Spatiotemporal analysis emphasizes value of vaccination

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Willem G. van Panhuis, M.D., Ph.D., from the University of Pittsburgh, and colleagues digitized all weekly surveillance reports of nationally notifiable diseases for U.S. cities and states published from 1888 to 2011 using data from the U.S. Centers for Disease Control and Prevention's *Morbidity and Mortality Weekly Report* and its precursor journals. A detailed analysis was conducted, focusing on eight vaccine-preventable contagious diseases.

Assuming that the difference in incidence rates before and after vaccine

licensure was attributable solely to vaccination programs, the researchers estimate that vaccines prevented 103.1 million cases of contagious diseases since 1924. The number of cases prevented per disease varied with prevaccination incidence and the vaccine program duration, with the most cases prevented for diphtheria (about 40 million) followed by measles (about 35 million cases). In the years after vaccination, the proportion of cases of each disease prevented increased with varying rates. During the first five years after the measles vaccine licensure, 22.2 percent more cases were prevented each year. By year five after licensure, 95 percent of measles cases had been prevented, compared with year eight for polio, 19 years for diphtheria, and 17 years for pertussis. Since the 1980s, multiple resurgences of measles, rubella, mumps, and pertussis have occurred.

"Our analysis shows how high-resolution spatiotemporal data can be effectively used to illustrate these trends at the national and local levels and to inform public opinion about the necessity of vaccination programs," the authors write.

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