

Early Childhood Health

by Dora Anne Mills



Dora Anne Mills presents a panoramic portrait of early childhood health in Maine, describing the ways in which poverty, health insurance, pregnancy, early growth and development, infectious and chronic diseases, oral health, environmental health, injury, mental health and physical activity and nutrition affect children. She notes policy successes in these areas and describes some of the challenges that remain and the new challenges that are arising. 🐉

INTRODUCTION

The prenatal and early childhood period are considered the most vulnerable chapter in a person's life. Early childhood is the only time in our lives when we are completely dependent on another person, and it is also the period when the brain and other organs are most intensely developing.

This article reviews factors affecting the health of our infants and young children, with a focus on those especially relevant to policymaking. It is a "picture" of early childhood health—where Maine is and where Maine needs to go. Readers should keep in mind that even within Maine's successes in early childhood, there are children who are left behind. Numerous studies indicate that the presence of health disparities in the prenatal and early childhood period has long-term costs not only for the individuals involved, but for society at large. (Several articles in this issue of *Maine Policy Review* discuss some of these costs, e.g., Trostel, Connors.) This article first considers two broad areas affecting early childhood health: poverty and health insurance. Then, it discusses specific factors related to early childhood health, beginning with the prenatal period, and then considering the topics of growth and development, infectious diseases, chronic disease, oral health, environmental health, injury, mental health, and physical activity and nutrition. The concluding section addresses where we go from here in terms of policy.

POVERTY

Poverty is perhaps the most widespread factor in Maine with the biggest impact on the health of our youngest residents. In Maine there are approximately 71,000 children under the age of five; of these, about one in five live in families that are below the official poverty level. Poverty can result in poor physical health throughout an individual's lifetime, lower school achievement, poor cognitive abilities, reduced emotional and behavioral outcomes, and high chances of teenage childbearing. (For further detail about poverty in Maine, see Acheson this issue.)

In terms of childhood health outcomes, poverty, even when other factors are adjusted for, doubles a child's chances of being in fair or poor health, almost

doubles the chances of low birth weight, doubles the chances of being hospitalized, triples the chances of lead poisoning, and almost doubles the chances of dying in the first year of life.

Poverty during early childhood correlates more strongly with dropping out of high school than poverty in later childhood (Brooks-Gunn and Duncan 1997). And for the approximate 15,000 Maine children ages birth to five years old living below the federal poverty level

(in 2008, an annual income of \$17,600 for a family of three), there is inadequate income to pay for clothing, food, and housing. Poverty is truly a major public health threat.

HEALTH INSURANCE

Through Dirigo Health Reform, the wise use of SCHIP (the federal government's State Children's Health Insurance Program), and numerous outreach efforts, Maine has done an excellent job expanding health insurance for children, resulting in one of the highest rates of children's health insurance in the country. SCHIP expansions using MaineCare (Medicaid) to insure children and their parents living in households earning up to 200 percent of the federal poverty level have resulted in about one-third of young children and their parents now being enrolled in MaineCare.

Although we have one of the lowest rates of uninsurance among children, seven percent of Maine children under five years of age still lack health insurance, translating to nearly 5,000 young children and infants. For all Maine children under 18 years old, the uninsurance rates are higher (10 percent) among low-income families (those with income under 200 percent of the federal poverty level), even though they are eligible for MaineCare. Uninsurance makes children vulnerable to a myriad of health problems as a result of late detection of illness and a lack of routine periodic well child care checks.

Poverty is perhaps the most widespread factor in Maine with the biggest impact on the health of our youngest residents.

PREGNANCY AND THE PERINATAL PERIOD

The health of infants and young children begins long before birth. Increasingly we recognize that the health of babies is influenced heavily by the health of mothers and fathers in the prenatal and even pre-conception time periods. Moreover, the perinatal period is a critical one. (The perinatal period is defined variously as starting at the 20th to 28th week of gestation and ending one to four weeks after birth).

Prevention of Unintended Pregnancy

Assuring the ability for people to determine the number and spacing of their children, and therefore to decrease the proportion of unintended pregnancies, results in healthier infants and young children. Intended pregnancies are associated with improved prenatal care and infant health, increases in educational and employment opportunities for both parents, and reductions in welfare dependency, child abuse, and neglect. Two effective strategies to reduce unintended pregnancies include assuring access to family planning services and comprehensive family life education in our schools and communities. Family planning in this context means the access to and use of preventive reproductive health care, including contraception. Comprehensive family life education gives the knowledge and skills to make healthy decisions about sexual activity and about accessing family planning services.

In Maine about 40 percent of pregnancies are unintended, a percentage that has increased over the last six years, though it is still lower than in other states. Maine unintended pregnancy rates are higher among those with low income (58 percent for those earning <\$15,000), young parents (75 percent for those under 20), and those with lower education attainment (65 percent for those with less than a high school education).

A key component of reducing unintended pregnancies is the prevention of teenage pregnancies since the vast majority of teenage pregnancies are unintended. Teenage pregnancy is associated with lower levels of educational attainment, higher levels of public assistance, higher rates of poverty, and higher rates of low birth weight babies, neonatal death, sudden infant

death syndrome, and child abuse and neglect. While Maine had one of the highest teen pregnancy rates in the country in the early-mid 1980s, the state saw the steepest decline of this rate in the nation in the 1990s, and the rate has continued to decline over the last 10 years. Maine now has one of the lowest teen pregnancy rates in the country, although these rates are still higher than seen in many developed countries. Maine's success is attributable to the two-pronged strategy of broadening access to effective education and family planning services.

