health-care providers. In southern Florida, where CFP is endemic, 68% of physicians who were presented with a typical case of CFP diagnosed it correctly.7 As a result of considerable education and outreach efforts by the Florida Department of Health during the past decade, accuracy of CFP diagnosis in that state has improved. However, in other nonendemic regions, diagnostic recognition remains low.

An interstate comparison of reports to PCCs revealed additional trends, beyond the increased number of NYC CFP cases. Unpublished data from CFP-related calls to the American Association of Poison Control Centers during 2000–2010 were analyzed for trends and changes in geographic distribution. The data revealed that the rate of CFP-related calls per capita during 2010, compared with the previous 10 years, was 55% higher in NYC but 44% lower in Florida. Although this data set might not be representative of individual state CFP records, the rate per capita of U.S. cases remained relatively constant throughout the preceding 11 years. This increase of reported cases in NYC might reflect changing sources and diversity of fish species marketed in NYC and elsewhere. The increase might also indicate improved awareness and capacity for investigation by the medical and public health community. The decrease in CFP reports from Florida likely was the result of improved awareness of CFP after extensive long-term outreach and education efforts and specific guidance on the harvest of high-risk fish in this endemic region.

CFP is considered a highly underreported illness, with only an estimated 10% of cases reported to health authorities.7 Increasing awareness among health-care providers might improve reporting and investigation. However, CFP prevention is complicated by difficulty in identifying high-risk fishing grounds and inadequate industry knowledge and compliance with the FDA seafood Hazard Analysis and Critical Control Point (HACCP) regulations.† Premarket testing of fish for CTX is not feasible because of the lack of rapid field methods and the sporadic distribution of toxic fish, even in endemic areas. Coordinated traceback of implicated fish by federal and state agencies to specific fishing grounds remains the primary strategy for managing CFP.

The findings in this report are subject to at least three limitations. First, meal remnant samples were available only in three of the six CFP outbreaks. Second, where physician reports to the PCC were unavailable, the symptoms were based entirely on self-report or secondhand reports from family members. Finally, additional cases might have occurred but were unrecognized because of lack of physician awareness to make an appropriate diagnosis and the need to report.

This investigation demonstrates the value of CFP-implicated fish traceback along with updated information on emerging CFP risks, including new harvest areas and species. Prevention through education alone might be limited by seafood mislabeling. Reports indicate that 20%-25% of all seafood products are mislabeled.8 A recent assessment of seafood purchased at retail stores and restaurants in New York, New Jersey, and Connecticut indicated that >20% of 190 specimens were mislabeled, incompletely labeled, or misidentified by employees.8 Methods for fish species identification using DNA barcoding have been validated9 and are being implemented in several U.S. state and federal laboratories, as well as academic institutions. These methods have been applied to multiple CFP cases. Ongoing collaborative efforts with federal, state, and local agencies tasked with consumer protection and food safety might be useful in controlling CFP and mislabeling of fish.10 Until accurate and cost-effective means of premarket testing become available, prevention of additional cases will continue to be dependent on HACCP compliance by the seafood industry and CFP diagnosis and reporting by health-care providers, warranting additional outreach and education.

Acknowledgment

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10 Available.
‡Additional information, including advisories and guidance related to high-risk species and endemic regions, is available at http://www.fda.gov/food/foodsafety/hazardanalysis/criticalcontrolpoint/haccp/seafoodhaccp/default.htm.

Serogroup A Meningococcal Conjugate Vaccine Coverage After the First National Mass Immunization Campaign—Burkina Faso, 2011


In December 2010, Burkina Faso became the first country to introduce PsA-TT (MenAfriVac), a new serogroup A meningococcal conjugate vaccine developed to eliminate epidemic meningitis in sub-Saharan Africa, via a national mass-immunization campaign. This campaign targeted persons aged 1-29 years, approximately 70% of the 16 million residents of the country. More than 11 million vaccine doses were administered in a 10-day period, for an estimated administrative coverage* of 102.6%.1 Accurate vaccination coverage estimates are critical for programmatic evaluation, identification of undervaccinated subpopulations, and for measurement of the impact of PsA-TT on serogroup A disease and carriage. In December 2011, the Burkina Faso Ministry of Health, in collaboration with CDC, conducted a stratified cluster survey to obtain regional and age-group–specific vaccination coverage estimates among campaign-eligible persons.
National coverage was 95.9% (74.3% with vaccination card, 21.6% by recall), and coverage in the 13 regions of Burkina Faso ranged from 90.8% to 98.3%. Coverage was 97.0% in children aged 2-5 years, 97.4% in those aged 6-15 years, and 93.4% in those aged 16-30 years. The results of this survey demonstrate successful introduction of a new vaccine in Burkina Faso through a mass immunization campaign, the first step in a strategy aimed at rapidly interrupting transmission and carriage of serogroup A Neisseria meningitidis before introduction of the vaccine into national routine immunization programs. With phased introduction of PsA-TT planned through 2016 in Africa’s “meningitis belt,”*† lessons learned from the Burkina Faso experience will help guide successful introduction of serogroup A meningococcal conjugate vaccine elsewhere.

