

Table S1 Adjusted association for pesticide exposures (kg) within 400-m radius of a child's residence and wheezing symptoms at baseline in the AIRE cohort stratified by history of doctor diagnosed asthma and excluding exposure to environmental smoking

Exposure	N	Wheezing Prevalence (95%CI) FULL		Wheezing Prevalence (95%CI) FULL		Wheezing Prevalence (95%CI) FULL	
		ALL		Asthmatic		Non-asthmatic	
All							
None	179	Ref.	36	Ref.	143	Ref.	
Low (<67kg)	224	0.07 (-0.008-0.15)	57	0.11 (-0.11-0.34)	167	0.03 (-0.03-0.10)	
High (≥67kg)	217	0.11 (0.03-0.19)	52	0.16 (-0.06-0.38)	165	0.05 (-0.10-0.12)	
Sulfur							
None	373	Ref.	71	Ref.	302	Ref.	
Low (<80kg)	126	0.05(-0.04-0.13)	36	-0.03 (-0.24-0.17)	90	-0.001 (-0.07-0.07)	
High (≥80kg)	121	0.14 (0.06-0.22)	38	0.14 (-0.07-0.34)	83	0.06 (-0.01-0.12)	
All minus Sulfur							
None	182	Ref.	37	Ref.	145	Ref.	
Low(<34kg)	224	0.08 (-0.004-0.16)	48	0.08 (-0.14-0.29)	176	0.02 (-0.04-0.08)	
High (≥34)	214	0.10 (0.02-0.18)	60	0.17 (-0.06-0.40)	154	0.06 (0.003-0.13)	
Chlorpyrifos							
None	496	Ref.	113	Ref.	383	Ref.	
Low (<2kg)	60	0.07 (-0.03-0.18)	16	0.17 (-0.10-0.43)	44	0.03 (-0.05-0.12)	
High (≥2kg)	64	0.17 (0.06-0.28)	16	0.24 (-0.02-0.50)	48	0.10 (0.009-0.19)	
Glyphosate							
None	329	Ref.	69	Ref.	277	Ref.	
Low (<7kg)	138	0.05 (-0.03-0.13)	35	-0.02 (-0.23-0.18)	111	0.04 (-0.03-0.10)	
High (≥7kg)	144	0.10 (0.02-0.18)	39	0.18 (-0.01-0.38)	111	0.03 (-0.04-0.09)	

Those exposed to environmental smoking were excluded

All models fully adjusted for sex, language of survey, health insurance, respondent education

Low and High categories split at the median for those with pesticide exposures greater than 0 within 400-m radius of the residence

None indicates no pesticide applications were applied within 400-m radius of the child's residence

Table S2 Minimally adjusted association for pesticide exposures (kg) within 400-m radius of a child's residence and wheezing symptoms at baseline in the AIRE cohort stratified by history of doctor diagnosed asthma and excluding those whose moms reported smoking during pregnancy

Exposure	N	Wheezing Prevalence (95%CI)		Wheezing Prevalence (95%CI)		Wheezing Prevalence (95%CI)
		ALL		Asthmatic		Non-asthmatic
All						
None	179	Ref.	33	Ref.	145	Ref.
Low	225	0.09 (0.05-0.20)	56	0.23 (0.01-0.44)	169	0.02 (-0.03-0.08)
High	219	0.13 (0.02-0.17)	52	0.26 (0.05-0.47)	167	0.05 (-0.005-0.11)
Sulfur						
None	371	Ref.	68	Ref.	303	Ref.
Low	125	0.06 (-0.02-0.14)	34	0.01 (-0.18-0.21)	91	0.004 (-0.06-0.07)
High	126	0.14 (0.06-0.22)	39	0.21 (0.005-0.42)	87	0.06 (-0.008-0.12)
All minus Sulfur						
None	180	Ref.	33	Ref.	147	
Low	221	0.10 (0.03-0.18)	47	0.22 (0.008-0.43)	174	0.02 (-0.04-0.07)
High	221	0.12 (0.04-0.19)	61	0.28 (0.06-0.51)	160	0.06 (0.005-0.12)
Chlorpyrifos						
None	499	Ref.	110	Ref.	389	
Low	59	0.09 (-0.01-0.19)	15	0.19 (-0.07-0.45)	44	0.04 (-0.04-0.12)
High	64	0.17 (0.06-0.27)	16	0.30 (0.04-0.57)	48	0.10 (0.02-0.18)
Glyphosate						
None	334	Ref.	69	Ref.	265	
Low	141	0.04 (-0.04-0.12)	36	0.003 (-0.20-0.20)	105	0.03 (-0.03-0.09)
High	144	0.10 (0.02-0.17)	36	0.22 (0.20-0.42)	108	0.02 (-0.04-0.08)

