



# Healthy Generations

Maternal & Child Health Program  
School of Public Health

Oral Health

UNIVERSITY OF MINNESOTA

Volume 7: Issue 1  
October 2006

## Healthy Smiles for Every Child: Enhancing Children's Oral Health

Diane Benjamin, MPH

### Inside this Issue:

- 4** Can Improving Maternal Oral Health Reduce Preterm Birth?
- 6** Changing Policies, Improving Dental Health: Reducing Soft Drink Sales at School
- 8** Low Income Children Have Difficulty Accessing Dental Care
- 9** Minnesota Head Start Takes Action for Oral Health
- 11** Bringing Smiles to Children in St. Paul and Ramsey County

*"Although dental problems don't command the instant fears associated with low birth weight, fetal death or cholera, they do have the consequence of wearing down the stamina of children and defeating their ambitions. Bleeding gums, impacted teeth, and rotting teeth are routine matters for the children I have interviewed in the South Bronx. Children get used to feeling constant pain. They go to sleep with it. They go to school with it. Sometimes their teachers are alarmed and try to get them to a clinic. But it's all so slow and heavily encumbered with red tape and waiting lists and missing, lost or canceled welfare cards, that dental care is often long delayed. Children live for months with pain that grown-ups would find unendurable. The gradual attrition of accepted pain erodes their energy and aspiration."*

*- Jonathan Kozol, Savage Inequalities: Children in America's Schools*

Early childhood caries (ECC) is an infectious disease. The bacterium *Streptococcus mutans* is transmitted from the saliva of mothers or other primary caregivers during close, personal contact, such as kissing a baby.<sup>1</sup> ECC can begin at any point after teeth erupt, progresses rapidly, and can have a lasting impact not only on oral health but on children's overall health, leading to problems with speech and communication, nutrition, pro-



Greater Twin Cities United Way Bright Smiles Program

ductivity, and quality of life. Children with ECC may also be very susceptible to developing caries in the future. Restorative treatment for infected teeth is extremely expensive compared to the cost of prevention, especially since young children generally require sedation under general anesthetic for major dental work, while the costs of preventive treatments are quite modest.<sup>2</sup>

Typically, dental care for children is provided by dentists, working with dental assistants or hygienists in solo practices, and their focus is on treating dental problems rather than oral health promotion. Dentists can choose which patients and payment types they will accept. Many practicing dentists have little training in pediatric

*Continued on page 2*

### Back Page:

Dates for upcoming Twin Cities' Conferences

[www.epi.umn.edu/mch](http://www.epi.umn.edu/mch)

The topic of this issue of Healthy Generations is oral health, with a special focus on children, youth, and pregnant women. Oral health often exists in a separate domain from other physical health issues. However, the health of teeth and gums is deeply entwined with the overall health of children and youth, and is associated with preterm births and low birth weight. Many simple, cost-effective interventions are available, and prevention is possible. However, our current system of service delivery is fragmented; the dental public health infrastructure is weak; dental health care is often unavailable to the lowest-income (and most at-risk) populations; and promotion of tooth-harming products such as soda pop continue to erode efforts to improve oral health.

Due to space constraints, this newsletter can only offer a brief survey of available research and information about oral health, but several excellent MCH resources are available and referenced throughout the publication. I hope you find this topic compelling and timely, and will use this newsletter to further the cause of improved oral health for MCH populations.

Our next issue of Healthy Generations will focus on the health of American Indian communities. If you have comments, questions or concerns, please let us know. We like to hear from you!

Diane Benjamin, MPH

dentistry, and may be uncomfortable working with young children as patients.<sup>3</sup> In addition, there is a decrease in the number of dentists per capita, a projected decrease in the overall number of dentists, and a lack of racial and ethnic diversity among incoming dental students, all factors which impact the care available for children.<sup>4</sup> Low-income families frequently have difficulty finding and paying for dental care. (See related article on page 8.)

## Overview of Children's Oral Health in the US

What is the status of children's oral health in the United States? A 2005 CDC surveillance system report indicates that,

- 68% of children ages 15-19 have decay in their permanent teeth.
- 41% of children under age 11 have tooth decay in their primary (or baby) teeth.
- 21% of children have untreated decay in their primary teeth.

However, some trends in oral health for older children are moving in the right direction. From 1994 to 2004, the prevalence of tooth decay in permanent teeth of children and adolescents decreased by 15%. Sealant use on permanent teeth increased by 64%.<sup>5</sup>

In the 2003 National Survey of Children's Health, parents reported that preventive dental care for children is also lacking.

- 28% of children had not visited a dentist in the past year for preventive care. Only 10% of one year olds, 24% of two year olds and 50% of three year olds had a preventive dental visit in the past year, despite guidelines suggesting that a first dental visit occur when a child's first tooth is visible.
- 31% of those who had no preventive dental care cited lack of insurance as a barrier and 29% cited cost. (Respondents could select more than one factor.)<sup>6</sup>

While ECC and other oral health concerns are a problem for the entire child population, they pose an especially large burden for low-income children as well as African American and Hispanic children. It is estimated that 25% of children and youth experience 80% of all decay occurring in permanent teeth.<sup>7</sup> Over half of children from families whose income is below the poverty line had decay in their primary teeth, compared with less than a third of children from higher income families. More than one-third of poor children had untreated decay, compared to 21% of higher income children.<sup>8</sup> In addition, the condition of children's teeth was identified as significantly worse for both African American and Hispanic children than for white children in the National Survey of Children's Health.<sup>9</sup>

## Oral Health and Children with Special Health Care Needs (CSHCN)

CSHCN have additional risk factors that work against optimal oral health. Medications and certain medical conditions may reduce saliva production, increasing the risk for

dental caries. They may need to frequently consume highly-sweetened medications. They may have problems with oral motor functioning, such as excessive tooth grinding,<sup>10</sup> as well as physical or mental impairments that make oral hygiene more challenging.<sup>11</sup> Dentist offices may not be physically accessible, and some dentists decline to care for CSHCN due to bias and lack of experience.<sup>12</sup>

The 2001 National Survey of CSHCN found that dental care was the second most common health need (after prescription drugs), but the most frequent unmet health need. Over 10% of children who needed care were not receiving it. This rate was even higher for low-income children in the survey.<sup>13</sup>

## Children's Oral Health Interventions

### Fluoridated water

One of the most successful preventive interventions to reduce dental caries in children is fluoridation of community water supplies. It is estimated that fluoridated water reduces dental caries by 20-40%. It is also very cost effective, ranging from as little as 50 cents per person per year for large urban communities to \$3 per person per year for smaller communities.<sup>14</sup> About two-thirds of the US population who use public water systems receive fluoridated water.<sup>15</sup> Those who drink well water or some sources of filtered or bottled water may not be receiving fluoride through their drinking water source. Although 60 years of scientific research supports both the safety and effectiveness of fluoridated water, some public opposition remains, and not all public water systems in the United States are fluoridated.

