Rural Healthy People 2010

A Companion Document to Healthy People 2010

A Report Prepared by the Southwest Rural Health Research Center
School of Rural Public Health, The Texas A&M University System Health Science Center

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IMMUNIZATIONS AND INFECTIOUS DISEASES IN RURAL AREAS

by Linnae Hutchison and Jennifer Peck

SCOPE OF PROBLEM

- Immunizations were identified as one of the leading health indicators by Healthy People 2010.[1]
- Immunizations and infectious diseases virtually tied with injury and violence prevention as the 13th highest ranking health concern in a survey of rural health stakeholders.[2]
- Despite record immunization levels among children, disparities persist especially among minorities, the impoverished, uninsured, preschoolers, and residents of inner city urban areas, rural and border areas. Immunization rates for these subgroups fall below the HP2010 goals.

GOALS AND OBJECTIVES

The Healthy People 2010 goal relating to immunizations and infectious diseases is to "prevent disease, disability, and death from infectious diseases, including vaccine-preventable diseases."[3] This review addresses the following HP2010 objectives:

- 14.1. Reduce or eliminate indigenous cases of vaccine-preventable diseases.
- 14.2. Reduce chronic hepatitis B virus infections in infants and young children (perinatal infections).
- 14.3. Reduce hepatitis B.
- 14.4. Reduce bacterial meningitis in young children.
- 14.5. Reduce invasive pneumococcal infections.
- 14.6. Reduce hepatitis A.
- 14.7. Reduce meningococcal disease.
- 14.9. Reduce hepatitis C.
- 14.10. Increase the proportion of persons with chronic hepatitis C infection identified by state and local health departments.
- 14.11. Reduce tuberculosis.
- 14.12. Increase the proportion of all tuberculosis patients who complete curative therapy within 12 months.
- 14.13. Increase the proportion of contacts and other high-risk persons with latent tuberculosis infection who complete a course of treatment.
- 14.18. Reduce the number of courses of antibiotics for ear infections for young children.
- 14.19. Reduce the number of courses of antibiotics prescribed for the sole diagnosis of the common cold.
- 14.22. Achieve and maintain effective vaccination coverage levels for universally recommended vaccines among young children. (The HP2010 target is 90 percent.)
- 14.23. Maintain vaccination coverage levels for children in licensed day care facilities and children in kindergarten through the first grade.
- 14.24. Increase the proportion of young children and adolescents who receive all vaccines that have been recommended for universal administration for at least five years.
- 14.25. Increase the proportion of providers who have measured vaccination coverage levels among children in their practice population within the past two years.
- 14.26. Increase the proportion of children who participate in fully operational population-based immunization registries. (The HP2010 target is 95 percent.)
- 14.27. Increase routine vaccination coverage levels for adolescents.
- 14.28. Increase hepatitis B vaccine coverage among high-risk groups.

- 14.29. Increase the proportion of adults who are vaccinated annually against influenza and ever vaccinated against pneumococcal disease. (The HP2010 target is 90 percent for noninstitutionalized adults 65 years and older and institutionalized adults. The target is 60 percent for those 18-64 years.)

The Rural Healthy People 2010 survey found the "immunization and infectious disease" focus area virtually tied with "injury and violence prevention" as the 13th ranking rural health priority among the 28 Healthy People 2010 focus areas.2 Urban and rural immunization rates appear fairly similar for school-age children, with the exception of vaccinations for the varicella zoster virus (causative agent of chicken pox), which has a lower rate in rural areas. Rates of influenza and pneumonia vaccination among the elderly are similar in rural and urban areas but fall below the HP2010 goal.4 Minorities, foreign-born individuals, the uninsured, and the poor exhibit lower immunization rates and higher infectious disease prevalence. Other populations at risk are those residing on the U.S./Mexico border and in rural Colonias, where rates of tuberculosis (TB) and hepatitis A are significantly higher than in other regions of the country.

PREVALENCE

There is considerable variation by age, ethnicity, region, socioeconomic, and insurance status regarding prevalence and susceptibility to infectious diseases, immunization rates, and associated morbidity and mortality.

Children

Childhood morbidity and mortality have been dramatically reduced in the past 50 years with routine vaccinations.[5] DTP (diphtheria, tetanus, and pertussis), polio, and MMR (measles, mumps, and rubella) vaccination coverage levels for school-aged children (five to six years old) have surpassed 95 percent every year since 1980[6] due to state-mandated completion of the immunization series by the time of school entry.[7] Coverage levels for infants and toddlers, however, have been much lower and are in need of improvement.[8] The varicella vaccine for chicken pox had the lowest coverage of all vaccines at 68 percent.[8]

Studies evaluating immunization coverage in infants and toddlers from 1991 through the present have revealed poor rates in both rural and urban areas.[9, 10] According to the Centers for Disease Control (CDC) National Immunization Survey (NIS) data from 2002, children ages 19 to 35 months residing in non-central city metropolitan statistical areas (MSA) reported the highest immunization rates for the basic 4:3:1 series and 4:3:1:3 series followed, in order, by nonMSAs and MSAs with a central city.[11] Children residing in rural or nonMSAs, however, had significantly lower levels of varicella coverage than urban and suburban children.[12]

Disparities in infectious disease prevalence also exist among ethnic and special populations. Latino children are 13 times more likely to be infected with tuberculosis than white children.[13] Children of farm laborers also have higher rates of tuberculosis, parasites, and sexually transmitted diseases.[14]

Adults

Hepatitis, tuberculosis, HIV, influenza, and pneumonia together represent significant causes of morbidity and mortality among adults.

Pneumonia and Influenza

The national immunization rate for influenza among adults ages 18 to 65 is 31 percent, while the rate for pneumonia immunization is 18.4 percent.[15] Nonmetropolitan areas had comparable or slightly higher rates of adult immunizations for influenza and pneumonia.[10]

Tuberculosis

Globally, tuberculosis is the leading cause of death by infectious disease.[16] In the U.S., the rate of TB has been declining over the past decade; however, the rate of decline between 2000 and 2001 was the smallest rate of decline in nine years (only 2 percent). While TB affects all age groups, the

percent of total cases is highest among adults ages 25-44 years old (35 percent), followed by adults age 45-64 (28 percent), and those greater than 65 years of age (21 percent).[17] Thirty-six percent of the total reported cases occur in African Americans, 29 percent in whites, and 20 percent in Hispanics.[18] However, incidence (cases/100,000) rates reveal the highest incidence rates are observed among Asian/ Pacific Islander (33/100,000), followed by African Americans (14/100,000), Hispanics (12/100,000), American Indian/Alaskan Natives (11/100,000), and whites (2/100,000).[18]

Three-fourths of the cases of TB are found in the four states that border Mexico.[19] The research is limited regarding disparities in TB rates among urban and rural populations; however, studies have found TB rates increase with increasing population density and decreasing income.[20]

TB rates along the border are significantly higher than those of Mexico or the United States (27/ 100,000, 19/100,000, and 6.8/100,000, respectively),[21] including a higher rate of multi-drug resistant TB (MDRTB).[22] The U.S./Mexico border also suffers from a higher incidence of a number of other infectious diseases including measles, mumps, botulism, brucellosis, diphtheria, hepatitis A, rabies, rubella, salmonellosis, and shigellosis.[23]

Other special rural populations at heightened risk for certain infectious diseases are migrant and seasonal farm workers. A 1998 study found that this population is six times more likely to develop TB than adults in other professions.[16]

Hepatitis

Hepatitis A is two to three times more prevalent along the U.S./Mexico border[24] and is particularly problematic in rural areas called Colonias.[23] Those at risk for hepatitis B (HBV) include African American and immigrants from areas where HBV is endemic (Asia, Sub-Saharan Africa, Amazon Basin, Eastern Europe, and the middle East), Alaskan Native and Pacific Islanders, households in contact with chronic hepatitis B carriers, people who have sexually transmitted diseases, users of illicit drugs, hemodialysis patients, international travelers, and inmates.[25] Black teenagers and young adults are infected three to four times more often than whites.[26] Asian and Pacific Islander children are also at a greater risk of contracting Hepatitis B (20 to 30 times higher than other children in the United States).[27] While Asian American and Pacific Islanders represent only 4.5 percent of the U.S. population,[26] their numbers are increasing. Asian Americans were second only to Hispanics in population growth between 1990 and 2000. The Asian population grew 56.1 percent in metro areas and 32.2 percent in nonmetropolitan; half of all Asians in nonmetropolitan counties were born outside the U.S.[28]

Elderly

Pneumonia and Influenza among the Elderly

Influenza and pneumonia together are the fifth leading causes of death among the elderly in the U.S.[29] Ninety percent of the deaths from influenza and 80 percent of deaths from pneumococcal infection occur in persons ages 65 and older.[30, 31, 32] The vaccination rate for influenza and pneumonia is 66 and 55 percent, respectively, for those 65 and older.[33, 34]

While influenza and pneumococcal vaccination rates among elderly men and women are equal,[35] differences in influenza and pneumococcal immunization rates exist among minorities. Nonhispanic whites experience the highest influenza immunization rates (68.8 percent), followed by African Americans (49.6 percent) and Hispanics (48.5 percent).[35] Pneumococcal vaccination rates follow a similar pattern: nonhispanic whites (60.3 percent), African Americans (37.2 percent), and Hispanics (27.1 percent).[35]

The literature supports that pneumonia and influenza immunization rates among those older than 65 are comparable between rural and urban areas,[36] and rural residence was not found to be related to lower rates of receipt of either pneumonia or influenza vaccine.[37, 38] However, disparities between racial groups appear more pronounced in rural residents than among urban residents.[39]

IMPACT

One-fourth of visits to physicians are infectious disease related with annual costs over $120 billion.[40] CDC data from 1995 estimated that for every dollar spent on immunizations, $14–25 in health care costs are saved.[41]

The death rate from complications of vaccine-preventable diseases (VPD) is higher among adults (50,000 to 90,000 annually) than among children[42] (300 each year).[43] Influenza and pneumonia are responsible for more illnesses and deaths than all other VPDs,[42] together constituting the seventh leading cause of death in the U.S.[33] Tuberculosis-related deaths have steadily decreased from nearly 20,000 in 1953 to 751 in 2000, or 0.3 per 100,000.[17] Hepatitis B is attributed to 5,000 chronic liver disease deaths, while Hepatitis C is associated with 8,000 to 10,000 chronic liver disease deaths.[44] There were 10,616 reported cases of Hepatitis A in 2001, 7,844 cases of Hepatitis B, and 4,000 estimated acute Hepatitis C cases.[44]

BARRIERS

Factors that contribute to under-immunization include living in poverty, being an ethnic minority, having a parent with a low level of education, and being from a large family.[45, 46, 47] Other barriers include the cost of immunizations, lack of insurance coverage, late initiation of the vaccination series, parental lack of awareness of the child's immunization status, missed opportunities during clinical visits, and record scatter resulting from the receipt of vaccinations from multiple providers.[41, 46, 4] In general, rural residents are more likely than urban residents to be poor, less educated, lack health insurance, and have longer travel times to health providers,[48-51] which are all factors associated with lower immunization rates.[52]

PROPOSED SOLUTIONS

While the U.S. has been successful in achieving high immunization rates overall, immunization rates among certain subgroups remain below the HP2010 goals. No single solution will increase the rates for all groups; however, it is suggested that organizational change strategies offer the most effective methods to increase immunization rates.[53] These strategies include the implementation of a reminder and/or recall system by vaccination providers to improve immunization rates.[54] Standing orders programs have also been successful in increasing pneumonia and influenza rates.[55] Finally, immunization registries that incorporate reminder and recall notices are fundamental to improving immunization rates by reducing the problem of record scatter—a problem perhaps more pervasive in rural areas.[56]

SUMMARY AND CONCLUSIONS

Access to immunization services and up-to-date immunization coverage are essential for protecting every age group from the debilitating and potentially life-threatening effects of infectious diseases. Immunization rates among school-age children demonstrate record high coverage; however, among preschool children, urban and rural area coverage rates fall below the HP2010 target. Similarly, flu and pneumonia vaccinations rates among the elderly are comparable for rural and urban areas; rates are also below the HP2010 goals but continue to increase. The strain on resources relating to influenza and pneumonia may be greater in rural areas, where the elderly represent a larger proportion of the total population, and access to quality health care may be more challenging.[57] Other populations at risk for low immunization rates include the impoverished, those without insurance, minorities, residents of rural Colonias and border areas, and immigrants.

A key finding is that rural and urban areas experience similar immunization rates, both below the HP2010 goals, emphasizing the need for continued efforts to increase immunization rates for both groups (particularly among preschool children, immigrants, minorities, adults, and the elderly). International travel and commerce, increased immigration, and contact with environments where infectious diseases remain leading killers reinforce the importance of full immunization coverage for the United States—regardless of the degree of urbanicity. Prevention is ultimately the most

effective defense system in controlling infectious diseases.

MODELS FOR PRACTICE

The following models for practice are examples of programs utilized to address this rural health issue.

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Infectious respiratory diseases were the leading cause of death in the United States during the first half of the 20th century. However, during the second half of the 20th century, with the successful implementation of an aggressive childhood immunization program controlling such diseases such as measles, mumps, rubella, pertussis, diphtheria, polio, and *Haemophilus influenza* type b, the leading killer became chronic diseases such as heart disease, diabetes, and cancer.[58]

Disparities among subpopulations in immunization rates have been reduced by a number of programs designed to address barriers to full immunization: access, cost, and knowledge. The Vaccines for Children Program, Medicare coverage of pneumonia and influenza vaccines, and expansion of immunization registries significantly contributed to improved immunization rates. Despite these programs, immunization rates vary by region, racial/ethnic group, socio-economic and insurance status.

Urban and rural immunization rates appear fairly similar for school-age children, with the exception of vaccinations for the varicella zoster virus (causative agent of chicken pox), which have lower rates in rural areas. Research examining immunization rates among preschool children in rural and urban areas reveal mixed results with studies reporting lower, comparable, and, in some cases, higher immunization rates in rural areas compared to urban areas. What is clear is that immunization rates among preschoolers for certain vaccines and vaccine series in rural and urban areas fall below the HP2010 goals.

Rates of influenza and pneumonia vaccination among the elderly are also similar in rural and urban areas but fall below the HP2010 goal.[4] Minorities, foreign-born individuals, the uninsured, and the poor exhibit lower immunization rates and higher infectious disease prevalence. Other populations at risk are those residing on the U.S./Mexico border and in rural Colonias, where rates of tuberculosis (TB) and hepatitis A are significantly higher than in other regions of the country. These disparities among the aforementioned subpopulations serve as the focus of this review.

The nation as a whole has been successful in increasing immunization rates to record highs and controlling many infectious diseases; however, this is not the case in many countries. Endemic, emergent, and re-emergent infectious diseases are leading causes of morbidity and mortality throughout the world and represent a global public health challenge by nature of the transmissibility of pathogens across borders. International travel and commerce, increased use of antimicrobial agents,[59] and persistence of immunization disparities in special populations (e.g., the elderly, minorities, and foreign-born individuals) represent opportunities to introduce and promulgate microbial threats to this country, reinforcing the need for vigilant immunization and surveillance programs at home and abroad.

Key definitions used in this discussion include:

- *Basic Series (4:3:1)* refers to the basic immunization series consisting of four doses of diphtheria-tetanus-pertussis (DTP), three doses of polio, and one dose of measles-mumps-rubella (MMR) vaccine.[60]
- The *Childhood Immunization Initiative (CII)* began in 1993. CII is a comprehensive national plan to increase childhood immunization levels among two year olds.
- *Hepatitis* is the inflammation of the liver.
- *Hepatitis A (HAV)* is a liver disease caused by the hepatitis A virus, which is transmitted through person-to-person contact.[61]

- *Hepatitis B (HBV)* is a serious liver disease caused by the hepatitis B virus, which is transmitted through infected blood or other body fluids.[62]
- *Hepatitis C (HCV)* is a liver disease caused by the hepatitis C virus, which is transmitted through infected blood or other body fluids.[63]
- *Multi-Drug Resistant Tuberculosis (MDRTB)* refers to tuberculosis strains resistant to two more primary drugs (such as Isoniazid or Rifampin) used for treatment of tuberculosis.[64]
- *Pneumococcal pneumonia* is caused by the bacteria *Streptococcus pneumoniae*.
- The *Vaccines for Children Program (VFC)*, part of CII, is a state implemented, federal program that purchases vaccines for children who cannot afford these vaccines. Among these children are the uninsured, those enrolled in Medicaid, and the State Children's Health Insurance Program (SCHIP) and Native Americans.[65] An estimated one-third of all children, or three million children, are eligible for VFC.[66] Currently, 43,000 provider sites are enrolled, including 30,000 private practices.[67] The Vaccines for Children Program and Section 317 of the Public Health Services Act provided $631.8 million to states, local health departments, territories, and the District of Columbia for vaccines in 1999.[68]

IDENTIFIED BY PEOPLE LIVING IN RURAL AREAS AS A HIGH PRIORITY HEALTH ISSUE FOR THEM

The Rural Healthy People 2010 survey found the "immunization and infectious disease" focus areas virtually tied with "injury and violence prevention" for the 13th ranking rural health priority among the 28 Healthy People 2010 focus areas.[2] It was nominated by an average of 17 percent of the four groups of state and local rural health leaders. Of these four groups, local public health agencies were most likely to select, and state organizations were least likely to select, immunization and infectious disease as a rural priority. There were no significant differences among the four regions of the country with respect to selection of this topic as a rural priority area.

PREVALENCE AND DISPARITIES IN RURAL AREAS

There is considerable variation by age, ethnicity, region, socioeconomic, and insurance status regarding prevalence and susceptibility to infectious diseases, immunization rates, and morbidity and mortality. To capture the variation among these various subgroups, this review focuses primarily on the following special population groups: children, adults, elderly, minorities, and immigrants.

Children

Childhood vaccination rates are considered a marker of the general quality of pediatric care given the high correlation between immunizations and other measures of preventive care.[69] Thus, disparities in immunization coverage rates may reflect problems in the quality of pediatric health care for these subgroups. High immunization rates have resulted in low rates of vaccine-preventable diseases (VPD) and subsequently, insulated the U.S. from many of the consequences of such diseases. Without vaccines, children under age 18 are estimated to be 22 times more likely to acquire measles and six times more likely to acquire pertussis (whooping cough). Children in day care facilities would be 60 times more likely to acquire measles and 16 times more likely to acquire pertussis.[70]

Childhood morbidity and mortality have been dramatically reduced in the past 50 years with routine vaccinations.[5] The public health practice of promoting vaccine use among all U.S. children has resulted in the eradication of smallpox, the elimination of poliomyelitis from the Western Hemisphere, and the control of other infectious diseases such as measles, rubella, tetanus, diphtheria, and *Haemophilus influenzae* type b.[6] As of 1998, the annual number of cases for nine vaccine-preventable diseases (smallpox, diphtheria, pertussis, tetanus, poliomyelitis, measles, mumps, rubella, and *Haemophilus influenza* type b) decreased between 95 percent and 100 percent since 1900.[6]

Children are currently recommended to receive vaccinations for 10 childhood diseases including diphtheria, tetanus, whooping cough, bacterial meningitis, polio, hepatitis B, chicken pox, measles, mumps, and rubella.[71] A total of 16 to 20 doses of seven different vaccines are recommended by 18 months of age.[72] In 2000, the national childhood immunization coverage for the combined 4:3:1:3:3 series (four or more doses of diphtheria and tetanus toxoids and pertussis vaccine [DTP]; three or more doses of oral poliovirus vaccine; one or more dose of measles, mumps, and rubella vaccine [MMR]; three or more doses of *Haemophilus influenzae* type b [Hib]; and three or more doses of hepatitis B) was 73 percent, well below the target of greater than 90 percent set by Healthy People 2010.[3, 8] The varicella vaccine for chicken pox had the lowest coverage of all vaccines at 68 percent.[8] The pneumococcal conjugate vaccine was added to the schedule of recommended vaccines in 2001 by the Centers for Disease Control (CDC) Advisory Committee on Immunization Practices, the American Academy of Family Physicians, and the American Academy of Pediatrics.[72]

DTP, polio, and MMR vaccination coverage levels for school-aged children (five to six years old) have surpassed 95 percent every year since 1980[6] due to state-mandated completion of the immunization series by the time of school entry.[7] Coverage levels for infants and toddlers, however, have been much lower and are in need of improvement.[8]

Immunization Coverage in Rural and Non-Rural Areas

Studies evaluating immunization coverage in infants and toddlers have revealed poor rates in both rural and urban areas. Data from the 1991 National Maternal and Infant Health Survey (NMIHS) and the 1993 National Health Interview Survey (NHIS) were evaluated to compare urban and rural immunization rates for the basic 4:3:1 series before 36 months of age.[9, 10] No differences in immunization rates were detected between metropolitan urban and nonmetropolitan areas, though rates failed to exceed 70 percent for either area. CDC data from 1994 reveal 66 percent of rural children (19-35 months) were immunized for the basic 4:3:1 series compared to 71 percent of suburban and 62 percent of urban children.[73] Thus, roughly one-third of urban and rural children under three years of age could be characterized as underimmunized in 1993 and 1994.