All models adjusted for sex and

Low and High categories split at the median for those with pesticide exposures greater than 0 within 400-m radius of the residence

None indicates no pesticide applications were applied within 400-m radius of the child's residence

Table S3 Fully adjusted association for pesticide exposures (kg) within 400-m radius of a child's residence and wheezing symptoms at baseline in the AIRE cohort stratified by history of doctor diagnosed asthma and excluding those whose moms reported smoking during pregnancy

Exposure	N	Wheezing Prevalence (95%CI)		Wheezing Prevalence (95%CI)		Wheezing Prevalence (95%CI)
		ALL		Asthmatic		Non-asthmatic
All						
None	167	Ref.	31	Ref.	146	
Low	215	0.08 (0.005-0.16)	54	0.20 (-0.02-0.43)	161	0.03 (-0.04-0.09)
High	206	0.13 (0.05-0.20)	48	0.23 (0.007-0.46)	158	0.06 (-0.003-0.12)
Sulfur						
None	350	Ref.	63	Ref.	287	Ref.
Low	120	0.07 (-0.02-0.15)	34	0.07 (-0.02-0.15)	86	0.007 (-0.06-0.07)
High	118	0.14 (0.06-0.22)	36	0.14 (0.06-0.22)	82	0.07 (0.003-0.13)
All minus Sulfur						
None	169	Ref.	31	Ref.	138	
Low	212	0.10 (0.02-0.18)	45	0.19 (-0.03-0.41)	167	0.02 (-0.04-0.08)
High	207	0.12 (0.04-0.20)	57	0.26 (0.02-0.50)	150	0.07 (0.005-0.13)
Chlorpyrifos						
None	470	Ref.	103	Ref.	367	
Low	57	0.09 (-0.02-0.19)	15	0.19 (-0.08-0.46)	42	0.04 (-0.04-0.12)
High	61	0.17 (0.06-0.28)	15	0.24 (-0.03-0.51)	46	0.11 (0.02-0.19)
Glyphosate						
None	314	Ref.	63	Ref.	251	
Low	137	0.05 (-0.03-0.13)	36	0.02 (-0.19-0.22)	101	0.03 (-0.03-0.09)
High	135	0.10 (0.02-0.18)	34	0.20 (-0.002-0.41)	101	0.02 (-0.04-0.09)

All models fully adjusted for sex, language of survey, health insurance, and respondent education

Low and High categories split at the median for those with pesticide exposures greater than 0 within 400-m radius of the residence

None indicates no pesticide applications were applied within 400-m radius of the child's residence

Table S4 Adjusted association for pesticide exposures (kg) within 400-m radius of a child's residence and wheezing symptoms at baseline in the AIRE cohort stratified by history of doctor diagnosed asthma and excluding exposure to environmental smoking and adjusting by length in residence

