

Economic and Environmental Costs of Obesity

The Impact on Airlines

During the 1990s, the mean weight of American adults rose approximately 10 lb according to data from the National Health and Nutrition Examination Survey conducted by the National Center for Health Statistics (Table 1). The direct health and disease implications of this change are serious,¹ but indirect economic and environmental effects are relevant as well.

During 2000, air travelers flew approximately 515 billion passenger-miles in the United States.² The U.S. Department of Transportation estimates that on average each gallon of jet fuel powers an airliner to transport 7.3 tons of passengers or cargo 1 mile by air (1994 data).³ Therefore, the average American weight gain over the last decade required the consumption of an additional 350 million gallons of jet fuel in 2000, roughly 2.4% of the total volume of jet fuel consumed in domestic service that year.⁴ At an average jet fuel cost of 79 cents per gallon,⁴ airlines spent approximately \$275 million in 2000 to transport this additional adiposity. The extra jet fuel consumption also produced environmental impacts, resulting in an additional 3.8 million tons of CO₂ emissions, and smaller quantities of other pollutants such as NO₂, CO, and particulates.^{5,6}

Although these rough calculations do not take into account variables such as the age, race/ethnicity, gender, country of residence, weight distribution of the flying public, or the variation in fuel efficiency by type and age of aircraft, they do highlight the order of magnitude of additional previously undocumented consequences of the ongoing epidemic of obesity in the United States.

In 1995, the Federal Aviation Administration (FAA) set the recommended average weight per adult passenger used in calculating aircraft loads at 180 lb in summer and 185 lb in winter.⁷ In May 2003, in response to the January 2003 crash of a commuter airplane in which passenger and baggage weight might have been a factor, the FAA ordered airlines temporarily to add 10 lb to the assumed average weight of its passengers when calculating aircraft loads.⁸ The FAA is examining information on current passenger and baggage weights to revise rules to better account for the increased weight of the average passenger.⁹

Table 1. Estimated mean weight^a of adults aged ≥ 20 years, United States, 1988–1994 and 1999–2000

Year	Mean weight (lb)	
	Male	Female
1988–1994 ^b	180.7	152.3
1999–2000 ^c	189.2	163.7
Change	+8.5	+11.4

^aOn the basis of physical measurements.

^bFrom National Center for Health Statistics.¹⁰

^cFrom National Center for Health Statistics, National Health and Nutrition Examination Survey 1999–2000, unpublished data, Hyattsville MD, February 2, 2004.

Andrew L. Dannenberg, MD, MPH

Deron C. Burton, MD, JD, MPH

Richard J. Jackson, MD, MPH

E-mail: acd7@cdc.org

National Center for Environmental Health
Centers for Disease Control and Prevention
Atlanta, Georgia

References

1. National Task Force on the Prevention and Treatment of Obesity. Overweight, obesity, and health risk. *Arch Intern Med* 2000;160:898–904.
2. U.S. Department of Transportation, Bureau of Transportation Statistics. National transportation statistics 2002. Table 1-34: U.S. passenger-miles. Available at: www.bts.gov/publications/nts/2002/html/table_01_34.html. Accessed June 2, 2004.
3. U.S. Department of Transportation, Bureau of Transportation Statistics. Airline fuel cost (1977–2004). Available at: <http://www.bts.gov/xml/fuel/reports/src/tableversion.xml>. Accessed July 29, 2004.
4. U.S. Department of Transportation, Bureau of Transportation Statistics. Fuel cost and consumption. Available at: www.bts.gov/oai/fuel/fuelyearly.html. Accessed June 2, 2004.
5. National Academy of Sciences. Table 3.1. Typical aircraft turbine engine exhaust gas composition at cruise operating conditions. In: *For greener skies—reducing environmental impacts of aviation*. Washington DC: National Academy Press, 2002. Available at: http://bob.nap.edu/html/greener_skies/ch3_t1.html. Accessed June 2, 2004.
6. U.S. Oil and Refining Company. Specifications for aviation turbine fuel, jet A, density. Available at: www.usor.com/pdfs/specs/lpd/finished/JetA.pdf. Accessed June 2, 2004.
7. U.S. Department of Transportation, Federal Aviation Administration. Aircraft weight and balance control. Advisory circular AC 120-27C. Washington DC. Issued November 7, 1995. Available at: [www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/1c80f3d68b747c3c86256e2e00568b46/\\$FILE/ATTJQA2U/ac120-27c.pdf](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/1c80f3d68b747c3c86256e2e00568b46/$FILE/ATTJQA2U/ac120-27c.pdf). Accessed June 2, 2004.
8. U.S. Department of Transportation, Federal Aviation Administration. Notice N8300.112: revision of all average weight programs, May 12, 2003. Available at: www.faa.gov/avr/afs/notices/8300/N8300-112.htm. Accessed June 2, 2004.
9. U.S. Department of Transportation, Federal Aviation Administration, Weight and Balance Control Program Committee. Federal Register 68 FR 31470, May 28, 2003.
10. National Center for Health Statistics. National Health and Nutrition Examination Survey III 1988–1994. Available at: www.cdc.gov/nchs/data/nhanes/t2.pdf and www.cdc.gov/nchs/data/nhanes/t3.pdf. Accessed June 2, 2004.