A national survey was conducted during December 17-27, 2011, using a stratified cluster sampling scheme to assess PsA-TT coverage achieved by the mass immunization campaign implemented during December 6-15, 2010, in Burkina Faso. The sampling frame for a target population of persons aged 2-30 years (those aged 1-29 years in December 2010) was derived from 2011 population estimates projected from the 2006 national census. Strata were defined by the 13 administrative regions. Twenty-five enumeration areas, which are the smallest geographic units into which the country is divided for the purposes of a census, were selected from each stratum in the first stage using probability proportional to size. In each enumeration area, field teams demarcated the boundaries of the enumeration area, enumerated all the households, and systematically selected 20 households by calculation of a sampling interval. All campaign-eligible persons residing in selected households were included. The sample size of 500 households per stratum was calculated to provide regional estimates for three age groups (2-5 years, 6-15 years, and 16-30 years) with +/-8% precision, assuming 80% coverage, 95% confidence intervals (CIs), a design effect of two, and a 5% nonresponse rate.

A questionnaire was administered to the head of each of the consenting retained households to capture demographic and socioeconomic information for the household. Vaccination status, modes of communication regarding the vaccination campaign, and reasons for nonvaccination were recorded by direct interview with eligible household members, or by head of household or other parent for children too young to respond. Receipt of vaccination was documented by a vaccination card designed specifically for this campaign, or by recall. Additionally, residency in Burkina Faso during the 2010 campaign was recorded to obtain campaign coverage estimates and 2011 population coverage estimates, accounting for migration to and from bordering countries. Before survey implementation, a pilot study and formal training of field teams were conducted. Each field team consisted of two interviewers and a supervisor who were under the direction of a regional supervisor. The sample was assumed to be self-weighting within each stratum. For the national estimates, stratum-specific weights were included. Variance estimates using Taylor series linearization to account for the survey design were used to calculate 95% CIs.

A total of 23,890 eligible persons from 6,455 households were surveyed; 6,434 (99.7%) of retained households consented to participation in the survey. Of enrolled consenting persons, 23,577 (99.2%) resided in Burkina Faso during the 2010 campaign. The 2011 estimated coverage among all surveyed persons did not differ significantly from estimated coverage among those residing in Burkina Faso during the 2010 campaign, and thus only results from those residing in Burkina Faso during the campaign are reported. National coverage was estimated to be 95.9%, with coverage documented by vaccination card for 74.3% and by recall only for 21.6%. Estimated coverage was >90% in all regions, with the lowest coverage in the most populous Centre region (90.8%) and highest in the Centre-Ouest region (98.3%). Coverage was 97.0% in children aged 2-5 years, 97.4% in those aged 6-15 years, and 93.4% in persons aged 16-30 years. Coverage was 96.1% in females and 95.8% in males. Highest coverage was in females aged 2-5 years (97.7%), and lowest in males aged 16-30 years (93.0%). Among the 775 unvaccinated persons with a known reason for nonvaccination, the most commonly cited reasons were as follows: not informed (44.2%), absence (16.4%), no vaccine available at site (7.6%), and did not know the location of the vaccination clinic (6.4%).

What is already known on this topic?

Meningococcal meningitis epidemics are a major public health problem in the “meningitis belt” of sub-Saharan Africa. PsA-TT (MenAfriVac) is a new serogroup A meningococcal conjugate vaccine recently introduced in 10 of 26 target countries in this region.

What is added by this report?

This study documents PsA-TT coverage after a mass immunization campaign in Burkina Faso, the first country to introduce PsA-TT nationally. Results of this survey demonstrate high coverage (>90%) in all regions, targeted age groups, and sexes.

What are the implications for public health practice?

High PsA-TT vaccination coverage rates in Burkina Faso provide context for the observed reduction in meningitis disease rates. Maintenance of high levels of population immunity in Burkina Faso, and continued successful introduction of PsA-TT in other countries, will be important in the effort to eliminate epidemics of serogroup A meningococcal meningitis in sub-Saharan Africa. Rigorous coverage surveys will continue to be critical for monitoring introduction of this new vaccine.
most commonly reported modes of campaign communication were criers (social mobilizers) (36.8%), community health workers (24.0%), family (13.4%), and school (9.6%).

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Editorial Note: In the meningitis belt of sub-Saharan Africa, serogroup A meningococcal meningitis is a major cause of death and disability. Major epidemics occur every 5-12 years, with hundreds of thousands of cases and a case-fatality ratio of >10%. During 2010-2011, PsA-TT was introduced into the hyperendemic countries of Burkina Faso, Mali, and Niger through mass campaigns, at a cost of $0.40 per dose. As of December 2012, 100 million persons had been vaccinated in 10 countries, and introduction is planned in a further 16 countries by the end of 2016.

As the first country to introduce PsA-TT on a national scale, Burkina Faso achieved >90% coverage in all regions, target age groups, and both sexes. These results demonstrate that mass vaccination of a large proportion of the population is an effective strategy to rapidly achieve high vaccine coverage. The scope of this campaign is unprecedented; previous measles and yellow fever campaigns have only targeted persons aged <5 years or affected or resident and no cases in vaccinated persons, representing a 99.8% risk reduction (Direction de la Lutte Contre la Maladie. Burkina Faso Ministry of Health, unpublished data, 2012). This substantial reduction in disease among all age groups, including the 30% of the population outside of the target age for vaccination, not only indicates excellent early vaccine effectiveness, but also is suggestive of herd immunity.

Achievement of high vaccination coverage in Burkina Faso demonstrates that coordinated preparation through microplanning, community engagement and mobilization, and development of a comprehensive communication plan are critical to successful vaccination campaigns.

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