Preventing Adult-Onset Diseases **Chapter 10**

From a population perspective, one of the most compelling justifications for investing in adolescent health is because of opportunities to favorably influence life-long trajectories of health. For example, effective efforts to prevent alcohol and other substance abuse, prevent or favorably influence chronic mental illness, prevent teen pregnancy, or prevent HIV infection during adolescence will pay off over many decades. Furthermore, investing in improving adolescent health provides the opportunity to reduce the risk of adult-onset disease, which again has payoff decades into the future.

This chapter focuses on what can be done during adolescence to reduce adult cardiovascular disease. The Task Force selected this focus to illustrate a life-span perspective for investing in adolescent health and because North Carolina has high rates of death from heart disease among adults; in 2005, North Carolina's age-adjusted heart disease death rate was 209.6 compared to 211.1 for the United States (ranking North Carolina 27th out of 50 states with 1 being the best).[1] Cardiovascular disease also accounts for high rates of stroke and chronic renal disease in our state.[2] The well-recognized risk factors for cardiovascular disease include family history of heart disease or stroke, tobacco use, obesity, high blood pressure, high cholesterol, and diabetes.

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For many North Carolinians, modifiable risk factors for adult cardiovascular disease have clearly emerged by late adolescence. In 2007, 31% of young adults ages 18-24 reported being current smokers, 22% were obese (BMI > 30), 6% had been told at some time that they had high blood pressure, and 1% had been told that they had pre-diabetes or diabetes.[3] Of note, some of these risk factors are interrelated; for example, individuals who are obese are also at higher risk of having high blood pressure, high cholesterol, and diabetes; weight loss and physical activity independently modify these risks.

There are three logical adolescent health-focused strategies to reduce rates of adult cardiovascular disease in North Carolina. The first is continuing to reduce rates of tobacco use among adolescents. Most adults who use tobacco began smoking before the age of 18, with the average age of initiation between ages 12 and 14 years.[4] Smokers typically become addicted to nicotine before they reach age 20.[5] In the first section of this chapter, we review tobacco use among adolescents; highlight the success we have had with a multifaceted, evidence-based approach to reducing tobacco use among young people; and present Task Force recommendations that will lead to continued reductions.

The second logical strategy is to reduce overweight and obesity among young people in North Carolina. This will, in turn, lead to reduced risk of high blood pressure, high cholesterol, diabetes, or adult cardiovascular disease. Success will require a multifaceted strategy using evidence-based approaches or promising practices when evidence-based strategies are not known. The second section of this chapter reviews adolescent nutrition and physical activity, and presents Task Force recommendations to reduce overweight and obesity among adolescents.

The third strategy is to assure that adolescents who have risk factors for adult cardiovascular disease are identified and receive high-quality, regular check-ups. Adolescents who are addicted to tobacco need treatment for tobacco cessation. Those with high blood pressure or diabetes should be identified and managed appropriately. Once identified, evidence-based clinical strategies to prevent and reduce obesity need to be available to adolescents. This strategy depends on adolescents having access to high-quality, evidence-based heath care services as discussed more fully in Chapter 4.

Tobacco

Tobacco use is a major risk factor for cardiovascular disease, which, in turn, can lead to heart attacks and strokes.[6] Smoking also causes nearly 90% of lung cancer deaths, at least 30% of all cancer deaths, and other cancers including oral, esophageal, pancreatic, cervical, bladder, stomach, and kidney cancer.[7] As discussed above, almost all adults who smoke became addicted to nicotine during their adolescent years. In North Carolina, 15.7% of high school students and 27.1% of middle school students who have ever smoked report smoking their first cigarette by age 11.[8]

Although one in five adolescents in North Carolina are still smoking, comprehensive prevention efforts aimed at young people have positively impacted youth smoking rates.

North Carolina youth are less likely to smoke than youth nationwide (19.0% vs. 19.7% among high school students and 4.5% vs. 6.3% among middle school students).[a] Although one in five adolescents in North Carolina are still smoking, comprehensive prevention efforts aimed at young people have positively impacted youth smoking rates. Smoking rates among high school students declined 40% from 1999 to 2007 (from 31.6% to 19.0%). Similarly, smoking rates among middle school students declined by 70% (from 15.0% to 4.5%).[8,9] These declines in youth smoking rates resulted in 34,000 fewer youth smokers in North Carolina in 2007 when compared to 2003. In the long run, declines in youth smoking will positively impact the state in respect to fewer smoking-related deaths and future savings in health care costs.[10] In fact, overall smoking rates among adults in North Carolina have dropped since 1997. Nonetheless, North Carolina's adult smoking rates consistently remain above the vast majority of other states, ranking 14th highest in smoking prevalence in the nation. In 2008, 20.9% of adults in North Carolina reported that they smoked compared to 18.4% of adults nationally.[11] However, there has been less progress made among college-age students ages 18-24 years. This group of young adults is the most likely to smoke. In 2007, 31.3% of 18-24 year olds reported that they were current smokers, although this number declined to 26.1% by 2008. More work is needed to further reduce smoking among adolescents and young adults so that fewer adults will be addicted in the future.

a Placona M. Evaluation Specialist, Surveillance and Evaluation Team, Tobacco Prevention and Control Branch, Division of Public Health, North Carolina Department of Health and Human Services. Written (email) communication. May 27, 2009.

The Centers for Disease Control and Prevention (CDC) promotes the implementation of comprehensive, statewide tobacco control programs as the best way to reduce smoking rates, tobacco-related deaths, and diseases caused by smoking. There are five components of comprehensive tobacco control programs, including state and community interventions, health communications interventions, cessation interventions, surveillance and intervention, and administration and management. This model combines evidence-based interventions aimed at changing social norms, affecting clinical practice, improving the community and environment, and strengthening public policies to reduce smoking and the negative health effects of smoking.[12]

Over the last eight years North Carolina foundations, governmental entities, health care professionals, insurers, and other community partners have worked together to implement a multifaceted, evidence-based campaign to reduce youth tobacco use.

Over the last eight years North Carolina foundations, governmental entities, health care professionals, insurers, and other community partners have worked together to implement a multifaceted, evidence-based campaign to reduce youth tobacco use. The campaign works to change social norms using multimedia and other initiatives, expand access to counseling and tobacco cessation services, change community and organizational policies to support tobacco prevention or cessation efforts, and pass new laws to reduce youth smoking and exposure to second-hand smoke. The Health and Wellness Trust Fund (HWTF) and the Tobacco Prevention and Control Branch (TPCB) of the North Carolina Division of Public Health have been the state leaders in promoting tobacco prevention among youth and young adults.[b] For example, the HWTF funded "TRU" (or Tobacco.Reality.Unfiltered), a media campaign aimed at changing social norms among youth to help prevent tobacco use.[c] The HWTF, TPCB, and other groups have also worked together to expand access to smoking cessation services. The HWTF and TPCB have helped fund North Carolina Quitline, a toll-free hotline that provides support and counseling for individuals who want to quit smoking.[d] The HWTF also launched "Call It Quits," a multimedia campaign aimed at promoting QuitLine services to young adults ages 18-24, parents, and others whose behavior influences teen tobacco use.[13] Due to legislation passed in 2008, nicotine replacement therapy (NRT) may be supplied free-of-charge to callers through Quitline.[e] In addition, most health insurers now provide some coverage of tobacco cessation services, although, as described more fully below, the required cost sharing may still be prohibitive to many individuals.

