

Supplementary Material

# Associations between Exposure to Industrial Air Pollution and Prevalence of Asthma and Atopic Diseases in Haifa Bay Area

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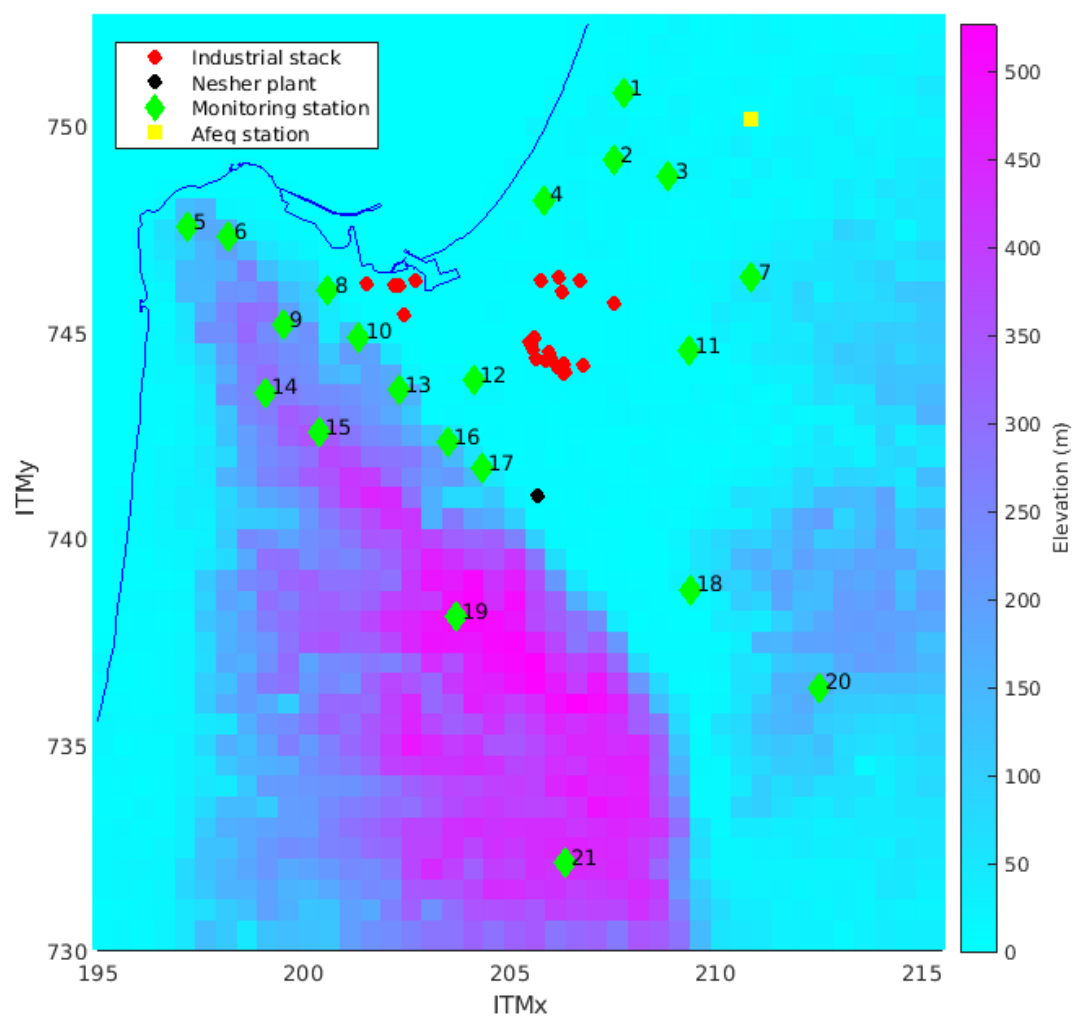
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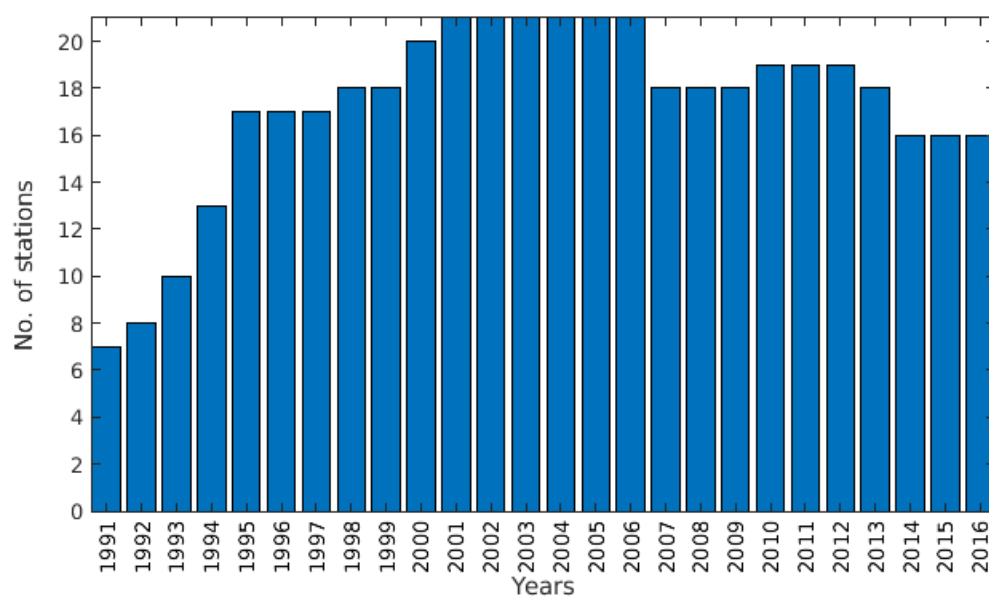
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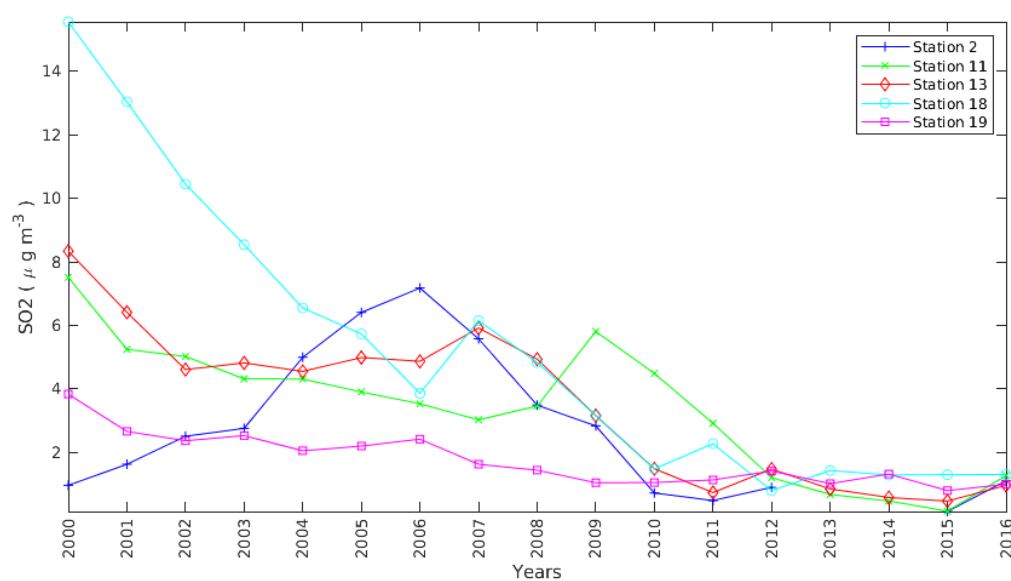
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**Figure S1.** Study area map. Superimposed on the HBA elevation map are the shoreline (blue continuous line), locations of the industrial stack from the 2015 Ministry of Environmental Protection report (red circles), the site of the historical Nesher cement plant furnace (black circle), the location of the Afeq meteorological station (yellow square), and the locations and numbers of the SO<sub>2</sub> air quality monitoring stations whose data were used (green diamonds). The coordinates are in the New Israel Mercator projection (in km).



