

Making the Case for Funding of Smoking Cessation Treatment Programs in Alabama

A Report Prepared for the Alabama Department of Public Health

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EXECUTIVE SUMMARY

While the prevalence of tobacco use among adults has declined to less than half the rate of use in the 1960s, these declines have slowed down, approximately one of every five adults in the U.S is a smoker, and there is still reluctance among some clinicians to intervene consistently with their patients who smoke. Smoking among Medicaid recipients is estimated to be considerably higher than smoking among the overall adult population (36% vs. 21% in 2006), and approximately 14% of all Medicaid expenditures are for smoking-related illnesses.

A large body of research provides evidence indicating that tobacco-dependence treatment is highly cost-effective, and even cost-saving, in certain populations. Yet, making such treatment available to Medicaid populations has proven to be a considerable challenge in some states, including Alabama. The Institute for Medicine has called for all insurance, managed-care, and employee benefit plans, including Medicaid, to cover reimbursement for effective smoking-cessation programs.

There is a continuing need to provide effective treatments to help individuals stop smoking. This report is intended to contribute to the discussion in the state of Alabama concerning public funding and policy issues regarding tobacco dependence programs for the general population, and particularly for the Medicaid-eligible population. Potential healthcare cost savings from reductions in smoking rates and evidence for treatment effectiveness are presented as they relate to pregnant women who smoke, young children exposed to secondhand smoke at home, and the general population of adult smokers. Throughout the report, all costs and potential savings have been adjusted to reflect 2008 dollar amounts, thus simplifying comparisons across studies and years. Furthermore, costs and savings reflect direct medical care only, and do not include the value of lives lost or saved, the cost of suffering, or indirect costs from lost work and productivity.

THE CASE FOR PREGNANT WOMEN

Smoking prevalence among pregnant women has been decreasing, as it has for other adult populations; however, smoking prevalence remains higher for women younger than 20 years, those with less education, and those on Medicaid. Although 30%-40% of female smokers do quit during pregnancy, it is important to reach the other 60%-70% and increase the numbers who successfully quit. There is ample evidence linking maternal smoking to negative maternal and infant health outcomes leading to morbidity, mortality, and increased health care costs. These smoking-related adverse outcomes are preventable, and costs can be reduced, with effective smoking cessation interventions during pregnancy. Studies have shown that mothers who quit smoking early in their pregnancy have birth outcomes that are similar to nonsmokers, and the weight and body measurements of their infants are comparable to those of nonsmokers.

Estimates of smoking-attributable medical expenditures per pregnant smoker vary depending on the time frame and consideration of delivery costs, neonatal costs, or continued

costs through the first year. Smoking-attributable neonatal cost estimates range from \$400-\$1,030 per pregnant smoker, and combined smoking-attributable costs to mother and infant from birth through the first year of life have been estimated to be approximately \$1,715.

One of the most widely recommended and effective counseling interventions is the Five A's counseling approach (Ask, Advise, Assess, Assist, Arrange) which can be administered by physicians or other trained personnel. The average cost for delivering the Five A's for pregnant women has been estimated to average approximately \$34. With modest success, (e.g., 4.5% quit rate) and average savings of \$1,715 per quit, a benefit-cost ratio of approximately 2:1 can be achieved in the first year of a child's life. With higher success rates, the return on investment would be even higher. Telephone quitlines have also been shown to be an effective counseling format for pregnant smokers who wish to quit, and they can be enhanced easily to address the particular needs of this group.

To help make smoking cessation intervention a priority for clinicians, it needs to be part of the protocol for all pregnant patients, and the costs need to be covered in the treatment regimen. Studies have shown that full Medicaid coverage for both counseling and pharmacotherapies yielded higher rates of quitting and maintenance of cessation among pregnant women compared to no coverage. In addition to covering the services, the availability of coverage needs to be promoted and early enrollment encouraged. The CDC recommends that state Medicaid agencies and state health departments work together to support initiatives that provide and promote smoking cessation benefits to reduce smoking during pregnancy.

THE CASE FOR CHILDREN

The causal relation between exposure to secondhand smoke and respiratory conditions has been well established, and children exposed to secondhand or environmental tobacco smoke (ETS) in their homes are at increased risk for a variety of health problems. Additional annual respiratory expenditures per child under five years old from smoking households have been estimated to be \$133. In Alabama this could account for as much as \$1.91 million in additional respiratory expenditures at the rate of one child per smoking mother (\$1.36 million for Medicaid-eligible children). If 4.5% of smoking mothers with young children quit smoking, nearly \$86,000 in respiratory care expenditures for these children could be averted in a year. In addition to counseling pregnant women and new mothers to abstain from smoking, studies have shown that counseling for parents that includes help in reducing their children's exposure to ETS can be beneficial, even without a focus on smoking cessation. To protect children from secondhand smoke, clinicians should ask parents about tobacco use and offer them cessation advice and assistance.

In addition to reducing secondhand smoke exposure in children, there is also a need to reduce their own smoking prevalence rates. Adolescents who are active smokers have an increased short-term risk for respiratory illnesses and increased long-term health risks if they

continue smoking. Therefore, clinicians should ask pediatric and adolescent patients about tobacco use, providing a strong message regarding abstaining from use, and offering interventions to aid them in quitting when needed.

THE CASE FOR THE GENERAL POPULATION

The smoking prevalence rate for Alabama is somewhat higher than the rate for the U.S. as a whole. In 2006, with a rate of 23.3% compared to the U.S. rate of 20.8%, Alabama ranked 41st among the states for smoking prevalence, where 1 is the lowest rate. Lack of funding for comprehensive state tobacco-control programs contributes to the barriers to achieving progress in increasing successful quit attempts. In 2007, Alabama spent less than 3% of the amount CDC recommended as the state's minimum spending target for tobacco prevention and control programs.

Tobacco smoking results in substantial medical costs. Estimated smoking-attributable annual health costs are approximately \$1800-\$1900 per smoker for the state and approximately \$1500 per smoker in the Medicaid eligible population. Such an estimate does not necessarily represent the savings that would accrue if the smokers were to quit. There have been some suggestions that smokers who quit actually cost the healthcare system more than those who continue smoking, and there is some evidence that this is true for the first year after quitting. These increases are likely due to cessation occurring in the midst of a serious health episode and to attention to neglected health care needs from the pre-quitting period. Costs fall after that, and the increase in costs appears to be compensated for within two years.

Although a large percentage of smokers would like to quit, the use of smoking-cessation services varies according to the extent of coverage from insurance plans. The highest rates of use occur among smokers with full coverage for cessation treatment. In a comparison of four insurance plans, it was estimated that at least one and a half times as many smokers would quit per year under full coverage as under any of the other three plans with less coverage.

Quitline services are one of the most universally available interventions for tobacco dependence. Annual costs for the Alabama quitline are estimated to be \$18.25 per call, or \$23.06 per call including NRT expenditures. The cost per person completing treatment is approximately \$265, with a cost per successful quit at 30 days of \$499 and a cost per quit at 6 months of \$1,197.

While smoking cessation can lead to long-term reductions in treatment costs due to prevention of cancers and lung diseases, the prevention of heart attacks and strokes provides an opportunity for nearly immediate savings. Estimated savings over a seven-year period due to reductions in acute myocardial infarction and stroke for an individual who quits exceed \$1200. Reducing the adult smoking rate in Alabama by one percentage point has been estimated to result in a 5-year savings from fewer smoking-caused heart attacks and strokes of \$14.9 million, producing Medicaid savings of \$1.99 million, and the state share of Medicaid savings of \$581,080. Savings from reductions in other diseases would also accrue.

One of the most useful tools for estimating costs and savings is a return-on-investment (ROI) simulation calculator developed by America's Health Insurance Plans (AHIP) and the Center for Health Research, Kaiser Permanente Northwest (CHR). Using this ROI calculator and Medicaid population estimates for Alabama, we find a positive return on investment in two years for covering the cost of the Five A's strategy through the primary care provider, quitline counseling, and NRT for four weeks through the Quitline. With initial intervention costs of \$2.88 million to provide benefits to all Medicaid smokers, by Year 2 the medical savings were estimated to be \$6.7 million, for a net savings of \$3.8 million and a return-on-investment of over \$2 for every \$1 spent. By Year 5, the return on the initial investment is \$7 to \$1.