### Treating teeth

ECC can be prevented by treating children's teeth directly with dental sealants or fluoride varnish. A dental sealant is a thin plastic film painted on the chewing surfaces of permanent molars and premolars. Sealants are highly effective in preventing dental caries. About 23% of all children have dental sealants, although as few as 3% of low-income children have them.<sup>16</sup> School-based sealant programs are successful, reducing caries by 60% among participating 6-17 year olds.<sup>17</sup>

Fluoride varnish is a lacquer containing 5% sodium fluoride that is painted on teeth. It appears to stop bacterial activity and reduce dental plaque, especially in young children. A recent study found that low-income children who had fluoride varnish treatments every six months and whose caregivers received counseling about dental care were almost four times less likely to have dental caries than children who received no fluoride varnish treatments but whose caregivers received dental care counseling.<sup>18</sup> Fluoride varnish is easy to apply, does not require special equipment or extensive training, is inexpensive, and is well-tolerated by very young children.<sup>19</sup> A recent study found that fluoride varnish treatments can be successfully integrated into pediatric medical practice settings.<sup>20</sup>

### Changes in delivery of preventive dental care

Another key intervention to improve children's oral health is to restructure the settings and providers of preventive dental care services. This includes improved surveillance by state public health agencies so that resources can be targeted appro-

privately,<sup>21</sup> expansion of basic screening for ECC by non-dental health professionals,<sup>22</sup> and better utilization of dental hygienists in treatment provision, including revisions to state dental practice laws and reimbursement practices.<sup>23</sup> Many states have been moving aggressively in this direction, and the Maternal and Child Health Bureau is funding a partnership with the Association of State and Territorial Health Directors to improve state oral health leadership.<sup>24</sup>

## Caring for CSHCN

There are many ways to improve the oral health of CSHCN. Specific recommendations include: developing a medical home that promotes oral health; increasing dental insurance coverage; including oral health screening by non-dental health professionals in early intervention programs; including oral health in the larger system of care for children with special health care needs; and providing training and support for parents.<sup>25</sup>

## References

- Kohler B, Brathall D, Krasse B. Preventive measures in mothers influence the establishment of *Streptococcus mutans* in their infants. *Arch Oral Biol* 1983;28:225-231.
- Bertness J, Holt, K. Promoting awareness, preventing pain: facts of early childhood caries. Washington, DC: National Maternal and Child Oral Health Resource Center, Georgetown University, 2004.
- Gehshan S, Straw T. Access to oral health services for low-income people—policy barriers and opportunities for intervention. National Association of State Legislatures, October 2002. Available from: <http://www.oralhealthamerica.org/pdf/NCSLReport.pdf>
- Valachovic RW. Dental workforce trends and children. *Ambul Pediatr* 2002;2suppl:154-161.
- Beltrán-Aguilar ED, Barker LK, et al. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis. *MMWR Surveill Summ* 2005;54(03):1-44.
- US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. The National Survey of Children's Health 2003. Rockville, Maryland: US Department of Health and Human Services, 2005.
- Berness J, Holt K. Dental sealant resource guide, second edition. Washington DC: National Maternal and Child Oral Health Resource Center, Georgetown University, June 2006.
- Beltrán-Aguilar ED, Barker LK, et al. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis. *MMWR Surveill Summ* 2005;54(03):1-44.
- US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. The National Survey of Children's Health 2003. Rockville, Maryland: US Department of Health and Human Services, 2005.
- National Institute of Dental and Craniofacial Research. Practical oral care for people with developmental disabilities: making a difference. Available from: <http://www.nidcr.nih.gov/HealthInformation/DiseasesAndConditions/DevelopmentalDisabilitiesAndOralHealth/ContinuingEducation.htm>
- American Academy of Pediatric Dentistry. Clinical guideline on management of persons with special health care needs. Chicago: American Academy of Pediatric Dentistry, 2004. Available from: [http://www.guideline.gov/summary/summary.aspx?ss=15&doc\\_id=6269&nbr=402](http://www.guideline.gov/summary/summary.aspx?ss=15&doc_id=6269&nbr=402)
- Casamassimo P. Pediatric oral health interfaces background paper: children with special health care needs; patient, professional and systems issues. Available from: <http://www.cdhp.org/downloads/Interfaces/Interfaces%20special%20health%20care.pdf>
- Lewis C, Robertson A, Phelps, S. Unmet dental care needs among children with special health care needs: implications for the medical home. *Pediatrics* 2005;166:3.
- American Dental Association. Fluoridation facts, 2005. Available from: [http://www.ada.org/public/topics/fluoride/facts/fluoridation\\_facts.pdf](http://www.ada.org/public/topics/fluoride/facts/fluoridation_facts.pdf)
- Centers for Disease Control and Prevention, Division of Oral Health. Fluoridation statistics 2002: status of water fluoridation by state. Available from: [http://www.cdc.gov/fluoridation/factsheets/states\\_stats2002.htm](http://www.cdc.gov/fluoridation/factsheets/states_stats2002.htm)
- Berness J, Holt K. Dental sealant resource guide second edition. Washington, DC: National Maternal and Child Oral Health Resource Center, Georgetown University, June 2006.
- The Association of State and Territorial Health Officers. The guide to community preventive services fact sheet: oral health. June 2005. Available from: <http://www.astho.org/pubs/CommunityGuide-OralHealth.pdf>
- Weintaub, JA, Ramos-Gomez F, et al. Fluoride varnish efficacy in preventing early childhood caries. *J Dent Res* 2006;85(2):172-176.
- Hawkins R, Noble J, et al. A comparison of the costs and patient acceptability of professionally applied topical fluoride foam and varnish. *J Public Health Dent* 2004;64(2):106-10.
- Lewis C, Lynch H, Richardson L. Fluoride varnish use in primary care: what do providers think? *Pediatrics* 2005;115(1):e69-e76.
- Association of State and Territorial Health Officials. Issue brief: integrating MCH and oral health programs to improve health. Washington, DC: November 2005.
- dela Cruz GG, Rozier RG, Slade G. Dental screening and referral of young children by pediatric primary care providers. *Pediatrics* 2004;114(5):e642-52.
- Nolan L, Kamoie, JD et al. The effects of state dental practice laws allowing alternative models of preventive oral health care delivery to low-income children. Washington, DC: Center for Health Services Research and Policy, 2003.
- National Maternal and Child Oral Health Resource Center. MCHB-funded projects. Available from: <http://www.mchoral-health.org/Projects/index.html>
- Blazer, J. Promoting the oral health of children with special health care needs – in support of the national agenda. Washington, DC: The Association of State and Territorial Dental Directors and the National Maternal and Child Oral Health Resource Center, Georgetown University, 2006.