According to 1995 county-level immunization data from 11 state public health agencies, nonmetropolitan counties had higher immunization coverage for the 4:3:1 series for two-year-old children in the public sector (by 2.5 percentage points) than metropolitan counties.[4] However, in a cross-sectional survey of two- and three-year-old children visiting selected private pediatric practices, Taylor, et al. reported that children seen in practices located in small towns with a population less than 50,000 were less likely to be fully immunized than those visiting practices in large (> 250,000) or mid-sized cities (50,000–250,000).[74]

More recently, the vaccination coverage rates of preschool-aged children were compared among urban, suburban, and rural children aged 19 to 35 months who participated in the 1999 National Immunization Survey.[12] In this study, urban, suburban, and rural residence was defined by using telephone exchanges to determine county and city of residence, which were then assigned one of five metropolitan statistical area (MSA) categories as described by the Office of Management and Budget. Urban was defined as those living within the central city of an MSA, and rural included those living outside MSAs. Suburban included all others (those living outside the central city of an MSA but within the county containing the central city, in the MSA but not in the central city county, or in an MSA that does not contain a central city). Coverage levels for the basic 4:3:1:3 series (four doses of DTP, three does of poliovirus vaccine, one dose of MMR vaccine, and three doses of Hib vaccine) were slightly higher for rural children (79.6 percent) compared to urban children (76.7 percent) and no different than suburban children (79.1 percent), but all remained well below the Healthy People 2010 goal of 90 percent.[3]

According to CDC National Immunization Survey (NIS) data from 2002, children ages 19 to 35 months residing in a non-central city metropolitan statistical areas reported the highest immunization rates (see Figure 1) for the basic 4:3:1 series, 4:3:1:3 series, and varicella vaccine compared to children in MSAs with a central city and nonMSA areas.[11]

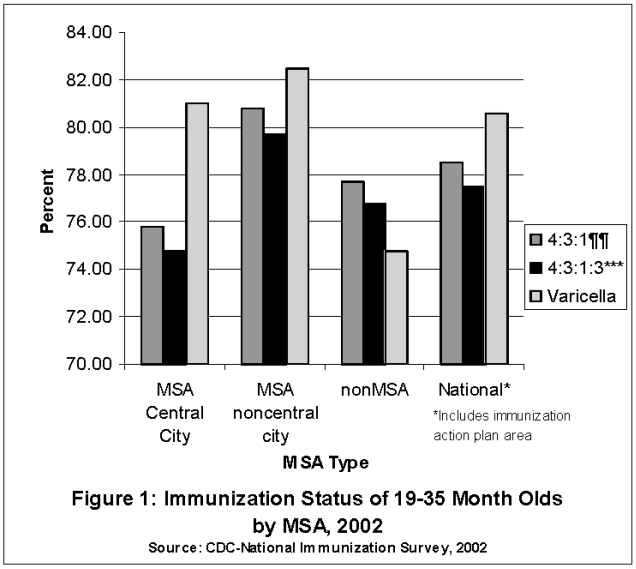

Figure 1: Immunization Status of 19-35 Month Olds by MSA, 2002
Source: CDC-National Immunization Survey, 2002

Includes all 50 states and 25 immunization action plan areas. ¶¶ Four or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of any measles-containing vaccine (MCV), three or more doses of Hib, *** Four or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of any MCV, three or more doses of Hib, and three or more doses of HepB.

Stokey, 2001, found when vaccination coverage for individual vaccines was evaluated, significantly lower levels of varicella coverage were observed among rural children (47.2 percent) compared to urban (58.9 percent) and suburban (60.5 percent) children.[12] Rates for pneumococcal conjugate immunization (three or more doses) among children ages 19-35 months were also lower in nonMSAs than MSAs with and without a central city (~32 percent, versus ~41 percent and ~45 percent, respectively); however, immunization rates among nonMSAs and MSAs with and without central cities were comparable for three or more doses of hepatitis B vaccines (~90 percent, versus ~89 percent and ~ 91 percent, respectively).[11]

Vaccination coverage levels were also found to differ by rural, urban, and suburban residence when evaluated by various subgroups defined by race, ethnicity, education, and income. Counter-intuitively, socially advantaged rural children faired worse than disadvantaged rural children when compared to their urban and rural counterparts. Rural children living above the poverty level with household incomes exceeding $75,000 had lower coverage levels (76.2 percent) than similar urban (84.9 percent) and suburban (83.4 percent) children.[12] Conversely, rural children who were non-Hispanic blacks, those whose mother had less than a high school education, and those who received their vaccinations from public facilities each had better coverage levels than their urban and suburban counterparts.[12]

Utilization and Referral Patterns

One barrier to high immunization rates is the problem of record scatter, which occurs when patients visit multiple providers to receive immunizations. A number of studies have evaluated the impact of referral patterns and provider type on immunization rates. Hueston, et al. tracked the immunization status of all children born within one year (mid-1988 to mid-1989) in two rural counties and four urban census tracts in Kentucky.[75] This study found rural children utilized public health clinics more often for immunization services than urban children. Furthermore, children seeing public providers were less likely to have up-to-date immunization records compared to those seeing private providers (44 percent versus 66 percent).[75] A statewide survey of children born in Kentucky in 1990-1991, however, showed different results. Rural children served by the public health sector had higher rates of adequate immunization coverage (4:3:1 basic series) by age two than rural children served by the private sector and urban children served by public health departments or private providers.[76] Immunization coverage in this study ranged from 56 percent (children served by urban health departments) to 68 percent (rural children served by health departments).

A national study conducted in 1994 of the 36,000 members of the American Academy of Pediatrics further examined the referral practices of pediatricians in an attempt to understand low immunization rates during the early 1990s. Researchers found immunization referrals to public health clinics were more common among pediatricians in nonmetropolitan areas (63.9 percent) than pediatricians in large (44.7 percent) and small (52.5 percent) metro areas.[77] This same study found that in states with programs providing free or reduced cost vaccines to providers, pediatricians were less likely to refer patients for immunizations. Note: During this 1994 study, only 16 states had vaccines programs in place that provided some or all vaccines free or at reduced cost to providers. More recent studies have found that since the implementation of the Vaccines for Children Program, providers participating in VFC may be less likely to refer uninsured children to public clinics for their vaccinations than those who do not participate in the program (44 percent versus 90 percent), although this study did not include comparisons of rural versus urban.[78] A study of rural Colorado physicians found that 40 percent of patients are referred for immunizations for insurance reasons.[79] Referral patterns also vary by specialty type. In a 1997 Texas study,[80] rural pediatricians and family practitioners were more likely than general practitioners to offer immunizations to children (80 percent, 76 percent, and 54 percent, respectively). In the same study, rural pediatricians were significantly more likely than family practitioners and general practitioners to participate in the VFC program (52.9 percent, 40.8 percent, and 33.3 percent, respectively). Forty percent of pediatricians participated in VFC, accepted Medicaid, and did not refer the uninsured for immunizations compared to 31.5 percent of family practitioners (FPs) and 25.5 percent of general practitioners (GPs).[80] While this study suggests pediatricians are less likely to refer children for immunizations (even in rural areas), there are fewer pediatricians in rural areas,[2] and children may be referred more often to public health providers in rural areas, compounding the problem of record scatter. Overall, a study of 1999 National Immunization Survey data found that rural children are more frequently vaccinated at public clinics than suburban and urban children.[12]

A component of full immunization coverage is also timely coverage. Williams, 1994, reported considerable delays in vaccine administration before school entry for urban, suburban, and rural children in Maryland.[81] By the age of two, children in rural areas experienced delayed immunization more often than suburban children but less frequently than urban children.[81]

Disparities in infectious diseases prevalence also exist among ethnic and special populations. Latino children, representing the largest minority group of children (11.6 million) are 13 times more likely to be infected with tuberculosis than white children.[13] Children of farm laborers, predominantly of Latino descent (94 percent), also have higher rates of tuberculosis, parasites, and sexually transmitted diseases.[13] In a Florida study, migrant farm worker children ages six to 11 years were found to have a higher seroprevalence of hepatitis A than the same age group in the general U.S. population (57 percent versus 10 percent).[82] One study found that the prevalence of hepatitis A in children residing in rural Texas Colonias areas was 37 percent compared to 17 percent in the urban border area of McAllen, Texas, and 6 percent in the San Antonio, Texas, metro area. However, the prevalence of hepatitis B and C in these Colonias studied was comparable to U.S. rates.[14] *Cryptosporidium parvum*, a parasite, was also higher in Colonias areas than urban border and urban nonborder communities.[83] (Note: Colonias are unincorporated and impoverished rural areas along the United States/Mexico border. These areas are home to 350,000 residents in 1,450 Colonias in Texas alone. Over half of the residents do not have access to adequate water supplies and waste water system.[84] These substandard conditions make residents particularly vulnerable to hepatitis A, which is transmitted person to person through unsanitary conditions, such as poor hand-washing practices and contaminated cooking utensils and overcrowding.[85])

Otitis media (OM), also known middle ear infection, is the most common childhood bacterial infection—accounting for an estimated 24 million cases annually. Amoxicillin is the recommended first line antibiotic treatment for otitis media. Appropriate use of first line antibiotics slows antibiotic resistance. One Healthy People 2010 objective is to decrease the number of courses of antibiotics for ear infections. In a study analyzing the antibiotic prescribing patterns of rural and urban physicians in a midwestern health plan, researchers found urban physicians more likely to prescribe amoxicillin for OM than rural physicians (31 percent versus 28 percent), although the differences were *modest*.[86] The same study found the prescribed duration of antibiotic treatment for children over two years old was longer than the recommended duration of five to seven days for acute infections; however, for individuals of all ages with recurrent infection, the prescribed duration was less than recommended (10 versus ≥ 14 days).

Another HP2010 goal is to reduce the number of antibiotics prescribed for the common cold. In a Kentucky study of Medicaid claims from 1993 to 1994, 60 percent of the patients filled a prescription for the common cold. Urban physicians were significantly more likely to prescribe antibiotics for the common cold than rural physicians in this study.[87] In a study of the use of broad-spectrum antibiotics using 1997 to 1999 data from the National Ambulatory Medical Care Survey, prescribing practices of broad-spectrum antibiotics for the common cold (51 percent), acute sinusitis (53 percent), acute bronchitis (62 percent), and otitis media (65 percent) revealed no significant difference in prescribing choice based on urban versus rural location.[88] Specialty type and geographic regions were the strongest predictors of broad-spectrum antibiotic prescription practices. Internal medicine physicians were more likely than generalists and family physicians to prescribe broad-spectrum antibiotics, while physicians in the South and Northeast were more likely to prescribe these same antibiotics than physicians in the West.[88]

Adults

Hepatitis, tuberculosis, HIV, influenza, and pneumonia together represent significant causes of morbidity and mortality among adults. The primary focus of this section is on influenza, pneumonia, hepatitis, and tuberculosis among adults. HIV, with an estimated 40,000 new infections each year, 800,000 to 900,000 people living with the disease,[89] and a significant risk factor for TBT:[90] is not discussed in depth in this chapter as it is a separate HP2010 focus area.[3]

Pneumonia and Influenza

The HP2010 goal for influenza and pneumonia vaccination coverage is 60 percent for those 18 to 65 years of age (not high risk, non-institutionalized).[3] Nationwide, the immunization rate for influenza among adults ages 18 to 65 is 31 percent, while the rate for pneumonia immunization is 18.4 percent.[15] There are limited data evaluating the effect of urbanicity on adult immunization rates; however, Steiner, et al. using 1993 National Health Interview Survey data, found nonmetro areas had comparable or slightly higher rates of adult immunizations for influenza and pneumonia.[10] Unlike those 65 and older, for whom Medicare covers the cost of these two vaccines, adults must cover the cost either through insurance or private pay. In one study of rural Appalachian 18-64 year olds, the most significant predictor of influenza and pneumonia immunization was insurance status; in fact, those with insurance were 1.75 to 3.5 times more likely to receive these immunizations than the uninsured.[15]

Tuberculosis

Globally, 1.9 million people die of tuberculosis each year—the leading cause of death by infectious disease globally.[16] In the U.S., the rate of TB has been declining over the past decade; however, the rate of decline between 2000 and 2001 was the smallest rate of decline in nine years (only 2 percent). Those at risk include the immuno-compromised such as babies and the frail elderly, those with HIV infection, and substance abusers.[91] In

2001, there were 15,989 cases of TB reported to the CDC,[92] with an associated death rate of 0.3 percent.[17] While TB affects all age groups, the percent of total cases is highest among adults ages 25-44 years old (35 percent), followed by adults age 45-64 (28 percent), and those greater than 65 years of age (21 percent).[17] The percent of total cases among residents of long term care (LTC) facilities is 2.8 percent.[17]

Declining rates of TB mask racial disparities among ethnic groups:[93] 36 percent of the total reported cases occur in African Americans, 29 percent in whites, and 20 percent in Hispanics.[18] However, incidence (cases/100,000) rates from 2001 reveal the highest incidence rates are observed among Asian/Pacific Islander (33/100,000), followed by African Americans (14/100,000), Hispanics (12/100,000), American Indian/Alaskan Natives (11/100,000), and whites (2/100,000).[18]

Three-fourths of the cases of TB are found in the four states that border Mexico.[19] The research is limited regarding disparities in TB rates among urban and rural populations. One study in Georgia[94] found rural persons were more likely to report a history of syphilis and TB. In one study of TB case rates along the Texas border, 14 counties were studied (four were classified as metro and 10 were nonmetropolitan). The three counties with the highest rates were nonmetropolitan.[95] However, in a North Carolina study reviewing TB rates from 1966 to 1986, researchers found TB rates increase with increasing population density and decreasing income. [20] Other studies have linked low socio-economic status with increased incidence of TB as well.[93]

The most significant change in the demographics of TB is the rise in the number of cases among foreign-born individuals,[92] where the case rate for this population is seven times higher than the rate among U.S.-born individuals.[96] Between 1990 and 1999, the number of TB cases reported among foreign-born individuals increased from 24 to 43 percent.[22] In 22 states in 2002, over half the TB cases were in foreign-born residents, and 70 percent of the cases were in foreign-born residents of New Hampshire, Idaho, Minnesota, California, Massachusetts, Hawaii, and Colorado.[97] The most common birth country for persons with TB is Mexico (24.8 percent), followed by Philippines, Vietnam, India, China, Haiti, and South Korea. Multi-drug resistant tuberculosis has also increased among foreign-born individuals, increasing from 31 percent in 1993 to 72 percent in 2000.[96]

The changing demographics in the prevalence of TB, particularly among Hispanics of foreign origin, represent an important rural health challenge. Seventy-five percent of the states reported Hispanic population growth rates of 50 percent, while half of all states reported growth rates of 100 percent.[28] In nonmetropolitan areas, Hispanics represent the fastest growing minority group,[98] comprising 5.5 percent of the total non-metropolitan population[99] and accounting for 25 percent of the total nonmetropolitan population growth during the 1990s.[98] Some nonmetropolitan counties experienced a 150 percent growth in the Hispanic population compared to only 14 percent for non-Hispanic minorities.[28] The growth rate for Hispanics in nonmetropolitan areas overall for 1990-2000 was 70.4 percent versus 60.4 percent in urban areas—the highest growth rate for all population groups regardless of urbanicity.[28] Furthermore, according to *Race and Ethnicity and Rural America*, one-third of all Hispanics in nonmetropolitan counties were born outside the United States. (It should be noted that African Americans are the most numerically dominant minority group in nonmetropolitan areas.[28])

While HIV infection is a significant risk factor for TB for all racial/ethnic groups, the association between HIV and TB has been found to be two to three times higher among Hispanics.[100] A study by Pablo-Mendez, et al. also found diabetes mellitus to be a significant risk factor for TB, especially among Hispanics where diabetes tripled the risk of TB in this group.[100]

The U.S./Mexico border suffers from a higher incidence of a number of infectious diseases.

According to the Health Resources and Services Administration (HRSA), if the U.S. territory along the border were a separate state, it would rank last in access to health care, second in hepatitis deaths, and third in deaths due to diabetes. The rates of measles and mumps are twice the national rate. The border area also has higher rates of botulism, brucellosis, diphtheria, hepatitis A, rabies, rubella, salmonellosis, and shigellosis than nonborder areas.[23] TB rates along the border are significantly higher than those of Mexico or the United States (27/100,000, 19/100,000, and 6.8/100,000, respectively).[21] The border also has a higher rate of MDRTB.[22]

Surveillance and control of border areas is a mammoth task given an estimated 320 million persons cross the northbound border between Mexico and the U.S. each year.[101] The Border Infectious Disease (BIDs) program was established to increase surveillance[101] along the U.S./Mexico border of certain infectious diseases such as hepatitis, measles, mumps, rubella, dengue, and typhus through a binational collaborative prevention and control effort.

Other special rural populations at heightened risk for certain infectious diseases are migrant and seasonal farm workers. While difficult to determine the number of migrant farm workers, one estimate places this population at 4.2 million.[102] Poss (1998) found that this population is six times more likely to develop TB than adults in other professions.[16] In addition to higher rates of TB, migrant farm workers also have higher rates of parasitic diseases and other communicable diseases—a finding attributed in part to overcrowded conditions.[102] The rural health center plays a vital role in the health of migrant workers; an estimated 74 percent of migrant farm workers and seasonal workers receive care in these health centers.[103]

Hepatitis

Hepatitis A, B, and C are viral infections of the liver, transmitted through person-to-person contact (e.g., hepatitis A) and contact with infected body fluids (e.g., hepatitis B and C). In 2001, there were 10,616 *reported* cases of acute hepatitis A, 7,844 *reported* cases of acute hepatitis B, and an *estimated* 4,000 acute cases of hepatitis C. During the same year, there were 1.25 and 2.7 million persons with chronic hepatitis B and C infections, respectively.[44]

Hepatitis A is endemic in 17 states, with the highest prevalence in the U.S. in Arizona, followed by Alaska, Oregon, New Mexico, Utah, Washington, Oklahoma, South Dakota, Idaho, Nevada, California,[104] Arkansas, Colorado, Missouri, Texas, and Wyoming.[105] The first 11 states mentioned had a rate twice the national hepatitis average or 20 cases out of 100,000.[105] Nearly 50 percent of the reported cases occur in these 17 states, where only 22 percent of the population resides.[105] Approximately 200,000 Americans are infected each year; 22 percent of infected adult patients require hospitalization, and 100 people die annually from the disease. The cost to the U.S. economy is estimated at $450 million annually. The highest incidence rates are among children, where 30 percent of cases occur among those ages five to 14 years old. Day care workers, by nature of the route of transmission, are also at heightened risk.[105]

Hepatitis A is two to three times more prevalent along the U.S./Mexico border [24] and is particularly problematic in rural areas called Colonias.[23] In children, this disease is usually asymptomatic; however, the high incidence of the virus among children increases the likelihood of transmission to adults, in whom, hepatitis A is symptomatic.[106]

The hepatitis B vaccine has been available since 1982, with routine vaccination for all children ages 0-18 years old recommended.[25] The control of perinatal infection (transmission from mother to infant) is also a key element of the hepatitis B elimination strategy, and screening has been recommended since 1988.[107] An estimated 4,000 to 5,000 persons die each year from HBV-related liver disease.[107] While the hepatitis B vaccination program has been very successful in targeting children, the greatest challenge lies in vaccinating high-risk adults.[107]

Those at risk include African Americans and immigrants from areas where HBV is endemic (Asia, Sub-Saharan Africa, Amazon Basin, Eastern Europe, and the middle East), Alaskan Natives and Pacific Islanders, households in contact with chronic hepatitis B carriers, people who have sexually transmitted diseases, users of illicit drugs, hemodialysis patients, international travelers, and inmates.[25] Black teenagers and young adults are infected three or four times more often than whites.[26] Asian and Pacific Islander children are also at a greater risk of contracting hepatitis B (20 to 30 times higher than other children in the United States).[27] Fifty percent of individuals with chronic hepatitis B (1.25 million total) and 50 percent of the 5,000 who die from hepatitis B-related liver failure are Asian American and Pacific Islander. While Asian American and Pacific Islanders represent only 4.5 percent of the U.S. population,[26] their numbers are increasing. Asian Americans were second only to Hispanics in population growth between 1990 and 2000.[28] During the same time period, the Asian population grew 56.1 percent in metro areas and 32.2 percent in nonmetropolitan, with half of all Asians in nonmetropolitan counties born outside the U.S.[28]

The risk of perinatal infection among infants is also high among children born to first generation immigrant mothers from areas where HBV is endemic.[108] It should be noted that since implementation of a HBV program in 1982 targeting Alaskan Natives (adults, infants, and pregnant women), incidence rates have declined 99 percent.[108] In 1992, it was recommended that all newborns receive the hepatitis B vaccine as part of their immunization schedule.[107]

There are approximately 300,000 HBV infections per year in the U.S., 90,000 to 120,000 symptomatic episodes, 10,000 to 17,000 hospitalizations, and 350 to 450 deaths from fulminate hepatitis—a condition marked by rapid destruction of the liver. The number of carriers increases 27,000 to 42,000 annually.[109]

Hepatitis C is the most common chronic viral infection in the United States. An estimated 1.8 percent (3.9 million people) of the United States population is infected. While 15 percent of chronic liver disease is attributed to hepatitis B, 40 to 60 percent of chronic liver disease is related to hepatitis C infection. A major risk factor for contraction of hepatitis C is IV drug use.[110] Approximately 80 percent of those who acquire hepatitis C eventually develop chronic liver disease.[111] The incidence of hepatitis C, like hepatitis B, is higher among African Americans than whites.[26]

Elderly

Pneumonia and Influenza

Influenza and pneumonia together are the fifth leading causes of death among the elderly in the U.S.[29] despite the fact that both flu and pneumonia vaccinations are covered by Medicare Part B with no deductible. Ninety percent of the deaths from influenza and 80 percent of deaths from pneumococcal infection occur in persons ages 65 and older.[30, 31, 32] The HP2010 goal for noninstitutionalized and institutionalized adults over 65 is 90 percent for influenza and pneumococcal vaccination.[3] The vaccination rate for influenza and pneumonia is 66 percent and 55 percent, respectively, for those 65 and older.s:[33, 34] State-by-state data for influenza and pneumococcal immunizations for the elderly revealed a median rate of 69 percent and 55.2 percent, respectively. In 2002, 66.4 percent of adults older than 65 received influenza vaccines compared to 36.4 percent for adults 50 to 64 and 16.4 percent for adults 18 to 29 years.[34]

While influenza and pneumococcal vaccination rates among men and women are equal,[35] differences in influenza and pneumococcal immunization rates exist among minorities. Nonhispanic whites experience the highest influenza immunization rates (68.8 percent), followed by African Americans (49.6 percent) and Hispanics (48.5 percent).[35] Pneumococcal vaccination rates follow a similar pattern: 60.3 percent among nonhispanic whites, 37.2 percent for African Americans, and 27.1 percent for Hispanics.[35] Household survey data from 1998 and 1999 revealed similar results: 70 percent of older

white persons received flu shots while African Americans and Hispanics had rates slightly over 50 percent.[112]

Another contributing factor to influenza immunization rates among the elderly is affluence. Using 1993 Medicare Current Beneficiary Survey (MCBS) data, Gornick, et al. found the least affluent had an immunization rate for influenza 26 percent lower than the most affluent group. Among blacks, the least affluent had a 39 percent lower rate than the most affluent.[113]

The literature supports that pneumonia and influenza immunization rates among those older than 65 are comparable between rural and urban areas. In a study by Zhang, 2000, evaluating use of preventative services by rural and urban populations, 55 percent of urban and 58 percent of rural elderly residents received flu shots (P=.11).[36] This finding is supported by another study by Casey, et al. in which the researchers used the 1997 Behavioral Risk Factor Surveillance System (BRFSS) and 1999 Area Resource File (ARF) data to evaluate the impact of education, income, and urbanicity on receipt of preventive services.[38] Rural residence was not found to be related to lower rates of either receipt of pneumonia or influenza vaccine.[37, 38] However, disparities among racial groups appear more pronounced in rural residents versus urban residents. In a study looking at 1993 MCBS data, Slifkin, et al. found rural nonwhites were significantly less likely than rural whites to have received a pneumonia shot.[39] The authors also found the gap in pneumonia immunization between racial groups in rural areas is greater than that between racial groups in urban areas. Within racial groups, place of residence did not impact the receipt of influenza shots among Medicare beneficiaries.[39]

In a Pennsylvania study comparing influenza vaccine rates among urban/suburban practices, inner-city health centers, and rural practices to Veterans Administration (VA) outpatient centers, VA centers had the highest immunization rates at 91 percent compared to 79 percent in rural, 79 percent in suburban, and 67 percent in inner-city health centers.[114] Sixty-six percent of rural patients in this study indicated the flu shot was not recommended by the provider versus 56 percent of suburban, 57 percent of inner city, and 48 percent of VA patients.

