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Publication Announcement

FAA Should Monitor Aircraft Cabin Air Quality,

Re-evaluate Regulations

More than a decade after the Federal Aviation Administration banned smoking on all domestic airline flights, passengers and cabin crew still frequently complain that the air on planes is unpleasant and may be unhealthy. The air is a mixture of outside and recirculated air, similar to that in many homes and offices. But the proximity of passengers to one another, the need for cabin pressurization, low humidity, and potential exposure to common chemical and biological contaminants -- all in an enclosed structure -- makes the cabin environment unique.

In a new report requested by Congress, the National Academies' National Research Council says the FAA should conduct a rigorous scientific investigation to ensure that regulations governing the air quality in commercial aircraft cabins are adequate to protect public health. The agency also should establish a surveillance program that monitors flights to determine compliance with FAA air-quality regulations and documents health effects or complaints.

The committee that wrote the report noted that the number of air passengers worldwide has nearly quadrupled in the last 30 years to about 1.5 billion annually. And concomitant with this increase, the number of older and younger passengers has gone up, including children, infants, and people with pre-existing medical conditions.

Because few health-effects data for passengers and crew have been collected in conjunction with exposure information, it is extremely difficult to establish a causal relationship between poor air quality on planes and adverse health effects, the report says. On the other hand, some evidence suggests that environmental factors inside commercial aircraft may be responsible for particular health complaints among passengers and crew. Ozone pollution may cause respiratory problems and decreased oxygen pressure may present a health risk for people with certain pre-existing conditions, such as cardiac and respiratory diseases. Other toxic substances that may contaminate cabin air, such as engine oils, hydraulic fluids, de-icing solutions, and pesticides, have not been monitored adequately to assess potential health risks.

Although the FAA requires that ozone concentrations be maintained within specified limits, studies indicate that ozone levels on some flights may exceed FAA and U.S. Environmental Protection Agency standards. Elevated ozone concentrations at ground level have been associated with decreased lung function, airway irritation, exacerbation of asthma, and impairment of the immune system. The FAA should take steps to ensure that its current regulation for ozone -- which limits average concentrations to less than 0.1 parts per million above 27,000 feet, and less than 0.25 parts per million above 32,000 feet -- is met on all flights, the committee said. In addition, aircraft should be either equipped to prevent ozone from entering the cabin or prohibited from flying at altitudes where high ozone concentrations are likely to occur. To ensure compliance, the FAA should monitor flights to verify that ozone controls are working properly.

The committee also was concerned about adverse health effects that may result from what is known as the reduced partial pressure of oxygen. At cruising altitudes, oxygen pressure in the atmosphere is too low to support human life, so the cabin must be pressurized. Current FAA regulations require that cabin air pressure must be no lower than the air pressure that naturally occurs at 8,000 feet. But it is unknown whether this is adequate to protect all passengers and crew from reduced partial pressure of oxygen, which typically does not cause problems for healthy people, but could pose risks for those who have conditions that may impair oxygen circulation through the bloodstream. People with pulmonary or cardiac disease, for example, might experience symptoms such as headache, lightheadedness, dizziness, fatigue, and numbness. The committee recommended further study to determine whether the 8,000-foot altitude cap for cabin pressure is adequate.

When operated properly, environmental control systems onboard aircraft provide an ample supply of air to pressurize the cabin, maintain a comfortable environment, and dilute or otherwise reduce odors, heat, and contaminants, the committee said. However, the current design standard for the minimum amount of outside air circulated into cabins is about half the ventilation rate often required for building environments. Low ventilation rates in buildings have been linked to increased incidences of health symptoms and sick leave, but whether building ventilation standards are appropriate for airplanes has not been established. The spread of infectious agents during flights does not appear to be facilitated by aircraft ventilation systems, but rather by the high density of people, the committee concluded.

An aircraft's environmental control system can be a source of contamination during abnormal operations when engine oil, hydraulic fluids, or de-icing solutions enter the cabin through the air-supply system in what is called "bleed air." Many crews and passengers have reported incidents of smoke or odors within cabins. The committee said FAA should study the need for and feasibility

of installing equipment to remove vapors and particles from air supplied by the environmental control system on all flights.

Two environmental factors that may contribute to passenger and crew complaints about air quality are low relative humidity and pesticide use. Low relative humidity occurs on nearly all flights and might cause some temporary discomfort, such as drying of the eyes, nose, and skin. Exposure to pesticides that are routinely sprayed on some international flights can cause skin irritation and are reported to be neurotoxic.

Reiterating a recommendation made in a 1986 Research Council report on cabin air quality, the committee called for a regulation requiring the removal of passengers from an aircraft within 30 minutes after the ventilation system fails or is turned off on the ground. Air conditioning also should be required to be kept on continuously during warm weather.

In addition, cabin crews should be trained to recognize and respond to asthma attacks and other serious allergic reactions that can be triggered by the presence of airborne allergens in the cabin, the committee said. Furthermore, FAA should work with organizations such as the American Medical Association and the Aerospace Medical Association to improve awareness among doctors, flight crews, and passengers of the potential health risks of flying. The report was sponsored by the Federal Aviation Administration. The National Research Council is the principal operating arm of the National Academy of Sciences and the National Academy of Engineering. It is a private, nonprofit institution that provides science and technology advice under a congressional charter. A committee roster follows.

Read the full text of *The Airliner Cabin Environment and the Health of Passengers and Crew* for free on the Web, as well as more than 1,800 other publications from the National Academies. Printed copies are available for purchase from the National Academy Press Web site or by calling (202) 334-3313 or 1-800-624-6242. Reporters may obtain a pre-publication copy from the Office of News and Public Information (contacts listed above).

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