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Strategies for Reducing Health Disparities — Selected CDC-Sponsored Interventions, United States, 2014

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Foreword

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In public health, a key challenge is moving from accurate monitoring to effective intervention. Selected findings for health determinants and outcomes were reported in the *CDC Health Disparities and Inequalities Report—United States, 2011* (*1*); a second report was released in 2013 (*2*). This supplement is a companion to the two earlier health disparity reports. It highlights health interventions included in those reports that are proven effective or show promise in reducing health disparities.

Taken together, these three reports offer real-world examples of how public health programs can achieve their intended impact. As previously described (*3*), there are six key components to effective public health program implementation:

1. **Innovation.** Whether in areas of science and medicine, information systems, data collection and analysis, issue framing, operations, program management and evaluation, or communications, innovation is essential for developing technical aspects of program implementation.
2. **Technical package.** A small number of synergistic, evidence-based interventions can make a major impact on specific, high-priority goals.
3. **Performance management.** Rigorous real-time monitoring and evaluation incorporating feedback mechanisms helps to ensure continuous program improvement and avoid misplaced confidence in results.
4. **Partnerships.** Coalitions with public- and private-sector organizations are often essential to successful program implementation.
5. **Communication.** Effective communication can save lives during emergencies and drive long-term behavior change. Perhaps more importantly, effective communication strategies can change public perception of health issues and create new contexts for public health action.
6. **Political commitment.** Supported by the other five elements, effectively engaged political commitment provides the resources and support needed for effective public health action.

The interventions described in this supplement demonstrate several of these components of effective program implementation. For example:

- The Many Men, Many Voices (3MV) intervention for black men who have sex with men (MSM) (*4*) demonstrated in a randomized clinical trial that it could reduce participants' high-risk sexual activity and increase rates of testing for human immunodeficiency virus. The strong performance management component of this evidence-based technical package has led to continuous quality improvement. The program has been expanded to serve other MSM of color, including Latinos, Asians/Pacific Islanders, and American Indians/Alaska Natives. Program facilitators have been trained in 37 states, the District of Columbia, and Puerto Rico.
- Ongoing political commitment has contributed to the long-term success of the Vaccines for Children program (VFC), the largest legally mandated program managed by CDC. VFC provides vaccines at no cost to children who might otherwise not be vaccinated because of inability to pay. The program has substantially increased childhood vaccination rates, and constant cycles of program evaluation ensure that VFC continues to have maximum impact. A report in this supplement (*5*) evaluates whether VFC has reduced disparities in vaccination coverage among Hispanic, non-Hispanic black, non-Hispanic American Indian/Alaska Native, and non-Hispanic Asian children, compared with non-Hispanic white children. The analysis indicates that VFC has eliminated disparities in coverage for many vaccines and that disparities in coverage for the recommended four doses of diphtheria-tetanus-pertussis/diphtheria-tetanus-acellular pertussis vaccine have been reduced, but still exist, for Hispanic and black children.
- For American Indians/Alaska Natives, rates of motor vehicle–related death are two to four times higher than for other races/ethnicities. A report in this supplement (*6*) describes how CDC helped four American Indian tribes use community strengths to increase use of seat belts and child safety seats and decrease alcohol-impaired driving. Effective communication—through billboards, radio and television media campaigns, and school and community education programs—was a major component of these successful public health programs.

CDC's Winnable Battles initiative is directed toward key public health priorities that have large-scale health effects and that have recognized effective strategies to address them (*7*). All four topic areas covered in this publication (HIV infection, vaccination, motor vehicle injuries, and tobacco use) have been identified as Winnable Battles. The projects described here demonstrate that effective public health interventions not only win the battle of reducing death and disability overall, but can also decrease health disparities among vulnerable populations.

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Background and Rationale

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In 2011, CDC published the first *CDC Health Disparities and Inequalities Report* (CHDIR) (*1*). This report examined health disparities in the United States associated with various characteristics, including race/ethnicity, sex, income, education, disability status, and geography. Health disparities were defined as "differences in health outcomes and their determinants between segments of the population, as defined by social, demographic, environmental, and geographic attributes" (*1*). Among other recommendations, the 2011 CHDIR emphasized the need to address health disparities with a dual intervention strategy that focuses on populations at greatest need and improves the health of the general population by making interventions available to everyone. The 2013 CHDIR included updates on most topics from the 2011 CHDIR and on new topics (*2*). Compared with the 2011 CHDIR, the 2013 CHDIR included more reports on social and environmental determinants of health and emphasizes the importance of multisector collaboration. The 2013 CHDIR highlights the need for a "comprehensive, community-driven approach" to reducing health disparities in the United States.

The U.S. Department of Health and Human Services defines health equity as "attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and healthcare disparities" (*3*). A salient challenge in the field of health equity is to move from monitoring to action. Certain groups within and outside CDC have accepted the challenge of identifying what works to decrease and eliminate health disparities. For example, the Community Preventive Services Task Force systematically reviews interventions to reduce health inequities (differences or disparities that are systematic, avoidable, and unfair) (*4,5*) among racial and ethnic minorities and low-income populations (*6*). As for the CHDIRs, many reports include brief descriptions of activities that address particular health disparities (*1,2*). However, in-depth discussions of interventions are beyond the scope of the CHDIRs.

To complement the CHDIR series, this report highlights selected CDC-sponsored interventions that have been applied to decrease health disparities. To identify reports for this supplement, CDC's Office of Minority Health and Health Equity (OMHHE) examined selected CDC-sponsored interventions that address health disparities. Eleven interventions met the following criteria: topics highlighted in the 2011 CHDIR were addressed, programs were effective or showed promise for decreasing health disparities, and sufficient data had been collected to enable evaluation. Five of these interventions are presented in this report.

The first report highlights the Vaccines for Children Program, a national initiative that reduced and in some cases (e.g., measles-mumps-rubella and poliovirus vaccines) eliminated racial and ethnic disparities in childhood vaccination coverage in the United States (*7*). The second and third reports describe interventions that were initially evaluated in randomized controlled trials in specific populations. "Healthy Love" is an HIV-prevention intervention for heterosexual black women (*8*). "Many Men, Many Voices" addresses HIV risk behaviors in black men who have sex with men (*9*). The fourth report describes how four American Indian nations addressed elevated rates of motor vehicle–related injuries by adopting proven strategies selected from The Community Guide (*10*). The fifth report (*11*) describes a project funded by the Racial and Ethnic Approaches to Community Health (REACH) program (*12*), the goal of which was to build healthy communities through overall increases in knowledge and motivation to live a healthy lifestyle. Its implementation in three Southeast Asian communities (two Vietnamese and one Cambodian) in the United States was associated with decreased rates of smoking among Vietnamese and Cambodian men.

Health disparities in the United States were well documented in the 2011 CHDIR and 2013 CHDIR (*1,2*). Identifying these disparities creates the opportunity to design intervention programs. Interventions can be applied at different levels; those highlighted in this supplement vary by their level of application (e.g., local or national) and their reach. For example, national legislation eliminated some important disparities in national child vaccination coverage. Local community- and tribal-level interventions reduced tobacco use among Vietnamese and Cambodian men in three communities and motor vehicle–related injuries among four American Indian tribes. HIV-prevention interventions, widely disseminated to small groups of heterosexual black women and to black men who have sex with men, led to reductions in self-reported HIV risk behaviors. Although only one analysis in this supplement (Vaccines for Children Program) involved measurement of health disparities

at a national level (*7*), the other interventions can be considered effective in reducing health disparities because they focus on populations at elevated risk for illness or death (e.g., from HIV infection) and show reductions in risk factors or, in the case of motor vehicle–related injuries, in outcomes themselves.

Reducing and eliminating health disparities is central to achieving "the highest level of health for all people" in the United States (*3*), and in coming years, OMHHE will continue to describe CDC-sponsored programs that address health disparities.

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Health-Care Access and Preventive Health Services

Reduction of Racial/Ethnic Disparities in Vaccination Coverage, 1995–2011

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Summary

The Presidential Childhood Immunization Initiative was developed in 1993 to address major gaps in childhood vaccination coverage in the United States. Eliminating the cost of vaccines as a barrier to vaccination was one strategy of the Childhood Immunization Initiative; it led to Congressional legislation that authorized creation of the Vaccines for Children program (VFC) in 1994. CDC analyzed National Immunization Survey data for 1995–2011 to evaluate trends in disparities in vaccination coverage rates between non-Hispanic white children and children of other racial/ethnic groups. VFC has been effective in ireducing disparities in vaccination coverage among U.S. children. CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion that follows to provide an example of a program that has been effective in reducing childhood vaccination coverage-related disparities in the United States.

At its inception in 1994, VFC was implemented in 78 Immunization Action Plan areas that covered the entire United States; within each area, concerted efforts were made to improve childhood vaccination coverage. The findings in this report demonstrate that there have been no racial/ethnic disparities in vaccine coverage for measles-mumps-rubella and poliovirus in the United States since 2005. Disparities in coverage for the diphtheria-tetanus-pertussis/diphtheria-tetanus-acellular pertussis vaccine were absent, declining, or inconsistent during this period, depending on the racial/ethnic group examined. The results in this report highlight the effectiveness of VFC.

Introduction and Background

During 1989–1991, a resurgence of measles in the United States resulted in 55,622 reported cases, approximately 11,000 reported hospitalizations, and 123 reported deaths (*1–5*). Affected children were disproportionately inner city or were American Indian, Hispanic, non-Hispanic black, and low-income children aged <5 years who had not been vaccinated (*6–11*). Racial/ethnic minority children were at three to 16 times greater risk for measles than were non-Hispanic white children (*10*).

In response to the measles resurgence, the Childhood Immunization Initiative was developed in 1993 to address the major gaps in vaccination coverage among young children in the United States (*12,13*). Eliminating the cost of vaccines as a barrier to vaccination was one strategy of the initiative; it led to creation of the Vaccines for Children program (VFC) in 1994 (*13*). VFC is the largest entitlement program managed by CDC and, since 1994, has provided vaccines at no cost to children who might not otherwise be vaccinated because of inability to pay the cost of vaccines. CDC buys vaccines at a discount and distributes them at no charge to private physicians' offices and public health clinics registered as VFC providers for use in eligible children.

Healthy People 2010 and *Healthy People 2020* (*14*) objectives included a target of 90% vaccination coverage for U.S. children aged 19–35 months for diphtheria, tetanus, and acellular pertussis (DTaP) 4-dose series; poliovirus 3-dose series; 1-dose measles-mumps-rubella vaccine (MMR); *Haemophilus influenzae* type b completed 3-dose series; hepatitis B completed 3-dose series; varicella vaccine; and completed 4-dose series of pneumococcal conjugate vaccines (*14*). Reducing or eliminating health disparities was an overarching goal of *Healthy People 2010* and remains an overarching goal for *Healthy People 2020*. Reducing disparities in childhood vaccination is a key component in achieving the vaccination objectives.

Healthy People 2020 defines a health disparity as "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage" (*15*). This report uses the *Healthy People 2020* definition of health disparities (*15*). Health disparities adversely affect groups of persons who have systematically experienced greater obstacles to health because of their racial/ethnic group; religion; socioeconomic status; sex; age; mental health; cognitive, sensory, or physical disability; sexual orientation or sex identity; geographic location; or other characteristics historically linked

to discrimination or exclusion (*15*). This report describes progress in reducing racial/ethnic disparities in vaccination coverage among children aged 19–35 months, focusing on vaccines recommended before the Childhood Immunization Initiative and the inception of VFC.

CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion that follows to provide an example of a program that has been effective in reducing vaccination-related disparities in the United States. Criteria for selecting this program are described in the Background and Rationale for this supplement (*16*).

Intervention

VFC is a policy and programmatic intervention. Children aged ≤18 years are entitled to receive VFC vaccines through their VFC-enrolled provider if they are 1) Medicaid-eligible, 2) uninsured (i.e., not covered by any health insurance that pays for doctor visits and hospital stays), 3) American Indian/Alaska Native, or 4) underinsured (i.e., covered by private health insurance that does not cover the costs of all recommended vaccines) and vaccinated at a Federally Qualified Health Center (FQHC) or a Rural Health Clinic (RHC) (*13*).

CDC supports implementation of VFC, which allocates funds to Section 317 for immunization and infrastructure and disburses them to state health departments to administer vaccination programs in the 50 states, the District of Columbia, five urban areas, and eight U.S.-affiliated jurisdictions (*17*). Among the key activities of the state and local-level federally funded vaccination programs are recruitment and training of private providers for VFC to ensure their compliance with VFC requirements, oversight of vaccine ordering activities, and assurance of proper handling and storage of vaccines purchased through VFC. These activities form the foundation of a VFC goal to facilitate VFC-entitled children's and adolescents' consistent use of a primary care "medical home" where all recommended vaccines can be administered and other primary care can comprehensively and consistently be provided (*18*).

This report highlights racial/ethnic disparities for MMR; poliovirus; and diphtheria, tetanus and pertussis–containing vaccines (i.e., DTP/DTaP) because these vaccines were recommended before VFC was established in 1994. Disparities in coverage for those vaccines are reported in percentage-point differences in estimated vaccination coverage between selected racial/ethnic groups and non-Hispanic whites. Annual coverage estimates are based on the recommendations for routine administration of those vaccines (*19*) that specify one or more doses of MMR, three or more doses of poliovirus vaccine, and four or more doses of DTP/DTaP.

Methods

To assess progress over time in reducing racial/ethnic disparities in childhood vaccination coverage, annual estimated coverage levels for children aged 19–35 months were compared from 1995 to 2011 by using data from the National Immunization Survey (NIS). NIS was established in 1994 as a result of VFC legislation to provide annual population-based estimates of vaccination coverage for each state and for urban areas that, at that time, corresponded to VFC Immunization Action Plan areas.

NIS is conducted annually and uses random-digit–dialed samples of landline telephone numbers to reach households with children aged 19–35 months for the 50 states and selected local areas and U.S.-affiliated jurisdictions, followed by a mail survey to the children's vaccination providers. Vaccination coverage estimates reported using data from the NIS are based on the provider-reported vaccination histories (*20*).

During 1995–2011, the response rate (*21*) of the landline telephone survey of NIS ranged from 62% to 76%, and the percentages of sampled children for whom vaccine providers provided a vaccination history with sufficient detail to accept as a complete report ranged from 62% to 73% (*21*). To address the increasing use of cellular telephones, in 2011 the NIS began including data from an independent sample of households that were contacted by random-digit-dialing of cellular telephone numbers. In 2011, the response rate of the cellular telephone survey was 25%, and the percentage of sampled children for whom vaccine providers provided a vaccination history with sufficient detail to accept as a complete report was 66%. For each survey year, NIS data were weighted to represent the population of children aged 19–35 months, with adjustments to the survey weights that accounted for household nonresponse, nonresponse of physicians to the mail survey, and other factors (*20*).

In this report, estimated vaccination coverage rates were compared for children who were reported as being Hispanic, non-Hispanic white, non-Hispanic black, non-Hispanic American Indian/Alaska Native, and non-Hispanic Asian. Children with other or multiple reported races are not included in this report because of small sample sizes. Estimated percentage point differences in vaccination coverage between a racial/ethnic group and non-Hispanic whites were considered statistically significant if a statistical z test comparing coverage rates had a p value <0.05. Differences were considered to be disparities when they were statistically significant and the vaccination coverage rate of a minority racial/ethnic group was lower than that of non-Hispanic whites.

To estimate trends in disparities in coverage rates between children belonging to racial/ethnic minority groups and

non-Hispanic whites, a weighted linear regression was used to evaluate how the estimated differences in estimated coverage rates changed linearly over time. The disparity in estimated vaccination coverage rates was determined to have declined significantly over time if the slope of the linear regression was negative and a statistical z test of the estimated slope had a p value <0.05.

Results

VFC Eligibility

In 2011, a total of 54.3% (95% confidence interval [CI]: 53.6%–55.0%) of all children aged 19–35 months were VFC entitled according to the following potentially overlapping VFC entitlement categories: 48.3% (CI = 47.6%–49.0%) were Medicaid-eligible; 4.7% (CI = 4.4%–5.0%) were uninsured; 3.5% (CI = 3.2%–3.8%) were American Indian/Alaska Native; and 0.4% (CI = 0.3%–0.5%) were underinsured and received vaccine doses at an FQHC or RHC. Among all VFC-entitled children aged 19–35 months in 2011, 52.1% (CI = 50.8%–53.4%) were reported as belonging to a racial/ethnic group other than non-Hispanic white.