Ongoing federal and state policies are critical to assuring access to family planning, which is effective at reducing unintended and teenage pregnancy rates. Recent federal policies increased support for abstinence-only-until-heterosexual-marriage programs, which are found overall to be ineffective. In fact, federal funds for abstinence-only educational efforts grew by a factor of 20, from \$9 million in 1997 to \$176 million in 2007, almost to the level of funding for federal family planning efforts. Despite these and other challenges from federal policies, Maine has maintained a strong track record of supporting effective family planning strategies. For instance, Maine was one of the first and is currently one of 17 states that have rejected abstinence-only federal funds (though they are granted directly from the federal government to one private organization in Maine). As of 2002 Maine law defines comprehensive family life education as the standard to be taught in public schools (MRSA Title 22, Chapter 406, Sections 1902 and 1910). And Maine is fortunate to have a network of 45 family planning clinics offering family planning services statewide to all people living in Maine, regardless of income, sexual orientation, or gender identification.

Substance Abuse and Tobacco

Alcohol and illicit drug use during pregnancy, even in small amounts, can be harmful to the baby. Substance use is associated with child abuse and neglect, domestic violence, and many other secondary effects on children. In Maine, about one in four post-partum women report they participated in binge drinking more than three times during pregnancy. Anecdotal reports from some physicians in Maine indicate that newborn admissions for narcotic abstinence syndrome due to

maternal drug addiction have increased over the last several years. The Office of Substance Abuse's treatment data confirm large increases over this decade in pregnant women being admitted in Maine for opiate addiction, from a total of 16 in 2000 to 164 in 2008. (See article by Logan et al. this issue for further discussion of maternal drug addiction and its impact on infants.)

Tobacco use during pregnancy is associated with low birth weight. Tobacco exposure in infants and young children is associated with sudden infant death syndrome (SIDS), asthma, ear infections, and pneumonia. In Maine, about one in five new mothers smoke throughout pregnancy. This rate is six times higher (33 percent) for low-income women than for higher-income women (five percent). About 40 percent of low-income new mothers are smoking in the postpartum period. One in 20 Maine newborns is exposed every day to cigarette smoke.

Policies and programs to prevent and treat the use of these substances in families of child-bearing age are important. Maine's share of the National Tobacco Settlement (Fund for a Healthy Maine) provides free counseling and access to medications for those who want to quit smoking through the Maine Tobacco Help Line, along with substance abuse treatment. Maine's Healthy Maine Partnerships work on tobacco and substance abuse prevention initiatives that especially focus on those at high risk. Maine's smoke-free laws directly protect our young children and help smokers to cut down or quit. Currently, Maine's smoke-free laws include virtually all indoor public places and automobiles in which children under age 16 are present. Home visiting and public health nursing offer important education and referrals for substance abuse and tobacco treatment to families of infants and young children.

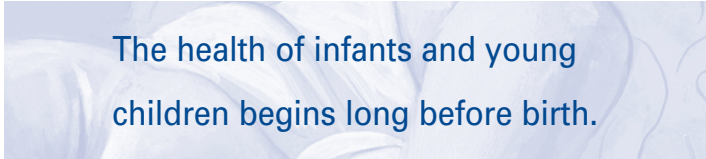
Prenatal Care

Besides assuring that women of child-bearing age and fathers are as healthy as possible, one direct intervention to assure early detection of health problems is ongoing prenatal care. Maine's rate of 87 percent of women receiving prenatal care starting in the first trimester is high relative to other states. Although this rate has stayed fairly steady the past few years, there are some variations within Maine from about 90 percent in Cumberland County and the Midcoast to about 83

percent in the Downeast, Penquis, and Central Maine districts. National data show that a lack of access to adequate prenatal care is associated with poverty, lack of health insurance, transportation difficulties, and family support.

Prematurity/Low Birth Weight

About 11 percent of infants born in Maine are considered premature (birth less than 37 weeks of pregnancy). Although this is lower than the national rate of 13 percent, it increased more than 17 percent between 1995 and 2005. Approximately three-quarters of preterm births occur spontaneously and are associated with such factors as previous preterm births, multiple fetal pregnancy (twins, triplets), and uterine or cervical abnormalities.



The health of infants and young children begins long before birth.

About seven percent of infants in Maine are born with low birth weight, less than 2,500 grams (5.5 pounds), compared with a national rate of about eight percent. Rates of low birth weight in Maine, a major contributing factor to infant mortality and morbidity, have steadily risen since the 1990s, increasing more than 11 percent between 1995 and 2005. Major risk factors for low birth weight include multiple fetal pregnancy, prematurity, maternal smoking, inadequate maternal nutrition, and extremes of maternal age.

Infant mortality, the rate of death among infants between birth and one year of age, is a barometer of the overall health of infants and mothers. Maine experienced lower rates of infant mortality than the U.S. as a whole. Of about 13,000 to 14,000 babies born each year in Maine, an average of 80 will not live to see their first birthday. This translates to a five-year infant mortality rate of 5.6 per 1,000 live births. Three-quarters of these deaths occurred during the neonatal period (first 28 days of life). While Maine's five-year infant mortality rates declined during the 1990s, infant mortality has risen since 2000, mainly from an increase in the neonatal rates.

