

# Measuring the acute health effects of dust storms: a matched analysis

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## Key words:

Transcontinental sandstorms are frequent in the eastern Mediterranean basin, with southeasterly winds transporting dust from the Sahara desert. The resulting ambient particulate matter is a potential health hazard for exposed populations. We aimed to quantify the extent of acute cardiac and respiratory health effects attributable to sandstorms in an Eastern Mediterranean region.

Continuous air quality monitoring is carried out by the Israel Ministry of Environmental Protection. We identified all sandstorm days (SSDs) for the period between January 2006 and December 2008. For each of these "case" days, we selected 2 non-sandstorm control days from the previous and the subsequent fortnights, matching them for day of the week. The number of emergency department (ED) visits for acute cardio-respiratory conditions at a regional medical center was counted for each SSD and its matched control days. SSD counts were compared to mean matched counts using the paired t-test.

48 SSDs and 96 matched control days were identified during the 3-year study period. Mean cardio-respiratory ED patient load on SSDs was  $32.67 \pm 11.39$  visits, compared to a mean of  $29.07 \pm 5.33$  on matched control days ( $p=0.04$ ). This represents a relative increase of 12.4% over the expected patient load. In absolute terms, and based on our medical center's estimated catchment population, this represents an increase of approximately 1.8 ED visits per 100,000 for each SSD, or 2,160 excess cases annually in Israel.

Sandstorms are a significant risk factor for acute cardio-respiratory syndromes, with a substantial impact on ED patient load in our region. This finding underlines the importance of the Ministry of Environmental Protection's pre-storm warning system, which appeals through the mass media to predisposed persons to remain indoors on SSDs. Future research should be focused on measuring the impact of sandstorms on community clinic patient load.

In this study, we quantify the additional emergency department cardio-respiratory patient load attributable to natural dust storms. Our presentation will discuss several methodological challenges in this type of epidemiologic study, the solutions we adopted to overcome them, and the sensitivity analyses we used to establish the robustness of our results. We will also discuss the importance and effectiveness of our pre-sandstorm warning system that advises susceptible individuals to remain indoors during storm activity.