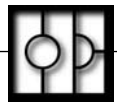

Feature Article

The March of Dimes and Polio: Lessons in Vaccine Advocacy for Health Educators

Dawn Larsen

ABSTRACT

The polio vaccine became available in 1955, due almost entirely to the efforts of the March of Dimes. In 1921, Franklin Roosevelt gave a public face to polio and mounted a campaign to prevent it, establishing the National Foundation for Infantile Paralysis in 1938. During the Depression, U.S. citizens were asked to contribute one dime. Entertainer Eddie Cantor suggested the name the March of Dimes, paraphrasing the popular newsreel "The March of Time." Jonas Salk advocated a killed-virus vaccine while Albert Sabin proposed a live-virus vaccine. Both competed for both recognition and funding from the March of Dimes. In 1955 Salk's vaccine was adopted, nationwide vaccination programs were implemented, and polio rates dropped by 80 percent. In 1961, Sabin's vaccine, endorsed by the American Medical Association, became the vaccine of choice. The World Health Assembly advocated polio eradication by the year 2000. By 2004 eradication efforts were threatened by allegations linking vaccines to chronic diseases. Immunization dropped and polio resurfaced in the U.S., Australia, Africa and Russia. Research linking vaccines to chronic disease was discredited, but vaccine opponents remain active. Health educators are well positioned to mitigate damage caused by the anti-vaccine movement and address barriers to immunization efforts.

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In 2008, The March of Dimes celebrated its 70th anniversary. During the 20th Century, few non-profit, volunteer organizations contributed more to the realm of public health or demonstrated more unwavering commitment to improving the health of babies and children. The March of Dimes has been instrumental in developing a screening test for PKU,[1-3] demonstrating the relationship between maternal alcohol consumption and birth defects,[4] developing neonatal intensive care units and surfactant therapy for premature babies,[5] establishment of worksite prenatal health promotion programs, and identification of folic acid as a preventive for neural tube defects in babies.[6-8] Despite these significant achievements, the March of Dimes remains best known for its role in developing the polio vaccine. Beginning with the first recorded epidemic in 1916, the poorly understood polio virus crippled or killed tens of thousands in the first half of the 20th Century. The worst outbreak occurred in 1952, when 57,000 cases resulted in over 3,000 deaths and over 21,000 cases of paralysis.[9] The polio vaccine became available in 1955, ending widespread fear of the virus that has been ranked second among the top 10 public health disasters of the 20th Century.[10]

By the beginning of the 21st Century, however, a growing contingent of activists arguing against the use of vaccines was becoming extremely vocal. Public health advocates were compelled to defend immunization against critics who alleged possible

Dawn Larsen is a professor and graduate coordinator in the Department of Health Science, Minnesota State University Mankato, Mankato, MN 56001; E-mail: dawn.larsen@mnsu.edu.

links between vaccines and rapidly increasing autism rates.[11,12] By 2004, worldwide eradication attempts were threatened by unfounded allegations that vaccines contained, among other things, HIV and infertility agents.[13] Misperception about the benefits and risks of vaccines led to a significant polio epidemic in Africa, where the disease threatened to make a comeback.[14]

This conflict threatens one of the great milestones in public health, and should be of significant concern for health educators. Few people are aware of the challenges and obstacles faced by early attempts to control polio. The history of polio, and the parallel history of the March of Dimes, reveals the determination and drive of an unlikely team of advocates, researchers, politicians, public relations experts and educators. In illustrating the tenacity of the March of Dimes, the story of polio can provide important policy lessons for educators, advocates and policymakers who feel strongly about preserving the public's trust and confidence in the immunization policies of a strong public health system.

EARLY POLIO EPIDEMICS

The agent of polio is a virus, transmitted by contact with fecal matter both directly and indirectly.[15] The portal of entry for the virus is the mouth, and the virus breeds rapidly in the small intestine, frequently producing only mild infection with few or no noticeable symptoms. Invasion of the central nervous system is rare but potentially deadly, as the virus destroys critical neurons that stimulate contraction of muscle fibers.[15] This was not known when polio clusters first appeared, nor was there any explanation for why the condition primarily affected children, affected more boys than girls, and spiked during certain times of the year. The uncertainly and ignorance bred fear, victimization and stigmatization and hampered public efforts to understand and control the disease.