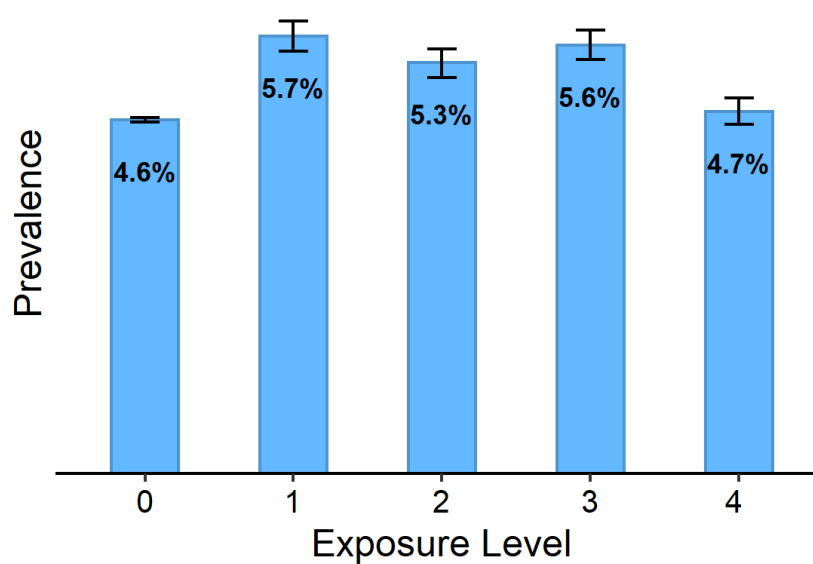
**Figure S2.** The number of air quality monitoring stations that observed SO<sub>2</sub> in HBA at each of 1991–2016.