Exposure	N	Wheezing Prevalence (95%CI)		Wheezing Prevalence (95%CI)		
		ALL	Asthmatic	Non-asthmatic		
All						
None	179	Ref.	36	Ref.	143	Ref.
Low (<67kg)	224	0.07 (-0.008-0.15)	57	0.12 (-0.11-0.35)	167	0.03 (-0.03-0.10)
High (≥67kg)	217	0.11 (0.03-0.19)	52	0.17 (-0.06-0.39)	165	0.05 (-0.10-0.12)
Sulfur						
None	373	Ref.	71	Ref.	302	Ref.
Low (<80kg)	126	0.05 (-0.04-0.13)	36	-0.03 (-0.24-0.17)	90	-0.0001 (-0.07-0.07)
High (≥80kg)	121	0.14 (0.06-0.22)	38	0.14 (-0.07-0.34)	83	0.06 (-0.01-0.12)
All minus Sulfur						
None	182	Ref.	37	Ref.	145	Ref.
Low(<34kg)	224	0.08 (-0.004-0.16)	48	0.08 (-0.14-0.30)	176	0.02 (-0.04-0.09)
High (≥34)	214	0.10 (0.02-0.18)	60	0.18 (-0.05-0.41)	154	0.06 (0.002-0.13)
Chlorpyrifos						
None	496	Ref.	113	Ref.	383	Ref.
Low (<2kg)	60	0.08 (-0.03-0.18)	16	0.17 (-0.10-0.43)	44	0.03 (-0.05-0.12)
High (≥2kg)	64	0.17 (0.06-0.28)	16	0.24 (-0.02-0.51)	48	0.10 (0.008-0.19)
Glyphosate						
None	329	Ref.	69	Ref.	277	Ref.
Low (<7kg)	138	0.05 (-0.03-0.13)	35	-0.02 (-0.23-0.18)	111	0.04 (-0.03-0.11)
High (≥7kg)	144	0.10 (0.02-0.18)	39	0.18 (-0.01-0.38)	111	0.03 (-0.04-0.09)

Those exposed to environmental smoking were excluded

Fully adjusted for sex, language of survey, health insurance, responded education, and length of residence

Low and High categories split at the median for those with pesticide exposures greater than 0 within 400-m radius of the residence

None indicates no pesticide applications were applied within 400-m radius of the child's residence

Table S5 Adjusted association for pesticide exposures (kg) within 400-m radius of a child's residence and wheezing symptoms at baseline in the AIRE cohort stratified by history of doctor diagnosed asthma and excluding exposure to environmental smoking among those that NEVER MOVED N= 175

Exposure	N	Wheezing Prevalence (95%CI)		Wheezing Prevalence (95%CI)		
		ALL		Asthmatic	Non-asthmatic	
All						
None	35	Ref.	8	Ref.	27	Ref.
Low (<67kg)	60	0.05 (-0.03-0.13)	17	0.25 (-0.17-0.67)	43	-0.007 (-0.14-0.13)
High (≥67kg)	60	0.10 (0.02-0.18)	18	0.22 (-0.21-0.65)	42	0.12 (-0.01-0.25)
Sulfur						
None	89	Ref.	20	Ref.	69	Ref.
Low (<80kg)	29	0.09 (-0.07-0.26)	10	0.12 (-0.27-0.51)	19	0.02 (-0.11-0.15)
High (≥80kg)	37	0.26 (0.08-0.44)	13	0.09 (-0.33-0.52)	24	0.24 (0.10-0.38)
All minus Sulfur						
None	35	Ref.	8	Ref.	27	Ref.
Low(<34kg)	60	0.09 (-0.08-0.27)	15	0.19 (-0.22-0.60)	45	0.01 (-0.12-0.14)
High (≥34)	60	0.15 (-0.03-0.32)	20	0.30 (-0.13-0.74)	40	0.10 (-0.03-0.23)
Chlorpyrifos						
None	124	Ref.	35	Ref.	89	Ref.
Low (<2kg)	13	0.08 (-0.13-0.28)	5	0.50 (-0.10-1.10)	8	0.10 (-0.04-0.25)
High (≥2kg)	18	0.34 (0.11-0.58)	3	0.24 (-0.23-0.70)	15	0.32 (0.13-0.51)
Glyphosate						
None	70	Ref.	19	Ref.	51	Ref.
Low (<7kg)	42	0.01 (-0.15-0.17)	12	0.06 (-0.32-0.43)	30	-0.0002 (-0.12-0.12)
High (≥7kg)	43	0.14 (-0.02-0.30)	12	0.33 (-0.03-0.69)	31	0.70 (-0.06-0.19)

