

## Supplemental material

### Appendix A: Methods used to adjust relative risk estimates from different measures of household second-hand tobacco smoke exposure

Twelve studies reported relative risk estimates for more than one level of exposure. Where possible, we collapsed multiple levels of exposure using methods described by (Greenland and Longnecker 1992) and derived a relative risk estimate (RR) that reflects similar exposure levels across studies. When units of measure differed between studies, we identified studies that examined two or more measures of exposure to estimate a reasonable basis for establishing comparable exposure values across units of measures (i.e., number of household smokers, cigarettes per day and cotinine in body fluid). For example, a Canadian study examined the RR in relation to two household smokers,  $\geq 20$  cigarettes smoked daily and  $\geq 10$  cigarettes smoked daily at home and found similar RRs of 5.77 (95% CI: 1.59, 20.99); 4.58 (1.34, 15.68) and 4.81 (1.47, 15.69) respectively among children with no allergy (Chen et al. 1996). Whereas, a South African study examined the RR estimate adjusted for atopy history among school children (Ehrlich et al. 1996). RRs in relation to 13 cigarettes smoked per day by the mother and 2 household smokers and found similar RRs of 1.57 (95% CI 0.95, 2.61) and 1.46 (1.20, 1.78), respectively. Two studies examined data from the third national health and nutrition survey (Gergen et al. 1998; Mannino et al. 2001). The first study reported an RR of 2.3 (95% CI 1.1-5.1) for exposure among children ages 4-6 years with cotinine levels in the highest tertile (range 3.24 to 113.6 nmol/L) which was comparable to an RR of 2.1 (95%

CI: 1.2, 3.5) reported in the second study for children 3-5 years of age exposed to  $\geq 20$  cigarettes smoked in the home (Gergen et al. 1998; Mannino et al. 2001). Table A1 lists the source of each measure, the range of exposure level and value to which each RR estimate was adjusted for the meta-analysis.

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Table A1: Exposure Measures of Household SHS and Adjusted Levels

First author of studies (subgroup)	Range	Adjusted level
Cigarettes per day		
Neuspiel et al. 1989	1 – 24+	20
Palmieri et al. 1990	1 – 20+	20
Cigarettes per day at home		
Gergen et al. 1998	1 – 20+	15
Number of household smokers		
Chen et al. 1996(ac,ever asthma)	1 – 2+	2
Chen et al. 1996(nac)	1 – 2+	2
Chen et al. 1996(ac,current asthma)	1 – 2+	2
Kay et al. 1995	1 – 2	2
Gilliland et al. 2001	1 – 2+	2
Ponsonby et al. 2000	1+(proximity to child)	2
Ehrlich et al. 1996	1 – 3+	2
Sturm JJ et al. 2004	1-3+	2

Cotinine in blood (nM/L)

Mannino et al. 2001(ever asthma)	3.24 - 113.6	50
Mannino et al. 2001(current asthma)	3.24 - 113.6	50

Abbreviations: SHS, second-hand tobacco smoke; ac, atopic children; nac, nonatopic children; ng, nanograms; L, liters, mL, milliliters; nM, nanomole.

Table S1. Observations Included in the Analysis of Household SHS Exposures: Studies with Ever Asthma Cases

Study Reference (Subgroup)	RR	95% CI	Controlled for Family Atopy Hist.	Restricted to Non Smoking Children	Age Range (in yrs)
Azizi and Henry 1991	1.1	0.9, 1.4	yes	yes	7-12
Bener et al. 1991	1.77	0.80, 3.91	yes	yes	7-12
Burchfiel et al. 1986(bo)	2.16	1.40, 2.93	no	no	0-19
Chen et al. 1996(ac)	1.39	0.60, 3.21	yes	yes	6-17
Chen et al. 1996(nac)	5.82	1.60, 21.15	yes	yes	6-17
Gergen et al. 1998	1.45	1.17, 1.79	yes	yes	0-5
Gilliland et al. 2001	1.1	0.9, 1.4	yes	yes	9-15
Goren and Hellman 1991	1.24	1.05, 1.43	yes	yes	7-10
Gortmaker et al. 1982	1.49	1.08, 2.06	no	no	0-17
Hajnal et al. 1999	1.20	0.94, 1.54	yes	yes	6-14
Jenkins et al. 1993	1.26	1.12, 1.40	yes	yes	7
Kay et al. 1995	1.92	1.27, 2.90	yes	no	3-11
Kivity et al. 2001(Ar,bo,ac)	1.73	1.44, 2.07	yes	no	8-17
Kivity et al. 2001(Ar,bo,nac)	1.74	1.12, 2.69	yes	no	8-17
Kivity et al. 2001(Ar,g,ac)	1.73	1.43, 2.09	yes	no	8-17
Kivity et al. 2001(Ar,g,nac)	1.61	0.96, 2.68	yes	no	8-17
Kivity et al. 2001(J,bo,ac)	1.73	1.45, 2.06	yes	no	8-17

Kivity et al. 2001(J,bo,nac)	1.74	1.22, 2.50	yes	no	8-17
Kivity et al. 2001(J,g,ac)	1.73	1.44, 2.07	yes	no	8-17
Kivity et al. 2001(J,g,nac)	1.75	1.14, 2.69	yes	no	8-17
Le Roux et al. 1995	1.79	1.06, 3.02	yes	yes	6-7
Maier et al. 1997	1.6	0.9, 2.7	yes	yes	5-9
Mannino et al. 2001	1.19	0.83, 1.72	yes	yes	4-16
Pokharel PK et al. 2001	3.33	1.85, 7.65	yes	no	11-15
Rasanen et al. 2000	1.48	0.97, 2.25	yes	yes <sup>a</sup>	16
Ronmark et al. 1998	1.29	0.95, 1.74	yes	yes	7-8
Selcuk et al. 1997	1.35	1.12, 1.62	yes	no	7-12
Soyseth et al. 1995	2.8	1.3, 6.1	yes	no	7-13
Wolf-Ostermann et al. 1995	1.43	0.96, 2.12	yes	yes	8-16

<sup>a</sup>investigators found non significant in the study population; Abbreviations: RR, rate ratio; SHS, second-hand tobacco smoke; CI, confidence interval; bo, boys; g, girls; ac, atopic children; nac, non-atopic children; Ar, Arab; J, Jewish

Table S2. Observations Included in the Analysis of Household SHS Exposures: Studies with Incident Asthma Cases

Study Reference	RR	95% CI	Controlled for Child Atopy History	Age Range (in yrs)
Bergmann et al. 2000	1.32	0.88, 1.97	yes	0-6
Jaakkola et al. 2001	0.84	0.53, 1.34	no	0.5-4
Neuspiel et al. 1989	1.49	1.18, 1.87	yes	0-10
Ponsonby et al. 2000	1.09	0.94, 1.26	no	0-7
Sigurs et al. 1995	1.2	0.41, 3.60	yes	0-3.5
Strachan et al. 1996	1.10	0.76, 1.60	yes	8-16
Withers et al. 1998	1.50	1.14, 1.98	yes	6-16
Zeiger and Heller 1995	1.37	0.55, 3.45	no	0-7

Abbreviations: RR, rate ratio; SHS, second-hand tobacco smoke; CI, confidence interval