The first recorded polio epidemic in the United States occurred in June of 1916.[16] The initial victims were children of Italian immigrants in a Brooklyn enclave known as Pigtown. When the first deaths were reported, investigators dispatched from the Health Department diagnosed the cause as polio.[16,17] The rapidly expanding immigrant population was blamed, as it had been for previous epidemics. In the mid-19th Century the Irish had been blamed for cholera in New York City, and Jewish immigrants had been accused of spreading tuberculosis several decades later.[18] Immigrants had been marginalized into crowded, unsanitary living conditions, and became convenient scapegoats. Italians endured the greatest stigma, and were said to have imported "deadly germs" from southern Europe.[17]

The assumption that immigrants were responsible for infectious disease spurred traditional public health strategies such as sewage regulation, water purification, and sanitation reform. Trash was removed and extreme measures were taken to eliminate stray animals. The New York Times[19(p. 1)] reported "72,000 Cats Killed in Paralysis Fear." Attempting to prevent the outward migration of germs from specific Italian neighborhoods, public officials condemned buildings, closed public places and cancelled ethnic festivals.[16] Angered by being singled out, newly formed Italian neighborhood organizations sent threatening letters to the Board of Health demanding that the stigmatization stop and their children be left alone.[16] All children in New York City were suspect by the middle of July, however, and those under 16 were required to obtain a "health certificate" stating they were "polio free" in order to leave the state. On a single day in late July the Health Department issued 3,376 certificates.[20(p. 1)]

Despite these extreme measures, the disease continued to spread, and by August additional cases were reported in upstate New York as well as New Jersey, Connecticut and Pennsylvania. Outbreaks continued through October, resulting in 27,000 deaths. Of the 2,400 deaths in New York City, 80 percent involved children under five.[21] Quarantine and sanitation measures had proven ineffective. Rates were consistently higher in wealthier communities in New York, Pennsylvania and New Jersey, confounding theories that the disease resulted from ignorance and substandard living conditions.[18] Health officials continued to be puzzled by the higher prevalence of the disease among well-nourished children in affluent areas with low population density and high sanitation standards. This suggested to some researchers that early exposure to substandard sanitation might provide a natural immunization to the disease.[16]

POLIO AND FRANKLIN D. ROOSEVELT

The public face of polio was changed forever on September 16, 1921, when the front page story of the New York Times revealed that Franklin D. Roosevelt was ill with poliomyelitis.[22] Predominant theories still focused on children from disadvantaged areas as primary victims, so the affliction of a well-educated, wealthy, socially prominent man who was thirty-nine years old was especially puzzling. Subsequent discoveries that early exposure to less sanitary conditions did indeed confer some protection seem to be supported by Roosevelt's medical history. Sheltered from early childhood illness by wealth and private schooling, his departure for boarding school in adolescence signaled a dramatic succession of afflictions: typhoid fever, sinus and tonsil infections, stomach problems, throat pain and a case of Spanish influenza resulting in a nearly fatal case of double pneumonia.[23] Historians note that Roosevelt may have been exposed to the virus during the peak summer season, when his immune system had been weakened by stress and exhaustion, and subsequently engaged in strenuous exercise that exacerbated the accompanying paralysis.[23]

Recent research has suggested that Roosevelt may have been suffering from Guillain-Barre Syndrome rather than polio. Authors of the research feel they have a strong clinical case, while conceding that: (1) they did not examine Roosevelt, and (2) Roosevelt had excellent physicians who were experts in their field.[24, 25]At the time, however, Roosevelt, his family, the medical community and the American people all believed that he had polio. This belief was

largely responsible for his efforts to mount a campaign to conquer the disease, and ultimately responsible for the establishment of the March of Dimes.

