did you keep a cat as a pet in your home?
<b>ham_home</b>	Do/did you keep a hamster as a pet in your home?
<b>bird_home</b>	Do/did you keep birds as a pet in your home?
<b>dog_contact</b>	Did your child have regular contact with dogs (e.g., at your friend's home)?
<b>cat_contact</b>	Did your child have regular contact with cats (e.g., at your friend's home)?
<b>ham_contact</b>	Did your child have regular contact with hamsters (e.g., at your friend's home)?
<b>bird_contact</b>	Did your child have regular contact with birds (e.g., at your friend's home)?
<b>pet</b>	Child has/had contact cat, dog or hamster or at home
<b>bird</b>	Child has/had contact or bird at home
<b>poultry</b>	Did your child have regular contact with poultry?
<b>pigs</b>	Did your child have regular contact with pigs?
<b>cows</b>	Did your child have regular contact with cows?
<b>horses</b>	Did your child have regular contact with horses?
<b>rabbits</b>	Did your child have regular contact with rabbits?
<b>other_animals</b>	Did your child have regular contact with any other animal?
<b>AnimalFarm</b>	Child has/had contact with a farm animal/ Farm (only no-yes)
<b>sm_preg</b>	Did your child's mother smoke during pregnancy with your child?
<b>cig_count_preg</b>	If yes (Q51), how many cigarettes a day?
<b>sm_home</b>	Does anybody, at present, smoke inside your child's home?
<b>sm_home_freq</b>	If yes (Q52): how often did they smoke / during which stage of your child's life?
<b>cig_home10</b>	Are less than 10 cigarettes in total smoked per day in the child's home?
<b>cig_home20</b>	Are 10-20 cigarettes in total smoked per day in the child's home?
<b>cig_home20plus</b>	Are > 20 cigarettes in total smoked per day in the child's home?
<b>sm_preg2</b>	Mother smoking during pregnancy (recoded 1= yes + periodically)
<b>SMOKING</b>	Smoking during pregnancy or smoking at home
<b>breastfed</b>	Was your child breast fed?
<b>breastfed_time</b>	If yes (Q54), for how long?
<b>preg_anti</b>	How often, during the pregnancy, was the child's mother on the antibiotics for more than
<b>feather</b>	Does or did your child sleep on a feather pillow?
<b>feather_freq</b>	How often does your child sleep on a feather pillow / during which stage of life?
<b>mattage_y1</b>	How old was the mattress that was used by your chi during the first year of life?

<b>mattage_y27</b>	How old was the mattress that was used by your child from 2nd till 7th year of life?
<b>mattage_after7y</b>	How old was the mattress that was used by your child after 7th year of life?
<b>mattage</b>	mattress older than 3 years at any stage of child life
<b>carpet</b>	Is/was there a fitted carpet in your child's bedroom?
<b>carpet_freq</b>	Frequency of fitted carpet in child's bedroom / stage of life?
<b>gas</b>	Do or did you use gas for heating in your child's home?
<b>oil</b>	Do or did you use oil for heating in your child's home?
<b>elec</b>	Do or did you use electricity for heating in your child's home?
<b>wood</b>	Do or did you use wood for heating in your child's home?
<b>coal</b>	Do or did you use coal/coke for heating in your child's home?
<b>cen_heat</b>	Do or did you use central heating in your child's home?
<b>gas1</b>	Gas heating (only no-yes)
<b>oil1</b>	Oil heating (only no-yes)
<b>elec1</b>	Electric heating (only no-yes)
<b>wood1</b>	Wood heating (only no-yes)
<b>cen_heating1</b>	Central heating (only no-yes)
<b>ed_mum</b>	Mother: What is the highest level of education you have completed?
<b>ed_dad</b>	Father: What is the highest level of education you have completed?
<b>employ_m</b>	Mother is (employment status):
<b>employ_d</b>	Father is (employment status):
<b>Placename_angl</b>	What town do you live in?
<b>urban_rural_adj</b>	Is the area you live in (rural/urban): (SEQ)
<b>population_adj</b>	If you live in an urban area, what is the population number?