The most common causes for infant mortality in Maine are congenital anomalies (about one-third), prematurity (about one-quarter), and SIDS (sudden infant death syndrome) (about one-tenth), with the remainder mostly due to pregnancy and labor complications. SIDS is the most common reason for infant death outside of the neonatal period (first 28 days). Deaths due to congenital anomalies have also increased in recent years.

...it is especially important to detect abnormalities with growth and development during [gestation and the first five years of life] since early intervention can successfully address many problems.

Policies and Perinatal Health

Many policies and programs have had a significant impact on perinatal health. Public health nursing in Maine began in 1920 to address the state's high infant and maternal mortality rates. The program continues to address these issues by providing nursing visits and other services to high-risk mothers and babies. Maine's system of home visiting provides voluntary pre- and post-natal home visits to all first time parents and ongoing visits for those at high risk to educate parents about factors that contribute to a family's overall health and link them to needed services.

Although a broad range of federal and state policies affect perinatal health, including most of those mentioned throughout this article, a few are worth special mention. For instance, federal and state policies have led to comprehensive data collection systems that include the extensive health information contained in vital records (abortion, miscarriage, birth, fetal death, death, and marriage certificates), and PRAMS (Pregnancy Risk Assessment Monitoring System), a voluntary survey of about 10 percent of post-partum women. One example of the success of these systems is that analyses of them showed the strong association

between exposure to tobacco smoke and infant stomach sleeping position with SIDS. Resulting awareness campaigns about both contributing factors (such as the "Back to Sleep" campaign) have helped to reduce the number of infant deaths due to SIDS.

State and federal policies led to the development of a system of newborn screening for disorders that if left untreated, would result in cognitive delays, significant health problems, or early death. Maine consistently screens 99 percent of infants born for 32 treatable, congenital, metabolic, and other genetic conditions detectable in the newborn period. The Maine Center for Disease Control's (CDC) genetics program coordinates specialty consultation and treatment within 48 hours of the test results for the infants who are found to have a disorder.

GROWTH AND DEVELOPMENT

The human brain and other organs develop during gestation and the first five years of life more rapidly than any other time. Therefore, it is especially important to detect abnormalities with growth and development during this period since early intervention can successfully address many problems.

Vision and Hearing

Because an infant and toddler's development is dependent on adequate vision and hearing, early detection of problems with these two senses is important. About 150 to 400 infants in Maine do not pass a newborn hearing test, and about four of them are identified with severe hearing impairment every year. One in 20 preschoolers has vision problems. With early screening and interventions, these children can develop normally.

State and federal policies are important to address early detection of vision and hearing problems. In 2000 the legislature passed the Maine Newborn Hearing Law that ensures all parents of children born in hospitals and birthing centers are offered newborn hearing screenings before returning home. Maine statute and rules also require hearing and distant vision screenings in kindergarten and grade one and near vision and binocular vision screening in grade one.

Developmental Disorders

Autism is emerging as one of the most common developmental disorders, occurring in about one in 150 children. A neurological disorder that affects the ability of a person to communicate and interact with others, autism is normally identifiable within the first three years of life. Autism can and should be screened for in all young children since early diagnosis and intervention have been shown to help children to develop. Some other common developmental disorders that can be detected and treated in the early childhood period include nervous system disabilities such as Down and Fragile X syndromes, metabolic disorders such as phenylketonuria (PKU) and hypothyroidism, and degenerative disorders such as Rett syndrome.

Child Development Services (CDS) offers comprehensive developmental screening, early intervention, and special education for children ages birth through age five with a variety of developmental challenges that may otherwise impede their school readiness. Head Start also offers comprehensive services for children living in poverty or with a disability. (See Cobo-Lewis this issue for further discussion of the service system for young children with disabilities.)

INFECTIOUS DISEASES

One hundred years ago one in five babies born in Maine did not live to see their fifth birthday. Today, this number is about one in 800. The main reason for this enormous success is the decrease of infectious diseases affecting mothers and infants. The top causes of infectious disease-related deaths among young children in Maine 100 years ago were diarrhea (most common), influenza and other causes of pneumonia and bronchitis, diphtheria, pertussis (whooping cough), tuberculosis, and meningitis.

Several major factors are responsible for these dramatic declines in lethal infectious diseases. First, improved sanitary conditions in the birthing and perinatal period and throughout our society have lessened the transmission of infectious diseases. Second, the availability of safe drinking water has led to the decline in water-borne infectious diseases. It wasn't

until 1903 that the Maine Board of Health (predecessor to the Maine CDC) gained the legislative authority to regulate public drinking water in Maine. Over the ensuing years Maine's public water supply gradually improved in safety, and as a result, water-borne infections decreased, especially among the most vulnerable—infants and young children. Third, immunizations are one of the top public health successes of the 20th century, resulting in millions of lives saved. Childhood immunizations have eliminated many of the top killers of young children from early in the last century—smallpox, tetanus, diphtheria, polio, several types of bacterial meningitis, measles, influenza, and others. Adult vaccinations such as those against tetanus and influenza have also reduced perinatal disease and deaths among mothers and newborns.

Public health successes—safe drinking water, sanitary conditions, and immunizations—are all the result of policies that set standards, provided regulatory authority, and funded programs to make these successes possible.