While the majority of smokers who attempt to quit do not use recommended cessation methods, success rates increase significantly, when evidence-based interventions are employed. Evidence shows that physician advice to quit smoking significantly increases abstinence rates. Numerous reviews and meta-analyses confirm the effectiveness of physician counseling for tobacco cessation. In one meta-analysis, even brief advice (3-5 minutes) from a physician increased long-term abstinence rates from 7.9% to 10.2%. More intensive interventions are more effective than less intensive interventions, with four or more sessions being especially effective. There is also evidence, however, that physicians do not consistently deliver all components of the recommended treatment to their patients, particularly to those demographic groups that tend to receive lower levels of treatment overall.

Nicotine replacement therapy and several other non-nicotine medications have been found to increase long-term smoking abstinence rates. In a review of 111 trials, the various forms of NRT increased the rate of quitting by 50%-70%. Furthermore, these effects appeared to be independent of the amount of additional support provided or the setting in which it was offered. There was evidence that combining a nicotine patch with a rapid delivery form (e.g., gum, nasal spray) was more effective than a single form of NRT. One of the keys to the success of NRT is to reduce the immediate financial burden on the smoking patient by providing coverage for the cost of the medication.

Telephone-based cessation services are available worldwide, including all states in the U.S. and Canadian provinces. There is good clinical evidence of the effectiveness of telephone counseling, with quit rates being higher for those who receive multiple sessions of proactive call-back counseling compared to those who receive only one contact. Telephone quitlines have a number of advantages over other forms of cessation counseling, by delivering treatment to large numbers of tobacco users, while eliminating many barriers to access. Thus, they are able to reach people who tend to be underserved by more traditional programs and might be ideal for reaching Medicaid populations. In spite of their benefits and availability, only 1%-2% of U.S. smokers utilize a quitline in a given year. A strong correlation exists between funding levels and smokers' utilization of quitline services, which probably reflects the impact of capacity and promotion on utilization rates. Thus, it will be difficult to increase the use of quitlines substantially without additional funding.

Based on extensive research, it is apparent that counseling and medication are each effective when used independently for treating tobacco dependence. Research has also shown that the combination of counseling and medication is more effective than either one alone.

Some of the newest innovations in smoking cessation interventions incorporate internet or web-based treatment programs, which have a number of potential advantages that make them attractive as a self-help strategy. The best results, however, are for multi-faceted programs, offering websites as a supplement to other methods, including NRT and personal counseling. Web-based interventions are relatively inexpensive and have a wider reach than many other strategies; but they are not a feasible method for reaching certain populations, such as low income groups or older populations, who have limited access to computers and internet services.

California was the first state to establish a comprehensive statewide tobacco control program in 1990, and during the first seven years of the program, reductions in smoking produced estimated savings in direct medical costs related to fewer heart attacks, strokes, and low birth weight infants that were greater than the program costs over that same period of time. The California program and other studies have shown that providing tobacco dependence treatments (both medication and counseling) as a covered benefit by health insurance plans increases the proportion of smokers who use cessation treatment, attempt to quit, and successfully quit. Removing all cost barriers yields the highest rates of treatment utilization and smoking abstinence.

Studies using smoking cessation treatments with low SES and limited education populations have shown that counseling is effective in treating smokers in these groups. Low SES smokers express interest in quitting and appear to benefit from evidence-based treatment, and yet, only 25% of smokers on Medicaid report receiving any assistance with quitting. It is important that these treatments be available to Medicaid recipients and that the recipients and their providers be made aware of the availability of the treatments.

The bottom line in treatment, according to the Public Health Service 2008 *Clinical Practice Guideline*, is that *all* smokers should be identified, *all* smokers should be encouraged to quit, and *all* smokers should be offered appropriate evidence-based treatment of counseling and medications. Furthermore, treatments shown to be effective should be included as covered services in both public and private health benefit plans. Partnerships among these public and private insurers, as well as other facets of the healthcare community will be necessary to meet the needs of all smokers.

INTRODUCTION

The prevalence of tobacco use among adults in the U.S. is currently 20%, down from 25% in 1996, and less than half the rate of use in the 1960s, when about 44% of adults smoked (Fiore, Jaen, Baker et al., 2008). Changes in the healthcare community's approach to tobacco use are apparent in that the rate at which smokers are advised to quit by healthcare providers has doubled since the early 1990s, and coverage of tobacco dependence treatment by healthcare plans increased from 25% in 1997 to 90% in 2003. Furthermore, by 2006, three-quarters of states offered some coverage of tobacco dependence treatment through their Medicaid programs, and coverage was added by Medicare, the Veterans Health Administration, and the United States Military (Fiore et al., 2008). In spite of these changes in health care, the declines in smoking rates have slowed, and there is still reluctance among some clinicians to intervene consistently with their patients who smoke. Barriers to the full utilization of tobacco dependence treatments continue to exist, including a variety of limitations placed on coverage of medications and counseling.

By 2005, 90% of smokers who had been to a healthcare provider in the previous year reported they had been asked about their smoking status, and more than 70% reported having received some counseling to quit. Additionally, more than 70% of smokers in the U.S. say they want to quit, and approximately 44% report that they have tried to quit in the previous year (Fiore et al., 2008). Most of these efforts to quit, however, are unaided by on-going counseling or medication, and very few unaided attempts are successful. There are, however, evidence-based treatments that can greatly increase the likelihood of a successful quit attempt. Thus, it is essential to ensure that smokers have access to these treatments.

Access will depend on motivating both providers and patients by providing them with information, financial resources, and a supportive environment. The 2008 update of the *Public Health Service Clinical Practice Guideline* for treating tobacco use offers the suggestion that “the most effective way to move clinicians to intervene is to provide them with information regarding multiple effective treatment options and to ensure that they have ample institutional support to use these options,” and in addition, to create a “culture of health care in which failure to intervene with a tobacco user is inconsistent with standards of care” (Fiore et al., 2008, p. ix). In pursuit of this goal, the *Guideline* provides many recommendations for treatment of smokers based on systematic reviews and meta-analyses of thousands of research articles published between 1975 and 2007. Similarly concerned about making treatments accessible to smokers, the Institute of Medicine has concluded that two essential strategies that should be implemented to reduce tobacco use include: (a) funding comprehensive tobacco-control programs at levels recommended by the Centers for Disease Control and Prevention (CDC); and (b) developing regulations designed to foster policy innovations (Institute of Medicine, 2007).

This report is written to contribute to the discussion in the State of Alabama concerning public funding and policy issues regarding tobacco dependence programs for the general

population, and particularly for the Medicaid-eligible population. It presents information concerning healthcare costs attributable to smoking, savings that could be realized with reductions in smoking rates, and evidence for treatment effectiveness. First, the case of pregnant women is presented, as the medical costs and potential savings are nearly immediate with this group. Second, the case of young children exposed to secondhand smoke is presented, where the costs and savings are relatively short-term. Finally, the case of the general population is presented, where both medical costs and potential savings have greater long-term impact. Before turning to these separate populations, some specific Medicaid issues will be discussed. Various Medicaid programs and research with Medicaid populations will also be mentioned throughout the report. All costs and potential savings reported from other studies or computed specifically for this project have been adjusted to reflect 2008 dollar amounts, unless indicated otherwise, thus simplifying comparisons across studies and years. Furthermore, the costs and savings presented are for direct medical care and do not include the value of lives saved or suffering avoided, nor do they reflect indirect costs from lost work and productivity.

Specific Medicaid Issues

Over eight million Americans suffer from a smoking-caused disease, disability, or other serious health problems. Smoking is correlated with income level and education, with lower-income and less educated populations smoking more and suffering more disease and disability (Riordan, 2008b). The smoking rate among those with less than a high school diploma is 35%, while those with a college education have a smoking rate of 10%. This difference shows up early, as smoking among high school seniors who are bound for college is 19%, while the rate for non-college bound seniors is 33%. Smoking among Medicaid recipients is estimated to be much higher than smoking among the overall adult population (36% vs. 21% in 2006). In addition to smoking more and suffering more from smoking-caused diseases, those low income individuals who do smoke are less likely to quit smoking compared to higher income smokers (Riordan, 2008b). Increased access to smoking cessation services such as nicotine replacement therapies or counseling could encourage more lower-income smokers to quit.

