

A photograph of a window with a view of a blue sky and white clouds. The window is framed by colorful striped curtains (blue, yellow, and red) hanging from a wooden rod. The text is overlaid on the image.

Indoor air pollution and Respiratory health

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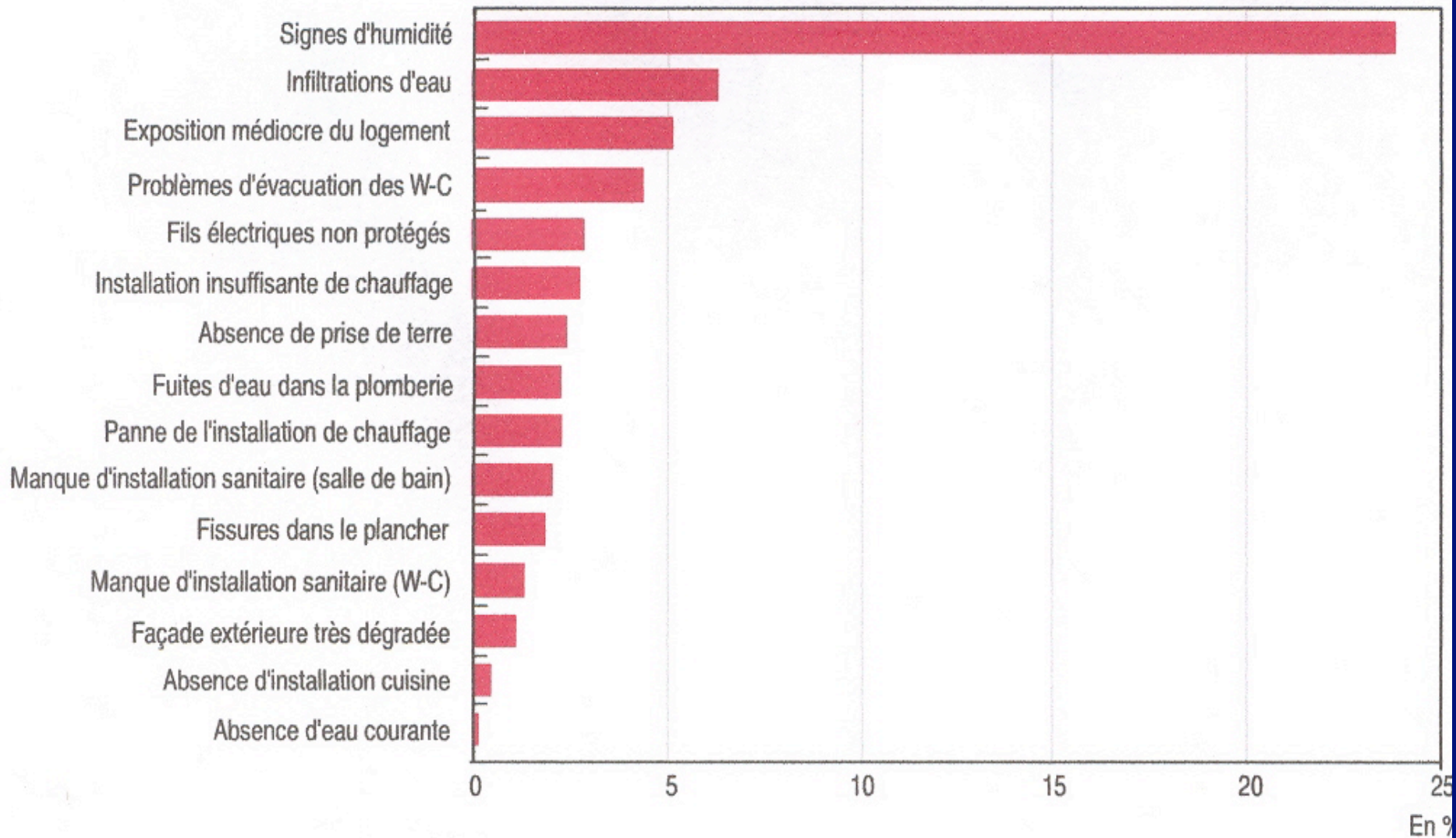