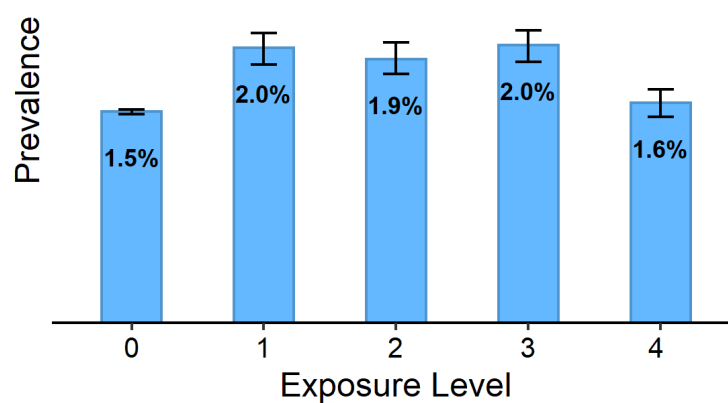


**Figure S3.** Annual means of SO<sub>2</sub> concentrations in a sample of five air quality monitoring stations in HBA. The station number corresponds to the numbers in Figure S1.

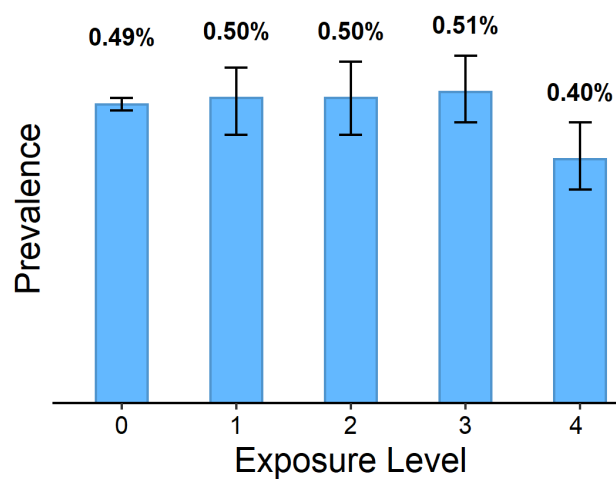
**Table S1.** Distribution of subjects by exposure to HBA-IAP and asthma.

HBA-IAP category	N	Asthma Cases, %, CI
Non-HBA	2216927	130873, 5.9% (5.9-5.9)
1	56480	3852, 6.8% (6.6-7.0)
2	56637	3897, 6.9% (6.7-7.1)
3	56587	3928, 6.9% (6.7-7.2)
4	56612	3411, 6.0% (5.8-6.2)

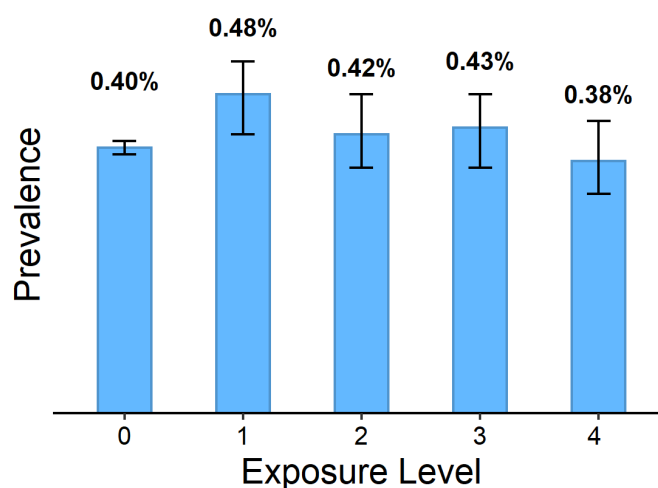
**Figure S4.** Crude prevalence of rhinitis by HBA-IAP categories. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.



**Figure S5.** Crude prevalence of asthma with comorbid rhinitis by HBA-IAP categories. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.



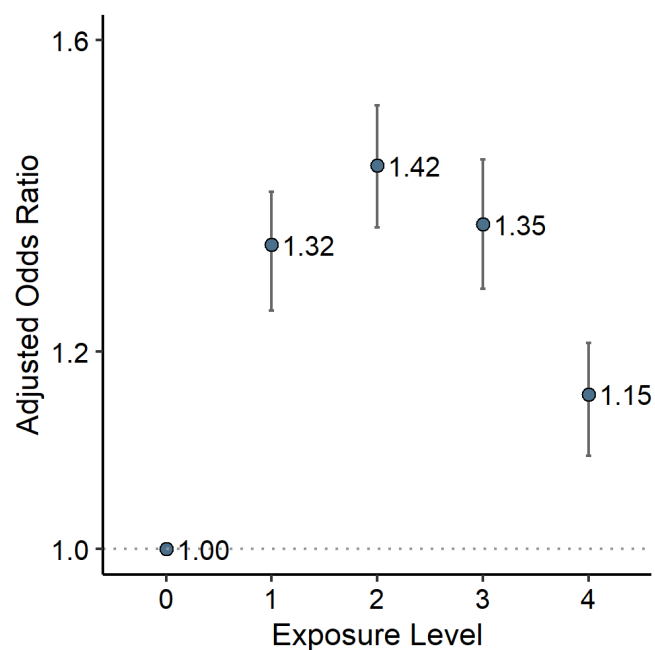
**Figure S6.** Crude prevalence of atopic dermatitis by HBA-IAP categories. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.