In a review of state Medicaid programs, 43 states offered coverage for at least one form of smoking cessation treatment; but only seven offered full coverage for all FDA-approved medications and at least one form of counseling for all enrollees, and only one state covered all treatments recommended by the 2000 *Public Health Service Clinical Practice Guideline*. As of September 2008, Alabama was still among the few states that offered no coverage for smoking cessation treatments for Medicaid beneficiaries (Riordan, 2008b). Even among the states that offer coverage, many programs have limitations or barriers to coverage including co-payments, requirements for prior authorization, limits on treatment duration, and coverage of only one treatment at a time. While most states have made efforts in their Medicaid program to adopt at least one of the recommended strategies to support tobacco cessation, there is much more that could be done effectively, and more research is needed to identify and ameliorate the barriers to

greater adoption of comprehensive strategies to promote cessation (Bellows, McMenamin, & Halpin, 2007).

In addition to the greater health burden of tobacco use, lower-income smokers spend a larger portion of their income on tobacco products than higher income smokers spend. If an individual who smokes a pack of cigarettes per day becomes a nonsmoker, more than \$1300 per year could be freed up to spend on other more useful purposes, thus producing sizable benefits for the lower-income household. Other smoking-related costs, such as missed work due to illness or the illness of a child, and out-of-pocket health care expenses, are also likely to be reduced with smoking cessation, thus adding to the benefit. Furthermore, smoking-caused medical expenditures paid by the government will also be reduced through reducing tobacco use among lower-income smokers. Approximately 14% of all Medicaid expenditures are for smoking-related illnesses (Centers for Disease Control, 2005), with a range of approximately 10%-20% for individual state Medicaid program expenditures on smoking-related illnesses.

A large body of research provides evidence indicating that tobacco-dependence treatment is highly cost-effective, and even cost-saving, in certain populations (Maciosek, Coffield, Edwards, Flottemesch, Goodman, & Solberg, 2006). Yet, making such treatment available to Medicaid populations has proven to be a considerable challenge in some states, including Alabama. The Institute of Medicine has called for all insurance, managed-care, and employee benefit plans, including Medicaid, to cover reimbursement for effective smoking-cessation programs (CDC, 2008e). Critical components for reducing tobacco use among Medicaid beneficiaries include fully covering all recommended tobacco-dependence treatments; eliminating restrictions, limitations, and barriers to using treatments; promoting treatment use; and educating Medicaid recipients and providers about coverage.

THE CASE FOR PREGNANT WOMEN

Smoking prevalence among pregnant women has been decreasing, as it has for other adult populations; however, smoking remains higher for pregnant women younger than 20 years, those with less education, and those on Medicaid. Although 30%-40% of female smokers who become pregnant quit during pregnancy, it is important to reach the other 60%-70% to increase the numbers who quit. It is also important to provide support that would prevent a return to smoking following pregnancy, as there are additional risks to infants and young children who are exposed to secondhand smoke. Alabama's Pregnancy Risk Assessment Monitoring System (PRAMS) data for 2005 show that the smoking rate for new mothers increased from 19% during pregnancy to 25% three to four months after delivery (Alabama Department of Public Health, 2007a).

The case for promoting smoking cessation among pregnant women rests on the following arguments: (a) the risks related to maternal smoking for both infant and mother are clear and significant; (b) the intervention opportunity is enhanced because women are more likely to quit

when pregnant; (c) there are effective treatments to assist women in quitting; and (d) savings related to the benefits of smoking cessation accrue quickly due to short-term reduced healthcare costs both to infants and mothers.

Neonatal costs

The total of Medicaid neonatal health care costs attributable to maternal smoking has been estimated at \$311 million (adjusted to 2008 dollars; Centers for Disease Control, 2002b). The Medicaid cost for Alabama was estimated to be \$4.9 million (Adams, Ayadi, Melvin, & Rivera, 2005). Although all pregnant women should be advised and assisted to abstain from smoking, cessation programs for the Medicaid population are especially warranted, as Medicaid finances nearly half the births in Alabama, and the Medicaid population of pregnant women has a smoking prevalence rate over twice as high as privately insured women. Thus Medicaid bears a disproportionate amount of the costs attributable to maternal smoking (65%-85%).

Table 1 presents data from the CDC Maternal and Child Health Smoking-Attributable Mortality, Morbidity, and Economic Costs (MCH SAMMEC) system (CDC, 2008c) for Alabama. Until October 2008, the MCH SAMMEC application (SAMMEC 2001) provided cost estimates based on smoking prevalence and medical costs from 1996-1997. In mid-October the system was updated to use data from 2003-2004 for estimating costs (SAMMEC 2004). Because much of the research literature relies on the earlier numbers, both sets of numbers are provided in this table. In addition, more current birth and smoking prevalence data from the Alabama Department of Public Health are presented.

Table 1. Smoking-attributable neonatal costs for Alabama

	1997 data from MCH SAMMEC (2001) ^{a,b}		2004 data from MCH SAMMEC (2004) ^a		2006 data from ADPH ^c	
	Overall	Medicaid (47%)	Overall	Medicaid (46%)	Overall	Medicaid (49%)
Number of births	60,873	28,452	58,834	27,105	62,915	31,017
Smoking prevalence during pregnancy	12.4%	17.0%	11.2%	18.4%	11.8%	16.4%
Number of smoking mothers	7,548	4,837	6,589	4,987	7,424	5,087
Total neonatal expenditures ^d	\$394.1 million	\$202.1 million	\$480.9 million	\$262.6 Million		
Overall smoking-attributable fraction (SAF) of expenditures	1.91%	2.47%	0.59%	0.89%		
Smoking-attributable neonatal expenditures (SAE) ^d	\$7.5 million	\$4.9 million	\$2.8 million	\$2.4 million		
SAF among smokers	14.34%	14.43%	5.22%	5.36%		
SAE per birth ^d	\$124	\$176	\$49	\$87		
SAE per birth to smoker ^d	\$999	\$1033	\$432	\$470		

^a CDC, 2008c

^b Adams et al., 2005

^c ADPH, 2008b

^d Expenditures in 2008 dollars

Based on the previously published data (SAMMEC 2001), on average a birth to a smoking mother costs \$999 more due to expenditures related to her smoking. Reducing the number of smoking mothers would reduce these costs. The newer results from SAMMEC indicate a birth to a smoking mother costs an average of \$432 more due to smoking-related considerations. This change in smoking attributable expenditures (SAE) is due to an increase in overall neonatal costs, with a corresponding drop in the smoking attributable fraction (SAF), that is, the percent of cost (and actual cost) that is attributed to smoking risks. Further information from the CDC indicates that in recent analyses NICU admissions were no longer found to be related to mother's smoking status; however, for infants who were admitted to NICU, those with mothers who smoked during pregnancy tended to have longer lengths of stay. Thus, among NICU patients, the babies of smoking mothers tend to have increased costs; but babies of smoking mothers are no more or less likely to be admitted to NICU than babies of non-smoking mothers.

Further explanation for additional smoking-attributable costs comes from an older study (CDC, 1997) using surveys of medical expenditures in 1987. These analyses showed that estimated expenditures for an uncomplicated birth were about the same for smokers and nonsmokers (\$7,212); but the estimated costs of a complicated birth were 66% higher for smokers (\$20,648) compared to nonsmokers (\$12,403). These higher costs for smokers may be an indication of more severe complications leading to longer hospital stays for the mother, more NICU days for the infant, and greater use of specialists and other healthcare personnel.

Using 2006 smoking rates and CDC points of reference for smoking cessation programs, if 25% of pregnant smokers in Alabama received smoking cessation counseling, and 18% of these women quit smoking early in pregnancy (i.e., 4.5% quit overall), based on the 2001 SAMMEC data, almost \$334,000 in SAE health care costs could be averted in a year. Using the new SAMMEC data, over \$144,000 in SAE costs would be averted if 4.5% of smokers quit early in their pregnancy. With higher quit rates, savings would be even greater.