In addition to the social marketing campaign and expanded access to counseling and medications, there have also been significant changes at the community and policy levels that support tobacco prevention or cessation efforts. Starting in 2001, then Governor Hunt initiated a campaign to reduce tobacco use in public schools (grades K-12). This initiative to make schools 100% tobacco-free

b Other organizations have taken a leadership role in promoting healthy workplaces and hospitals, including The Duke Endowment, NC Prevention Partners, and NC Allicance for Health.

c TRU uses emotional testimony of young North Carolinians whose health has been severely impacted from tobacco use to help prevent tobacco use among youth.

d The Quitline, 1-800-Quit-Now, is free and confidential for the caller and is available daily from 8 a.m. to 2 a.m.

e NCGS §90-18.6

started as a voluntary effort, supported by the HWTF with technical assistance provided by the TPCB. The General Assembly later enacted a law requiring *all* elementary, middle, and high schools to be 100% tobacco-free beginning no later than August 1, 2008.[f] The HWTF also provided two rounds of grant funding in 2005 and 2007 to support tobacco-free college campuses.

In addition to the changes in state laws requiring all schools to be 100% tobacco-free, the North Carolina General Assembly has also implemented other laws which support prevention efforts. For example, the General Assembly raised the tobacco tax by 30 cents in 2005-2006, and by another 10 cents in 2009. In 2007, the General Assembly passed a law which required all dorms and other buildings on campuses of the University of North Carolina system to be smoke-free, and allowed UNC campuses to prohibit smoking on their grounds.[g] The General Assembly gave community college campuses the authority to go smoke-free in 2008.[h] According to the HWTF, 17 community colleges and nine private colleges and universities went 100% tobacco-free as of September 2009. Four of the UNC campuses have gone smoke-free (within 100 feet of the perimeter). Additionally, in 2009, the General Assembly enacted legislation to prohibit smoking in restaurants and bars.[i]

Implementation of these multifaceted evidence-based strategies has helped to reduce tobacco use among youth. However, more is needed, particularly among college-aged students ages 18-24.

Implementation of these multifaceted evidence-based strategies has helped to reduce tobacco use among youth. (See Figure 10.1.) However, more is needed, particularly among college-aged students ages 18-24. Given the proven negative impact of tobacco use on health and well-being and on North Carolina, the Task Force has developed a recommendation supporting a continuing comprehensive approach to youth tobacco use prevention. The recommendation includes further increases in the tobacco taxes, providing adequate funding for a comprehensive tobacco control program, enacting comprehensive smoke-free policies, and further strengthening cessation services including coverage of counseling and appropriate medications.

Comprehensive Tobacco Control Program

Funding

The CDC recommends that states fund a comprehensive tobacco control program at levels based on the evidence as documented in *Best Practices for Comprehensive Tobacco Control Programs* (2007).[12] Based on North Carolina's population, smoking prevalence, and other factors, the CDC recommends

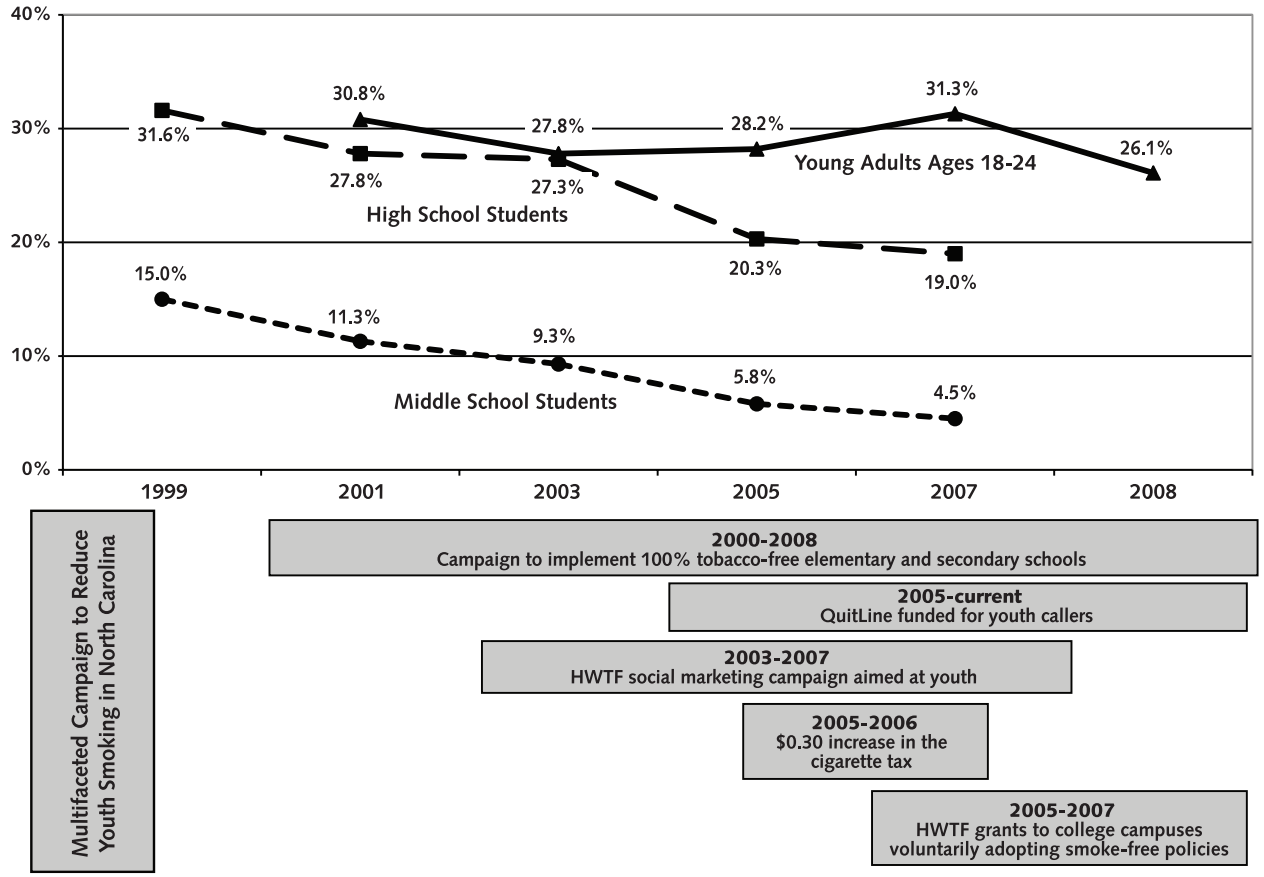
f Session Law 2007-236.

g Session Law 2007-114. All buildings and residential dorm rooms on UNC system campuses were required to be smoke-free as of the 2008-2009 school year. (NCGS §143-596-597.) Under current law, UNC system campuses were also given the authority to prohibit smoking on other grounds and within 100 feet of a building. The law provides an exception to all grounds and walkways of the UNC Health Care system and of the East Carolina University School of Medicine, Health Sciences Complex, and Medical Faculty Practice Plan, and each of these facilities prohibits all tobacco products on their grounds. While the law does not address the prohibition of other tobacco products, universities are allowed to prohibit all tobacco products use within 100 feet of their buildings. (Martin, J. Director of Policy and Programs, NC Tobacco Prevention and Control Branch. Written (email) communication. October 5, 2009.)

h Session Law 2008-95.

i Session Law 2009-27.

