Introduction and widespread use of vaccines around the world has led to global eradication of smallpox and near-eradication of poliomyelitis (polio). In the United States, widespread use of vaccines has led to interruption of indigenous transmission (elimination) of polio, measles, rubella, and diphtheria as well as dramatic reductions in occurrence of other vaccine-preventable diseases. When the Communicable Disease Center (CDC; currently the Centers for Disease Control and Prevention) was established in 1946 and the Epidemic Intelligence Service (EIS) in 1951, the only vaccines routinely administered to children in the United States were smallpox and combined diphtheria and tetanus toxoids and pertussis vaccine (DTP), protecting children against 4 diseases with a simple schedule—a single dose of smallpox vaccine and 4–5 doses of DTP. Children now routinely receive vaccines to prevent 16 diseases according to a complex schedule (1). Consequently, dramatic reductions have occurred in vaccine-preventable diseases among US children (Table 1) (2).

Since CDC’s establishment in 1946, the agency’s employees have investigated vaccine-preventable diseases, and EIS officers (EISOs) have been involved since that program began (3). This article summarizes CDC and EISO investigations of vaccine-preventable diseases during 1946–2005, noting the association between investigations into specific diseases and introduction of vaccines for those conditions. It also provides selected examples of individual investigations as well as the role of current and former EISOs in developing and implementing immunization programs throughout the United States. Finally, it summarizes the role of EISOs in smallpox eradication and the ongoing effort to eradicate polio and reduce mortality caused by measles.

MATERIALS AND METHODS

CDC’s Office of Workforce and Career Development provided a line listing of all reports of epidemic-assistance investigations (Epi-Aids) by year for 1946–2005. The listing represented an abstraction of the listings of Epi-Aids from bound volumes. Epi-Aids typically were initiated only for those investigations carried out by headquarters-based
EISOs. Investigations conducted by state-based officers usually did not result in issuance of a formal Epi-Aid unless the officers were deployed to another state or out of the country. In addition, EISOs working within the Division of Immunization at CDC sometimes undertook investigations of vaccine-preventable diseases as part of program assistance to state and local immunization programs and did so without issuance of Epi-Aids.

The listing describes the topic of each investigation as of the time it was initiated. One of the authors (A. R. H.) reviewed the line listing of the 4,485 Epi-Aids for which an investigation was initiated and, on the basis of the subject line of each one, identified Epi-Aids related to the following conditions now preventable by vaccines—smallpox, influenza or pneumonia, polio, diphtheria, tetanus, pertussis, measles, mumps, rubella, hepatitis, Haemophilus influenzae type b (age <5 years), measles, mumps, rubella, hepatitis, Haemophilus influenzae type b (age <5 years), and other vaccine-preventable disease-related topics. The listing was reviewed twice (by the same person) to ensure complete ascertainment. The conditions influenza and pneumonia were combined because many of the investigations related to "acute respiratory disease," "suspected influenza," "pneumonia," and so forth, but the final reports of certain investigations were unavailable. We also reviewed published and unpublished reports regarding the history of CDC’s involvement in vaccine-preventable disease prevention and control and vaccination efforts.

### RESULTS

During the 60-year period, vaccine-preventable disease investigations accounted for 901 (approximately 20%) of all of CDC’s epidemic investigations (Table 2). After the EIS Program was established, virtually all investigations included EISOs (often along with other CDC staff). Hepatitis was, by far, the most commonly investigated condition, with 338 investigations. Many were conducted before specific diagnostic tests were available; therefore, all forms of hepatitis are included. Influenza, pneumonia, and acute respiratory disease were second, with 159 investigations, followed by measles (n = 108), polio (n = 102), and smallpox vaccinia (n = 54). As might be expected, temporal changes occurred in the types of vaccine-preventable diseases investigated, often related to development and introduction of a new vaccine (Table 3). Investigations into smallpox ended during 1971–1975 but reappeared during 2001–2005, when 5 investigations examined suspected adverse events among smallpox vaccine recipients or their contacts. Polio investigations were most common during the 1950s and early 1960s.