<b>populationCat</b>	Population quintiles
<b>farm</b>	If you live in a rural area, do you live on a farm?
<b>income</b>	Including wages, salaries, self-employment, and any other source of income, was the total combined family income during the one month period?
<b>adults_home</b>	How many adults live in your household?
<b>kids_home</b>	How many children live in your household?
<b>bedrooms</b>	How many bedrooms are in your household (including children's room and guest rooms)?
<b>BEDROOMS</b>	number of rooms in household
<b>airq_nearest_code</b>	Air quality station nearest to child home location
<b>O3_nearest_code</b>	O3 station nearest to child home location
<b>Weather_nearest</b>	Weather station nearest to child home location
<b>Meantotal</b>	Mean of total ragweed pollen counts/m3 per year
<b>Meanmax</b>	Mean of maximum daily ragweed pollen counts/m3
<b>days5</b>	number of days>5 pollen counts/m3
<b>days10</b>	number of days>10 pollen counts/m3
<b>days15</b>	number of days>15 pollen counts/m3
<b>days20</b>	number of days>20 pollen counts/m3
<b>days25</b>	number of days>25 pollen counts/m3
<b>days30</b>	number of days>30 pollen counts/m3
<b>days50</b>	number of days>50 pollen counts/m3
<b>days100</b>	number of days>100 pollen counts/m3
<b>days200</b>	number of days>200 pollen counts/m3
<b>days500</b>	number of days>500 pollen counts/m3
<b>days1000</b>	number of days>1000 pollen counts/m3
<b>SO2_mean_d</b>	SO2_mean_d ug/m3 daily mean
<b>SO2_mean_h</b>	SO2_mean_h ug/m3 hourly mean
<b>PM10_mean_d</b>	PM10_mean_d ug/m3 daily mean
<b>PM10_mean_h</b>	PM10_mean_h ug/m3 hourly mean
<b>NO2_mean_d</b>	NO2_mean_d ug/m3 daily mean
<b>NO2_mean_h</b>	NO2_mean_h ug/m3 hourly mean
<b>O3_mean_d</b>	O3_mean_d ug/m3 daily mean
<b>O3_mean_h</b>	O3_mean_h ug/m3 hourly mean
<b>SO2_Area</b>	Mean hourly SO2 by Area

<b>PM10_Area</b>	Mean hourly PM10 by Area
<b>O3_Area</b>	Mean hourly O3 by Area
<b>NO2_Area</b>	Mean hourly NO2 by Area
<b>PT_DJF_19902010</b>	PT_DJF_1990-2010 Precipitation mm Dec, Jan, Feb
<b>PT_MAM_19902010</b>	PT_MAM_1990-2010 Precipitation mm Mar, Apr, May
<b>PT_JJA_19902010</b>	PT_JJA_1990-2010 Precipitation mm Jun, Jul, Aug
<b>PT_SON_19902010</b>	PT_SON_1990-2010 Precipitation mm Sep, Oct, Nov
<b>TG_DJF_19902012</b>	TG_DJF_1990-2010 Mean daily temperature C Dec, Jan, Feb,
<b>TG_MAM_19902012</b>	TG_MAM_1990-2010 Mean daily temperature C Mar, Apr, May
<b>TG_JJA_19902012</b>	TG_JJA_1990-2010 Mean daily temperature C Jun, Jul, Aug
<b>TG_SON_19902010</b>	TG_SON_1990-2010 Mean daily temperature C Sep, Oct, Nov
<b>Elevation</b>	Elevation m
<b>Continuousurbanfabric</b>	Continuous urban fabric m2
<b>Discontinuousurbanfabric</b>	Discontinuous urban fabric m2
<b>Industrialor~</b>	Industrial or commercial units m2
<b>Roadandrailne~</b>	Road and rail networks and associated land m2
<b>Portareas</b>	Port areas m2
<b>Airports</b>	Airports m2
<b>Mineralextrac~</b>	Mineral extraction sites m2
<b>Dumpsites</b>	Dump sites m2
<b>Constructionsites</b>	Construction sites m2
<b>Greenurbanareas</b>	Green urban areas m2