Figure 10.1
North Carolina's Multifaceted Campaign to Reduce Youth Smoking is Working



Source: Tobacco Prevention and Control Branch, Division of Public Health, North Carolina Department of Health and Human Services. Youth Tobacco Survey. 2003, 2005. http://www.tobaccopreventionandcontrol.ncdhhs.gov/data/factarchives.htm. Published September 2, 2009. Accessed September 21, 2009. North Carolina State Center for Health Statistics. Behavioral Risk Factor Surveillance System. 2000-2008. http://www.schs.state.nc.us/SCHS/data/brfss.cfm. Published June 22, 2009. Accessed September 21, 2009.

an annual state appropriation for North Carolina of $106.8 million for comprehensive tobacco control programs.[j,12] A practical approach would be to incrementally work toward the full amount, which would allow the state time to build the capacity and infrastructure needed to successfully support and sustain initiatives and efforts within the five best practice areas.

In theory, most or all of the funding recommended by the CDC could come from Tobacco Master Settlement Agreement (MSA) funds. In North Carolina, only 25% of MSA funds were allocated specifically for population health improvement.

j Comprehensive tobacco control programs are coordinated efforts to establish smoke-free policies and social norms in all populations and age groups, to help all tobacco users to quit, and to prevent the initiation of tobacco use in young people.

These funds were allocated to the HWTF.[k] This funding has been primarily focused on reducing tobacco use among teens and young adults up to age 24. For FY 2008-2009, the HWTF's funding for tobacco prevention and cessation initiatives was $19.2 million, less than one-fifth the amount recommended by the CDC. However, the HWTF will have less money available to support tobacco prevention and cessation or other health promotion activities in the future. In 2004, the North Carolina General Assembly scheduled the HWTF to pay $350 million in bonds the state issued to support capital construction unrelated to prevention and cessation services. Due to this debt service burden, the HWTF will have significantly less money to put towards tobacco prevention and cessation. HWTF funding for these activities is expected to decrease to below $15 million starting in FY 2010-2011 as it begins to pay for the debt service at the highest level under the 2004 legislation.[13]

North Carolina spends far less than the amount recommended by the CDC on tobacco control funding and has insufficient resources to reach everyone who wants help with tobacco cessation.

The CDC is the other primary source of current funding for tobacco prevention and control in North Carolina. In FY 2009-2010, the TPCB received $1.7 million from CDC grants.[l] This funding provides infrastructure for the Division of Public Health's evidence-based tobacco control efforts. Combining all sources of tobacco prevention and control funding, North Carolina's total funding amount for FY 2008-2009 is $19.2 million, which the CDC considers "minimal reach," reaching less than 10% of the total population.[12] Total funding for FY 2009-2010 is expected to be below $17.8 million due to the decrease in funding to the HWTF.

North Carolina spends far less than the amount recommended by the CDC on tobacco control funding and has insufficient resources to reach everyone who wants help with tobacco cessation. Data from the Youth Tobacco Survey show that of those who are current smokers, 53.2% of high school students and 57.0% of middle school students have tried to quit at least once in the past year; yet, only 7.6% of high school students and 13.9% of middle school students have ever participated in a program to help them quit using tobacco.[8]

State and Community Interventions

Evidence-based comprehensive state and community tobacco prevention and cessation policies are an important component of a state's comprehensive tobacco control program. Such policies help all tobacco users quit, prevent young people from starting to use tobacco products, and protect everyone from the dangers of secondhand smoke. Three of the five most significant actions the CDC recommends are policy changes: levying effective tobacco taxes on all tobacco products, enacting smoke-free laws, and reducing out-of-pocket costs for effective cessation therapies.[14]

k In 2000, the North Carolina General Assembly created the Health and Wellness Trust Fund. With its funding (25% of the Tobacco Master Settlement Agreement), the HWTF invests in programs and partnerships to help all North Carolinians achieve better health. The HWTF invests in a wide array of prevention activities, including teen tobacco use and prevention and cessation ($19.2 million in FY 2008-2009), obesity prevention ($3.4 million in FY 2008-09), health disparities reduction ($5.0 million in 2008-09), and other prevention activities ($1.0 million in FY 2008-09).

l Jim D. Martin, Director of Policy and Programs, N.C. Tobacco Prevention and Control Branch. Written (email) communication. June 29, 2009.

Tobacco Taxes: The CDC recommends increasing the tax on tobacco products as a primary method for states to reduce tobacco use and improve public health.[12] Prior to 2005, North Carolina only had a $0.05 cigarette tax, the second lowest in the country. The General Assembly increased the rate by $0.30 in 2005-2006, and another $0.10 this last session (2009). However, even with this increase, North Carolina still has the 7th lowest cigarette tax in the country (as of August 12, 2009). Furthermore, the state's tax on other tobacco products (OTP), which is 12.8% of the wholesale price, is among the lowest in the country.[15] A United States Surgeon General's report states that youth who use OTP are more likely to use cigarettes.[16]

Research shows that youth are more price sensitive to the cost of tobacco products than adults; a 10% price increase on a pack of cigarettes results in a 4%-7% decrease in the number of youth who smoke.[14,17] In February 2009, the federal tax on cigarettes was increased to $0.62 with the federal reauthorization of the Children Health Insurance Program (CHIP) (making the federal taxes on cigarettes $1.02 per pack).[m,18] It is estimated that increasing North Carolina's state cigarette tax to the national average of $1.32 (as of August 21, 2009) would reduce North Carolina's youth smoking rate by 14.0% and prevent more than 73,700 children in North Carolina from becoming adult smokers.[19] In addition, enacting an OTP tax comparable to the cigarette tax, which would be 55.0% of the wholesale price, would discourage the use of OTPs as an alternative by individuals who are quitting or reducing their cigarette consumption. According to the Campaign for Tobacco-Free Kids, it is estimated that increasing North Carolina's OTP tax to 55% would lead to an overall OTP consumption youth use decline of 14.8%.[n,20] Therefore, implementing these tax increases at the same time would have a dramatic impact on the number of youth using tobacco products.

The CDC recommends increasing the tax on tobacco products as a primary method for states to reduce tobacco use and improve public health... North Carolina still has the 7th lowest cigarette tax in the country.

Based on research findings and experiences of other states, the Task Force determined that raising North Carolina's tobacco taxes is one of the most effective ways to reduce initiation of tobacco use by young people and encourage all tobacco users to quit. In addition, North Carolina can show continued commitment to protecting public health and saving lives from tobacco use and secondhand smoke exposure by maintaining a cigarette tax rate that always meets or exceeds the current national average.

