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Spatiotemporal distribution of major pollutants and their health impacts in Hubei Province from 2015 to 2018 based on machine learning to improve LUR

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Air pollution poses a serious threat to human health. A large number of studies have shown that certain diseases are closely related to air pollution. Understanding the spatiotemporal distribution of air pollutants and their health effects are of great significance for pollution prevention. This study takes Hubei Province, China as an example. It integrates measured ground air quality data, natural environment data, and socioeconomic data, and uses machine learning to improve the land use regression model to simulate the spatial distribution of concentration $PM_{2.5}$ / O_3 from 2015 to 2018 in the study area. The combined pollutant concentration data and population raster data were used to assess the deaths from specific diseases (stroke, ischemic heart disease, lung cancer) caused by air pollutants. The result shows that high concentrations of pollutants are concentrated in the more economically developed eastern regions of Hubei Province, and the economically backward western regions have good air quality. In addition, the distribution of deaths caused by exposure to air pollution is similar to that of pollutants, which is higher in eastern part of Hubei province. However, the total number of deaths in the province is decreasing year by year. This result shows that environmental governance policies have alleviated the threat of air pollution to human health to some extent. It shows that Hubei Province should combine actual conditions and spatial-temporal distribution characteristics of pollutants to make appropriate environmental protection measures.