Immunity to Diphtheria and Tetanus in the United States

What is the problem and what is known about it so far?
It is standard practice in the United States to vaccinate babies against diphtheria, tetanus, and whooping cough during the first year of life and to give booster shots at 15 to 18 months and 4 to 6 years. Ninety-five percent of children in the United States receive at least three doses of the vaccine by age 35 months. Revaccination against diphtheria and tetanus is performed less frequently than recommended by the U.S. Advisory Committee on Immunization Practices (ACIP). Although diphtheria infections and tetanus are rare in the United States, both are highly fatal. Occasional outbreaks of diphtheria show that low levels of immunity can be dangerous.

Why did the researchers do this particular study?
To find out how many adults were immune to diphtheria and tetanus and whether anyone was particularly likely to have poor immunity.

Who was studied?
18,045 people at least 6 years of age who had taken part in a nationwide health survey (National Health and Nutrition Examination Survey) between 1988 and 1994 and had given blood samples.

How was the study done?
Blood samples were tested for immunity to diphtheria and tetanus by evaluating how much antibody (the protective material in the blood) was present in each sample. The authors used a questionnaire to evaluate income, residence in a metropolitan or nonmetropolitan area, educational level, marital status, occupation, history of military service, ethnicity, and access to health care.

What did the researchers find?
Only 60% of Americans were protected against diphtheria, and 72% were protected against tetanus. Mexican-American persons were somewhat less likely to have protection against diphtheria and tetanus than other groups. Men had better protection than women against diphtheria, but immunity to diphtheria decreased in men and women as they got older. Immunity to tetanus was much lower for women than for men. By age 70 years, only 45% of men and 21% of women were protected against tetanus. People with more years of education had increased protection against both infections. People with low income and those with previous military service were less likely to be protected against diphtheria, but previous military service was associated with increased protection against tetanus. In a surprising finding, people with good access to medical care were less likely to be protected against both infections.

What were the limitations of the study?
The study evaluated only antibody levels in the blood, although immunity to infection also involves other mechanisms.

What are the implications of the study?
Since immunity to diphtheria and tetanus decreases with age, doctors should reimmunize patients at 11 to 12 years of age and every 10 years thereafter, as recommended by the ACIP.