Smoke-Free Policies: The CDC recommends smoking bans and restrictions to decrease exposure to secondhand smoke.[12] Secondhand smoke contains more

m Pub L No.111-003

n Campaign For Tobacco-Free Kids is a nonprofit 501(c)(3) based in Washington, DC, that is dedicated to being a leader in reducing tobacco use and its consequences. Major funders include the American Cancer Society, the Robert Wood Johnson Foundation, the American Legacy Foundation, the American Heart Association, and GlaxoSmithKline Consumer Health care. Numerous professional associations including the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Obstetricians and Gynecologists, the American Dental Association, and the American Medical Association are partner organizations. For more information, visit http://www.tobaccofreekids.org.

than 250 toxic chemicals. Of these, more than 50 of them are cancer-causing agents. There is no safe level of exposure to secondhand smoke. Even exposure for a short duration is harmful to health.[21] According to a recent report by the Institute of Medicine, exposure to secondhand smoke can increase the risk of coronary heart disease and heart attacks, and bans on smoking can reduce this risk.[22] Youth are uniquely affected by secondhand smoke. Children's lung development is hindered by secondhand smoke exposure, and exposure can also lead to acute respiratory infections and ear problems, and exacerbate asthma, causing more severe and frequent attacks.[23] In addition, smoking bans are effective in reducing cigarette consumption and in increasing the number of people who quit smoking.[14] Studies have shown that enactment of smoking bans in workplaces and in public places have led to a reduction in the number of hospitalizations due to acute coronary syndrome and are associated with a decrease in acute myocardial infarction incidence.[24-27]

Comprehensive statewide smoke-free laws to eliminate exposure to secondhand smoke in *all* worksites and public places would save more lives in North Carolina.

In May 2009, North Carolina passed Session Law 2009-27 banning smoking in restaurants and most bars. The law goes into effect January 2, 2010.[o] Effective January 2, 2010, local governments will have expanded authority to regulate smoking on local government grounds and in public places. Local governments will have the ability to further restrict smoking in enclosed public places such as theaters and retail stores. Counties, municipalities, and boards of health may take action under the new authority. However, the law requires that if a local board of health adopts a rule after January 2, 2010, the rule will not be effective until the board of county commissioners adopts an ordinance approving the rule[28] While this new law is a step forward and marks progress in protecting North Carolinians from secondhand smoke, North Carolina still does not have comprehensive smoke-free laws that protect all North Carolinians from secondhand smoke exposure by prohibiting smoking in *all* worksites and public places. Venues that are currently not covered by smoke-free law at the state level in North Carolina include private workplaces, retail stores, and recreational/cultural facilities.[29]

Comprehensive statewide smoke-free laws to eliminate exposure to secondhand smoke in *all* worksites and public places would save more lives in North Carolina.

Cessation Services: Only about 4%-7% of individuals who try to quit using tobacco are successful. Quitting is difficult due to the addictive nature of tobacco and the inability for some people to access affordable counseling and medications. Consistent and effective tobacco intervention in the health care delivery system requires the involvement of providers, health care systems, insurers, and purchasers of health insurance.[30]

o Session Law 2009-27 exempts cigar bars and private clubs.

Many North Carolinians lack health insurance that provides "first-dollar" coverage for evidence-based clinical services. First-dollar coverage would ensure that people could access needed counseling and medications without first meeting a deductible, or paying coinsurance and copayments. Cessation counseling and appropriate medications, when offered together, have proven effective in smoking cessation.[30] While the major insurance plans in North Carolina all offer some coverage of tobacco cessation products or services, out-of-pocket costs for individuals still remain.[31] These costs can be quite significant depending on the plan and an individual's ability to pay, and may even discourage people from seeking help. The CDC recommends reducing out-of-pocket costs for effective cessation therapies to increase the use of effective therapies, the number of people who attempt to quit, and the number of people who successfully quit.[14]

Quitting is difficult due to the addictive nature of tobacco and the inability for some people to access affordable counseling and medications.

Although there is less research on smoking cessation among adolescents, evidence shows that health care providers who advise their adult patients to quit can help motivate people to quit. Provider counseling can increase successful quit rates by 5%-10%.[32] For example, eight counseling sessions in addition to medication increases quit rates to 32.5%, while simple advice from a physician can increase quit rates to 10%.[30] Moreover, cessation success (or abstinence) is directly related to the length, number, and intensity of counseling sessions. Research shows that as these factors increase, so do long-term quit rates.[30] Yet, nearly 28.5% of adult smokers in the state reported they had not been advised within the last 12 months by their provider to quit.[33] Appropriate medication is another effective method for treating tobacco dependence. However, in 2007, 61.6% of adult smokers in North Carolina reported that their health care provider did not "recommend or discuss medication to assist them with quitting smoking."[33]

One early intervention used to reduce substance use is the Screening, Brief Intervention, and Referral into Treatment (SBIRT) model. SBIRT has been studied for more than 20 years in different settings and populations and has shown to be effective in reducing tobacco, alcohol, and other drug use among adults and adolescents.[34] Primary care providers who treat adolescents screen them to determine if they are using or thinking about using tobacco. Individuals who are identified through screening tools to be at risk, or who are using tobacco, should be offered counseling. (See **Recommendation 7.6**.)

In the past ten years, North Carolina has implemented many components of a comprehensive tobacco control program and, subsequently, has seen dramatic declines in youth smoking. However, North Carolina can still do more to implement a comprehensive tobacco control program as recommended by the CDC. Given the success of this approach over the past ten years, the Task Force recommends:

Recommendation 10.1: Support the Implementation of North Carolina's Comprehensive Tobacco Control Program (PRIORITY RECOMMENDATION)

a) The North Carolina General Assembly (NCGA) should adopt measures to prevent and decrease adolescent smoking. As part of this effort, the NCGA should:

   1) Increase the tax on tobacco products and new revenues should be used for a broad range of prevention activities including preventing and reducing dependence on tobacco, alcohol, and other substances.

      a. The NCGA should increase the tax on a pack of cigarettes to meet the current national average. The cigarette tax should be regularly indexed to the national average whenever there is a difference of at least 10% between the national average cost of a pack of cigarettes (both product and taxes) and the North Carolina average cost of a pack of cigarettes.

      b. The NCGA should increase the tax on all other tobacco products to be comparable to the current national cigarette tax average, which would be 55% of the product wholesale price.

   2) The NCGA should support the state's Comprehensive Tobacco Control Program by

      a. Protecting the North Carolina Health and Wellness Trust Fund's (HWTF) ability to continue to prevent and reduce tobacco use in North Carolina by

         i. Ensuring that no additional funds are diverted from HWTF's share of the Master Settlement Agreement.

         ii. Releasing HWTF from its obligation to use over 65% of its annual MSA receipts to underwrite debt service for State Capital Facilities Act, 2004.

      b. The NCGA should better enable the Division of Public Health (DPH) and North Carolina Health and Wellness Trust Fund (HWTF) to prevent and reduce tobacco use in North Carolina by appropriating $26.7 million in recurring funds in SFY 2011 to support implementation of the Comprehensive Tobacco Control program. The NCGA should appropriate other funds as necessary until state funding, combined with HWTF's annual allocation for tobacco prevention (based on provision A), reaches the Centers for Disease Control and Prevention recommended amount of $106.8 million by 2020.

c. DPH should work collaboratively with the HWTF and other stakeholders to ensure that the funds are spent in accordance with best practices as recommended by the Centers for Disease Control and Prevention. A significant portion of this funding should be targeted towards youth.

3) The NCGA should amend current smoke-free laws to mandate that all worksites and public places are smoke-free.

4) In the absence of a comprehensive state smoke-free law, local governments, through their Boards of County Commissioners should adopt and enforce ordinances, board of health rules, and policies that restrict or prohibit smoking in public places, pursuant to NCGS §130A-497.

b) Comprehensive evidence-based tobacco cessation services should be available for all youth.

1) Insurers, payers, and employers should cover comprehensive, evidence-based tobacco cessation services and benefits including counseling and appropriate medications.

2) Providers should deliver comprehensive, evidence-based tobacco cessation services including counseling and appropriate medications.

