

# Estimated cost of indoor air pollution: First study in France

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The quality of air inside buildings is a public health concern in France and in many other countries. In fact, indoor environments encompass a broad diversity of exposure scenarios and many physical agents and chemical and microbiological contaminants which have variable effects on health. Numerous health risk assessments, research studies and measurement campaigns are being, or have been, conducted in France in order to reinforce population prevention and protection measures. In addition, an exploratory study of the socio-economic cost of indoor air pollution has been launched by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES), the Observatory for Indoor Air Quality (OQAI) and Pierre Kopp, Professor of economy at the University of Paris I – Sorbonne-Panthéon. This work has led to the development of an exploratory method aiming to quantify the economic consequences of the impact of certain indoor air pollutants on the health of the population living in France. This first study, more illustrative than quantitative due to the assumptions adopted and the limits identified, estimates the cost of indoor air pollution at approximately 19 billion euros per year.

The quality of indoor air is a public health concern in France and in many other countries, since individuals living in temperate climates spend an average of almost 90% of their time in indoor environments.

Indoor environments encompass a broad range of different exposure scenarios and numerous physical agents and chemical or microbiological contaminants. The health consequences of these exposures vary greatly depending on the type of pollutant, and the intensity and duration of exposure. The occurrence of health effects also depends on other factors such as genetic determinants, socio-economic considerations and other environmental parameters.

In order to address this health challenge and to reinforce population prevention and protection measures, numerous health risk assessments, research studies and measurement campaigns have regularly been conducted in France.

In an attempt to evaluate the consequences of this pollution for the community, an *exploratory study to test the method for evaluating the socio-economic cost of indoor air pollution* has been launched in relation to a project implemented by ANSES, the OQAI, and Pierre Kopp, Professor of economy at the University of Paris I – Sorbonne-Panthéon. The study proposes a method for calculating the economic consequences of the impact of some indoor air pollutants on the health of the population living in France, over a given year.

Providing socio-economic insight into a public health issue

Beyond the health aspects, this study will also provide socio-economic insight into a public health issue which will prove useful in structuring prevention measures.

Any pollutant found in the air of indoor environments regardless of its source, whether it is specific to the environment and its occupants (heating, cooking, furniture, cleaning products, etc.), or exterior to it, such as pollution of the outdoor atmosphere, for example, is considered to be an indoor air pollutant.

For this study, six pollutants have been selected: benzene, radon, trichloroethylene, carbon monoxide, particulate matter and environmental tobacco smoke. The choice of these pollutants is based on the availability of data on both population exposure in French housing and extrapolated to other types of interior environments (OQAI data), and the existence of a dose-response relationship or published health data, in conjunction with expert assessments on indoor air guideline values (IAGVs) conducted by ANSES.

In this study, the economic consequences of indoor air pollution for society correspond to the costs of the health impact generated by the selected pollutants (estimated cost of premature deaths, health care, production losses, etc.).

#### Results and prospects for further development

According to the exploratory method developed, the cost for the community comes to approximately 19 billion euros per year. While these results should be considered more of an illustration than a final figure due to the assumptions adopted and the limits identified, they indicate that the costs associated with the health impact of exposure to particulate matter represents a major part of the total cost. Since the costs generated by the health effects of certain pollutants are also applied to studies on outdoor air pollution, the cost estimations for indoor and outdoor air cannot be added together.

Further development of this work will require the integration of other pollutants commonly found in indoor air environments, formaldehyde and moulds for example, as well as the possible health effects of co-exposures by the population to various indoor air pollutants. Further development of this work would also entail analysing the sensitivity of certain calculation hypotheses.

A comparison with other socio-economic calculation methods should make it possible to improve the robustness of the results obtained and to evaluate the possibility of applying like methods to other subjects.

Source: <https://www.anses.fr/en/content/estimated-cost-indoor-air-pollution-first-study-france>