The relative decline in the number of Epi-Aids after 1975 might have resulted from decreased incidence of vaccine-preventable diseases because of immunization, development of ongoing population-based surveillance systems to answer questions regarding vaccine-preventable diseases.

### Table 1. Comparison of Prevaccine With 2010 Morbidity, Vaccine-preventable Diseases, United States

<table>
<thead>
<tr>
<th>Disease</th>
<th>Prevaccine Era, No.</th>
<th>2010, No.</th>
<th>Reduction, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>21,053</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>117,333</td>
<td>8,493c</td>
<td>93</td>
</tr>
<tr>
<td>Hepatitis B (acute)</td>
<td>66,232</td>
<td>9,419c</td>
<td>86</td>
</tr>
<tr>
<td>Haemophilus influenzae type b (age &lt;5 years)</td>
<td>20,000</td>
<td>246c</td>
<td>99</td>
</tr>
<tr>
<td>Measles</td>
<td>530,217</td>
<td>63</td>
<td>&gt;99</td>
</tr>
<tr>
<td>Mumps</td>
<td>162,344</td>
<td>2,612</td>
<td>98</td>
</tr>
<tr>
<td>Pertussis</td>
<td>200,752</td>
<td>27,550</td>
<td>86</td>
</tr>
<tr>
<td>Pneumococcus (invasive)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All ages</td>
<td>63,607</td>
<td>44,000c</td>
<td>30</td>
</tr>
<tr>
<td>Age &lt;5 years</td>
<td>16,069</td>
<td>4,700c</td>
<td>72</td>
</tr>
<tr>
<td>Poliomyelitis (paralytic)</td>
<td>16,316</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Rotavirus (hospitalizations)</td>
<td>62,500c</td>
<td>28,125c</td>
<td>55</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>5</td>
<td>&gt;99</td>
</tr>
<tr>
<td>Congenital rubella syndrome</td>
<td>152</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Smallpox</td>
<td>29,005</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Tetanus</td>
<td>580</td>
<td>26</td>
<td>96</td>
</tr>
<tr>
<td>Varicella</td>
<td>4,085,120</td>
<td>408,512c</td>
<td>90</td>
</tr>
</tbody>
</table>

a Adapted from reference 2.
b Source: reference 27.
c Source: reference 29.
d 23 type b and 223 of unknown serotype (age <5 years).
e Source: reference 20.


Downloaded from https://academic.oup.com/aje/article-abstract/174/suppl_11/S16/106995
on 09 May 2018
Table 2. Number of Epi-Aids for Vaccine-preventable Diseases, United States, 1946–2005

<table>
<thead>
<tr>
<th>Period</th>
<th>VPDs (Total)</th>
<th>Smallpox</th>
<th>Influenza/Pneumonia</th>
<th>Polio</th>
<th>Diphtheria</th>
<th>Pertussis</th>
<th>Measles</th>
<th>Mumps</th>
<th>Rubella</th>
<th>Hepatitis</th>
<th>Hib</th>
<th>Varicella</th>
<th>Rotavirus</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946–1950</td>
<td>9</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1951–1955</td>
<td>44</td>
<td>3</td>
<td>18</td>
<td>2</td>
<td>1</td>
<td>16</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1956–1960</td>
<td>74</td>
<td>7</td>
<td>13</td>
<td>19</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1961–1965</td>
<td>128</td>
<td>23</td>
<td>19</td>
<td>31</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>44</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966–1970</td>
<td>143</td>
<td>13</td>
<td>17</td>
<td>14</td>
<td>5</td>
<td>2</td>
<td>30</td>
<td>6</td>
<td>2</td>
<td>51</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971–1975</td>
<td>110</td>
<td>3</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>17</td>
<td>2</td>
<td>6</td>
<td>57</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976–1980</td>
<td>89</td>
<td>24</td>
<td>3</td>
<td>12</td>
<td>3</td>
<td>40</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981–1985</td>
<td>69</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>14</td>
<td>2</td>
<td>3</td>
<td>24</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1986–1990</td>
<td>72</td>
<td>21</td>
<td>3</td>
<td>8</td>
<td>14</td>
<td>5</td>
<td>19</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991–1995</td>
<td>55</td>
<td>13</td>
<td>1</td>
<td>4</td>
<td>13</td>
<td>1</td>
<td>3</td>
<td>19</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996–2000</td>
<td>58</td>
<td>12</td>
<td></td>
<td>7</td>
<td>2</td>
<td>5</td>
<td>25</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000–2005</td>
<td>50</td>
<td>5</td>
<td></td>
<td>14</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>14</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>901</td>
<td>52</td>
<td>159</td>
<td>102</td>
<td>29</td>
<td>35</td>
<td>108</td>
<td>16</td>
<td>24</td>
<td>338</td>
<td>7</td>
<td>16</td>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

