dren aged <15 years was 738 per 100,000. The most affected regions were central and southern Italy, with regional incidences seven to 36 times higher than in northern Italy. After an apparent decline in reported incidence during August-December 2002, the epidemic continued during the first half of 2003, affecting the southern regions of Abruzzo, Puglia, and Calabria (Figure 2).[4]

Reported by: ML Ciofi degli Atti, MD, F Fabi, MS, S Salmaso, D Biol, National Center for Epidemiology, Surveillance, and Health Promotion, National Institute of Health. R Pizzuti, MD, E de Campora, MD, Regional Health Authority, Campania, Italy.

CDC Editorial Note: Four measles-associated deaths and 594 hospitalizations occurred during January-July 2002 in Campania. This outbreak indicates that measles can be severe and sometimes fatal, even in industrialized countries. The outbreak occurred as a result of low vaccination coverage and affected primarily unvaccinated school-aged children. Vaccination coverage levels were lower for school-aged children than for preschool-aged children. The regional measles vaccination coverage estimated for the 1991 birth cohort was 16% in 1993,[5] increasing to 65% for the 1998 birth cohort.[1] Inadequate vaccination coverage could not interrupt virus circulation but resulted in a prolonged interepidemic interval (an earlier epidemic in Campania occurred in 1996) and a shift of the disease incidence toward older age groups during the 2002 epidemic.

The findings in this report are subject to at least two limitations. First, although SPES is four times more sensitive than statutory notification in detecting measles cases at the national level, and 22 times more sensitive in southern Italy,[1] it obtains data only on children aged <15 years. Because incidence data on older adolescents and adults were lacking, the extent of the epidemic probably was underestimated, and biased age distribution of cases probably occurred. Because incidence increased with age and peaked among children aged 10-14 years, many cases probably occurred among persons aged ≥15 years, which is consistent with data obtained through the hospital record review. Second, provincial results should be interpreted cautiously. SPES was designed to obtain information at the regional level. Although the large number of children in Campania under surveillance permitted estimation of incidence figures for each province, not all provinces were represented equally.

In Italy in 1979, measles vaccination was recommended for children aged >15 months. During the early 1990s, combined MMR vaccines were introduced, and in 1999, the recommended age of administration was lowered to 12-15 months. In areas where vaccine coverage among infants aged ≤2 years was >80%, administration of a second dose at age 5-6 years or at age 11-12 years has been recommended since 1999. However, each of the country's 20 regions establishes its own measles vaccination policy, and adherence to recommendations has not been universal. As a result, national vaccination coverage with 1 dose of MMR vaccine by age 24 months remains inadequate, with an estimated coverage of 74% in 2001.[6] Coverage is lowest in southern Italy.[7]

Italy's Field Epidemiology Training Program (FETP, known locally as PROFEA) assisted in this investigation. Modeled after CDC's Epidemic Intelligence Service, PROFEA was created to establish an experienced group of epidemiologists at local and regional levels.

Measles elimination requires achieving and sustaining 2-dose coverage of ≥95% in multiple subsequent cohorts, either through routine vaccination[8] or a combination of routine and supplemental immunization activities.[9] The World Health Organization's European Region aims to eliminate measles by 2007, but large differences in vaccination coverage and disease incidence exist among European countries.[10] In Italy, the interruption of measles transmission can be achieved at the national level only with coordinated and uniform actions throughout the country. For this reason, a national plan has been developed jointly by regional health authorities, the National Institute of Health, and the Ministry of Health. Key strategies to achieve measles elimination in Italy include (1) improving routine coverage with 1 dose of MMR vaccine to ≥95% of children aged 24 months, (2) conducting a national "catch-up" vaccination campaign for children aged 6-13 years during 2004-2005, (3) achieving and sustaining a high coverage with a second routine dose of MMR vaccine among children aged 5-6 years while administering the MMR vaccine simultaneously with the DTaP booster dose included in the national schedule, and (4) strengthening surveillance.

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10 available

West Nile Virus Infection Among Turkey Breeder Farm Workers—Wisconsin, 2002

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1 table omitted

IN 2002, WISCONSIN PUBLIC HEALTH OFficials were notified of two cases of febrile illness in workers at a commercial turkey breeder farm (farm A) in county A. The Wisconsin Division of Public Health (WDPH) initiated an investigation that found a high prevalence of West Nile virus (WNV) antibody among farm A workers and turkeys. An associated high incidence of febrile illness among farm A workers also was observed. This report summarizes the results of this investigation, which indicate possible nonmosquito transmission among birds and subsequent infection of humans at farm A. Because the mode of transmission in this outbreak is unknown, turkey handlers should take appropriate precautions, including use of DEET-

containing mosquito repellents, protective clothing and gloves, respiratory protection, and proper hand hygiene. Suspected occupationally acquired WNV infections should be reported immediately to local and state health departments.