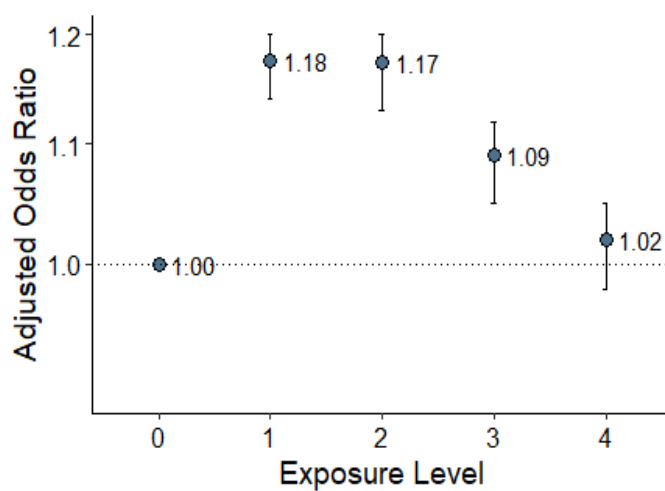
**Figure S7.** Crude prevalence of rhinoconjunctivitis by HBA-IAP categories. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.

**Table S2.** Distribution of subjects by exposure to HBA-IAP and additional atopic conditions.

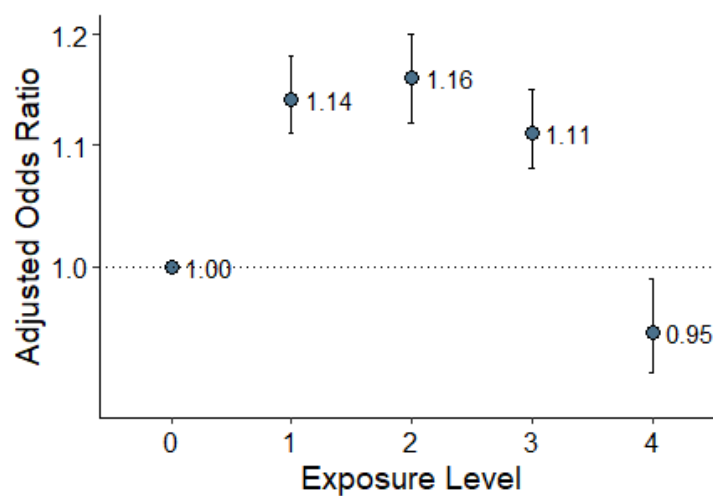
HBA-IAP category	Rhinitis Cases, %, CI	Conjunctivitis Cases, %, CI	Dermatitis Cases, %, CI	Rhinitis + Asthma, Cases, %, CI
Non-HBA	130873 5.9% (5.9-5.9)	8884 0.4% (0.39-0.41)	10906 0.49% (0.48-0.5)	34088 1.54% (1.52-1.55)
1	3852 6.8% (6.6-7.0)	269 0.48% (0.42-0.53)	281 0.5% (0.44-0.55)	1128 2.0% (1.88-2.11)
2	3897 6.9% (6.7-7.1)	241 0.42% (0.37-0.48)	284 0.5% (0.44-0.56)	1090 1.92% (1.81-2.04)
3	3928 6.9% (6.7-7.2)	243 0.43% (0.37-0.48)	292 0.52% (0.46-0.57)	1142 2.02% (1.9-2.13)
4	3411 6.0% (5.8-6.2)	218 0.38% (0.33-0.44)	230 0.41% (0.35-0.46)	906 1.6% (1.5-1.7)



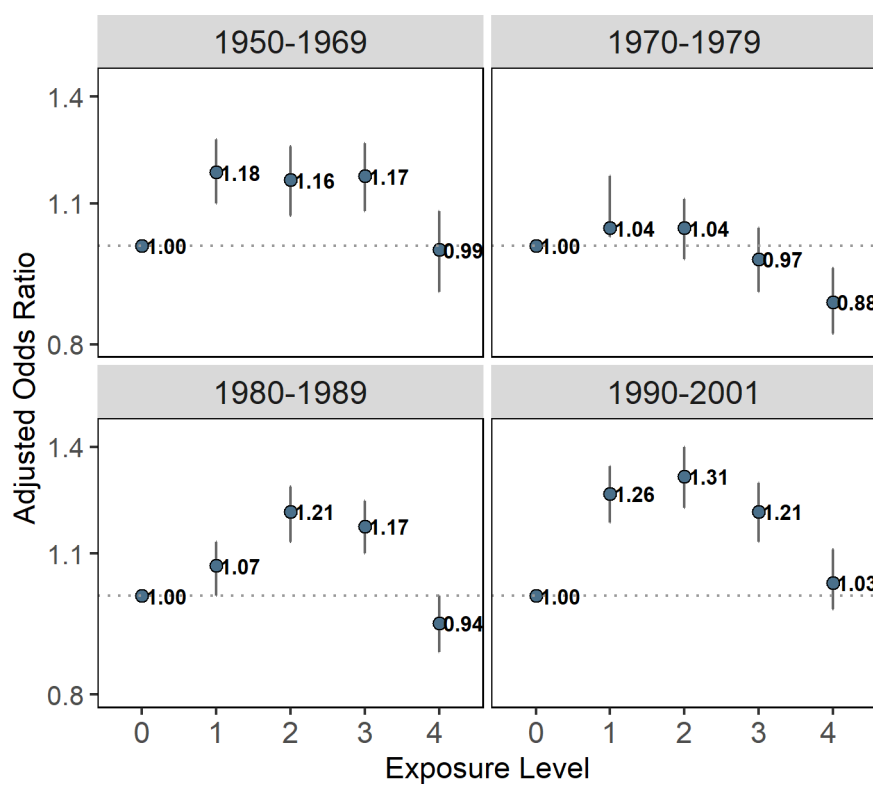
**Figure S8.** Association between HBA-IAP and asthma, adjusted for SES, year of birth, school orientation, NO<sub>x</sub> and PM<sub>2.5</sub>. N = 791,132, N = 57,573. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.



