

Supplementary material

Household cleaning and poor asthma control among elderly women

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Table E1. Household cleaning tasks, spray and chemical use* according to household cleaning patterns

	Very sparse cleaning	Sparse cleaning	Medium cleaning	Frequent general cleaning	Frequent use of products	Very frequent general cleaning	Very frequent use of products
Weekly household cleaning, %	3	11	29	85	94	97	91
Weekly use of sprays, %							
No	84	95	55	86	66	75	13
1 type	13	5	26	10	28	22	29
≥ 2 types	3	0	18	2	6	3	58
Weekly use of chemicals, %							
No	73	75	36	59	45	37	9
1 type	21	23	46	32	44	43	33
≥ 2 types	6	2	18	9	11	20	58

* This table only describes the main cleaning tasks (household cleaning) and general use of products (sprays, chemical) using summary variable. Detailed description of the patterns based on 24 variables for cleaning tasks / products has been published previously.^{E1}

Table E2. Associations between types of DCP and asthma control classified in two categories

Asthma Control Test score					
	20-25 (ref.; controlled or partly controlled)			≤19 (poorly controlled)	
	n	%	OR*	%	OR* (95% CI)
Weekly use of sprays					
No (ref.)†	863	78	1	22	1
1 type	372	73	1	27	1.28 (0.96-1.71)
≥ 2 types	202	69	1	31	1.41 (0.99-2.00)
<i>P-trend</i>					0.03
Weekly use of chemicals					
No (ref.)†	863	78	1	22	1
1 type	733	75	1	25	1.14 (0.90-1.45)
≥ 2 types	316	70	1	30	1.42 (1.06-1.91)
<i>P-trend</i>					0.02

* OR from logistic regressions, adjusted for age, smoking status, body mass index, and education level. OR – odds ratio; CI – confidence interval. †No weekly use of sprays or chemicals.

Table E3. Associations between specific types of DCP and asthma control in all participants

	Asthma Control Test score							P-trend
	25 (ref.)			20-24			≤19	
	n	%	OR*	%	OR* (95% CI)	%	OR* (95% CI)	
No weekly use of sprays or chemicals (ref.)	863	32	1	46	1	22	1	
Weekly use of:								
Furniture sprays	125	25	1	45	1.26 (0.79-2.01)	30	1.68 (0.99-2.83)	0.05
Windows/mirror sprays	176	26	1	41	1.14 (0.76-1.71)	34	1.91 (1.23-2.97)	0.004
Floor cleaning sprays	63	25	1	48	1.20 (0.63-2.29)	27	1.11 (0.53-2.33)	0.69
Degreasing/oven sprays	55	29	1	40	0.87 (0.44-1.70)	31	1.21 (0.58-2.50)	0.55
Air-refreshing sprays	315	25	1	46	1.27 (0.93-1.75)	29	1.54 (1.07-2.22)	0.01
Insecticide/pesticide/acaricide spray	117	27	1	43	1.18 (0.73-1.91)	31	1.67 (0.98-2.85)	0.05
Other sprays	53	23	1	42	1.27 (0.61-2.63)	36	2.06 (0.96-4.42)	0.05
Ammonia	43	44	1	40	0.61 (0.31-1.21)	16	0.47 (0.19-1.18)	0.06
Acids	405	27	1	45	1.17 (0.88-1.55)	27	1.45 (1.04-2.02)	0.02
Stain removers/solvents	139	22	1	48	1.58 (0.99-2.50)	30	1.89 (1.13-3.17)	0.01
Bleach	848	28	1	44	1.08 (0.86-1.35)	28	1.34 (1.03-1.74)	0.04

* OR from multinomial logistic regressions, adjusted for age, smoking status, body mass index, and education level. OR – odds ratio; CI – confidence interval

Table E4. Associations between specific types of DCP and asthma control in participants without household help