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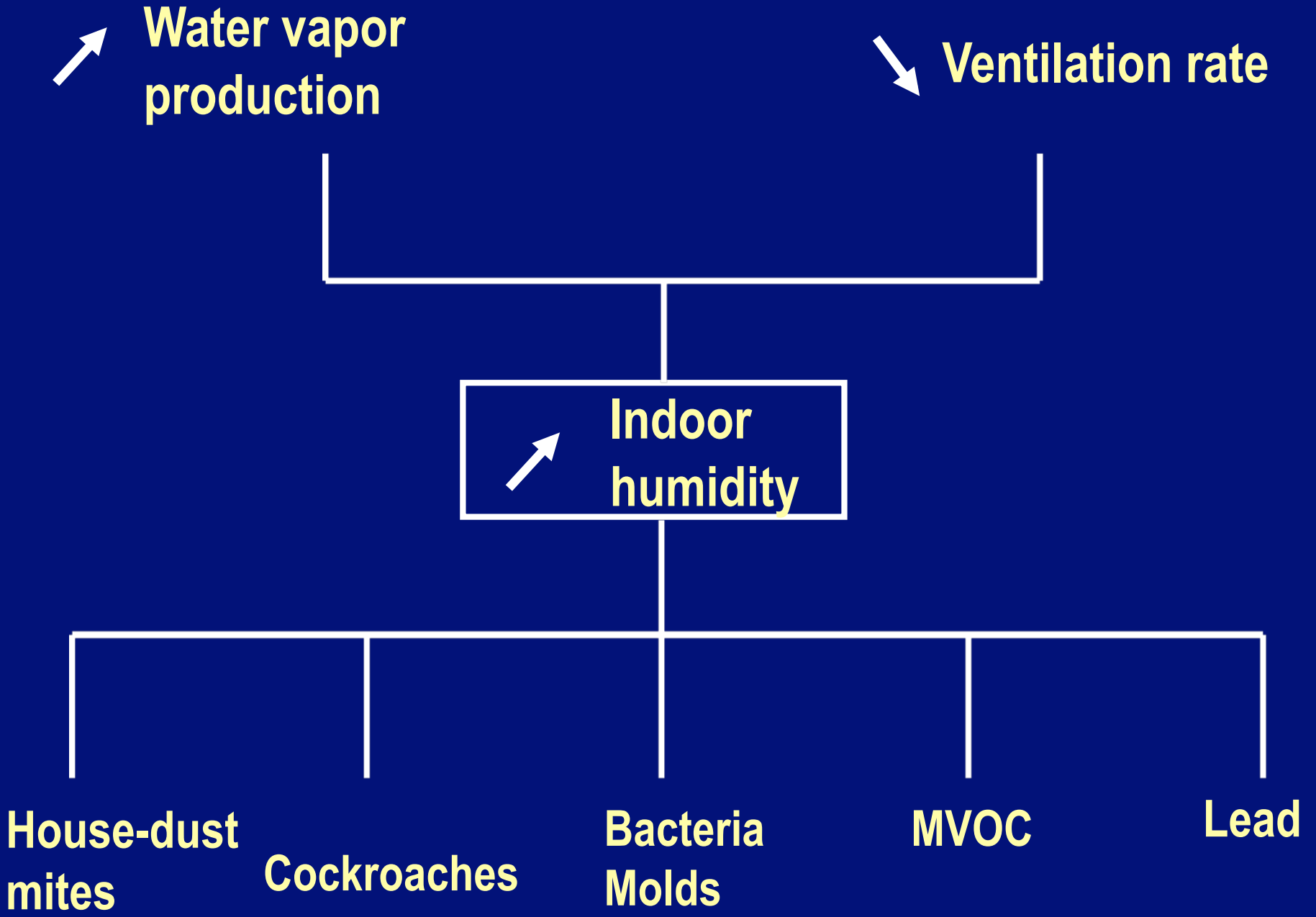
Health hazards identified	%
Indoor molds	74.4
High mite-allergen levels (Acarex-test® ; ++ / +++)	56.3
Indoor VOCS	9.0
Household cleaning materials to hand of children	47.8
Drugs to hand of children	21.1
Defects in electric circuit	14.3
High indoor electromagnetic field	2.8