Finally, residents in nursing homes are considered high risk for infection by influenza and pneumonia. The HP2010 goal is 90 percent for these two immunizations.[3] In nursing homes, the 1999 immunization rate was 66 percent for influenza and 38 percent for pneumonia,[42] which is well below the HP2010 goal. Another study finds wide variation in influenza immunization rates in long term care facilities ranging from 56 percent to 85 percent.[115]

IMPACT OF THE CONDITION ON MORTALITY

The death rate from complications of vaccine-preventable diseases is higher among adults (50,000 to 90,000 annually) than among children[42] (300 each year).[43] Influenza and pneumonia are responsible for more illnesses and deaths than all other VPDs,[42] together constituting the seventh leading cause of death in the U.S.[33] According to the 2001 National Vital Statistics Report, 67,024 deaths were attributed to these two diseases.[116] Of all influenza deaths (approximately 20,000),[117] more than 90 percent occur in persons over age 65.[30] An estimated 40,000 pneumonia deaths are attributed to pneumococcal infection, half of which could be prevented through vaccines.[118] While very young children and the elderly are at the highest risk for pneumococcal infection, the vast majority of deaths caused by pneumococcal infection (pneumonia, bacteremia, and meningitis) occur in the elderly. For pneumococcal disease, the case fatality rate is 15 percent to 20 percent for adults and 40 percent for the elderly.[30] Ten to 25 percent of adults with pneumococcal pneumonia develop bacteremia, with a mortality rate of 20 percent.[30, 119]

Tuberculosis-related deaths have steadily decreased from near 20,000 in 1953 to 751 in 2000, or .3 per 100,000.[17] Data from 2000 and 2001 finds hepatitis B attributed to 5,000 chronic liver disease deaths, while hepatitis C is associated with 8,000 to 10,000 chronic liver disease deaths.[44] AIDS death rates are highest among blacks, with urban areas experiencing much higher death rates among blacks than rural

areas.[39] Finally, immigrant women had a 50 percent higher risk for mortality related to infectious diseases than U.S. women.[120]

IMPACT OF THE CONDITION ON MORBIDITY

One-fourth of visits to physicians are infectious disease related, with annual costs over $120 billion[40] reinforcing prevention through full immunization coverage as the most cost effective approach to infectious disease control. According to CDC 1995 data, it is estimated that for every dollar spent on immunizations, $14–25 in health care costs are saved.[41]

Ten to 20 percent of the population becomes ill with influenza each year, contributing to an estimated 100 to 200 million days of illness, lost work days, and lost school productivity.[42] Pneumococcal pneumonia, caused by *Streptococcus pneumonia*, is the leading cause of community-acquired bacterial pneumonia in very young children and those 65 years and older.[121] This disease causes 3,000 cases of meningitis, 50,000 cases of bacteremia, 500,000 cases of pneumonia, seven million cases of otitis media, [118] and leads to 100,000 to 175,000 hospitalizations.[42] Annually, 3.9 million cases of chicken pox occur, resulting in the loss of 8.7 school days per case, 10,000 hospitalizations, and 90 to 100 deaths.[122] There were 10,616 *reported* cases of hepatitis A in 2001, 7,844 *reported* cases of hepatitis B, and 4,000 estimated acute hepatitis C cases.[44] It should be noted that the actual number of infections may be significantly higher than the number of reported cases.[105] In addition, estimated acute cases of hepatitis A and B are quadruple and triple the actual reported number, respectively.[44] Annual medical costs and lost productivity due to hepatitis A are estimated at more than $200 million.[123]

CONTRIBUTOR TO MANY OTHER HEALTH PROBLEMS

The primary result of failure to receive recommended vaccinations is increased incidence and transmission of infectious diseases. Other diseases caused by or intensified by infectious agents are diabetes, heart disease, ulcers,[59] and some cancers. For example, hepatitis B and C are known to contribute to hepatocellular carcinoma.[59] Higher rates of anemia and lead exposure have been reported among children who are under-immunized, because these children also fail to receive the necessary screenings for other illnesses.[124]

BARRIERS

Factors that contribute to under-immunization include living in poverty, being an ethnic minority, having a parent with a low level of education, and being from a large family.[45, 46, 47] Other barriers include the cost of immunizations, lack of insurance coverage, late initiation of the vaccination series, parental lack of awareness of a child's immunization status, missed opportunities during clinical visits, and record scatter resulting from the receipt of vaccinations from multiple providers.[4, 41, 46] In general, rural residents are more likely than urban residents to be poor, less educated, lack health insurance, and have longer travel times to health providers,[48, 49, 50, 51] which are all factors associated with lower immunization rates.[52]

A number of studies have investigated the relation between insurance and immunization rates, finding lower immunization rates among the uninsured and underinsured. Using data from a 1997 BRFSS, 73 percent of the long-term uninsured reported not receiving a flu shot compared to 57.3 percent of the insured.[125] Rates for pneumococcal vaccination were also lower among the uninsured. Madhaven, et al.[15] in a study of eight rural counties in Appalachia found the primary predictor for receipt of influenza and pneumonia vaccination among adults (under 65) was insurance coverage. Those with insurance were found to be 1.75 to 3.5 times more likely to be immunized for influenza and pneumonia. According to the Institute of Medicine Report, "A Shared Destiny," insurance coverage (public or private) was

positively correlated with immunization coverage for both adults and children.[126]

As mentioned earlier, socioeconomic status is also a predictor of immunization coverage (i.e., low socioeconomic status has been associated with low immunization rates).[127] This disparity is evident when comparing receipt of the 4:3:1:3 series among children from different socio-economic backgrounds. In 1999, for children ages 19-35 months, 78 percent received the four doses of DTP, three doses of polio, one dose of measles, and three doses of Hib; however, children living below the poverty level were less likely to receive the basic series than those at or above poverty (73 percent compared with 81 percent).[57]

Missed opportunities have been identified as a major source of delayed immunizations among children. A missed opportunity is defined as a health care encounter in which an eligible child is due for a vaccination, but no vaccination is given. Missed opportunities for childhood vaccinations were compared among selected urban and rural practices in the Rochester, New York, area, including a hospital clinic, neighborhood health center, health maintenance organization, urban private practice, suburban private practice, rural health center, and rural private practice. Opportunities for vaccination in the first year of life were missed most frequently by the rural private pediatric practice.[128] This study estimated that 1.8 visits per person per year, or 12 percent of all office visits, in the rural private practice could be characterized as missed opportunities, compared to 0.26 visits per person per year and 2 percent of all office visits in the suburban practice, which had the lowest number of missed opportunities. In the second year of life, the rate of missed opportunities increased for all practices but the hospital clinic and the suburban practice, which exceeded 20 percent of all office visits. At two years, the rural private practice continued to exhibit the highest number of missed opportunities per patient per year (2.16), and the suburban practice demonstrated the lowest (0.55).[128]

Programs utilizing reminders and patient education have resulted in increased pneumonia vaccination rates by 20 percent over control groups;[129] however, widespread implementation represents a challenge. According to one study, while generalists strongly recommended flu and pneumococcal vaccines (86 percent and 81 percent, respectively), fewer than 30 percent of the providers used standing orders, special clinics, or patient reminders.[130]

Another barrier proposed is lack of availability of services in rural areas. Studies during the early 1990s, prior to full implementation of the full VFC program, found physicians in rural areas were less likely to offer immunization services than urban physicians.[131, 154] The primary reason cited for not offering immunization services was cost to the patient.[154] Patients of physicians who did not offer immunizations were often referred to public health departments for immunization services and less than two-thirds of physicians followed-up on such referrals.[152] Even when rural providers did offer vaccines, they were more likely to refer uninsured[77] and Medicaid[132] patients to public clinics. The frequency of referrals from private practices to public health clinics was reported to range from 44 percent to as high as 90 percent.[78] Referrals to public health clinics contribute further to existing barriers to proper immunization by often exacerbating transportation difficulties, increasing time away from work, and contributing to record scatter.

Knowledge barriers among providers and patients also represent a challenge to achieving full immunization coverage. For example, there may be a gap between the provider's perceived and actual immunization rates among their patients. In a California study, physicians believed their immunization rates to be at 90 percent; however, in a chart review, the rates were found to be 54 percent for children under two years old.[133] Lack of patient knowledge, particularly regarding need for pneumonia and influenza immunizations, also contributes to underimmunization. A study using Medicare Current Beneficiary Survey data from 1996 found the number one reason cited for not receiving pneumonia and influenza was "not

knowing" the two were needed (19 percent and 57 percent, respectively).[117] Furthermore, in examining 1996 MCBS data, nonwhites were more likely to than whites to cite not knowing it was needed as the reason for not receiving flu and pneumonia immunizations.[117]

A study looking at VA, rural, urban, and suburban health centers and practices found the number one reason for not getting the flu vaccine was fear of contracting the disease, while the number one reason for getting the vaccination was recommendation by the provider and the habit of receiving a vaccination.[114] In this same study, one-third of those not receiving a flu shot stated it was not recommended by the provider.

Finally, balancing patient service needs and provider resource constraints represents a complex barrier to improved access to immunization services. This challenge is highlighted in a Colorado study of 52 nonmetropolitan area counties. The primary organizational barriers identified by providers in this study were not immunizing for sick visits, not providing for walk-ins, not providing evening or weekend hours, failing to perform screening at every visit, no formal reminder system, lack of availability of immunization records, and low reimbursement. Forty percent of providers said their ability to obtain immunization histories from other community providers was fair or poor; two-thirds had no formal tracking system.[79] Adding to the complexity, cost, attitudes, language barriers, transportation, and patient mobility were identified by parents as primary barriers.[79] A South Carolina study of three rural counties found cost (20 percent) to be second only to waiting time (54 percent) as the primary barriers to up-to-date immunizations.[47] Balancing patient and provider constraints remains an ongoing challenge for all areas in improving immunization rates; however, rural providers may face a greater challenge in meeting their patient needs due to difficulties in achieving economies of scale.

KNOWN CAUSES OF THE CONDITION OR PROBLEM SO EFFECTIVE INTERVENTIONS OR SOLUTIONS CAN BE IDENTIFIED

Poverty,[134] low socioeconomic status, low educational levels, lack of insurance, lack of knowledge regarding the need for immunization, cost, record scatter, fear of contracting the diseases or adverse reactions, access issues such as taking time from work, and parental and provider attitudes toward prevention[134, 135] have all been cited as possible reasons for low immunization rates.

PROPOSED SOLUTIONS OR INTERVENTIONS THAT ARE FEASIBLE IN RURAL COMMUNITIES

While the U.S. has been successful in achieving high immunization rates overall, immunization rates among certain subgroups remain below the HP2010 goals. No single solution will increase the rates for all groups; organizational change strategies offer the most effective methods to increase rates.[53] Establishment of separate clinics devoted to screening and prevention, use of continuous quality improvement processes and techniques, and designation of specific prevention responsibilities to nonphysician staff have all been suggested as effective organizational change strategies aimed at increasing immunization rates.[53] Other suggestions aimed at improving influenza and pneumonia vaccination rates include mobile health clinics[136] and dedicated flu clinics.[137]

The Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP) recommend the implementation of a reminder and/or recall system by vaccination providers to improve immunization rates.[54] As noted earlier, immunization reminder and recall systems have been cited as effective interventions to increase immunization rates.[134]

Standing orders programs have also been successful in increasing pneumonia and influenza immunization rates. The Centers for Medicare and Medicaid

Services (CMS) has issued an interim rule that removes the physician signature requirement for flu and pneumonia vaccinations from the conditions of participation for Medicare and Medicaid participating hospitals, long term care facilities, and home health agencies as a method to improve immunization rates.[55] In the study mentioned earlier, comparing immunization rates in VA centers, rural, suburban, and urban centers, the VA center outperformed the other centers and with minimal racial disparity. The reason cited for the VA's success was a multi-modal approach that combined patient reminders, standing orders, freestanding vaccinations clinics, and assessment of vaccination rates with feedback and incentive to clinicians—an approach recommended by the Task Force on Community Preventive Services.[114] In a study of LTC facilities in 1996 in Alaska, Idaho, Montana, and Wyoming, pneumonia vaccinations increased from 40 percent to 75 percent in facilities using a system of chart reminders and standing orders.[121]

Immunization registries and incorporating reminder and recall notices are fundamental to improving immunization rates. Registries are computerized, confidential, population-based systems designed to capture immunization records in a certain geographic area.[138] The *gold standard* are registries that are able to link data from multiple providers.[56] Registries began in the early 1970s, but in 1998, the Immunization Registry Initiative was undertaken by the National Vaccine Advisory Committee (NVAC).[139] It is estimated that 44 percent of U.S. children's (ages six and under) immunization records are housed in immunization registries as of 2002, and half of all states are collecting immunization information on people of all ages.[140] Due to resource constraints, often states utilize a linked regional registry system rather than a statewide system.[140] Of the 50 states, 44 reported operating registries that targeted their entire catchment area, while seven states reported operating registries that targeted specific counties or regions.[138] Among the challenges faced in registry implementation are record scatter, confidentiality concerns, cost, and resource constraints. Challenges are posed by the *need to sustain and document high levels of immunization coverage for a growing number of vaccines delivered within multiple health care settings,* and *persistent disparities in childhood levels of immunization coverage.*[43]

A strength of registries is the ability to decrease the problem of record scatter. Record scatter occurs when children utilize multiple providers for immunizations not only regionally but statewide and nationally. A national study determined that 22 percent of children received their immunizations from more than one provider.[141] One study found that one-third of children in public clinics with fragmented record keeping received one or more unnecessary vaccinations, compared to less than 5 percent in private practice or children seen in clinics with integrated record keeping.[68] Some studies have suggested that the problem of record scatter is more pervasive in rural areas, because rural children are more frequently referred to public health clinics.[56] However, it is difficult to assess the impact of computerized registries in rural areas, given these registries are being developed in urban areas more frequently than in rural areas.[155]

A fundamental barrier to registry development is cost. The cost in terms of human resources, capital expenditures, and maintenance is estimated at four man-years of technical effort, approximately $250,000, and $5100 per end user per three year period (1998 dollars).[142] Rural areas, unable to achieve economies of scale, may be unable to develop regional registries; however, statewide registries may serve as a vehicle to capture immunization data. To help defray costs associated with registry development, *All Kids Count*, a program of the Robert Wood Johnson Foundation began in 1992, funds projects across the country to develop computerized immunization registries.[143] It is estimated the savings associated with full implementation of registries far outweighs the costs. It is estimated that $250 million in costs could be saved via registry usage each year by making information readily available to providers and schools.[143] Another barrier to registry development is the ability to allocate sufficient resources to comply with HIPAA confidentiality standards.[140]

To increase access to pneumococcal and influenza vaccines for African Americans and Hispanics, the CDC launched the READII project (Racial and Ethnic Adult Disparities Immunization Initiative)[144] in five locations in the U.S. (Chicago, Illinois; Milwaukee, Wisconsin; Rochester, New York; San Antonio, Texas; and 19 rural counties of Mississippi).[140, 144, 145] Strategies or interventions vary by site but include such elements as community partnerships, reminder/recall systems, methods to expand and enhance access to services, and outcome measurement.

Finally, despite the ability of vaccines to prevent infectious diseases and therefore, decrease related health costs, it is estimated that only 50 percent of indemnity plans pay for immunizations.[67] This raises the question as to whether or not managed care, with financial incentives to increase delivery of preventive services, increases immunization rates. Study results are mixed. Using 1996 Medicare Current Beneficiary Survey data, one study found managed care was associated with higher influenza immunization rates among whites and African Americans than in fee-for-service plans, but racial disparities were not reduced by managed care.[156] In another study, Medicaid managed-care plans demonstrated lower immunization rates than fee-for-service Medicaid plans.[146] In a study of the State Children's Health Insurance Program using data from the National Immunization Survey (1995-2001), researchers found that SCHIP did not increase immunization rates among poor and near poor enrollees compared to nonpoor children, with the exception of varicella immunization rates, which increased 7 to 16 percentage points more among SCHIP enrollees than rates among nonpoor counterparts; SCHIP also did not increase the likelihood of enrollees finding a medical home.[147] The impact of SCHIP on immunization rates is particularly relevant to rural areas given SCHIP enrollees tend to be more suburban, rural, and older than Medicaid enrollees.[148]

While vaccines and antibiotics have controlled many infectious diseases, the threat of emergent and re-emergent diseases remains a constant public health concern, escalated by changes in demographic and environmental conditions such as international travel and commerce, increased antibiotic use, and increased habitation of areas considered reservoirs for infectious diseases (known and unknown).[59] In 1994, under the leadership of the CDC's National Center for Infectious Diseases (NCID), a nationwide effort to protect the public from infectious diseases was launched. The key elements of the strategy are *improving disease surveillance and outbreak response*, research support, implementation of disease prevention and information programs, and *rebuilding the infectious disease control component of the public health infrastructure*.[59]

COMMUNITY MODELS KNOWN TO WORK

A number of immunization programs are outlined in the Models for Practice section addressing increasing childhood and elderly immunization levels and expanding immunization registries to rural areas. Other models suggested in the literature are Pharmacist Immunization Programs (PIPs). In 2002, there were 196,000 licensed pharmacists in the U.S.[149] Thirty-one states allow pharmacists to administer immunizations through standing orders programs. Pharmacists may offer increased access given an estimated 250 million people visit a pharmacist each week,[150] and while a community may not have access to a physicians, they may have access to a pharmacy. A 1998 survey found only 2.2 percent of pharmacists actually administer immunizations;[150] however, there is evidence of program success. For example, an influenza immunization campaign, managed by a team of pharmacists, increased influenza immunization rates 95 percent in the community practice where the intervention was utilized.[157] Expanding the role of pharmacists to include immunizations is not without limitations. The nation as a whole is experiencing a shortage of pharmacists, and the problem is particularly challenging in rural areas.[149] Additionally, it has been suggested that while pharmacy immunization programs may be utilized to increase adult immunization rates, one study suggests neither parents nor pharmacists prefer to expand the role of pharmacists in providing immunization programs to pediatric patients.[150]

Another program suggested is AFIX[151] (Assessment, Feedback, Incentives, and Exchange), which is a quality improvement initiative initially implemented in Georgia that successfully raised immunization rates from 40 to 91 percent in public clinics during a four-year period (1986 to 2000). AFIX is now a national model to improve immunization rates. Data driven, this program includes four components, with a focus on changing provider behavior:

- assessment of immunization coverage of public and private providers,
- feedback of diagnostic information to improve service delivery,
- incentives designed to recognize and reward improved performance, and
- exchange of information among providers.

SUMMARY AND CONCLUSIONS

The decrease in the number of vaccine-preventable diseases is considered one of the top 10 great public health achievements in the United States.[152] Access to immunization services and up-to-date immunization coverage are essential for protecting every age group from the debilitating and potentially life-threatening effects of infectious diseases.

Immunization rates among school-age children demonstrate record high coverage; however, among preschool children, urban and rural areas coverage rates fall below the HP2010 target. Similarly, flu and pneumonia vaccinations rates among the elderly are comparable for rural and urban areas; rates are also below the HP2010 goals but continue to increase. The strain on resources relating to influenza and pneumonia may be greater in rural areas, where the elderly represent a larger proportion of the total population, and access to quality health care may be more challenging.[57] Other populations at risk for low immunization rates include the impoverished, those without insurance, minorities, residents of rural Colonias areas and border areas, and immigrants. While whites represent the largest racial/ethnic group in rural America, rural areas experienced record growth of minority populations, particularly Hispanics and Asian Americans. As discussed earlier, these groups may be heightened risk for certain infectious diseases.