Abbreviations: Epi-Aids, epidemic-assistance investigations; Hib, *Haemophilus influenzae* type b; polio, poliomyelitis; VPDs, vaccine-preventable diseases.

a Two investigations involved 2 diseases.
b One investigation involved 2 diseases.
c Five investigations relating to vaccination.

that typically occur in endemic rather than epidemic patterns, undertaking of formal research efforts to address critical vaccine and program questions, investigations performed as part of immunization program assistance, or increased state capacity for investigation.


**Immunization activities at CDC**

After the Vaccination Assistance Act was enacted in 1962, CDC formed a Division of Immunization, which subsequently became the National Immunization Program (1993) and later the National Center for Immunization and Respiratory Diseases (2006). Although the Vaccination Assistance Act allowed for supporting immunizations for adults as well as children, the focus of the program has historically been on childhood immunization.

Introduction of new vaccines, expansion of immunization recommendations for children, enactment of the Vaccines For Children Program (which entitles uninsured, Medicaid-eligible, and American Indian/Alaska Native children aged less than 19 years (and underinsured children who seek care at federally qualified health centers) free vaccine at any participating provider), and the increasing price of newer vaccines have resulted in immunization activities accounting for more than $3.5 billion in costs in 2010 (approximately one-third of the total CDC annual budget). The vast majority of this money supports state, local, and tribal health departments with either operational support or access to vaccines for their populations.

Four of the 5 directors of this activity (the late John J. Witte and the authors of this paper) started their public health careers as EISOs. Since establishment of the Division of Immunization, current and former EISOs have made major contributions to the understanding of vaccine-preventable disease epidemiology in the United States and the development of appropriate strategies to address these diseases. The following examples illustrate the role of EISOs in different aspects of the immunization enterprise.

**Investigations by EISOs into vaccine-preventable disease epidemiology**

EISOs have been involved in investigating the entire spectrum of vaccine-preventable diseases. Selected examples are described briefly in chronological order.

A 1960 epidemic of polio in Rhode Island demonstrated the changing epidemiology of this disease as a result of use of inactivated poliovirus vaccine and also enabled...
A common-source outbreak. The summary of the article and symptoms of hepatitis. Clustering of cases indicated stationed at a naval air base in Florida experienced signs and symptoms of hepatitis. Clustering of cases indicated.

During November–December 1961, a total of 22 officers experienced signs and symptoms of hepatitis. Clustering of cases indicated a common-source outbreak. The summary of the article describing the investigation stated the following:

It was concluded that the disease was primarily spread through potato salad. A salad handler with minor illness in October, perhaps anicteric hepatitis, who evidenced unusual behavior relating to urination, was considered to be the likely source of the contamination. The mechanics of contamination are obscure although fragmentary evidence suggests that salad dressing, perhaps contaminated by urine, may have been the specific responsible ingredient (6, p. 194).