Turning to Medicaid births, according to the 2001 SAMMEC analysis for Alabama, a birth to a smoking mother covered by Medicaid cost an average of \$1,033 more due to expenses related to her smoking compared to a non-smoking Medicaid mother. The more recent 2004 SAMMEC results for Alabama indicate an average of \$470 in additional costs related to a mother who smokes. (The national averages for Medicaid births were \$1012 for the older estimates and \$443 for the new estimates.) Reducing the number of smoking Medicaid mothers would reduce Medicaid costs for these births. Given the ratio for State:Federal funds for Alabama's Medicaid program, these smoking-related costs per birth to a smoker can be apportioned as State = \$330, Federal = \$703 for the 2001 SAMMEC data; and State = \$150, Federal = \$320 for the 2004 SAMMEC results.

Therefore, if 25% of pregnant smokers in the Medicaid program in 2006 received smoking cessation counseling, and 18% of these women quit smoking early in pregnancy (i.e., 4.5% quit),

using the 2001 SAMMEC data, over \$236,500 in SAE Medicaid neonatal health care costs could be averted in a year. Using the new SAMMEC data, the savings would be over \$107,500.

The SAMMEC data for smoking prevalence among pregnant women are based on birth certificate information and probably underestimate the number of women who smoke while pregnant. PRAMS data, which are based on a mail survey conducted several months after delivery, show considerably higher smoking rates than the birth certificate data. The PRAMS survey, asking about smoking during the last three months of pregnancy, shows that the smoking rate among pregnant women in Alabama has increased somewhat since 2003, when it reached a low of 13.3%; in 2005 this rate was 18.6%; and in 2006 the rate was 15.4%. For Medicaid participants the rates were 27.0% in 2005 and 23.9% in 2006 (Alabama Department of Public Health, 2008a). With higher smoking prevalence, the potential savings from smoking cessation is even higher than the SAMMEC estimates would indicate. Adams et al. (2005) further note that the SAMMEC estimate is for neonatal costs only and does not include smoking attributable maternal expenses, or expenses in relation to readmissions or other outcomes after the four-week neonatal period.

One of the most direct risks for the infant of a smoking mother is low birth weight (LBW), which contributes to other complications. A CDC-Centers for Medicare and Medicaid Services (CMS) benefit-cost analysis indicated that the smoking attributable cost for neonatal health care per LBW baby is \$1,794 (CDC, 2002b). Cessation of maternal smoking before or during the first trimester of pregnancy greatly eliminates the excess risk of LBW infants, yielding immediate health and economic benefits (Lightwood, Phibbs, & Glantz, 1999). Based on the relative medical costs of low birth weight versus normal birth weight infants and the percent of LBW infants that can be attributed to maternal smoking, Lightwood et al. estimated a total of \$722 in excess costs per birth to a maternal smoker. Thus, they propose a health insurer could spend up to \$722 to create a new nonsmoker and break even by eliminating the costs of delivering a low birth weight infant to that woman. As the investigators note, these benefits accrue in the same year as the costs for promoting cessation, and they are based on neonatal costs alone, not including any cost reductions that might be related to fewer maternal complications or reductions in early childhood respiratory illnesses.

In a study that considered expenses beyond basic neonatal costs, Miller, Villa, Hogue, and Sivapathasundaram (2001) estimated total smoking-attributable costs for mothers and their infants from birth to one year of age. These costs were summed across 15 possible smoking-related outcomes (e.g., LBW, respiratory infection; 11 for infants, 4 for mothers), and yielded a range from \$1567 to \$1863 per smoking pregnant woman. For infants, birth and first-year costs attributable to smoking were estimated at \$1405-\$1681 per maternal smoker, while smoking-attributable costs for the mother were \$162-\$183.

Table 2 summarizes the available information regarding additional healthcare costs attributable to pregnant smokers.

Table 2. Smoking-attributable expenditures per pregnant smoker

	MCH SAMMEC 2001	MCH SAMMEC 2004	Lightwood et al. (1999)	Miller et al. (2001)
Neonatal costs				
U.S.	\$966	\$401	\$722	
Alabama	\$999	\$432		
U.S. Medicaid	\$1013	\$443		
Alabama Medicaid	\$1033	\$470		
Birth through first year, infant and mother				\$1567-\$1863

Treatment costs and potential savings

The magnitude of excess expense attributable to pregnant smokers suggests that insurers, including Medicaid programs, could save money if interventions are effective and not overly expensive (Adams et al., 2005). Successful interventions could lead to savings accruing from reduced use of NICU, shorter lengths of stay in the hospital, and decreased use of other services. During pregnancy, smoking has almost immediate health effects and thus almost immediate cost implications, as well. Therefore, the potential benefits of smoking cessation interventions are also likely to be realized in the short-term. As noted previously, these potential savings are particularly relevant to Medicaid, as it finances nearly half of the births in Alabama, and smoking rates are 2 to 2 ½ times higher among Medicaid mothers than non-Medicaid mothers.

Recommended treatments for pregnant smokers include various forms of counseling and pharmacotherapies, if needed. One of the most widely recommended and effective counseling formats is the Five A's intervention which can be administered by physicians or other personnel in the healthcare setting or by telephone (see p. 36 for description). Ayadi, Adams, Melvin, Rivera, Gaffney, Pike, Rabius, and Ferguson, (2006) compared the costs of implementing the Five A's intervention across three different settings: a clinical trial, a national telephone quitline for pregnant smokers, and a rural managed care organization. Costs included in the computations were personnel, materials, incentives, equipment, and initial training. The trained personnel included counselors, certified nurse midwives, and physicians, depending on the setting. Average time for the counseling ranged from five minutes to 13 minutes across the settings. Average cost per session was \$3.50-\$11.70; average cost for counseling one individual ranged from \$11.70-\$23.40; average cost for training ranged from \$9.36-\$14.00; and average total cost per individual ranged from \$28-\$40 across these settings. These figures probably overestimate the long-term costs of intervention as training costs would go down over time; in addition, practitioners may already cover some of the Five A's as part of their regular patient discussions, so there would not be as much additional cost to the time already being spent with a patient.

Table 3 presents estimates of the costs and potential savings of implementing the Five A's treatment in Alabama. The calculations use the 2006 figures from ADPH for number of smoking mothers (Table 1), the midpoint of the total treatment cost range from Ayadi et al. (2006) (\$34 per individual), an 18% quit rate for 25% treated, and the medical costs from SAMMEC (2001 and 2004), Lightwood et al. (1999), and Miller et al. (2001) as reported in Table 2. As seen in this table, when the medical savings include the infant's first year of life (the estimates in the right hand column from Miller et al.), there is a positive net annual savings and a benefit-cost ratio of more than 2 to 1 (for every one dollar spent, 2.27 dollars would be saved). In addition to these savings related to quitting smoking during pregnancy, if those who quit remain smoke-free after their pregnancy, both short-term and long-term costs could be further reduced through health-care savings to both mother and child.

Table 3. Costs and potential savings for implementing 5 A's treatment for pregnant smokers

	Total State	Medicaid	Medicaid	Medicaid	Medicaid
Number of smoking mothers (ADPH, 2006)	7,424	5,087	5,087	5,087	5,087
Estimated program cost: Ayadi et al. (2006) midpoint cost of Five A's @ \$34 each	\$215,296	\$147,523	\$147,523	\$147,523	\$172,620
Number who quit: Assume 25% treated, 18% of those quit (4.5%)	334	229	229	229	229
Medical savings per mother who quits ¹	\$432 (SAMMEC 2004)	\$753 (SAMMEC 2001)	\$412 (SAMMEC 2004)	\$511 (Lightwood et al.)	\$1715 (Miller et al.)
Total medical cost savings = number who quit x savings per quitter	\$144,288	\$172,437	\$94,348	\$117,019	\$392,735
Net annual savings = medical cost savings – program cost	(\$71,008)	\$24,914	(\$53,175)	(\$30,504)	\$220,115

A number of studies have investigated the costs and benefits of smoking cessation programs for pregnant women. In a systematic review of economic evaluations of such programs, Ruger and Emmons (2008) conclude that prenatal smoking cessation programs are relatively inexpensive on average, and that they pay for themselves because they save more than they cost. Following are some of the evaluations that led to this conclusion.