**Figure S9.** Association between HBA-IAP and asthma, adjusted for SES, year of birth, school orientation, NO<sub>x</sub>, and locality type. N= 2,294,152, N cases = 139,400. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.

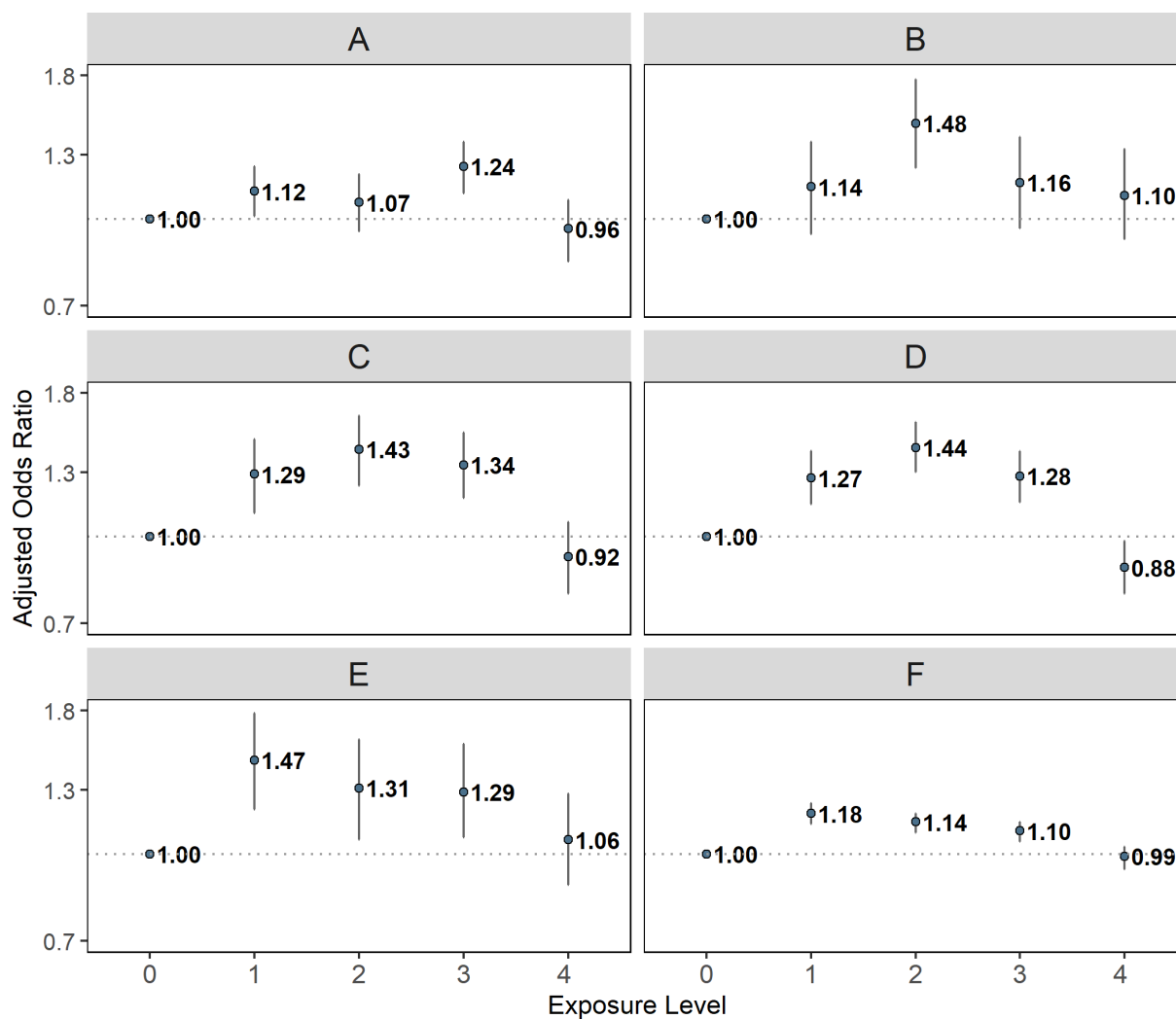


**Figure S10.** Association between HBA-IAP and asthma, adjusted for SES, year of birth, school orientation, NO<sub>x</sub>, and BMI category. N = 2,248,006, N cases = 139,419. 0 = reference category (non-HBA residents), 1 = lowest HBA-IAP exposure.