Indoor dampness is by far the commonest defect of dwellings

① Part des logements concernés pour chaque difficulté







Water vapor production

Ventilation rate

Indoor humidity

House-dust mites

Cockroaches

**Bacteria
Molds**

MVOC

Lead

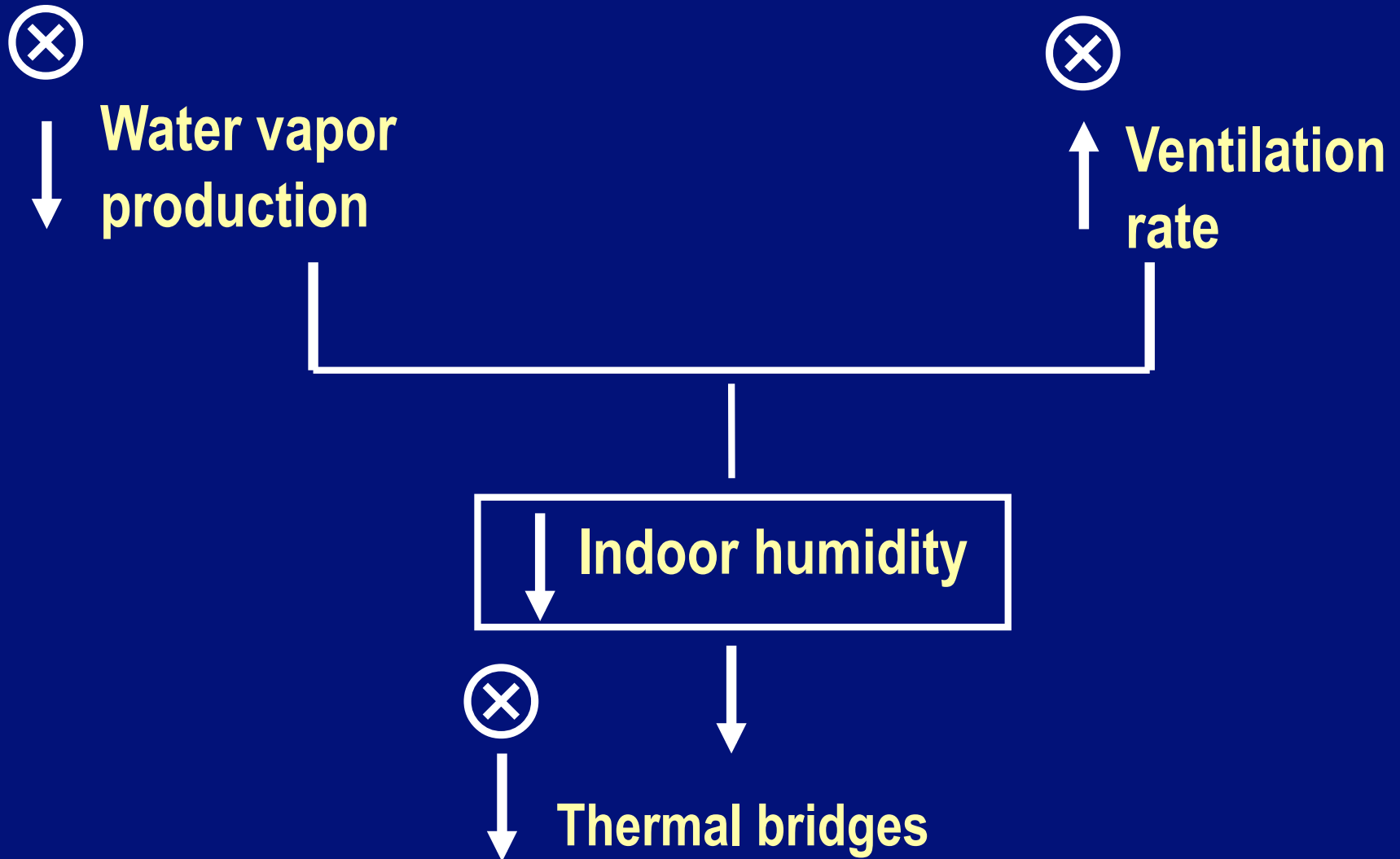
Health impact

Mecanism	Allergy	Irritation	Toxicity	Infection in immuno-compromised patient
Aero-contaminants	<ul style="list-style-type: none"> - House dust mites - Cockroaches - Molds 	<ul style="list-style-type: none"> - MVOC - Glucans - Endotoxins 	<ul style="list-style-type: none"> - Mycotoxins 	<ul style="list-style-type: none"> - Bacteria - Molds
Health impact	Rhinitis and/or asthma	Rhinitis and/or asthma	<ul style="list-style-type: none"> - General discomfort - SBS - Pulmonary hémorr. in infants 	<ul style="list-style-type: none"> - Pulmonary infections - Septicemia

Computed respiratory risks

Symptom/Disease	Study group	N° Study	OR (95%C.I.)
ENT symptoms	All	13	1.70 [1.44 - 2.00]
Cough	All	18	1.67 [1.49 - 1.86]
	Adults	6	1.52 [1.18 - 1.96]
	Children	12	1.75 [1.56 - 1.96]
Wheezing	All	22	1.50 [1.38 - 1.64]
	Adults	5	1.39 [1.04 - 1.85]
	Children	17	1.53 [1.39 - 1.68]
Active asthma	All	10	1.56 [1.30 - 1.86]
Ever asthma	All	8	1.37 [1.23 - 1.53]
Newly developed asthma	All	4	1.34 [0.86 - 2.10]

What to do ?