¹ Birth certificate and PRAMS data are likely to underestimate prenatal smoking prevalence because they are based on self-report data, and thus the SAEs are probably underestimated; on the other hand, Medicaid reimbursements are often at a lower level than private sector costs on which the SAMMEC data are based, which might overestimate Medicaid costs.

- Ershoff, Aaronson, Danaher, and Wasserman (1983) evaluated a prenatal health education program including smoking cessation with an HMO and found a benefit-cost ratio of approximately 2:1 in the first year of the infant's life, i.e., \$1 invested in smoking cessation yielded medical cost savings of \$2.
- In another similar investigation, Ershoff, Quinn, Mullen, and Lairson (1990) evaluated a self-help smoking cessation program that used printed materials and found a benefit-cost ratio of 2.8:1.
- Marks, Koplan, Hogue, and Dalmat (1990) reported that a program costing \$30 per participant (in 1986 dollars) would save \$3 in NICU expenses due to LBW for every dollar spent. They estimated an additional \$3.26 in long-term savings for every \$1 spent by preventing LBW disabilities.
- According to Lightwood et al. (1999), achieving a decline of one percentage point in the smoking prevalence among pregnant women could prevent 1,300 cases of low birth weight infants annually, thus saving approximately \$29.7 million in direct medical costs.
- Hueston, Mainous, and Farrell (1994) reported that a program would be cost-effective in reducing the number of low birth weight babies if the cost was less than \$146 per pregnant woman served and the success rate was at least 18%.
- Shipp, Croughan-Minihane, Petitti, and Washington (1992) modeled a break-even cost for smoking cessation treatment of approximately \$55 per pregnant woman.
- Windsor, Warner, and Cutter (1988) compared three cessation treatment protocols and found success rates of 2%, 6%, and 14%, with related costs of approximately \$189, \$215, and \$91 per pregnant woman who quit, respectively.
- In a more limited intervention, Windsor, Lowe, Perkins, Smith-Yoder, Artz, Crawford, Amburgy, and Boyd (1993) reported a cost of \$9.88 per patient for one 15-minute counseling session for a pregnant smoker by a nurse along with pregnancy-specific written materials.

In a more recent and very helpful investigation, Thorsen and Khalil (2004) conducted a pilot study of smoking cessation counseling using Medicaid claims data in Wisconsin. Average total savings per woman for those who quit smoking was \$1,525. Most of the savings was in 6-month infant health care costs, but there was also over \$230 difference in delivery and neonatal costs. Estimated average cost of counseling was \$44 (44 minutes total), and the estimated average cost per quit was \$170. Thus the return on investment (ROI) for this program was approximately 9 to 1. One of the keys to the high ROI for this pilot program was a high success rate: 35% of those who participated in the program quit smoking; and this represents 25% of all enrollees (including those lost to follow-up from moves, miscarriages, etc.).

The results of the Wisconsin pilot project highlight the fact that many of the cost and savings estimates, such as those presented in Table 3, are based on very modest success for a smoking cessation program (typically 4.5%). Where higher success rates are achieved, the potential savings are greatly increased. In Table 3, if 25% of Alabama's pregnant Medicaid smokers quit, the ROI for neonatal costs alone would be 3.55 to 1, and if first year costs are included, the 9 to 1 ROI documented by Thorsen and Khalil (2004) would also be accomplished.

Health concerns and demographic considerations

Women of reproductive age who smoke are at increased risk for adverse pregnancy outcomes and adverse health outcomes for themselves (CDC, 2008d). In addition, following pregnancy they also expose their children to secondhand smoke, increasing the children's potential for adverse health outcomes and the likelihood that they also will become smokers. Prevention and reduction of tobacco use among this group of women are essential for improving health outcomes of the women themselves and their children.

In the Surgeon General's 2001 report on women and smoking (U.S. Department of Health and Human Services, 2001), there was ample evidence linking maternal smoking to negative maternal and infant health effects; but more recent studies continue to confirm the link between prenatal smoking and fetal morbidity and mortality. Smoking during pregnancy is related to many adverse outcomes leading to increased health care costs. Most of these costs are immediate or short-term, including NICU days, length of stay, and use of services; while others can pose health problems throughout the infants' lives (Salihu & Wilson, 2007; Figueras, Meler, Eixarch, Francis, Coll, Gratacos, & Gardosi, 2008; Jaddoe, Troe, Hofman, Mackenbach, Moll, Steegers, & Witteman, 2008; U.S. Department of Health and Human Services, 2001). Examples include, but are not limited to, the following findings:

- Smokers are between 1.5 and 3.5 times more likely than nonsmokers to have a low birth weight baby (U.S. Department of Health and Human Services, 2001).
- Infants born to smokers weigh an average of 200 grams less than infants born to women who do not smoke (CDC, 2007b).
- A baby born to a smoker has 30% higher odds of being born prematurely compared to a baby born to a nonsmoker (CDC, 2007b).
- Children of mothers who smoke are more likely to have lower respiratory infection in infancy and through childhood (Environmental Protection Agency, 1993).
- Pregnant smokers are 1.8 times more likely than nonsmokers to have ectopic pregnancy (Castles, Adams, Melvin, Kelsch, & Boulton, 1999).

These smoking-related adverse outcomes are preventable, and costs can be reduced, with effective smoking cessation interventions during pregnancy. Previous studies have shown that mothers who quit smoking early in their pregnancy have birth outcomes that are similar to nonsmokers (U.S. Department of Health and Human Services, 2001), and the weight and body

measurements of their infants are comparable to those of nonsmokers. In another more recent study, Jaddoe et al. (2008) demonstrated again that smoking during pregnancy was associated with low birth weight and preterm birth, and that quitting smoking was associated with higher birth weight compared to continuing smoking.

Just as smoking prevalence has decreased in the general population, smoking during pregnancy also has decreased somewhat, and 30%-40% of female smokers who get pregnant do stop smoking when they learn they are pregnant. However, most women who smoke before pregnancy do not quit during their pregnancy (Ruger & Emmons, 2008). Estimates of smoking prevalence for pregnant women range from 12%, based on birth certificate data, to 22%, based on survey data such as PRAMS (U.S. Department of Health and Human Services, 2001). Among those who stop smoking during pregnancy, only about one third are still abstinent one year after delivery. Nationwide, smoking among pregnant women who were covered by Medicaid was 2.5 times that of pregnant women without Medicaid coverage (Lipscomb, Johnson, Morrow, Colley, Ahluwalia, Beck, Gaffield, Rogers, & Whitehead, 2000). This disparity also holds true for Alabama (Alabama Department of Public Health, 2007a, 2008a, 2008b).

Table 4 presents smoking data from the 2005 Alabama PRAMS report (Alabama Department of Public Health, 2007a). As seen here, Medicaid respondents were more than twice as likely to report smoking during and after their pregnancy compared to non-Medicaid respondents. Those with lower levels of education were also much more likely to smoke during and after pregnancy.

Table 4. Smoking data for Alabama PRAMS, 2005

	Smoked Before Pregnancy	Smoked During Pregnancy	Smoking After Pregnancy
All Alabama pregnant women	31.4%	18.6%	25.2%
Medicaid	39.0%	27.0%	34.2%
Non-Medicaid	24.3%	10.6%	16.8%
Education: 0-11 years		35.9%	42.7%
12 years		23.2%	35.3%
13+ years		7.8%	11.0%

In 2005, 48% of women delivering a baby in Alabama had Medicaid coverage; Medicaid eligibility was more likely for women who were younger, unmarried, black, or had lower education (Alabama Department of Public Health, 2007b). Most Medicaid mothers (75%) received prenatal care in the first trimester, and over 70% received adequate prenatal care; but low birth weight was more likely for Medicaid births than private insurance, and infant mortality was higher for Medicaid births than private insurance. Generally, outcomes were worse for Medicaid births than private insurance births, but better than for self-pay patients.

Table 5 presents 2005 PRAMS data showing how smoking status, race, and Medicaid status are related to low birth weight in Alabama. Overall, smokers are about 35% more likely than non-smokers to have a LBW baby, and in all categories across race and Medicaid status, smokers have higher rates of LBW than non-smokers. Mothers covered by Medicaid are 42% more likely than non-Medicaid mothers to have a LBW baby. Mothers who are white are less likely than members of other racial groups to have a LBW baby.