In 1924, a philanthropist friend of Roosevelt's suggested he visit a well-known but dilapidated thermal spa called Warm Springs in Georgia. The warm mineral-laden waters did nothing to cure paralysis, but provided buoyancy that facilitated exercise to build unaffected muscles. Roosevelt's enthusiasm for the spa was noted by the press, and it became increasingly popular as a therapeutic destination for polio patients.[26] In 1926, Roosevelt purchased Warm Springs and, on the advice of his business partner, Basil O'Connor, turned the property into a nonprofit institution renamed Georgia Warm Springs Foundation.[26] This gesture required much of Roosevelt's personal fortune,[26] and his openness about polio demonstrated that the debilitating disease could strike anyone. This ultimately reduced both the stigma of infection and lingering perception that it was a shameful disease.

Roosevelt's disability was exploited by political opponents during his New York gubernatorial campaign. In 1928, Republican newspapers questioned his physical ability, calling his campaign "pathetic," pitiless" and "equally unfair to the people of the state."[27(p. 72)] His supporter, Democratic presidential candidate Al Smith, responded that "A governor does not have to be an acrobat. We do not elect him for his ability to do a double back-flip or a handspring. The work of the governor is brainwork [and] there is no doubt of Franklin Roosevelt's ability to do it."[27(p.73)] By the time Roosevelt ran for President in 1932, however, his physical disability generated little comment, and his campaign was extremely successful.

Once he became President, Roosevelt became a relentless advocate for polio victims and their families. In 1928, he had selected his law partner, Basil O'Connor, to replace him at the Warm Springs Foundation. O'Connor, in turn, used the prestige of the presidency to stimulate funding for polio services. When donations dropped dramatically during the Depression, O'Connor hired sales and public relations experts to promote Warm Springs. Fundraising campaigns took the form of annual balls to celebrate Roosevelt's birthday at the end of January. The gala events were promoted with the slogan "We Dance So That Others May Walk," a public relations slogan that linked an immensely popular president with a debilitating, mysterious "children's disease."[28]

In 1934, 6,000 balls were held nationwide,[29] setting the standard for future events. The New York City ball included performances by noted showman George M. Cohan as well as detachments of the Army, Navy and Marines performing a ballad Cohan had written for the occasion. The President's voice was broadcast on national radio stations declaring "This is the happiest birthday I have ever known!" [29(p.1)] Ultimately, the 1934 balls succeeded in raising $1,016,443 to support and sustain the Warm Springs Foundation.[26] In 1935 O'Connor announced that 70 percent of the revenue from the annual balls would remain in local communities to treat and sustain polio victims.[30] Major motion picture celebrities were enlisted to promote and glamorize the events in Washington. Although the names changed over the years, use of celebrities for fundraising would continue for decades.

THE MARCH OF DIMES

By 1937 Roosevelt's fluctuating political popularity threatened revenues from the birthday balls. A decision was made to depoliticize fundraising efforts, and in 1938 Roosevelt announced the formation of the National Foundation for Infantile Paralysis.[21] The goals of the nonpartisan, nonprofit organization were to provide the best treatment possible for polio victims while searching for a cure to the disease. Again, Roosevelt's former partner Basil O'Connor was selected as Director of the new foundation. O'Connor developed the National Foundation for Infantile Paralysis into one of the largest voluntary, nonprofit health organizations in history, establishing benchmarks for raising funds, generating publicity, treating victims and sponsoring medical research designed to find both the source and a cure for the disease. Emerging public relations strategies were used both to establish polio as the nation's premier public health threat and to emphasize that conquering the disease was the nation's greatest medical mission.