MMR

Disparities in vaccination coverage for Hispanic, non-Hispanic black, and American Indian/Alaska Native children compared with non-Hispanic white children have been absent for MMR since 2005 (Table 1). MMR coverage for Hispanic children increased from 87.9% in 1995 to 92.4% in 2011, and coverage for non-Hispanic white children remained ≥90% during the same period (Table 1). There were no statistically significant disparities in MMR vaccination coverage between non-Hispanic white and Hispanic children during 2003–2011 (MMR coverage was significantly higher for Hispanic children than for non-Hispanic white children in 2010). Disparities in MMR coverage between Hispanic children and non-Hispanic white children declined significantly at an average of 0.26 percentage points per year. In 1995, Hispanic children had 2.8% lower coverage than non-Hispanic white children; in 2011, MMR coverage was 1.3% higher in Hispanic children than in non-Hispanic white children (Table 1). MMR coverage for non-Hispanic black children increased from 87.1% in 1995 to 90.8% in 2011, and there was no disparity during 2005–2011 (Table 1). Disparities in MMR coverage between non-Hispanic black and non-Hispanic white children declined significantly by an average of 0.23 percentage points per year from 1995 to 2011. Only in 2002 was MMR coverage significantly lower for American Indian/Alaska Native children than for non-Hispanic white children, and MMR coverage was higher for American Indian/Alaska Native children than for non-Hispanic white children from 2007 to 2009 (Table 1). Vaccination coverage differed significantly between non-Hispanic Asian and non-Hispanic white children in 1995, 2003, and 2008, when MMR coverage was significantly higher for non-Hispanic Asian children but otherwise did not differ significantly in any other year. Estimates of MMR coverage have consistently met or exceeded the *Healthy People* target of 90% for most years since 2000 for all racial/ethnic groups (Table 1).

Poliovirus Vaccination

No disparities in poliovirus vaccination coverage between Hispanic children and non-Hispanic white children have been observed since 2003 (Table 2). Regression analysis indicated that the average coverage difference between Hispanic and non-Hispanic white children decreased from approximately 2 to 0 percentage points from 1995 to 2011. No significant disparities in poliovirus vaccination coverage between non-Hispanic black and non-Hispanic white children have been detected since 2006 (Table 2). The trend in disparity of poliovirus vaccination coverage between non-Hispanic black and non-Hispanic white children decreased significantly by an average of 0.22 percentage points per year. No disparities existed between non-Hispanic American Indian/Alaska Native and non-Hispanic white children. Poliovirus vaccination coverage estimates have consistently met or exceeded the *Healthy People* target of 90% for most years since 2000 for all racial/ethnic groups (Table 2).

DTP/DTaP

Disparities in DTP/DTaP vaccination coverage varied by racial/ethnic group during 1995–2011 for Hispanic, non-Hispanic black, and non-Hispanic American Indian/Alaska Native children (Table 3). Hispanic children had significantly lower DTP/DTaP 4-dose coverage than did non-Hispanic white children from 1995 to 2005, except in 2001 when the difference in coverage was not statistically significant between those groups. Since 2003, estimated coverage among Hispanic children has been >80%, and the number of statistically significant disparities in DTP/DTaP coverage has decreased since 2005. Coverage was significantly lower for non-Hispanic black children than for non-Hispanic white children in 16 of the 17 years during 1995–2011; the disparities in estimated DTP/DTaP coverage between non-Hispanic black and non-Hispanic white children did not decrease significantly during 1995–2011. DTP/DTaP coverage for non-Hispanic Asian children did not differ significantly from that of non-Hispanic white children, except in 2008 and 2011, when coverage was significantly higher for non-Hispanic Asian children (Table 3). Disparities in DTP/DTaP coverage between non-Hispanic

TABLE 1. Estimated measles, mumps, rubella (≥1 doses) vaccination coverage for children aged 19-35 months, by survey year and racial/ethnic category — National Immunization Survey, United States, 1995–2011

	Hispanic		Non-Hispanic white*		Non-Hispanic black		Non-Hispanic AI/AN		Non-Hispanic Asian	
Year	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
1995	87.9	(85.1–90.7)	90.7	(89.8–91.6)	87.1	(84.7–89.5)†	86.8	(80.2–93.4)	94.8	(91.7–97.9)†
1996	88.1	(86.1–90.1)†	91.1	(90.3–91.9)	89.4	(87.7–91.1)	88.5	(82.1–94.9)	93.0	(90.5–95.5)
1997	88.4	(86.4–90.4)†	91.1	(90.4–91.8)	88.7	(86.8–90.6)†	91.7	(87.8–95.6)	89.7	(86.1–93.3)
1998	91.0	(89.5–92.5)†	92.7	(92.0–93.4)	88.7	(86.8–90.6)†	91.3	(84.5–98.1)	92.0	(88.6–95.4)
1999	89.8	(88.0–91.6)†	91.9	(91.2–92.6)	89.2	(87.0–91.4)†	91.1	(86.8–95.4)	92.9	(90.3–95.5)
2000	89.3	(87.7–90.9)	91.0	(90.3–91.7)	87.9	(86.1–89.7)†	87.2	(82.1–92.3)	88.2	(81.6–94.8)
2001	92.1	(90.8–93.4)	91.3	(90.5–92.1)	88.8	(86.9–90.7)†	95.1	(91.8–98.4)†	89.7	(86.1–93.3)
2002	90.5	(88.8–92.2)†	92.6	(91.8–93.4)	90.3	(88.4–92.2)†	84.3	(76.6–92.0)†	94.6	(92.3–96.9)
2003	92.7	(91.3–94.1)	93.2	(92.4–94.0)	92.1	(90.4–93.8)	91.8	(86.5–97.1)	96.0	(94.2–97.8)†
2004	93.2	(92.0–94.4)	93.5	(92.8–94.2)	90.7	(88.7–92.7)†	88.8	(82.6–95.0)	94.1	(91.4–96.8)
2005	91.1	(89.6–92.6)	91.4	(90.5–92.3)	91.9	(90.2–93.6)	89.6	(83.0–96.2)	91.9	(87.7–96.1)
2006	92.0	(90.5–93.5)	92.8	(92.1–93.5)	90.9	(89.0–92.8)	89.3	(83.9–94.7)	94.7	(92.0–97.4)
2007	92.6	(91.0–94.2)	92.1	(91.3–92.9)	91.5	(89.5–93.5)	96.2	(93.0–99.4)†	93.9	(90.4–97.4)
2008	92.8	(91.4–94.2)	91.3	(90.3–92.3)	92.0	(90.1–93.9)	95.8	(93.1–98.5)†	94.7	(92.2–97.2)†
2009	89.3	(87.3–91.3)	90.8	(89.9–91.7)	88.2	(85.5–90.9)	94.9	(91.8–98.0)†	90.7	(86.4–95.0)
2010	92.9	(91.3–94.5)†	90.6	(89.7–91.5)	92.1	(90.2–94.0)	93.4	(87.1–99.7)	91.7	(88.1–95.3)
2011	92.4	(90.6–94.2)	91.1	(90.2–92.0)	90.8	(88.6–93.0)	94.8	(90.0–99.6)	93.9	(91.1–96.7)

Abbreviations: AI/AN = American Indian/Alaska Native; CI = confidence interval.
* Referent category.
† Significantly different from the estimated percentage for non-Hispanic whites for the specified survey year (p<0.05).

TABLE 2. Estimated poliovirus (≥3 doses) vaccination coverage for children aged 19-35 months, by survey year and racial/ethnic group — National Immunization Survey, United States, 1995-2011

	Hispanic		Non-Hispanic white*		Non-Hispanic black		Non-Hispanic AI/AN		Non-Hispanic Asian	
Year	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
1995	87.2	(84.5–89.9)	89.0	(88.1–89.9)	84.2	(81.4–87.0)†	86.5	(79.4–93.6)	90.0	(85.4–94.6)
1996	89.4	(87.6–91.2)†	91.6	(90.9–92.3)	89.8	(88.0–91.6)	90.2	(84.2–96.2)	89.8	(85.9–93.7)
1997	89.6	(87.9–91.3)	91.2	(90.5–91.9)	89.0	(87.3–90.7)†	89.5	(83.8–95.2)	88.5	(84.9–92.1)
1998	88.7	(86.8–90.6)†	91.8	(91.1–92.5)	87.7	(85.7–89.7)†	84.6	(76.1–93.1)	93.2	(90.3–96.1)
1999	89.1	(87.5–90.7)	89.9	(89.1–90.7)	85.9	(83.5–88.3)†	86.7	(78.3–95.1)	90.5	(87.5–93.5)
2000	87.2	(85.4–89.0)†	89.9	(89.0–90.8)	86.5	(84.4–88.6)†	89.5	(84.8–94.2)	93.0	(90.5–95.5)†
2001	90.8	(89.3–92.3)	89.6	(88.7–90.5)	84.2	(81.9–86.5)†	87.8	(79.7–95.9)	89.8	(86.5–93.1)
2002	90.4	(88.8–92.0)	91.2	(90.4–92.0)	87.4	(85.3–89.5)†	80.9	(69.9–91.9)	91.6	(88.5–94.7)
2003	90.1	(88.5–91.7)†	93.0	(92.3–93.7)	89.2	(87.3–91.1)†	91.3	(85.4–97.2)	91.3	(87.7–94.9)
2004	91.2	(89.7–92.7)	92.1	(91.3–92.9)	90.4	(88.6–92.2)	86.5	(78.9–94.1)	92.8	(90.0–95.6)
2005	92.3	(90.7–93.9)	91.4	(90.4–92.4)	91.1	(89.1–93.1)	83.7	(73.6–93.8)	92.9	(88.7–97.1)
2006	93.3	(92.2–94.4)	93.3	(92.6–94.0)	90.4	(88.5–92.3)†	91.0	(85.8–96.2)	92.4	(87.3–97.5)
2007	93.0	(91.4–94.6)	92.6	(91.7–93.5)	91.1	(89.0–93.2)	94.8	(89.3–100.0)	95.0	(92.4–97.6)
2008	94.3	(93.1–95.5)	93.6	(92.8–94.4)	91.5	(88.7–94.3)	90.6	(85.0–96.2)	96.5	(94.4–98.6)†
2009	92.5	(90.7–94.3)	93.3	(92.5–94.1)	90.9	(88.6–93.2)	92.2	(86.7–97.7)	94.0	(90.6–97.4)
2010	93.8	(92.2–95.4)	93.2	(92.4–94.0)	94.0	(92.4–95.6)	94.6	(91.1–98.1)	92.8	(89.3–96.3)
2011	93.8	(92.4–95.2)	93.9	(93.1–94.7)	93.9	(92.3–95.5)	88.1	(80.7–95.5)	96.5	(94.8–98.2)†

Abbreviations: AI/AN = American Indian/Alaska Native; CI = confidence interval.
* Referent category.
† Significantly different from the estimated percentage for non-Hispanic whites for the specified survey year (p<0.05).

American Indian/Alaska Native and non-Hispanic white children were inconsistent and sporadic during 1995–2011, and those disparities did not decline significantly over those years. Estimated DTP/DTaP coverage did not reach the *Healthy People* target of 90% (within confidence limits) for any racial or ethnic group.

Discussion

Since 1995, annual estimates of MMR vaccination coverage and poliovirus vaccination coverage increased among all children aged 19–35 months, and since 2007, disparities between racial/ethnic minorities and non-Hispanic white children for these vaccines has been nonexistent. Disparities in coverage for the 4-dose DTP/DTaP series between racial/

TABLE 3. Estimated diphtheria, tetanus, acellular pertussis (≥4 doses) vaccination coverage for children aged 19-35 months, by survey year and racial/ethnic group — National Immunization Survey, United States, 1995–2011

	Hispanic		Non-Hispanic white*		Non-Hispanic black		Non-Hispanic AI/AN		Non-Hispanic Asian	
Year	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
1995	75.2	(71.7–78.7)†	80.6	(79.4–81.8)	74.8	(71.6–78.0)†	71.2	(62.0–80.4)†	83.9	(78.0–89.8)
1996	77.1	(74.6–79.6)†	82.5	(81.5–83.5)	78.7	(76.3–81.1)†	84.6	(77.9–91.3)	84.2	(80.0–88.4)
1997	77.6	(75.1–80.1)†	83.6	(82.6–84.6)	77.2	(74.7–79.7)†	79.8	(72.8–86.8)	80.4	(75.8–85.0)
1998	80.3	(78.0–82.6)†	86.3	(85.4–87.2)	77.3	(74.8–79.8)†	82.8	(74.5–91.1)	89.3	(86.1–92.5)
1999	80.2	(78.1–82.3)†	85.1	(84.1–86.1)	78.7	(76.0–81.4)†	78.0	(68.7–87.3)	86.8	(83.1–90.5)
2000	78.5	(76.4–80.6)†	83.5	(82.5–84.5)	75.3	(72.6–78.0)†	74.7	(67.5–81.9)†	84.0	(80.0–88.0)
2001	82.8	(80.9–84.7)	83.0	(82.0–84.0)	75.4	(72.7–78.1)†	77.4	(68.4–86.4)	83.7	(79.6–87.8)
2002	79.2	(77.0–81.4)†	84.4	(83.4–85.4)	75.8	(72.9–78.7)†	65.9	(54.4–77.4)†	88.0	(84.5–91.5)
2003	81.9	(79.9–83.9)†	87.5	(86.6–88.4)	79.9	(77.2–82.6)†	80.1	(72.6–87.6)	88.5	(84.6–92.4)
2004	84.1	(82.2–86.0)†	87.7	(86.7–88.7)	79.5	(76.6–82.4)†	76.7	(68.2–85.2)†	89.6	(86.4–92.8)
2005	83.7	(81.4–86.0)†	87.1	(86.0–88.2)	84.1	(81.6–86.6)†	76.7	(66.3–87.1)	88.8	(84.2–93.4)
2006	84.5	(82.6–86.4)	86.6	(85.5–87.7)	81.2	(78.6–83.8)†	82.7	(74.5–90.9)	86.0	(80.5–91.5)
2007	83.8	(81.6–86.0)	85.3	(84.1–86.5)	82.3	(79.6–85.0)†	86.4	(79.3–93.5)	87.5	(83.5–91.5)
2008	84.9	(82.9–86.9)	85.0	(83.8–86.2)	80.1	(76.7–83.5)†	82.0	(74.8–89.2)	92.3	(88.6–96.0)†
2009	82.9	(80.4–85.4)†	85.8	(84.7–86.9)	78.6	(75.5–81.7)†	82.1	(74.0–90.2)	86.6	(81.1–92.1)
2010	84.4	(81.9–86.9)	84.5	(83.2–85.8)	83.7	(81.0–86.4)	81.8	(74.3–89.3)	88.3	(84.3–92.3)
2011	84.1	(81.9–86.3)	85.0	(83.7–86.3)	81.3	(78.4–84.2)†	72.7	(63.2–82.2)†	92.0	(89.5–94.5)†

Abbreviations: AI/AN = American Indian/Alaska Native; CI = confidence interval.
* Referent category.
† Significantly different from the estimated percentage for non-Hispanic whites for the specified survey year ($p<0.05$).

ethnic minority groups and non-Hispanic white children are absent (non-Hispanic Asian versus non-Hispanic white children), or not consistently present (non-Hispanic American Indian/Alaska Native), or have been decreasing (Hispanic and non-Hispanic black children). Furthermore, although the statistical analysis indicated disparities in 4-dose DTP/DTaP series coverage in 2011 in non-Hispanic black and non-Hispanic American Indian/Alaska Native children compared with non-Hispanic white children, a recent report indicates that after adjustment for poverty status, only the disparity between non-Hispanic American Indian/Alaska Native and non-Hispanic white children remained significant (*21*). Minority children are disproportionately poorer than non-Hispanic white children, (*22*) which might explain the 2011 disparity in vaccination coverage between non-Hispanic white and non-Hispanic black children.

High vaccination coverage needs to be maintained among all racial/ethnic groups to reduce vaccine-preventable diseases nationwide. The success of the U.S. immunization program, fostered by VFC, in sustaining high MMR coverage levels contributed to the end of endemic measles transmission in 2000, and sustained measles vaccination coverage >90% has helped prevent the return of endemic measles to the United States (*23,24*). Increasing access and eliminating cost as barriers to vaccination have expanded the impact of the VFC, as evidenced by the declines in disparities illustrated in this report.