Table 5. Low birth weight by smoking status from Alabama PRAMS, 2005

% Low birth weight born to:	Smokers	Non-smokers	Total
Total	12.2%	9.0%	9.6%
Medicaid	12.2%	10.9%	11.2%
Non-Medicaid	19.9%	7.4%	7.9%
White	10.8%	6.2%	
Black & other	18.3%	15.5%	

Treatments – effectiveness and reach

According to the Surgeon General’s 2001 report on women and smoking (U.S. Department of Health and Human Services, 2001), tobacco use treatments are among the most cost-effective of preventive health interventions. As such, they should be part of all women’s health care programs, and health insurance plans should cover such services. Furthermore, efforts to maximize and maintain smoking cessation among women before, during, and after pregnancy deserve high priority, not only because of health outcomes for the fetus, but because of health outcomes for the mother. Pregnancy is a time of high motivation to quit and occurs when women have many years of potential life left (Rohweder, DiBiase, & Schell, 2007), thus the return on investment is likely to be high.

The *Clinical Practice Guideline* (Fiore et al., 2008) echoes these recommendations, indicating that whenever possible, pregnant smokers should be offered person-to-person psychosocial interventions that exceed minimal advice to quit. Clinicians should offer effective tobacco dependence interventions to pregnant smokers at the first prenatal visit as well as throughout the course of pregnancy (CDC, 2007b).

Physician advice

Psychosocial interventions are significantly more effective than usual care in getting pregnant women to quit smoking while they are pregnant. Self-help materials also are effective compared to basic information sheets or no interventions.

There is considerable agreement that a brief 5-15 minute counseling session with pregnancy-specific materials increases cessation rates for women who smoke less than 20 cigarettes a day (CDC, 2002b; Goldenberg, Klerman, Windsor, & Whiteside, 2000). Use of the Five A’s strategy has been shown to have a modest, clinically significant effect on cessation rates for pregnant

women, and Windsor et al. (1988) reported that pregnancy-specific smoking cessation materials increased quit rates and were more cost-effective than nonspecific materials.

In the 1990s, a number of innovative programs designed to evaluate various methods to increase smoking cessation, especially among low-income pregnant smokers, were found to be less effective than anticipated primarily because the interventions apparently had a low priority both for staff and patients themselves. In these interventions, the smoking abstinence messages had to compete for attention in the public health clinic setting with a variety of other important health messages including HIV and STD prevention, nutrition, drug and alcohol use, domestic violence, and breast feeding (Goldenberg et al., 2000). Finding ways to promote all of these messages continues to be a challenge.

Ruger, Weinstein, Hammond, Kearney, and Emmons (2008) compared motivational interviewing (three one-hour home visits) with usual care (5-minute counseling with self-help materials provided) among low-income women. They found that motivational interviewing was more effective at preventing smoking relapse, but surprisingly, it was no more effective than usual care in promoting smoking cessation, and it was more costly.

Some programs have suggested that monetary incentives might increase smoking cessation among pregnant women. Heil, Higgins, Bernstein, Solomon, Rogers, Thomas, Gadger, and Lynch (2008) tested the success of a voucher-based reinforcement therapy program for smoking abstinence during pregnancy. They found that when vouchers were earned for abstaining, smoking abstinence was significantly higher than when voucher receipt was independent of smoking abstinence. The difference was significant both at the end of pregnancy (41% vs. 10%) and 12-weeks following delivery (24% vs. 3%). Importantly, Heil et al. also reported significantly greater growth of the fetus in the contingent group where vouchers were linked to abstinence.

Quitlines

Another area of agreement is on the need to do more to reach the population of low-income women where smoking rates are highest. This can be accomplished by providing counseling early in prenatal care, but also through quitline promotions that might reach pregnant women even before they are enrolled in prenatal care.

Telephone counseling, or quitline counseling, offers a relatively inexpensive and convenient way of delivering cessation counseling. For pregnant smokers, studies have reported abstinence rates of 18%-25% for telephone counseling (Rohweder et al., 2007). All states now have telephone counseling or quitline services for tobacco users, but many do not have specific protocols or materials for pregnant and post-partum callers. Quitlines have been shown to be an effective counseling format for pregnant smokers who wish to quit, and they can be enhanced easily to address the needs of this group. According to Rohweder et al. (2007) such enhancement should include additional counselor training on pregnancy issues, pregnancy-

specific materials, targeted media promotion, and implementation of a fax referral system from health care settings to the quitline. They estimate the average costs of the counseling, training, and materials to be \$30 per client, although increasing the volume of callers would lower the per caller cost of the training.

Medicaid issues

Most women in the Medicaid population, in fact, do recall a discussion with their healthcare provider about smoking (Petersen, Clark, Hartmann, & Melvin (2005). For PRAMS data from 15 states, 93% of smokers and 88% of nonsmokers reported such discussions. For Alabama 2006 PRAMS data, these figures are similarly high, with 92% of Medicaid smokers and 83% of Medicaid non-smokers remembering a discussion with their provider about smoking. However, the analysis by Petersen et al. found that recall of such a discussion was actually associated with lower levels of quitting smoking. Clearly there is room for improvement in the effectiveness of these discussions. Appropriate training and financial reimbursement for treating smoking dependence would potentially increase the impact of such conversations.

To help make smoking cessation intervention a priority, it needs to be part of the protocol for all pregnant patients. The time devoted to counseling and the costs of appropriate pharmacotherapy need to be covered in the treatment regimen. To this end, the new Maternity Care Program Operation Manual for the Alabama Medicaid Agency (2008), implemented in October 2008, delineates duties of the care coordinator that include asking about smoking, recommending quitting, and providing counseling and resources (QUITline number) for quitting. This topic is to be covered at each of four encounters between the care coordinator and the pregnant woman, and at a follow-up home visit if warranted. These new guidelines are a welcome addition to the Medicaid program, and it is recommended that the impact of this program, its costs and effectiveness, be tracked carefully over the next several years.

In 2006, 39 states provided some coverage for smoking cessation interventions for all Medicaid recipients, and another four provided benefits for pregnant recipients. Only one state provided coverage for all recommended services including counseling and a full range of pharmacotherapy options. Alabama was one of eight states that provided no Medicaid coverage for smoking cessation interventions (CDC, 2008e). Again, the new guidelines are an important step in the right direction.

Petersen, Garrett, Melvin, and Hartmann (2006) compared states with differing levels of Medicaid coverage for prenatal smoking cessation: those covering both counseling and pharmacotherapies; those covering either counseling or pharmacotherapies, but not both; and those covering no treatments. They found significant differences both for quitting smoking and for maintenance of smoking cessation. The quit rates were 51%, 43%, and 39% for women in states with extensive, some, or no coverage, respectively. In states with extensive coverage, 48% of women who quit maintained cessation after delivery, compared with 37% of women in states

with no coverage. Thus Medicaid coverage for both counseling and pharmacotherapies yielded higher rates of quitting and maintenance of cessation, highlighting the importance of continuing to increase Medicaid reimbursement for smoking cessation interventions.

With regard to smoking cessation among pregnant women, there are clear benefits to quitting, scientific consensus on treatment, and evidence of considerable short-term return on investment. Although these factors should be sufficient to ensure that all pregnant smokers are treated for tobacco use, this is not always the case. Barker, Orleans, Halpin, and Barry (2004) have suggested several steps that should be taken to achieve this goal.

- First among these steps is expanding Medicaid to include coverage for, and promotion of, effective counseling services for pregnant smokers in all states. As they point out, Medicaid coverage is a particularly important part of the answer because smoking during pregnancy is more prevalent among the Medicaid population. Barker et al. concluded that until there is a federal mandate for Medicaid to cover tobacco dependence treatments, all state Medicaid programs should be encouraged to offer comprehensive coverage to help pregnant women and mothers quit smoking.

Additional important steps identified by Barker et al. for ensuring treatment for all pregnant smokers include:

- building the capacity of prenatal providers and health care systems to deliver effective treatments through comprehensive, system-wide initiatives;
- encouraging purchasers of private and public health benefit packages to demand coverage for, and promotion of, effective counseling services for pregnant smokers; and
- redirecting state resources to ensure a statewide system of care for pregnant smokers.

