Supplemental Material

Temporal Trends in Respirable Dust and Respirable Quartz Concentrations within the European Industrial Minerals Sector over a 15-year period (2002-2016)

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Table of Contents

Supplementary material 1: Ratios reported in the literature for respirable dust and respirable quartz

In *Table S1a* the applied efficiency factors are presented for the respirable dust samplers present in the IMA-DMP database.

Table S1a Efficiency factors used for analysis of temporal trends

Respirable Samplers	Respirable dust	Respirable quartz
DO[a]	0.89	0.76
CIP10-R[b]	0.86	0.75
SKC[c]	1.35	1.50
IOM[d]	0.96	1.00
FSP-10[e]	0.92	0.96
HD[f] /BCIRA[g]	1.00	1.00

These factors are based on the results of three field studies, which are summarized below in *Table S1b (*Refs. 1, 4, 7). For the CIP10-R the average of the results from the two field studies were used (see *table S1a)*.

Table S1b Efficiency factors for respirable dust samplers from field studies

Field studies				
Respirable Samplers	**Respirable dust**	**Respirable quartz**	**Reference sampler**	**Ref**
DO[a]	0.89	0.76	*BCIRA*[g]	**1**
CIP10-R[b]	0.77 0.94	0.60 0.89	*BCIRA* *HD*	**1** **4**
SKC[c]	1.35	1.50	*BCIRA*	**1**
IOM[d]	0.96	1.00	*HD*[f]	**7**
FSP-10[e]	0.92	0.96	*HD*	**4**
SIMPEDS[h]	1.18	1.37	*BCIRA*	**1**

Results of wind tunnel studies with the respirable samplers are shown in *Table S1c* (Refs 2, 3, 5, 6, 8). These results compare relatively well with the field studies. However, given the non-experimental setting of the measurements collected within the IMA-DMP the efficiency factors based on the field studies were used to adjust under and over-sampling of respirable dust and respirable quartz.

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Table S1c Efficiency factors for respirable dust samplers from experimental studies

Experimental studies								
Respirable Samplers	**Respirable dust**				**Respirable quartz**			
	Fine dust	**UF[i]**	**ARD[j]**	**UF & ARD**	**Fine dust**	**UF & ARD**	**Reference sampler**	**Ref**
BCIRA[g]		1.01	1.05				*SIMPEDS*	2
Cip10-R[b]		0.85	0.95				*SIMPEDS*	2
				0.84		0.88	*SIMPEDS*	3
	0.75				0.60		*SIMPEDS*	5
	0.76						*HD*	6
					0.96		*HD*	8
DO[a]		0.92	0.84				*SIMPEDS*	2
				0.83			*SIMPEDS*	3
SKC[c]		1.30	1.40				*SIMPEDS*	2
IOM[d]		0.82	0.80				*SIMPEDS*	2
			0.78				*SIMPEDS*	3
FSP-10[e]		1.11	1.13				*SIMPEDS*	2
				0.99			*SIMPEDS*	2
						1.07	*SIMPEDS*	3
	1.14						*SIMPEDS*	5
	0.99						*SIMPEDS*	6
					1.13		*HD*	8

[a] *Dorr-Oliver*
[b] *Capteur individuel de poussieres*
[c] *SKC LTD (company name)*
[d] *Institute of Occupational Medicine sampler*
[e] *Fein staub probe*
[f] *Higgins-Dewell*
[g] *British Cast Iron Research Association*
[h] *Safety In Mines Personal Dust sampler*
[i] *Ultrafine Arizona road dust*
[j] *Medium Arizona road dust*

References

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Supplementary material 2. Estimated differences in temporal trends between time periods adjusted for random effects of site, job and worker

Table S2a Estimated differences in temporal trends between time periods for respirable dust

Respirable dust						
Effect	**period**	**Estimate**	**Standard Error**	**Pr > |t|**	**Lower CI estimate**	**Upper CI estimate**
Intercept	_	-0.082	0.191	0.675	-0.459	0.296
time trend	_	-0.058	0.006	<0.0001	-0.070	-0.046
time trend x period	1	-0.017	0.007	**0.013**	-0.031	-0.004
time trend x period	2	0.043	0.008	**<0.0001**	0.026	0.059
time trend x period	3	0	.	.	.	.

Table S2b Estimated differences in temporal trends between time periods for respirable quartz

Respirable quartz						
Effect	**period**	**Estimate**	**Standard Error**	**Pr > |t|**	**Lower CI estimate**	**Upper CI estimate**
Intercept	_	-2.129	0.262	<0.0001	-2.647	-1.610
time trend	_	-0.096	0.009	<0.0001	-0.118	-0.084
time trend x period	1	0.077	0.009	**<0.0001**	0.059	0.096
time trend x period	2	0.142	0.011	**<0.0001**	0.120	0.165
time trend x period	3	0	.	.	.	.

Statistically significant temporal trends were observed for respirable dust and respirable quartz in different periods (manuscript, Table 2). To see whether the differences in time trends between the time periods were statistically significant we added an interaction term 'time trend x period' to the model. These analyses clearly showed that the differences in time trend between periods were significantly different for both respirable dust and respirable quartz.

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