The *Healthy People 2020* objective of achieving 90% vaccination coverage in children aged 19–35 months has been surpassed for MMR and polio vaccination in most racial/ethnic groups for most years since 1995. Although DTP/DTaP series coverage increased during 2005–2011 from coverage in previous years in all racial/ethnic groups, coverage remains below the *Healthy People 2020* target for all groups. Strategies can be implemented to promote increasing the fourth dose of DTP/DTaP and to maintain or improve coverage for the other vaccines for which *Healthy People 2020* vaccination coverage goals have not been achieved. These strategies would include reducing missed opportunities for vaccination during all visits to primary health care providers (25).

Limitations

The findings in this report are subject to at least two limitations. First, the moderate response rates of the telephone portion of the NIS provide the potential for selection response in estimates of vaccination coverage derived from the NIS. However, analyses of all sources of error associated with noncoverage of the target population of children aged 19–35-months found that this bias might be no more than approximately 1.7 percentage points (*26*). Second, certain vaccination providers of children with multiple vaccination providers might not have replied to the NIS mail survey. Although this record scattering does result in biased estimates of vaccination coverage, estimates of disparities in vaccination coverage are not affected (*27*).

Conclusion

Disparities in vaccination coverage between non-Hispanic white children and children of other racial/ethnic groups have declined for vaccines that have been routinely recommended since 1995. The many interventions and programs implemented during this period, including VFC, have built a successful infrastructure for vaccination services. Reduction of disparities for these vaccines demonstrates that the strengthening of the immunization program since 1994 does reach all groups of children, laying the foundation for equity in access to new vaccines introduced over the past decade. By providing increased access to vaccination services, VFC has expanded protection of all children from vaccine-preventable diseases.

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Health Outcomes: Morbidity or Mortality

Community-Based Program to Prevent HIV/STD Infection Among Heterosexual Black Women

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Summary

Heterosexual non-Hispanic black women in the United States are far more affected than women of other races or ethnicities by human immunodeficiency virus (HIV). SisterLove, Inc., a community-based organization in Atlanta, Georgia, responded to this disparity early in the epidemic by creating the Healthy Love HIV and sexually transmitted disease (STD) prevention intervention in 1989. Since then, SisterLove has been delivering the intervention to black women in metropolitan Atlanta.

This report describes successful efforts by SisterLove, Inc., to develop, rigorously evaluate, and demonstrate the efficacy of Healthy Love, a 3-4–hour interactive, educational workshop, to reduce HIV- and sexually transmitted disease-related risk behaviors among heterosexual black women. On the basis of the evaluation findings, CDC packaged the intervention materials for use by service provider organizations in their efforts to reduce HIV disparities that affect black women in metropolitan Atlanta, the South, and the United States. This report also describes initiatives by SisterLove after the efficacy study to increase the potential effectiveness and reach of the Healthy Love intervention and further address HIV-related disparities that affect black women. CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion that follows to provide an example of a program that might be effective in reducing HIV-related disparities in the United States.

The results of the randomized controlled efficacy trial highlight the potential of culturally tailored, interactive group intervention efforts to reduce health disparities. CDC's support for evaluating and packaging SisterLove's intervention materials, and making the materials available (www.effectiveinterventions.org) for use by service provider organizations, are important contributions toward efforts to address HIV-related disparities that affect black women.

Introduction

Heterosexual non-Hispanic black women in the United States are far more affected than women of other races or ethnicities by human immunodeficiency virus (HIV) (*1*). The greatest source of risk for HIV infection for U.S. black women is unprotected sex with a male partner (*1*). In 2010, non-Hispanic blacks constituted 12.6% of the U.S. population but accounted for 45% of all new HIV infections (*2,3*). Of women aged ≥13 years, black women accounted for 63.5% of new infections and had a reported HIV infection rate 15 and three times as high as those for white women and Latina women, respectively (*2*). An estimated 85% of black women who are infected with HIV are infected during heterosexual sex; the remaining 15% are infected through injection drug use (*1*).

The South accounts for approximately one third of the U.S. population and for half of newly reported HIV infections (*4*). During 2005–2008 in the South, black women accounted for 71% of new HIV diagnoses among all women (*4*). In Georgia, blacks accounted for 30% of the state's population and for 74% of all HIV cases in 2009 (*5*). Black women in Georgia have been particularly affected; in 2012, they accounted for 75% of all women in the state who were living with HIV (*6*).

Among the social determinants and situational factors that can contribute to HIV/AIDS among black women are poverty, limited partner availability because of high incarceration rates and death among black men, and sex-based power differentials within couple relationships that can limit women's ability to negotiate HIV protective actions with their regular male sex partners (*7*). Effective, culturally appropriate interventions are needed to reduce HIV-related risks among black women (*8*).

Community-based organizations (CBOs) are uniquely placed to understand the circumstances of the communities of color and other high-risk populations they serve. In addition, these organizations can potentially translate their knowledge, credibility, and cultural competence into effective HIV prevention initiatives, thereby addressing HIV disparities that affect these populations (*9,10*).

Background

Actions by the Atlanta-based CBO, SisterLove, Inc. (http://sisterlove.org), exemplify such a community-based effort. Responding early to the disproportionate effects of the epidemic of HIV/AIDS on heterosexual black women and the lack of prevention resources for this population, SisterLove created the Healthy Love intervention to prevent HIV and sexually transmitted disease (STD) infection in 1989. Since then, SisterLove has been delivering Healthy Love to preexisting social groups (e.g., sororities, churches, and friendship circles) of black women in metropolitan Atlanta. CBO staff members describe Healthy Love as an intervention that "makes house calls" because it is delivered to groups of women at locations they select.

This report describes 1) efforts by SisterLove, to develop the Healthy Love Intervention; 2) previously published findings (*11*) demonstrating the efficacy of the Healthy Love intervention for reducing HIV/STD-related risk behaviors among heterosexual black women; 3) CDC support for packaging the intervention and making it freely available to the public; and 4) subsequent initiatives by SisterLove to increase the potential effectiveness and reach of Healthy Love, further address HIV-related disparities that affect black women, and make the intervention accessible to other high-risk populations.

CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion that follows to provide an example of a program that might be effective in reducing HIV-related disparities in the United States. Criteria for selecting this program are described in the Background and Rationale for this supplement (*12*).

History

To learn from community-based HIV prevention practices and make effective practices available more broadly, CDC initiated the Innovative Interventions Project in 2004 (*13*). The project aimed to identify and rigorously evaluate culturally appropriate HIV prevention interventions that CBOs had developed with substantial community input and were delivering to minority populations at high risk for HIV infection in their communities and that had shown some promise of being effective but had not been evaluated because of funding constraints. Before the project began in 2004, CDC had identified only one efficacious HIV prevention intervention designed specifically for black heterosexual women (*14*). The other interventions for black women targeted women at higher risk for acquiring or transmitting HIV, including crack cocaine users (*15,16*), patients at inner-city family-planning or primary-care clinics (*17–19*), and women with HIV/AIDS (*20*). In 2004, the Innovative Interventions Project supported SisterLove to evaluate the efficacy of its Healthy Love intervention in a randomized controlled trial.

Intervention

Healthy Love is a highly interactive intervention designed to provide a safe environment in which women can learn about modes of HIV transmission and effective strategies for reducing risks for contracting or transmitting HIV and other STDs. It provides opportunities for participants to develop or enhance skills for assessing the risks of different sexual acts and for using safer sex techniques and to develop awareness of personal, community, and social attitudes, beliefs, and norms that can influence women's relationships, sexual behaviors, and risk-related decision making.

Healthy Love seeks to increase women's use of condoms during vaginal sex with male partners; encourage sexual abstinence, HIV testing, and receipt of test results; and reduce the number of women's sex partners and unprotected vaginal and anal sex with male partners. Healthy Love also aims to improve HIV/STD knowledge, self-efficacy for using condoms, intentions to use condoms, and condom-related attitudes.

The intervention is based on principles of self-help developed by the National Black Women's Health Project (*21*) and incorporates elements of the Health Belief and Trans-Theoretical Models and Social Cognitive Theory (*22–24*). Healthy Love is delivered as a single session containing three modules: Setting the Tone, The Facts, and Safer Sex. Overall, the intervention includes an opening, 11 content-focused components, and a closing. Three of the content-focused components provide basic information about HIV/AIDS and STDs (HIV/AIDS Facts, STD Facts, and The Look of HIV). The remaining eight components are activities in which participants interact with the facilitator and each other on such topics as rating their personal risks for contracting HIV and other STDs, practicing correct use of male and female condoms, role-playing negotiations of condom use with male partners, and demonstrating their increased knowledge about HIV infection risks and protective actions (Table). The intervention lasts 3–4 hours and is typically delivered to groups of four to 15 women.

The following components of Healthy Love illustrate how the intervention addresses the shared cultural aspects of black women's experiences that can affect their vulnerability to HIV infection. The synonym activity demonstrates how words, when used to describe sexual acts and sexual organs, can be demeaning of sex and reinforce women's feelings of having limited power and worth because they are women or

TABLE. Description of the Healthy Love HIV and STD Prevention Intervention

Module (Duration)	Components	Description
Setting the Tone (60 minutes)	Opening*	Introduces facilitator, describes workshop purpose, identifies participants' expectations, and establishes ground rules
	Fantasy name	Participants select sexy name for use during the remainder of intervention to demonstrate that Healthy Love will be casual and fun Makes participants feel comfortable about discussing their sexuality and risk behavior
	Synonyms	Decreases participants' inhibitions about discussing HIV, AIDS, and STDs Helps participants recall and acknowledge positive and negative feelings, attitudes, and beliefs about words associated with sex and sexuality Helps participants appreciate the societal influences that can trivialize or denigrate women's sexuality Promotes agreement by participants to use only positive words for remainder of the intervention
The Facts (60 minutes)	HIV/AIDS Facts*	Defines the acronyms HIV and AIDS, provides basic information on behaviors and circumstances that can increase a woman's risk for contracting or transmitting HIV, and discusses the relation between HIV and AIDS
	STD Facts*	Provides basic information about common STDs: their names, how they are spread, symptoms, and protective actions Elicits discussion; gives participants an opportunity to share what they know
	The Look of HIV*	Dispels myth that one can visually tell if someone is living with HIV or AIDS Describes HIV testing options and encourages testing for HIV and knowledge of serostatus Provides information about prevalence of HIV/AIDS in the United States and among women of color
Safer Sex (120 minutes)	Risk Assessment	Participants rate their personal risk for HIV and other STDs on the basis of past and current sexual behaviors
	Condom Demonstration	Demonstrates correct application of male condom to penis model and disposal of male condoms after ejaculation Promotes discussion of how to negotiate condom use with a male partner
	Condom Race	Competitive game gives participants opportunity to practice placing a condom on a penis model "under pressure" (under conditions resembling a romantic situation, with lights out and music playing)
	Female Condom Demonstration	Provides basic information on the female condom as a means of preventing HIV and STDs Demonstrates correct use of female condom with vagina model Participants practice inserting female condom in vagina model
	Oral Sex	Demonstrates use of dental dams, plastic wrap, and the oral application of a male condom to a penis model as methods for reducing HIV and STD risks
	High-Low-No Risk	Participants discuss high, low, and no risk activities and demonstrate their increased knowledge of HIV transmission risk by assessing and ranking various behaviors on the basis of their associated risk levels Gives participants opportunities to ask lingering questions and to provide feedback on the relevance and usefulness of the workshop

Abbreviations: HIV = human immunodeficiency virus; AIDS = acquired immunodeficiency syndrome; STD = sexually transmitted disease.
* Denotes components included in the HIV 101 comparison workshop during the randomized controlled trial.

can contribute to their empowerment and appreciation of their rights relative to male partners. The risk-identification exercise makes the potentially abstract notion of HIV risk more concrete by teaching black women how to assess their own risks on the basis of their past or current sexual behaviors and through group discussions of high-, low-, or no-risk behaviors. The intervention also provides information about the impact of HIV on black women in a way that helps participants situate known risk factors in their lives and communities while maintaining an affirming, black woman–centered, sex-positive focus on ways to avoid or eliminate some of those risks.

Women trained as facilitators to deliver Healthy Love are required to have previous experience as a facilitator and to know about HIV/STD transmission and prevention, the disproportionate impact of HIV on black women, safer sex practices, and HIV testing methods. Healthy Love facilitators are trained during two consecutive day-long training sessions that are designed to increase their knowledge of Healthy Love, show them how to prepare for and implement the intervention, and give them opportunities to review and practice group facilitation skills. Program managers from service-provider organizations implementing Healthy Love supervise the facilitators to ensure fidelity of their intervention delivery to the intervention manual.

Methods

SisterLove evaluated the efficacy of Healthy Love in Atlanta during March 2006–June 2007 using a group-randomized controlled trial design (*11*). Women who were eligible to participate in the evaluation were those who self-identified as black (i.e., African American, African, or Caribbean), were aged ≥18 years, were not pregnant or planning to become pregnant during the next 6 months, and were English speakers. Ineligible women were those who had participated in a group-level HIV prevention intervention during the preceding 6 months or whose religious beliefs prohibited the use of male or female condoms.

Information about the evaluation was disseminated through diverse print and electronic media, mailings to local AIDS-service organizations, county health departments, medical clinics, and community centers. Outreach was used to recruit groups of women affiliated with faith-based organizations and CBOs serving African immigrants and at college health fairs, community events, and SisterLove-sponsored activities. Persons from such groups as friendship circles, church groups, college classes, and dormitories who were interested in participating in the evaluation of the Healthy Love intervention contacted SisterLove. Evaluation staff broadly determined whether groups met the eligibility criteria, matched them by type of group (i.e., friendship circles were matched with friendship circles and church groups were matched with church groups), randomly assigned groups by coin toss to receive Healthy Love or the comparison workshop, and arranged a date and preferred workshop location. Immediately before each workshop, women were individually screened to ensure they met the study inclusion criteria.

Thirty groups totaling 313 women were enrolled and randomized to receive the Healthy Love workshop (15 groups totaling 161 women) or the comparison HIV 101 workshop (15 groups totaling 152 women). The comparison workshop used a didactic presentation format to provide the same HIV/STD-related information (*11*). The groups of women in the evaluation were friendship circles (16 groups), college classes or dormitories (six groups), residential housing units (two groups), churches (two groups), social support groups (two groups), and groups of African immigrants (two groups). Each Healthy Love and comparison workshop was delivered by a trained black female facilitator. Details on the methods used to recruit and enroll groups of women into the trial, measure behavioral and psychosocial outcomes, and sociodemographic characteristics of study participants are reported elsewhere (*11*).

Analysis of the intervention outcomes used an intent-to-treat approach based on the initial random assignment of participants' groups to Healthy Love or the comparison workshop and regardless of whether participants completed their respective workshops. All but one of the 161 women assigned to receive Healthy Love completed the intervention workshops; all of the 152 assigned to the comparison condition completed their workshops. Generalized estimating equation models were used to assess intervention efficacy, and all statistical analyses controlled for clustering that could result from the group-level randomization process. The study was approved by the institutional review boards of the AIDS Research Consortium of Atlanta and CDC and was registered on www.clinicaltrials.gov.

Published Findings

Healthy Love participants reported significantly higher rates of condom use during vaginal sex with any male partner (adjusted odds ratio [AOR] = 2.40, 95% confidence interval [CI] = 1.28–4.50) and with a primary male partner (AOR = 2.87, CI = 1.18—6.95) during the past 3 months than did comparison participants at the 3-month follow-up assessment. However, intervention effects on these condom-use outcomes were not sustained at the 6-month follow-up. Healthy Love participants reported significantly higher rates of condom use than did comparison participants at last vaginal, anal, or oral sex with any male partner at both the 3-month (cluster-adjusted $\chi^2 = 6.66$; $p = 0.01$) and 6-month follow-up assessments (cluster-adjusted $\chi^2 = 4.62$; $p = 0.03$). At the 6-month follow-up, Healthy Love participants reported significantly higher rates of HIV testing and receipt of test results (AOR = 2.30, CI = 1.10–4.81). There was no significant intervention effect on sexual abstinence. Healthy Love participants reported greater improvements than comparison participants in HIV knowledge ($p = 0.04$) and self-efficacy for using condoms ($p = 0.04$) immediately after the intervention, greater intentions to use condoms with their primary male partners at the 3-month follow-up ($p = 0.04$), and greater improvements in attitudes toward using condoms ($p = 0.054$) and HIV knowledge ($p = 0.01$) at the 6-month follow-up assessment.