CHRONIC DISEASE

Nearly three-quarters of Maine people die from one of four chronic diseases: cancer, cardiovascular disease, diabetes, and chronic lung disease, which are also the major causes of disability and premature death. Although the burden of most of them is seen primarily in adulthood, the disease process can start early in life and reach across the lifespan. It is therefore important to examine policies that have their impact in early childhood to prevent these diseases. Policies related to the behavioral risk factors of tobacco, physical activity, and nutrition hold some of the most direct preventive impact.

Screening for Chronic Diseases in Early Childhood

Increasingly we recognize that some chronic diseases have biological risk factors that are identifiable in early childhood, including high cholesterol, hypertension, and obesity. Current recommendations are for children to be screened starting at age two with a fasting lipid profile blood test if they have a family

history of early cardiovascular disease or of significant risk factors (such as high cholesterol, smoking, obesity) or have an unknown family history. Blood pressure screening is also recommended in early childhood. Obesity screening (which can include determining parental obesity and/or the child's body mass index with percentile determinations by age and gender) should start early in childhood also.

Diabetes

The recent upsurge in diabetes associated with the obesity epidemic is clearly already having an impact on infant health. In 2007, 5.3 percent of births (744 births) were to mothers with gestational or existing diabetes. This is up from 1.7 percent (297 births) just 20 years ago, with a steady increase seen in the years between. Eleven percent of post-partum Maine women report having diabetes during pregnancy (gestational and pre-existing diabetes). Policies related to reducing obesity are discussed elsewhere in this article, but have potential for significantly impacting the diabetes epidemic that is affecting the health of our young children.

Asthma

Asthma is the only major chronic disease with a higher prevalence in children than adults, and Maine has among the highest asthma rates in the country. Approximately 45,000 Maine children have asthma (15 percent), including approximately 5,000 children ages birth to age five (6.5 percent). Those under age five have the highest rates of emergency department visits and hospitalizations. Asthma rates are higher in families living in poverty and in some racial minorities such as in African Americans (Maine CDC 2008a).

A number of policies affect the impact of asthma in early childhood. Federal policies that control air pollution (including ozone production) are especially important to states in the northeastern United States since the jet stream carries asthma-inducing air pollutants here from elsewhere in the country. Other federal and state policies that assure clean outdoor and indoor air are also important, including those that increase use of public transportation, decrease exposure to second-hand smoke, and improve the efficiency of wood-burning and other sources of heat and energy.

ORAL HEALTH

Maine has one of the highest edentulous rates (loss of teeth) in the country among adults. Given that the foundation for adult oral health starts in early childhood, one can consider this adult health indicator to also be a measurement of childhood poor oral health. Although there is a scarcity of oral health measurements among young children, one survey in 2004 showed that one in seven Maine kindergarteners had untreated tooth decay (Governor's Economic Summit on Early Childhood. 2007). Poor oral health in early childhood is found much more commonly among families living in poverty, and its impact is seen throughout an individual's lifetime.

There are two major policy-related strategies that improve the oral health of young children. First, obtaining regular preventive dental health care at an early age is important both for detecting early oral health problems and for preventing them, since these visits are an opportunity for oral hygiene education and preventive cleanings. In Maine about half of all children between the ages of one and five years of age have never been to a dentist (CDC 2003). Many policy-related factors affect this strategy, including shortages of oral health care providers, lack of dental insurance, and low dental care reimbursements. Some current initiatives to improve access to early oral health care include Fund for a Healthy Maine dollars that are used for reimbursing dental care for some uninsured low-income people and for building community dental capacity; the training of pediatricians for some basic preventive oral health care; and the ability for dental hygienists to practice in public health settings.

Second, community water fluoridation is an important and successful population-based intervention that improves the oral health of young children. Although about 80 percent of Maine's public drinking water supplies are fluoridated (all of which were voted by the community, as required by state law), more than half of Mainers, mostly in rural areas, obtain their home drinking water from a private well, which may not have naturally occurring fluoride. It is important for the health of our young children to assure fluoridation of public water supplies and access to supplemental fluoride when indicated.

ENVIRONMENTAL HEALTH

Young children are particularly vulnerable to environmental toxins. They breathe air and consume food and fluids several times more per body weight than adults. Young children are also more susceptible to the harmful effects of many toxicants, especially those that exert their damage disproportionately on developing organs. Yet, of the significantly produced commercial chemicals, nearly three-quarters have undergone little or no toxicity testing. What little testing has been done has focused on adult animals, whose kinetics are different from young, developing animals (Physicians for Social Responsibility 2008).

Lead

Lead poisoning remains one of the major environmental hazards threatening young children in Maine. Given that the paint found in homes built before 1950 accounts for the very vast majority of lead poisoning in U.S. children and that Maine has one of the highest proportions of pre-1950 housing stock, lead poisoning is likely to be a major public health threat to Maine's young children for years to come.