Realizing that a massive infusion of funding was needed, O'Connor sought help from the foundation's newly formed public relations department. Turning to the entertainment industry for assistance, the foundation approached Eddie Cantor, one of the nation's most popular, visible and highly paid performers in 1938.[21] Cantor was a veteran of vaudeville, silent movies and popular stage and film musicals such as the Ziegfield Follies. In addition, he performed in his own radio show every Sunday. He suggested that a fundraising campaign be titled "The March of Dimes," a slogan that paraphrased the popular movie newsreel feature "The March of Time" which was frequently shown in theaters.[31] Even during the Depression, it was thought, all could afford to donate a dime, and Cantor thought people could be asked to send their dimes directly to the President at the White House.[31] This allowed those who would never attend a gala charity ball or society event to join the crusade against polio.

Roosevelt was initially reluctant to link his name to the campaign, but was persuaded by Cantor to do so. The campaign was again keyed to the president's birthday, promoted by posters, pamphlets, movie shorts, radio shows popular celebrities like Jack Benny, Bing Crosby, Rudy Vallee, Edgar Bergen and the Lone Ranger. Told to expect a temporary spike in the volume at the White House mail room, manager Ira T. Smith reported that "...the roof fell in—on me. We had been handling about 5,000 letters a day…We got 30,000 on the day the March of Dimes began. We got 50,000 the next day. We got 150,000 the third day. We kept on getting incredible numbers and the government of the United States darned near stopped functioning because we couldn't clear away enough dimes."[31(p.385), 32(p.158)] The final total was 2,680,000 dimes, supplemented by thousands of dollars in checks

and small bills. Smith[32(p.159)] noted that "It was days before we began to restore some kind of routine, and it was four months before we had cleaned up the debris." While the National Foundation for Infantile Paralysis retained its name, fundraising efforts would forever after be called the March of Dimes, and the dime became symbolic of attempts to combat polio.

As expenses mounted for patient care and research, fundraising efforts expanded. In 1939, a "Mile O'Dimes" campaign was instigated, where individual towns competed to produce the "longest line" of dimes, raising $200,000.[30,31] Disney characters, led by Mickey Mouse, led a marching band in a chorus of "Hi Ho, Hi Ho, we'll lick that polio" and celebrities such as Helen Hayes, whose daughter had died from polio, spoke out for the cause. Hollywood executives were persuaded to show short films, such as "The Crippler,"[15] in theaters as "March of Dimes Mothers" passed collection boxes to patrons. "The Crippler" showed a National Foundation volunteer eliminating a sinister figure who was casting the dark cloud of polio over communities. Disturbing but effective, these films generated $ 435,000 for the March of Dimes in 1941.[15]

After the attack on Pearl Harbor in December of 1941, conquering polio was linked to the importance of a wartime victory for the country. Roosevelt affirmed his endorsement of the March of Dimes by declaring: "The fight being waged against infantile paralysis...is an essential part of the struggle in which we are all engaged. Nothing is closer to my heart than the health of our boys and girls and young men and women. To me it is one of the front lines of our National Defense."[33] This affirmation allowed the March of Dimes to diversify effectively during the war, using the slogan "Polio Wears No Party Label." Women were recruited to replace male volunteers who were in the armed forces, and former silent-screen star Mary Pickford was chosen as the honorary director of female volunteers at the March of Dimes. Emphasis on polio as a family issue became a campaign strategy, and March of Dimes revenues continued to rise.

THE POLIO VACCINE

Unfortunately, the number of polio cases continued to rise as well during the years of World War II, from 9,000 in 1941 to 19,000 in 1944.[28] The total for 1944 was the greatest since the first epidemic in 1916.[28] As leading research scientists pooled their collective efforts for the war effort, polio became another front within the war. Virologist Albert Sabin of the Army Medical Corps was assigned to the Middle East, where polio had broken out among the troops.[34] Working with polio researcher John Paul from Yale, Sabin noted that in an area where polio was endemic, children became immune through exposure in infancy while still protected by immunities from their mothers. For the first time there was speculation that excessive cleanliness, critical for preventing some diseases, increased the risk of polio. One study concluded that Infantile Paralysis was not primarily a disease of the slums or associated with low socioeconomic status, as originally thought. Instead, the research noted, the reverse was more likely to be true.[35] In industrialized nations like the United States, sanitation efforts had broken the link between children and disease, and most avoided contact with the virus until immunity conveyed by their mothers had disappeared.[28] Research progressed incrementally, and in 1948 it was discovered how to grow polio in test tubes.[28] Studies were expensive and time-consuming and required a constant influx of funds.