Limitations

The findings in this report are subject to at least two limitations. First, the findings are based on self-reported risk and protective behaviors, which are subject to recall or social desirability response bias. Second, both intervention and comparison participants reported relatively low rates of alcohol use and drug use and high rates of condom use and abstinence at baseline (*11*). Therefore, these findings might not be generalizable to black women who are at higher risk for acquiring or transmitting HIV, such as substance users, STD clinic patients, and women with HIV/AIDS. Several efficacious interventions are available for these higher-risk women (*15–20*).

Although HIV infection during heterosexual sex accounts for an estimated 85% of HIV infections among all black women (*1*), prevention resources for these women remain limited (*25*). The Healthy Love intervention was designed to address this gap in prevention coverage for black women whose greatest risk for HIV infection is sex with an infected male partner. The intervention reduced participants' self-described actions with male partners that can increase black women's risks for

HIV infection and increased participants' likelihood of using condoms, being tested for HIV, and receiving their test results. Healthy Love is the only efficacious behavioral HIV prevention intervention developed for black heterosexual women of widely varying ages. As such, Healthy Love provides a needed resource for efforts to reduce HIV-related disparities that affect black women in the United States (*7,26*–30).

Discussion

The study demonstrated the efficacy of a single-session intervention for increasing condom use and HIV testing among black women. On the basis of the findings and rigor of the study methods used, CDC identified Healthy Love as a Good Evidence behavioral intervention and included it in the August 2011 update of the *Compendium of Evidence-Based HIV Prevention Interventions* (*31*). In 2012, CDC's Replicating Effective Programs Project (*24*) packaged the intervention materials and, in 2013, made the materials available (http://www.effectiveinterventions.org) for use by service-provider organizations.

Several features of Healthy Love might enhance its potential as a resource for HIV/STD prevention. The intervention's short duration and relatively low cost (an estimated $92 per participant [*32*]) might make it attractive to service provider organizations. Intervention delivery to women who know each other at locations they select might facilitate open discussion and learning about HIV/STD risk- and prevention-related topics and promote their capacity to translate the knowledge and changed attitudes from the intervention into protective actions. The relatively short single-session format also might make the intervention more attractive to potential participants, thereby overcoming some attrition-related difficulties that can affect multiple-session interventions. Finally, the intervention was developed by and for heterosexual black women to provide them with a culturally appropriate tool for addressing their unique HIV/STD prevention needs.

Since completing the evaluation study, SisterLove has delivered Healthy Love to increasing numbers of women, totaling 3,780 in 2010 and 4,198 in 2011; most were aged 16-63 years and resided in six of metropolitan Atlanta's 28 counties (SisterLove, Inc., unpublished data, January 2012). Approximately 90% of the women served by SisterLove during these years resided in DeKalb and Fulton counties, which contain 17 of the 20 metropolitan Atlanta ZIP codes that have the largest number of AIDS cases in the region (Georgia HIV/AIDS Internal Reporting System, unpublished data, January 18, 2008). Of all women who received Healthy Love in 2010 and 2011, 92%–100% stated that they intended to discuss safer sex with their sex partners; use condoms or other barrier methods during vaginal, oral, or anal sex; and be tested for HIV (SisterLove, Inc., unpublished data, January 2012). SisterLove routinely delivers the intervention to black women aged 13–65 years (Lisa Diane White, personal communication, February 26, 2013).

After the evaluation, SisterLove began several initiatives to increase the potential effectiveness and reach of Healthy Love. To complement the intervention's promotion of HIV testing and facilitate follow-up actions by participants, SisterLove provides screening for HIV, chlamydia, gonorrhea, and hepatitis C and linkage to care for Healthy Love participants and other women who seek these services. To address the promising but nonstatistically significant intervention effects observed during the evaluation, such as women's condom use at the 6-month follow-up, SisterLove invites Healthy Love participants to attend the single-session intervention whenever the CBO delivers it to reinforce its effectiveness over time. To gauge the potential longer-term effects of Healthy Love, from mid-2012 through mid-2013, SisterLove followed up with selected women who receive the intervention as it is routinely delivered and provided the intervention to members of their social and sexual networks. This follow-up will enable SisterLove to ascertain the degree to which network members and their sex partners are tested for HIV/STDs and linked to care.

To address intimate-partner violence that can increase women's vulnerability to HIV/STD infection, SisterLove is collaborating with local domestic violence shelters. SisterLove delivers Healthy Love, which promotes HIV counseling, and shelter staff members assist participants with developing plans to reduce their HIV risks with abusive partners. SisterLove is also co-developing and implementing a nationwide training curriculum to increase the capacity of HIV and domestic violence educators to screen and provide referrals for women who are vulnerable to both HIV and sex-based violence. To increase the accessibility of Healthy Love to other high-risk populations, SisterLove is delivering adapted versions of the intervention to heterosexual and homosexual adolescent men and HIV-positive women. SisterLove intends to evaluate the effectiveness of these adaptations and will continue to adapt Healthy Love for use with transgender females and adult heterosexual and HIV-positive men.

Conclusion

The study demonstrated that a CBO can successfully develop and deliver a culturally appropriate, efficacious HIV prevention intervention for heterosexual black women. The single-session Healthy Love intervention provides a relatively low-cost tool for

use by CBOs and other service provider organizations. CDC's support for evaluating and packaging SisterLove's intervention materials is an important contribution toward addressing HIV-related disparities that affect black women.

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Evidence-Based HIV/STD Prevention Intervention for Black Men Who Have Sex with Men

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Summary

This report summarizes published findings of a community-based organization in New York City that evaluated and demonstrated the efficacy of the Many Men, Many Voices (3MV) human immunodeficiency virus (HIV)/sexually transmitted disease (STD) prevention intervention in reducing sexual risk behaviors and increasing protective behaviors among black men who have sex with men (MSM). The intervention addressed social determinants of health (e.g., stigma, discrimination, and homophobia) that can influence the health and well-being of black MSM at high risk for HIV infection. This report also highlights efforts by CDC to disseminate this evidence-based behavioral intervention throughout the United States. CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion to provide an example of a program that might be effective for reducing HIV infection- and STD-related disparities in the United States.

3MV uses small group education and interaction to increase knowledge and change attitudes and behaviors related to HIV/STD risk among black MSM. Since its dissemination by CDC in 2004, 3MV has been used in many settings, including health department- and community-based organization programs. The 3MV intervention is an important component of a comprehensive HIV and STD prevention portfolio for at-risk black MSM. As CDC continues to support HIV prevention programming consistent with the National HIV/AIDS Strategy and its high-impact HIV prevention approach, 3MV will remain an important tool for addressing the needs of black MSM at high risk for HIV infection and other STDs.

Introduction

Major advances in the prevention and treatment of human immunodeficiency virus (HIV) and care for HIV-infected persons have occurred during the past 3 decades. One important advance is development of efficacious behavioral interventions that reduce HIV-related sex and drug-injection risk behaviors and incident sexually transmitted diseases (STDs) among at-risk populations (*1*). Biomedical advances, such as antiretroviral therapy, afford persons living with HIV long and productive lives and effectively prevent transmission to uninfected persons (*2–5*). Despite these prevention efforts, approximately 1.2 million adolescents and adults live with HIV, and 41,800–62,900 persons acquire new HIV infections each year in the United States (*6,7*).

Disparities in HIV/STD prevention and care persist among racial/ethnic minority populations and sexual minorities. Among blacks, the prevalence of HIV is greater than that among all other racial/ethnic groups (*8*). Despite representing only 12.6% of the U.S. population in 2010 (*9*), blacks accounted for 45% of all new HIV infections that year (*8*). Black men have a higher proportion of HIV infections at all stages of disease—from new infections to deaths—than men of other racial/ethnic groups (*8*). HIV is consistently among the 10 leading causes of death for black men aged 15–64 years (*10*).

Gay, bisexual, and other men who have sex with men (MSM), and black MSM in particular, consistently represent the largest proportion of HIV-infected persons in the United States (*11*). Although MSM represent approximately 2% of the U.S. population (*12*), they accounted for 63% of all new HIV infections in 2010, and black MSM accounted for a larger proportion of new HIV diagnoses than did white or Latino MSM (*8*). Each year during 2006–2009, HIV incidence increased an estimated 12.2% among black MSM aged 13–29 years, whereas incidence remain stable among white and Latino MSM (*7*). More new HIV infections occurred among black MSM aged 13–29 years (6,500 diagnoses in 2009) than among white MSM aged 13–29 and 30–39 years combined (6,400 diagnoses in 2009) (*7*). Black MSM also have higher rates of STDs, including primary and secondary syphilis (*13,14*) and chlamydia (*15*), than do their white and Latino counterparts.

Higher rates of HIV and other STDs for black MSM than for other MSM are well documented (*16*), and research has identified several explanations for the excess risk (*17,18*). These include higher background prevalence of HIV in the community that can lead to exposure to an infected partner despite less risky behavior; higher prevalence of other STDs in the community that can facilitate HIV infection; partnerships with men of unknown HIV serostatus; infrequent HIV testing and later diagnosis of HIV infection; limited access to antiretroviral therapy; stigma, homophobia, and social discrimination; and financial hardship (*19–24*).

However, black MSM reported fewer sex and drug-risk behaviors than did white MSM, and behaviors such as commercial sex work and sex with known HIV-positive persons did not significantly differentiate these groups (*17*). A cross-sectional study conducted in 2005 and 2006 reported that young black and Latino MSM with older partners engaged in higher rates of sexual risk behaviors and had a greater likelihood of unrecognized HIV infection than did those with younger partners, possibly because of increased prevalence of HIV infection among older partners (*25*). Many black MSM struggle with negative perceptions of themselves because of internalized racism; marginalization; and feelings of isolation from their communities, families, and religious organizations (*26*).

A combination of social, cultural, and personal factors probably prevents black MSM from accessing health-care services (*27,28*). Thus, HIV/STD prevention programs for black MSM must target sociocultural determinants of health, in addition to behavioral risk reduction, to successfully reduce disparities and improve health equity (*29*). However, when the Many Men, Many Voices (3MV) intervention began in 1997, no efficacious, culturally appropriate HIV/STD risk-reduction interventions had been developed for black MSM since acquired immune deficiency syndrome (AIDS) was first recognized in the 1980s (*30*).

Background

Two community-based organizations (CBOs), in collaboration with an STD/HIV prevention training center, created 3MV in 1997 (*31*). 3MV has been delivered by various CBOs serving black MSM since its development. Because of an urgent need for risk-reduction interventions for black MSM, CDC has nationally disseminated 3MV since 2004. However, the efficacy of 3MV had never been rigorously evaluated in a randomized controlled trial.

To learn from and assess community-based HIV prevention practice, CDC initiated the Innovative Interventions Project (*32*). The project aimed to identify and rigorously evaluate culturally appropriate HIV prevention interventions that CBOs were delivering to minority populations at high risk for HIV infection in their communities and that showed the possibility of being effective in reducing risk behaviors. In 2004, the Innovative Interventions Project supported People of Color in Crisis, Inc., a CBO located in Brooklyn, New York, to evaluate the efficacy of the 3MV HIV/STD prevention intervention in a randomized controlled trial (*31*).

This report summarizes published findings from a CBO in New York City to evaluate and demonstrate the efficacy of 3MV in reducing sexual risk behaviors among black MSM (*31*). In addition to addressing individual-level risk behaviors, 3MV addresses social determinants that can potentially influence HIV-related outcomes among black MSM at very high risk for HIV infection. For example, the intervention positively influences the identity and value of being a "black gay man," thereby reducing the effects of stigma, racism, homophobia, and discrimination that can influence risk behavior. This report also describes efforts by CDC to disseminate the evidence-based 3MV behavioral intervention throughout the United States.

CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion that follows to provide an example of a program that might be effective in reducing HIV-related disparities between black MSM and other persons in the United States. Criteria for selecting this program are described in the Background and Rationale for this supplement (*33*).

Intervention

3MV is a seven-session, small-group intervention for black MSM that aims to reduce the behavioral risks for acquiring HIV and other STDs and increase health protective actions (*34*). The intervention focuses on helping black MSM better understand the social, cultural, and behavioral determinants that affect their HIV/STD risk. Moreover, 3MV focuses on perceptions of personal susceptibility to HIV and other STDs; knowledge of STDs and the interrelation between STDs and HIV; awareness of risk-reduction and health-promotion behaviors; skills and self-efficacy related to consistent condom use, condom negotiation, and partner communication; and decisions about testing for HIV/STDs.

Two trained peers co-facilitate the intervention sessions and serve as role models to support risk-reduction efforts. The intervention can be delivered as seven weekly sessions or as a 3-day weekend retreat (*34*). Behavior change theories and models guiding the development of the intervention include social cognitive theory (*35*), the behavioral skills acquisition model (*36*), the transtheoretical model of behavior change (*37*), and the decisional balance model (*38*). The intervention

sessions involve group discussions, games, and other activities to convey factual information; role play to enhance skill building; and development of personal risk-reduction plans (Table 1).

The personal risk-reduction plan is an innovative component of the intervention that uses menus of behavior change options for HIV/STD risk reduction rather than a singular emphasis on consistent condom use that is common in other prevention interventions for MSM. Black MSM also benefit from participation in the intervention by forming collegial relationships with other black MSM to support the maintenance of their risk-reduction efforts.

Most persons who are trained to deliver 3MV are college educated, although no minimum education is required (*34*). Facilitators participate in 32 hours of training and skills building during 4 consecutive days. Before they can deliver 3MV, facilitators are trained to know about HIV/STD and about issues such as racism, homophobia, stigma, and discrimination that can affect black MSM. Once trained, facilitators are supervised by program managers of implementing service-provider organizations to ensure fidelity of their delivery to the intervention curriculum (*34*).

Evaluation Methods

During August 2005–November 2006, People of Color in Crisis, Inc., and its university research partners evaluated the efficacy of 3MV among black MSM in New York City using a randomized controlled trial design (*31*). The study sample comprised 338 black MSM of negative or unknown HIV serostatus. Participants were randomly assigned to the 3MV intervention condition (164 men) or to a wait-list control condition (174 men). The intervention was delivered as a 3-day weekend retreat at a resort in upstate New York. Participants who were randomized to the control condition were scheduled to receive 3MV after completing the 6-month follow-up assessment. The Human Subjects Research Review Committee at Binghamton University, State University of New York approved the study protocol.

Participants' knowledge, attitudes, and behaviors were assessed by using audio computer-assisted self-interview at baseline and at 3- and 6-months postintervention follow-ups. Behavioral outcomes assessed were number of episodes of unprotected (without a condom) insertive and receptive anal intercourse with main and casual male partners; number of male sex partners; number of episodes of condom-protected anal intercourse acts (analyzed as always protected [100%], sometimes protected [1-99%] versus never protected [0%]); and self-reported testing for HIV and other STDs, including gonorrhea, syphilis, and chlamydia.

Retention of study participants exceeded 70% in both study conditions at all follow-up assessments. Outcome analyses used an intent-to-treat approach in which participants were included in the analysis as originally assigned, and generalized estimating equation models were used to assess intervention efficacy across the entire study period. Details about participant eligibility criteria, screening procedures, study implementation methods, data collection, and statistical analyses are reported elsewhere (*31*).

Published Findings

The trial indicated that 3MV is efficacious in reducing HIV/STD risk behaviors and increasing health protective actions of black MSM (*31*). Relative to men assigned to the control condition, 3MV intervention participants reported a 25% greater reduction in the number of male sex partners at the 3-month follow-up assessment (rate ratio [RR] = 0.75; 95% confidence interval [CI] = 0.57–0.98); a 66% greater reduction in number of episodes of unprotected anal intercourse with casual male partners at the 6-month follow-up assessment (RR = 0.34; CI = 0.14–0.83); and a 51% greater reduction in the number of episodes of unprotected insertive anal intercourse with casual male partners across the entire study period (RR = 0.49; CI = 0.28–0.87). Intervention participants also exhibited a trend for greater consistent condom use during receptive anal intercourse with casual male partners throughout the entire study period (odds ratio [OR] = 1.55; CI = 0.99–2.43). Finally, intervention participants had an 81% greater odds of testing for HIV at the 6-month follow-up (OR = 1.81; CI = 1.08–3.01) and 33% greater odds of testing for HIV across the entire study period (OR = 1.33; CI = 1.05–1.68) than control participants. There was no statistically significant intervention effect on unprotected anal intercourse or condom use with main male partners, although these effects were in the protective direction for intervention participants. 3MV did not significantly increase testing for syphilis or chlamydia.