Subsequent Epi-Aids related to hepatitis helped to further elucidate risk factors for hepatitis A. They also contributed to formulation of immunization policies with respect to both hepatitis A and hepatitis B.

EISOs were also involved in measles vaccination programs. In 1966, a mass vaccination program was conducted in Rhode Island, sponsored by the state medical society. At the invitation of the state health officer, CDC provided EISOs, other CDC staff, and 11 jet injector vaccination guns. A total of 36 clinic sites were selected, each staffed by volunteer physicians, nurses, and lay community members. In total, 30,647 children aged 1–12 years were vaccinated on Sunday, January 23, 1966 (7). Follow-up approximately 2 years later showed that the campaign had apparently interrupted measles transmission, one of the first demonstrations that transmission could be interrupted by a mass campaign (8).

A 1970 outbreak of measles in Texarkana, Texas and Arkansas provided a dramatic example of the impact of measles vaccination campaigns and school immunization requirements. A total of 606 cases of measles occurred in the city, which is bisected by the Texas-Arkansas state line. Approximately 95% of cases occurred in Texarkana, Texas, which had never had a measles vaccination campaign and where only 57% of children aged 1–9 years had been vaccinated. In contrast, a limited number of cases occurred in Texarkana, Arkansas, where a school immunization requirement was in effect and more than 95% of children aged 1–9 years had been vaccinated; vaccine efficacy was 95.9% (9).

In 1979, EISOs played prominent roles in investigating what was recognized later to be the last outbreak of polio in the United States (10). The outbreak of 15 cases occurred among unvaccinated Amish persons living in Iowa, Missouri, Pennsylvania, and Wisconsin. Because of preexisting high levels of vaccination in the surrounding communities, no cases of illness were reported among non-Amish persons. Epidemiologic and virologic evidence indicated this outbreak resulted from importation of poliovirus from the Netherlands through Ontario, Canada, where outbreaks had occurred during 1978 among members of religious groups with objections to vaccination. Vaccination efforts involved extensive contacts with Amish groups in the 21 states with Amish populations and ultimately resulted in vaccination of approximately one-half of Amish populations in the United States (11).

During 1988–1989, measles outbreaks in Los Angeles, California, and Houston, Texas, affected predominantly unvaccinated preschool-aged children within low socioeconomic groups. Approximately one-fourth of the cases occurred among children aged less than 16 months (too young to be protected by vaccination at the then-recommended age of 15 months). A substantial proportion of cases—23% in Los Angeles—occurred among Amish persons living near the epidemic area. This outbreak and others have demonstrated that the introduction of vaccine-preventable disease into low vaccination areas has the potential to result in large outbreaks.
cases occurred in Arizona, providing an opportunity to investigators to conclude that measles transmission in pediatric emergency rooms played a prominent role in perpetuating these outbreaks. Measles transmission in emergency rooms can be reduced by triage and isolation of suspected cases and by vaccination of eligible patients. Vaccination in emergency rooms provides postexposure prophylaxis and may increase vaccination coverage in the community (12, p. 74).

Although vaccination in emergency departments can prevent this type of transmission, efforts to introduce immunizations as a part of emergency department practice generally have not been successful.

In 1988, a statewide pertussis outbreak of 522 reported cases occurred in Arizona, providing an opportunity to study the effectiveness of erythromycin therapy and prophylaxis for pertussis. Seventeen households with 1 or more secondary cases were compared with 20 households without secondary cases in Maricopa County. Groups were similar in age distribution, size, crowding, race/ethnicity, immunization status, and medical care of patients who were primary cases. However, the median interval from onset of illness in the patient who was a primary case and initiation of erythromycin prophylaxis among contacts was significantly longer in households with secondary cases (22 days) compared with households with no secondary transmission (16 days). Investigators concluded that “these results provide additional evidence that erythromycin is effective in the medical management of pertussis and should be initiated promptly to minimize secondary spread” (13, p. 177).