During November 2002, WDPH and the Wisconsin State Laboratory of Hygiene (WSLH) confirmed that two ill residents of county A had been infected with WNV. Before these reports, only one human WNV infection had been reported in this county. Both persons worked at farm A and had febrile illness with rash during late September–early October. These human illnesses occurred after a suspected fowl pox outbreak among farm A turkeys in September. Workers were concerned the pox outbreak might be associated with their illnesses.

Farm A is one of six turkey breeder farms in county A owned by a company that also operates nonbreeder farms and a turkey meat processing plant in county A. The five other turkey breeder farms are located within 10 miles of farm A, and multiple private residences are within a quarter mile. In February 2003, county and state public health staff, in collaboration with the company, identified workers at the six turkey breeder farms, the nonbreeder farms, and the plant, and requested their consent to participate in a serosurvey. Serum samples were collected from participating workers (N=93) to identify persons infected recently. A questionnaire was administered to identify persons who had a febrile illness during August-October 2002. Serum samples also were collected from residents (N=14) who lived within a quarter mile of farm A. All serum samples were tested for WNV-specific IgM antibody at WSLH.[1] IgM-positive specimens were confirmed by plaque-reduction neutralization tests at CDC.[2] Of 107 total participants, 10 (9%) were seropositive. Of approximately 90 workers at the six breeder farms, 57 (63%) participated; of these, 10 (18%) were infected recently with WNV. None of the meat processing workers or other area residents was infected. Of 11 persons who worked exclusively at farm A, six (55%) were WNV IgM-positive, compared with two (25%) of eight who worked at both farm A and other breeder farms and two (5%) of 38 who worked only at other breeder farms. Of the 10 IgM-positive workers, six (60%) reported febrile headaches during August-October (all occurring during the last week of September), compared with seven (7%) of 97 IgM-negative persons sampled ($p=0.0002$ by Fisher exact test). All six IgM-positive persons who reported febrile headache had worked at farm A. All six noted a skin rash, and one had meningoencephalitis and was hospitalized; no deaths occurred. Reported mosquito exposures and bites were similar for IgM-positive (nine [90%] and eight [80%] of 10, respectively) and IgM-negative workers (67 [85%] and 54 [68%] of 79, respectively). Only one (2%) of 57 breeder farm workers reported using insect repellent while working.

Farm A includes two breeder bird barns and a juvenile flock barn. The breeder barns separate uncaged females from male turkeys with a solid plywood wall. The sides of the barns housing the female turkeys are covered with 1 in. × 1 in. mesh wire fencing and plastic curtains that can be adjusted to lower the temperature during warm months.

Serum from farm A turkeys and turkeys from the nearest breeder farm were collected in late January 2003. The farm A flock sampled was the group of birds housed in the juvenile flock barn from mid-June to early December 2002, at which time this flock was moved to a breeder barn on farm A to replace a flock slaughtered in November. The flock sampled on the nearby farm was a breeder flock also in place in September. Both flocks had suspected fowl pox outbreaks during September. Serum samples were submitted to the U.S. Department of Agriculture's National Veterinary Services Laboratories for WNV-neutralizing antibody testing. Of 135 farm A female turkeys, 130 (96%) had WNV-neutralizing antibody (measured at two dilutions, 1:10 and 1:100, and considered to be positive if a given dilution neutralized ≥90% of virus growth). No WNV-neutralizing antibody was found in 135 female turkeys tested from the nearby farm or 30 male turkeys tested from either farm.

Reported by: LC Glaser, DVM, MV Wegner, MD, JP Davis, MD, Div of Public Health, State of Wisconsin Dept of Health and Family Svcs. ML Bunning, DVM, AA Marfin, MD, GL Campbell, MD, Div of Vector-Borne Infectious Diseases, National Center for Infectious Diseases; B Bernard, MD, SW Lenhart, MSPH, Div of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health; MJ Sotir, PhD, EIS Officer, CDC.