**Diane Benjamin, MPH, is the Director of Community Outreach for the Center for Leadership Education and Child Public Health**





# Can Improving Maternal Oral Health Reduce Preterm Birth?

See Moua

Recent studies show that dental caries and periodontal disease in pregnant women, particularly in the second trimester of pregnancy, are risk factors for preterm birth. The bacterium present in dental caries and periodontal disease is believed to be a factor contributing to preterm birth.

Preterm birth, generally defined as delivery before 37 complete weeks of gestation, continues to be a major public health problem. Despite intense medical and public health interventions to reduce preterm births, the rate has increased over the past two decades. Preterm births now account for 12.5% of all US births. Preterm births and the associated condition of low birth weight, (defined as a weight of less than 2500 grams or 5.5 pounds), are the major causes of neonatal mortality. Among those who survive, they are major contributors to long-term disability, including neuro-developmental problems, respiratory problems, congenital anomalies, and behavioral problems. It is estimated that over \$17 billion is spent each year in medical expenses for the care of these infants.<sup>1</sup>

Many factors affect the preterm birth rate such as the growing use of fertility drugs resulting in more multiple births, more pregnancies at older maternal ages, maternal smoking, and physicians' improved ability to successfully deliver infants from high-risk pregnancies.<sup>1</sup> Now, pregnant women's oral health is emerging as another risk factor.

Periodontal diseases are serious bacterial infections that destroy the attachment fibers and supporting bone that hold the teeth in place. When the attachment fibers are destroyed, gums separate from the teeth, forming pockets that fill with plaque which contributes to more infection. As the disease progresses, teeth eventually become loose and fall out.<sup>2</sup>

Maternal periodontal disease and the worsening of the disease during pregnancy, due to increases in hormonal levels which cause the gums to be extra sensitive, are significant contributors to the risk of preterm delivery, low birth weight and low weight for gestational age. In a case-control study of 124 mothers who were pregnant or had recently delivered, researchers found that after controlling for other variables, women with periodontal disease were seven times more likely to have preterm low birth weight babies than women not affected with the disease.<sup>3</sup> Another study found that periodontal disease in mothers older than age 25 was statistically associated with a reduction in infant birth weight.<sup>4</sup> Results of a five-year prospective study of 1,313 women also support these findings. Women with the most advanced periodontal disease had the greatest risk of giving birth at less than 32 weeks.<sup>5</sup>

In another study, high levels of oral bacterium associated with dental caries were found in the amniotic fluid and amniotic membranes of low birth weight babies and babies born

prematurely. Each unit of increase in bacterial levels was associated with a 60 gram decrease in birth weight and a 1.19 day decrease in the length of the pregnancy.<sup>6</sup> Researchers speculate that oral bacteria responsible for causing periodontal diseases, tooth decay and cavities travel to the uterus as transient bacteria. Once in the uterus, the bacteria and the molecules that the body produces in response to them lead to uterine contractions and cervical dilation. When the cervix becomes dilated, more bacteria enter and eventually cause the uterine membranes to rupture and preterm birth to occur.<sup>6</sup>

The association between oral health and preterm birth may be especially important for African American women. Studies show that even after controlling for factors such as socioeconomic status, age, and smoking habits, African Americans are twice as likely as non-Hispanic whites to have periodontal disease.<sup>7</sup> Since African American infants are twice as likely as infants of nearly all other U.S. ethnic/racial groups to be premature and low birth weight,<sup>8</sup> this connection should be explored further.



While studies have found statistically significant correlations between periodontal disease and low birth weight babies, it is still unknown whether periodontal disease is a cause of preterm births. To explore this, studies are being conducted to see if treatment of periodontal disease will reduce the risk of preterm birth. Results of a pilot intervention study, for instance, show that periodontal treatment is not only safe, but that it can lead to a 5-fold reduction in rates of prematurity. Effective periodontal treatments include scaling and root planing, a special type of treatment that goes deeper below the gum line to remove contaminated debris, pus, and bacteria,<sup>9</sup> and plaque control instructions, a daily program to remove the plaque that forms on the teeth.<sup>10</sup> A large intervention study is currently underway at four sites, including Hennepin County Medical Center in Minneapolis,

to further investigate the effectiveness of scaling and root planing on reducing the incidence of low birth weight and preterm births. (More information about this study is available at <http://www.clinicaltrials.gov/ct/show/NCT00066131?order=1>.)

Although research on effective interventions is incomplete, researchers suggest that women contemplating pregnancy should prevent oral disease from developing, and pregnant women should seek care from dental professionals as soon as possible to improve oral health and contribute to healthy birth outcomes.

*Continued on next page*

## References

1. Behrman RE, Stith Butler A, Eds. Preterm birth: causes, consequences, and prevention. Washington, DC: Institute of Medicine, The National Academies, 2006.
2. American Academy of Periodontology. Periodontol (gum) diseases. Available from: <http://www.perio.org/consumer/2a.html>
3. Offenbacher S & Beck J. Periodontal infection as a possible risk factor for preterm low birth weight. *J Periodontol* 1996;67:1103-1113.
4. Marin C, Segura\_Egea JJ, Martinez-Sahuquillo A, and Bullon P. Correlation between infant birth weight and mother's periodontal status. *J Clin Periodontol* 2005; 32:299-304.
5. Jeffcoat MK, Guers NC, Reddy MS, et al. Periodontal infection and preterm birth: results of a prospective study. *J Am Dent Assoc* 2001;132(7):875-880.
6. Dasanayake, AP, Yihong L, Wiener H, Ruby JD, and Lee M. Sali vary *Actinomyces naeslundii* Genospecies 2 and *Lactobacillus casei* levels predict pregnancy outcomes. *J Periodontol* 2005;76(2):171-177.
7. Borrell LN, Taylor GW, Borgnakke WS, Woolfolk MW, and Nyquist LV. Perception of general and oral health in white and African American adults: assessing the effect of neighborhood socioeconomic conditions. *Community Dent Oral Epidemiol* 2004;32(5):363-373.
8. Reagan PB & Salsberry PJ. Race and Ethnic differences in determinants of preterm birth in the USA: broadening the social context. *Soc Sci Med* 2005;60(10):2217-2228.
9. Jeffcoat MK, Hauth JC, Geurs NC, et al. Periodontal disease and preterm birth: results of a pilot intervention study. *J Periodontol Res* 2003;74:1214-1218.
10. Lopez NJ, Smith PC, Gutierrez J. Periodontal therapy may reduce the risk of preterm low birth weight in women with periodontal disease: a randomized controlled trial. *J Periodontol* 2002;73(8):911-924.