Epi-Aids sometimes lead to legal approaches to ending outbreaks. An extreme example occurred in Philadelphia, Pennsylvania. During November 4, 1990–March 24, 1991, approximately 1,300 measles cases and 9 measles-associated deaths were reported to the Philadelphia Health Department. Approximately one-third of the cases and 6 of the deaths occurred among members of 2 religious groups who did not accept vaccination or conventional medical treatment. Five children were hospitalized by court order.

Because voluntary immunization was not accepted by church member families, on March 4, 1991, the city obtained a court order to immunize preschool age children of church members who did not have school age siblings and who were not believed to have been exposed to measles. All eight of these children were vaccinated with measles-mumps-rubella vaccine by court order (14, p. 291).

Investigations were not limited to the United States. In 1991, epidemic diphtheria appeared in the former Soviet Union and, during the following years, resulted in more than 150,000 cases of the disease. The majority of cases occurring throughout the Russian Federation and Ukraine were among adults. Serologic surveys in both countries indicated that a majority of adults lacked protective levels of circulating antitoxin. Other factors contributing to the epidemic included a lengthy list of contraindications to use of DTP vaccine and widespread use of reduced-strength diphtheria toxoid in vaccinating children before school entry (15).

Investigations into vaccine safety

Since the earliest years of the EIS Program, EISOs have played major roles in evaluating adverse events after vaccine administration, beginning with the Cutter incident in 1955, in which 192 inactivated poliovirus vaccine recipients or their close contacts experienced paralysis as a result of inadequate inactivation of the wild poliovirus in the vaccine (16). This investigation involved at least 11 of 43 EISOs on duty at the time, and most of the field investigation was accomplished in less than 6 weeks after the initial report (17). The investigation revealed that almost all cases were associated with a single lot of inactivated poliovirus vaccine manufactured by Cutter Laboratories (originally located in Berkeley, California) and that the inactivation procedure used by Cutter allowed some viable viral particles to survive. The overall impact of the Cutter incident was summarized in a history of CDC, as follows:

In retrospect, it was apparent that the Cutter incident was a turning point in the history of [CDC]. . . . The extensive surveillance program required a bigger budget, always a help in achieving recognition, and the value of the Epidemic Intelligence Service was apparent. The importance of competent viral diagnostic services in the public health movement was clearly demonstrated and CDC led the way to accomplish this (18, pp. 79–80).

Subsequently, EISOs were involved in assessing the risk of vaccine-associated paralysis related to oral polio vaccine, sudden infant death syndrome and DTP, localized abscesses and DTP, Guillain–Barré syndrome and swine influenza vaccine, and rotavirus vaccine and intussusceptions (refer to the following discussion).

In addition, EISOs established the Monitoring System for Adverse Events Following Immunization, the Vaccine Adverse Event Monitoring System, and the Vaccine Safety Datalink. The Vaccine Adverse Event Monitoring System, which succeeded the Monitoring System for Adverse Events Following Immunization, is a passive reporting system obtaining reports on adverse events occurring after vaccination but is usually not able to determine whether vaccine plays a causal or coincidental role in the adverse event. By contrast, the Vaccine Safety Datalink obtains data from 8 different health maintenance organizations throughout the United States containing approximately 3% of the US population and can conduct investigations rapidly to assess the possible causal roles of vaccines in a variety of adverse events.

One of the largest recent vaccine safety investigations conducted by EISOs was on intussusception among recipients of rotavirus vaccine in the United States during 1998–1999.
Smallpox eradication, polio eradication, and accelerated measles mortality reduction

Beginning in 1966, CDC assigned EISOs (typically paired with public health advisors—nonphysicians trained in practical-field public health (21)) to work in programs to eradicate smallpox and to control measles in West Africa, as well as to participate in smallpox eradication activities throughout the world. Some worked on short-term assignments (typically 3 months), whereas others were assigned overseas for periods of 2 or more years. In total, 46 EISOs participated in the smallpox eradication program. A former EISO (D. A. Henderson) was assigned by CDC to be director of the Smallpox Eradication Program at the World Health Organization in Geneva, Switzerland (22). EISOs documented the effectiveness of the surveillance-containment approach, which was the strategy that ultimately resulted in global eradication of smallpox (23).