Limitations

Limitations of the efficacy study included the use of self-reported sexual risk behaviors, limited generalizability of findings based on delivery of the intervention as a 3-day weekend retreat rather than as weekly intervention sessions, and whether 3MV was effective in reducing risk behaviors under real-world conditions. To address the latter limitation, CDC funded three CBOs in 2008 to conduct outcome monitoring

TABLE 1. Sessions and objectives of *Many Men, Many Voices*, an HIV/STD prevention intervention for black men who have sex with men

Session	Description of objectives
1. Black MSM and dual identity	Influence of personal factors, familial norms, social networks, and social attitudes and norms on behavior Influence of racism and homophobia on behavior, including dual-identity struggle of being a black man and a gay man Explore how reactions of family, religious community, and society lead to nondisclosure of sexual identity, isolation, and fear Understand how internalized racism and homophobia lead to negative emotions and values, and can be used to develop a positive self-concept Understand how personal and social factors lead to high-risk sexual and substance use behaviors and contribute to disparities in HIV/STDs
2. HIV/STD prevention for black MSM: the roles and risks for tops and bottoms	Recognize how sexual roles/positions (i.e., top versus bottom) influence HIV/STD risk Increase knowledge of HIV and other STDs Understand how having an STD increases chance of acquiring or transmitting HIV Understand factors that determine STD/HIV risk and can be used for prevention options Learn why HIV/STD epidemic is increasing for black MSM Understand how black MSM are at high risk even if they engage in low-risk behaviors
3. HIV/STD risk assessment and prevention options	Use of "transmission puzzle" to create menu of prevention options Understand how personal sexual choices increase HIV/STD risk behavior Increase awareness of how partner selection and sexual decisions impact HIV risk Increase perceived risk for getting HIV/STD
4. Intentions to act and capacity for change	Learn how behavior change occurs, including spiral pattern of relapses and slips Recognize personal barriers to change behavior Form intentions and agree to act on one prevention option of their choosing Provide social support to help build confidence in ability to implement prevention option Develop and practice skills related to chosen prevention option
5. Relationship issues: Partner selection, communication, and negotiation of roles for black MSM	Identify preferred relationships Explore how sex role (i.e., tops and bottoms) can create power and control issues Explore attitudes towards sex roles and power in black communities Recognize origins of relationship roles and how roles might reflect stereotypes and sexism Explore how relationship dynamics affect decision-making and HIV/STD risk behaviors Build communication and negotiation skills to practice risk-reduction options Develop skills in partner selection, communication, and negotiation of role
6. Social support and problem solving to maintain change	Provide positive reinforcement for behavior-change efforts Discuss experiences with chosen behavior-change options Build skills in correct condom use Build skills in problem-solving by sharing ideas Establish ongoing social support system to maintain change
7. Building bridges and community	Describe self-development and self-growth resulting from intervention Identify prevention needs and list resources and services to access Describe need for ongoing community development to create environment where black MSM feel safe and accepted

Abbreviations: MSM = men who have sex with men; HIV = human immunodeficiency virus; STD = sexually transmitted disease.

of 3MV to determine the effectiveness of the intervention in reducing HIV-related risk behaviors among young men of color who have sex with men (*39*). Men in the intervention group showed significant reductions, relative to baseline levels, in unprotected anal intercourse at 3-month (OR = 0.38; CI = 0.27–0.52) and 6-month (OR = 0.44; CI = 0.32–0.61) postintervention assessments (*39*). In addition to replicating the efficacy of study findings, the results of this outcome monitoring initiative provide evidence of the effectiveness of 3MV delivered by CBOs in reducing unprotected sex among young men of color who have sex with men. Additional studies are needed to demonstrate the effectiveness and generalizability of 3MV among diverse black MSM populations, delivery settings, and geographic regions.

Discussion

This was the first study to demonstrate the efficacy of an HIV/STD prevention intervention for reducing sexual risk behaviors and increasing HIV testing among black MSM. 3MV has the capacity to reduce risk behaviors associated with HIV-related disparities among black MSM because the intervention was designed specifically to address their unique prevention needs. Moreover, the intervention's impact on increasing HIV testing is critical for black MSM who might be unaware of their HIV serostatus and can segue to additional prevention and treatment services. On the basis of the findings of the efficacy trial and rigor of study methods, CDC identified 3MV as a "best evidence" evidence-based

behavioral intervention in 2009, and the program is listed in the online *Compendium of Evidence-based HIV Prevention Interventions* (*40*).

Since 2004, when CDC first disseminated 3MV, 899 members of HIV prevention service organizations completed one of the 66 trainings of facilitators offered by CDC (Table 2). These 899 members represent 245 CBOs, 36 health departments, and 82 other agencies. Of the 153 CBOs funded directly by CDC to implement HIV behavioral prevention interventions in 2012, a total of 24 (16%) delivered 3MV to black MSM and other MSM of color (including Latinos, Asian/Pacific Islanders, and American Indian/Alaska Natives) in 12 states, the District of Columbia, and Puerto Rico. Persons from 37 states, the District of Columbia, and Puerto Rico have been trained to facilitate 3MV. 3MV remains the only HIV/STD prevention intervention with proven efficacy for black MSM.

After results from the efficacy trial described above were published and the intervention's inclusion in CDC's Diffusion of Effective Behavioral Interventions (DEBI) project was affirmed (*41*), CDC updated the 3MV intervention package in 2011. Consistent with developments in the literature (*42,43*), components of the intervention that address the effects of discrimination, stigma, racism, and homophobia were strengthened, and information about HIV and STDs was updated. The new intervention package now provides detailed guidance on implementing the intervention by using a weekend retreat format as an alternative to a multisession weekly format. The new intervention materials and training curriculum were completed, distributed to all directly funded CBOs and health departments delivering 3MV, and made available to the public in January 2011 (www.effectiveinterventions.org) (*34*). Continuous quality improvement efforts are ongoing to build service-provider capacity related to recruitment, retention, adaptation, and evaluation.

The cost-effectiveness of 3MV was not ascertained in the efficacy trial. However, according to the 3MV Implementation Manual (34), the estimated annual cost of delivering six cycles of the intervention to 120 clients (i.e., 20 clients per cycle) is $142,000 or $1,183 per client based on 2010 dollars. The estimated lifetime treatment cost for a person in whom HIV infection is newly diagnosed is $379,668 (in 2010 dollars and discounted to time of infection) (*44*). Because of the very high rates of HIV among black MSM and substantial lifetime treatment cost of each new HIV infection, the proven efficacy of 3MV in modifying antecedents of HIV infection and testing behavior supports its dissemination and implementation with high expectations of potential economic and public health benefits.

Conclusion

The 3MV intervention is an important component of a comprehensive HIV and STD prevention portfolio for at-risk black MSM. With continuous CDC support since 2004, the intervention has been delivered to thousands of black MSM and other MSM of color by CBOs, health departments, and other service providers. Black MSM who participate in 3MV take steps to reduce their personal risk behaviors and raise awareness about the importance of STD and HIV prevention, testing, and treatment among their partners and social networks that can contribute to reducing HIV and STD incidence and prevalence in their communities. As CDC continues to support HIV prevention programming consistent with the National HIV/AIDS Strategy (*45*) and its high-impact HIV prevention approach (*46*), 3MV will remain an important tool for addressing the needs of black MSM at high risk for HIV infection and other STDs.

Acknowledgments

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TABLE 2. Participation in *Many Men, Many Voices* training of facilitators — Diffusion of Effective Behavioral Interventions Project, July 2004–February 2013

3MV Intervention description	Dates of training	No. trainings	No. participants	No. CBOs represented	No. health departments represented	No. other agencies represented*
Original package	2004–Mar 2011	54	752	188	31	58
Repackaged	2011–Feb 2013	11	139	54	5	24
Spanish translation	2009–Feb 2013	1	8	3		
Total		**66**	**899**	**245**	**36**	**82**

Abbreviations: 3MV = Many Men, Many Voices; CBO = community-based organizations; HD = health department.
* Other agencies include academic institutions, medical centers and clinics, national nongovernmental organizations, and technical assistance providers.

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Tribal Motor Vehicle Injury Prevention Programs for Reducing Disparities in Motor Vehicle–Related Injuries

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Summary

A previous analysis of National Vital Statistics System data for 2003–2007 that examined disparities in rates of motor vehicle–related death by race/ethnicity and sex found that death rates for American Indians/Alaska Natives were two to four times the rates of other races/ethnicities. To address the disparity in motor vehicle–related injuries and deaths among American Indians/Alaska Natives, CDC funded four American Indian tribes during 2004–2009 to tailor, implement, and evaluate evidence-based road safety interventions. During the implementation of these four motor vehicle–related injury prevention pilot programs, seat belt and child safety seat use increased and alcohol-impaired driving decreased.

Four American Indian/Alaska Native tribal communities—the Tohono O'odham Nation, the Ho-Chunk Nation, the White Mountain Apache Tribe, and the San Carlos Apache Tribe—implemented evidence-based road safety interventions to reduce motor vehicle–related injuries and deaths. Each community selected interventions from the Guide to Community Preventive Services and implemented them during 2004–2009. Furthermore, each community took a multifaceted approach by incorporating several strategies, such as school and community education programs, media campaigns, and collaborations with law enforcement officers into their programs. Police data and direct observational surveys were the main data sources used to assess results of the programs. Results included increased use of seat belts and child safety seats, increased enforcement of alcohol-impaired driving laws, and decreased motor vehicle crashes involving injuries or deaths. CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion as an example of a program that might be effective for reducing motor vehicle-related injury disparities in the United States.

The Guide to Community Preventive Services recognizes these selected interventions as effective; this report examines the feasibility and transferability for implementing the interventions in American Indian/Alaska Native tribal communities. The findings in this report underscore the effectiveness of community interventions to reduce motor vehicle crashes among selected American Indian/Alaska Native communities.

Introduction

Motor vehicle crashes (MVCs) are a leading cause of death for children, teenagers, and young adults in the United States, and some U.S. populations are disproportionately affected (*1*). A previous analysis of National Vital Statistics System data for 2003–2007 that examined disparities in rates of MVC-related death by race/ethnicity and sex found large disparities among American Indians/Alaska Natives, with death rates two to four times the rates for other races/ethnicities (*2*).

Previous reports have documented several factors that place American Indians/Alaska Natives at increased risk for MVC-related injuries and deaths, including low rates of seat belt use and child safety seat use and a high prevalence of alcohol-impaired driving (*3*–*5*). In 2006, an observational study found that seat belt use among American Indians/Alaska Natives was approximately 62% (*4*), compared with 81% for the general U.S. population (*6*). Research on child safety seat use in 2004 found that approximately 66% of fatally injured American Indian/Alaska Native children aged <5 years were unrestrained at the time of the crash (*3*), compared with 35% in the general population (*7*). In 2006, data examining MVCs involving alcohol-impaired driving found that 48% of MVC-related fatalities among American Indians/Alaska Natives occurred in alcohol-related crashes, the highest percentage for any race/ethnicity (*5*).

Effective interventions to increase seat belt use include primary enforcement seat belt laws and enhanced enforcement programs; interventions to increase child safety seat use include child safety seat use laws and and distribution of safety seats plus education programs; and interventions to decrease alcohol-impaired driving include enforcing 0.08% blood alcohol concentration (BAC) laws, minimum legal drinking age laws, sobriety checkpoints, and zero tolerance laws for drivers aged <21 years (*8*).

To address disparities in MVC-related injuries and deaths among American Indians/Alaska Natives, CDC funded projects within four American Indian/Alaska Native

tribes—the Tohono O'odham Nation (TON), the Ho-Chunk Nation (HCN), the White Mountain Apache Tribe (WMAT), and the San Carlos Apache Tribe (SCAT)—during 2004–2009 to tailor, implement, and evaluate evidence-based road safety interventions. The four tribes are in Arizona (TON, WMAT, SCAT) and Wisconsin (HCN) (Figures 1 and 2). The TON, located in the southwestern corner of Arizona on approximately 2.8 million acres, is the second largest reservation in the United States. The TON comprises approximately 28,000 tribal members. The WMAT and SCAT are both located in eastern Arizona. The WMAT sits on approximately 1.67 million acres and comprises about 16,000 tribal members, and the SCAT is located on 1.8 million acres and has approximately 14,000 tribal members. Finally, the HCN is largely concentrated in midwestern Wisconsin on approximately 13,000 acres in 14 counties and comprises a tribal membership of approximately 7,000. The HCN project focused on five rural counties (i.e., Jackson, Juneau, Monroe, Sauk, and Wood).

CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion that follows to provide an example of a program that might be effective in reducing disparities in motor vehicle–related injuries in the United States. Criteria for selecting this program are described in the Background and Rationale for this supplement (*9*).

FIGURE 1. Location of the Tohono O'odham Nation, White Mountain Apache Tribe, and the San Carlos Apache Tribe reservations — Arizona

FIGURE 2. Location of the Ho-Chunk Nation reservation — Wisconsin*

* The Ho-Chunk Nation is largely concentrated on approximately 13,000 acres in 14 counties. The project focused on five rural counties (i.e., Jackson, Juneau, Monroe, Sauk, and Wood).

Methods

Intervention

Each tribe was expected to tailor at least two interventions chosen from the *Guide to Community Preventive Services* (*Community Guide*) (*8*) to its community. The *Community Guide* is a resource of evidence-based findings and recommendations about community-based health and injury prevention interventions. The recommendations derive from a rigorous, replicable systematic review process that evaluates the strengths and limitations of existing research for community-based health promotion and disease prevention programs, services, and policies. For motor vehicle safety, the *Community Guide* includes recommendations for several interventions designed to increase use of seat belts and child safety seats and decrease alcohol-impaired driving (*8*).

CDC encouraged each tribe to take a multifaceted approach by incorporating education and awareness-raising activities, media campaigns, and enforcement components into its program (Table). For example, education activities included programs at schools as well as community information and awareness raising through safety expos and health fairs; media campaigns included billboards, radio public service announcements (PSAs), and newspaper articles; and

TABLE. Intervention emphasis and components included in four tribal motor vehicle injury prevention programs — United States, 2004–2009

Tribe	Seat belt use			Child safety seat use			Alcohol-impaired driving		
	Education	Media	Enforcement	Education	Media	Enforcement	Education	Media	Enforcement
Tohono O'odham Nation	✓	✓	✓	✓	✓	✓	✓		✓
Ho-Chunk Nation	✓	✓	✓	✓	✓	✓	✓	✓	
White Mountain Apache Tribe	✓	✓	✓		✓	✓	✓	✓	✓
San Carlos Apache Tribe			✓			✓	✓	✓	✓

enforcement components included enhanced enforcement focusing on specific issues, such as alcohol-impaired driving or seat belt nonuse, and aimed to increase the number of citations for these illegal behaviors.

TON passed a primary seat belt law in 2005 (no CDC funds were used for this activity). To support implementation of the new law, TON focused a comprehensive media campaign that included billboards, radio PSAs, and articles in the tribal newspaper to increase seat belt use and collaborated with tribal police on enhanced police enforcement campaigns. Enhanced enforcement campaigns involve targeted police enforcement of a specific illegal behavior, such as seat belt nonuse, with increased resources and staffing during specific times. TON not only focused these campaigns on increasing seat belt use (e.g., Click-It or Ticket programs) but also on reducing alcohol-impaired driving through driving under the influence (DUI) saturation patrols and sobriety checkpoints. In addition, TON held community events and health fairs in which motor vehicle education stations or booths helped to inform the community about laws and safety benefits of wearing seat belts, as well as the risks associated with alcohol-impaired driving. Finally, TON conducted child safety seat distribution and education programs and community education and awareness-raising activities through safety expos and health fairs.

HCN set goals to increase use of seat belts and child safety seats. An important component of the HCN's program was partnership with local county police departments to educate and train police officers to increase enforcement of laws pertaining to use of seat belts and child safety seats. HCN also held several child safety seat education and distribution events. HCN implemented a comprehensive media campaign that included newspaper and radio ads, radio PSAs, seat belt road signs, mobile media, and billboards. Additionally, HCN educated the community through events, such as crash simulations, safety expos, health fairs, school events, and child passenger safety clinics.

WMAT focused on increasing seat belt use and decreasing alcohol-impaired driving through enhanced police enforcement and sobriety checkpoints and implementing a comprehensive media campaign that included radio and newspaper ads and periodic radio PSAs. WMAT trained 29 police officers on the installation, education, and enforcement of child safety and booster seats.