Obesity

In addition to tobacco use, a major risk factor for adult cardiovascular disease is being overweight or obese. Overweight or obese children have higher risks than healthy weight children for developing high blood pressure, high cholesterol, and Type 2 diabetes during adolescence and later on in life. Overweight or obese children are also more likely to become overweight or obese adults. [35] In North Carolina, a large proportion of youth are overweight or obese. (See Figure 10.2.) According to Trust for America's Health, North Carolina youth ages 10-17 ranked 14th highest in the country for overweight and obesity. [36] In 2008, 17.5% of North Carolina adolescents ages 12-18 were overweight, and 28.5% were obese.[p,q ,37]

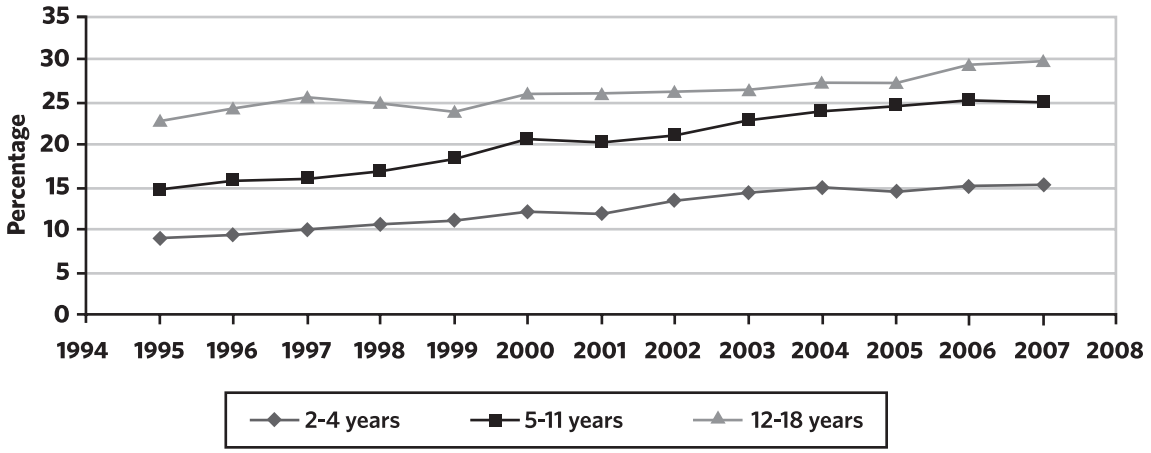
Overweight or obese children have higher risks than healthy weight children for developing high blood pressure, high cholesterol, and Type 2 diabetes during adolescence and later on in life.

Youth gain weight when they consume more calories than are needed for their level of physical activity. Aside from the large role that the environment and behavior play, genes and metabolism also affect body weight.[35] Given the variety of factors affecting weight gain, there is no one cause or solution to the obesity

p The Nutrition Services Branch, North Carolina Division of Public Health, maintains the North Carolina Nutrition and Physical Activity Surveillance System (NC-PASS) and notes that "NPASS data are limited to children seen in North Carolina Public Health Sponsored WIC and Child Health Clinics and some School Based Health Centers."

q Overweight is defined as BMI ≥ 85th percentile but < 95th percentile. Obesity is defined as BMI ≥ 95th percentile.

Figure 10.2
Percentage of Low-Income North Carolina Children and Youth Who are Obese by Age Group (1995-2007)



Notes: BMI based on body mass index for age and gender. NC-NPASS data includes children seen in North Carolina Public Health sponsored WIC and Child Health Clinics and some School-Based Health Centers.
Source: Nutrition Services Branch, Division of Public Health, North Carolina Department of Health and Human Services. North Carolina Nutrition and Physical Activity Surveillance System (NC-NPASS), 1995-2008. http://www.eatsmartmovemorenc.com/Data/ChildAndYouthData.html.

epidemic. However, prevention interventions at the behavioral and environmental level within schools, the community, and clinical settings offer the greatest opportunity for action.[38]

Schools

Schools can play an important role in helping youth develop healthy eating habits and patterns of physical activity (for more information about improving physical education and physical activity in schools, see Chapter 5).[39]

Improving School Nutrition in Middle and High Schools

Good nutrition is vital for adolescents in achieving and maintaining optimal health. Promoting healthy eating patterns among children is particularly important since unhealthy eating habits established during adolescence tend to be carried into adulthood.[40] Schools can play an important role in helping youth develop lifelong healthy eating habits since youth spend a significant amount of time in the school environment. Making healthy food available, while also reducing access to unhealthy foods, is one strategy schools can use to promote healthy eating among students.[r,41]

r Food and beverages are typically sold in schools in three ways: as meals that qualify for reimbursement in the National School Lunch Program, through a la carte food and beverage sales in the school cafeteria, and/or through vending machines. A la carte items are foods or beverages sold separately from reimbursable school meals in school cafeterias. More information about the National School Lunch Program is available online at http://www.fns.usda.gov/cnd/Lunch/.

Over the last 20 years, there have been many federal- and state-level efforts to improve the nutritional profile of foods and beverages served in North Carolina schools. The latest federal effort, the Child Nutrition and WIC Reauthorization Act of 1995, required that all meals qualifying for federal reimbursement meet the 1995 Dietary Guidelines for Americans.[s] The Child Nutrition Reauthorization ACT is being reviewed and revised again in 2009-2010. Since 1995, the Dietary Guidelines for Americans have been updated twice with new guidelines coming out every five years. In 2005, the North Carolina General Assembly passed legislation directing the State Board of Education (SBE) to adopt new nutrition standards for schools (that were stricter than the federal dietary guidelines) to be implemented in elementary schools by the end of the 2008 school year.[t,u]

In 2005, the North Carolina General Assembly passed legislation directing the SBE to adopt new nutrition standards for schools ... to be implemented in elementary schools by the end of the 2008 school year.

The SBE, in collaboration with the Division of Public Health and Child Nutrition Administrators in the school districts, developed nutrition standards which were pilot tested in 124 elementary schools from January to May 2005.[v] A majority of the schools involved in the pilot test lost money implementing the new standards, in part due to the removal of profitable unhealthy *à la carte* items[w] (high in fat, sugar, and/or calories) without replacement. Unfortunately, profits from these unhealthy *à la carte* items provided substantial revenue that schools relied upon to subsidize school meal programs. As districts reduced the availability of less healthful *à la carte* items, the school nutrition program operating budgets suffered.[42] While the termination of *a la carte* items often leads to increases in the sale of school meals, overall revenues still suffer because federal reimbursement for school meals is inadequate.[x] Since 2005, a number of schools nationally have implemented nutrition standards. Thus far, few data exist from longer term studies to substantiate the concern that changes in nutrition standards in schools lead to a loss in total revenue.[43] While it is common to lose money initially, many schools have protected revenue by substituting healthier *à la carte* items and vending items and using social marketing with stakeholders.[44]

s More information on the Dietary Guidelines developed jointly by the US Department of Health and Human Services and the US Department of Agriculture is available online at http://www.health.gov/DietaryGuidelines/.

t § 115C-264.3.

u The implementation of the new nutrition standards in elementary schools (to be followed by middle and high schools) has been delayed.

v The nutrition standards for elementary schools promote gradual changes to increase fruits and vegetables, increase whole grain products, and decrease foods high in total fat, trans fat, saturated fat, and sugar

w A la carte items are foods or beverages sold separately from reimbursable school meals in school cafeterias.

x Sackin B. B. Sackin and Associates. Personal Communication. September 25, 2008.