The key finding is that rural and urban areas experience similar immunization rates, both below the HP2010 goals, emphasizing the need for continued efforts to increase immunization rates for both groups (particularly among preschool children, immigrants, minorities, adults, and the elderly). International travel and commerce, increased immigration, and contact with environments where infectious diseases remain leading killers reinforce the importance of full immunization coverage for the United States—regardless of degree of urbanicity. Prevention is ultimately the most effective defense system in controlling infectious diseases. As the CDC report observes in its strategy, "Protecting the Nation's Health: It is neither efficient or feasible to examine each person who enters or returns to the U.S. for evidence of infection or to examine all imported goods for evidence of contamination. Investing in global health is an area in which global humanitarian needs and U.S. national interest coincide."[153]

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MODELS FOR PRACTICE
FOCUS AREA: IMMUNIZATIONS AND INFECTIOUS DISEASES

Program Name: Communities Caring for Children
Location: Thief River Falls, Minnesota
Problem Addressed: Immunization and Infectious Disease; Maternal, Infant, and Child Health
Healthy People 2010 Objective: 14, 14-26, 16
Web Address: www.ccc-registry.org

SNAPSHOT

Communities Caring for Children (CCC) is both an immunization registry and a maternal and child health outreach program. Public health nursing agencies in 12 relatively low income and rural counties in northwest Minnesota conduct the program. All of the public health nursing agencies work with various groups within the community including clinics, hospitals, health plans, and schools. The mission of the program is to improve the health of mothers, children, and families through education, outreach, and support to families.

CCC began in 1991, when only 58 percent of the two-year-old children in the area were up to date on their immunizations, only 17 percent of children zero to five years of age received well-child exams, and approximately 25 percent of pregnant women in the area did not receive prenatal care in the first trimester. CCC has increased the percentage of pregnant women who receive prenatal care and has increased the immunization rates of children through collaboration and cooperation among various entities.

THE MODEL

Blueprint: CCC serves all children in the area ages zero to 21, pregnant women, and adults who receive immunizations. Currently, 2,886 pregnant women are enrolled with 61,548 total records in the system. There is no cost to participate in CCC, and families may enroll at any time. In an effort to maintain accurate and up-to-date immunization records, CCC includes an immunization registry that is universal, web based, and includes a reminder system. This is the first web-based registry in the state and now includes 45,703 children ages zero to 21 years old. All participating public health agencies support the registry financially. The registry also tracks well-child exams and other data used for outreach and evaluation. It records who has received or needs newsletters and follow up on immunizations, pregnancy, and well-child care. The system allows summary statistics for each county or the aggregate participating counties to be generated.

The outreach component of the program falls under two categories: education and the provision of services. Through public education efforts, CCC seeks to increase community awareness of the importance of prenatal care, childhood immunizations, and well-child care and the barriers that prevent families from receiving such care. Public health nurses accomplish this through presentations to local clubs, businesses, organizations, and state conferences. Other methods the program uses to increase awareness include: publication of articles in newspapers and different agency newsletters, brochures, public service announcements, local radio and TV talk shows, posters, health fairs, mail stuffers, stickers, and activity sheets used for evaluation purposes.

The program also provides services to those enrolled in the program. Pregnant women can enroll at local clinics, Women, Infant, and Children (WIC) clinics, local public health agencies, or at the hospital obstetric wards. During the pregnancy, women receive three newsletters—one each trimester. A public health nurse follows up with women who miss appointments and works with them to reschedule and address any barriers the women may face. After delivery, new mothers receive the newborn "Health Tracks" newsletter whether or not they are already enrolled. This newsletter is sent to enrolled families two weeks before every well-child exam and/or immunizations are due. In addition, follow-up phone calls are made to families four weeks after the two-month, nine-month, and 18-month newsletters are sent; data are collected about well-child exams, immunizations, barriers to receiving care, and ways that barriers can be overcome. The public health nurses use this information as they continue to follow up with families until the child is up to date on immunizations.

CCC has increased the percentage of pregnant women who receive prenatal care and has increased the immunization rates of children through collaboration and cooperation among various entities.

CCC is an inter-agency agreement between the 12 participating public health agencies. An agency director is appointed as a fiscal agent, and there are several standing committees. During the first three years, a project director worked full time but then changed to two days a week, with a public health nurse coordinator working one day a week. The project director and the public health nurse coordinator met with the agency public health nurses every four to eight weeks. Now that the program is established the administrative coordination is coordinated through the fiscal agent and the chair of the lead committee, with coordination for local staff combined with regional maternal and child health nurse meetings.

CCC attributes its success to many factors, among them:

- a trusting relationship among the consortium members,
- community support for the program,
- intra-agency support among the public health nurses through the sharing of knowledge and experiences, and

- incorporation as part of maternal and child health programs in the participating agencies.

Making a Difference: The consortium used several methods to evaluate the program processes and outcomes, including telephone and mail surveys and survey statistics from the registry. Phases of the evaluation are ongoing.

Data from the registry show that 90 percent of two year olds in the program received age-appropriate immunizations compared to the baseline data of 58 percent. At the same time, 91 percent of women in CCC's prenatal program received first trimester care compared to 75 percent of women before the program began. In addition, only 3.6 percent of participating women had low-birth-weight babies, compared to the state average of 3.8 percent for the 12 counties; and only 4.6 percent of pregnant women had preterm births, compared to 8.8 percent for the state.

Public health nurses in CCC conducted more than 10,000 outreach activities including letters (43 percent), phone calls (42 percent), and home visits (15 percent). Often, these activities included discussions about immunizations, well-child exams, prenatal information, and follow-up on missed appointments among other issues. Public health nurses also referred participants to community resources, including 970 referrals to medical assistance, WIC, public health nursing services, social services and other agencies, and 262 postnatal referrals to similar services as well as to Early Childhood Special Education and Head Start.

A survey of 710 participants revealed that 100 percent of participants felt it was somewhat or very important to receive prenatal care in the first three months of pregnancy; 99 percent felt well-child exams were somewhat or very important, and 100 percent felt it was somewhat or very important for children to receive well child exams. In addition, 85 percent felt the program phone calls were useful, and 93 percent would recommend the program to other families.

Beginnings: CCC began in 1991 when the Minnesota Department of Health and 10 public health nursing agencies formed a consortium and applied for and received a $300,000 three-year grant offered through the Office of Rural Health Policy. To determine the needs of the counties, a discussion was initiated among public health nursing directors, public health nurses, local physicians, social workers, early childhood educators, hospital nurses, and others. Data for 1991 in the 13 counties showed:

- an average population of 12 persons per square mile, compared to the state average of 54 persons per square mile;
- 25 percent of pregnant women did not obtain prenatal care in the first trimester versus 18 percent for the state;

- 42 percent of Native American women did not receive prenatal care in the first trimester, with 22 percent of the state's native American population living in the 13-county population area;
- the 13 counties had a higher infant mortality rate than the state average; and
- only 58 percent of the two-year-old children in the area were fully immunized.

The consortium realized these findings called for outreach programs that encouraged pregnant women to seek and remain in medical care, and programs that educated parents about healthy pregnancies, immunizations, well-child exams, and community resources.

Grant goals, objectives, activities, and a budget were developed by the consortium between March 1992 and December 1992. Funds were allocated for evaluation purposes through the Center for Social Services at Bemidji State University, and the consortium contracted with an independent software developer to create the registry. The fiscal agent developed contracts with the other nine public health agencies, and a public health nurse was hired in each county to conduct the program. An advisory committee was formed, but it was disbanded in the second year of the program after the promotional material was developed and later reconvened as a partnership work group with health plans and medical providers to develop the immunization registry. The program was fully implemented in 1993.

Challenges and Solutions: Maintaining and sustaining the program financially is the largest challenge faced by CCC. After the initial grant ended, it was a challenge for the program to find grants that fund ongoing programs. Fortunately, CCC was able to secure funding through the Medica Foundation (now the Allina Foundation). Beginning in 1995, the Foundation developed a partnership with CCC. This allowed the program to continue, write a manual for replication in other rural communities, and find a stable funding source. Dakota Medical Foundation partnered with CCC with funding to develop the immunization registry. Since 1991, CCC raised $2 million from grants and foundations to develop the program and become fully operational, in addition to the financial contribution of the local agencies.

In 1996, CCC received the Governor's Commendation for a Cooperative Public Service Award. In addition, it was identified as a model program in Shots for Tots Best Practices by the Allina Foundation and the Children's Defense Fund of Minnesota.

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MODELS FOR PRACTICE
FOCUS AREA: IMMUNIZATIONS AND INFECTIOUS DISEASES

Program Name: Greater Grand Forks Immunization Coalition
Location: Grand Forks County, North Dakota; Polk County, Minnesota
Problem Addressed: Immunization and Infectious Diseases
Healthy People 2010 Objective: 14
Web Address: www.246t.com

SNAPSHOT

The Greater Grand Forks Immunization Coalition is a community partnership that began in 1994 with 35 participating agencies and organizations for the purpose of improving immunization rates. The 62 community partners include health care agencies, businesses, educational institutions, social service agencies, media, volunteer organizations, faith-based organizations, private foundations, and individuals from the community.

Grand Forks County in North Dakota and Polk County in Minnesota are separated by the Red River of the North, and residents receive health care from both sides of the river. The Coalition was originally funded to address the immunization rates of children from birth through two years of age in the community. The Coalition's initial goal was to have a 90 percent up-to-date immunization rate for these children. The Coalition also recognized the need to reach out to rural health clinics to improve their immunization rate of 40 percent. Today, the up-to-date immunization rate for children two years of age and younger in rural and urban Grand Forks is 71.1 percent. In 2000, the Coalition's goal expanded to include: achieving age-appropriate immunizations across the lifespan, connecting families to a regular source of health care, increasing community awareness of the importance of timely immunizations for all residents, and improving tracking and recall systems within health care agencies.

THE MODEL

Blueprint: The Grand Forks Public Health Department is the lead agency and fiscal agent for the Greater Grand Forks Immunization Coalition and provides administrative support for various Coalition activities. As a result, the Grand Forks Public Health Department's Immunization Program manager is also the Coalition coordinator. Four additional health department staff members represent the Coalition through membership on community organizations. The Coalition itself has no officially paid staff. Coalition partners volunteer for committees, sharing their expertise and experience. Committees are formed to address specific Coalition activities. Partner

activities may include participation on a committee, coordination of awareness efforts in a place of business, volunteering, sponsorship of materials, monetary contributions, or lending name and voice to the Coalition's effort.

Coalition services target health care providers; parents of infants, children, and adolescents; and adults in the community. Services provided to health care professionals include presentations, onsite or satellite education and training, an Immunization Action Kit, resource library, website and statewide immunization conference. These services are provided to health care professionals by the public health department and various Coalition partners. Each month, the Immunization Program manager conducts an "Immunization Update" for public and private providers in the community, which is videotaped and distributed to rural clinics in both states. Immunization education and training sessions are also provided annually to nurse practitioner and physician assistant students; migrant health nurses; school nurses; and Women, Infant, and Children (WIC) clinic employees. The Coalition organized and hosted two statewide immunization conferences and developed an Immunization Training Manual that was used to teach staff in a rural clinic how to administer vaccines. Prior to this training, vaccine administration was not a service offered by this rural clinic.

In 2000, the Coalition's goal expanded to include achieving age-appropriate immunizations across the lifespan.

The services provided to parents, adolescents, and adults include health fairs, educational classes and materials, immunization reminder postcards, hospital newborn immunization information packets, a Drive-through Flu Clinic, and promotional campaigns that use newsletters and articles, public service announcements, stickers, immunization incentives, and a website. Coalition activities are designed to reach the target populations in the home, at work, through faith-based organizations, health fairs, local businesses, hospitals, daycares, clinics, and social service agencies. The Coalition developed and distributed an immunization video that was used by health care providers, schools, and WIC. Production of the video was discontinued due to the high cost of keeping the information current. Private clinics offer classes to parents about immunization, and all Coalition members educate parents during community health fairs. Educational materials were developed and distributed to daycares, emergency rooms, prenatal classes, and home-visiting agencies. These materials remain available upon request through the Public Health Department. In addition, the Coalition participates in the McDonald's Corporation sponsored campaign "Immunize for Life" each fall. During national immunization observances, the Coalition does promotional campaigns with local organizations and businesses.

The Coalition also sponsors a Drive-through Flu Clinic in the fall. In 2002, 467 residents received the influenza vaccine through the clinic. The Coalition developed a Company Kit for local businesses, which includes an informational letter, fliers, copies of the Coalition's logo, a newsletter story, and a paycheck stuffer. Businesses were encouraged to promote immunizations to their employees during national health observances.

Making a Difference: The Provider Education Program has been evaluated by the attendance at presentations, number of presentations, and immunization practice surveys. Currently, there are three regularly scheduled Immunization Updates per month, with an average of 65 health care providers in attendance. In 2002, the Resource Library received 35 requests for materials. The immunization conferences were evaluated by participant surveys. Attendance for the 2003 conference increased by 50 participants over the attendance for the 2000 conference.

Parent education programs were evaluated by the number in attendance, pre- and post-tests, and surveys. Surveys were used in the community to assess parental knowledge of immunizations to develop appropriate educational materials. Immunization rates generated by the Immunization Registry were used to evaluate the effectiveness of the Reminder Postcard Program. The program focuses on children 16 months of age who are not up-to-date, being caught up by age two years. The adolescent and adult programs are in the beginning stages. Similar tools (knowledge surveys, immunization rates, disease incidence) will be used to measure their success. Company Kits were evaluated by the number distributed and a survey of businesses to determine how the kits were used. The effectiveness and visibility of the media campaign and promotional materials are assessed every six to 12 months.

Beginnings: The John S. and James L. Knight Foundation provided the initial funding for the coalition from 1994 through 1999. Since then, the Coalition has relied on local grant funding and business contributions. The Public Health Department also contributes to the Coalition, but most activities are supported by in-kind contributions and do not generate revenue. Health care agencies throughout Grand Forks County, North Dakota, and neighboring Polk County, Minnesota, were the original stakeholders in the Coalition. They continue to be active partners in Coalition activities.

Challenges and Solutions: The Coalition's greatest challenge has been its sustainability. Maintaining enthusiasm for Coalition activities is part of this challenge. New and creative activities have generated new partnerships. The Coalition has sponsored two awards luncheons, recognizing community partners' contributions. Organizing and hosting two statewide immunization conferences brought Coalition partners to the table to work together. Recognition for Coalition achievements has renewed Coalition spirit. In 2000, the Coalition was chosen as one of five Model Immunization Coalitions by the National Coalition for Adult Immunization. The National Association of County and City Health Officers chose the Coalition's Drive-through Flu Clinic as a 2003 Model Practice. The Coalition was a finalist in the Promotional Products Association's 39th Golden Pyramid Competition for its marketing efforts.

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MODELS FOR PRACTICE
FOCUS AREA: IMMUNIZATIONS AND INFECTIOUS DISEASES

Program Name: Regional Early Childhood Immunization Network
Location: Marshfield, Wisconsin
Problem Addressed: Immunization and Infectious Diseases
Healthy People 2010 Objective: 14, 14-26
Web Address: www.recin.org

SNAPSHOT

Regional Early Childhood Immunization Network (RECIN), a service of the Marshfield Clinic, began in 1994 and was developed to assist counties in central and northern Wisconsin to meet the Healthy People 2000 goal—90 percent of children up to date with immunizations by age two. RECIN is a population-based immunization registry that is shared by immunization providers and is used to track immunizations for patients across the lifespan while focusing on children ages zero to 18. The mission of RECIN is to improve access to complete and current immunization data, facilitate the analysis of immunization trends, and support intervention activities to improve vaccine coverage. RECIN covers a 23-county service area, approximately the size of West Virginia, with a total population of 1,377,254 residents. Many of the counties are classified as a health professions shortage areas or medically underserved areas or both.

RECIN has been able to raise the up-to-date population-based immunization rate of the zero to two-year-old population in these counties to above 93 percent.

THE MODEL

Blueprint: Recognizing the problem of low private provider participation in immunization registries, RECIN was developed in a private provider environment with significant public sector input. Participating providers are able to obtain complete immunization data from a centralized registry, including current information for each patient regarding immunizations that are due, along with the appropriate contraindications and warnings. Data are housed on a central server, which is maintained by Marshfield Clinic staff and can be accessed by modem or the Internet at any time. After the provider has entered the vaccination data and administered the vaccine, RECIN generates a copy of the immunization record for the parent and a cumulative medical record document, as well as vaccine administration forms for local use.

The Marshfield Clinic is a regional multi-specialty group practice system of care under the direction of more than 700 physicians. Marshfield Clinic Information Systems department is responsible for the development, implementation, training, and support of the RECIN program. RECIN staff include the following: a medical director, program manager, one and a half

programmers, two coordinators, one intervention specialist, a training and development liaison, and one community health center director. In addition, RECIN receives secretarial, legislative, and editorial support. There is one grant-funded staff member, and no volunteers. RECIN also receives assistance from over 200 information systems staff in terms of system security, server administration, and other forms of system management.

Program organizers realized the importance of building and enhancing the registry based on the needs of the users to maximize utility. To foster this collaboration, currently, RECIN users gather on a quarterly basis with end users to discuss topics such as program enhancements, immunization requirements, and intervention strategies.

RECIN addresses the problem of incomplete immunization records due to the fragmentation of care by linking providers to a common repository where all immunization and alert information on patients is stored. Utilizing this consolidated immunization repository enables providers to efficiently target interventions on a community-wide basis to raise immunization rates and protect children from vaccine-preventable diseases. RECIN also strives to eliminate over- and under-immunization by providing cross facility documentation for immunizations and patient alerts, educating through the use of standard schedules, providing decision support based on the patient's age and previous history, improving the efficiency of the immunization process in both provider practices as well as schools, and most importantly improving service to those needing the protection vaccine provides.

Making a Difference: RECIN currently serves a region where approximately 15 percent of Wisconsin's population resides. Through successful intervention campaigns in several Wisconsin counties, RECIN has been able to raise the up-to-date population-based immunization rate of the zero to two-year-old population in these counties to above 93 percent. RECIN has also been an integral part in raising Health Plan Employer Data and Information Set (HEDIS) immunization rates for Security Health Plan, a nonprofit HMO located in central Wisconsin.

In 2000, RECIN became a part of a study that was undertaken on behalf of the Marshfield Medical Research Foundation entitled *Vaccine Safety Datalink (VSD): Comprehensive Linked Data Collection of Medical Events and Immunization*. The project aims to improve and understand vaccine safety by minimizing vaccine injuries. There are no reportable outcomes at this time.

Beginnings: In 1994, RECIN received a $2500 grant from the Family Health Center of Wisconsin to develop a regional immunization tracking system. At the same time, Marshfield Clinic decided to support the RECIN system based on its goal to prevent vaccine-preventable disease through the use of a common repository. An advisory board was formed and organized in

a partnership structure. The board provided recommendations regarding the future growth and direction of the RECIN initiative, major program delivery issues, and areas of program research priority.

The program has seen steady growth since 1995 and continues to receive funding and support from various groups, although RECIN continues to operate with a deficit budget. The original stakeholders of RECIN were Marshfield Clinic, Family Health Center of Marshfield, Inc., Clark County Public Health Department, Rusk County Public Health Department, Marathon County Public Health Department, and Memorial Medical Center. To date, no stakeholders have left the program. In addition, Marshfield Clinic, Family Health Center of Marshfield, Inc., and the Children's Miracle Network provided funding to begin development of RECIN and are still involved today. RECIN received additional funding through Merck Pharmaceuticals as well as Rotary International. RECIN has grown to include 65 private provider facilities, 15 public health departments, eight hospitals, 17 school districts, eight daycare facilities, and one retirement community.

Challenges and Solutions: One of the challenges RECIN faces is the development of an ongoing funding mechanism to offset user fees. RECIN staff look for additional funding opportunities by working with local service groups, foundations, pharmaceutical companies, as well as the state budget.

RECIN staff take a grassroots approach to seeking out funding opportunities. Every occasion is taken to present RECIN on both a local as well as national level through newsletters, websites, quarterly user group meetings, national presentations, and the development of journal publications. In 2001, RECIN entered into a Memorandum of Understanding with the Wisconsin Department of Health and Family Services to develop a statewide immunization registry network. RECIN was able to secure additional funding through the state legislature to offset the costs for public health departments through the biennium ending June 2003. Plans have been made to expand the service in terms of provider participation in the registry and services provided throughout the registry such as preventative services.

To successfully integrate registries into private practices, providers must recognize the added value of a registry. RECIN staff demonstrate the flexible and time-saving features of the registry to providers, which will improve their workflow and, ultimately, save them money. Currently, RECIN staff is developing a five-year plan to sustain and expand the service.

Recognition for their efforts and continued success includes the following:

- the 2002 Rotary International distinguished Paul Harris Award in recognition of the program's continued efforts to prevent vaccine-preventable disease;

- the 2002 Protect Award from the American Academy of Pediatrics and the National Immunization Program of the Centers for Disease Control and Prevention; and
- a citation by the assembly from the state of Wisconsin on December 2002 for its collaborative effort and service, which contributed to the improvement in health care for the children of central Wisconsin.

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MODELS FOR PRACTICE
FOCUS AREA: IMMUNIZATIONS AND INFECTIOUS DISEASES

Program Name: Sickness Prevention Achieved through Regional Collaboration
Location: Connecticut, Massachusetts, and New York
Problem Addressed: Immunization and Infectious Diseases
Healthy People 2010 Objective: 14-29
Web Address: www.sparc-health.org

SNAPSHOT

Sickness Prevention Achieved through Regional Collaboration **(**SPARC) is a nonprofit health care organization that began in 1994 dedicated to improving the health of residents of four counties in Connecticut, Massachusetts, and New York through the use of basic disease prevention services.

SPARC does not deliver services but rather facilitates the delivery of preventive services through the use of outreach efforts via a local infrastructure that includes approximately 75 local partnerships. SPARC is a collaborative organization that works with private practitioners, public health nurses, hospitals, and academic medical centers. SPARC also works closely with state and federal agencies, including state health departments, Medicare, and the Centers for Disease Control and Prevention (CDC).