SCAT focused on reducing alcohol-impaired driving and increasing use of seat belts and child safety seats among tribal members. Media campaigns, including radio and newspaper ads, and flyers, posters, and sponsored booths to educate the community at local events complemented their enforcement efforts to reduce alcohol-impaired driving. SCAT used sobriety checkpoints and enhanced police enforcement to decrease alcohol-impaired driving and increase restraint use.

Data Analyses

Observational surveys of seat belt use conducted by tribal staff (all tribes) followed the University of North Carolina/Indian Health Service Seat Belt Use Observational Survey Protocol (*10*). Observations of seat belt use were recorded for drivers and front seat passengers. The proportion of seat belt use was calculated by dividing the number of observed belted occupants by the total number of observations. In addition, observational surveys of child safety seat use (TON, HCN) followed the guidelines outlined by the Indian Health Service Ride Safe Program (*11,12*).

The numbers of community observational surveys conducted by the tribal programs varied by year and tribe; ranges by tribe are presented here. Observational surveys among TON drivers and passengers ranged from 1,000 observations in 2005 to 3,378 observations in 2008; for HCN, from 1,177 in 2007 to 1,924 in 2009; and for WMAT, from 636 in 2004 to 1,971 in 2006. Observational surveys of child safety seat use also were conducted by TON and HCN. For TON, total observations of child safety seat use ranged from 246 in fall 2006 to 261 in fall 2005; for HCN, from 31 in fall 2006 to 88 in spring 2008.

Tribal police data were used to measure changes in overall numbers of MVCs (SCAT), nighttime MVCs (SCAT), MVCs involving injuries (TON) or injuries and deaths (SCAT), and DUI arrests (SCAT). Tribal police data also were used to count the total number of sobriety checkpoints and vehicles stopped during the checkpoints (WMAT and SCAT), DUI arrests (TON), citations for seat belt nonuse (HCN), and enhanced enforcement campaigns (HCN) during the program period. Additionally, WMAT measured knowledge and

behavior change among 29 police officers by using surveys immediately before and after the child safety seat and booster seat installation, education, and enforcement training sessions. The surveys asked police officers how confident they were in educating the community about proper use of child safety seats and about properly identifying the requirements for rear-facing child safety seats and booster seats.

Finally, SCAT conducted a cost–benefit analysis to further evaluate its program. Data from the Arizona Crash Outcome Data Evaluation System (CODES) were used to compare all program costs with the dollar value of ensuing benefits. The analysis used a human capital approach and benefits in terms of direct and indirect costs saved from reduced numbers of MVCs, fewer injuries per crash, and reduced injury severity were calculated from a societal perspective. Arizona CODES data include probabilistically linked police crash report data, emergency medical systems data, emergency department and hospital records data, and rehabilitation and long-term care data. These CODES data contain direct and indirect cost information, including costs of medical expenses (such as professional, hospital, emergency department, drug, rehabilitation, and long-term care costs), and police, fire, insurance administration, loss of wages, loss of household work, legal and court, and property damage costs (*13*).

Results

On the TON reservation from 2005 to 2009, observed driver use of seat belts increased 73% (from 45% to 77%), and passenger use of seat belts increased 85% (from 37% to 68%) (Figure 3). Additionally, observed use of child safety seats increased 45% (from 34% to 49%). From 2004 to 2008, TON documented a 36% decrease in crashes with injuries. Enhanced enforcement activities resulted in 388 DUI arrests.

During 2005–2009, observed HCN driver use of seat belts increased 38% (from 50% to 69%), and passenger use of seat belts increased 94% (from 33% to 63%) (Figure 4). Observed use of child safety seats increased 85% (from 41% to 76%). During the program period, activities included 13 enhanced seat belt use enforcement campaigns that resulted in 151 citations for seat belt nonuse.

From 2004 to 2008, observed WMAT driver use of seat belts increased 315% (from 13% to 54%), and passenger use of seat belts increased 220% (from 10% to 32%) (Figure 5). In evaluations of police enforcement training about child passenger safety, the percentage of officers who reported being extremely confident about educating the community in the proper use of child safety seats increased 314% (from 14% to 58%), and officer's proper identification of requirements for

FIGURE 3. Percentage of observed driver and passenger seat belt use — Tohono O'odham Nation, 2005–2009

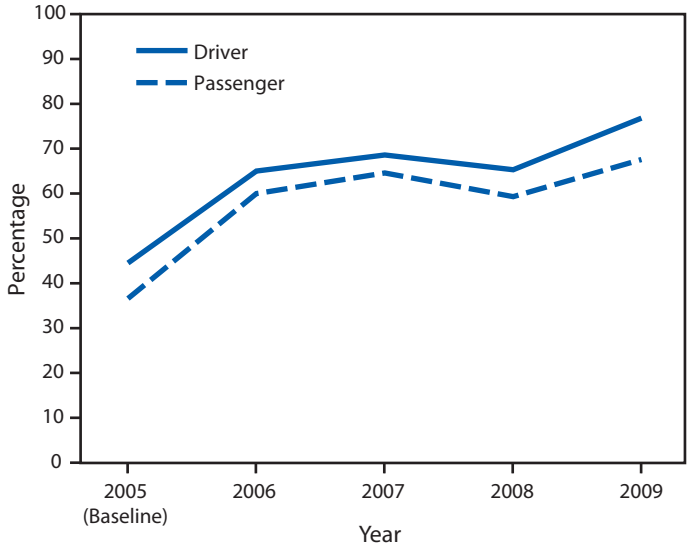
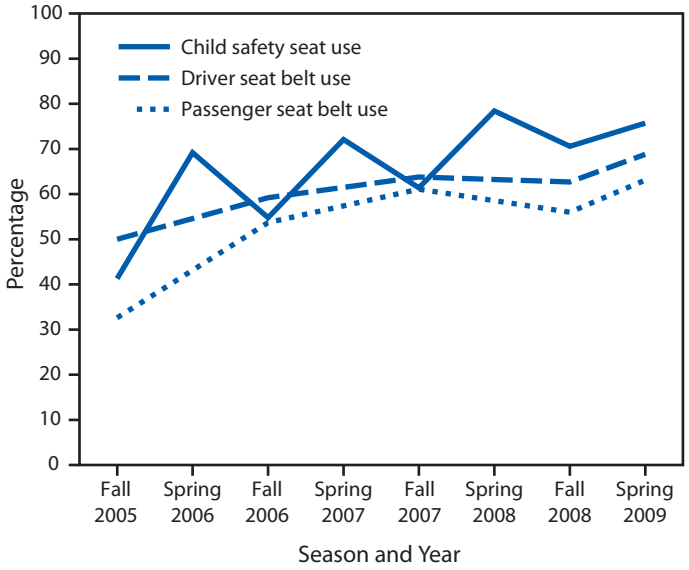


FIGURE 4. Percentage of observed seat belt and child safety seat use — Ho-Chunk Nation, 2005–2009

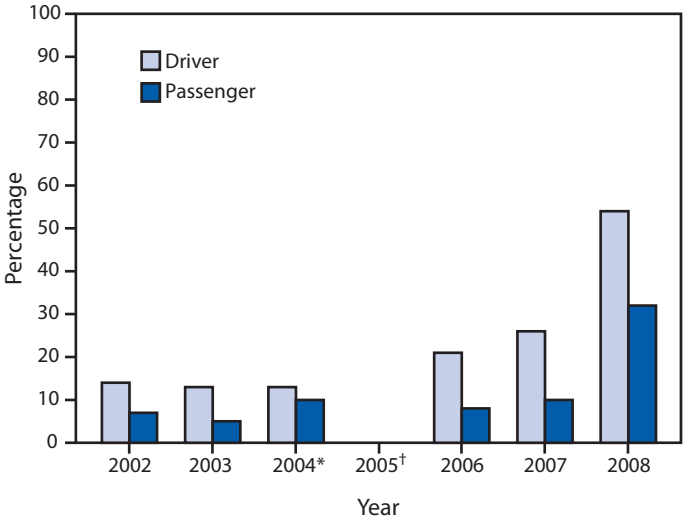


rear-facing child safety seats and booster seats increased by 51% (from 59% to 89%) and 13% (from 24% to 27%), respectively. In addition, from 2006 to 2008, enhanced alcohol-impaired driving enforcement activities included conducting 55 sobriety checkpoints and stopping approximately 28,000 vehicles to check for alcohol-impaired drivers.

For SCAT from 2004 to 2008, observed driver seat belt use increased 46% (from 13% to 19%) and MVCs decreased 29% (Figure 6). Furthermore, nighttime MVCs decreased 27%, and MVCs involving injuries and/or fatalities decreased 31%.

During 2004–2008, SCAT conducted 39 sobriety checkpoints and stopped approximately 18,000 vehicles. In addition, total DUI arrests increased 52% during this period. In addition, SCAT passed two motor vehicle safety resolutions in 2007 (no CDC funds were used for these activities). In the first, the legal limit in the BAC law was lowered from 0.10% to 0.08%, making driving with a BAC ≥0.08% illegal. The second established a primary seat belt law for the SCAT Reservation that allowed officers to pull over a driver and issue a citation solely because of an unbuckled occupant, rather than needing to pull over a driver for another offense before issuing a citation for a seat belt violation. A cost–benefit analysis of the SCAT program documented a savings of $2,710,000 during the project period, including $360,000 in direct medical costs and $2,350,000 in other costs (e.g., foregone earnings because of death or injury). Moreover, the program had a lifetime cost–benefit ratio of 1:9.54; in other words, for every $1 spent, a lifetime benefit of $9.54 was saved from fewer MVCs, fewer injuries per crash, and reduced injury severity (*13*).

FIGURE 5. Percentage of observed driver and passenger seat belt use — White Mountain Apache Tribe, 2002–2008



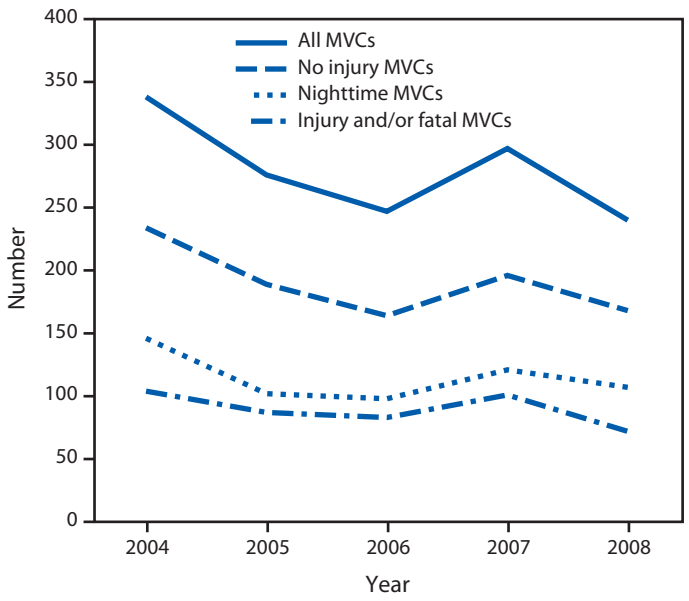
* Data from 2004 were used as baseline estimates.
† Data were unavailable for 2005.

Discussion

MVCs and MCV-related injuries and deaths are preventable. Seat belts can reduce the risk for death in a crash by approximately half, and child safety seats can reduce the risk for death to infants by 71% and to toddlers by 54% *(7,14)*. Moreover, sobriety checkpoints reduce fatal alcohol-related crashes by approximately 20% (*15*). During 2004–2009, evidence-based road safety interventions were implemented in four American Indian/Alaska Native tribes. Over this time period, seat belt and child safety seat use increased and alcohol-impaired driving decreased in these communities. However, these observational studies do not provide information regarding causal association. As CDC continues to address disparities in motor vehicle–related injuries and deaths, the successes and lessons learned from these programs will be applied to improve future programs.

Lessons learned from the first four programs included the need for several strong partners, including police and tribal leaders; a full-time tribal program coordinator; evaluation consultants; and local Indian Health Service and tribal environmental health professionals who can provide on-the-ground technical assistance. Additionally, implementation of evidence-based strategies and a multicomponent approach that includes elements of media, education, and enforcement were thought to contribute to program successes. These lessons learned might—or might not—transfer for use in future programs because of the diverse cultural, environmental, social, and political characteristics of

FIGURE 6. Number of motor vehicle crashes (MVCs), by type of crash — San Carlos Apache Tribe, 2004–2008



the 566 federally recognized sovereign American Indian/Alaska Native tribes in the United States.

To better understand what is needed to implement successful motor vehicle–related injury prevention programs across diverse tribal populations, CDC will continue to work with tribal communities to tailor, implement, and evaluate evidence-based interventions. CDC funded six new tribes, one tribal organization, and the Alaska Native Consortium

during 2010–2014 to apply approaches similar to those used by the four tribes described in this report: Caddo Nation of Oklahoma, California Rural Indian Health Board, Colorado River Indian Tribes, Hopi Tribe of Arizona, Oglala Sioux Tribe of South Dakota, Rosebud Sioux Tribe of South Dakota, Sisseton-Wahpeton Oyate of the Lake Traverse Reservation, and Southeast Alaska Regional Health Consortium. CDC plans to use the best practices and lessons learned from all 12 tribal programs, including the four described here, to advise and guide future tribal programs to prevent motor vehicle–related injuries.

Limitations

The findings in this report are subject to at least two limitations. First, uniform data collection on the same measures across all four tribes was not possible because of differences in information collected by the police and data accessibility issues. Therefore, the results cannot be compared between tribes. Second, the cost estimates used in the cost–benefit analysis are conservative because of difficulty in obtaining complete cost data; therefore the total savings reported probably are underestimated.

Conclusion

Tailoring evidence-based interventions (e.g., through culturally appropriate messages, by using important tribal forums to raise awareness, and by establishing unique enforcement partnerships) to prevent motor vehicle–related injuries was a promising approach for these pilot programs. Continued translation and application of effective interventions in other tribal populations is necessary to further reduce disparities in motor vehicle–related injuries and deaths.

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Health Outcomes: Behavioral Risk Factors

Decreased Smoking Disparities Among Vietnamese and Cambodian Communities — Racial and Ethnic Approaches to Community Health (REACH) Project, 2002–2006

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Summary

Since 1964, smoking prevalence in the United States has declined because of nationwide intervention efforts. However, smoking interventions have not been implemented uniformly throughout all communities. Some of the highest smoking rates in the United States have been reported among Southeast Asian men, and socioeconomic status has been strongly associated with smoking. To compare the effect in reducing racial and ethnic disparities between men in Southeast Asian (Vietnamese and Cambodian) communities and men residing in the same states, CDC analyzed 2002–2006 data from The Racial and Ethnic Approaches to Community Health (REACH) project. The prevalence of current smoking significantly decreased and the quit ratio (percentage of ever smokers who have quit) significantly increased in REACH Vietnamese and Cambodian communities, but changes were minimal among all men in California or all men in Massachusetts (where these communities were located). The smoking rate also declined significantly, and the quit ratio showed an upward trend in U.S. men overall; however, the changes were significantly greater in REACH communities than in the nation. Stratified analyses showed decreasing trends of smoking and increasing trends of quit ratio in persons of both high and low education levels in Vietnamese REACH communities. The relative disparities in the prevalence of smoking and in the quit ratio decreased or were eliminated between less educated Vietnamese and less educated California men and between Cambodian and Massachusetts men regardless of education level.

Eliminating health disparities related to tobacco use is a major public health challenge facing Asian communities. The decline in smoking prevalence at the population level in the three REACH Vietnamese and Cambodian communities as described in this report might serve as a model for promising interventions in these populations. The results highlight the potential effectiveness of community-level interventions, such as forming community coalitions, use of local media, and enhancing communities' capacity for systems change. The Office of Minority Health and Health Equity selected this intervention analysis and discussion to provide an example of a program that might be effective for reducing tobacco use-related health disparities in the United States.

Introduction and Background

Despite an overall decline in smoking prevalence in the United States since 1964, prevalence remains high in some groups (*1*), particularly among Asian American men, including Vietnamese, Cambodian, Laotian, Korean, and Filipino Americans (*2*). The National Latino and Asian American Study in 2002–2003 found smoking prevalences of 23.6% in Chinese men, 24.4% in Filipino men, and 29.5% in Vietnamese men (*3*). Smoking is a social and cultural norm for men in Asian countries (*4*), and review of tobacco industry documents indicated that the tobacco industry has targeted and developed specific strategies to promote tobacco-use among immigrants and Asian American communities (*5*). Since 1985, a limited number of tobacco-control interventions were targeted to Asian American communities (*6–10*).