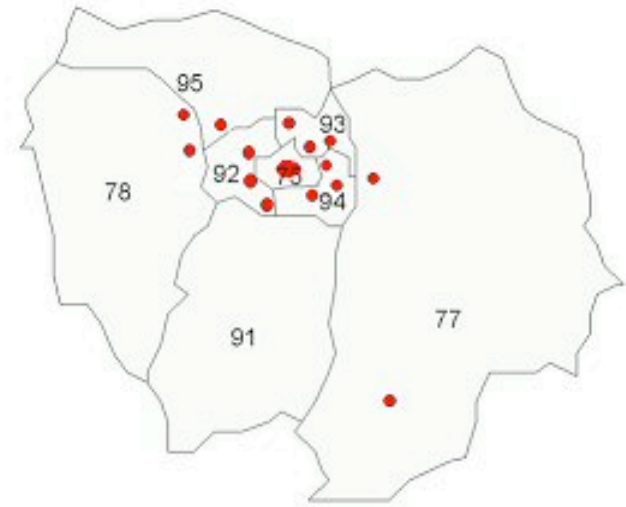
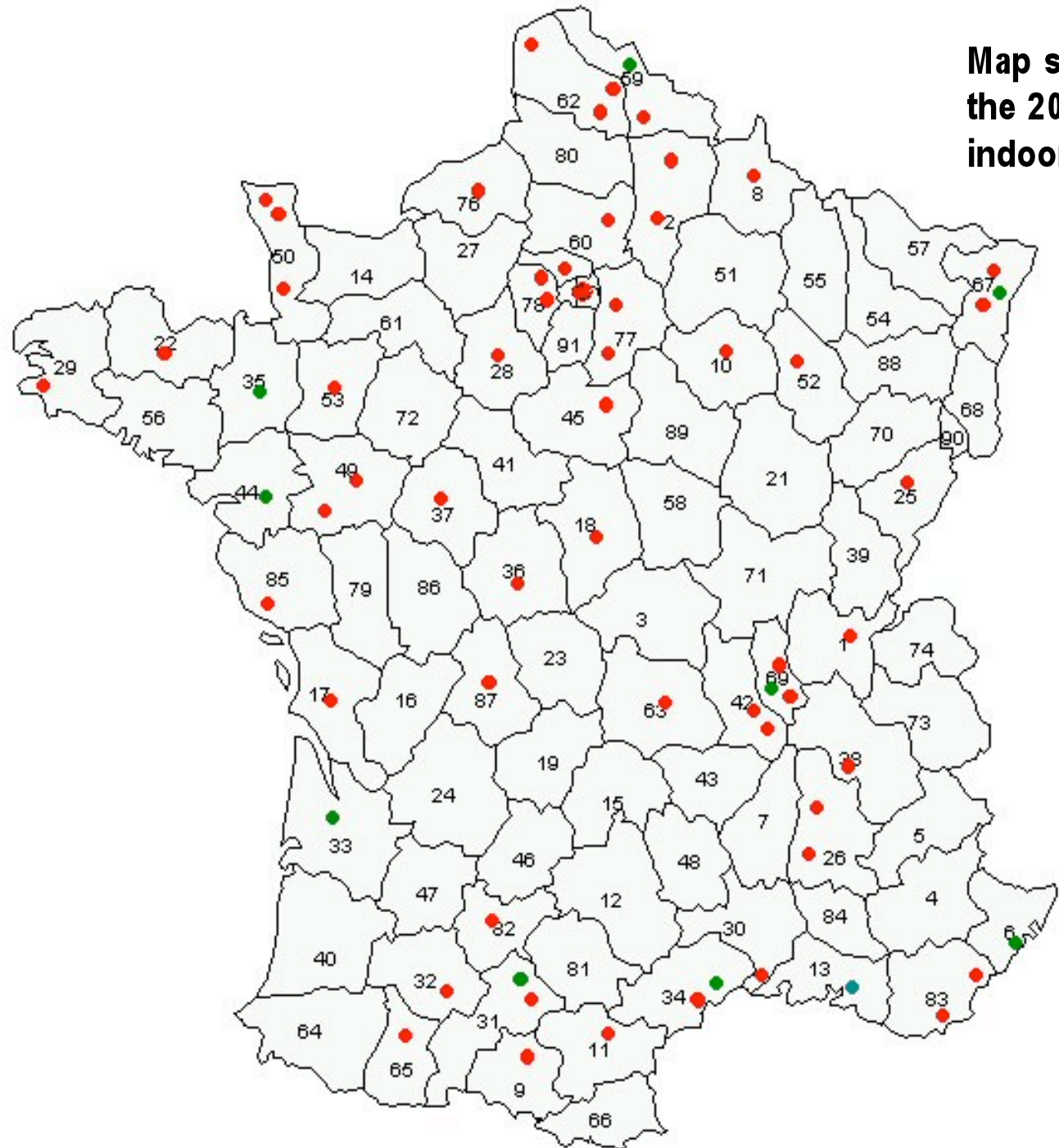


What are VOCs ?

