

## Saharan Dust Pollution: Implications for the Sahel?

### To the Editor:

The main source of atmospheric mineral dust is the Sahara desert, which produces about half of the yearly global mineral dust.<sup>1</sup> About 12% of the Saharan dust moves northwards to Europe, 28% westwards to the Americas, and 60% southwards to the Gulf of Guinea.<sup>1</sup> Saharan dust storms can lead to particulate matter (PM) levels that exceed internationally recommended levels.<sup>1-3</sup> Recently, special attention has been paid to the mineral PM air pollution of dust storms, which may be a serious health threat.

We took a systematic review of the literature to find relevant studies on the effects of Saharan dust on air quality or human health. We searched the ISI web of knowledge database using "PM<sub>10</sub>," "PM<sub>2.5</sub>" or "health" AND "dust storm," "sand storm," "African dust," "Saharan dust," or "dust events" without restrictions. The search extended from January 1999 to December 2008.

We selected 97 articles of which 72 studied PM air pollution in Europe, 13 in the Americas, 7 in the Near East and Asia, and 4 considered international data. Only one specifically addressed air pollution in the Sahel. Four focused on human health effects—2 in the Mediterranean and 2 in the Caribbean.

Recent work has shown that wind-blown Saharan dust causes daily mortality to increase by 8.4% per 10  $\mu\text{g}/\text{m}^{-3}$  increase in PM<sub>10-2.5</sub> in Barcelona, Spain. However, the increase in average PM concentration during Saharan and dust days was modest: from 14.9 to 16.4  $\mu\text{g}/\text{m}^{-3}$  PM<sub>10-2.5</sub>, and from 38.9 to 46.3  $\mu\text{g}/\text{m}^{-3}$  PM<sub>10</sub>.<sup>4</sup> These findings are consistent with

results from a 10-year time-series analysis of morbidity in Cyprus. All-cause admissions were 4.8% higher on Saharan dust storm days and cardiovascular admission were 10.4 higher.<sup>5</sup> On the Caribbean island of Trinidad, Saharan dust clouds have been associated with increased pediatric asthma accident and emergency admissions,<sup>6</sup> although these results have been challenged.<sup>3</sup>

Despite this large body of information far from the source, information about health effects of dust storms in the Sahel is remarkably scarce. In 41 villages across Niger, a survey assessed farmers' views about the relative importance of constraints to agricultural production. Surprisingly, health problems related to dust storms were of more concern than crop damage or loss of topsoil. Eighty percent of villagers (n = 892) reported severe health symptoms during the Harmattan season, when people are exposed to high dust concentration.<sup>7</sup> In Nouakchott, Mauritania, mineral dust accounts for an estimated 137 daily exceedances of the 50  $\mu\text{g}/\text{m}^{-3}$  PM<sub>10</sub> EU limit value per year. The annual mean PM<sub>10</sub> is 108  $\mu\text{g}/\text{m}^{-3}$ .<sup>3</sup>

An appeal for more studies about health effects of desert dust in Europe appeared recently in this journal,<sup>8</sup> with concern that the toxicity from coarse mineral particles may be underestimated. However, most of the desert dust is deposited near its source<sup>1</sup>; the mass concentration of PM affecting air quality several thousand kilometers away is relatively modest.

What are the effects of the much larger PM concentrations near the Sahara? How sensitive are Sahelian people to large amounts of coarse mineral dust? What are the health effects of exposure to several consecutive days of high dust concentration? No systematic particulate air pollution data are available for

the Sahel, and the potentially-affected countries do not have good-quality public health data to adequately support such studies. More research on this topic is sorely needed in arid and semiarid regions of West Africa, where air pollution studies are currently as scarce as rainfall.

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## AUTHOR QUERIES

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