Children under six years of age are at the greatest risk for lead poisoning because lead has a bigger impact on developing nervous systems. Its effects can lead to lifelong physical and developmental disabilities. By state law, all Maine children at ages one and again at two years old are required to have a blood test for lead unless a child does not have MaineCare insurance and if the child is determined by their health care provider's screening to not have any risk factors for lead poisoning. Over the last several years, half of Maine's one-year-olds and one-quarter of Maine's two-year-olds have had such a blood test. Although the annual number of young children identified with elevated blood lead levels has declined over the last five years, there are an estimated 1,000 children under six years of age with lead poisoning. Lead-poisoned children are found throughout the state; however, about 40 percent are in five metropolitan areas (Lewiston/Auburn, Portland/Westbrook, Bangor, Biddeford/Saco, and Sanford), which also have higher rates of lead poisoning among those screened. The

vast majority of lead-poisoned children in Maine are found to have been exposed to lead from household paint, mostly paint found in pre-1950 homes. Low-income and racial minority children are also at higher risk for lead poisoning, mainly because they are more likely to live in pre-1950s housing with deferred maintenance.

Young children are particularly vulnerable to environmental toxins.

Federal and state policies play an especially important role in preventing and detecting lead poisoning. For instance, federal laws that banned lead in residential paint (1978) and greatly reduced its presence in gasoline (1970s-1990s) resulted in large reductions in the overall blood lead levels among American children. Federal Medicaid regulations requiring all young children with Medicaid insurance (MaineCare) to be blood tested for lead (1992) along with subsequent Maine state laws that require screening and appropriate follow up blood testing are associated with increased screening rates among Maine children over the last 15 years. Maine law that requires all blood lead tests to be reported to the Maine CDC assures that all children identified with high levels will have appropriate follow-up, such as medical treatment, home inspection and testing, along with public health nursing visits to help the family mitigate the presence of lead at home. In the future, federal and state policies and resources that assure all high-risk housing is tested and mitigated are our best hope for primary prevention of this ongoing 100+ year old environmental public health threat (Maine CDC 2008b).

Other Environmental Toxins

Other environmental toxins have emerged that also appear to disproportionately affect young children. For instance, because of their developing nervous systems, young children are more affected by forms of mercury, a heavy metal with similarities to lead. In 1999 it was determined that a common preservative found in vaccines, thimerosal, contained ethylmercury,

and was contributing significantly to the mercury exposure in young children. During the subsequent years thimerosal was virtually eliminated from the early childhood vaccine supply. Young children continue to be exposed to methylmercury found in certain fish such as tuna and swordfish. This mercury's origins are thought to be primarily from sources of air pollution (such as coal-fired industrial plants) that produce mercury, which is then carried by prevailing winds and precipitates in cold climates to be taken up in the environment.

Bisphenol-A (BPA), a chemical and endocrine disrupter with possible long-term health effects, is commonly found in some hard plastic food and beverage containers and liners, including that of some baby bottles. Young children appear to have some the highest exposures to BPA because of its use in baby bottles and pre-mixed infant formula liners.

Decabromodiphenyl ether (decaBDE), a brominated flame retardant, is another chemical of concern for young children. Based on animal studies, it is classified as a possible carcinogen (cancer-causing chemical), a likely endocrine disrupter, and as possibly having neurological and reproductive effects. DecaBDE has been detected in human breast milk and urine. One dilemma has been to assure that there are safe alternatives that can provide life-saving fire retardation properties to products such as mattresses and furniture. Several possible alternatives have been identified. As a result, some countries and states such as Maine are moving toward phasing out the use of decaBDE.

INJURY

A review of the major causes of injury in young children gives us three stunning examples. The dramatic successes of motor vehicle policies give us a road map to approach policies and programs that can reduce injuries and deaths. On the other hand, the data on child abuse and neglect indicate an ongoing tragedy that our country and state have not adequately addressed. Finally, falls are an interesting example because of a silent acceptance that can also be affected by effective policies.

Motor Vehicle Crashes

Motor vehicle crashes are the single biggest cause of death in Mainers ages one through five years (and to age 35). These deaths have decreased over the years, from a rate of six per 100,000 for Maine children less than five years old in the early 1980s to 1.4 in the last three years. This dramatic reduction in crash deaths is directly related to policies that assure the safe transport of young children. Federal policies and programs have improved the safety of automobiles and provided funding for states to provide free infant car seats to low-income families. State laws requiring appropriate vehicle restraints for all children (car seats and booster seats), backseat placement for all children under 12 years of age, and primary seat belt laws for adults along with speed and alcohol laws all have improved the safe transport of our children.

The success of these policies is seen in the data. In 1995, one in six Maine children ages birth to four years old was not restrained in a child passenger seat. In a 2007 Maine study, 100 percent of infants (birth to age one), 96 percent of children ages one to four, and 87 percent of four- to seven-year-olds were restrained.

Intentional Injuries and Domestic Abuse

Among infants, the second leading cause of injury hospitalization is assault. In 2007, an astonishing 5,307 children in Maine ages birth to 17 were found to be victims of substantiated abuse or neglect. Forty percent of these, 2,150, were children under five years old. The effects of child abuse can be lifelong and have an impact on many aspects of a person's life. Policies related to the reporting of these crimes, enforcement of laws against perpetrators, treatment of victims, and prevention strategies can have a positive effect on these devastating statistics.

Domestic violence of any sort can affect the health of Maine's young people. Every year more than 7,000 Maine women are physically or sexually assaulted by an intimate partner. One in 20 new mothers in Maine reports experiencing physical abuse around the time of pregnancy. Those mothers reporting abuse are three times as likely to be diagnosed with post-partum depression.