See Moua is an MPH student in the MCH Program.

## Healthy People 2010 Goals

Through its Healthy People 2010 Initiative, the federal government has set many national goals to improve the oral health of children and youth. Some of the goals related to oral health include:

21-1 Reduce the proportion of children and adolescents who have dental caries experience in their primary or permanent teeth.

21-2 Reduce the proportion of children and adolescents with untreated dental decay.

21-8 Increase the proportion of children who have received dental sealants on their molar teeth.

21-9 Increase the proportion of the US population served by community water systems with optimally fluoridated water.

21-10 Increase the proportion of children who use the oral health care system every year.

21-12 Increase the proportion of low-income children and adolescents who received any preventive dental service during the past year.

21-13 Increase the proportion of school-based health centers with an oral health component.

21-14 Increase the proportion of local health departments and community-based health centers, including community, migrant, and homeless health centers, that have an oral health component.

21-17 (Developmental) Increase the number of Tribal, State (including the District of Columbia), and local health agencies that serve jurisdictions of 250,000 or more persons that have in place an effective public dental health program directed by a dental professional with public health training.

All of the oral health goals from Healthy People 2010 are available at: <http://www.healthypeople.gov/Document/HTML/Volume2/21Oral.htm>

## Web-Based Resources on Oral Health

American Academy of Pediatric Dentistry <http://aapd.org>. Provides information on oral health in infants, children, adolescents, and people with special health care needs. Provides links to dental organizations and pediatric dental programs.

American Dental Association <http://www.ada.org> The professional association of dentists committed to public oral health. Contains information, programs and products for dental professionals; and oral health news and information, interactive learning tools, career resources and more for consumers, students, teachers, and the media.

The Children's Dental Health Project <http://www.cdhp.org/Home/QuickClicks.asp> Works to advance policies that improve children's access to oral health. Available resources include a manual for increasing access to dental care through public/private partnerships, policy briefs and a searchable database of news articles on children's oral health and dental care.

HRSA Bright Futures in Practice; Oral Health <http://www.brightfutures.org> A national health promotion initiative dedicated to the idea that every child deserves to be healthy. Contains resources on oral health, including a guide that outlines current oral health promotion, disease prevention and other preventive strategies and tools.

National Center for Chronic Disease Prevention and Health Promotion – Oral Health Resources <http://www.cdc.gov/OralHealth/index.htm> Contains a number of oral health resources, such as articles, fact sheets, press releases, data systems, and information on different state oral health programs.

National Conference of State Legislatures <http://www.ncsl.org/programs/health/oralheaother.htm> A bipartisan organization that serves the legislators and staff of the nation's 50 states, its commonwealths and territories. Provides research, technical assistance and opportunities for policymakers to exchange ideas on the most pressing state policy issues, including oral health.

National Maternal and Child Oral Health Resource Center. <http://mchoralhealth.org> Collaborates with others to gather, develop and share information and materials on MCH oral health issues. Responds to information requests on a number of related topics. Contains databases, information, materials, discussion boards, and links to other MCH oral health sites.

Oral Health America <http://www.oralhealthamerica.org/resources.html> Provides resources for improving and promoting the oral health of Americans through a broad-based public advocacy coalition. Includes links to PDFs and websites containing national reports and articles on oral health.

# Changing Policies, Improving Dental Health: Reducing Soft Drink Sales at School

Gillian Lawrence

*This article is based on an interview with three key members of the Minnesota Dental Association staff: Richard W. Diercks, Executive Director; Patricia Glasrud, Director of Policy Development; and Carol Embertson, Communications Director.*

The carbonation and sugar in soda beverages is known to cause dental problems for both children and adults.<sup>1</sup> Soda consumption affects dental health because the sugar in soda combines with bacteria in the mouth to form acid, causing tooth decay. Even sugar-free sodas are problematic because the carbonation in soda also contributes to high acidity in soda beverages. One of the worst soda consumption patterns is “sipping all day,” because this constantly coats the teeth and each sip starts another “acid attack.” Each of these acid attacks lasts about 20 minutes.<sup>2</sup>

The Minnesota Dental Association (MDA) reports that their member dentists began to notice an increase in tooth decay among children and youth in their practices about ten years ago. Many of them noticed that this increase occurred at the same time consumption of soda among youths increased. Half to three fourths of high school students drink at least one glass of pop or soda per day, according to the 2004 Minnesota Student Survey.<sup>3</sup> Much of this soda and other sugar-containing beverages came from a source beyond parental control: schools. Concerned about the effect of young people’s soda consumption in schools in Minnesota and its effect on their oral health, the Minnesota Dental Association (MDA) decided to take action.

In 2001, MDA brought this issue to the state legislature by proposing to ban soda sales in schools. The issue caught media attention almost immediately; just before the first hearing, the Minneapolis Star Tribune’s front page featured the story. The proposal was, understandably, met with resistance from the beverage industry; however, some of the strongest opposition also came from schools themselves. Many schools relied heavily on the revenue from exclusive contracts with beverage companies. Although the proposed legislation to ban soda sales in schools did not pass, the fight was far from over.

Initially, beverage companies denied the scientific evidence of a link between the consumption of their product and development of tooth decay and other health problems, such as osteoporosis and obesity. However, as media attention to this issue increased, the industry eventually changed in 2003 and admitted there was a need for healthier beverage vending in schools. Schools, however, were still resistant to allowing state control over individual school districts.