**Figure S11.** Association between HBA-IAP and asthma, stratified by the decade of birth and adjusted for SES, year of birth, school orientation, and NO<sub>x</sub>. 0 = reference category (non-HBA residents), 1 = lowest HBA-IAP exposure category.

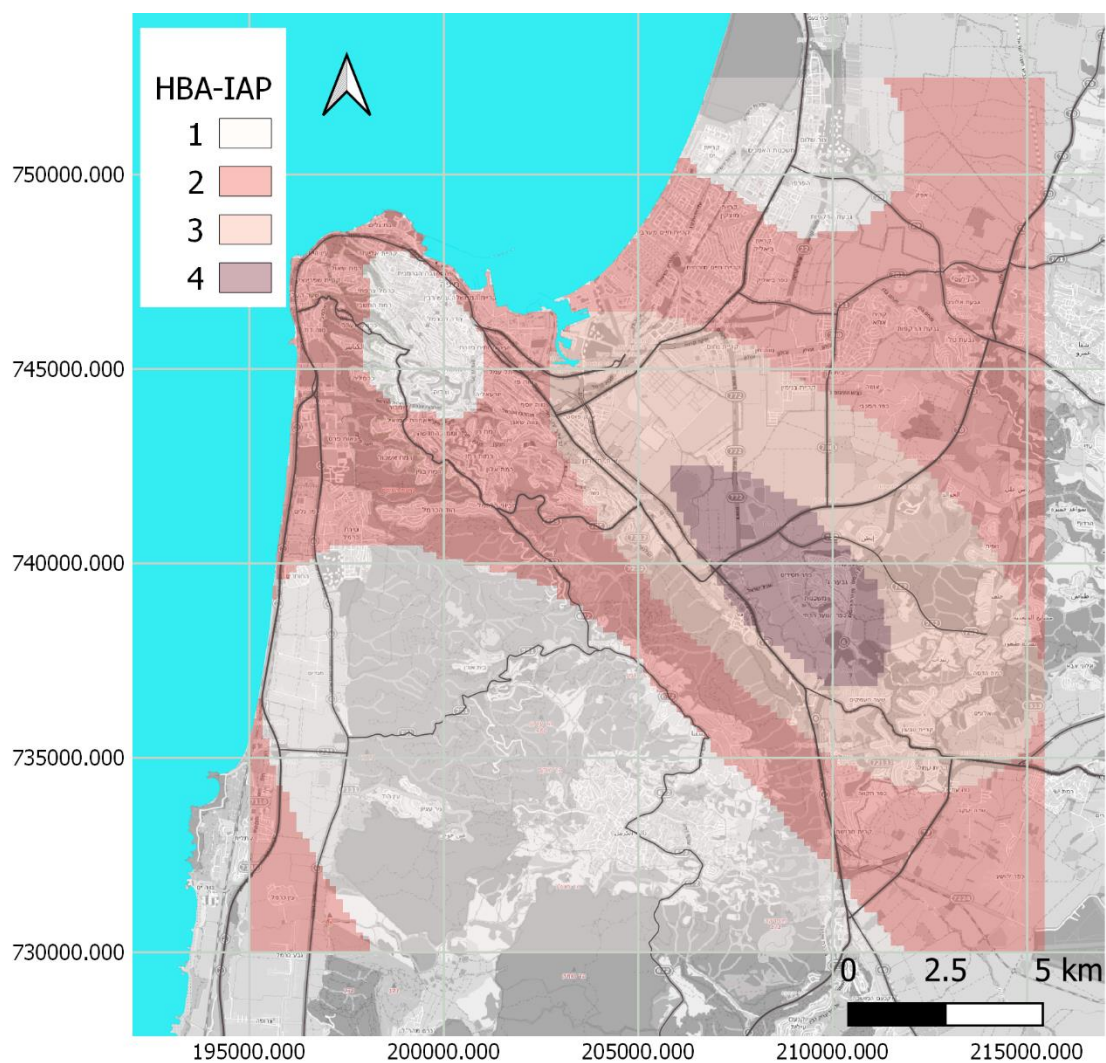




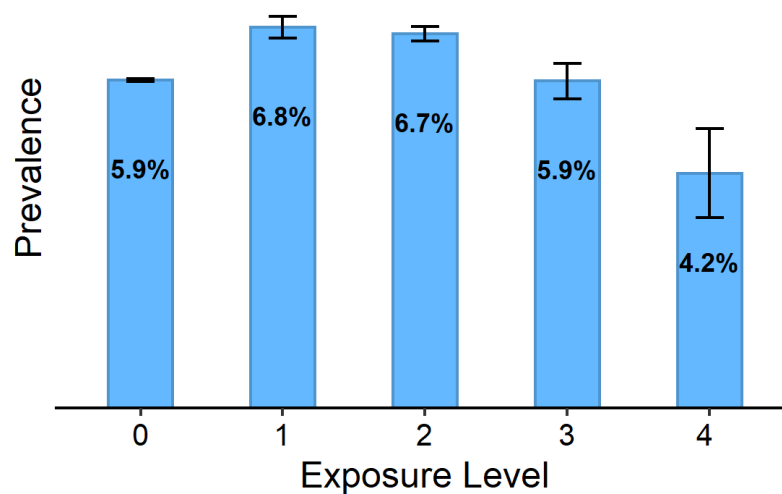
**Figure S12.** Association between HBA-IAP and asthma, stratified by parental region of birth and adjusted for SES, year of birth, and school orientation. A- both parents from Jewish "Ashkenazi" country (N= 147,121); B- one parent from Jewish "Ashkenazi" country and the other one Israeli-born (N= 61,636); C- one parent from Jewish "Ashkenazi" country and the other one from Jewish "Mizrahi" country (N= 86,759); D- both parents from Jewish "Mizrahi" country (N= 321,001); E- one parent from Jewish " Mizrahi" country and the other one Israeli-born (N= 79,002); F- all other participants (N= 1,828,226). 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.

**Table S3.** Equal-interval HBA-IAP exposure (four groups).

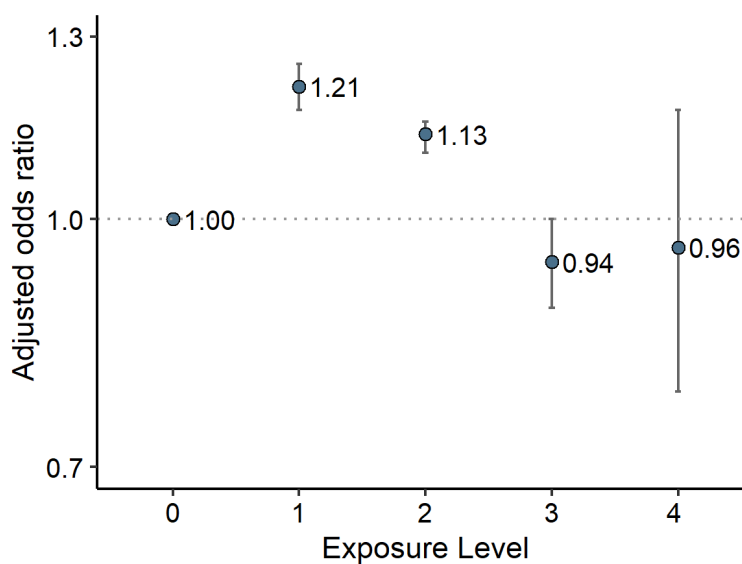
HBA-IAP category	N
Reference (non-HBA)	2,216,927
1	63,298
2	140,262
3	20,301
4	2,437



**Figure S13.** A map of the HBA-IAP exposure model with equal-interval color-coded exposure categories 1–4.



**Figure S14.** Crude prevalence of Asthma by HBA-IAP four equal-interval categories. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.