Fundraising efforts received a blow, however, when Franklin Roosevelt died on April 12, 1945. He died in Warm Springs, often referred to as the "Little White House," and his passing marked the end of the annual fundraising birthday balls that had continued since 1934. In addition, Hollywood executives, whose interest was driven largely by their association with the President, decided to discontinue individual theater donations and instead contribute a specified amount to the United Way. This unexpected deficit drove further expansion of fundraising efforts, and in 1946, an innovative strategy was introduced that would become known as the Poster Child.[28] Children of both genders and multiple races were selected for national, regional, and local poster representation. These polio victims were attractive, appealing, well-dressed and well-groomed, wearing slings, crutches or braces. The optimistic impression was of a happy child on the road to recovery made possible by the contribution of ordinary Americans to the March of Dimes. While this portrayal was not necessarily representative of the national population of polio victims, and was criticized as manipulative, the campaign proved to be successful and enduring.

Other strategies encouraged the involvement of mothers in the crusade against polio during the post-war years when both family size and polio cases were increasing rapidly. In 1948, the March of Dimes created a Women's Division. The most successful of their endeavors was the Mothers' March on Polio, initiated in January of 1950 in Phoenix, Arizona. Following a promotional campaign that involved billboards, newspapers, storefronts, sound trucks, searchlights, and radio, women canvassed houses with burning porch lights for donations from 7:00 to 8:00 pm on January 16. Their slogan was "Turn On Your Porch Light! Help Fight Polio Tonight!" [28]

The Phoenix event raised $44,890 and led to the initiation of the annual nationwide Mothers' March in January of 1951,[36] involving detailed promotion, recruitment and training protocols. Millions of mothers traversed their own neighborhoods, collecting from all houses that indicated a willingness to donate by leaving a porch light on. Results exceeded expectations, and between 1951 and 1955 donations would total $250 million. The Mothers' March became the single greatest fundraiser in the history of the March of Dimes.[21]

Much of the intense fundraising was funneled into research to develop a vaccine to prevent polio, and efforts continued to build on the efforts of Sabin and his colleagues. Funded by the National Foundation through donations from the March of Dimes, several laboratories began a three-year program to type all known samples of polio, which revealed that there were only three strains

of the virus.[37] The race to develop a vaccine was complicated by theoretical differences as to whether vaccines should be produced using a live virus or an inactivated "killed" virus. Virologist Jonas Salk was the leading proponent of the killed-virus vaccine, which he had used to develop influenza vaccines. Albert Sabin advocated use of a mild, harmless, live strain of the virus in techniques similar to those used to prevent smallpox and rabies. Both fought for funding and public acceptance of their research.[21]

In 1951, Salk received a large grant from the National Foundation for Poliomyelitis and began to culture the virus, develop test vaccines and examine their effect on laboratory animals. During the spring of 1952, Salk sought test subjects for vaccine testing, and obtained consent to inoculate the residents of two institutions in Pennsylvania.[28,38] The March of Dimes escalated grant donations, spending over $ 2 million in 1953.[15] Elated by the success of the initial trials and heavily promoted by the March of Dimes, Salk discussed his research on CBS radio on March 26, 1953.[39] He announced that the killed-virus experiments had been successful, generating public and professional support for what became a double-blind, placebo controlled field trial in summer of 1954. Unprecedented in size, the trial involved 1.8 million schoolchildren, 20,000 doctors, 40,000 nurses, 50,000 teachers, and 200,000 volunteers.[28]

On April 12, 1955, the tenth anniversary of Roosevelt's death, epidemiologist Thomas Francis announced that the Salk vaccine was safe and effective. Nationwide vaccination programs were implemented, and within two years polio incidence had dropped by 80 percent in areas where everyone was vaccinated.[28] Unfortunately, vaccine lots contaminated with live virus had resulted in paralysis for some and death for 11 children.[21] Public relations campaigns were launched to encourage vaccination where people were resistant to the idea. Observers thought perhaps resistance could be overcome by use of a single dose, instead of the three separate injections required for the Salk vaccine.[28]