Organic compounds containing one or more carbon atoms that have high vapor pressures and therefore evaporate readily to the atmosphere.

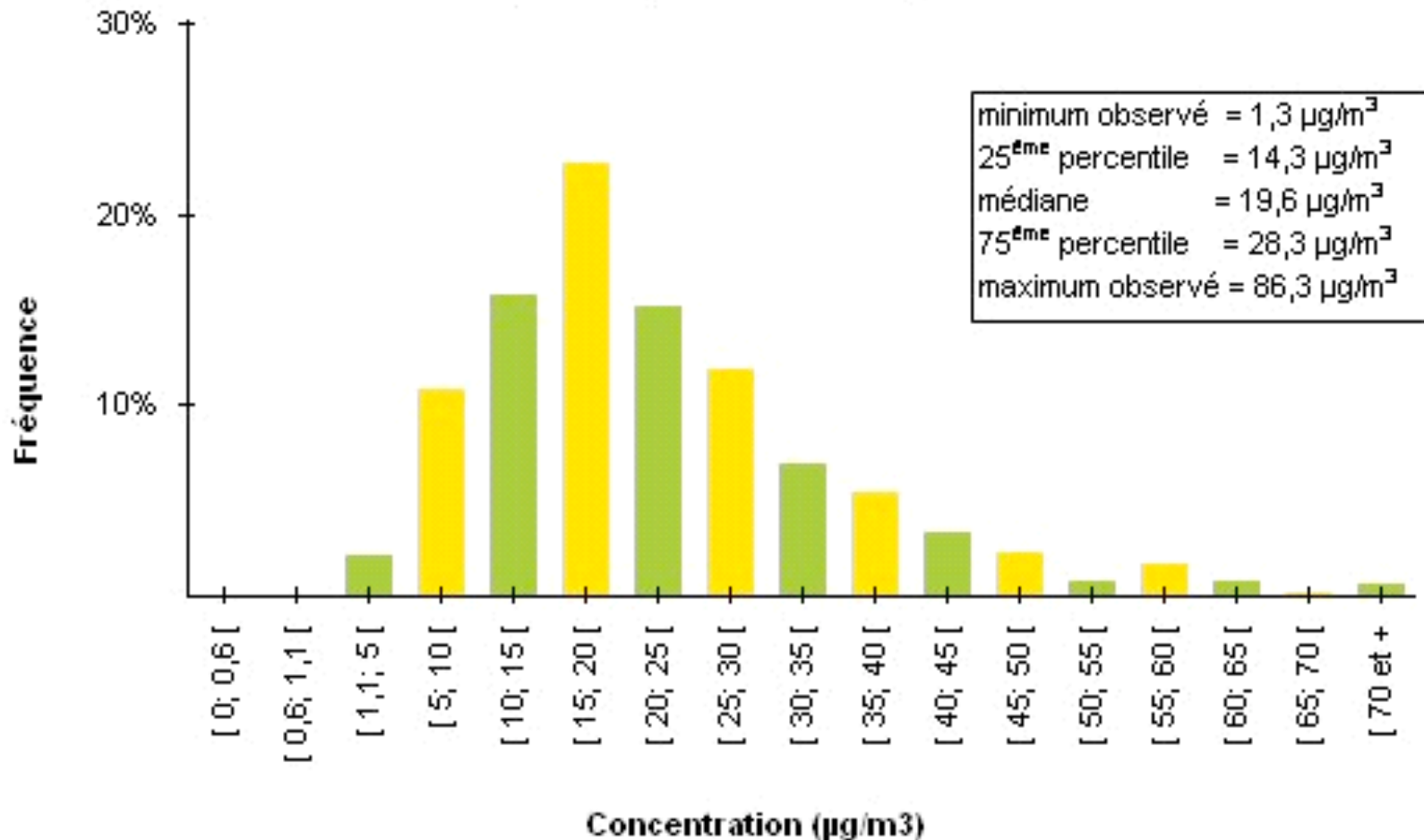
Natural sources of VOC are larger overall but anthropogenic sources in populated and industrialized areas are the main contributors to air quality problems.

Map showing communities included in the 2003 survey of the French national indoor air quality network.