A 2010 study documented overall decreasing trends in the prevalence of smoking among men in Asian communities served by the Racial and Ethnic Approaches to Community Health (REACH) project (*11*). REACH is a CDC effort to eliminate racial/ethnic disparities in health by supporting community coalitions to design, implement, and evaluate community-driven strategies (*12*). Because some of the highest smoking rates in the United States have been reported among Southeast Asian men (*2,3*), 5-year trends in smoking prevalence during 2002–2006 were examined among men in three REACH Southeast Asian communities: two Vietnamese communities in California (one each in Los Angeles/Orange counties and

Santa Clara County) and one Cambodian community in Lowell, Massachusetts. Trends were compared with those in the total population of men living in the respective states and in the total U.S. male population. Because smoking is strongly associated with socioeconomic status (*2,3,13*), rates stratified by education levels were compared.

CDC's Office of Minority Health and Health Equity selected the intervention analysis and discussion that follows to provide an example of a program that might be effective in reducing smoking-related disparities in the United States. Criteria for selecting this program are described in the Background and Rationale for this supplement (*14*).

Methods

Intervention

In 1999, CDC launched REACH 2010 to help 42 minority communities across the United States eliminate health disparities (*12*). With the intent to promote widespread change in risk or protective behaviors and reduce health disparities, REACH emphasized changes in policy and community environments, in community resources to remove barriers to healthy behavior, and in social norms. In each of the 42 competitively selected and funded communities, REACH targeted at least one of the following racial/ethnic groups: blacks, Hispanic Americans, Asian Americans/Pacific Islanders, and American Indians/Alaska Natives. Each intervention program focused on one or more of the following health priority areas: cardiovascular disease, diabetes, breast and cervical cancer screening and management, infant mortality, vaccinations, and human immunodeficiency virus/acquired immunodeficiency syndrome. This report examines two Vietnamese communities in California (one in Los Angeles/Orange Counties and one in Santa Clara County) and a Cambodian community in the city of Lowell, Massachusetts.

REACH was a multicomponent community intervention, not a tobacco intervention trial. Although different communities selected different diseases and conditions as their priority areas, the overall goal was to build a healthy community through increased knowledge and motivation to live a healthy lifestyle. The intervention of these three communities followed a logic model developed by CDC (*15*) that included three stages:

1. **Capacity building.** Community-based coalitions were formed to address community health issues. Each coalition comprised a community-based organization and at least three other organizations, of which at least one was a local or state health department, university, or research organization. These coalitions were operated primarily by residents of the community at every stage of the program (planning, implementation, and evaluation). For example, the Vietnamese REACH for Health Initiative Coalition in Santa Clara County was a partnership of 16 community groups, county health providers, and researchers at the University of California, San Francisco. The coalition planned and implemented a Community Action Plan that included multimedia campaigns, outreach activities by lay health workers, patient navigation assistance, and continuing medical education for Vietnamese health-care professionals.
2. **Targeted actions.** Interventions included culturally tailored and language-appropriate health communications campaigns, education, and health promotion programs. The communities created local radio and cable TV talk shows in Vietnamese and Khmer languages (e.g., the Public Service Announcement program "Quitting Smoking for Your Kids" in Lowell). The coalitions also distributed educational audiotapes and CDs to low-literacy residents and distributed posters, newsletters, and fact sheets in stores, restaurants, churches and temples, community meetings, health fairs, worksites, health clinics, and senior centers. Educational classes, seminars, health-focused field trips, and workshops also were offered to community members. Education topics varied by community, with different chronic disease emphases. However, because smoking is a common risk factor for many chronic diseases, many interventions addressed it in that light. For example, active and passive exposure to cigarette smoke is a risk factor for cervical cancer (*16*). Although Vietnamese American women have a low prevalence of active smoking, passive smoke exposure is a problem for them because of the high prevalence of smoking by Vietnamese men (*2,3*).
3. **Community and systems change.** REACH focused on reducing the barriers to health promotion information and access to health care for poor and underserved persons and ensured nondiscriminatory and culturally competent health education. For example, in Lowell, the coalitions worked with Buddhist monks, families, and community leaders to promote smoke-free environments. Communities also provided continuing education on cardiovascular disease and breast and cervical cancer prevention for health-care providers. Hospitals and health clinics provided free health promotion and health education sessions. A key intervention strategy was to create change agents among community leaders, such as community health advocates, advisors, health promoters, ministers, and Buddhist monks, by changing their knowledge, attitudes, beliefs, and behaviors with the intent of diffusing similar changes to the broader community. The coalitions reached out to community leaders, invited them to participate in the coalition activities,

and provided them with health information and knowledge. REACH helped community leaders act as catalysts for change in the community. These communities used lay health workers/advisors to reach the most disadvantaged population subgroups. Lay health workers, trained by the programs, assisted residents through health education and health promotion efforts, and they responded to their needs, including linking community members to health-related services, including smoking-cessation programs.

Evaluation

As part of the REACH 2010 evaluation, CDC conducted annual risk factor surveys of adults in each of the five project years during 2002–2006 (*17*). The surveys were conducted by telephone (except for 2002 in Lowell, where interviews were conducted in person). In the telephone surveys, a dual frame sample design (i.e., a combination of random-digit–dial frame and listed telephone frame) was used, except in Santa Clara County, where only a listed telephone frame was used. The listed telephone frames included the telephone numbers listed under Vietnamese or Cambodian surnames in area telephone directories. For 2002 in Lowell, an area probability sample was drawn. All eligible women aged 40–64 years and up to two other adults in the household were invited to participate in the surveys. The mean response rate for household screening was 65% for the contacted households and 57% for family members interviewed among the eligible members.

The same questionnaire was used in all communities and in all survey years. Interviews were conducted in English, Vietnamese, or Khmer in accordance with the respondent's choice. Respondents were first asked, "Have you smoked at least 100 cigarettes in your entire life?" Those who answered "yes" to the first question were then asked: "Do you now smoke cigarettes every day, some days, or not at all?"

Data from the REACH 2010 Risk Factor Survey were compared with data from the Behavioral Risk Factor Surveillance System (BRFSS), a state-based annual health survey conducted in the 50 states and the District of Columbia (*18*). The survey uses multistage, random-digit dialing to gather a representative sample from each state's noninstitutionalized residents aged ≥18 years. During 2002–2006, the response rates ranged from 37% to 45% in California, 36% to 45% in Massachusetts, and median rates of 51% to 58% in the United States.

Data Analysis

A total of 14,540 adult residents (43% men) were interviewed in the REACH 5-year surveys. Excluding men with missing information about smoking (0.4%), the average sample sizes in each year were 904 Vietnamese men (range: 748–1,055) and 334 Cambodian men (range: 135–418). The average numbers of men participating each year in BRFSS during 2002–2006 were 2,000 and 3,500 in California and Massachusetts, respectively.

Persons who had smoked at least 100 cigarettes in their entire lifetime were defined as ever smokers. Those who smoked cigarettes every day or some days at the time of the interview were defined as current smokers. Those who had smoked at least 100 cigarettes but did not smoke at the time of the interview were defined as former smokers. Quit ratio, an indicator of proportion of smokers quitting (*19*), was calculated as the percentage of former smokers among ever smokers.

The prevalence of current smoking and the quit ratio were calculated for each survey year and were age-standardized by the direct method to the 2000 U.S. census. In REACH communities, the measures were also standardized by the language used during the interview, using percentage distributions of the combined 5 years of data as the standard. The prevalences of current smoking and quit ratio were also stratified by two education levels (less than high school/high school graduate or higher) and by two income levels (<$25,000/≥$25,000 per year). Chi-square test was used to compare baseline (2002) characteristics between REACH communities and comparison states. $P<0.05$ was considered as statistically significant.

Logistic regression was performed by using person-level data to examine the trend in the prevalence of current smoking and quit ratio during 2002–2006. Age (categorized into 5 groups) and the language used in the interview were included in the model as covariates. The β coefficient of the year term was determined for each target and each comparison population. The 2-sided z test was then used to determine whether the β coefficients for the trend in the target and comparison populations significantly differed from one another. $P<0.05$ was considered as statistically significant.

To better compare the relative changes over time among different populations with different absolute baseline levels of smoking measures, the average annual percentage change was used in this report, instead of the absolute percentage point change, which was used previously (*11*). Natural log transformation of the age-standardized current smoking prevalence and quit ratios at each survey year was performed and then linear regressions on the year term (values of 1 through 5) was performed. The average annual percentage change in the dependent variable was calculated as $100*(e^{\beta}- 1)$, where β is the regression coefficient of the year term derived from the linear regression (*20*).

Relative disparity was used as an indicator to measure disparity between REACH communities and comparison states. A value >1.0 indicated disparity in tobacco use (e.g.,

higher smoking prevalence or lower quit ratio) in the REACH community, compared with the corresponding states and vice versa. A value of 1.0 indicated no disparity. Relative disparity in current smoking was the ratio of the standardized prevalence of current smoking in REACH communities versus comparison states, whereas relative disparity in quit ratio was the reverse (i.e., the ratio of the standardized quit ratio in comparison states versus REACH communities). Relative disparity was calculated for two education and two income levels separately.

All analyses were performed by using SUDAAN to account for the complex sampling designs in both REACH and BRFSS. In Lowell, where the survey mode changed (i.e., face to face in year 1 and telephone in subsequent years), additional analyses were repeated using years 2-5 only.

Results

Adult men in Vietnamese and Cambodian communities participating in the REACH Risk Factor Survey were compared with men in California and Massachusetts and all U.S. men in 2002 from BRFSS data (Table 1). In the Vietnamese and Cambodian communities, approximately one third of the interviews were administered in English. Vietnamese men in REACH were generally older than California men overall ($p<0.001$), whereas Cambodian men were younger than Massachusetts men overall and the total U.S. population of men ($p<0.001$). Cambodian men had the lowest education level. Men in REACH communities had substantially lower annual family income than men in the comparison states and the total population of U.S. men ($p<0.001$).

In 2002, approximately one third (30.3%) of Vietnamese and nearly half (49.3%) of Cambodian men were current smokers, whereas approximately one fifth of California (19.4%) or Massachusetts (20.3%) men and one fourth (25.4%) of the overall U.S. male population smoked (Table 2). Logistic regression analysis indicated that the prevalence of current smoking significantly decreased in both Vietnamese and Cambodian communities during 2002–2006 but not in California or Massachusetts, the states where these communities were located. As a result of these different trends, the smoking prevalence among Vietnamese men, which exceeded that of California men by 10.9 percentage points in 2002, exceeded the California prevalence by only 5.9 percentage points in 2006; the excess smoking prevalence among Cambodian men versus Massachusetts men decreased from 29.0 percentage points in 2002 to 7.9 percentage points in 2006.

Although smoking prevalence declined significantly in U.S. men overall, the decline in the REACH communities was greater: the magnitude of the negative values of the β coefficient for the year term in the logistic regression equations was significantly larger for Vietnamese and Cambodians than for U.S. men overall ($p<0.05$ by *z* tests). The annual decrease in the Vietnamese communities (-6.4%), and the Cambodian community (-13.9%) was larger than in U.S. men overall (-3.8%).

Stratified analyses indicated that the prevalence of current smoking decreased significantly in both education levels among the Vietnamese communities (both $p<0.05$) (Table 2). Within the Cambodian community, smoking rates significantly decreased in men with higher education ($p = 0.001$) but not in those with lower education level ($p = 0.203$). In California and Massachusetts none of the β coefficients in the stratified logistic regressions were significant.

Quit ratios in 2002 were lower in REACH communities than in the comparison states and in the nation (Table 3). Although there was a downturn in 2006, quit ratios increased significantly during 2002–2006 in Vietnamese ($p<0.001$, 9.6% annually) and Cambodian ($p = 0.002$, 19.0% annually) communities. In contrast, the quit ratio changed little (-0.7% to 0.1% annually) in the comparison states. Although a significant upward trend also was found in U.S. men overall, the change (1.4% annually) was much smaller than those in REACH communities ($p<0.01$ by *z* test).

Stratified analyses showing significant increases in the quit ratio were observed in both education levels in REACH communities but not in the comparison states (Table 3). The quit ratio significantly increased in U.S. men for both low and high education levels (2.1% and 1.4% annually, respectively). However, the changes were significantly smaller than those among REACH communities ($p<0.01$).

To control for changes in survey interview methods after year 1, only data from years 2–5 in the Cambodian community in Lowell were analyzed. The downward trend of prevalence of current smoking and the upward trend of quit ratio remained stable.

A downward trend in the disparity of current smoking was apparent in both Vietnamese and Cambodian communities and for both education levels (Figure). At year 5 (2006), the relative disparity was <1.0 in Vietnamese men with lower education (0.55) and Cambodian men with higher education (0.78). Downward disparity trends were similar for quit ratio (Figure). In 2006, the disparity was eliminated among men with lower education in Vietnamese communities (relative disparity = 1.0) and reverse among men with higher education in the Cambodian community (relative disparity = 0.90). However, at year 5, disparity in the prevalence of current smoking and quit ratio still existed between Vietnamese men and comparison men in California with higher education level (Figure).

The trends in relative disparity stratified by income level were, in general, similar to those stratified by education level.

TABLE 1. Characteristics of adult men in Vietnamese and Cambodian communities in REACH 2010, and in California, Massachusetts, and the United States, 2002

	Vietnamese		California		Cambodian		Massachusetts		United States	
Characteristics	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**
Interviewed in English	29.1	(1.7)	86.4	(1.1)	32.6	(7.5)	96.8	(0.4)	94.3	(0.2)
Age group (yrs)										
18–34	28.3	(1.8)	36.4	(1.5)	39.9	(4.9)	32.2	(1.1)	33.4	(0.2)
35–44	26.6	(1.7)	22.1	(1.1)	32.1	(5.9)	22.1	(0.9)	21.5	(0.2)
45–54	19.6	(1.5)	18.1	(1.1)	16.1	(4.6)	18.7	(0.9)	18.7	(0.2)
55–64	12.7	(1.2)	11.1	(0.9)	4.6	(1.0)	12.3	(0.7)	12.4	(0.1)
≥65	12.8	(1.1)	12.3	(0.8)	7.3	(2.5)	14.8	(0.7)	14.1	(0.1)
Education level										
<High school	18.6	(1.4)	17.4	(1.2)	40.2	(6.5)	9.3	(0.7)	12.6	(0.2)
High school graduate	23.6	(1.6)	22.9	(1.3)	42.2	(6.7)	26.8	(1.0)	30.2	(0.3)
Some college	25.6	(1.7)	25.9	(1.3)	14.5	(2.7)	22.0	(1.0)	25.5	(0.3)
College graduate	32.3	(1.9)	33.7	(1.3)	3.1	(1.0)	41.9	(1.1)	31.7	(0.3)
Annual family income (dollars)										
<25,000	49.2	(2.0)	29.7	(1.5)	45.6	(5.6)	17.6	(0.9)	25.2	(0.3)
25,000–<50,000	27.9	(1.8)	24.5	(1.0)	43.4	(7.2)	27.5	(0.8)	32.5	(0.3)
50,000–<75,000	11.4	(1.2)	16.6	(1.1)	2.3	(0.7)	19.8	(1.0)	18.2	(0.2)
≥75,000	11.5	(1.2)	29.3	(1.3)	8.8	(3.5)	35.1	(1.1)	24.1	(0.3)

Abbreviation: REACH = Racial and Ethnic Approaches to Community Health; SE = Standard error.