To offset losses due to the implementation of the improved nutrition standards in elementary schools, two-thirds of North Carolina's school districts have returned to the sale of unhealthy, high-fat, high-sugar, and high-calorie foods and beverages in middle and high schools.[42] As a result of the pilot study, the North Carolina General Assembly has ultimately delayed mandatory implementation of the new nutrition standards in all schools.[y]

To support healthy growth and proper development, all middle and high schools should make available healthy foods and beverages.

Although some school districts have reverted back to practices that encourage unhealthy food promotion, some progress has been made in restricting the sale of less nutritious foods and beverages. The percentage of public secondary schools in North Carolina in which students could not purchase candy or salty snacks from school vending machines or school stores, canteens, or snack bars increased from 26.4% to 51.8% from 2002-2008, while the percentage of public secondary schools in which students could not purchase soda pop or sports drinks also increased from 2006-2008. This progress notwithstanding, the CDC recently noted that "greater efforts are needed to ensure that all foods and beverages offered or sold outside of school meal programs meet nutrition standards."[45]

To support healthy growth and proper development, all middle and high schools should make available healthy foods and beverages. Continued implementation of nutrition standards in schools requires additional state funding support. Maintaining the financial integrity of child nutrition programs will enable districts to ensure child nutrition standards are being met in all North Carolina middle and high schools. Therefore, the Task Force recommends:

Recommendation 10.2: Improve School Nutrition in Middle and High Schools (PRIORITY RECOMMENDATION)

North Carolina funders should develop a competitive request for proposal to fund a collaborative effort between North Carolina Department of Public Instruction and other partners to test the potential for innovative strategies to deliver healthy meals in middle and high schools while protecting/maintaining revenue for the child nutrition program. Funders should require grant recipients to conduct an independent rigorous evaluation that includes the cost of implementing healthy meals.

Joint-Use Agreements to Increase Opportunities for Physical Activity

Physical activity is a key component of a healthy lifestyle and an important part of preventing overweight and obesity.[46] It is recommended that children get at least 60 minutes of moderate to vigorous physical activity every day of

y During the 2007 and 2008 legislative sessions, the NC State Board of Education requested recurring state funds ($20 million) to support the implementation of the State Board of Education-adopted nutrition standards in all elementary schools in North Carolina. The North Carolina General Assembly has not appropriated funds for this purpose.

the week.[47] Unfortunately, not enough children in North Carolina are meeting this recommendation. Only 55% of middle school students and 44.3% of high school students in North Carolina report being physically active for at least 60 minutes per day on five or more of the past seven days.[48] To address physical inactivity in North Carolina, schools and communities should increase access to park and recreational facilities to encourage regular physical activity within communities.

Recreational facilities exist on school property within many communities; however, these facilities are often not available for use by school children and their families after school hours. Creating additional recreational facilities requires funding and land—one or both of which are limited in many communities in North Carolina. Joint-use agreements, whereby communities establish partnerships with schools to provide community access to school facilities during after-school hours and on weekends, are a potential solution to this predicament. Research shows that although school administrators are generally open to the idea, it is only sporadically done. Some of the most common reasons given by administrators for not opening their facilities to the public include concerns of supervision, safety, liability, and overuse.[49]

To address physical inactivity in North Carolina, schools and communities should increase access to park and recreational facilities to encourage regular physical activity within communities.

Preliminary evidence also shows elevated rates of physical activity for youth who are able to use school facilities on evenings and weekends.[50] Fayetteville-Cumberland County Parks and Recreation and the Cumberland County School System have relied on joint-use agreements for approximately 40 years. The parks and recreation department has joint use of facilities at more than 60 schools in the county and 12 recreation centers located on school property. In addition, Parks and Recreation has been able to expand infrastructure and program capacity beyond what would have been possible without such agreements, and the school system has physical education facilities it would not otherwise have.

In order to increase access to facilities for physical activity, North Carolina should support joint use agreements among schools, parks and recreation, and other community organizations. Therefore, the Task Force recommends:

Recommendation 10.3: Establish Joint-Use Agreements for School and Community Recreational Facilities

a) The North Carolina School Boards Association should work with state and local organizations including, but not limited to, the North Carolina Recreation and Park Association, Local Education Agencies, North Carolina Association of Local Health Directors, North Carolina County Commissioners Association, North Carolina League of Municipalities, North Carolina High School Athletic Association, and Parent Teacher Associations to encourage collaboration among local schools, parks and recreation, faith-based organizations, and/or other community groups to expand the use of school facilities for after-hours community physical activity. These groups should examine successful

local initiatives and identify barriers, if any, which prevent other local school districts from offering the use of school grounds and facilities for after-hour physical activity and develop strategies to address these barriers. In addition, this collective group should examine possibilities for making community facilities available to schools during school hours, develop model joint-use agreements, and address liability issues.

b) The State Board of Education should encourage the School Planning Section, Division of School Support, North Carolina Department of Public Instruction to do the following:

1) Provide recommendations for building joint-use park and school facilities.

2) Include physical activity space in the facility needs survey for 2010 and subsequent years.

Due to the overwhelmingly high rates of overweight and obesity, this generation of youth may be sicker and die younger than their parents, for the first time in history.

Community-Based Initiatives

Approximately 30% of North Carolina's youth are overweight or obese.[51] Due to the overwhelmingly high rates of overweight and obesity, this generation of youth may be sicker and die younger than their parents, for the first time in history.[52] To address the growing obesity epidemic, many North Carolina communities are implementing strategies and practices to improve nutrition and increase physical activity. However, long-term, sustainable community-level efforts are needed statewide in order to reach all North Carolinians; creating local capacity is integral to this approach.

To help communities address overweight and obesity, *Eat Smart, Move More* (ESMM) has created *North Carolina's Plan to Prevent Overweight, Obesity, and Related Chronic Diseases*. The plan includes strategies and recommendations for individuals and families, communities, and schools, as well as model public policies that should be implemented. Choosing healthy drinks, preparing and eating more meals at home, controlling portion size, breastfeeding, consuming more fruits and vegetables, decreasing screen time, and increasing physical activity are just some of the key messages included in the *Eat Smart, Move More* plan. These messages are consistent with health behavior messages promoted by the CDC. In addition, the plan recommends creating worksite interventions for the prevention and treatment of obesity, making screening and prevention services part of the routine for health exams, increasing access to community gardens and farmers' markets, providing economic incentives for the production and distribution of healthy foods, and building new paths and sidewalks for bikers and walkers.[53]

Given the need to have sustainable interventions at the community and state level, North Carolina should provide appropriated funds for programs aimed at

reducing overweight and obesity among adolescents. Therefore the Task Force recommends:

Recommendation 10.4: Fund Demonstration Projects in Promoting Physical Activity, Nutrition, and Healthy Weight[z]

The North Carolina Division of Public Health, along with its partner organizations, should fully implement the *Eat Smart, Move More North Carolina Obesity Plan* for combating obesity in selected local communities and identify best practices for improving nutrition and increasing physical activity that will ultimately be adopted across the state. As part of this project, the North Carolina General Assembly should appropriate $500,000 in non-recurring funds for six years beginning in SFY 2011 to the North Carolina Division of Public Health for pilot programs of up to $100,000 per year to reduce overweight and obesity among adolescents. Funded programs should be evidence-based or promising practices and should include an evaluation of their effectiveness. If shown to be effective, programs should be expanded statewide.