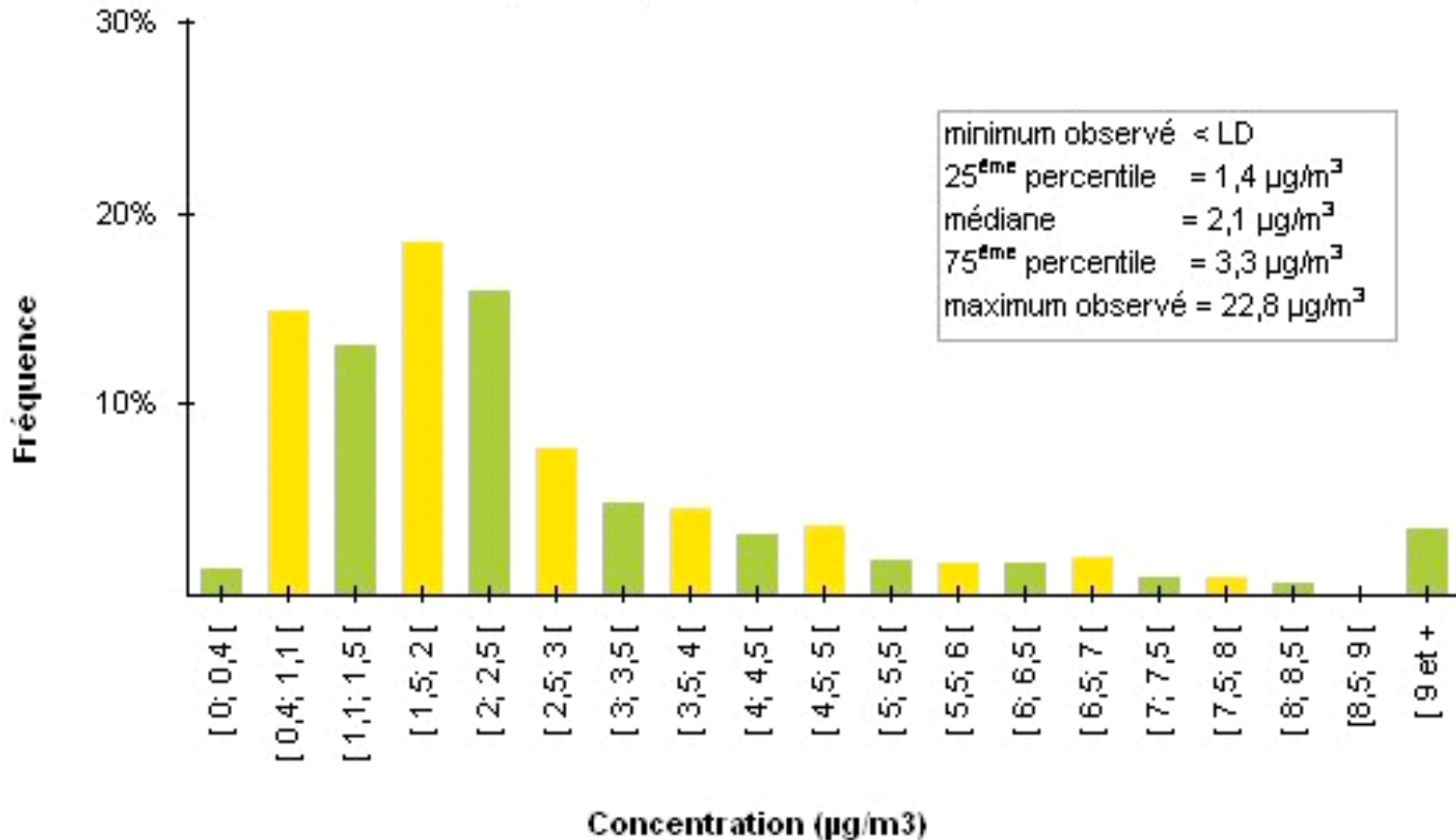


- Communes de plus de 100 000 résidences principales
- Communes de moins de 100 000 résidences principales tirées au sort

Concentration en formaldéhyde Chambre principale ou pièce assimilée Répartition pondérée des logements



Concentration en benzène Chambre principale ou pièce assimilée répartition pondérée des logements



European Community Respiratory Health Survey (n=3503, 10 countries, 10-year follow-up study).