Baseline data from a local survey highlighted the need for increasing the use of prevention services that include cancer screening, cardiovascular screenings, and immunizations. In 1997, SPARC initiated its pneumococcal and influenza vaccine outreach project. This project targeted all persons for whom an influenza or pneumococcal immunization was recommended, including rural homebound elders. SPARC and its collaborators develop and implement outreach methods tailored to each community such as creating new points of contact for preventive services, bundling the delivery of preventive services together, community mailings, and radio and local cable television announcements. Together, these methods increase the community's use of influenza and pnuemococcal vaccines, assure community-wide access to vaccine supplies, and help physicians avoid missed opportunities.

THE MODEL

Blueprint: SPARC serves a four-county area with a population of approximately 640,000 and targets residents primarily in rural communities. The rural areas of the region are in the northwest corner of Connecticut (Litchfield County), the southwest and northwest corners of Massachusetts

(Berkshire County), and in Dutchess and Columbia Counties, New York. The rural area covers approximately 1,500 square miles with a population of about 133,000. The immunization outreach program focuses on all persons who should receive these services including children with chronic illness and all diabetics.

SPARC and its collaborators have expanded prevention services to a variety of settings. These include doctor's offices, hospitals, community flu clinics, mobile clinics, "Vote and Vax" programs, public schools, Meals-on-Wheels programs, nursing homes, senior centers, churches, and community centers. SPARC provides added value by offering providers education, information, and social marketing to increase outreach efforts so that providers can deliver more cancer screening and immunizations. SPARC plans to develop programs to increase the use of preventive services for those at highest risk for cardiovascular disease.

SPARC brings together funders and local partners around an innovative idea and provides the staffing to oversee and facilitate the completion of the project. SPARC consists of a staff of seven, including one physician (MD/MPH), two public health nurses, a certified health care specialist, a health care communications specialist, an administrator and a secretary. A 15-member board of directors provides overall governance and strategic direction for the organization. Additionally, SPARC has a seven member advisory board.

The SPARC immunization program targets all persons for whom an influenza or pneumococcal immunization was recommended, including rural homebound elders.

Making a Difference: SPARC uses data provided by external agencies to monitor outcomes. The primary outcome measure is the change in delivery of clinical preventive services. Some of these data are obtained by aggregating data from local practitioners and from Medicare reimbursement data. SPARC also uses Behavioral Risk Factor Surveillance System (BRFSS) survey data obtained from the state.

Using these sources of data, SPARC has been able to document in the professional literature several successful interventions. Based on Medicare reimbursement data, SPARC has doubled the countywide rate of pneumonia vaccinations in Litchfield County, Connecticut, in a single flu-shot season—approximately twice the increase in other Connecticut counties, and has also increased by 94 percent the pneumonia vaccinations delivered in Dutchess County, New York. SPARC arranged Hepatitis B immunization clinics in schools in three counties and vaccinated approximately 2,000 6th–12th grade students. Finally, SPARC has doubled the use of breast cancer screening among women attending flu clinics where SPARC made mammography appointments available. As a result, SPARC is being promoted by the CDC as a national model for the improved community-wide delivery of preventive services. The CDC is currently seeking funding to sustain and replicate the activity in several settings across the country.

Beginnings: SPARC began with a small grant of $10,000 in 1994 from the Berkshire Taconic Community Foundation that brought together health providers in a three-state area. Since that time, SPARC has received support from many non-profit foundations and public sector agencies. In 1997, SPARC became an independent 501(c)(3) agency. They now operate with an annual budget of approximately $500,000. The Federal Office of Rural Health through a Network Outreach grant will provide funding in the coming year.

After conducting a local population-based survey,* SPARC confirmed that their region faced the same problems of underutilization and need for disease prevention services as the rest of the nation. Since 1994, the program's activities have grown to include more than 60 projects. These include initiatives designed to increase the use of influenza, pneumococcal, and Hepatitis B immunizations, tetanus booster, blood pressure check, cholesterol screening, colorectal cancer screening, Pap tests, and mammography. SPARC has recently added diabetes prevention and currently holds two grants that support diabetes outreach and education. SPARC's list of collaborators has also grown continually since it was founded to not only include local programmatic partners but also the CDC.

Challenges and Solutions: The challenges faced by SPARC have generally been related to the rapid pace of growth and expansion. Due to the limited human resources, it has been difficult for SPARC to respond fully to requests for assistance and guidance from outside their region. They have also had to develop a sophisticated internal accounting and financial tracking system since they receive funding from several sources, each with its own set of constraints (geographic, project limited, matching, etc). In addition, the demands on SPARC's infrastructure are great. Their hardware infrastructure (telephones, computers, photocopying equipment) is often stretched to the limit.

Over the years, their adult immunization projects have presented many challenges. Last year, their success arose paradoxically from a shortage of vaccine. Through their relationships with local collaborators, SPARC successfully created a re-distribution plan. Along with its partners, SPARC developed a uniform public health message that provided the community with constant and consistent information. Their web pages became the site for the most up-to-date schedules used by both health care providers and the public. These immunization efforts earned SPARC recognition, including two statewide awards.

The American Cancer Society and the New York State Department of Health have replicated a number of the program's projects, such as the pneumococcal vaccination initiative and the mammography access project. As to the overall program, SPARC will continue to support itself through competitive local, regional, and national funding of specific projects, community-based research, service grants, and local philanthropy.

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* CDC. Local Data for Local Decision making – Selected Counties, Conn., Mass., and NY, 1997. i:*Morbidity and Mortality Weekly Report*, 47:809-813, 1998.

INJURY AND VIOLENCE PREVENTION IN RURAL AREAS

by James Alexander and Graciela Castillo

SCOPE OF PROBLEM

- Age-adjusted injury and unintentional injury death rates are higher in rural areas than urban areas.[1, 2]
- Unintentional injuries are the fifth leading cause of death and are more prevalent in rural areas.[3]
- Motor vehicle deaths and occupational injuries are higher in rural areas.[2]
- The 40 percent of agricultural work-related fatalities accounted for by minors far outweighs the small percentage of minors in agriculture, eight percent.[4, 5]

GOALS AND OBJECTIVES

The Healthy People 2010 (HP2010) goal for this focus area is to "reduce injuries, disabilities, and deaths due to unintentional injuries."[6] For the purposes of this review, the following Healthy People 2010 objectives are addressed:[6]

- 15.1. Reduce hospitalization for nonfatal head injuries.
- 15.3. Reduce firearm-related deaths.
- 15.4. Reduce the proportion of persons living in homes with firearms that are loaded and unlocked.
- 15.5. Reduce nonfatal firearm-related injuries.
- 15.7. Reduce nonfatal poisonings.
- 15.8. Reduce deaths caused by poisonings.
- 15.13. Reduce deaths from unintentional injuries.
- 15.14. Reduce nonfatal unintentional injuries.
- 15.15. Reduce deaths caused by motor vehicle crashes.
- 15.17. Reduce nonfatal injuries from motor vehicle crashes.
- 15.19. Increase use of safety belts.
- 15.27. Reduce deaths from falls.
- 15.29. Reduce drownings.
- 15.32. Reduce homicides.
- 15.33. Reduce maltreatment and maltreatment fatalities of children.
- 15.34. Reduce the rate of physical assault by intimate partners.
- 15.36. Reduce sexual assaults.
- 15.38. Reduce physical fighting among adolescents.
- 20.1. Reduce work-related injury deaths.
- 20.2. Reduce work-related injuries.

Unintentional injuries were the fifth leading cause of death overall in 2001.[3] While injury and violence are prevalent in both rural and urban areas, differences exist across urbanicity in the cause and type of injury. The prevalence of high-risk occupations, such as those agriculturally related, and greater travel distances place rural residents at heightened risk for occupational and motor vehicle injuries. The need to address injury and violence in this population is evidenced through the Rural Healthy People 2010 survey in which accidental injury and violence was tied for 13th rank with immunization and infectious diseases as a rural health priority by state and local rural health leaders in considering the 28 Healthy People 2010 focus areas.[7] There were no significant differences in rates of nomination across the four geographic regions of the country.

Unintentional injuries were the fifth leading cause of death overall in 2001.[3]

PREVALENCE

In this review, injuries are classified as intentional or unintentional—a categorization scheme used by the World Health Organization's 2002 World Report on Violence and Health.[8] In this context, *unintentional injury* includes injuries related to traffic (motor vehicle, safety belt use, and all-terrain vehicles), occupational and work related (focusing on agriculture, mining, forestry, and fishing), firearms, drowning, falls, burns, and poisonings. *Intentional injury* includes interpersonal violence (pertaining to youth, family, and intimate violence) and homicide.

Unintentional Injuries

Traffic Injuries

Deaths due to motor vehicle-related injuries are a leading cause of unintentional injuries. Higher motor vehicle death rates are found in rural areas than in urban areas, particularly in the West and South.[2, 9] An analysis of data from the National Highway Traffic Safety Administration's Fatal Accident Reporting System (FARS) and the U.S. Census Bureau between 1977–1996 found the rural motor vehicle crash death rate (58.1 percent) was higher than the urban rate (41.9 percent).[9] Failure to use safety belts is an important factor in unintentional injuries and deaths.[10] Farm residents are less (or have been found to be less) likely to regularly wear safety belts than residents in metropolitan areas.[11] Another contributor to traffic injuries and deaths is use of all-terrain vehicles (ATVs). Rural residents, farmers, and men have been found more likely to have ridden an ATV in the last year than urban residents.[1, 11] While ATVs can be used on farms for work-related activities, they are commonly used for recreation, where more injuries occur.[12] Children less than 16 years of age account for approximately 36 percent of ATV-related deaths in the United States.[13, 14]

Occupational Injuries

The overall 2001 U.S. occupational fatality rate is 4.3 per 100,000 (after excluding the September 11, 2001 fatalities).[15] The highest occupational fatality rates occur among workers in the mining, agriculture, forestry, and fishing industries.[2, 16-20] Workers in these sectors also have the highest rates of machine-related deaths and motor vehicle deaths.[19]

In 2000, agriculture, forestry, and fishing had an incidence rate of 6.8 per 100 full-time equivalent (FTE) workers of nonfatal occupational injuries and illnesses, for a total of 103,400.[21, 22] Sprains and strains were the leading injuries and accounted for over 33 percent of injuries in agriculture, forestry, and fishing.[23] A review of a rural emergency department found that agricultural work-related injuries accounted for as many as 12.5 percent of 12,000 injuries. Occupational injuries were found more likely to occur among older people and men.[17] Farmers, with a mean age of 54, are at heightened risk of occupational nonfatal and fatal injury.[24-25] One study found farmers over 55 years of age had an injury rate of 9 per 100 farmers.[26] Occupational injury death rates in agriculture are largely due to motor vehicle incidents including tractors and collisions, as well other farm machinery accidents.[27] Pesticides and herbicide exposure represent another occupational hazard.

The impact of work-related unintentional injuries in agriculture among youth is significant because youth working in agriculture account for 8 percent of the population, but they account for 40 percent of work-related fatalities among minors.[4, 5] The rate of work-related agricultural fatalities for youth ages 15–19 is 12.2 per 100,000 FTE, with higher rates among males than females.[28-30] The highest rates per 100,000 of fatal injury to children occur in crop production in the Midwest, South, and West.[28, 29] In the Northeast, the highest rates of fatalities occur in livestock production.[28, 29] The main causes of injury to youth on farms are falls, transportation-related incidents, and "being struck by objects."[31-33] The leading causes of death are machinery accidents and electrical current.[5]

Injuries Due to Firearms

Firearm-related injuries contribute to both unintentional and intentional injuries. In 1999, the overall age-adjusted death rate for firearm injuries

was 10.6 per 100,000, with the largest rate (21.6 per 100,000) among ages 20–24.[34] Urban rates of unintentional firearm injuries were found to be 10 times higher than nonurban (28.3 per 100,000 versus 2.4 per 100,000). In rural counties, nonfatal firearm injuries occurred most often at home compared to urban counties where injuries occurred most often in the streets.[35, 36] The unintentional firearm mortality rate is higher (1.0 per 100,000) in nonmetropolitan counties than metropolitan counties (0.5 per 100,000).[2, 37]

Drowning

An average of 32 childhood farm drownings occur annually, a rate comparable to that of urban areas.[38] Fatalities were most common in the South and Midwest, with the West and Northeast having the lowest rates. From 1986–1997, six states accounted for 45 percent of drowning incidences: Texas, Mississippi, Missouri, Oklahoma, Georgia, and North Carolina.[38] Approximately a third of deaths were among children between zero to four years old, and 87 percent of deaths were among boys, making the rate of death 3.8 times higher for boys than for girls.[5, 38, 39] Adolescents have also been identified as at risk for drowning.[40, 41]

Falls, Burns, and Poisonings

Falls, burns, and poisonings are also significant causes of unintentional injuries. In 1995, poisonings were the third leading cause of injury deaths, accounting for 11 percent of injury deaths. In 1995, unintentional poisoning deaths had an age-adjusted death rate in metropolitan counties higher than nonmetropolitan counties, 3.5 compared with 2.0 per each 100,000.[2] Certain rural groups may be more vulnerable to poisonings, such as farm workers who are exposed to pesticides and other chemicals.[42] Falls were the fourth leading cause of injury death in 1995, and 93 percent of such deaths were due to unintentional injuries.[2] Falls from farm vehicles were a significant source of fatalities involving farm vehicles.[27] Age is also a strong factor in the occurrence of falls from injuries, particularly among the rural elderly and very young children.[43-45] Deaths due to burns were the seventh leading cause of injury deaths in 1995, and the majority (89 percent) were unintentional injuries. Children in metropolitan counties had a slightly higher burn injury rate (363 per 100,000) than nonmetropolitan (296 per 100,000).[46]

Intentional Injuries

Interpersonal Injuries

Violence among youth is a leading cause of intentional injuries, and data suggest an increasing trend in this category of injuries. The National Youth Gang Center estimates more than 24,500 gangs were active in more than 3,330 jurisdictions across the United States in 2000.[47] Thirteen percent of smaller cities reported persistent gang activity compared to only 7 percent of rural counties—a strong contrast to 100 percent of law enforcement agencies in larger cities reporting such gang activity.[48]

Family and intimate partner violence, including domestic violence, sexual assault, child abuse, and elder abuse, is a problem in urban and rural areas.[49] In rural areas, victims of domestic violence were "more likely to report they knew the perpetrator,"[50, 51] were older (mid-40s versus mid-30s), twice as likely to be currently involved in an abusive relationship (25 percent versus 12 percent),[52] and more likely than urban victims to seek help from clergy.[49] There are conflicting data about the differences in domestic abuse among adults in rural and urban areas, ranging from no difference to significantly higher rates in urban areas.[49] The rate of child abuse was higher in rural areas, although the difference did not remain when variables such as race and family income were held constant.[53] Finally, rural-urban comparisons of prevalence of elderly abuse are difficult given the dearth of comparative information on this subject. Nonetheless, it is important to pay attention to this issue given the increasing and disproportionate numbers of elderly people residing in rural areas. One out of four older Americans live in rural areas, making up 15 percent of the total rural population compared to 11 percent of metropolitan areas.[51, 54]

Homicide

In 1999, the homicide death rate was significantly higher for ages 15–24 (13.2 per 100,000) than among other age groups.[34] National data show that across all categories, increasing urbanization is strongly associated with higher homicide rates.[20, 55] Rural homicides are more likely to involve firearms than urban homicides.[56-58] In 2000, homicide was the leading cause of death for young African-American males and the second leading cause of death for young Hispanic males.[15, 20, 59, 60] The disproportionate numbers of homicides among young African-American and Hispanic males is also apparent in rural areas.[61]

IMPACT

In 2001, unintentional injuries were among the fifth leading cause of death overall and the leading cause of death for people ages one to four and 25–34.[62-63] Deaths due to motor vehicles are a leading cause of unintentional injuries, and the motor vehicle death rate is higher in rural areas than urban areas. The agriculture, mining, forestry, and fishing industries have among the highest occupational fatality rates.[2, 17, 18, 23] In addition to deaths among adults, youth also experience occupation fatalities, especially in agriculture. Youth account for 40 percent of work-related fatalities in agriculture.[4] For youth and adults, the unintentional firearm fatality rate is higher in nonmetropolitan counties than metropolitan counties.[37] Unintentional drowning-related fatalities were found to be most common in the South and Midwest.[38] Intentional injuries due to homicide show the South has the highest homicide rates; areas in the Northeast and Midwest have greater urban-rural disparities in homicide rates.[20]

> The agriculture, mining, forestry, and fishing industries have among the highest occupational fatality rates.[2, 17, 18, 23]

> Youth account for 40 percent of work-related fatalities in agriculture.[4]

The majority of data related to injury morbidity is limited to a few areas of unintentional and intentional injuries, such as occupational injuries—specifically, agriculture and family violence. Falls from vehicles, falls among the elderly, as well as poisonings from pesticide use were also found to be significant contributors to morbidity.[27, 42, 64] Falls, burns, and poisonings were also significant causes of unintentional injuries.[42, 43, 65, 66] In addition, firearm-related injuries among children in rural areas may be increasing.[67, 68]

> The unintentional firearm fatality rate is higher in nonmetropolitan counties than metropolitan counties.[37]

Unintentional injuries involving family and intimate partner violence show a link between injuries and related illnesses such substance abuse and mental illnesses.[69-74] There are also negative consequences for children who witness domestic violence, including psychological problems, behavioral problems, cognitive difficulties, mental health problems, substance abuse, post traumatic stress disorder, and other trauma-related symptoms.[75-79]

BARRIERS

Unintentional injuries due to motor vehicles in rural areas were found to be affected by factors such as time of driving (dusk, dawn, night), by delayed reporting and discovery of accidents, the fact that rural areas are less likely to have trauma systems or trauma centers, and they are less likely to have health professionals experienced in major trauma.[9, 10, 80, 81]

Social isolation is also a barrier for rural residents seeking services, particularly for the elderly and for victims of domestic abuse. Cultural factors may also impact treatment-seeking behaviors; for example, rural women may be more likely to seek help from clergy than counselors about domestic violence.

Barriers within organizations may also exist. For example, a study showed a majority of domestic abuse victims would like to approach the issue with their physicians; yet another study showed that 42 percent of internal medicine residents felt unprepared to deal with domestic violence issues.[82]

PROPOSED SOLUTIONS

A critical step toward decreasing the incidence of injury and violence-related mortality and morbidity is the improvement and coordination of surveillance activities. Currently, data on injury are mainly collected at the national level and not the state or local levels.[83] The surveillance systems at the state level that do exist vary and are not uniform.[19] In addition to surveillance, the populations of interest need to be well defined and classified.

Education campaigns in rural areas can be effective in addressing domestic violence and child abuse.[84] Violent behavior prevention programs targeting boys and girls at very young ages have also been shown to be effective in decreasing violence behavior during the later teen years.[60] In areas of injury and violence where surveillance data as well as effectiveness studies are scarce, particularly along a rural and urban division such as elderly abuse, public education and awareness raising may be a critical first step. Such programs could focus on educating the public at large about the abuse, how to identify it, and where to seek help.[85] This could help alleviate the problem of underreporting, which is caused by several factors including denial, embarrassment, a victim's cognitive or physical inability to seek help, as well as ageism.[86, 87] Primary care providers may be best suited to identify and report victims of elder abuse since such patients use health care services more often, and that may be their only social contact.[88]

Finally, it is important to note that regardless of the injury and violence area being assessed, rural regions vary in the causes and prevalence of injury and violence morbidity and mortality.[10, 89] Programs and policies should match local characteristics as closely as possible; one solution will not work for all rural areas.

SUMMARY AND CONCLUSION

Overall, age-adjusted injury and unintentional injury death rates are higher in rural areas than urban areas.[1, 2] Rural disparities in injury and violence appear to be more prevalent among unintentional rather than intentional injuries. Mortality rates are higher in rural areas in accidents involving motor vehicles, safety belt use, and all-terrain vehicles. The same is also true in occupational injuries, especially since mining, agriculture, forestry, and fishing have the highest fatality rates of all industries. Unintentional firearm fatality rates are also higher in rural areas, although intentional firearm fatality rates (for example, in homicides) are higher in urban areas. The remaining unintentional injuries either had similar prevalence rates in both urban and rural areas, had higher rates in urban areas, or data were insufficient to suggest a difference. This includes unintentional injuries caused by drowning, falls, burns, and poisonings. Intentional injuries are not significantly more prevalent among rural populations. Youth violence and homicide are more common in urban areas, while family and intimate partner violence occurs in similar rates in urban and rural areas. Family and intimate partner abuse victims face additional barriers in seeking services in rural areas. In addition to disparities in prevalence, disparities exist in risk factors between urban and rural areas. Although age, for example, is related to incidence of injury in most settings, age may present additional risks for injury among rural residents engaged in high-risk occupations, e.g., aging farmers. Rural geographic isolation affects the provision and seeking of services, for example, by affecting the availability of experienced health professionals and availability of educational, preventive and treatment programs, and facilities. Social isolation is also a barrier for rural residents, particularly for the elderly and for victims of domestic abuse.

It is important to understand the disparities in prevalence and risk factors among rural populations and to incorporate explanatory factors for such disparities in the development, implementation, and evaluation of programs and policies aimed at injury and violence prevention. Urban programs may not be

effective in rural areas, and programs effective in one rural area may not be effective in another rural area. Improved surveillance of morbidity and mortality data, a clearer definition of populations studied, and more evaluation of program effectiveness are essential to meet the Healthy People 2010 goals for injury and violence reduction among rural populations.

MODELS FOR PRACTICE

The following models for practice are examples of programs utilized to address this rural health issue.