Those exposed to environmental smoking were excluded

Fully adjusted for sex, language of survey, health insurance, and respondent education

Low and High categories split at the median for those with pesticide exposures greater than 0 within 400-m radius of the residence

None indicates no pesticide applications were applied within 400-m radius of the child's residence

Table S6 Adjusted association for pesticide exposures (kg) within 400-m radius of a child's residence and wheezing symptoms at baseline in the AIRE cohort stratified by history of doctor diagnosed asthma and excluding exposure to environmental smoking among those that MOVED N= 501

Exposure	N	Wheezing Prevalence (95%CI)		Wheezing Prevalence (95%CI)		
		ALL		Asthmatic	Non-asthmatic	
All						
None	137	Ref.	23	Ref.	114	Ref.
Low (<67kg)	156	0.01 (-0.015-0.30)	29	0.09 (-0.19-0.37)	117	0.04 (-0.03-0.11)
High (≥67kg)	146	0.14 (-0.02-0.30)	30	0.16 (-0.11-0.44)	116	0.04 (-0.03- 0.11)
Sulfur						
None	268	Ref.	44	Ref.	224	Ref.
Low (<80kg)	94	0.04 (-0.06-0.14)	26	-0.08 (-0.34-0.18)	68	0.005 (-0.08- 0.09)
High (≥80kg)	77	0.10 (0.01-0.20)	22	0.15 (-0.10-0.39)	55	0.008 (-0.07-0.08)
All minus Sulfur						
None	139	Ref.	24	Ref.	115	Ref.
Low(<34kg)	157	0.07 (-0.02-0.17)	32	0.06 (-0.20-0.33)	125	0.02 (-0.05-0.10)
High (≥34)	143	0.09 (-0.003-0.18)	36	0.15 (-0.13-0.44)	107	0.05 (-0.02-0.13)
Chlorpyrifos						
None	351	Ref.	69	Ref.	282	Ref.
Low (<2kg)	45	0.08 (-0.05-0.20)	11	0.10 (-0.20-0.41)	34	0.007 (-0.09-0.11)
High (≥2kg)	43	0.12 (-0.003-0.24)	12	0.26 (-0.06-0.59)	31	0.04 (-0.06-0.14)
Glyphosate						
None	248	Ref.	44	Ref.	204	Ref.
Low (<7kg)	98	0.06 (-0.03-0.16)	26	-0.05 (-0.03-0.21)	72	0.05 (-0.02-0.13)
High (≥7kg)	91	0.08 (-0.009-0.18)	22	0.11 (-0.14-0.35)	69	0.009 (-0.07-0.08)

Those exposed to environmental smoking were excluded

Fully adjusted for sex, language of survey, health insurance, and respondent education

Low and High categories split at the median for those with pesticide exposures greater than 0 within 400-m radius of the residence

None indicates no pesticide applications were applied within 400-m radius of the child's residence

Table S7 Top pesticides applied in Imperial County, CA, USA 2016-2020.