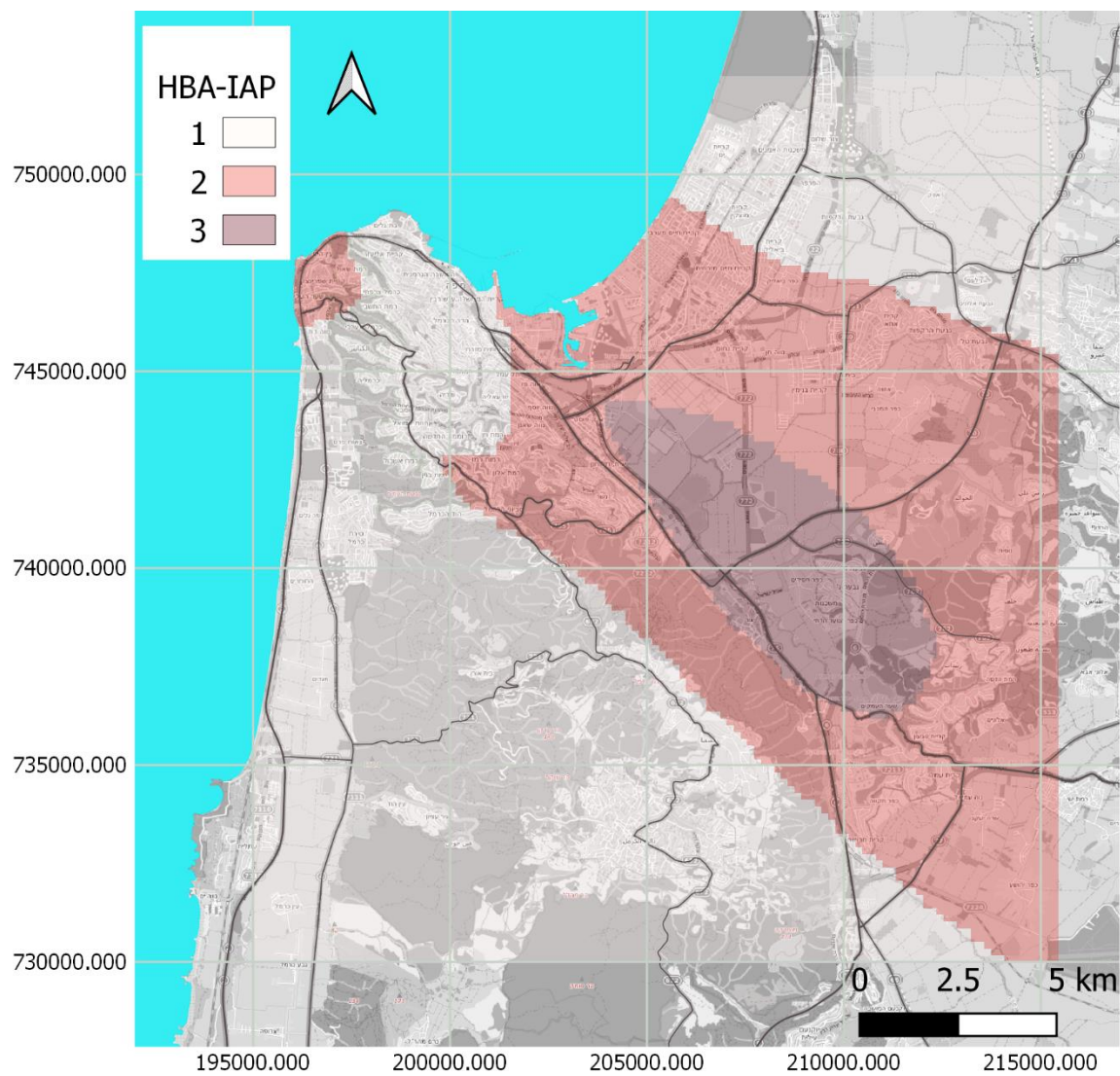


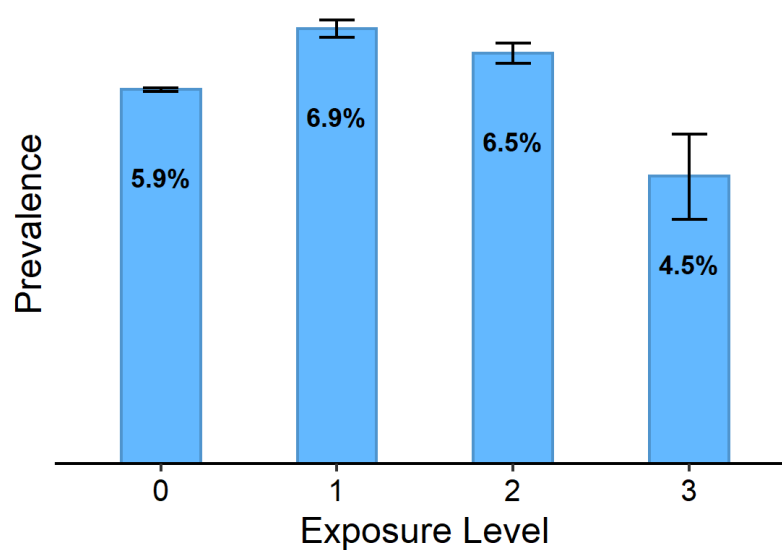
**Figure S15.** Association between HBA-IAP and asthma with four equal-interval categories, adjusted for SES, year of birth, and school orientation. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.



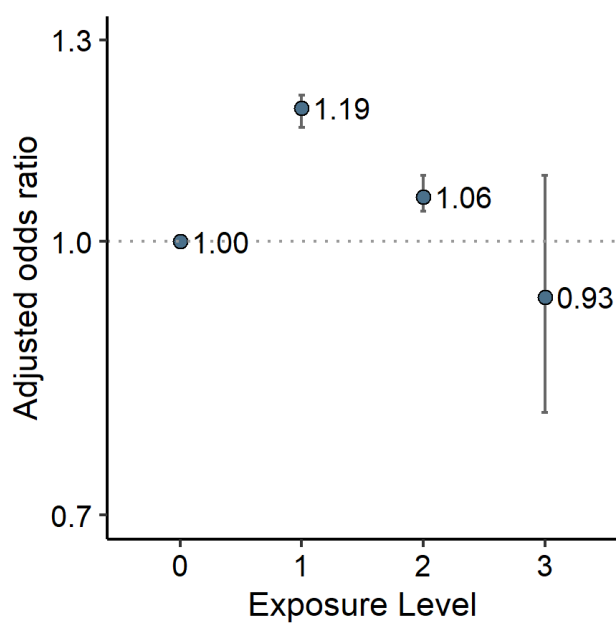
**Table S4.** Equal-interval HBA-IAP exposure (three groups).

HBA-IAP category	N
Reference (non-HBA)	2,216,927
1	130,156
2	92,520
3	3,640

**Figure S16.** A map of the HBA-IAP exposure model with equal-interval color-coded exposure categories 1–3.



**Figure S17.** Crude prevalence of Asthma by HBA-IAP three equal-interval categories. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.



**Figure S18.** Association between HBA-IAP and asthma with three equal-interval categories, adjusted for SES, year of birth, and school orientation. 0= reference category (non-HBA residents), 1= lowest HBA-IAP exposure.