These kinds of stressors in early childhood can affect children through their lifespan, even if they themselves are not victims of abuse. For instance, the Adverse Childhood Experiences (ACE) Study (Felitti et al. 1998) showed an association of stressful childhood experiences (such as witnessing or being victimized by abuse, violence, and substance abuse) with adult risk behaviors and health outcomes such as alcoholism, drug abuse, depression, attempted suicide, smoking, high-risk sexual behaviors, and obesity.

Falls

Falls are the leading cause of injury hospitalization and emergency department visits for children under age five. In the five-year period between 2002 and 2006, more than 16,000 children in Maine were treated in emergency departments due to falls, and an additional 200 were hospitalized. Policies related to safe play-grounds and other places where young children spend time, along with educational efforts about children's developmental stages (what children are capable of at different ages) can help reduce these falls.

MENTAL HEALTH

Mental health of young children is defined as the healthy social and emotional development of young children. Infants and very young children are especially affected by the relationships with their parents and caregivers, including the adults' mental health problems, along with the impact of their environment and any genetic or other biological effects.

In Maine, the annual PRAMS (www.maine.gov/dhhs/bohodr/prams.htm) survey of post-partum women shows the prevalence of a variety of issues that can affect the mental health of infants and young children. For instance, about one in four Maine women report binge drinking at least three times during pregnancy. Of post-partum women with MaineCare insurance, about one in six report at least five major stressors during pregnancy, such as inability to pay some bills, inability to buy enough food, job loss, physical abuse by a partner, moving to a new address, homelessness, drug or drinking problems in the household, and death of or major illness in a family

member. About one in seven post-partum women in Maine has been diagnosed with depression by a health care provider, and this rate rises to one in five for low-income women.

Several sources of health data on Maine children indicate high rates of behavioral health issues relative to other states. For instance, according to the National Survey of Children with Special Health Needs, Maine has high rates of children with special health needs (18 percent) relative to the country (14 percent), which appear to be due to high rates of behavioral health diagnoses such as attention deficit disorder and high rates of asthma (<http://cshcndata.org/Content/StatePrevalence2005.aspx?geo=Maine>). Medicaid (MaineCare) claims data in Maine also indicate high claims related to behavioral health diagnoses among Maine children.

Fortunately, effective early interventions to promote healthy social and emotional development and to prevent and treat mental health problems can have lifelong positive effects. Such programs and policies include public education and awareness campaigns that promote healthy social and emotional development in early childhood, family leave policies, safety net financial programs that protect families with young children from extreme poverty, home visiting programs, Early Head Start, foster care and treatments to address the stressors foster children have encountered, interventions to prevent and treat parental behavioral health problems, and laws that protect children from abuse.

PHYSICAL ACTIVITY AND NUTRITION

Nutrition and physical activity habits seen in early childhood set the stage for related successes and challenges throughout the lifetime, and therefore warrant special attention by policymakers.

Growth retardation and malnutrition were once the major nutritional challenges facing our young children. Although food insecurity with resulting hunger and malnutrition continue to challenge too many families with young children, often food insecurity today results in poor nutrition with fatty and sugary foods and sugary beverages, with resulting obesity. The heavy marketing of relatively unhealthy foods to young chil-

dren and families, the lower costs of many relatively unhealthy foods and beverages over healthier choices, and the time investments it takes for overly busy families to cook are all factors that contribute to the uphill battle families with young children face when trying to make healthy food-purchasing decisions.

Physical activity, the other side of the calorie equation (calories expended versus calories ingested), also poses challenges to families with young children. With most parents of young children working and with our environments no longer making it easy to exercise, it is increasingly challenging for parents and children to get adequate exercise.

Thirty-six percent of Maine kindergartners are obese, a higher rate than seen in older children.

Maine data show the results of these physical activity and nutritional challenges. Thirty-six percent of Maine kindergartners are overweight or obese, a higher rate than seen in older children. (And about 60 percent of Maine adults are overweight or obese.) Some of the factors associated with childhood obesity are poverty and obesity in one or both parents. Obesity rates among Maine young adults (18-34), i.e., those who are most commonly becoming parents, have more than doubled in just 10 years. More than one-third (37 percent) of pregnant women in Maine are overweight or obese, and this rate is higher (42 percent) among low-income pregnant women (www.maine.gov/dhhs/bohodr/prams.htm).

Breastfeeding in infancy is one of the best nutritional strategies for the health of infants and young children, including helping to prevent obesity and to boost infant immune systems. Breastfeeding in Maine ranks about average in the U.S., though we have slightly lower rates of ever breastfeeding and of breastfeeding at six months of age (www.cdc.gov/BREASTFEEDING/DATA/report_card2.htm). Low-income Maine women are less likely to have ever breast fed than higher income women (69

percent vs. 87 percent). The most common reasons for stopping breastfeeding include the belief that breastfeeding is insufficiently feeding the baby and difficulties with breastfeeding (www.maine.gov/dhhs/bohodr/prams.htm).

Programs and policies to address nutritional needs of pregnant women and young children include WIC (Women, Infants and Children), a public health program that provides food, nutrition counseling, health screenings, and access to health services to low-income women and young children and young children (birth to age five) with nutrition risks. Originally created to address malnutrition, the program is undergoing changes in its food package to also address obesity-related poor nutrition that disproportionately affects low-income families. Studies show that WIC reduces medical costs and improves a number of important health outcomes in infants and young children.