By 1959, a simpler oral vaccine had been developed by Sabin, who, like Salk, had received nearly all funding from the March of Dimes.[34] The vaccine was tested in Russia, where epidemics were rampant and nobody had been vaccinated. Within two years, seventy-seven million Russians took the "live-virus" vaccine. In 1961, the American Medical Association endorsed Sabin's vaccine for use in the United States and the simpler oral vaccine subsequently became the choice of doctors and public health officials.[28, 34] Succeeding decades saw the development of vaccines for measles, mumps, hepatitis A, hepatitis B, chickenpox, meningitis, pneumonia and Haemophilus influenzae bacteria.[40]

In 1988, the World Health Assembly adopted the goal of polio eradication by the year 2000.[41] International cooperative efforts were launched, resulting in the certification of polio eradication in the Americas in 1994 and the elimination of polio from China soon after.[42] In 1995, 18 countries of the Middle East, Caucasus and the Central Asian Republics set aside their political and territorial struggles in a synchronized immunization effort involving 85 million children.[43] Extraordinary international cooperation stimulated truces in countries at war, enabling health workers on camels, horses, motorcycles and on foot to immunize 10 million children during designated "Days of Tranquility" in the Democratic Republic of Congo.[44] By the end of the 20th Century, the initial deluge of dimes at the White House had resulted in the largest international health initiative in history.

THREATS TO IMMUNIZATION EFFORTS

By 2004, however, the polio eradication effort, as well as other immunization campaigns, faced significant threats to continued success. Vaccines were called into question for scientific, medical, ethical, political and religious reasons. Public officials were forced to field accusations that vaccines did not work and defend mandated vaccination programs against charges that they represented excessive government intervention. Vaccine opponents also alleged that vaccines were not safe and increased risks for chronic disease.[12,45] Fear of litigation prompted some vaccine makers to stop production and push for new laws providing liability protection from vaccine injury claims.[46]

These events have contributed to an alarming drop in polio vaccination and caused significant concern among public health officials. The target immunization level of the World Health Organization is 90 percent.[44] While the overall immunization rate in the United States is 92 percent, 20 states and 10 large cities experienced drops in polio vaccination among toddlers from 2005 to 2008.[47] Richard Bruno, director of the Post-Polio Institute and International Centre for Post-Polio Education, observed that "…20 states had a reduction of more than two percent, while in 10 cities polio vaccination dropped nearly three percent" and noted that this "…leaves more than one million U.S. toddlers unvaccinated."[48(p.1)] Toddlers raised in low-income homes have the lowest vaccination rates, which are below 87 percent in Boston, Indianapolis, Memphis and Phoenix and below 85 percent in Detroit, Houston and Seattle.[49]

Low rates are of particular concern in U.S. border states and cities that are major ports of entry. States with the greatest drop in vaccination rates include Arizona, Texas, New Mexico, Montana, Maine and Minnesota, where five unvaccinated children caught polio in 2005.[49, 50] A nearly four percent drop in vaccination has been reported in major ports of entry into the U. S. such as New York, Philadelphia, Houston and Seattle.[49] This raises concerns that travelers may bring polio into the United States from areas where polio has been reintroduced or is not yet under control. Infected travelers were responsible for the polio cases in Minnesota[50] and also in Australia, where the first polio case in 21 years was recorded in a visiting student from Pakistan.[51] Tajikistan, certified as a polio-free country, experienced an outbreak involving 560 cases when immunization rates dropped to 87 percent. Subsequent cases appearing in Russia and Uzbekistan have been attributed to infected individuals from Tajikistan.[52] These examples can serve

as "canaries in the coal mine" to illustrate how global travel can increase the risk of polio transmission anywhere immunization rates are inadequate.