During the ongoing campaign launched in 1988 to eradicate poliomyelitis, EISOs have played leading roles at CDC, the World Health Organization (both at headquarters and at regional offices), and in countries around the world, again working on both short- and long-term assignments. A recent initiative to accelerate measles mortality reduction in sub-Saharan Africa has had remarkable success (24). Approximately 84 EISOs have participated in the global Polio Eradication Initiative and the Accelerated Measles Mortality Reduction Initiative. As of December 2010, only 4 countries are considered endemic for polio transmission (Afghanistan, India, Nigeria, and Pakistan) (25). Measles mortality in sub-Saharan Africa was reduced by 75% during 2000–2005 (24). Additionally, EISOs have played key roles in global efforts to develop and introduce vaccines against rotavirus, pneumococcal disease, and meningitis in developing countries.

DISCUSSION

Introduction and widespread use of vaccines has led to dramatic declines in the incidence of vaccine-preventable diseases, typically by more than 95% for vaccines recommended for universal use before 1980. Less dramatic declines have been observed for certain vaccines introduced more recently.

As described in the introductory paper to this Journal supplement (3), the numbers of investigations summarized here substantially underestimate the total number of vaccine-preventable disease investigations involving EISOs, because Epi-Aids were typically issued only when Atlanta, Georgia–based EISOs were dispatched or when state-based EISOs were involved in investigations that crossed state lines. Investigations by state-based EISOs within the state of their assignment usually did not result in issuance of an Epi-Aid. During 1966–1969, immunization grants paid the salaries of 40 EISOs assigned to work in state health departments, half of the time on immunization (specifically, measles eradication) and half of the time on general epidemiology (26). Consequently, many investigations of vaccine-preventable diseases are not reflected in the Epi-Aid summaries.

Another limitation of this paper is that final reports on some of these Epi-Aids were not readily accessible. As a result, further characterizing the 4 general immunization assistance investigations during 1961–1965 was impracticable.

Notwithstanding these limitations, we believe that the information summarized here provides a flavor of the depth and breadth of EISO involvement in vaccine-preventable diseases and immunizations during 1946–2005. The majority of that involvement has related to vaccines and vaccine-preventable diseases affecting children, but increasing attention is being paid to adolescents and adults.

Post-EIS contributions made by former EISOs are worth mentioning. In addition to having trained 4 of the 5 directors of immunization activities at CDC, many former EISOs have gone on to become important staff for state and local health departments as well as CDC. Former EISOs have been important members (and chairs) of the Advisory Committee on Immunization Practices and the National Vaccine Advisory Committee as well as members and chairs of World Health Organization and professional society advisory committees. Additionally, they have made important contributions to the development and assessment of vaccines, both in academia and within industry.

SUMMARY AND CONCLUSIONS

Investigations into diseases now preventable by vaccines have been a hallmark of CDC since the early 1950s. Both in the United States and abroad, EISOs have played a critical role in describing the epidemiology of vaccine-preventable diseases, contributing to development of immunization policies, participating in the implementation of immunization programs, and establishing effective means for assessing adverse events after vaccination. As newer vaccines are developed and introduced, EISOs will continue to play similar roles and most likely will be involved increasingly in investigations of the factors that affect people’s willingness to accept vaccination for themselves or their children.

ACKNOWLEDGMENTS

Author affiliations: The Task Force for Global Health, Decatur, Georgia (Alan R. Hinman); Bill and Melinda Gates Foundation, Seattle, Washington (Walter A. Orenstein); and National Center for Immunization and Respiratory Diseases, Atlanta, Georgia (Anne Schuchat).

The authors did not receive any funding for this project. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention. Conflict of interest: none declared.

REFERENCES