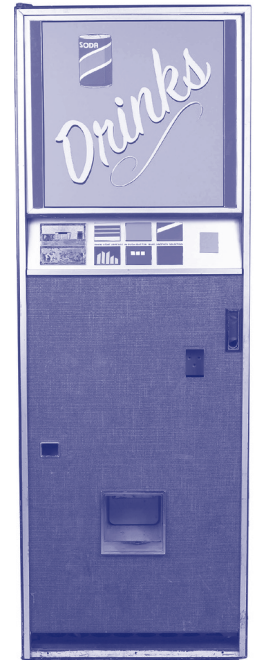
Then, in 2004, another proposal was brought to the legislature that followed the American Academy of Pediatrics’ recommendations for healthier vending in schools.<sup>4</sup> The legislation sought to redefine “nutritional beverage” to one of three non-carbonated drinks: skim or low-fat milk (including flavored milk), fruit drinks containing no less than 50% fruit juice with no added sweeteners, and bottled water. Furthermore, the bill required public schools to turn off vending machines

containing snack foods or drinks with minimal nutritional value during school lunch hours, and prohibited these items within the school lunch program. Additionally, the Healthy Vending Coalition formed around this time to provide support for the legislation. This coalition included Minnesota dentists, physicians, health care organizations, child advocates, dairy farmers, and businesspeople. Due to resistance from advocates for local control over school policy, this legislation also failed. However, support for the effort grew throughout the state, with several individual school districts changing their vending policies to improve the nutritional quality of beverage vending options. For example, North High School in Minneapolis and the districts of Apple Valley, Hopkins, and Rochester all implemented exemplary local policies to improve vending options in their schools.

In conjunction with their legislative efforts, the MDA also began the “Sip All Day, Get Decay” campaign, which involved educational materials for dental practices and other health care and school settings. These materials were easy to understand and highlighted the damage caused by “sipping all day” on sugary beverages and soda. Richard Diercks, Executive Director of MDA, said, “This program is the country’s leader. We’ve sold materials to virtually every state.”

Additionally, in 2006, the Alliance for a Healthier Generation—a joint initiative of the William J. Clinton Foundation and the American Heart Association—worked out an industry agreement with Cadbury Schweppes, Coca-Cola, PepsiCO, and the American Beverage Association that established new guidelines for the voluntary removal of high-calorie sodas from all schools and set limits on portion sizes. At the elementary school level, these guidelines allow for the sale of bottled water, low-fat and non-fat regular and flavored milk (including soymilk), and 100% juice beverages. In middle school, the guidelines are the same as at the elementary school level, except that juice and milk may be sold in larger servings. At the high school level, vending may include bottled water, no- or low-calorie beverages up to 10 calories, up to 12-ounce servings of milk, 100% juice, light juice, and sports drinks; at least 50% of beverages offered must be water or low calorie options. Although these policies are aimed primarily at preventing overweight and still allow some acidic beverages (for example, diet soda), they do represent a vast improvement in vending options for students.<sup>5</sup>

The “Sip All Day” campaign, combined with the proposals brought to the legislature and the new industry agreement, appear to be having their intended effect. Local districts are





now paying closer attention to their vending policies and offering their students healthier choices. The beverage industry has begun self-regulating. Most importantly, although tooth erosion is still a problem, there is some indication that tooth decay is decreasing among youth.<sup>6</sup> The MDA is pleased that dentists are seeing these improvements in their patients, and that changes are taking place in many Minnesota schools. They emphasize that other programs, such as school-based sealant programs, can also help prevent tooth decay,<sup>7</sup> and believe that promoting and funding these kinds of programs are an important next step in improving the oral health among children and youth.

## References

1. Ismail AI, Burt BA and Eklund SA. Cariogenicity of soft drinks in the United States. *J Am Dent Assoc* 1984;109(2):241-245.
2. Lussi A, Jaeggi T, Zero D. The role of diet in the aetiology of dental erosion. *Caries Res* 2004;38(Suppl):34-44.
3. Minnesota Department of Education. Minnesota Student Survey, 2004. Available from: <http://education.state.mn.us/mde/static/2004%20MSS%20Statewide%20Tables.pdf>.
4. American Academy of Pediatrics Committee on School Health. Policy statement: soft drinks in schools. *Pediatrics* 2004;113(1):152-154.
5. Alliance for a Healthier Generation. School Beverage Guidelines. Available from: <http://www.healthiergeneration.org>
6. Hicks MJ and Flaitz CM. Epidemiology of dental caries in the pediatric and adolescent population: a review of past and current trends. *J Clin Pediatr Dent* 1993;18(1):43-49.
7. Centers for Disease Control and Prevention. Impact of targeted, school-based dental sealant programs in reducing racial and economic disparities in sealant prevalence among school children — Ohio, 1998-1999. *MMWR Morb Mortal Wkly Rep* 2001;45(34):736-8.

**Gillian Lawrence is an MPH student in the MCH Program.**



## Web-Based Oral Health Curricula for Health Professionals and Human Service Providers

From the National Maternal and Child Oral Health Resource Center at Georgetown University, designed by the Center for the Advancement of Distance Education at the University of Illinois at Chicago.

- **A Health Professional's Guide to Pediatric Oral Health Management**

This curriculum provides health professionals (physicians, physician assistants, nurses, and nutritionists) with information to help them promote oral health and prevent oral diseases for infants, children, and their families.

<http://www.mchoralhealth.org/PediatricOH>

- **Open Wide: Oral Health Training for Health Professionals**

This curriculum helps health and early childhood professionals working in community settings (Head Start and WIC staff) promote oral health in the course of promoting general health for infants, children, and their families.

<http://www.mchoralhealth.org/OpenWide>

- **Special Care: An Oral Health Professional's Guide to Serving Young Children With Special Health Care Needs**

This curriculum provides oral health professionals (dentists and dental hygienists) with information to help ensure that young children with special health care needs have access to health promotion and disease prevention services that address their unique oral health needs in a comprehensive, family-centered, and community-based manner.

<http://www.mchoralhealth.org/SpecialCare>

Also available:

- **Dental Health Screening and Fluoride Varnish Application, University of Minnesota**

A one-hour course including the following topics: The Etiology and Prevention of Dental Caries, Strategies for Prevention, The Dental Health Screening, The Fluoride Varnish Application Procedure, and The Billing Process.

<http://meded1.ahc.umn.edu/fluoridevarnish>

## MCH Oral Health Data Book Available

This fall, the Minnesota Department of Health issued their first-ever Maternal and Child Health Oral Health Data Book. The publication contains much important data about oral health, including factors influencing dental caries and periodontal diseases, and factors influencing access to oral health care.