TABLE 2. Age-standardized* prevalence (%) and 5-year trend of current smoking in adult men, overall and by education levels — Vietnamese and Cambodian communities in REACH 2010, and in California, Massachusetts, and United States, 2002–2006

						5-year trend			
	Survey year					Logistic regression			Linear regression
Characteristics	**2002**	**2003**	**2004**	**2005**	**2006**	**β**	**SE**	**P value**	**Annual % change**
Overall									
REACH Vietnamese	30.3	28.4	30.6	23.0	24.2	-0.097	0.030	0.005	-6.4
California	19.4	20.2	18.2	18.9	18.3	-0.022	0.024	0.364	-1.8
REACH Cambodian	49.3	43.7	28.5	31.0	27.6	-0.299	0.071	0.001	-13.9
Massachusetts	20.3	20.3	19.9	18.4	19.7	-0.020	0.019	0.300	-1.6
United States	25.4	25.2	23.3	22.8	22.0	-0.051	0.005	<0.001	-3.8
Stratification by Education level									
REACH Vietnamese									
<High school	42.7	34.1	44.1	33.7	14.0	-0.149	0.069	0.046	-20.1
≥High school	28.9	27.1	28.9	22.3	25.6	-0.086	0.033	0.020	-4.3
California									
<High school	23.6	24.5	22.4	24.4	25.3	0.007	0.058	0.900	1.3
≥High school	18.4	19.3	17.1	17.6	16.6	-0.037	0.026	0.162	-3.0
REACH Cambodian									
<High school	46.5	51.3	38.2	45.3	41.7	-0.093	0.070	0.203	-3.4
≥High school	50.2	37.1	29.0	22.2	14.4	-0.461	0.112	0.001	-26.0
Massachusetts									
<High school	37.2	34.4	28.2	33.1	37.5	0.013	0.059	0.828	-0.3
≥High school	18.9	19.3	19.2	16.9	18.6	-0.020	0.021	0.341	-1.7
United States									
<High school	39.1	38.3	36.5	34.7	35.5	-0.048	0.014	0.001	-2.9
≥High school	23.6	23.5	21.5	21.2	20.2	-0.053	0.005	<0.001	-4.1

Abbreviation: REACH = Racial and Ethnic Approaches to Community Health; SE = standard error.
* Additional standardization for language use during the interview in REACH communities; β = coefficient for year term in logistic regression.

Downward trends of the disparities in prevalence of smoking and quit ratios were observed for both income levels and for both REACH communities during the 5-year period, except the disparity in prevalence of smoking for Vietnamese men with higher income compared with the corresponding state. In 2006, the relative disparity in current smoking was <1.0 among men with lower income level in Vietnamese communities (0.91) and in the Cambodian community (0.72 and 0.94 for

TABLE 3. Age-standardized* quit ratio (%) and 5-year trends in adult men, overall and by education — Vietnamese and Cambodian communities in REACH 2010, and in California, Massachusetts, and United States, 2002–2006

						5-year trend			
	Survey year					Logistic regression			Linear regression
Characteristic	2002	2003	2004	2005	2006	β	SE	P value	Annual % change
Overall									
REACH Vietnamese	26.8	35.5	46.3	50.2	35.7	0.238	0.004	<0.001	9.6
California	59.7	59.5	60.4	58.5	59.9	0.014	0.028	0.609	0.1
REACH Cambodian	20.1	31.7	43.6	39.7	42.9	0.392	0.104	0.002	19.0
Massachusetts	60.2	60.4	58.2	60.3	58.2	-0.019	0.022	0.386	-0.7
United States	52.2	52.6	53.3	54.2	55.1	0.031	0.006	<0.001	1.4
Stratification by Education level									
REACH Vietnamese									
<High school	24.0	29.7	42.9	48.0	54.9	0.330	0.107	0.007	23.8
≥High school	27.2	37.3	47.0	50.3	34.9	0.219	0.044	<0.001	8.3
California									
<High school	57.6	56.3	59.0	55.7	54.7	-0.009	0.070	0.893	-1.2
≥High school	60.4	60.2	60.8	59.6	61.5	0.015	0.030	0.613	0.3
REACH Cambodian									
<High school	19.7	26.0	39.6	36.0	35.5	0.364	0.101	0.003	16.2
≥High school	8.5	40.6	43.8	45.7	66.4	0.467	0.149	0.007	52.8
Massachusetts									
<High school	45.6	43.2	51.8	49.3	37.8	-0.062	0.066	0.353	-2.4
≥High school	61.8	62.0	58.8	62.2	60.0	-0.019	0.023	0.428	-0.5
United States									
<High school	40.3	42.2	41.6	44.1	43.9	0.035	0.017	0.040	2.1
≥High school	54.1	54.3	55.3	56.0	57.1	0.031	0.006	<0.001	1.4

Abbreviation: REACH = Racial and Ethnic Approaches to Community Health; SE = standard error.
*Additional standardization for language use during the interview in REACH communities; β = coefficient for year term in logistic regression.

low and high income level, respectively). Relative disparity in quit ratio was also <1.0 among men with lower income level in Cambodian community (0.94). Trends in absolute disparities by education level were similar to those of relative disparities in both prevalence of current smoking and quit ratio.

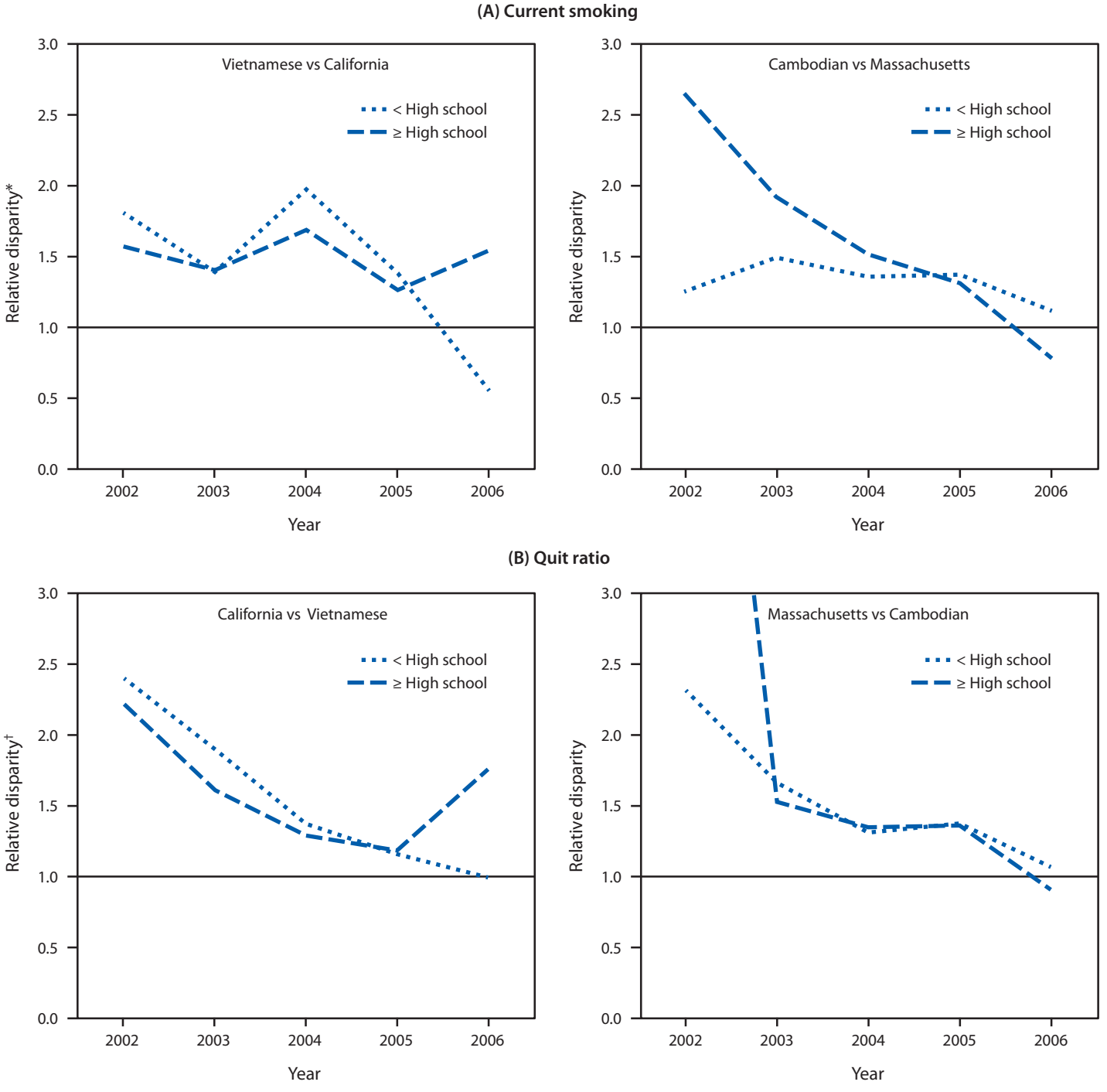
Discussion

This study describes community interventions to encourage a healthy lifestyle among Asian Americans. These communities included tobacco use and secondhand exposure as a targeted behavior within a comprehensive local health program. The apparent effectiveness of the interventions at reducing disparities in three communities in two states illustrates the likelihood of the interventions' transferability. Approximately one third of Vietnamese and nearly half of Cambodian men smoked at baseline in 2002. However, the prevalence of current smoking significantly decreased, and the quit ratio (percentage of ever smokers who have quit) significantly increased in Vietnamese and Cambodian communities in the REACH 2010 project from 2002 to 2006; during this period, minimal changes were observed in the comparison states where the communities were located. In general, the decreasing trends of smoking and increasing trends of quit ratio were observed in both high and low education levels in REACH communities. Although there was also a trend of decreasing prevalence of smoking and increasing quit ratio in men nationwide, the trends observed in REACH communities were much larger. The relative disparities in smoking were decreased or eliminated between less educated Vietnamese and California men and between Cambodian and Massachusetts men, regardless of education levels.

Over several decades, the United States has experienced a large reduction in the prevalence of major cardiovascular and cancer risk factors. However, this progress has not occurred uniformly in all segments of society (*21*). Although progress has been achieved in reducing cigarette smoking in the nation, less progress has been made in reducing disparities in cigarette use among persons of low socioeconomic status (*13*). REACH communities focused on improving the health of the most disadvantaged segments of society (e.g., those who were new immigrants and those with language barriers).

This study documents overall decreasing disparities in smoking in Southeast Asian REACH communities for men of two education and income levels. However, the findings underscore segments in the Vietnamese communities where disparities in smoking remain wide, especially among men

FIGURE. Five-year trends of relative disparity in the age- and language-standardized prevalence of current smoking (Panel A) and quit ratio (Panel B) stratified by education level among adult men — Vietnamese and Cambodian communities, REACH 2010, and in California, Massachusetts, and United States, 2002–2006



* Relative disparity in current smoking was the ratio of the standardized prevalence of current smoking among Vietnamese or Cambodian men in REACH communities versus all men in comparison states.

† Relative disparity in quit ratio was the ratio of standardized quit ratio among all men in comparison states versus Vietnamese or Cambodian men in REACH communities. Quit ratio was calculated as the percentage of former smokers among ever smokers.

with higher education or income levels. A recent study had suggested higher education was associated with no intention to quit smoking among Vietnamese male current smokers in California (*22*). Differential associations between income and current smoking have been reported across multiple Asian American communities, with evidence suggesting a positive association between income and current smoking among Vietnamese in contrast to a negative association between income and smoking among Filipinos and no significant association among Chinese Americans (*23*). To effectively eliminate disparities in smoking in Vietnamese communities, tobacco-control efforts might need to target efforts for smokers of higher socioeconomic status using a different set of cultural and social factors relevant to smoking and quitting.

REACH interventions have several unique features in support of the generalizability and scalability of the project. REACH was not a small-scale clinical trial under controlled conditions. It was an intervention implemented under real-world conditions reaching a large proportion of minority populations. Orange, Los Angeles, and Santa Clara counties in California have the three largest populations of Vietnamese Americans in the United States, and Lowell, Massachusetts, has the second highest population of Cambodian Americans in the United States. REACH did not use a standardized intervention protocol across all sites as in a typical research setting but was sufficiently flexible to enable community choices based on available resources and local realities. Culturally sensitive interventions were tailored for minorities and diverse segments of communities. Not all REACH communities focused on the same behavior or disease, but increasing the knowledge and motivation to live a healthy lifestyle was a common objective of the communities. For example, although the Vietnamese communities focused on breast and cervical cancer screening, they also addressed cigarette smoking. REACH was a grassroots community participatory program. It engaged members of the communities to be active participants in their own health and was able to create a sense of ownership for the project by drawing on community groups to create and implement the Community Action Plan. This report on the REACH project offers promising strategies that might help future health interventions in other Asian communities succeed.

Limitations

The findings in this report are subject to at least four limitations. First, the community interventions were evaluated through an annual telephone survey of representative samples of the community. Households without telephone service or with wireless-only telephones were excluded, which might have resulted in under-coverage bias. Adults with wireless-only service are more likely to be current smokers (*24*). However, such bias also existed in the comparison data from BRFSS. Second, the response rates of the surveys were somewhat lower than optimal, which might result in nonresponse bias. In the nation, there was a consistently downward trend of response rate in the telephone survey over the past decades (*18*). In REACH, multiple eligible adults in the household were recruited. Hence, a lower response rate was expected. Third, unlike a typical clinical trial, control communities with the same racial groups were not available. Therefore, the net effect of intervention on the significant decline in smoking prevalence observed in the REACH communities was not able to be estimated. Finally, the estimates were based on self-reported data and subject to recall errors/bias or social desirability effects.

Conclusion

Eliminating health disparities related to tobacco use is a major public health challenge facing Asian American communities. The smoking prevalence decrease at the population level in the REACH Vietnamese and Cambodian communities as described in this report is a model for successful interventions in these populations. Analysis of behavioral and health status outcome data from REACH communities has consistently demonstrated improvements across a broad range of outcomes, from reductions in amputations among persons with diabetes to increasing physical activity (*25–31*). The findings presented here add to the evidence from these previous REACH reports that community-based programs can improve multiple health outcomes and decrease health disparities if they build community partnerships, recognize cultural influences, and develop tailored interventions.

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Epilogue

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As racial and ethnic minorities constitute ever larger percentages of the U.S. population, the overall health statistics of the nation increasingly reflect the health status of these groups (*1*). Overcoming persistent health and health-care disparities that affect racial/ethnic minorities benefits the entire society. For example, the economic well-being of a nation relies on the health of its populace. According to one report, "The nation's dependence on an increasingly minority workforce means that healthy communities of color are vital to the nation's economic fortunes" (*2*). Other U.S. population groups, such as persons with disabilities or special health-care needs, persons living in certain geographic locations, and persons with certain sexual identities or sexual orientations, also have higher rates of preventable morbidity and premature death, and efforts should be directed toward improving their health outcomes and eliminating health disparities.

Eliminating disparities in health and health care includes monitoring current disparities, identifying effective interventions, and promoting necessary change. As one example of how disparities affecting population groups other than racial/ethnic minorities are receiving increased attention, the health status of people with disabilities is presented more frequently in descriptive demographic tables in public health reports. Health indicators included in the 2011 and 2013 *CDC Health Disparities and Health Inequalities Reports* were stratified by disability status (*3,4*). Many of the descriptive demographic tables in *Health, United States, 2012*, included comparative data for persons with and without disabilities for a variety of health conditions, health behaviors, health-care access and coverage, and preventive service use (*5*). Presentation of health indicators by disability status should increase the awareness of public health practitioners and health-care providers of the serious preventable health disparities of this population.

Eliminating disparities and health inequities (i.e., disparities that are systematic, avoidable, and unfair) and improving the health of all groups are overarching goals included in the *Healthy People 2020* national public health agenda (*6*) and a top priority for CDC and the public health community. Eliminating health disparities is also one of four strategic directions of the National Prevention Strategy (*7*), which was created through the Patient Protection and Affordable Care Act of 2010 (*8*). The Affordable Care Act and other national policy initiatives create unprecedented opportunities to overcome historical barriers to eliminating health disparities. For example, preventive screenings to test for high blood pressure, high cholesterol, and diabetes are now available at no cost to persons with health insurance. These persons also can be screened for obesity and receive free nutrition counseling and counseling on the use of daily aspirin to reduce their risk for stroke. These screening and education programs are particularly important for black adults, for whom death rates for coronary heart disease and stroke are substantially higher than for non-Hispanic white adults (*3,4*). Increased access to these preventive screening services might help reduce heart disease and stroke in communities at high risk for these preventable conditions.

CDC supports the implementation, evaluation, and dissemination of public health practices to reduce health disparities. This supplement provides a snapshot of five varied programs that showed evidence of having made a difference and documented similarities that contributed to lessons learned. Building a strong base of intervention science is critical to effectively reducing, and ultimately eliminating, health disparities. The intervention strategies presented here share common elements: targeting population groups with higher risk or poorer outcomes; increasing knowledge and consideration of social, environmental, and behavioral factors that increase risks for negative health outcomes; enhancing community support and engagement; promoting cultural sensitivity and appropriateness; and following principles of program evaluation.

Multiple and intersecting characteristics at the societal, regional, community, family, and individual levels contribute to a population burden of health disparities, including health inequities (*9,10*). As improvements in data collection enable better identification of health disparities that affect diverse populations, elaboration of conceptual frameworks that inform public health practice, and implementation of population-based strategies toward health equity, health disparities and inequities can be overcome.

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