Clinical Initiatives

Medical expenditures for physical inactivity and overweight in youth cost North Carolina approximately $75 million in 2006.[52] In light of the obesity epidemic in North Carolina and its impact on children, Community Care of North Carolina (CCNC) is conducting a two-year pilot project to develop systems of care for the prevention of obesity in Medicaid-enrolled children. CCNC is a Medicaid program offering coordinated health care through a network of medical homes. This Childhood Obesity Prevention Initiative is being piloted with 187 primary care practices in four of the 14 CCNC networks reaching 102,000 children ages 2-18.[aa] The project's objectives are "to promote practice-based standardized screening with prevention messages for all children, to increase provider self-efficacy in treating childhood obesity, and to develop effective linkages between the child's primary care provider and existing community recourses."[54]

CCNC is conducting a two-year pilot project to develop systems of care for the prevention of obesity in Medicaid-enrolled children.

Through the pilot, primary care providers receive practice toolkits to use with their patient. In addition, participating providers receive trainings on motivational interviewing and implementation of clinical guidelines to prevent obesity. Patients and families receive education about nutrition, and both patients and practices are linked to community resources. Targeted case management and

z This is one part of a recommendation that is being adopted by the Prevention Task Force and the legislatively created Obesity Task Force. The full recommendation is for $10.5 million Division of Public Health to allow full implementation of the *Eat Smart, Move More North Carolina* state plan for obesity in selected local communities and to identify best practices for improving nutrition and increasing physical activity that will ultimately be adopted across the state.

aa The pilot project is supported by the Kate B. Reynolds Charitable Trust and has in-kind support from the Office of Rural Health and Community Care and the North Carolina Foundation for Advanced Health Programs. Access II Care of Western NC, Southern Piedmont Community Care Plan, Carolina Community Health Partnership, Partnership for Health Management, and Community Care of Wake and Johnston Counties are the participating networks.

participation incentives are also part of the pilot project.[54] The project is being evaluated through chart audits and by the percent of practices that are trained in the use of obesity screening tools, that are using body mass index (BMI) screening, and that have established linkages to community resources. The intervention project will end December 2009.

Given the prevalence of childhood obesity in North Carolina and among Medicaid-enrolled children, North Carolina should support research and the dissemination of obesity-reduction clinical initiatives. Therefore, the Task Force recommends:

Recommendation 10.5: Expand the CCNC Childhood Obesity Prevention Initiative

If shown to be successful through program evaluations, Community Care of North Carolina (CCNC) should continue expansion of the Childhood Obesity Prevention Initiative including the dissemination and use of already developed clinical initiatives aimed at obesity reduction for Medicaid-enrolled and other children and their families. The North Carolina General Assembly should appropriate one-time funding of $174,000 in SFY 2011 to the North Carolina Office of Rural Health and Community Care to support this effort.

References

1 National Center for Health Statistics, Centers for Disease Control and Prevention. NCHS State Profiles 2009: North Carolina. Washington, DC. http://www.cdc.gov/nchs/PRESSROOM/data/NorthCarolina09.pdf. Accessed October 30, 2009.

2 Elsayed EF, Tighiouart H, Griffith J, et al. Cardiovascular disease and subsequent kidney disease. *Arch Intern Med.* 2007;167(11):1130-1136.

3 State Center for Health Statistics, North Carolina Department of Health and Human Services. Behavioral Risk Factor Surveillance System, 2007. http://www.schs.state.nc.us/SCHS/data/brfss.cfm. Published 2008. Accessed September 18, 2008.

4 Malek SH, Hopking DP, Molloy M, McGloin T. The public health challenge of youth smoking in North Carolina, putting what we know into practice. *NC Med J.* 2002;63(3):153-161.

5 White HR, Pandina RJ, Chen P. Developmental trajectories of cigarette use from early adolescence into young adulthood. *Drug Alcohol Depend.* 2002;65:167-178.

6 Centers for Disease Control and Prevention, US Department of Health and Human Services. Smoking and tobacco use: health effects of cigarette smoking. http://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm. Published January 23, 2008. Accessed November 4, 2008.

7 American Cancer Society. Cancer facts & figures 2007. http://www.cancer.org/docroot/STT/content/STT_1x_Cancer_Facts__Figures_2007.asp. Published 2007. Accessed November 4, 2008.

8 Tobacco Prevention and Control Branch, North Carolina Department of Health and Human Services. 2007 North Carolina Youth Tobacco Survey. http://www.tobaccopreventionandcontrol.ncdhhs.gov/data/yts/index.htm. Published June 26, 2008. Accessed November 4, 2008.

9 Conlisk E, Malek SM. Results from the 1999 north carolina youth tobacco survey. *NC Med J.* 2001;62(5):256-259.

10 Tobacco Prevention and Control Branch, North Carolina Department of Health and Human Services. Youth Tobacco Use Prevention. http://www.tobaccopreventionandcontrol.ncdhhs.gov/youth/index.htm. Published March 23, 2009. Accessed 7/7/2009.

11 Centers for Disease Control and Prevention, US Department of Health and Human Services. Behavioral Risk Factor Surveillance System, 2008. http://apps.nccd.cdc.gov/BRFSS/. Accessed June 16, 2009.

12 Centers for Disease Control and Prevention, US Department of Health and Human Services. Best practices for comprehensive tobacco control programs—2007. http://www.cdc.gov/tobacco/tobacco_control_programs/stateandcommunity/best_practices/. Published October 2007. Accessed November 5, 2008.

13 Shah V. North Carolina initiatives to reduce tobacco use: Part II. Presented to: the North Carolina Institute of Medicine Task Force on Prevention; May 8, 2008; Cary, NC. Accessed June 29, 2009.

14 Centers for Disease Control and Prevention, US Department of Health and Human Services. Guide to community preventive services: reducing tobacco use initiation. http://www.thecommunityguide.org/tobacco/. Published November 5, 2008. Accessed November 5, 2008.

15 Campaign for Tobacco-Free Kids. State cigarette excise tax rates and rankings. http://www.tobaccofreekids.org/research/factsheets/pdf/0097.pdf. Published 2009. Accessed August 12, 2009.

16 Offfice on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. Preventing tobacco use among young people: a report of the surgeon general. http://www.cdc.gov/tobacco/data_statistics/sgr/1994/. Published 1994.

17 Campaign for Tobacco-Free Kids. Raising cigarette taxes reduces smoking, especially among kids (and the cigarette companies know it). www.tobaccofreekids.org/research/factsheets/pdf/0146.pdf. Published June 24, 2008. Accessed November 6, 2008.

18 National Conference of State Legislatures Health Program. 2009 Proposed state tobacco tax increase legislation. National Conference of State Legislatures website. http://www.ncsl.org/IssuesResearch/Health/2009ProposedStateTobaccoTaxIncreaseLegislati/tabid/13862/Default.aspx#Federal09. Published June 1, 2009.

19 Campaign for Tobacco-Free Kids. Benefits from an 87-cent cigarette tax increase in North Carolina. Washington, DC. Published August 21, 2009. Accessed September 15, 2009.

20 Campaign for Tobacco-Free Kids. Benefits to North Carolina from adjusting its tax rates for other tobacco products to match the state's tax rate for cigarettes. Washington, DC. 2009.