Barker et al. maintain that states have an obligation to provide a comprehensive tobacco control program to their citizens; and programs that save money, such as those for pregnant women, should be a particularly high priority in every state. They further suggest that various departments serving pregnant women who smoke (e.g., maternal and child health offices, tobacco control programs, Medicaid programs) can pool their resources to serve this population and their providers more efficiently.

Even if Medicaid benefits included the full range of treatments for tobacco dependence for pregnant women, additional work would need to be done to reach the population of low-income women. Several surveys in states with full Medicaid coverage showed that only 60% of Medicaid providers and just 36% of Medicaid smokers were aware that Medicaid covered any tobacco dependence treatments. Wherever Medicaid coverage is available, promotional efforts among providers and recipients are needed to increase their awareness both of effective treatments and of financial coverage for treatments. In addition to covering the services, the availability of coverage needs to be promoted and early enrollment encouraged. Counseling on

smoking cessation is most important and most beneficial during the early stages of prenatal care (Adams et al., 2005).

The CDC recommends that state Medicaid agencies and state health departments work together to support initiatives that provide and promote smoking cessation benefits to reduce smoking during pregnancy. This includes providing training for providers on tobacco use screening, counseling, and other interventions. Relapse rates for new mothers are close to 70%, indicating the need for major advances in preventing relapse. Furthermore, there is a need to make strides in reducing smoking among the heaviest smokers. This group is most likely to have adverse outcomes and least likely to quit smoking spontaneously or with counseling (Goldenberg et al., 2000).

THE CASE FOR CHILDREN

Secondhand smoke and children

For many children the risks associated with tobacco smoke come from living in a household in which there are adult smokers. The 2008 *Clinical Practice Guideline* has the following advice about children and exposure to secondhand smoke: Secondhand smoke is harmful to children. Cessation counseling delivered in pediatric settings has been shown to be effective in increasing cessation among parents who smoke. Therefore, to protect children from secondhand smoke, clinicians should ask parents about tobacco use and offer them cessation advice and assistance (Fiore et al., 2008).

Healthcare costs

Children exposed to secondhand smoke (environmental tobacco smoke, or ETS) at home are at increased risk for a number of health concerns, and particularly for respiratory conditions. Several studies have attempted to calculate annual excess healthcare expenditures associated with exposure to smoke in the home. In a study of respiratory conditions among children ages 0-4, Hill and Liang (2008) found an increased probability of emergency department visits and inpatient hospital stays for children exposed to ETS at home. This increased use of healthcare services resulted in additional annual healthcare expenditures, estimated as shown in Table 6 below.

Table 6. Comparison of healthcare services for children living in homes with smokers vs. homes with no smokers

	Smoking in home	No smokers in home	Regression analysis, adjusted difference
Percentage with hospital stays	4.3%	1.1%	3.1 percentage points
Percentage with emergency department visits	8.5%	3.6%	4.8 percentage points
Annual expenditures per child	\$311	\$171	\$133
Annual expenditures among those with any expenditures	\$752	\$384	
Percentage with any bed days	21.6%	13.6%	8.4 percentage points

As seen in this table, the difference in annual expenditures per child was estimated to be \$133; and it should be noted that this expense is for direct medical services and does not include other out-of-pocket costs such as over-the-counter medication, transportation costs to obtain care, or parents' lost wages while caring for children. These results are consistent with earlier studies also showing higher respiratory expenditures and hospitalization rates for children exposed to ETS (Lam, Leung, & Ho, 2001; Stoddard & Gray, 1997).

According to PRAMS Surveillance Reports for Alabama (Alabama Department of Public Health, 2007a, 2008a), 23%-25% of new mothers were smoking at the time of the survey, that is, 2-4 months following the birth of their child. An even higher percentage of Medicaid-supported mothers (33%) reported smoking at the time of the survey. Combining these figures for new mothers with the dollar figure from the Hill and Liang study, Table 7 shows that in a one-year period, infants and children from homes where there is a smoker account for an additional \$1.91 million dollars in medical costs for respiratory problems, and Medicaid-eligible children alone account for \$1.36 million additional respiratory-related expenditures.

Table 7. Additional respiratory-related expenditures for children from homes with smokers

	Alabama	Medicaid
Number of births (2006 ADPH data)	62,915	31,017
Smoking prevalence after pregnancy (PRAMS, 2006)	22.8%	32.9%
Number of smoking mothers	14,345	10,204
Additional respiratory expenditures per child under 5 years old from smoking household (Hill & Liang, 2004 dollars)	\$133	\$133
Total additional respiratory expenditures (1 child per smoking mother)	\$1,907,885	\$1,357,132
Number of new non-smokers if 25% receive services and 18% of these stop smoking	646	459
Savings if 4.5% successfully stop smoking	\$85,918	\$61,047

Following the treatment utilization and cessation points of reference used by the CDC, if 25% of smoking mothers with new infants received smoking cessation counseling, and 18% of these women quit smoking during pregnancy or following the birth of their child (i.e., 4.5% of the total quit), nearly \$86,000 in respiratory care expenditures for young children could be averted in a year.

If 25% of smoking Medicaid mothers with young children received smoking cessation counseling, and 18% of these women quit smoking during pregnancy or following the birth of their child (i.e., 4.5% quit), over \$61,000 in respiratory care expenditures for young children could be averted in a year. In addition to these savings for the newborn infant, there would likely be other savings for children already in the household who also would benefit from the reduction of ETS.

Using several national databases, Florence, Adams and Ayadi (2007) considered annual health care costs for children ages 12 and under and also found a positive relationship between exposure to ETS at home and having any respiratory expenses during the year. Children exposed to smoke at home also had greater expenses if there were any expenses not related to respiratory illness. When looking at all expenses together, however, Florence et al. found an overall negative relationship between children's exposure to ETS and having *any* expense in the year. In other words, children exposed to ETS were less likely to have any health care expenses, but if they did, the expenses were likely to be higher than those of children not exposed to ETS. The investigators suggest this negative relationship may reflect a higher threshold for smoking parents in seeking medical attention for their child, which they posit is consistent with studies indicating that adult smokers have a lower tendency to seek preventive care, thus decreasing their use of discretionary health services. Once the threshold is reached, however, the child tends to be sicker and higher expenses occur.

Health concerns

Overall, parental smoking results in substantial annual direct medical expenditures for children (\$6.85 billion, according to Aligne and Stoddard [1997]). This is clearly an area that warrants additional efforts to reduce children's exposure and prevent unnecessary morbidity.

There are two ways in which parental smoking affects children's health outcomes: there are the prenatal effects from the mother smoking or being exposed herself to secondhand smoke; and there are the postnatal effects from either parent (or other household member) smoking after the child is born. In a Norwegian study, following children for the first 18 months of life, Haberg, Stigum, Nystad, and Nafstad (2007) found that children exposed to parental smoking, whether prenatal, postnatal, or both, had increased risk of lower respiratory tract infection, hospitalization, and wheeze conditions. The greatest risk was associated with prenatal exposure to maternal smoking, but postnatal effects for parental smoking were also significant.

Many children are exposed to secondhand smoke in their home. Because their lungs are still developing, very young children are especially at risk from secondhand smoke. In addition, young children are likely to spend more time at home compared to adults and older children, thus increasing their vulnerability to ETS in the home. Respiratory tract symptoms and respiratory disease are common in childhood, accounting for about 25% of hospitalizations or emergency department visits for young children (Hill & Liang, 2008).

The causal relation between exposure to secondhand smoke and respiratory conditions has been well established. According to a report of the Surgeon General (U.S. Department of Health and Human Services, 2006) children exposed to secondhand smoke are at increased risk for a variety of health problems including sudden infant death syndrome (SIDS), acute respiratory infections, ear infections, and more severe asthma. In the Surgeon General's report, the chapter on respiratory effects on children lists the following conditions for which there is sufficient evidence to infer a causal relationship from secondhand smoke exposure from parental smoking: lower respiratory illnesses; middle ear disease, including acute and recurrent otitis media and chronic middle ear effusion; cough, phlegm, wheeze and breathlessness; asthma; lower level of lung function. Aligne and Stoddard (1997) estimated that annual excess cases of childhood illness attributable to parental smoking included the following: 22,000 cases of respiratory syncytial virus bronchiolitis; 3.4 million outpatient visits due to acute otitis media; 110,000 cases of tympanostomies for otitis media; 1.8 million outpatient visits for asthma.