Although many other states regularly survey oral health status and publish reports, this is the first time that Minnesota oral health data has been collected and published in one place. Free copies of the report will be available to download at the Department's website: <http://www.health.state.mn.us>.



# Low-Income Children Have Difficulty Accessing Dental Care

Gillian Lawrence

As public health advocates work to improve children's oral health, there is one barrier that consistently stands in the way of these improvements. Many low-income children simply lack access to adequate oral health care, including regular dental visits and preventive services such as sealants and fluoride treatments. Even children covered by public assistance programs such as Medicaid continue to lack access to care.

Medicaid is a federal/state entitlement program that pays for medical care for eligible low-income families. Although there are broad national guidelines for dental care coverage, "each state (1) establishes its own eligibility standards; (2) determines the type, amount, duration, and scope of services; (3) sets the rate of payment for services; and (4) administers its own program." Under Medicaid, dental services are optional for adults over 21 years of age. However, as part of the Early and Periodic Screening, Diagnostic and Treatment (EPSDT) benefit, Medicaid-eligible children under age 21 must be provided dental services that "meet reasonable standards of dental practice, as determined by the state after consultation with recognized dental organizations involved in child health, and at such other intervals, as indicated by medical necessity, to determine the existence of a suspected illness or condition." In addition, many low-income children who do not qualify for Medicaid can still be covered by health insurance through the State Children's Health Insurance Program or SCHIP. Although dental services are an optional benefit under SCHIP, almost all states have opted to include dental services in their SCHIP programs.<sup>1</sup>

Despite widespread coverage by both Medicaid and SCHIP, many children enrolled in these programs are not receiving dental services due to recent reductions in the amount of dental services covered, low provider participation in these programs, and significant barriers to accessing dental care. Recently, many states have reduced Medicaid dental coverage. Given the voluntary nature of dental coverage under SCHIP, benefits for children in that program are precarious at best and nonexistent at worst.<sup>2</sup> Massachusetts' experience with elimination of most dental services from their SCHIP program (MassHealth) resulted in a significantly lower number of enrollees receiving dental services, more reported untreated dental problems, a reduction in corrective and restorative treatments, increased pain, diminished self-esteem, and negative effects on employment and families' finances due to dental problems. However, researchers found that "the dental benefit reductions resulted in savings of less than one percent of the state's share of total program spending, and it appears that some dental costs were shifted to other areas."<sup>3</sup> This experience shows that cost-saving efforts on the part of policy-makers may be inefficient and detrimental to the dental health of those covered by state-run insurance programs.

One major factor affecting access is the limited supply of dental care providers for low-income children. There is a low rate of participation by dentists in Medicaid and SCHIP pro-

grams. National data from 2004 show that the average percentage of dentists in states participating in the Medicaid program was 40%; the average percentage participating in state SCHIP programs was similar at 39%. These rates declined from 2002 to 2004.<sup>4</sup> From the dentists' perspective, seeing patients covered by public health care programs does not make economic sense, as the reimbursement rate from these programs usually does not cover actual costs of providing care. Although participation in Medicaid and SCHIP is not required, some states do not allow dentists to limit the size of their Medicaid and SCHIP practices. This creates fear among dentists that participation will result in more patients than they can handle while they are reimbursed at a rate less than their costs. In addition, clashes in expectations between dental providers and Medicaid and SCHIP clients can strain the provider-patient relationship. For example, low-income patients may lack experience with routine dental care and may not seek care unless there is significant pain or injury. Dental practices are not accustomed to accommodating missed appointments, nor experienced in providing supportive services such as transportation and interpreters.<sup>5</sup>

Even when children are covered for dental services under a subsidized health care program, and even when they manage to locate a participating dentist, parents may still face significant barriers to accessing care for their children. In a study of an ethnically diverse sample of Medicaid-insured children's caregivers, researchers identified many barriers preventing or discouraging caregivers from accessing dental care for their children. The authors concluded that, "Negative experiences with the dental care system discouraged many caregivers...from obtaining dental services for their...children. Searching for providers, arranging an appointment where choices were severely limited [many providers will only see Medicaid-insured patients during certain times of the month, or will only fit them in if time permits], and finding transportation left caregivers describing themselves as discouraged and exhausted. Caregivers who successfully negotiated these barriers felt that they encountered additional barriers in the dental care setting, including long waiting times and judgmental, disrespectful, and discriminatory behavior from staff and providers because of their race and public assistance status."<sup>6</sup>

In order to combat these issues, oral health advocates recommend that Medicaid and SCHIP preserve, at a minimum, basic dental services that address preventive care, pain, infection, and dysfunction, pointing out that cutting these services often does not save money.<sup>2</sup> Additionally, many advocates are recommending expanded use of dental hygienists and dental assistants, as well as developing a new mid-level practitioner similar to a nurse practitioner or physician's assistant to help expand the supply of dental care providers. Routine dental visits with these professionals also cost less than a visit with a dentist, thus making them economically attractive to both Medicaid and SCHIP programs and to dental practices receiving reimbursement from these public programs.<sup>7</sup>



# Minnesota Head Start Takes Action for Oral Health



Diane Benjamin, MPH

Every fall, Head Start agencies across Minnesota tell the same story: a child comes into the program and can't sit still, cries constantly, and has difficult behaviors. In the process of trying to assess the child's problems, he is found to have untreated dental caries, abscessed teeth, and gum disease. Once the child receives proper dental care, her behavior immediately improves. Out of these kinds of experiences and their passion to improve the health of the 17,000 children and families they serve, Minnesota Head Start and other stakeholders have developed a statewide initiative to improve oral health policy and practice for Head Start children throughout the state.

The very low-income, preschool children and their families that Head Start serves are at high risk for dental problems. Most Head Start families lack access to dental care because most dentists will not take patients covered by public assistance, and many dentists will not see children younger than age three. Families in rural areas face additional barriers of transportation and a general lack of dental providers.

While several components of the initiative addressed dental care access, it was clear that Head Start home visitors and staff were not feeling effective in their oral health prevention strategies. According to Head Start Association Director Gayle Kelly, while staff could "hand people a toothbrush," they were not sure how to assess risk and deliver effective early intervention messages.

In collaboration with the University of Minnesota School of Dentistry and with financial support from Delta Dental, Head Start developed a risk-assessment training for their home visitors. According to Kelley, "This training made our home visitors real advocates for why oral health is important." A pilot training with four Early Head Start programs found that children at participating sites were more likely to have seen a dentist by age three than children at non-participating sites. The training was expanded to cover all Head Start home visitors the second year, and also was opened to county public health nurses. The public health nurses reported that they had never received any other training about oral health disease and

prevention. After the training, Head Start arranged regular conference calls so that training participants could share successful implementation strategies.