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INJURY AND VIOLENCE PREVENTION IN RURAL AREAS: A LITERATURE REVIEW

by James Alexander and Graciela Castillo

SCOPE OF PROBLEM

- Age-adjusted injury and unintentional injury death rates are higher in rural areas than urban areas.[1, 2]
- Unintentional injuries are the fifth leading cause of death and are more prevalent in rural areas.[3]
- Motor vehicle deaths and occupational injuries are higher in rural areas.[2]
- The 40 percent of agricultural work-related fatalities accounted for by minors far outweighs the small percentage of minors in agriculture, 8 percent.[4, 5]

GOALS AND OBJECTIVES

Injuries represent a significant cause of morbidity and mortality for children, adults, and the elderly. Steps to address this complex problem are articulated in the Healthy People 2010 (HP2010) injury and violence prevention goal and associated objectives. Specifically, the HP2010 goal for this focus area is to reduce injuries, disabilities, and deaths due to unintentional injuries.[6] For the purposes of this review, the following Healthy People 2010 objectives are addressed:[6]

- 15.1. Reduce hospitalization for nonfatal head injuries.
- 15.3. Reduce firearm-related deaths.
- 15.4. Reduce the proportion of persons living in homes with firearms that are loaded and unlocked.
- 15.5. Reduce nonfatal firearm-related injuries.
- 15.7. Reduce nonfatal poisonings.
- 15.8. Reduce deaths caused by poisonings.
- 15.13. Reduce deaths from unintentional injuries.
- 15.14. Reduce nonfatal unintentional injuries.
- 15.15. Reduce deaths caused by motor vehicle crashes.
- 15.17. Reduce nonfatal injuries from motor vehicle crashes.
- 15.19. Increase use of safety belts.
- 15.27. Reduce deaths from falls.
- 15.29. Reduce drownings.
- 15.32. Reduce homicides.
- 15.33. Reduce maltreatment and maltreatment fatalities of children.
- 15.34. Reduce the rate of physical assault by intimate partners.
- 15.36. Reduce sexual assaults.
- 15.38. Reduce physical fighting among adolescents.
- 20.1. Reduce work-related injury deaths.
- 20.2. Reduce work-related injuries.

Nationally, injury data are collected by three main categories—unintentional injuries, homicide, and suicide. Unintentional injuries were the fifth leading cause of death overall in 2001.[3] Age-adjusted injury and unintentional injury death rates are higher in rural areas than urban areas.[1, 2] The leading cause of unintentional injuries was deaths due to motor vehicles—a rate that is higher in rural areas than urban areas.

> Unintentional injuries were the fifth leading cause of death overall in 2001. [3]

Occupational injuries are another significant source of unintentional injuries, and the agriculture, mining, forestry, and fishing industries have some of the highest occupational mortality rates.[2, 17, 18, 23] Firearm fatalities, drowning, falls, burns, and

poisonings are significant causes of unintentional injuries as well. Intentional injuries such as those caused by youth violence, homicide, and family and intimate partner violence are more prevalent in urban areas. Since the underlying factor in suicide is mental health, it is included in the Rural Healthy People 2010 chapters addressing mental health. While mortality data are used mainly to report on youth violence and homicide, morbidity data are frequently used to report on family and intimate partner violence. Victims of domestic violence are more likely to attempt suicide and to experience mental health problems. Overall, however, morbidity data are incomplete and stand out as one of the leading areas for surveillance improvement.

Throughout the literature review and in the community models highlighted, the need to recognize the diversity of rural areas is apparent—the problems are not common to all regions, and one solution will not work for all rural areas. Currently, this is being addressed by the National Institute for Occupational Safety and Health (NIOSH) Centers for Agricultural Disease and Injury Research, Education, and Prevention and through the recent classifications of nonmetropolitan areas into micropolitan and noncore counties by the Office of Management and Budget (OMB).[90]

IDENTIFIED BY PEOPLE LIVING IN RURAL AREAS AS A HIGH PRIORITY HEALTH ISSUE FOR THEM

The Rural Healthy People 2010 survey found accidental injury and violence was tied for 13th rank as a rural health priority by state and local rural health leaders in considering the 28 Healthy People 2010 focus areas.[7] Among four groups of rural health leaders, this topic was significantly more likely to be identified as a priority by state-level rural health leaders and, to a slightly lesser degree, by local public health agencies than by leaders of rural hospitals or health centers or clinics. There were no significant differences in rates of nomination across the four geographic regions of the country. Accidental injury and violence share the 13th rural health priority ranking with immunization and infectious diseases.

PREVALENCE AND DISPARITIES IN RURAL AREAS

To examine the wide scope of injury and violence, it is necessary to categorize injuries as intentional or unintentional. Although some areas do not divide clearly along these lines, the majority of injuries do. In addition to this broad categorization, each one is subdivided by the cause of injury. The scheme used in this literature review is one used by the World Health Organization's 2002 World Report on Violence and Health.[8] In this context, *unintentional injury* includes injuries related to traffic (motor vehicle, safety belt use, and all-terrain vehicles), occupational and work related (focusing on agriculture, mining, forestry, and fishing), firearms, drowning, falls, burns, and poisonings. *Intentional injury* includes interpersonal violence (pertaining to youth, family, and intimate violence) and homicide.

Unintentional Injuries

Traffic Injuries

Deaths due to motor vehicle-related injuries are a leading cause of unintentional injuries. In 1999, the overall age-adjusted rate in the U.S. was 15.5 per 100,000.[2] Specifically, higher motor vehicle death rates are found in rural areas, particularly in the West and South.[2, 9] In 1994, rural counties had an unintentional motor vehicle death rate of 31.4 per 100,000, compared to a rate of 13.2 in metropolitan counties.[2] An analysis of data from the National Highway Traffic Safety Administration's Fatal Accident Reporting System (FARS) and the U.S. Census Bureau between 1977–1996 found the rural motor vehicle crash death rate (58.1 percent) was higher than the urban rate (41.9 percent). The rural dead-at-scene rate (44.9 percent) was also higher than the urban rate (27.7 percent).[9] A study of FARS data from four Midwestern states during 1986–1990 found death rates increased as population density decreased.[10] It is necessary to mention the difficulty

Deaths due to motor vehicle-related injuries are a leading cause of unintentional injuries.

in differentiating motor vehicle accidents from work-related motor vehicle accidents, which are discussed in a following section. It is also important to recognize the unclear distinction of accidents actually occurring to rural residents and urban visitors who happen to have an accident on rural roads. This may disproportionately and incorrectly classify a greater proportion of accidents as involving rural populations rather than urban populations.

Failure to use safety belts is an important factor in unintentional injuries and deaths.[10] Farm residents are less (or have been found to be less) likely to regularly wear safety belts than residents in metropolitan areas.[11] Analysis of data from the 1994 Fatal Accident Reporting System on child restraint use among children zero to nine years old found safety belt use decreased in older children and also decreased as the number of passengers increased. Safety belt use was found to be less common in rural areas, in "older vehicles," and in trucks.[91]

Use of all-terrain vehicles (ATVs) is an increasingly important factor in motor vehicle injuries and deaths. ATVs are "motorized, gasoline-powered vehicles, generally weighing 300–600 lbs intended for use by riders on off-road, non-paved terrain."[13] Rural residents, farmers, and men have been found more likely to have ridden an ATV in the last year.[1, 11] While ATVs can be used on farms for work-related activities, they are commonly used for recreation, where more injuries occur.[12] A report by the U.S. Consumer Product Safety Commission (CPSC) of West Virginia regarding ATV-related deaths between 1985–1997 found the majority of deaths were due to head or neck injuries, mainly from collisions and overturns.[13]

Children are frequently victims of ATV-related injuries. Children less than 16 years of age account for approximately 36 percent of ATV-related deaths in the United States.[13, 14] The majority of ATV-related deaths among children are due to head injuries, while nonfatal injuries are due to head and spinal trauma as well as abdominal injuries.[12] Data may suggest the possibility of misclassification of ATV-related injuries to rural populations since a significant proportion of accidents are recreation-related and occur among youth less than 16 years of age who may be urban residents traveling to rural areas solely for recreational purposes.

Occupational Injuries

Unintentional injuries also occur in occupational settings. The overall 2001 U.S. occupational fatality rate of 4.3 per 100,000 did not change from the previous year (after excluding the September 11, 2001 fatalities).[15] The highest occupational fatality rates occur among workers in mining, agriculture, forestry, and fishing industries.[2, 16-20] Workers in these sectors also have the highest rates of machine-related deaths and motor vehicle deaths.[19]

Nonfatal mining injuries occurred at a rate of 3.5 per 100 full-time equivalent (FTE) workers in 2001, resulting in more than 500,000 lost workdays.[22] The main causes of nonfatal mining injuries and illnesses were musculoskeletal diseases. Hearing loss, pneumoconiosis ("black lung" disease), and silicosis were also reported.[22] The occupational fatality rate for mining is 30 fatalities per 100,000 in 2001, although a rate of 25.6 per 100,000 for 2001 is also reported.[15, 22] The main causes of death in the mining industry were roof and wall collapse, and methane and coal dust explosions.[92]

In 2000, agriculture, forestry, and fishing had an incidence rate of 6.8 per 100 FTE workers of nonfatal occupational injuries and illnesses for a total of 103,400.[21, 22] Sprains and strains were the leading injuries and accounted for over 33 percent of injuries in agriculture, forestry, and fishing.[23] The Bureau of Labor Statistics surveys of occupational injuries and illnesses and their 1998 data show the morbidity rate of work-related illness was 30.9 per 10,000 for agricultural workers. The main causes were skin conditions, cumulative trauma, as well as respiratory diseases.[22, 93] Analysis of emergency department admissions of nine rural hospitals showed work-related burns were common among construction workers, including burns to roofers, laborers, and welders.[94]

A review of a rural emergency department found that agricultural work-related injuries accounted for as many as 12.5 percent of 12,000 injuries. Occupational injuries were found more likely to occur among older people and men.[17] This is consistent with the 1997 Census of Agriculture, which found farmers, with a mean age of 54, are generally older than workers in other occupations.[25] This is important since age has been found to increase the risk of both fatal and nonfatal injuries, including those from tractor overturns.[22, 24, 25] A study found farmers over 55 years of age had an injury rate of 9 per 100 farmers.[26]

Occupational injury death rates in agriculture are largely due to motor vehicle incidents, including tractors and collisions, as well other farm machinery accidents.[27] Various studies show the leading causes of agricultural work-related deaths and injuries are motor vehicle crashes, falling objects, machinery, falls, over-exertion, and cuts by sharp objects.[17, 18, 95] A study found that during a 10-year period, 98 percent of agricultural deaths occurred to males, and 38 percent of the deaths occurred among people 65 years of age and older. The majority of the accidents were due to either rollovers or runovers.[96] Rollovers often occur as a result of attempts by farmers to avoid crashes.[97, 98] A North Carolina study found that although farm vehicle crashes decreased between 1995–1999, farmers showed a greater concern about such crashes.[97]

Pesticide and herbicide exposure are related to higher rates of certain cancers, and a study suggests an association between Parkinson's disease and occupational exposure to herbicides and insecticides.[17, 99] It has also been suggested that poisoning by insecticides containing organophosphate and carbamate may lead to depression that can persist long after the exposure.[100] Several surveillance systems for pesticide-related illness and injury exist. Two are national systems, and there are additional statewide systems. The U.S. Environmental Protection Agency supports several statewide surveillance programs. Data from such a program between 1992–1996 of California, Florida, New York, Oregon, and Texas found that 33 percent of the pesticide cases involved pesticide accidents, injuries, and exposures.[19]

To fully address the impact of occupational injuries in agriculture, the working agricultural population must be well defined.[22] It is difficult, however, to gain exact counts of youth and migrant and seasonal workers among the agricultural population. The 2000 U.S. Department of Agriculture's National Agricultural Statistical Service (USDA NASS) survey found that of 1.24 million people hired to work on farms, 11.9 percent were migrant workers,[101] although this is likely to be an underestimation.[101, 102] The number of youth working on farms may be underreported since many farms are small and thus exempt from some regulations and reporting requirements. However, there are several surveillance systems that provide information about agricultural occupational injuries. Generally, although data are available for fatal injuries, there are less data available about nonfatal injuries, making it difficult to assess overall injury prevalence and morbidity. Data that are available are not always consistent.[22] In addition, a number of categorizations of injuries overlap and may not provide the degree of detail desired.

> Youth working in agriculture account for 40 percent of work-related fatalities among minors.[4, 5]

The impact of work-related unintentional injuries in agriculture among youth is significant because youth working in agriculture account for 8 percent of the population, but they account for 40 percent of work-related fatalities among minors.[4, 5] This includes not only youth living on and hired to work on farms but also youth migrant and seasonal farm workers.[5, 29, 103, 104] Approximately 32,800 children under age of 20 were injured in 1998 in farm-related accidents, and it is estimated that 104 children under the age 20 die of agricultural injuries on U.S. farms each year.[29, 39]

The rate of work-related agricultural fatalities for youth ages 15–19 is 12.2 per 100,000 FTE.[28, 29] The rate is higher for males than females.[30] Males had a

work-injury rate of 2.4 per 100 FTE, while females had a rate of 1.5 per 100 FTE.[29, 33] The highest rates per 100,000 of fatal injury to children occur in crop production in the Midwest, South, and West.[28, 29] In the Northeast, the highest rates of fatalities occur in livestock production.[28, 29] It is estimated, however, that the child and adolescent (age 19 and younger) farm resident death rate may be underestimated due to underreporting.[30]

A five-state, 1990 analysis of the Regional Rural Injury Study-I database identified three main sources of work-related farm injuries: injuries due to animals, motor vehicle injuries, and injuries caused by machinery.[105] NIOSH and the USDA also conduct the Childhood Agricultural Injury Survey (CAIS). Results from this 1999 survey found that most youth (younger than 20 years of age) working on farms lived in the Midwest and South, and 73 percent of youth working in farms were male.[106] Consistent with the national survey, a study of North Carolina youth (ages 14–17) also found 72 percent of youth farm workers were male.[32]

The majority of agricultural work-related injuries occurred to youth living on farms, to visitors, and to workers. Several studies identify the major causes of injuries to these youth as: falls, transportation-related incidents, and "being struck by objects."[31, 32, 33] A study of farm injuries among youth 16–19 years old found that between 1982–1994, the leading causes of death for occupational fatalities were machinery and electrical current.[5] The study also showed a decrease of on-farm fatalities among youth ages 16–19. Between 1982–1985, the on-farm occupational fatality rate was 12 per 100,000, and it decreased during the last time period, 1991–1994, to a rate of 4.9 per 100,000.[5]

Injuries Due to Firearms

Firearm-related injuries contribute to both unintentional and intentional injuries. In 1999, the overall age-adjusted death rate for firearm injuries was 10.6 per 100,000, with the largest rate (21.6 per 100,000) among ages 20–24.[34] A six-year, Pennsylvania study of nonfatal firearm injuries found injury was greatest in urban counties and lowest in rural counties. Nonfatal intentional injuries from assaults increased from rural to urban counties, while the reverse was seen for unintentional injuries—they decreased from urban to rural counties.[35, 36] In rural counties, nonfatal firearm injuries occurred most often at home compared to urban counties where injuries occurred most often in the streets.[35]

The unintentional firearm mortality rate is higher (1.0 per 100,000) in nonmetropolitan counties than metropolitan counties (0.5 per 100,000).[2, 37] A study analyzed intentional and unintentional firearm deaths in Washington state between 1990–1996 and found rural areas had a higher proportion of gun deaths from shotguns and rifles than urban areas. Rural areas also had more than 50 percent of gun deaths due to handguns. Overall, handguns were the most commonly used weapon in both urban and rural areas.[36, 107] A study of the Pennsylvania Trauma System Foundation database from 1987–2000 found that, of firearm injuries among those under 20 years of age, 90.7 percent were among males, and the majority (85 percent) of those studied were ages 15–19.[36] Urban rates of unintentional firearm injuries were found to be 10 times higher than nonurban (28.3 per 100,000 versus 2.4 per 100,000).

A study in a rural Iowa county found 85.8 percent of people in farm households reported having firearms in their household versus 61.1 percent of people living in rural towns. Twice as many farm households as town households claimed have a loaded, unlocked gun on the premises.[37] This is significant, since people who have guns in their home are twice as likely to be killed by guns as people who do not have guns in their home.[108]

An analysis of firearm-related deaths in Kentucky among youth less than 20 years of age between 1988–1993 found that children in rural Kentucky had a higher risk of firearm-related death than children in urban areas, even when additional variables were accounted for, including emergency services availability.[68] Analysis from the Vital Statistics Mortality file and the National Traumatic Occupational Fatalities surveillance systems from 1982–1994 showed the two leading causes of death

for non-occupational on-farm fatalities among 16–19 year olds were drowning (38.9 percent) and firearms (28.6 percent).[5] In rural areas, firearm injuries among children may be increasing, as a 1989–1992 study of injury-related deaths in children less than 15 years old in Montana found.[67]

Drowning

An average of 32 childhood farm drownings occur annually. Between 1986–1997, the unintentional drowning rate for U.S. youth overall was 2.2 per 100,000 population. During the same time, childhood farm drownings occurred at an almost identical average annual rate of 2.3 deaths per 100,000 youth resident years.[38] Approximately a third of deaths were among children between zero to four years old, and 87 percent of deaths were among boys, making the rate of death 3.8 times higher for boys than for girls.[5, 38, 39] Adolescents have also been identified as at risk for drowning.[40, 41] Fatalities were most common in the South and Midwest, with the West and Northeast having the lowest rates. From 1986–1997, six states accounted for 45 percent of drowning incidences: Texas, Mississippi, Missouri, Oklahoma, Georgia, and North Carolina.[38] The causes of drowning also vary in rural areas. A study of drownings in a California county during a 10-year period showed that 85 percent of these fatalities occurred in an irrigational canal, and 53 percent were associated with illegal entry into the U.S. Such drownings in canals were associated with increased rate of water flow in the canal.[109]

Falls, Burns and Poisonings

Falls, burns, and poisonings are also significant causes of unintentional injuries. In 1995, poisonings were the third leading cause of injury deaths, accounting for 11 percent of injury deaths. More than half (56 percent) of the deaths were unintentional.[2] In 1995, unintentional poisoning deaths had an age-adjusted death rate in metropolitan counties higher than nonmetropolitan counties—3.5 compared with 2.0 per each 100,000.[2] Analysis of California data between 1997–2000 showed most poisonings among California farm workers occurred during use of pesticide and fumigation of grapes, oranges, and cotton.[42] Lead poisoning data from Washington, D.C., suburban and rural Maryland, and Virginia show lead poisoning in the urban areas were 60 percent higher than the rural areas, and none of the rural group had blood lead at high-risk levels.[65]

Falls were the fourth leading cause of injury death in 1995, and 93 percent of such deaths were due to unintentional injuries.[2] Falls from farm vehicles were a significant source of fatalities involving farm vehicles.[27] Age is also a strong factor in the occurrence of falls from injuries, particularly among the rural elderly and very young children.[43-45] Between 1996–1998, falls were the main source of injury among children less than three months of age, while falls from furniture was a primary source of injury for children at six to eight months.[45]

Deaths due to burns were the seventh leading cause of injury deaths in 1995, and the majority (89 percent) were unintentional injuries. Nationally, mortality rates for burns were higher in children ages one to four than for children ages five to 14.[2] The majority of deaths (91 percent) due to burns among children were caused by unintentional injuries. Alabama fatality reports for fire-related deaths during 1992–1997 showed fatality rates were higher among African Americans, men, children, and the elderly. Residential fires accounted for the largest proportion of deaths. While smoke detectors were present in only 32.5 percent of the residential fires, the presence of smoke detectors was more common with deaths in urban (41.8 percent) than rural areas (20.8 percent).[110] A 1994–1995 study of Missouri children ages zero to 14 found an overall burn injury rate of 229 per 100,000 per year. Children zero to four years had a higher burn injury rate than children five to 14 years old; boys had a higher rate than girls, and African-American children had a rate of 592 per 100,000 per year compared to white children (291 per 100,000). Children in metropolitan counties had a slightly higher burn injury rate (363 per 100,000) than nonmetropolitan (296 per 100,000).[46]

Intentional Injuries

Interpersonal Injuries

Violence among youth is a leading cause of intentional injuries, and data suggest an increasing trend in this category of injuries. From 1986–1995, overall juvenile arrests for violent crime increased 67 percent.[111] From 1991–1995, female juvenile arrests for violent crimes increased 34 percent—nearly four times the male juvenile increase of 9 percent.[111]

The National Youth Gang Center estimates more than 24,500 gangs were active in more than 3,330 jurisdictions across the United States in 2000.[47] In 2000, 95 percent of respondents reporting gang activity identified activity within one or more high schools in their jurisdiction, and 91 percent reported gang activity within one or more intermediate schools in their jurisdictions.[47]

Law enforcement agencies serving smaller cities and rural counties were less likely to report persistent gang activity between 1996–2000.[48] Thirteen percent of smaller cities reported persistent gang activity compared to only 7 percent of rural counties.[48] These numbers provide a strong contrast to 100 percent of law enforcement agencies in larger cities reporting such gang activity. Fifty-nine percent of law enforcement agencies in small areas (cities with populations between 2,500–24,999) reported that the majority of gang-related violent crime was committed against persons not involved in gangs, compared to 21 percent reporting the same in larger areas (cities with populations of 25,000 or more).[47]

Family and intimate partner violence is an additional source of intentional injuries. Family violence, including partner and domestic violence, sexual assault, child abuse, and elder abuse is a problem in rural areas.[49] Nationally, a study found 31 percent of women report being physically abused by an intimate partner during their lifetime.[112] In rural areas, victims of domestic violence were "more likely to report they knew the perpetrator" than victims in urban areas.[50] A study of three Minnesota family practice clinics found that victims of domestic abuse in small towns were older (mid-40s versus mid-30s) and twice as likely (25 percent versus 12 percent) to be currently involved in an abusive relationship.[52] An Iowa study found that rural women were more likely than urban victims to seek help from clergy.[49] Results from a study of Hispanic and migrant workers treated at rural health clinics in Texas found the overall rate of domestic violence was 19 percent, similar to the national rate of 17 percent.[113] A Georgia study found similar rates of spousal abuse among African American and white women in both urban and rural areas.[114]

However, there are conflicting data about the differences in domestic abuse among rural and urban areas. A study of domestic abuse in Iowa found no difference in rates among rural and urban residents.[49] However, a South Dakota survey of 534 clinic patients found physical assault was four times more frequent in urban than rural areas; fear of being assaulted was greater in urban areas, and being threatened with assault was more often reported in urban than rural areas.[115] While it found that actual sexual assault was low in both urban and rural respondents, the overall rate of assault and fear of assault combined were significantly different between urban (35 percent) and rural (19 percent) residents.[115]