Active Ingredient	Total Sum (kg)
SULFUR	3675988
1,3-DICHLOROPROPENE	1075487
PENDIMETHALIN	704381
GLYPHOSATE	680440
CHLORPYRIFOS	343866
BENSULIDE	337528
TRIFLURALIN	319379
MINERAL OIL	228666
KAOLIN	139606
EPTC	106711
IMIDACLOPRID	101825

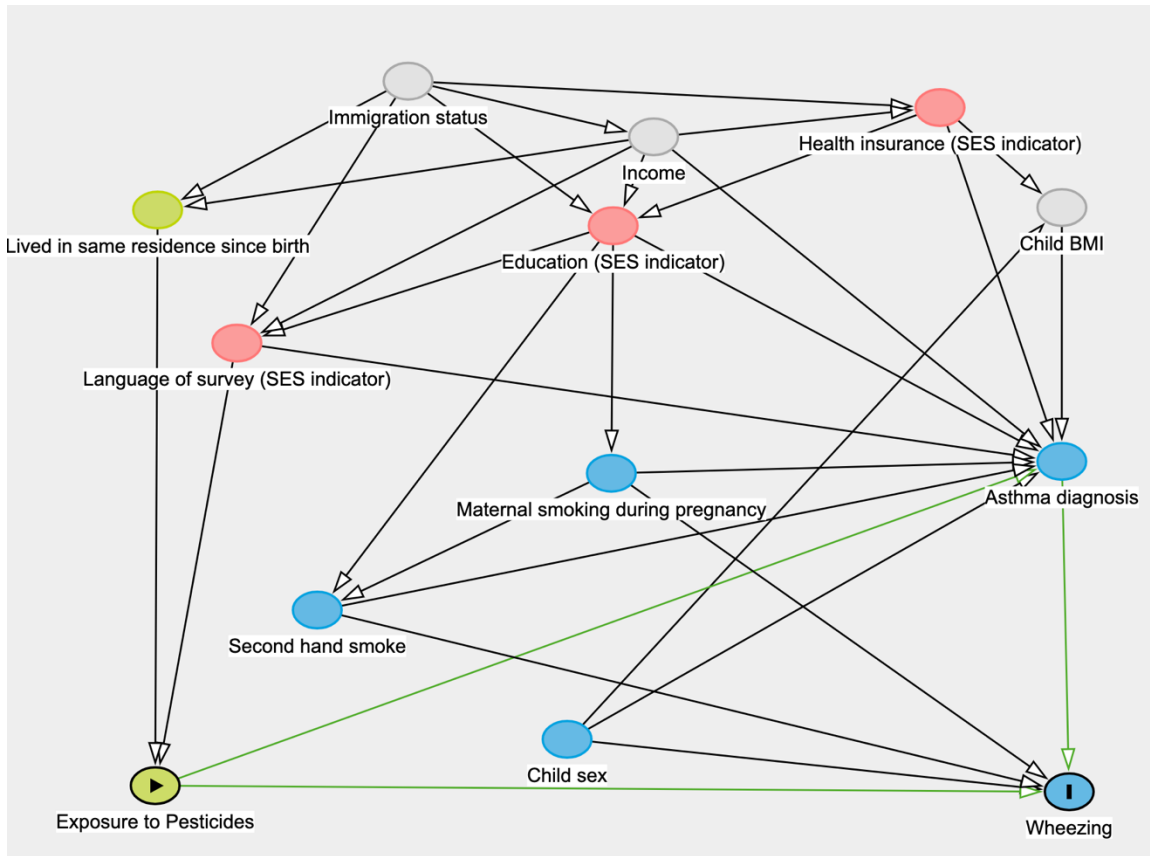


Figure S1 Directed acyclic graph for estimating the direct effect of pesticide exposure on childhood wheezing. **Parameters in red are potential confounding factors**, parameters in blue are ancestors of the outcome only (i.e., cause of the outcome but not of the exposure) and parameters in grey are unmeasured variables. Green line: causal path. According to the DAG, the minimal sufficient adjustment for estimating the total effect of pesticide exposure on childhood wheezing is language of survey and lived in the same residence since birth. As we are only focusing on short term exposures of pesticides (12 months) we opted to have the minimal model be language of survey, and child sex as it is a strong predictor for wheezing. Living in the same residence since birth is a proxy for cumulative exposure and thus excluding does not change the 12-month exposure estimates used in analyses. In full models we further adjusted by education and health insurance both indicators of socioeconomic status.