	Asthma Control Test score							P-trend
	25 (ref.)			20-24		≤19		
	n	%	OR*	%	OR* (95% CI)	%	OR* (95% CI)	
No weekly use of sprays or chemicals (ref.)	465	34	1	48	1	19	1	
Weekly use of:								
Furniture sprays	80	20	1	49	1.62 (0.86-3.05)	31	2.48 (1.22-5.06)	0.01
Windows/mirror sprays	109	25	1	41	1.12 (0.65-1.91)	34	2.28 (1.26-4.12)	0.006
Floor cleaning sprays	39	23	1	51	1.20 (0.51-2.84)	26	1.14 (0.41-3.13)	0.72
Degreasing/oven sprays	29	17	1	45	1.43 (0.49-4.19)	38	2.74 (0.87-8.59)	0.06
Air-refreshing sprays	177	27	1	47	1.16 (0.76-1.77)	26	1.53 (0.92-2.54)	0.10
Insecticide/pesticide/acaricide spray	60	25	1	47	1.33 (0.68-2.62)	28	1.90 (0.87-4.16)	0.11
Other sprays	26	12	1	46	2.92 (0.79-10.8)	42	5.99 (1.56-23.0)	0.003
Ammonia	32	41	1	41	0.64 (0.28-1.47)	19	0.62 (0.22-1.80)	0.27
Acids	237	30	1	46	1.07 (0.74-1.54)	25	1.51 (0.97-2.36)	0.09
Stain removers/solvents	74	18	1	54	2.23 (1.14-4.37)	28	2.82 (1.31-6.07)	0.004
Bleach	490	29	1	45	1.03 (0.76-1.39)	26	1.49 (1.03-2.14)	0.05

* OR from multinomial logistic regressions, adjusted for age, smoking status, body mass index, and education level. OR – odds ratio; CI – confidence interval

Table E5. Associations between types of DCP and asthma control, imputed dataset (n=2980)

	Asthma Control Test score		
	25 (ref.; controlled)	20-24 (partly controlled)	≤19 (poorly controlled)
Weekly use of sprays			
No (ref.)†	1	1	1
1 type	1	1.06 (0.81-1.40)	1.29 (0.93-1.77)
≥ 2 types	1	1.36 (0.95-1.94)	1.75 (1.17-2.61)
Weekly use of chemicals			
No (ref.)†	1	1	1
1 type	1	1.12 (0.90-1.39)	1.21 (0.93-1.58)
≥ 2 types	1	1.15 (0.85-1.55)	1.62 (1.16-2.27)
Household cleaning patterns			
Very sparse cleaning	1	0.82 (0.54-1.26)	1.63 (1.03-2.59)
Sparse cleaning	1	0.97 (0.73-1.29)	1.29 (0.89-1.88)
Medium cleaning	1	1.04 (0.71-1.53)	1.55 (1.03-2.34)
Frequent general cleaning	1	1	1
Frequent use of products	1	1.00 (0.77-1.31)	1.11 (0.79-1.56)
Very frequent general cleaning	1	1.20 (0.88-1.64)	1.22 (0.83-1.70)
Very frequent use of products	1	1.19 (0.83-1.70)	1.59 (1.06-2.40)

Data presented as OR (95% CI) from multinomial logistic regressions, adjusted for age, smoking status, body mass index, and education level. OR – odds ratio; CI – confidence interval. †No weekly use of sprays or chemicals.