A number of additional local and state programs that provide education, outreach, prevention, screening, examination, and treatment are also in place to help improve oral health among Head Start families. Projects include the following:

- Statewide education efforts. *The Tooth Book* provides basic information in Spanish, Somali, Hmong, and English about caring for the teeth and gums of young children. (This resource is available on the MN Headstart website.)
- A statewide training for primary health care providers developed by Dr. Amos Deinard, a pediatrician at the University of Minnesota, on screening and administering fluoride varnish for high-risk children who are unable to access dental care.
- Three community-level education, prevention, screening, and referral projects for high-risk children at Head Start sites, including one focused on Latino families, one for Southeast Asian families, and one in the rural Red River Valley area.
- Three models of improved oral health delivery for Head Start children, including use of teledentistry, mobile care, and changes in State of Minnesota purchase and delivery policies for oral health services.

Minnesota Head Start has also identified next steps, including developing a focus within the dental care system on early prevention with bridges to treatment if needed; creating more oral health care services in underserved geographic areas; expansion of promising models and prevention strategies for at-risk populations; and dental workforce expansion.

More information on all of these programs is available at <http://www.mnheadstart.org/oralhealth.html>

*Thanks to Gayle Kelly, Director, Minnesota Headstart Association, for information used in this article.*

Continued from page 8

## References

1. Centers for Medicaid and Medicare Services. Medicaid - general information: technical summary. Available from: [http://www.cms.hhs.gov/MedicaidGenInfo/03\\_TechnicalSummary.asp](http://www.cms.hhs.gov/MedicaidGenInfo/03_TechnicalSummary.asp)
2. Children's Dental Health Project. Policy brief: preserving the financial safety net by protecting Medicaid and SCHIP dental benefits. Washington, DC: 2003. Available from: <http://www.cdhp.org/CDHPPubs/issuepolicybriefs.asp>
3. Pryor C, Monopoli M. Eliminating adult dental coverage in Medicaid: an analysis of the Massachusetts experience. Washington, DC: The Henry J. Kaiser Family Foundation Commission on Medicaid and the Uninsured, 2005.
4. National Center for Chronic Disease Prevention and Health Promotion. Synopses of State and Territorial Dental Public Health Programs - Trends. Available from: <http://apps.nccd.cdc.gov/synopses/NatTrendTableV.asp>
5. Gehshan S, Hauck P, Scales J. Promising Practices Issue Brief: Increasing Dentists' Participation in Medicaid and SCHIP. Washington, DC: National Conference of State Legislatures, 2001.
6. Mofidi M, Rozier RG, King RS. Problems with access to dental care for Medicaid-insured children: what caregivers think. *Am J Public Health* 2002;92(1):53-58.
7. Nolan L, Kamoie, JD et al. The effects of state dental practice laws allowing alternative models of preventive oral health care delivery to low-income children. Washington, DC: Center for Health Services Research and Policy, 2003.



# Bringing Bright Smiles to Children in Saint Paul and Ramsey County

See Moua

United Way Bright Smiles began as a pilot program in 2004 with a \$100,000 investment from The John S. and James L. Knight Foundation to improve children's oral health in the City of St. Paul. Through the collaborative efforts of two community clinics and the United Way, Bright Smiles reached children and families at risk of poor oral health with education, screening, and low or no cost dental care.

The program employed bilingual, bicultural outreach workers to focus on Latino and Hmong communities experiencing high levels of early childhood tooth decay. It focused on reaching immigrant children because of the fast growing populations, differences in cultural practices and beliefs about oral healthcare, and a general lack of trust of unfamiliar medical personnel. In its first year, "Bright Smiles" provided over 800 children with screenings and 850 parents and caregivers with education about good oral hygiene practices and preventative care. If necessary, more extensive dental care was provided for minimal cost.

The Bright Smiles pilot program revealed a need for greater focus on children's oral health, leading Greater Twin Cities United Way to convene the Partnership for Improving Children's Oral Health in Ramsey County (PICOH) in 2004. The partnership was especially concerned about high rates of untreated tooth decay and barriers to dental care in low-income communities. They developed a plan to increase awareness, reduce barriers to care, create and expand dental access points in targeted areas of need, promote effective public policy, and foster collaborative practices.

"It's important to get everyone caring about oral health and working together for the benefit of these children," said Sharon Oswald, Community Impact Manager at United Way

and coordinator of PICOH. "That's how we're going to be able to see long term change." With major support from The John S. and James L. Knight Foundation, the program has now expanded beyond St. Paul to serve low-income children throughout Ramsey County. Its goal is to reach 3,000 children annually over the next four years.

"We have been very successful, both at the partnership and direct service level," she continued. The partnership is strong and growing, as dental access sites are opening and expanding in various schools, health centers, and areas of high need. More children are getting the preventive care and treatment they require and parents are gaining knowledge about how to care for their children's oral health needs.

The partnership is committed to sustaining this work through continued collaborations, shared communications strategies, integration of oral health into existing health and human service programs, and public policy improvements. These efforts will support oral health as a core component of overall health and wellness, and dental care as a critical element of health care.

For more information: <http://www.unitedwaytwincities.org/ourimpact/brightsmiles.cfm> or Sharon Oswald, 612-340-7612.

*Thanks to Sharon Oswald from the Twin Cities United Way for information used in this article.*

## A Bright Smiles Success Story

A public health nurse completed a home visit with a family who recently arrived in the US three years ago as refugees. Both children in the family were found to have extensive tooth decay due to poor brushing habits and diet. Although the mother noted that it was painful for her children to eat, she associated it with other issues and was not aware of their oral health problems.

The older child was in Head Start and after the family failed four appointments and was not welcome back at the dentists who were originally willing to see them, Head Start brought in Children's Dental Services (a Bright Smiles partner) to provide dental treatment to the children on-site. With an interpreter and a public health nurse working with the family, the five year-old received the first of four sets of treatments needed, including root canal therapy and a stainless steel crown. The 2½ year-old received an exam and was scheduled to get four fillings.

Head Start staff supported the mother, who was very scared of the needles and what was happening to her daughters, while her children received care. Staff members will continue to reinforce good oral hygiene and the importance of taking care of teeth. This includes education about improved food choices and helping the family to learn how to make and keep appointments.