IMPLICATIONS FOR HEALTH EDUCATORS

Health educators are in a unique position to address anti-vaccination concerns that are a significant threat to public health. As public health advocates, they have the potential to influence public perceptions as well as influence public health policy. They can stress the importance of preventing disease as a personal health problem while focusing on broader issues of community health as social imperatives. The vaccine controversy has clouded these issues by eroding the trust between public health leaders, who rely on scientific studies to resolve the debate, and vaccine opponents, who charge data have been manipulated and distorted. Guided by health education principles and trained in the diffusion of innovation theory, health educators can help mitigate the fear and frustration generated by the anti-vaccination movement and close the gap between knowledge and reasoned action among their constituents.

Anti-vaccine activists have indicated that they will continue their efforts,[53-55] and it is critical that health educators capitalize on the momentum offered by the discrediting of research that caused public anxiety about vaccines.[56, 57] Preventing disease and injury is the most effective way to improve health in the United States.[58] The Affordable Care Act (ACA),[59] signed into law by President Obama in March 2010, included the creation of a Prevention Fund designed to provide communities around the country with more than $16 billion over the next 10 years to invest in effective, proven prevention efforts.[58] Of these funds, $182 million is targeted toward clinical preventions, which include increasing the availability and use of immunizations.[60] Health Educators can access state-specific information to determine how much funding is available from the Prevention Fund to reduce disease rates.[58, 61] The ACA and the Prevention Fund offer health educators opportunities and funding to advocate for existing and emerging immunizations, and further debunk the deeply flawed research that called them into question.

Opportunities for vaccine advocacy in health education can take many forms. They may involve work with institutes that develop and implement policies related to immunization.[62] In community and school environments, health educators can take action on legislative and regulatory issues that address immunization across the lifespan. In some states, this action has focused on supporting legislative endeavors related to the HPV vaccine, which were hampered by opposition from HPV vaccine opponents.[63] Community health educators can work with advocacy committees or coalitions to provide communication and information on these legislative and regulatory efforts. Successful strategies have included the use of personal stories to educate parents, media, and the general public, provision of accurate information about immunization resources for schools and parents, and development of educational websites providing tools and strategies for immunization.[64]

Health educators can also advocate for vaccines on a global level. Lack of awareness about the devastating impact of global disease, and misinformation about disease rates, pose a significant challenge to the introduction of vaccines in many areas around the world. Coalitions are working to initiate and sustain the uses of typhoid vaccination to prevent childhood enteric fever at national and global levels.[65] In Latin America and the Caribbean, where cervical cancer is one of the leading causes of death for women, advocates are working to establish the burden of disease to expedite and accelerate introduction of the HPV vaccine.[66] Health education and advocacy were critical in regaining trust in polio vaccination in Africa, where fear and distrust had resulted in refusal of Nigerian officials to administer the vaccine.[67] Research in Africa and Asia has suggested that resistance or opposition may, in fact, be important analytical dimensions that help reveal new opportunities for effective health interventions.[68] These examples illustrate the potential of immunization advocacy as it faces the challenges generated by the need to maintain effective campaigns and immunization activities in the face of determined immunization opponents and decreasing levels of perceived risk.

In the successful effort to prevent polio, the March of Dimes marshaled a disparate but tenacious group of volunteers to coordinate efforts involving education, research, communication, advocacy, health promotion and policy development. These efforts resulted in one of the greatest public health achievements of the 20th Century. In some ways polio and other vaccines have fallen victim to the success of immunization policies because young parents have not seen the devastation and disability caused by diseases that have been virtually eliminated. Although understanding historic precedents may not directly translate into establishing policy guidelines, it is critical for those responsible for developing, promoting, and implementing such policy. Now that the primary research linking chronic diseases to immunizations has been discredited,[56,57] health educators are well-positioned to mitigate the damage caused by the anti-vaccine movement. They can use their skills to extend the "culture of prevention" and strengthen educational and institutional infrastructure critical for addressing barriers to immunization efforts as well as other health threats.

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