SUPPLEMENTAL MATERIALS

Table SI. Data on excluded studies[a]

Study Design	Process	Exposure period	Asthma Cases	Person-years	Average TDI Level (ppb)	Study References[c]
case-series	R&D	1962-1963	4	148.5	NR	1, 2
case-series	production	1957-1974	3	1000	NR	3
case-control	production	1979-1990	27	NA	1.3	4
cross-sectional	PUR foam	NR	4	NR	0.95	5
cross-sectional	mixed industries	NR	8	NR	3.5	6
cross-sectional	steel coatings	1971-1979	21	1242	NR	7
cross-sectional	PUR foam	1996-2014	NR	289	2.1	8
cross-sectional	PUR foam	1971-1992	1	NR	160	9
cross-sectional	TDI-base adhesive	1984-1985	14	25.9	29	10
cross-sectional	TDI-based varnish	1988-1989	7	353	58	11
cross-sectional	PUR foam	1975-1978	15	426	50	12
cross-sectional	R&D	1957-1967	26	146	29	13
cross-sectional	production	1978-1991	3	92	20	14[b]
longitudinal	production	1961-1971	124	2412	NR	15
longitudinal	PUR foam	1972-1976	NR	NR	3.0	16
longitudinal	PUR foam	2010-2011	NR	42	0.10	17
longitudinal	PUR foam	1954-1955	8	25	NR	18

a. Some data were not explicitly reported; therefore, values may be estimated from available information.
b. The next available study for inclusion (This study is on the boundary of inclusion criteria).
c. List of excluded studies:

1. Williamson KS. Studies of diisocyanate workers. *Occup Med.* 1964;14(1):81-88.
2. Wiliamson KS. Studies of diisocyanate workers (2). *Occup Med.* 1965;15(1):29-35.
3. Porter CV. A Retrospective Study of Clinical, Physiologic and Immunologic Changes in Workers Exposed to Toluene Diisocyanate. *Am Ind Hyg Assoc J.* 1975;36(3):159-168.
4. Meredith SK, Bugler J, Clark RL. Isocyanate exposure and occupational asthma: a case-referent study. *Occup Environ Med.* 2000;57(12):830-836.
5. White WG, Sugden E, Morris MJ, Zapata E. Isocyanate-induced asthma in a car factory. *Lancet.* 1980;315(8171):756-760.
6. Kim H, Kim YD, Choi J. Seroimmunological characteristics of Korean workers exposed to toluene diisocyanate. *Environ Res.* 1997;75(1):1-6.
7. Venables KM, Dally MB, Burge PS, Pickering CA, Newman Taylor AJ. Occupational asthma in a steel coating plant. *Br J of Ind Med.* 1985;42(8):517-524.
8. Świerczyńska-Machura D, Brzeźnicki S, Nowakowska-Świrta E, et al. Occupational exposure to diisocyanates in polyurethane foam factory workers. *Int J Occup Med Envion Health.* 2015;28(6):985-998.
9. Lee HS, Phoon WH. Diurnal variation in peak expiratory flow rate among workers exposed to toluene diisocyanate in the polyurethane foam manufacturing industry. *Br J of Ind Med.* 1992;49(6):423-427.
10. Wang JD, Huang PH, Lin JM, Su SY, Wu MC. Occupational asthma due to toluene diisocyanate among velcro-like tape manufacturers. *Am J Ind Med.* 1988;14(1):73-78.
11. Huang J, Wang Xp, Chen Bm, Ueda A, Aoyama K, Matsushita T. Immunological effects of toluene diisocyanate exposure on painters. *Archives of Environmental Contamination and Toxicology.* 1991;21(4):607-611.

12. Franzinelli A, Mariotti F, Innocenti A. Respiratory disease due to isocyanates in a refrigerator factory. *Medicina del Lavoro.* 1978;69(2):163-171.
13. Bruckner HC, Avery SB, Stetson DM, Dodson VN, Ronayne JJ. Clinical and Immunologic Appraisal of Workers Exposed to Diisocyanates. *Archives of Environmental Health.* 1968;16(5):619-625.
14. Soderlund N, Rees D, Wasserfall C, Roodt L. A survey of a small group of workers exposed to toluene di-isocyanate. *South African Medical Journal.* 1993;83(2):100-103.
15. Adams WGF. Long term effects on the health of men engaged in the manufacture of tolylene di isocyanate. *Br J Ind Med.* 1975;32(1):72-78.
16. Wegman DH, Musk AW, Main DM, Pagnotto LD. Accelerated loss of FEV-1 in polyurethane production workers: A four-year prospective study. *Am J Ind Med.* 1982;3(2):209-215.
17. Gui W, Wisnewski AV, Neamtiu I, et al. Inception cohort study of workers exposed to toluene diisocyanate at a polyurethane foam factory: initial one-year follow-up. *Am J Ind Med.* 2014;57(11):1207-1215.
18. Woodbury JW. Asthmatic syndrome following exposure to toluene diisocyanate. *Ind Med Surg.* 1956;25(11):540-543.

Abbreviations: NR, not reported or estimable; PUR, polyurethane; R&D, research and development; TDI, toluene diisocyanate

Table SII. Benchmark dose modeling results (BMR=0.01) for longitudinal studies selection (*n*=5)

	TDI (ppb)		Goodness-of-fit	
Model	BMD	BMDL[a]	(p-value)	AIC
Quadratic	6.32	4.17	0.22	1034.44
Logistic	6.20	3.94	0.22	1034.48
Probit	6.27	3.89	0.22	1034.48
quantal-linear	6.65	2.93	0.21	1034.52
no intercept, LQ	3.58	2.56	0.20	1034.72
Gamma	5.54	2.74	0.11	1036.38
log-logistic	5.48	2.96	0.11	1036.39
log-probit	5.45	2.74	0.11	1036.39
Weibull	5.45	2.96	0.11	1036.39

a. 95% lower confidence level on dose for a 1% change in response level (i.e., BMD).

Abbreviations: BMD, benchmark dose (in this case annual average TDI concentration); BMDL, lower 95% confidence interval on the benchmark dose; LQ, linear-quadratic.

Table SIII. Benchmark dose modeling results (BMR=0.01) for naïve studies selection (*n*=4)

Model	TDI (ppb)		Goodness-of-fit (p-value)	AIC
	BMD	BMDL[a]		
Quadratic	4.98	3.61	0.32	510.71
Logistic	4.69	3.70	0.31	510.75
Probit	4.69	3.65	0.31	510.75
quantal-linear	4.17	3.05	0.29	510.90
Gamma	4.93	3.08	0.14	512.64
log-logistic	4.91	3.04	0.14	512.65
log-probit	4.97	3.04	0.15	512.62
Weibull	4.91	3.08	0.14	512.65

b. 95% lower confidence level on dose for a 1% change in response level (i.e., BMD).

Abbreviations: BMD, benchmark dose (in this case annual average TDI concentration); BMDL, lower 95% confidence interval on the benchmark dose; LQ, linear-quadratic.