21 Office of the Surgeon General. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. What is secondhand smoke? US Department of Health and Human Services website. http://www.surgeongeneral.gov/library/secondhandsmoke/factsheets/factsheet1.html. Published January 4, 2007. Accessed November 4, 2008.

22 Institute of Medicine of the National Academies. Secondhand smoke exposure and cardiovascular effects: making sense of the evidence. http://www.iom.edu/~/media/Files/Report%20Files/2009/Secondhand-Smoke-Exposure-and-Cardiovascular-Effects-Making-Sense-of-the-Evidence/Secondhand%20Smoke%20%20Report%20Brief%202.ashx. Published October 2009.

23 Centers for Disease Control and Prevention, US Department of Health and Human Services. Smoking and tobacco use: secondhand smoke. http://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/general_facts/index.htm. Published September 1, 2006. Accessed November 4, 2008.

24 Pell JP, Haw S, Cobbe S, et al. Smoke-free legislation and hospitalizations for acute coronary syndrome. *N Engl J Med.* 2008;359(5):482-491.

25 Meyers DG, Neuberger JS, He J. Cardiovascular effect of bans on smoking in public places: A systematic review and meta-analysis. *J Am Coll Cardiol.* 2009;54(14):1256-1257.

26 Centers for Disease Control and Prevention, US Department of Health and Human Services. Reduced hospitalizations for acute myocardial infarction after implementation of a smoke-free ordinance—city of Pueblo, Colorado—2002-2006. *MMWR Morb Mortal Wkly Rep.* 2009;57(51&52):1373-1377.

27 Lightwood JM, Glantz SA. Declines in acute myocardial infarction after smoke-free laws and individual risk attributable to secondhand smoke. *Circulation.* 2009;1373-1379.

28 Mann A. Smoking in Public Places: Recent Changes in State Law (HLB #90). UNC School of Government: Health Law Bulletin website. http://www.sog.unc.edu/pubs/electronicversions/pdfs/hlb90.pdf. Published May 2009. Accessed June 29, 2009.

29 Tobacco Prevention and Control Branch, North Carolina Department of Health and Human Services. Summary of state regulations of smoking in government workplaces, private worksites and public places in North Carolina. http://www.tobaccopreventionandcontrol.ncdhhs.gov/shs/Documents/summaryOf-NC-SHS-Laws-092508.pdf. Published March 2008. Accessed June 29, 2009.

30 Public Health Service, US Department of Health and Human Services. Treating Tobacco use and Dependence: 2008 Update (to *Treating Tobacco Use and Dependence*). http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=hstat2.chapter.28163. Published May 2008. Accessed November 4, 2008.

31 NC Prevention Partners. Preventive benefits profile. http://www.ncpreventionpartners.org/index.html?page=preventivebenefits/healthplan.html. Accessed June 29, 2009.

32 Office of the Surgeon General, US Department of Health and Human Services. Reducing tobacco use: a report of the Surgeon General. http://www.surgeongeneral.gov/library/tobacco_use/. Published August 9, 2000. Accessed June 29, 2009.

33 State Center for Health Statistics, North Carolina Department of Health and Human Services. Behavioral Risk Factor Surveillance Survey, 2007. http://www.schs.state.nc.us/SCHS/brfss/2007/nc/all/topics.html. Published May 29, 2008. Accessed June 29, 2009.

34 McEwen S. Substance abuse screening and brief intervention in primary care. *NC Med J.* 2009;70(1):38-42.

35 Centers for Disease Control and Prevention, US Department of Health and Human Services. Overweight and obesity: childhood overweight and obesity. http://www.cdc.gov/obesity/childhood/index.html. Published May 28, 2009. Accessed June 19, 2009.

36 Trust for America's Health. Robert Wood Johnson Foundation. F as in fat 2009. http://healthyamericans.org/reports/obesity2009/. Published July 2009. Accessed July 1, 2009.

37 Nutrition Services Branch, Division of Public Health, North Carolina Department of Health and Human Services. North Carolina Nutrition and Physical Activity Surveillance System, 2008. http://www.eatsmartmovemorenc.com/Data/ChildAndYouthData.html. Accessed June 16, 2009.

38 Government Printing Office, US Department of Health and Human Services. Healthy People 2010. Washington, DC. http://wonder.cdc.gov/data2010/.

39 Hofferth S, Sandberg JF. How american children spend their time. *J Marriage Fam.* 2001;63(2):295-308.

40 Centers for Disease Control and Prevention, US Department of Health and Human Services. Guidelines for school health programs to promote lifelong healthy eating. *MMWR Recomm Rep.* 1996 Jun 14;45(RR-9):1-33.

41 Institute of Medicine of the National Academies Committee on Prevention of Obesity in Children and Youth. *Preventing Childhood Obesity: Health in the Balance.* Ed. Koplan JP, Liverman CT, Kraak VA. Washington, DC: National Academies Press; 2005. 436.

42 Hoggard L. Section Chief, Child Nutrition Services, North Carolina Department of Public Instruction. Written (email) communication. October 14 2008.

43 Wharton CM, et al. Changing nutrition standards in schools: The emerging impact on school revenue. *Journal of School Health.* 2008;78(5):245-251.

44 Economic Research Service, US Department of Agriculture. Balancing nutrition, participation, and cost in the national school lunch program. *Amber Waves.* 2008;6(4):32-39.

45 Brener N, O'Toole T, Kann L, et al. Availability of less nutritious snack foods and beverages in secondary schools—selected states, 2002–2008. *MMWR Morb Mortal Wkly Rep.* 2009;58(Early Release):1-4.

46 Devlin L, Plescia M. The public health challenge of obesity in North Carolina. *NC Med J.* 2006;67(4):278-282.

47 Centers for Disease Control and Prevention, US Department of Health and Human Services. Physical activity for everyone. http://www.cdc.gov/physicalactivity/everyone/guidelines/index.html. Published October 7, 2008. Accessed October 10, 2008.

48 North Carolina Department of Public Instruction. North Carolina Youth Risk Behavior Survey (YRBS), 2007. http://www.nchealthyschools.org/data/yrbs/. Published 2008. Accessed January 23, 2009.

49 Evenson KR, McGinn AP. Availability of school physical activity facilities to the public in four US communities. *Am J Health Promot.* 2004;18(3):243-250.

50 Farley TA, Meriwether RA, Baker ET, Watkins LT, Johnson CC, Webber LS. Safe play spaces to promote physical activity in inner-city children: Results from a pilot study of an environmental intervention. *Am J Public Health.* 2007;97(9):1625-1631.

51 NC Prevention Partners. A progress report on prevention and health in North Carolina, 2005–2007. http://www.ncpreventionpartners.org/content/documents/2008ReportCard.pdf. Published January 2008. Accessed July 28, 2009.

52 Be Active North Carolina. Tipping the scales: how obesity and unhealthy lifestyles have become a weighty problem for the North Carolina economy. http://209.200.69.140/downloads/Tipping_the_Scales.pdf. Published June 2008. Accessed September 16, 2008.

53 Eat Smart Move More North Carolina. North Carolina's plan to prevent overweight, obesity, and related chronic diseases: 2007-2012. http://www.eatsmartmovemorenc.com/ESMMPlan/Texts/ESMMPlan_ProPrint.pdf. Published August 2006.

54 Community Care of North Carolina. Community Care of North Carolina: KBR childhood obesity prevention pilot.