With the care, education, and support provided to this family, staff members are hopeful that they will improve their preventive care and be more likely to see the dentist when needed. Bright Smiles is helping create a foundation for good oral health that will last a lifetime!

# Interested in making a difference?

## Consider a Master's in Public Health (MPH) Degree in Maternal and Child Health (MCH)



Liz Hansen is a full-time, second year student in the MCH program.

After completing her undergraduate studies, Liz taught ninth and tenth grade math. It was through teaching inner-city high school teens and seeing how they often struggled due to their poor health that Liz first became interested in public health. She realized how “fundamentally

important” health was to these adolescents’ success in school and everything else in their lives.

Liz continued to explore the field of public health by volunteering at Planned Parenthood and organizing Carver County’s first “Baby Celebration” fair with grant dollars she obtained from the county’s Children’s Mental Health Coalition. The fair connected families to public and private resources (such as WIC and ECFE) and was such a success that it has become a tradition in Carver County.

These various experiences inspired Liz to pursue her MPH. She chose the U of M’s School of Public health due to its great reputation and that fact that it was close to home. Also, she had very positive experiences when visiting the school and connected right away to people she had met.

In her first year, she participated in the school’s Mentorship Program and has learned valuable lessons from her mentor about effective leadership skills, and developing compassionate ways to deal with many public health programs with limited resources.

Currently, Liz is involved in two research projects that add richness to her education. In one position, she assists with a study that is looking at patterns of methamphetamine usage among pregnant women and its effects on their mental health, social support systems, and

interactions with the medical community. In her other position, she is tracking youth smoking trends across Minnesota. Both positions are teaching her a lot about the collaborative effort involved in collecting and analyzing data and using this data to inform decision making and policy planning.

Liz enjoys her assistantships, her classes, and the relationships she has with peers and professors. “It’s been fun to learn about and work in a field that I strongly believe in and that people value and admire so much. I’m very proud to be here,” she says.

Liz hopes to complete her MPH this spring and continue on to obtain either a nursing or medical degree. She would like to eventually combine her public health management and research skills with clinical practice.

**What is the Maternal and Child Health Program?** An MPH training program about promoting and preserving the health of families, women, children, and adolescents. It is in the Division of Epidemiology and Community Health in the School of Public Health at the University of Minnesota.

**Who are the faculty?** The MCH faculty is multidisciplinary (e.g., epidemiology, medicine, nursing, psychology, sociology, nutrition) and focuses on children with chronic health conditions; reproductive health and family planning; pregnancy outcomes; social inequities in health; women’s health; infectious diseases; substance use; and child, adolescent, family, and community health promotion, risk reduction, and resiliency.

**Who should apply?** People who care about vulnerable populations and want careers in program planning and development, evaluation, surveillance, assessment, teaching, or research. The program offers a special emphasis on MCH epidemiology for interested students. Clinical professionals, and others with advanced degrees or significant MCH experience may enroll in the online degree program.

**For further information about the MCH Program**, call 612-626-8802 or 1-900-774-8636; e-mail [gradstudies@epi.umn.edu](mailto:gradstudies@epi.umn.edu); or visit <http://www.sph.umn.edu/academicprograms>

## Stay in the Know! Join our MCH Leadership Education Center Listserv!

Do you ever have a question that you know someone in your field could answer if you could only connect with him or her? Have you ever had a great success that you know would be helpful for colleagues to hear? Have you ever sponsored a program that you know would attract more people if you only knew how to share the event with others? Would you like to receive announcements, research updates and links to publications via email?

The Maternal and Child Health Program in the Division of Epidemiology and Community Health in the School of Public Health at the University of Minnesota sponsors the cyfhealth listserv to enhance networks between professionals working to improve the health and well-being of children, adolescents and their families.

The listserv can be used to share ideas, new research developments, resources, and event announcements. In addition, the listserv helps inform academicians of the training needs of public health practitioners.

To sign up for the listserv, send an email message to: [cyfhealth-request@epi.umn.edu](mailto:cyfhealth-request@epi.umn.edu). In the body of the text write: SUBSCRIBE cyfhealth.

If you have problems with the subscription process, you may also send an email to [pearson@epi.umn.edu](mailto:pearson@epi.umn.edu) requesting to be subscribed.



# Save these dates for upcoming Twin Cities' conferences ...



**November 18, 2006: Pediatric Environmental Health Toolkit: Clinical Applications for the Busy Pediatric and Family Practice.** For physicians, physician assistants, nurse practitioners and nurses in pediatric and family practices. U of MN West Bank Office Building, Mpls. Co-sponsored by the Institute for Agriculture and Trade Policy and the Maternal and Child Health Program, School of Public Health, University of Minnesota. Brochure and registration information: [www.iatp.org/foodandhealth/peht.cfm](http://www.iatp.org/foodandhealth/peht.cfm).

**December 1, 2006; 1:00-3:00 pm: Healthy Generations Videoconference: Improving the Oral Health of Children and Youth.** The Minneapolis site will be in room 140 of the U of MN West Bank Office Building, 1300 So. 2nd St., Minneapolis, MN. For an up-to-date list of local sites, please go to [www.epi.umn.edu/mch/events](http://www.epi.umn.edu/mch/events). To host a site, please contact Diane Benjamin at [benjamin@epi.umn.edu](mailto:benjamin@epi.umn.edu) or 612-625-4891.

**2007 CONFERENCE DATES:**

**July 24-25, 2007: MCH Summer Institute on Addressing Health Disparities, University of Minnesota**

**July 25-27, 2007: The 2007 National Maternal Nutrition Intensive Course, University of Minnesota**

Both conferences will feature an overlapping day focused on cultural issues surrounding pregnancy, birth and breastfeeding.

*HealthyGenerations* is published three times each year by the Center for Leadership Education in Maternal and Child Public Health. The editor is Diane Benjamin, Director of Community Outreach for the Center. For subscription changes, requests for bulk copies, or for more information, contact Jan Pearson at [pearson@epi.umn.edu](mailto:pearson@epi.umn.edu).

**Maternal and Child Health Program  
School of Public Health  
Division of Epidemiology and Community Health  
University of Minnesota  
1300 So 2<sup>nd</sup> St Suite 300  
Minneapolis, MN 55454**

Nonprofit Org.  
U.S. Postage  
PAID  
Mpls., MN  
Permit No. 155

Supported in part by the  
Maternal and Child Health Bureau  
Health Resources and Services Administration  
US Department of Health and Human Services