Partner violence and child abuse are often related; children in homes where domestic abuse occurs are more likely to experience physical abuse.[77, 116-118] Data from the 1997 U.S. Department of Justice National Incident-Based Reporting System (NIBRS) for 12 states show that 13 percent of child abuse incidents reported to the police are associated with spouse abuse.[94] The National Family Violence Resurvey found the rate of child abuse was higher in rural areas, although the difference did not remain when variables such as race and family income were held constant.[53]

Elder abuse is often referred to as a "hidden problem" in the U.S.[88] The definition and classification of elder neglect and abuse vary between states, making it difficult to gather and compare data. Neglect is defined as withholding food, medication, or other necessities whether

intentionally or unintentionally. Elder abuse includes physical, psychological, and emotional abuse, as well as sexual abuse, and financial or material abuse.[85, 88] Clinical presentations range from the appearance of bruises and fractures, to dehydration, depression, apathy, and social withdrawal.[88]

Data and reports are lacking that compare rural and urban rates of elder abuse. Nonetheless, it is important to pay attention to this issue given the increasing and disproportionate numbers of elderly people residing in rural areas. One out of four older Americans live in rural areas, making up 15 percent of the total rural population compared to 11 percent of metropolitan areas.[51, 54] Between 1990–2000, the population of nonmetropolitan counties grew by 10.3 percent, and the elderly nonmetropolitan population is expected to increase as baby boomers turn 65 years old beginning in 2011.[119]

Homicide

In 1999, the homicide death rate was significantly higher for ages 15–24 (13.2 per 100,000) than among other age groups.[34] National data show that across all categories, increasing urbanization is strongly associated with higher homicide rates.[20, 55] The Northeast and Midwest have the largest urban-rural differences in homicide, while the South has the highest homicide rates of all urbanization levels.[20] A study of the homicide rate in 3,130 counties comparing rural versus urban rates found a similar trend.[120] This is also consistent with Alabama data from 1980 and 1982, which show homicide rates in rural areas are lower than in urban areas.[121] A study of 11 California urban and rural counties in 1985 also found a higher homicide rate in urban counties.[61]

Rural homicides are more likely to involve firearms than urban homicides.[56, 57, 58] A study of a rural North Carolina county found higher than expected incidence and case fatality rates of firearm injury—66.4 per 100,000 versus the national rate of 38.6 per 100,000. The study also found the incidence and case fatality rates higher among African Americans than other racial/ethnic groups.[122] In 1994, African-American juveniles were six times more likely than white juveniles to be homicide victims.[60] In 2000, homicide was the leading cause of death for young African-American males and the second leading cause of death for young Hispanic males.[15, 20, 59, 60] The disproportionate numbers of homicides among young African-American and Hispanic males is also apparent in rural areas.[61]

IMPACT OF THE CONDITION ON MORTALITY

In 2001, unintentional injuries were among the fifth leading cause of death overall and the leading cause of death for people ages one to four and 25–34.[62, 63] Ethnic and racial disparities are apparent as unintentional injures were the third leading cause of death for Hispanics and American Indians, the fourth for African Americans and Asian Pacific Islanders, and the fifth leading cause of death for whites.[62]

Deaths due to motor vehicles are a leading cause of unintentional injuries, and the motor vehicle death rate is higher in rural areas than urban areas. Safety belt use and use of all-terrain vehicles contribute significantly to traffic-related mortality.[1, 11, 13, 91, 123] The agriculture, mining, forestry, and fishing industries have among the highest occupational fatality rates.[2, 17, 18, 23] While agricultural-related occupational fatalities occur most often among adults, youth are at significant risk, accounting for 40 percent of work-related fatalities in agriculture.[4]

The agriculture, mining, forestry and fishing industries have among the highest occupational fatality rates. [2, 17, 18, 23]

Overall, for youth and adults, the unintentional firearm fatality rate is higher in nonmetropolitan counties than metropolitan counties.[37] Unintentional drowning-related fatalities were found to be most common in the South and Midwest.[38]

Mortality data on intentional injuries caused by family violence is not easily available, especially on a rural-urban differentiation. Intentional injuries due to homicide show the South has the highest homicide

rates; areas in the Northeast and Midwest have greater urban-rural disparities in homicide rates.[20] Homicide is the leading cause of death for African-American males and the second leading cause of death for Hispanic males.[15, 20]

IMPACT OF THE CONDITION ON MORBIDITY

The majority of data related to injury morbidity is limited to a few areas of unintentional and intentional injuries, such as occupational injuries—specifically, agriculture and family violence. Pesticide use may contribute to higher morbidity among agricultural occupational injuries.[17, 95] Falls from vehicles, falls among the elderly, as well as poisonings from pesticide use were also found to be significant contributors to morbidity.[27, 42, 64] Falls, burns, and poisonings were also significant causes of unintentional injuries.[42, 43, 65, 66] In addition, firearm-related injuries among children in rural areas may be increasing.[67, 68]

Unintentional injuries involving family and intimate partner violence show a link between injuries and related illnesses. For example, victims of domestic violence may have a greater likelihood of substance abuse as a coping strategy.[69, 70] Victims of domestic violence are also more likely to attempt suicide and to have mental health problems, including depression, an anxiety disorder, and post-traumatic stress disorder.[118] A study of five domestic violence shelters in Alabama either located in or serving rural communities found that women who experienced both sexual and physical violence were two to six times more likely to have various health consequences than women who experienced only physical abuse.[71-74] There are also negative consequences for children who witness domestic violence, including psychological problems, behavioral problems, cognitive difficulties, mental health problems, substance abuse, post-traumatic stress disorder, and other trauma-related symptoms.[75-79]

Since morbidity data are limited generally and even more so in regards to urban and rural differences, there is a recognized need for additional surveillance of injury morbidity data for both unintentional and intentional injuries. This is important since morbidity data—not just mortality data—are also necessary for developing and assessing prevention and treatment policies.[96]

BARRIERS

It is necessary to assess the barriers in rural areas to develop effective programs and policies. Unintentional injuries due to motor vehicles in rural areas were found to be affected by factors such as time of driving (dusk, dawn, night), delayed reporting and discovery of accidents, the fact that rural areas are less likely to have trauma systems or trauma centers, and they are less likely to have health professionals experienced in major trauma.[9, 10, 80, 81]

Social isolation is also a barrier for rural residents seeking services, particularly for the elderly and for victims of domestic abuse. Cultural factors may also impact treatment-seeking behaviors; for example, rural women may be more likely to seek help from clergy than counselors about domestic violence. Barriers within organizations may also exist. For example, a study showed a majority of domestic abuse victims would like to approach the issue with their physicians, yet another study showed that 42 percent of internal medicine residents felt unprepared to deal with domestic violence issues.[82] Although the American Medical Association, the American College of Obstetricians and Gynecologists, and others recommend screening, only 10 percent of physicians and 17 percent of obstetricians ask.[124]

KNOWN CAUSES OF THE CONDITION OR PROBLEM SO EFFECTIVE INTERVENTIONS OR SOLUTIONS CAN BE IDENTIFIED

Although unintentional and intentional injuries have their own set of contributing factors, there is a degree of overlap among several types of injuries. Data suggest that age may be directly associated with injury in rural populations.[20] A six-year analysis of rural elderly suggests the likelihood of falling increases with each year of age.[43] In addition, in fatal accidents, the average age of farm drivers is higher than for other drivers.[1, 27]

A study found motor-vehicle accidents in lower population density areas were due to greater alcohol use, greater numbers of crashes on low-traffic roads, and gravel surfaces.[10]

Deaths related to all-terrain vehicles may be due to the lack of helmet use, since the immediate cause of death of two thirds of deaths was trauma to the head or neck, and 74 percent of those who died were not wearing helmets.[13] Other contributing factors include lack of experience, alcohol or drug use, passengers, and excessive speed.[13, 125, 126]

A risk factor for occupational injuries is the nature of the work itself and the necessary use of heavy machinery and vehicles that may or may not include safety features. Among youth, a risk factor for occupational injuries is the age appropriateness of jobs performed.[4] Another is the susceptibility and sensitivity of children to various exposures.[4] Although the Fair Labor Standards Act sets the federal minimum age for child labor, the minimums are not strictly enforced on farms, and farms with less than 11 employees are exempt from the Occupational Safety and Health Administration (OSHA) standards.[4]

The risk of falls among older women may be increased by depression.[43] A study of home health clients in rural Illinois showed previous falls, frailty, physical inactivity, balance problems, absence of handrails, and uneven floors were related to the incidence of falls.[44] Studies show conflicting evidence of falls and medications—some show no relationship while some show certain prescriptions may increase the probability of falling, and other medications may decrease the probability of falling.[43, 44]

Risk factors for domestic violence include geographical and social isolation, and a lack of privacy, resources, and services. In addition, drug and/or alcohol use by the perpetrator is a risk factor for domestic abuse.[49, 113, 127-130] These risk factors are often greater in rural areas and may reduce the effectiveness of programs designed for urban areas when they are employed in rural areas.[49, 52, 118, 127]

A multitude of factors affecting caregivers and victims contribute to elder abuse and neglect. Caregiver risk factors include stress, exhaustion from caregiving, mental illness, alcoholism, and substance abuse.[88] Victim risk factors include poor health, inability to perform activities of daily living, cognitive impairment, and social isolation. Of particular significance to rural areas is the lack of community support that may increase risk because of the contribution to caregiver stress, frustration, and burnout.[86] Institutionalization in a nursing home is also a risk factor for elderly abuse since nursing home residents are more likely to be vulnerable, more socially isolated, and mentally impaired.[131] Institutional factors such as staff shortages and inadequate training and screening procedures may contribute to a greater likelihood of elder abuse. Although continuous progress is being made in improving the quality of care in nursing homes, the problem persists and presents specific challenges.[132]

PROPOSED SOLUTIONS OR INTERVENTIONS THAT ARE FEASIBLE IN RURAL COMMUNITIES

A critical step toward decreasing the incidence of injury and violence-related mortality and morbidity is the improvement and coordination of surveillance activities. Currently, data on injury are mainly collected at the national level and not the state or local levels.[83] The surveillance systems at the state level that do exist vary and are not uniform.[19]

In addition to surveillance, the populations of interest need to be well defined and classified. Agricultural workers, for example, include not only farmers but also their families, youth, and migrant and seasonal workers.[22] Further classification of other contributing factors in injury, such as farm vehicles, will also improve data collection.[27] Demographic characteristics also need to be included, not only for occupational injuries but for other areas of injuries, as well.[22] A demographic characteristic to consider is the victim's place of residence, which is useful in examining motor vehicle and ATV-related injuries. While the incidence of events is greater in rural areas, it is unclear if the victims are rural residents. This is

significant because it affects the target populations and places for prevention and education programs.

Education campaigns in rural areas can be effective. A study measuring changes in attitudes and behavior in response to a public health education campaign targeting domestic violence in a rural county suggests that local public health education campaigns in rural areas are effective methods for targeting men.[84] Another study also shows that in child abuse prevention, there has been progress among several agencies and organizations in an isolated rural area in creating and improving networking for information sharing and for greater access to resources.[133]

Findings from three prospective longitudinal surveys supported by the Office of Juvenile Justice and Delinquency Prevention found that involvement in violent behavior began at a very young age; it occurred among both boys and girls, and violence did not decrease during the late teenage years. Such findings highlight the need to implement violence prevention programs earlier—not waiting until middle school, for example, and to target both boys and girls—not simply boys.[60]

Acceptance of potential programs and policies should also be studied prior to implementation to identify possible programs and barriers that will need to be overcome. A California study of 542 adults asked their willingness to support domestic violence prevention programs through various financial methods. A majority (79.4 percent) supported raising funds for domestic violence prevention, although men were less likely than women to support such funding. Most respondents approved of paying $5 or less through fees and donations.[134] With regard to possible interventions, a study found 90 percent of abused victims would like to discuss the issue with their doctors.[82]

In areas of injury and violence where surveillance data as well as effectiveness studies are scarce, particularly along a rural and urban division such as elderly abuse, public education and awareness raising may be a critical first step. Such programs could focus on educating the public at large about the abuse, how to identify it, and where to seek help.[85] This could help alleviate the problem of underreporting, which is caused by several factors including denial, embarrassment, a victim's cognitive or physical inability to seek help, as well as ageism.[86, 87] Primary care providers may be best suited to identify and report victims of elder abuse since such patients use health care services more often, and that may be their only social contact.[88]

Finally, it is important to note that regardless of the injury and violence area being assessed, rural regions vary in the causes and prevalence of injury and violence morbidity and mortality.[10, 89] Programs and policies should match local characteristics as closely as possible; one solution will not work for all rural areas. It is necessary to acknowledge that progress is being made in this aspect. Currently, 10 NIOSH Centers for Agricultural Disease and Injury Research, Education, and Prevention exist that deal with health and safety issues pertinent to their specific location.[135]

COMMUNITY MODELS KNOWN TO WORK

A number of programs are presented in the Models for Practice section. These models are collaborative efforts to provide one of or a combination of the following: preventive services, educational opportunities, and methods and resources in an effort to reduce and prevent injury and violence.

SUMMARY AND CONCLUSIONS

Overall, age-adjusted injury and unintentional injury death rates are higher in rural areas than urban areas.[1, 2] Rural disparities in injury and violence appear to be more prevalent among unintentional rather than intentional injuries. Differences in rural and urban areas considered in this paper are based principally on mortality data since morbidity data are extremely limited in injury and violence surveillance. Mortality rates are higher in rural areas in accidents involving motor vehicles, safety belt use, and all-terrain vehicles. The same is also true in occupational injuries, especially since mining, agriculture, forestry, and fishing have the highest fatality rates of all industries. Unintentional firearm-

fatality rates are also higher in rural areas, although intentional firearm fatality rates (for example, in homicides) are higher in urban areas. The remaining unintentional injuries either had similar prevalence rates in both urban and rural areas, had higher rates in urban areas, or data were insufficient to suggest a difference. This includes unintentional injuries caused by drowning, falls, burns, and poisonings. Intentional injuries are not significantly more prevalent among rural populations. Youth violence and homicide are more common in urban areas, while family and intimate partner violence occurs at similar rates in urban and rural areas. Family and intimate partner abuse victims face additional barriers in seeking services in rural areas. Data regarding elder abuse were scarce since both surveillance and program effectiveness research is relatively small.[51]

Rural disparities in injury and violence appear to be more prevalent among unintentional rather than intentional injuries.

In addition to disparities in prevalence, disparities exist in risk factors between urban and rural areas. Although age, for example, is related to incidence of injury in most settings, age may present additional risks for injury among rural residents engaged in high-risk occupations, e.g., aging farmers. Rural geographic isolation affects the provision and seeking of services, for example, by affecting the availability of experienced health professionals and availability of educational, preventive and treatment programs, and facilities. Social isolation is also a barrier for rural residents—particularly for the elderly and for victims of domestic abuse.

It is important to understand the disparities in prevalence and risk factors among rural populations and to incorporate explanatory factors for such disparities in the development, implementation, and evaluation of programs and policies aimed at injury and violence prevention. Urban programs may not be effective in rural areas, and programs effective in one rural area may not be effective in another rural area. Improved surveillance of morbidity and mortality data, a clearer definition of populations studied, and more evaluation of program effectiveness are essential to meet the Healthy People 2010 goals for injury and violence reduction among rural populations.

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MODELS FOR PRACTICE
FOCUS AREA: INJURY AND VIOLENCE PREVENTION

Program Name: AgriSafe Network
Location: Spencer, Iowa
Problem Addressed: Injury and Violence Prevention
Healthy People 2010 Objective: 15
Web Address: www.AgriSafe.org

SNAPSHOT

The AgriSafe Network is composed of 23 rurally based hospitals, health clinics, and county health departments that provide preventive occupational health services for the farming community in Iowa. Piloted in 1987 and fully implemented in 1990, the ongoing program serves farmers and their families in the way of preventive health services, referrals, and personal protective equipment. Each clinic has approximately a 1,600 square mile service area, covering a total of 35,200 square miles.

Farmers often seek health care only when ill and at which time their condition may not be preventable. Utilization of AgriSafe services serves as an early point of entry into the health care system before serious conditions develop. Agricultural health screenings conducted in the past three years have resulted in referrals to specialists, primary care providers, and mental health providers for follow-up care. The Network clinics utilize highly trained nurses in the delivery of preventive agricultural health care and community-based education.

Occupational fatality rates in Iowa agriculture are about 20 percent higher than national rates, while work-related disabling injury rates are more than double the national rate.

THE MODEL

Blueprint: The AgriSafe clinics provide preventative occupational health services to farmers and their families in Iowa who might otherwise not be able to afford these services. Farmers are at an increased risk of suffering from noise-induced hearing loss, chronic back problems, respiratory disease, stress, and farm-related injuries and fatalities. Occupational fatality rates in Iowa agriculture are about 20 percent higher than national rates, while work-related disabling injury rates are more than double the national rate. Given the average age of the farmers receiving services is 49, the increasing elderly population in the farming community requires additional health care services specific to the needs of an aging society.

The AgriSafe Network consists of hospitals, health clinics, and county health departments that respond to the health and social needs as determined by the agricultural communities they serve. The strength in the AgriSafe clinic model rests with the strong coalition of organizations providing

services and the continuous quality improvement in the services offered. Social service agencies, mental health, Extension, health departments, local health care providers, religious leaders, and universities are partners among the AgriSafe clinics throughout the state.

AgriSafe services complement and do not replace a routine physical examination. The comprehensive health assessments provided at clinic sites include but are not limited to: lung function testing, audiogram, cholesterol screening, height and weight evaluation, blood pressure screening, vision screen, skin cancer exam, and education for their personal high-risk areas. In addition to the screening, the client and his or her family receives education on the use, purchase, and maintenance of proper personal protective equipment. Safety and health education programs are another important part of the services provided to the community. Payment for services varies across the state. Farmers may receive services at no charge or at a reduced rate depending on the resources at each clinic site. Farmers in a pilot project, Certified Safe Farm (CSF), do not pay for the farm site evaluation or the screening but do pay for follow-up services and the purchase of personal protective equipment.

Various clinic staff are also trained as farm safety consultants and provide on-site farm safety reviews to recommend removal of identified hazards. They use a farm safety checklist that was developed by a team of six agricultural health specialists who reviewed over 40 different lists prepared by other organizations in North America and around the world. The checklist scores hazardous areas on the farm, including: machinery, livestock facilities, chemical storage areas, presence and use of personal protective equipment, outdoor farm environment, and storage facilities. Community-wide programs such as Farm Safety Day camps and education at the county fairs are other important services provided to the community.

Nurses who have received extensive training specifically in the field of agricultural health and safety at Iowa's Center for Agricultural Safety and Health (I-CASH) at the University of Iowa staff all AgriSafe clinics. These nurses are also involved in continuing education and receive technical assistance as needed. The staff of AgriSafe Network consists of a clinical director, communications director, and development director. However, these positions are part time and total approximately one full-time employee. In total, the AgriSafe Network has two paid staff, one donated staff, and 13 volunteer staff.

Making a Difference: In collaboration with Iowa's Center for Agricultural Safety and Health, the Network collects qualitative and quantitative data to measure program success. The Certified Safe Farm pilot program that has been in place for over seven years is designed to measure whether the AgriSafe services are successful in reducing farm-related injuries and illnesses. The program has a control group and intervention group. Indicators for success include but are not limited to: changes in behavior,

improvement in health status, improvement in injury rates, and removal of farm hazards.

CSF empowers farmers to take control of their health and to take the necessary steps needed to prevent illness and injury. Data collected from the first year (1998) of the Certified Safe Farm unpublished study funded by the National Institute for Occupational Safety and Health (NIOSH) indicate that 25 percent of farmers screened were referred to a specialist for examination of potential skin cancer lesions; 60 percent were referred to a specialist for noise-induced hearing loss, and 35 percent were referred for immediate physician follow up due to elevated blood pressure levels. Without the AgriSafe clinic's screening program, many of these farmers would not have received the appropriate follow-up care.

Preliminary results of the CSF study show a 17 percent reduction in total farm-related illness and injury costs and a 35 percent reduction in the costs covered by insurance. The results are largely based on self-reported data and thus are susceptible to various biases. To validate these findings, CSF researchers at I-CASH will use health insurance claims data to measure success in reducing the cost and rate of farm-related illnesses and injuries in the study population. In addition to the data collected as part of the CSF study, AgriSafe collects qualitative data on an ongoing basis, including patient satisfaction.

Beginnings: For over a decade, researchers have documented the unique health and injury problems faced by farmers. In the past, however, there were few resources to address this problem. Kelley Donham, a professor at the University of Iowa and Director of Iowa's Center for Agricultural Safety and Health, created the original Network in 1987 after spending years studying a similar program in Sweden.

The network began in 1987 and was originally funded by a small pilot grant from the Iowa State Legislature. It initially consisted of five clinics. The support of foundations, and state and federal funds aided in the expansion to 23 clinics throughout the state. In June 2002, the AgriSafe Network became incorporated as a 501(c)(3), and is now independent from I-CASH. I-CASH continues to provide exceptional technical assistance, educational resources, and training to the AgriSafe clinics. In addition, AgriSafe Network clinics currently collaborate with I-CASH on several research projects, including Certified Safe Farm.

Challenges and Solutions: The AgriSafe Network faces three main challenges: clinics leaving the Network as a result of the turnover in trained nurses at clinic locations, rapid growth of clinics without proper funding, and financial difficulties among the local clinics to provide services outside of grant funding.