We used multiple imputations to estimate asthma control among women with missing values on the Asthma Control Test, assuming a missing at random pattern.^{E2} We used the PROC MI SAS procedure to perform 20 imputations using. The following variables were included in the imputation model: age; frequency of wheezing, woken up with a feeling of chest tightness, attack of shortness of breath (SOB) at rest, attack of SOB after exercise, woken by attack of SOB, woken by attack of coughing in the last 12 months; symptoms exacerbations; difficulty breathing; breathlessness (4 classes); exacerbations in the past 12 months (deterioration in asthma requiring: treatment with an oral corticosteroid, or an emergency department visit or hospitalization or a change of asthma treatment); asthma exacerbations >2 days in the past 12 months; seasonal asthma exacerbations in the past 12 months, asthma attacks in the past 3 months; woken up because of asthma in the past 3 months; breathing difficulty frequency in the past 3 months; chronic obstructive pulmonary disease ever; rhinitis ever; eczema ever; smoking (never, ex and current smokers); body mass index; hospitalizations for asthma attacks, emergency visit because of asthma, medical visit for asthma in the past 12 months; Asthma Quality of Life Questionnaire score (past 2 weeks); number of canisters of Short Acting Beta Agonist dispensed in the past 12 months (claims database). Compared to women without missing values for ACT, women with missing values were older (70.4 years on average vs. 69.6, p=0.006) and less often overweight or obese (36% with BMI≥25 vs. 43%, p=0.002), but did not differ for smoking status, education level, weekly use of spray or chemicals and household help (all p>0.15).

Table E6. Associations between types of DCP and asthma control, with adjustment for multimorbidity-related medication profiles

	Asthma Control Test score		
	25 (ref.; controlled)	20-24 (partly controlled)	≤19 (poorly controlled)
Weekly use of sprays			
No (ref.)†	1	1	1
1 type	1	1.03 (0.77-1.38)	1.24 (0.88-1.73)
≥ 2 types	1	1.23 (0.84-1.81)	1.58 (1.03-2.43)
<i>P-trend</i>		0.33	0.03
Weekly use of chemicals			
No (ref.)†	1	1	1
1 type	1	1.13 (0.90-1.43)	1.20 (0.91-1.59)
≥ 2 types	1	1.02 (0.75-1.40)	1.41 (0.99-2.01)
<i>P-trend</i>		0.63	0.04
Household cleaning patterns			
Very sparse cleaning	1	0.77 (0.49-1.21)	1.44 (0.89-2.33)
Sparse cleaning	1	0.98 (0.72-1.33)	1.31 (0.91-1.88)
Medium cleaning	1	1.06 (0.72-1.56)	1.52 (0.98-2.36)
Frequent general cleaning	1	1	1
Frequent use of products	1	1.05 (0.78-1.42)	1.12 (0.78-1.62)
Very frequent general cleaning	1	1.21 (0.86-1.68)	1.12 (0.74-1.69)
Very frequent use of products	1	1.15 (0.78-1.70)	1.62 (1.04-2.50)

Data presented as OR (95% CI) from multinomial logistic regressions, adjusted for age, education level, and multimorbidity-related medication profiles. Multimorbidity-related medication profiles were identified by a clustering method relying on medications assessed through drug administrative databases, as described previously.^{E3} Three profiles were identified: “Few multimorbidity-related medications” (34.3%), “Predominantly allergic multimorbidity-related medications” (39.5%) and “Predominantly metabolic multimorbidity-related medications” (26.2%). The clustering model included a comprehensive list of selected drug classes, and three clinical/environmental factors that could not be assessed by drug classes (obesity, sleep apnoea syndrome and smoking status).

OR – odds ratio; CI – confidence interval. †No weekly use of sprays or chemicals.

References

- E1. Marbac M, Sedki M, Boutron-Ruault MC, Dumas O. Patterns of cleaning product exposures using a novel clustering approach for data with correlated variables. *Ann Epidemiol.* 2018;28:563-569.e6.
- E2. Temam S, Chanoine S, Bédard A, Dumas O, Sanchez M, Boutron-Ruault MC, et al. Low socioeconomic position and neighborhood deprivation are associated with uncontrolled asthma in elderly. *Respir Med.* 2019;158:70–7.
- E3. Chanoine S, Sanchez M, Pin I, Temam S, Moual N Le, Fournier A, et al. Multimorbidity medications and poor asthma prognosis. *Eur Respir J.* 2018;51:1702114.