Other programs and policies to address the physical activity and nutritional needs of young children include those that change the built environment (such as adding sidewalks, especially in low-income neighborhoods); educate young families on how to make healthy nutrition and physical activity choices; make healthy foods and beverages and physical activity options less expensive for low-income families; and encourage breastfeeding. The long-standing federal policies that resulted in the addition of folic acid and iodine to the food supply are other examples of ongoing successes that positively affect the health of pregnant women and infants.

DISCUSSION: WHERE DO WE GO FROM HERE?

Maine and the nation have been successful in many aspects of children's health, but challenges remain in a number of areas, and new challenges are arising.

Infant Mortality

Despite the U.S. being considered the wealthiest country and a world leader in many areas, in early childhood health, we lag behind. Our infant mortality ranks 33rd, after countries in almost every corner of the world—Australia, Canada, the European Union, Singapore, and Japan (United Nations 2007). Our

mortality rate for children birth to age five similarly ranks 36th. These countries also give us a road map to improve the health of our young children, and ironically, it's the same road map the U.S. helped to develop early in the last century, with investments in maternal and child health and support for families with young children.

In response to the state's rising infant mortality rates, about two years ago the Maine Infant Maternal Mortality Review Panel was formed to do in-depth reviews of infant deaths in order to identify common and preventable contributory factors. It is modeled after the long-standing Maine Child Review Death Panel. Analysis of their first reviews is expected in the coming year.

Growth and Development, Early Intervention

A number of issues need to be addressed in the areas of growth and development and early identification of children with developmental disorders. Policies are important for tracking, research, early detection, and intervention of developmental issues. As noted previously, Maine law enables the Maine CDC to offer bloodspot testing and to provide referrals and follow up on all newborns for 32 metabolic and genetic conditions. There are also policies providing for hearing screening for newborns and hearing and vision screening for children in kindergarten and first grade. A gap that needs to be remedied is the lack of any policy or program supporting pre-school vision and hearing screening. Screening and early intervention for autism is another process that needs improvement. Although developmental screening is a standard part of a well child check, the screening for autism has not yet been fully adopted. Maine is working to integrate this screening into the policies of payers and into the education of physicians and other health care providers.

Cobo-Lewis (this issue) notes that there can be a lack of coordination between various systems serving young children with disabilities. Recommendations from a recent report of the Subcommittee to Study Early Childhood Special Education resulted in changes to Maine law that mandate referrals to Children's Development Services based on the CDC's screening results in their bloodspot testing, newborn hearing,

and birth defects surveillance programs (Cobo-Lewis this issue).

Infectious Diseases

Sanitation and clean drinking water had a dramatic impact in reducing mortality among infants and young children, along with the general population. Today, however, many of our public drinking water supplies are more than 100 years old and need repairs to maintain safe water for a growing population. Adequate funding from state, federal and local sources is needed for these repairs and upgrades.

Successes in immunizations face many policy-related challenges. The U.S. is one of the few developed countries without sufficient federal oversight to ensure adequate manufacturing and distribution of vaccinations. Vaccine availability is dependent on each state's policy and funding abilities. In a number of states, costs are a barrier for many patients. Misinformation about the risks of vaccines, with resulting parental fears about them, has grown these past few years. Because of the success of vaccines, the diseases they prevent are often rare or nonexistent in the U.S. Concerns about the vaccines, however, are far more common than the deadly diseases they prevent. The number of shots given to young children is also a barrier for some parents. The pandemic with the new H1N1 ("swine flu") is disproportionately affecting children, young adults, and pregnant women. Challenges with mitigating and delivering vaccine to address this pandemic are pointing out the weaknesses in our policies on infectious diseases. One can hope that the experiences of this pandemic will result in improved policies.

Chronic Diseases

Some chronic diseases have biological risk factors that are identifiable in early childhood (e.g., high cholesterol, hypertension, and obesity). However, screening for these risk factors is not fully incorporated into the health care system. To assure such screenings are done more routinely, it is important that there be effective policies within health settings and related government agencies, such as policies that all children should be screened and inclusion of the screening on well child care forms, and adequate health care provider reimbursement for the services. Effective prevention

of chronic diseases also starts in childhood and is the result of federal, state, and community policies resulting in easier access to healthy nutrition, physical activity, and tobacco-free life at school, at home, and throughout a child's community.

Some of the most remarkable progress in health over the past 100 years includes measures that affect early childhood.

Environmental Health

Lead, mercury, BPA, and decaBDE all provide examples of the importance of federal and state policies for protecting young children from environmental toxins. Policies have been instrumental in providing the necessary research, in regulating or banning the use of these chemicals, or in mitigating their effects. A number of environmental health experts, however, believe the U.S. should adopt the precautionary principle as a policy approach to commercial chemicals, as is being done in some other countries including the European Union. This precautionary principle would assure that research is done up front so that the proposed use of a chemical will not result in significant harm or that potential harm is minimized. Proponents say that this approach assures the health of our entire population better than the current approach of determining if harm has occurred only after perhaps years of exposure. Some argue that the precautionary principle will help avoid another tragic legacy like lead poisoning.