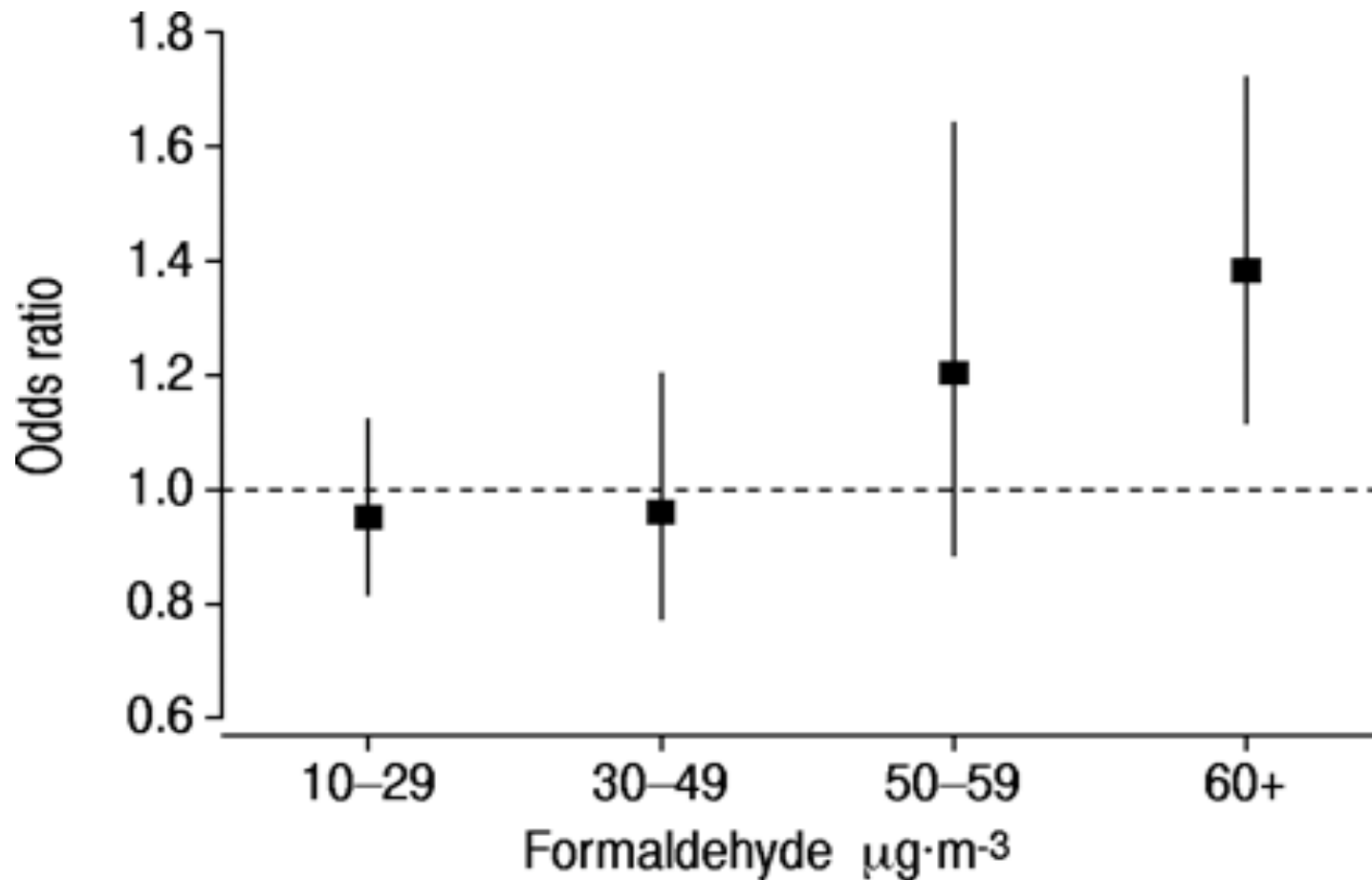
Incidence of :

Asthmatic symptoms	1.49 [1.12 - 1.99]
Intake of anti-asthmatic drugs	1.39 [1.06 - 1.80]
Diagnosis of newly-diagnosed asthma	2.11 [1.15 - 3.89]