<b>Sportandleisu~</b>	Sport and leisure facilities m2
<b>Nonirrigateda~</b>	Non-irrigated arable land m2
<b>Permanentlyir~</b>	Permanently irrigated land m2
<b>Ricefields</b>	Rice fields m2
<b>Vineyards</b>	Vineyards m2
<b>Fruittreesand~</b>	Fruit trees and berry plantations m2
<b>Olivegroves</b>	Olive groves m2
<b>Pastures</b>	Pastures m2
<b>Annualcropsas~</b>	Annual crops associated with permanent crops m2
<b>Complexcultiv~</b>	Complex cultivation patterns m2
<b>Landprincipal~</b>	Land principally occupied by agriculture, with significant areas of natural vegetation m2
<b>Agroforestrya~</b>	Agro-forestry areas m2
<b>Broadleavedf~s</b>	Broad-leaved forest m2
<b>Coniferousfor~</b>	Coniferous forest m2
<b>Mixedforest</b>	Mixed forest m2
<b>Naturalgrassl~</b>	Natural grasslands m2
<b>Moorsandheath~</b>	Moors and heathland m2
<b>Sclerophyllou~</b>	Sclerophyllous vegetation m2
<b>Transitionalw~</b>	Transitional woodland-shrub m2
<b>Beachesdunes~</b>	Beaches, dunes, sands m2
<b>Barerocks</b>	Bare rocks m2
<b>Sparselyveget~</b>	Sparsely vegetated areas m2
<b>Burntareas</b>	Burnt areas m2
<b>Glaciersandpe~</b>	Glaciers and perpetual snow m2
<b>Inlandmarshes</b>	Inland marshes m2
<b>Peatbogs</b>	Peat bogs m2
<b>Saltmarshes</b>	Salt marshes m2
<b>Salines</b>	Salines m2
<b>Intertidalflat</b>	Intertidal flats m2
<b>Watercourses</b>	Water courses m2
<b>Waterbodies</b>	Water bodies m2
<b>Coastallagoons</b>	Coastal lagoons m2
<b>Estuaries</b>	Estuaries m2

<b>Seaand</b> ocean	Sea and ocean m2
<b>abandoned_5km</b>	abandoned_5km m
<b>disused_5km</b>	disused_5km m
<b>abandoned_or_~</b>	Abandoned or disused 5 km buffer m
<b>rail_5km</b>	rail_5km m
<b>tram_5km</b>	tram_5km m
<b>living_street</b>	living_street m
<b>motorway</b>	motorway m
<b>path</b>	length of path in m
<b>pedestrian</b>	length of pedestrian in m
<b>platform</b>	length of platform in m
<b>primary</b>	length of primary roads m
<b>residential</b>	length of residential roads in m
<b>road</b>	length of road in m
<b>secondary</b>	length of secondary roads m
<b>service</b>	length of service road in m
<b>tertiary</b>	length of tertiary roads m
<b>trunk</b>	length of trunk roads m
<b>unclassified</b>	length of unclassified roads m
<b>distancetonea~</b>	distance to nearest motorway m
<b>distan~maryroa</b>	distance to nearest primary road m
<b>distan~daryroa</b>	distance to nearest secondary road m
<b>distan~iaryroa</b>	distance to nearest tertiary road m
<b>river</b>	length of rivers m
<b>stream</b>	length of streams m
<b>all_water_bod~</b>	All water bodies
<b>water</b>	Waterbodies + Watercourses
<b>waterCat</b>	water thirds if wb >0
<b>ALLROADdistance</b>	distance to primary, secondary or tertiary road
<b>rural_urban_code</b>	Rural or urban location of child home (GIS)
<b>VegArtificial</b>	Sportandleisurefacilities + Greenurbanareas
<b>UrbanRoad</b>	distance to roads in urban and rural areas
<b>UrbanRoad5</b>	distance to primary, secondary or tertiary roads in urban and rural areas
<b>UrbanRoad4</b>	distance to primary, secondary or tertiary roads in urban and rural areas