Networks and Systems

Maine is fortunate to have several strong statewide networks that work on issues affecting the health of infants and young children. These include: the statewide systems of family planning clinics and community outreach; home-visiting programs; Healthy Maine Partnerships (our statewide system of comprehensive community health coalitions); Child Development Services (CDS); a network of health centers, pediatric practices, hospitals and health systems; dental clinics;

Maine CDC District Public Health Units within DHHS Offices that include field epidemiologists and public health nurses; community health nursing; child abuse and neglect councils; Communities for Children and Youth; WIC; Maine's Department of Health and Human Services (DHHS) social services Future Search councils, and Community Service Networks.

To maintain past successes and address current challenges, a concerted, coordinated, and ongoing effort is needed to work with such a myriad of systems and factors affecting the health of infants and young children. One strategy to strengthen Maine's public health and some social service systems has been the creation of and improved coordination in the eight DHHS districts. With emerging coordinating bodies such as the co-location of Maine CDC regional staff in District Public Health Units, the District Coordinating Councils for Public Health, the child-focused Future Search District Initiatives, and the mental health-focused Community Service Networks, there have been recent improvements in and are ongoing opportunities to improve coordination, efficiency, and effectiveness of all the systems.

Because disparities are common, even in some of our successful outcomes and areas of the state, it is also important that all our systems address populations at risk or already facing disparities, along with the overall indicators.

CONCLUSION

Some of the most remarkable progress in health over the past 100 years includes measures that affect early childhood. These successes were primarily the result of coordinated, focused, and evidence-based investment in maternal and child health, yet the entire population reaped the benefits. We know from these successes that it is possible for all children in Maine to begin with a healthy start. With a focused investment on early childhood and coordination of existing programs, we can assure that all babies born are wanted and born to families who are able to feed, house, and clothe them. And, each of these children will have the support of their family, community and health system. This is how our village of Maine can assure that all are

born equal, free, and with a chance to pursue their full measure of happiness. This is how our village of Maine can touch the future. 🐟

ACKNOWLEDGMENTS

Special thanks to Erika Lichter and Brenda Corkum from the Maine CDC for compiling many of the data used in this article.

REFERENCES

- Acheson, Ann. 2009. "Family Economic Security." *Maine Policy Review* 18(1): 34–45.
- Brooks-Gunn, Jeanne and Greg J. Duncan. 1997. "The Effects of Poverty on Children." *The Future of Children* 7(2): 55–71.
- Centers for Disease Control. 2003. 2003 National Survey of Children's Health. CDC, Atlanta. <http://www.cdc.gov/nchs/slaits/nsch.htm> (Accessed December 2, 2008)
- Cobo-Lewis, Alan B. 2009. "Interdepartmental Coordination for Maine's Young Children with Disabilities." *Maine Policy Review* 18(1): 68–81.
- Connors, Dana F. 2009. "Investing in Maine's Youngest Children Has Great Returns for Business." *Maine Policy Review* 18(1): 26–29.
- Felitti, Vincent J, Robert F. Anda, Dale Nordenberg, David F. Williamson, Alison M. Spitz, Valerie Edwards, Mary P. Koss and James S. Marks. 1998. "Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults, the Adverse Childhood Experiences (ACE) Study." *American Journal of Preventive Medicine* 14(4): 245–258.
- Governor's Economic Summit on Early Childhood. 2007. *Early Childhood in Maine: A Compilation of Statewide Data*. Governor's Economic Summit on Early Childhood, Augusta, ME. <http://www.maine.gov/dhhs/boh/phdata/Non%20DHP%20Pdf%20Doc/Early%20Childhood%20in%20Maine.%20A%20Compilation%20of%20Statewide%20Data.pdf> [Accessed September 20, 2009]
- Logan, Beth A., Marie J. Hayes, Mark S. Brown, Paul Tisher, Jonathan A. Paul and Ramesh Krishnan. 2009. "Maine's High Risk Infants and Maternal Health and Wellbeing: The Maine Infant Follow-Up Project." *Maine Policy Review* 18(1): 60–67.
- Maine Center for Disease Control and Prevention (CDC). 2008a. *Burden of Asthma in Maine, 2008*. Maine CDC, Augusta. <http://www.maine.gov/dhhs/bohdcfh/mat/Information%20and%20Publications/2008%20Asthma%20Burden%20Report.pdf> [Accessed September 19, 2009]
- Maine Center for Disease Control and Prevention (CDC). 2008b. *Childhood Lead Poisoning in Maine, 2008 Update*. Maine CDC, Augusta. <http://www.maine.gov/dhhs/eohp/documents/LeadinMe2008.pdf> [Accessed September 20, 2008]
- Physicians for Social Responsibility. 2008. *Pediatric Environmental Health Toolkit: Key Concepts in Pediatric Environmental Health*. Physicians for Social Responsibility, Washington, DC. <http://www.psr.org/assets/pdfs/toolkit-key-concept-08.pdf> [Accessed September 19, 2008]
- Trostel, Philip. 2009. "The Dynamics of Investments in Young Children." *Maine Policy Review* 18(1): 18–25.
- United Nations. 2007. *World Population Prospects: The 2006 Revision*. United Nations, New York. http://www.un.org/esa/population/publications/wpp2006/WPP2006_Highlights_rev.pdf [Accessed September 20, 2009]



Dora Anne Mills is the public health director for Maine and serves as the director of the Maine Center for Disease Control and Prevention (Maine CDC) in the Department of Health and Human Services. Before taking this position in 1996, she did her medical pediatric training and worked in Los Angeles, did volunteer work in Tanzania, and practiced medicine in her hometown of Farmington. She is also the mother of two young children.