CDC Editorial Note: The investigation described in this report found that workers at farm A had a higher incidence of febrile illness and prevalence of WNV antibodies than workers at other breeder and nonbreeder farms, workers at a turkey meat processing facility, or persons who lived on or near the affected farm and who did not work in the turkey barns. The mode of transmission to these workers is unknown. Although the majority of human WNV infections are mosquito-borne, transmission by less typical routes might have occurred, including percutaneous (e.g., exposure of broken skin or mucosa to infected turkey feces or serous exudates from dually-infected pox lesions), fecal-oral, or respiratory (e.g., exposure to aerosolized infected turkey feces).

The WNV seroprevalence (96%) among female turkeys on farm A was high. However, experimental evidence suggests that turkeys develop insufficient levels of WNV viremia to contribute to a bird-mosquito-bird amplification cycle.[3] Although WNV was detected in the feces of these turkeys, no oropharyngeal shedding or transmission to cage mates was observed.[3] Nonvector-borne WNV transmission has been demonstrated experimentally among rodents and among certain bird species other than turkeys.[4,5] Once WNV was introduced to female turkeys at farm A (presumably by mosquitoes), widespread transmission within that flock might have taken place by fecal-oral, respiratory, or another atypical (e.g., percutaneous

exposure associated with pecking behavior or vaccination) route. In addition, other unique conditions at farm A, including possible co-infection with an avian pox virus, might have resulted in higher WNV viremias or infectious materials with higher WNV titers than laboratory studies have suggested.

Despite uncertainty over the mode(s) of transmission, epidemiologic evidence suggests that this outbreak was related to occupational exposure. Occupationally acquired WNV infections have been reported previously among laboratory or field workers who experienced a known percutaneous injury or aerosol exposure while working with high concentrations of WNV in cell culture or infected animal tissues.[6-9] In this investigation, no such exposure was documented. Because the mode of transmission in this outbreak is unknown, turkey handlers should (1) take personal protective measures, including wearing protective clothing and using mosquito repellents (e.g., those containing DEET on skin and clothing and those containing permethrin on clothing), as recommended for outdoor workers; (2) wear gloves; and (3) wash hands frequently. In addition, respiratory protection has been recommended for reducing other exposures to workers in turkey barns.[10] Respiratory protection should be selected and used in accordance with the Occupational Safety and Health Administration (OSHA) respiratory protection standard (Title 29 CFR 1910.134).

Workers should receive training that reinforces awareness of potential occupational hazards and risks and stresses the importance of timely reporting of all injuries and illnesses of suspected occupational origin. Health-care workers should inquire about a patient's outdoor exposure and occupation when a human WNV infection is suspected or identified and consider WNV as a possible etiology among turkey farm workers with febrile headache or rash, meningitis, encephalitis, or other severe neurologic illness, especially when WNV illnesses exist among co-workers or birds. Suspected occupationally acquired WNV infections should be reported immediately to local and state health departments.

The investigation of turkey breeder farm workers in county A is ongoing. In addition, further studies are needed to determine the factors involved in this outbreak, to better define the occupational risk for WNV infections, and to assess appropriate personal protective measures. On the basis of recommendations from public health staff, the company has made mosquito repellent containing 30% DEET available at farm A and other turkey breeder farms. Recommendations that were outlined previously in place at the company farms include protective clothing, frequent hand washing, and an OSHA-required respiratory protection program. Gloves and safety glasses also are available to workers.

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Publication of *Health, United States, 2003 With Chartbook on Trends in the Health of Americans*

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CDC HAS PUBLISHED *HEALTH, UNITED States, 2003 with Chartbook on Trends in the Health of Americans*, the 27th edition of the annual report on the nation's health. This report includes 151 trend tables organized around four broad subject areas: health status and determinants, health-care use, health-care resources, and health-care expenditures. Disparities in health by race/ethnicity and socioeconomic status are presented in several tables.

This year's report includes *Chartbook on Trends in the Health of Americans*. The chartbook assesses the nation's health by presenting trends and information about selected determinants and measures of health status. Determinants of health status include demographic factors, health insurance coverage, health behaviors, and preventive health care; measures of health status focus on trends in mortality and limitations of activity caused by chronic health conditions. Although the overall health of persons in the United States improved substantially during the 20th century, disparities in health and health care among segments of the U.S. population persist. This year's chartbook includes a special focus on diabetes, a leading cause of morbidity and mortality that is consuming an increasing amount of health care resources.

This report is available at http://www.cdc.gov/nchs/hus.htm. Additional information is available from the National Center for Health Statistics, telephone 301-458-4636, or at nchsquery@cdc.gov. Print copies can be purchased from the Government Printing Office, telephone 212-512-1800, or at http://bookstore.gpo.gov/index.html.