The Network's strategy to address this financial barrier to AgriSafe services is to leverage financial resources at both the state and local level. At the local level, AgriSafe clinics will be expected to develop their own business plan that incorporates community-based marketing strategies. At the state level, financial support is being sought from a variety of both public and private entities, including insurance organizations. In the future, health care insurance organizations that decide to cover AgriSafe services may anticipate a reduction in claims as a result of the improved preventive care and lower injury rates of the farming population. This strategy is beneficial to both the insurer and the farmer and justifies industry investment. As a group of 23 clinics, the Network has the leveraging power to affect change in the insurance industry. Current negotiations with the private sector are promising, and the Network is also in the process of developing a corporate sponsorship package

An important long-term goal of the Network is to advance to an organizational and operational capacity not limited by state boundaries. Significant accomplishments to reach this goal have been achieved. The AgriSafe Network is viewed as a model program for other states, and several have begun replicating the Network. Network staff frequently present at state and national meetings to enhance the state-to-state collaboration of the AgriSafe concept. The Network's operational manual was recently revised and is being utilized as an important resource across the nation. In addition, health professionals from various states have attended the agricultural health training offered by I-CASH.

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MODELS FOR PRACTICE
FOCUS AREA: INJURY AND VIOLENCE PREVENTION

Program Name: Farm Safety 4 Just Kids
Location: Earlham, Iowa
Problem Addressed: Injury and Violence Prevention
Healthy People 2010 Objective: 15-13,15-14, 20-1, 20-2
Web Address: www.fs4jk.org

SNAPSHOT

Farm Safety 4 Just Kids is an ongoing network consisting of chapters, participants, sponsors, and donors that seek to prevent the problem of farm-related injuries and deaths to children and youth. It incorporates health and safety issues specific to rural communities and provides individuals, families, and communities with educational opportunities and resources to make the farm a safe and healthy environment. The program promotes awareness and education of farm safety, community involvement and collaboration, increases the awareness of and supports public policies regarding safety, and promotes efforts to advance safety in farm practices and equipment.

Farm Safety 4 Just Kids targets school children, youth including teenagers, farm families, grandparents, and Spanish-speaking adults. The program message is delivered in various environments including homes, schools, hospitals, and other work environments.

THE MODEL

Blueprint: Based in Iowa, Farm Safety 4 Just Kids currently has nearly 150 chapters throughout the United States and Canada. Over 500,000 children and families attended chapter activities in 2001. The chapter structure gives communities ownership and responsibility for developing and conducting local children's farm safety awareness and education activities using Farm Safety 4 Just Kids resources and technical support. Safety programs conducted in the community adhere to the main objectives of Farm Safety 4 Just Kids: increasing public awareness and understanding of the hazards to children on the farm, and motivating and empowering individuals and farm families.

Educational materials on farm safety are developed through partnerships with other injury-prevention organizations and community groups. Specific educational packages are developed each year and include teaching ideas, facts, references, and supplemental materials. Promotional materials vary and include interactive displays, fact sheets, brochures, puzzles, puppet

shows, videos, and t-shirts, in addition to other items. These are disseminated through a network of sponsors, members, chapter-based volunteers, and collaborating organizations. The program is marketed and publicized to prospective clients and the community at large through newspapers, billboards, web pages, community involvement, radio, television, booths, conferences, and exhibits.

Farm Safety 4 Just Kids is staffed with eight full-time individuals and one part-time employee. Farm Safety 4 Just Kids staff also deliver keynote addresses, workshops, and conduct community involvement programs and training on youth farm safety issues. There are approximately 3,000 chapter volunteers and members. A 14-member board that includes agricultural industry leaders, health and safety professionals, and community representatives governs the organization. In addition, Farm Safety 4 Just Kids has established formal relationships with various organizations such as the National Children's Center for Rural and Agricultural Health and Safety, the Great Plains Center for Agricultural Safety and Health, and the Southeast Agricultural Center, to name a few.

The program is funded though grants, members, donors, and private and public sponsors. The program is brought to the attention of potential supporters through continuous communication via media such as newsletters, special mailings, and community activities.

Making a Difference: Each program that Farm Safety 4 Just Kids conducts includes an evaluation component. Every educational resource is peer reviewed before it is produced and constantly monitored for ease of use, creativity, and accurateness. An organizational effectiveness survey is conducted every five years. Survey instruments include paper surveys, phone interviews, and e-mail responses. In addition, Farm Safety 4 Just Kids maintains a database of names, addresses, and contact information that is used to track every contact, activity, and cross-reference.

Beginnings: Marilyn Adams founded Farm Safety 4 Just Kids after her 11-year-old son suffocated in a gravity flow wagon on his family's Iowa farm in 1986. Implemented in 1987, the organization started through a gift from Firestone Tire in Des Moines, Iowa. In 1992, the first of many chapters throughout the United States and Canada were established.

Each year, new community-based chapters are initiated while some are dissolved for various reasons including change in leadership, community support, and time commitments. Farm Safety 4 Just Kids programs continue to be delivered through community volunteers, members, and staff. Marilyn Adams continues to serve as the spokesperson for the organization and helps deliver the message about farm safety through her speaking engagements.

The program promotes awareness and education of farm safety, supports public policies regarding safety, and promotes efforts to advance safety in farm practices and equipment.

Challenges and Solutions: Financial challenges include limited budgets to establish additional volunteer groups as well as provide face-to-face training to curb attrition. Second, financial resources are needed to create, pilot test, and implement quality programs and resources. Many programs are not fully developed, and products sit on shelves when funding sources are depleted. Although many new businesses and organizations have been added as sponsors, others have decreased their support in recent years due to budget considerations. The current agricultural economy has affected the organization's membership base and general charitable contributions. Ongoing efforts to seek funds are strengthened by awards and recognition that Ms. Marilyn Adams and Farm Safety 4 Just Kids have received for their efforts in promoting farm safety for kids.

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MODELS FOR PRACTICE
FOCUS AREA: INJURY AND VIOLENCE PREVENTION

Program Name: Kansas Rape Prevention and Education Program
Location: Topeka, Kansas
Problem Addressed: Injury and Violence Prevention
Healthy People 2010 Objective: 15-34, 15-35, 15-36
Web Address: www.kdhe.state.ks.us/rpe/grantee.html

SNAPSHOT

The Kansas Rape Prevention and Education Program focuses on educational efforts as a means for rape prevention. Rape prevention is a public health concern since there are high societal costs due to violence against women. Such costs can include greater demand for health services, law enforcement resources, lost income, and substance abuse treatment services. The program conducts activities that are often presented to students in a school setting since the level of interaction between boys and girls is relatively high and occurs at an early age.

The program is flexible. The state provides resources and guidelines for local programs, but more specific educational decisions are made at the local level. Currently, the program is conducting activities in 11 counties including a Youth Violence Prevention Task Force, Safe Homes, Inc., Rape Victim/Survivor Services, a Risk Reduction Involving Sexuality of Kids project, a Crisis Center, Sexual Assault Center, and a Metropolitan Organization to Counter Sexual Assault.

THE MODEL

Blueprint: The Kansas Rape Prevention and Education Program began in 1995 and was fully implemented in 1996. It is a collaboration between the Kansas Department of Health and Environment, the Kansas Governor's Office of Federal Grant Programs, and the Kansas Coalition against Sexual Domestic Violence.

The goal of the program is to help young boys and girls aged 11–19 learn to distinguish and prevent sexually aggressive behavior. The program currently funds nine grantees in 11 counties throughout the state; five of these are rural areas. Together, the grantees sponsor programs and activities that focus on prevention through community awareness and education. The program also monitors state level policy change in the state legislature through its partnership with the Kansas Coalition against Sexual and Domestic Violence. Program activities include school-based educational efforts, media campaigns, and the coordination of services among community agencies.

The program is intended to complement efforts by parents, caregivers, and schools to facilitate the emotional development of boys and girls.

The program awards community-based grants to local non-profit organizations that provide violence prevention services to their communities. These interventions take place in settings such as schools, faith-based organizations, after-school programs, and other nonprofit agencies. The interventions are flexible so that grantees work with local representatives to tailor the programs to meet local needs. Program collaborators and grantees communicate often through various means including an e-mail list-serve.

The Kansas Rape Prevention and Education Program staff consists of a part-time injury and disability director, a full-time sexual assault prevention grant coordinator, and a part-time sexual assault prevention epidemiologist. An Office of Health Promotion director and an injury manager donate their time. In addition, there are three volunteer staff who serve as public health educators at the local level.

The goal of the program is to help young boys and girls aged 11-19 learn to distinguish and prevent sexually aggressive behavior.

Making a Difference: The program is conducting several evaluations of the program's process, impact, and outcomes. Overall, indicators of program success are based on objectives stated in the grant application.

Currently, methods of evaluation are mainly composed of process evaluation including dates, session topics, and numbers of students. The program utilizes a series of pre- and post-tests to measure a number of indicators. Cognitive indicators measure changes in awareness of sexual harassment and awareness of school policies pertaining to sexual violence and sexual bullying. Attitudinal indicators include those toward gender violence, healthy relationships, bullying, self-esteem, and self-efficacy. Skills outcome indicators measure the ability to handle conflict resolution. Other outcome indicators measured include behavior based and environmental, as well as those pertaining to social and community levels.

Impact evaluation is mainly used for local program purposes such as demonstrating the extent of the problem and showing teachers, other school personnel, and coalition members that the program's educational activities have caused changes in understanding, attitudes, or behavior.

Beginnings: The program was identified after a review of several state surveys indicated specific characteristics useful in identifying target audiences for preventive measures and a timeline for preventive measures. This resulted in identifying the target audiences for the program. This includes youth ages 11–19, populations identified at risk for sexual assault including females, people with disabilities, ethnic minorities, people with low socioeconomic status, people living in rural areas, and youth identified by school or law enforcement authorities as high risk. The review of the

surveys also indicated that preventive measures should begin before high school.

The program began in 1995, with an initial meeting at the Kansas History Museum. The original stakeholders included: the Kansas Department of Health and Environment, the Kansas Coalition against Sexual and Domestic Violence, the Kansas Office of the Attorney General (moved to the Governor's Office of Federal Grants Program in 2002), Kansas Department of Education, several mental health professionals, representatives from local crisis centers throughout the state, and representatives from Kansas State University Cooperative Education and Extension Office. This meeting led to the formation of a cooperative plan and provided direction on the allocation of resources. Since this initial meeting, no new stakeholders have been added, although some have withdrawn.

Challenges and Solutions: A significant challenge for the program is in the evaluation process. It is challenging to determine age-appropriate intermediate indicators of awareness, attitude, and behavioral changes that illustrate the program's effectiveness. Also, the rigorous evaluation necessary to answer this question with intermediary indicators is difficult given limited resources. To address both challenges, the program is working with the Centers for Disease Control to develop rigorous methods of program evaluation given limited resources. Once the full evaluation of the program supports significant change in the community, plans to disseminate the program statewide will move forward. Another approach to future sustainability of the program involves the drafting of a strategic sexual assault primary prevention plan for the state.

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MODELS FOR PRACTICE
FOCUS AREA: INJURY AND VIOLENCE PREVENTION

Program Name: Partners for Rural Traffic Safety
Location: Rural Michigan
Problem Addressed: Injury and Violence Prevention
Healthy People 2010 Objective: 15
Web Address: www.com.msu.edu/micrh

SNAPSHOT

Partners for Rural Traffic Safety is a collaborative effort by state and community partners to encourage and support enforcement of Michigan's occupant protection laws. The community campaigns are designed to increase safety belt usage and promote the proper use of child car seats among residents of 16 rural counties in Michigan. Initial participating communities were selected based on the presence of a critical access hospital exhibiting a willingness to serve as program leader, facilitator, and collaborator and with a proven track record of successful network development.

The safety campaign became a central focus, uniting different community organizations.

THE MODEL

Blueprint: The program is a collaboration of state and community organizations. The state team consists of the Michigan Center for Rural Health, Office of Highway Safety and Planning, Office of Emergency Medical Services, Michigan State Police Section of Traffic Safety Services, Michigan Department of Community Health's Safe Kids Program, and Michigan State University Extension of Family/Consumer Sciences. The four community teams include representatives from health care, law enforcement, business, faith based, education, and general community. The four communities selected are in rural Michigan, and each have a critical access hospital willing to provide community leadership as well as having a proven track record of successful network development and collaboration**.** The program director is from the Michigan Center for Rural Health and allocates 20 percent of her time to the program. Other collaborators at the state and local level donate their time.

The state team identified communities in which to implement the program, established community partner teams, and provided technical training to the community team, as well as serving as an information resource. The community team is responsible for the actual implementation of the program. A major focal point of the program is a 30-day awareness and education campaign that is delivered in each community and serves as central focus, uniting different community organizations. The campaign was

delivered at schools, places of business and worship, employer sites, health care settings, and senior and community services. In 2003, each community delivered five to 33 activities including, among others, child safety seat inspections, appearances by crash dummies, roll-over demonstrations, and a 55-Alive mature driver's program.

While the campaign is a key activity, the program has been extended beyond the initial 30-day campaign through the purchase of a series of permanent signs and banners to be utilized in the community throughout the year. In addition, two individuals from each community are trained to perform car seat safety inspections. Car seat give-aways are also planned throughout the year. Attention is brought to the program via newspapers, community events, banners, websites, traffic signs, speakers, and demonstrations.

Making a Difference: The May 2003 campaign relied on a series of pre and post tests to assess the effectiveness of the campaign. Each of the four counties increased the percent of drivers utilizing safety belts, while three of the counties reported increased safety belt usage among passengers. One county had a slightly lower safety belt usage in the post test (91 percent versus 88 percent). Overall, the results were encouraging. Pigeon and Manistique Counties demonstrated a 10 percent increase in driver safety belt usage in pre and post testing. Safety belt usage among passengers was also documented. Manistique County's passenger safety belt usage increased from 64 to 84 percent in pre and post testing. Two other counties reported increases of 4 and 5 percent. Child car seat safety inspections were also considered successful, with scheduled screenings extending two and three hours due to larger than anticipated attendance and more car seats given away than expected.

While the intent of the program was to increase the usage of proper occupant restraints, the program was also successful in providing the community team with tools to address other community-based problems. The community team was trained in the process model that seeks consensus and input from the community in decision making—a powerful tool for the communities to apply to other problems.

Beginnings: Funded through a grant from the National Rural Health Association and the National Highway Traffic Safety Administration, this demonstration program began in January 2003 and ended in June 2003. The program will expanded to 12 additional communities over the course of the next three years through a grant from the National Highway Transportation Safety Agency.

Challenges and Solutions: A key challenge to organizers is the implementation of a labor-intensive model that requires considerable advance planning and training. Central to meeting this challenge is the selection of a community access hospital with a willingness to serve as the

community leader and facilitator. Currently, as a result of the collaborative efforts of the state and community, this demonstration project has been extended for three years. Through a grant from the National Highway Transportation Safety Agency, the program will be extended to the remaining 12 critical access hospitals. The Michigan Center for Rural Health plans to institutionalize the program through its core State Office of Rural Health contract with the Michigan Department of Community Health. This enables the program to have a consistent budget and receive annual evaluations. Ultimately, the program's success is attributed to the successful collaboration of state and community partners.

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MODELS FOR PRACTICE
FOCUS AREA: INJURY AND VIOLENCE PREVENTION

Program Name: Rural Response to Intimate Partner Violence
Location: Franklin and Washington Counties, Maine
Problem Addressed: Injury and Violence Prevention
Healthy People 2010 Objective: 15
Web Address: www.mepca.org

SNAPSHOT

In the 1990s, Intimate Partner Violence (IPV) was identified by the Maine Primary Care Association (MPCA) as a critical public health concern because of its pervasiveness and its impact on the physical and mental health of victims and their children. The problem is particularly insidious and resistant to intervention in the rural areas where most of MPCA's member community health centers are located. In 1996, with funding from Centers for Disease Control (CDC), MPCA initiated a six-year pilot project at four sites. The project emphasized changing clinical practices and building community coalitions, with the goal of increasing awareness of and commitment to change on the part of community members and clinicians to intimate partner violence. Incidence rates for such a complex behavior take decades to change, but MPCA has measured significant changes in community awareness and attitudes, and in clinical practices, over the course of the project.

THE MODEL

Blueprint: Rural Response to Intimate Partner Violence is a six-year pilot project involving four program sites and one comparison site, all located at community health centers in rural Maine. These remote areas are economically distressed, and in 1996, nearly a quarter of the population lived below the federal poverty level with an unemployment rate 40 percent higher than the state average. These conditions, combined with the lack of access to social services, make addressing IPV particularly challenging in rural areas.

The Maine Primary Care Association has been instrumental in managing this program, with funding via two three-year grants from CDC. At each program site, a community coalition was formed, with staff support provided by the local health center through a subgrant from MPCA. Project activities, aimed at increasing awareness of IPV among clinicians, patients, and the community at-large, were carried out simultaneously at the local level and state level. At the local level, each of the four program sites began their activities in a similar way following the initially proposed plan; however,

over time, the programs diverged as their coalitions matured and as differing global circumstances and perspectives became increasingly influential.

The primary goal of the program is to develop a coordinated community response to IPV through the use of community coalitions that will develop and implement primary prevention programs, empower and support programs, and provide training and education about IPV. MPCA provides the structure to support these coalitions, including development of prevention and training programs, as well as program facilitation including evaluation.

The four coalitions vary in size (from 13 to 30 participants) and in the scope of their activities, but overall, the coalitions include the following entities: law enforcement officers and officers of the courts, educators, counselors, health care providers (clinical and administrative), domestic violence victim service providers, substance abuse agencies, batterers intervention projects, clergy, business owners, government employees, artists, students, victims/ survivors and witnesses of abuse, and other interested community members.

Making a Difference: Expanded community awareness was the program's major goal and impact. Prior to the inception of the project, family violence was not openly discussed in the home, community, or clinician's office. By the end of the project, active screening was a part of all health center protocols. Local businesses, schools, and media outlets were all partners in distributing information and addressing the issue of community values. Project impact was assessed through administration of the following instruments: anonymous patient surveys, clinician surveys, coalition member surveys, and medical record audits.

Anonymous patient surveys were collected as a means to inform clinicians about the incidence of abuse experienced in their practices. Compiled results revealed that 18-25 year olds reported the highest incidences of abuse within the previous 12 months (24 percent) followed by 26-35 year olds (22 percent), although there was wide variation among the individual program sites. Nationally, lifetime experience of domestic violence by women is generally estimated at 31 percent. Combined data from the four Maine health centers, however, revealed an average lifetime experience of about 50 percent, ranging from 55 percent for ages 18-50 to 47 percent for ages 51-65 and 22 percent for those 66 years old and over.

A key goal of the project was to increase the rate of proactive clinician engagement with patients on the issue. Patient surveys at project sites reflected an increase in clinician inquiries about violence. Patient-reported inquiry rates increased, on average, from 23 percent in 1998 to 35 percent in 2002. Inquiry rates at the control site remained at 23 percent over that same period. These baseline data are similar to those from national surveys (typically reported as showing that 80 percent of all women have never been asked about family violence by a health care provider).

The clinician survey conducted in 2000 and 2002 showed that 60 percent of the clinicians said they "almost always" or "often" asked about IPV at annual exams/regular checkups, and 73 percent said they "almost always" or "often" asked about IPV if the patient presented with an injury. The patient survey responses cited above confirm that clinician inquiries did increase. Most clinicians reported changes in their clinical behavior as a result of this project, especially increases in awareness and assertiveness in asking patients about the issue, some relating these changes directly to the project's educational activities. The surveys also reflect increasing awareness of local community resources, confidence in referring patients to those resources, and reduced obstacles in assisting women who have experienced abuse.

Findings from the coalition member survey to date show that the members are satisfied with the work of the coalition; nearly all respondents are able to identify at least one major accomplishment of their coalition in the past year, generally related to activities carried out to increase community awareness. Nearly every respondent felt that the coalition had improved coordination of IPV services in their community.

The primary goal of the program is to develop a coordinated community response to IPV through the use of community coalitions.

Finally, audits of patient records show an increase in the incidence of documentation of abuse inquiries from 5 percent in 1996 to 30 percent in 2002 at the intervention health centers, while it remained around 5 percent at the comparison site. Consistent with the intentions stated by project site clinicians in 2002, documentation of inquiry was found in records of 47 percent of the women patients who had undergone a complete physical in the previous year.

Beginnings: In 1996, mental health providers at community health centers were reporting domestic violence as an underlying factor in the conditions of up to 50 percent of the patients referred to them for treatment. Regional data were not consistently collected or reported in other systems; however, anecdotal data collected by health center staff seemed to suggest that the area around Rangeley in Franklin County (one of the four coalition sites) had a significant number of arrests in which domestic violence (DV) was considered a factor by the arresting officer. In Washington County, the site of the other three coalitions, there was evidence of above average rates of domestic violence, depression, and drug and alcohol dependence. To begin to increase awareness of the problem and connect victims with resources, the pilot program was initiated in 1996, with the implementation phases growing and expanding yearly.

Challenges and Solutions: Three of the four coalition sites are in the same county (Washington) and work together on collaborative regional strategies and with the local domestic violence provider agency. The fourth site, in Franklin County, is located in a remote area of the Western Mountains, far from DV and other provider agencies. The isolation affects staff morale, resource availability, opportunities for interagency

collaboration, and other factors that limit coalition progress and effectiveness.

The broad delineation of the project and insufficient coordination prior to the grant application brought all the coalitions into conflict with local DV victim services provider agencies and the statewide DV coalition. This was one of several frictions that had to be addressed by the project. The project was also challenged by high turnover of project management staff at both the state and local level. Finally, the project itself continues to search for additional funding sources to maintain key elements of the program beyond the CDC funding term.

Presentations of the project will be conducted in national and international conferences. MPCA has also convened a statewide "violence against women stakeholders group," which intends to pursue policy changes and financial support to continue and extend the work begun during the CDC-funded IPV coalition project.

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The Rural Healthy People 2010 contributors explore many of the disadvantages and disparities facing many rural communities with an eye toward creating wider understanding of rural health needs. At the same time, we do not wish to diminish advantages and attractions that many rural areas already offer to their residents and visitors. More important, we want to recognize and highlight many rural communities, like those featured in Rural Healthy People 2010 "models for practice." They reflect the hard work and commitment of rural people unwilling to accept existing conditions and who, instead, explore new pathways to improve the health of rural people.

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