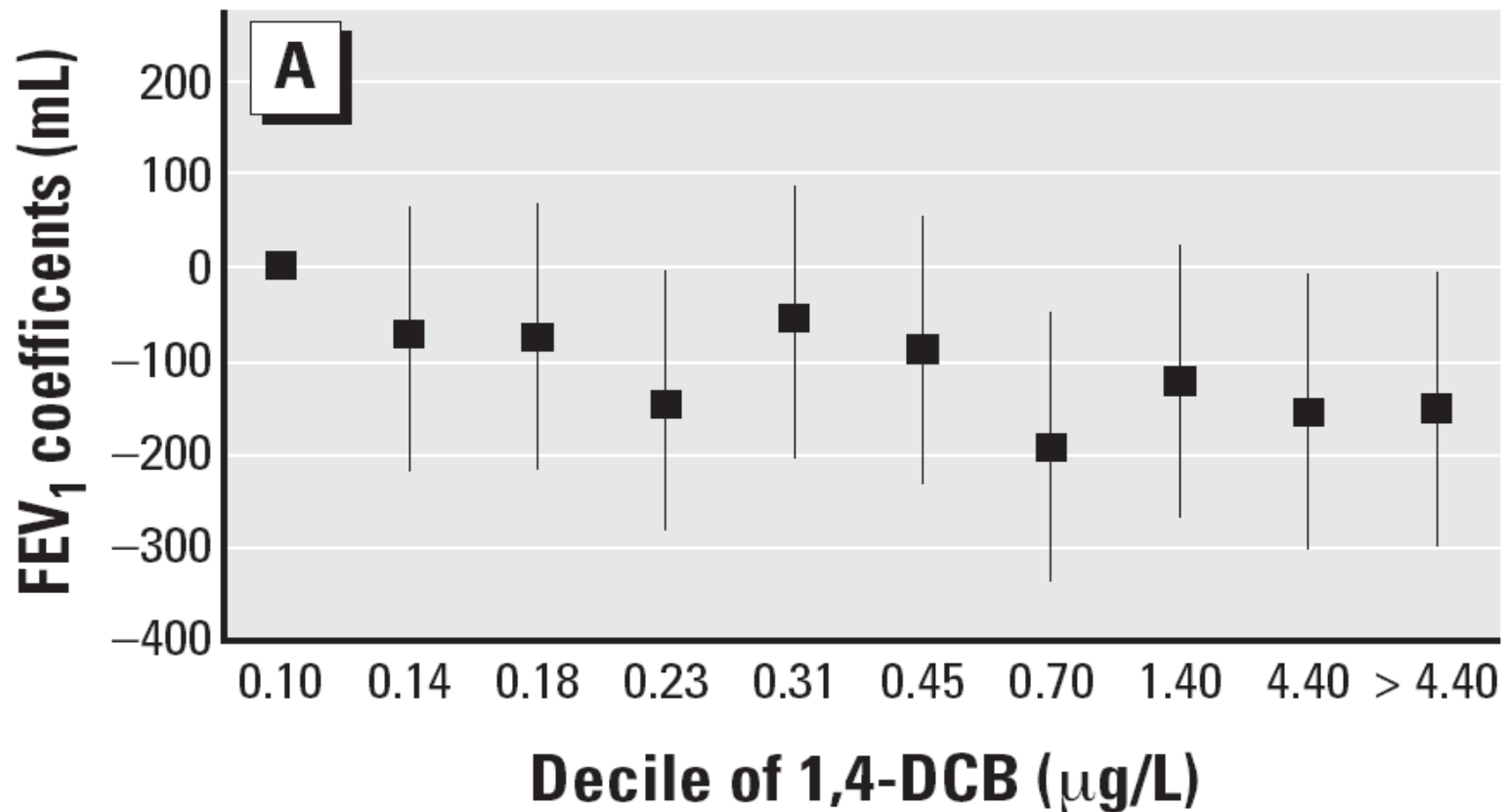
Relationship between personal exposure to VOCs and asthma risk in a sample of the American adult general population

Independent variables	Physician diagnosed asthma		
	Odds ratio	95% CI	
Factor 1 ^a	1.63	1.17	2.27
Benzene	1.33	1.13	1.56
Ethylbenzene	1.34	1.01	1.78
Toluene	1.21	0.93	1.58
<i>o</i> -Xylene	1.32	1.04	1.67
<i>m,p</i> -Xylene	1.33	1.08	1.64
Factor 2 ^b	0.93	0.66	1.32
Tetrachloroethene	1.02	0.90	1.15
Trichloroethene	0.94	0.77	1.14
No loading ^b			
Chloroform	1.10	0.89	1.35
1,4-dichlorobenzene	1.16	1.03	1.30
MTBE	1.19	1.07	1.32

Relationship between exposure to formaldehyde and incidence of asthma in young children



Relationship between exposure to VOCs and pulmonary function in the American NHANES III survey.



A summary of respiratory health hazards related to VOCs:

- **[ENT and bronchial irritative symptoms]**
- **Increase in asthma attacks**
- **Increase in rate of newly-diagnosed asthma**
- **[Potential cancer risk]**

Conclusion

The main 2 indoor environmental risk factors are:

- **home dampness**
- **VOC exposure**

To prevent or control them, 2 joint actions :

- **reduce hazard production**
- **increase indoor ventilation rate**