

An expanded Heathrow Airport would lead to 100 more pollution-related early deaths annually in the U.K. by 2030

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Planes await takeoff at London's Heathrow Airport.

According to the U.K.'s Department for Transport, demand for air travel in the country will more than double by 2030, from 127 million to 300 million passengers per year. A debate over how to accommodate this rising demand has revolved around two main proposals: adding a third runway to London's Heathrow Airport, or replacing Heathrow with a new airport in the Thames Estuary. Over the years, concerns over cost and environmental impacts have fueled both sides of the debate.

Now a study evaluating the health impacts associated with the two

proposals finds that a new hub on the Thames Estuary may be the better option.

The study, published this week in the journal [Atmospheric Environment](#), has found that by 2030, an expanded Heathrow would add 100 early deaths from air pollution annually in the U.K. Compared with the expanded Heathrow scenario, a new [airport](#) on the Thames Estuary would cause 60 to 70 percent fewer [premature deaths](#).

Steven Barrett, an assistant professor of [aeronautics and astronautics](#) at MIT, says the numbers make sense from a geographic perspective.

"Heathrow is almost in the worst possible place because it's in the middle of this populated area, and upwind of it," says Barrett, the study's lead author and director of the Laboratory for Aviation and the Environment at MIT. "The pollution from an airport [in the Thames] would just blow over the [North Sea](#)."

The findings are part of a wider assessment the team conducted on the health impacts of the U.K.'s 20 busiest airports. To determine the number of premature deaths from airport-related emissions, the team first tracked the number of flights coming in and out of each airport, using 2005 to represent the present day. The researchers also obtained projections from the Department for Transport of the number of flights expected in 2030 under scenarios where Heathrow is and is not expanded.

For each scenario, the team developed a model, detailed in a previous paper, to estimate emissions from aircraft, as well as ground support vehicles such as trolleys and tractors. The team then used a model called Weather Research and Forecasting to simulate wind patterns and other atmospheric conditions throughout the country. They plugged the aircraft emissions data into the model to see where the winds carried the

pollution, and then used a simulation of chemical reactions in the atmosphere to understand conversion of emissions into fine particles. Finally, the group superimposed the fine-particulate data over population-density maps in the country.

Previous epidemiological studies have determined the health risk associated with long-term exposure to given concentrations of fine particulate matter. Barrett and his colleagues applied the health-risk data to their fine-particulate map to determine the number of premature deaths caused by a given airport scenario.

In a present-day scenario in which Heathrow operates under current demands, the researchers found the airport-related emissions cause 50 premature deaths throughout the U.K. If Heathrow undergoes no expansion, the number of early deaths would increase to 110 by the year 2030, possibly as a result of other U.K. airports expanding to meet growing demand.

If officials decide to expand Heathrow, adding a third runway, the study projected, the resulting [air pollution](#) would cause 150 early deaths annually; a new replacement airport on the Thames Estuary would drop that number to 50, as any [emissions](#) created by the new hub would be carried across the English Channel, away from population centers.

Barrett says there are several factors the group did not account for in evaluating a Thames Estuary scenario. For example, if a new airport were built, populations might grow around that airport, while traffic around a retired Heathrow might decrease, creating less pollution around London (and more to the west). Barrett says that overall it is not clear if these additional factors would increase or decrease the relative benefits of the Thames Estuary option, but thinks these will be smaller than the effect of moving aircraft.

"Even by expanding the hub airport's capacity and moving it, you would cause fewer deaths than not expanding the hub and leaving it where it is," Barrett says. "When you look at the results, they're environmentally quite interesting."

The team also found that the number of early deaths in all scenarios would decrease if airports adopted several key mitigation measures: removing sulfur from jet fuel, using one engine instead of two to taxi, converting ground transportation to electric power, and using preconditioned air from the airport terminal to cool aircraft cabins when their engines are off.

"If the cost was no object, and the air quality and health impacts were the priority, then clearly the Thames airport would make more sense," Barrett says. "But obviously, it would cost a lot of money. If people decided to do this, it would be a very long process."

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