Treatment - decreasing ETS in the home

ETS may affect 30%-40% of children in the United States. One important strategy for reducing the effects of ETS on children is to reduce the smoking prevalence in households with children. All smoking cessation programs for pregnant women and the general population can contribute to this effort. Another strategy is to reduce the exposure of children by altering the smoking behaviors of parents, such that they do not smoke in the presence of their children or in areas where the children spend time. A question from the PRAMS asks the mother, "About how many hours a day is your baby in the same room with someone else who is smoking?" Among Alabama's Medicaid smokers, 78.5% say 0; while 90.7% of non-Medicaid smokers say 0; 90.4% of Medicaid non-smokers say 0, and 96.0% of non-Medicaid, non-smokers say 0 (Alabama Department of Public Health, 2007a). These results indicate that most parents, even smokers, try to keep from exposing their babies to environmental tobacco smoke; but it appears that babies of Medicaid smokers are exposed to more cigarette smoke than babies in any other group.

A study by Hovell, Zakarian, Matt, Hofstetter, Pernert, and Pirkle (2000) tested the effects of a counseling program for smoking mothers on reductions in exposure of their children to ETS. The trial tested a combined in-person and telephone counseling program among low income families with children younger than four years. Based on self-reports over a 12 month period, children's exposure to tobacco smoke declined steeply, for both the counseling and the control groups, from baseline to three months, and then remained at approximately the same level

through 12 months of follow-up. There were significant differences between groups, however, with a greater decline in exposure for the counseling group. The pattern was similar both for exposure to mother's smoke and total exposure to environmental smoke. This intervention was designed to reduce children's exposure to ETS, not specifically to promote smoking cessation; and in fact, there were no significant differences in the number of mothers who stopped smoking (9% overall) during the study. Nevertheless, by the end of 12 months, children's exposure to smoke in the counseling group was less than half that of children in the control group. This study indicates that counseling for parents that includes help in reducing their children's exposure to ETS can be beneficial, even without a focus on smoking cessation.

Adolescents and smoking

In addition to reducing secondhand smoke exposure in children, there is also a need to reduce the smoking prevalence rates among this group. In 2000, smoking rates for all U.S. children were 15% for 8th graders, 24% for 10th graders, and 31% for 12th graders (Barry, 2001). In Alabama, the prevalence of smoking for 2004 in grades 9-12 was 24%, representing 47,000 children and ranking 27th among the 50 states (CDC, 2006). Smoking prevalence data specifically for Medicaid-eligible children and adolescents are not available; but with the smoking rate among Medicaid beneficiaries overall being higher than the smoking rate among the general population (35% vs. 24% in 2000, [Barry, 2001]), it is highly likely that Medicaid-eligible adolescents smoke at a higher rate than the nationwide rates. Adolescents who are active smokers have an increased short-term risk for respiratory illnesses and increased longer-term health risks if they continue smoking. While most tobacco control efforts targeting adolescents tend to focus on prevention of uptake of smoking, adolescents who have started smoking should receive interventions to encourage and assist them in quitting. For Medicaid beneficiaries, states are required to provide limited cessation coverage for adolescents through the Early and Periodic Screening, Diagnostic, and Treatment program. According to the *Clinical Practice Guideline* (Fiore et al., 2008), clinicians should ask pediatric and adolescent patients about tobacco use and provide a strong message regarding the importance of totally abstaining from tobacco use. Additionally, adolescent smokers should be provided with counseling interventions to aid them in quitting smoking as well as pharmacotherapies when needed.

THE CASE FOR THE GENERAL POPULATION

Background

In 2007, an estimated 19.8% (43.4 million) of U.S. adults were current smokers, a decrease of 1.0 percentage point from 2006 (20.8%). This was the first decline in three years, as the rate had remained basically the same from 2004 through 2006 (CDC, 2007a, 2008c). Within this overall rate, large disparities in smoking prevalence continue to exist by race/ethnicity and education levels. The prevalence is higher among American Indians/Alaskan natives, persons

with GEDs or less, and persons with family incomes below the federal poverty level, all pointing to the need for more effective policies and interventions to reach and assist these subpopulations (CDC, 2008a).

Considering state level data, the Behavioral Risk Factor Surveillance Survey (BRFSS) for 2006 reported a median national adult cigarette smoking prevalence rate of 20.2%; for Alabama the 2006 prevalence was 23.3% (men 26.3%; women 20.6%), and the rate for 2007 was 22.5% (CDC, 2006; CDC, 2007c). The U.S. prevalence rate among 18-35 year olds was 25.3%; for Alabama this rate was 27.6%. Thus, the prevalence rate for Alabama is somewhat higher than for the U.S. as a whole. In fact, Alabama ranks 41 among the states for smoking prevalence, where 1 is the lowest rate. In Alabama, rates by education level follow the national trends: < 12 years: 34.6%; 12 years: 26.7%; > 12 years: 19.4%. Smoking prevalence is also related to income as follows: family income less than \$35,000: 30.7%; \$35,000 or more: 19.6% (CDC, 2006).

Smoking cessation has major long term and immediate health benefits for persons of all ages. Furthermore, smokers who quit before the age of 35 have a life expectancy similar to that of lifetime non-smokers. A majority (59%) of current smokers aged 18-35 in the U.S. say they have quit for at least one day during the past year, and 67% of 18-35 year-old smokers in Alabama say they quit for at least a day in the past year. In 2006, among people aged 18-35 who had ever smoked, 34% in the U.S. had quit; and 29.5% in Alabama had quit (CDC, 2007c). In another survey in 2004, 47% of smokers of all ages in Alabama said they had attempted to quit in the past year (CDC, 2006).

Lack of funding for comprehensive state tobacco-control programs contributes to the barriers to achieving progress in increasing smokers' successful quit attempts. The CDC has provided recommendations to all states regarding the amount of spending they should do on tobacco control and prevention programs. In 2005, mean per capita spending on tobacco control was \$2.76, with states ranging from \$0 to \$11.00. At that time, CDC had recommended state-specific per capita annual expenditures of \$9.23-\$18.03 by state tobacco control programs, and no state was meeting its target as set by CDC (CDC, 2008a). Money for tobacco control programs is expected to be generated from tobacco taxes and tobacco settlement revenues. Following is the relevant information concerning this funding issue for Alabama in 2007 (Lindblom, 2006b; Riordan, 2008a).

- State tobacco tax revenues 2007: \$162.3 million
 - Cigarette tax per pack: \$.425
 - Cigarette tax rank: 43 (1=high)
- State tobacco settlement revenues 2007: \$94.3 million
- State tobacco prevention spending \$.68 million
 - CDC minimum spending target: \$26.7 million
 - Percent of CDC minimum spent for tobacco control: 2.9%
 - CDC percent spending rank: 49 (1=high)

As seen from these numbers, in 2007 Alabama collected over \$250 million in tobacco taxes and settlement revenues, but it spent less than \$1 million on tobacco prevention and control programs, i.e., less than 3% of the amount CDC considers the minimum spending target. Alabama's policy makers decided these funds are needed more in other areas.

Costs of health care

Although smoking prevalence in the U.S. has decreased substantially since the 1960s when it was about 44%, cigarette smoking continues to result in substantial costs. Approximately one in five adults in the United States smokes cigarettes (CDC, 2008a), and smoking is the leading cause of preventable disease and death among adults in the U. S. It is the major cause of cancer and cardiovascular and respiratory diseases. For each person who dies from a smoking-related disease, an estimated 20 more are living with a smoking-attributable illness (CDC, 2006). Smoking-attributable personal medical expenditures have been estimated to represent an excess of \$2,097 for each of the 46.5 million adult smokers (CDC, 2002a). The total economic costs have been estimated at \$99.7 billion in health care costs and \$121.5 billion in productivity losses (CDC, 2007a). For each pack of cigarettes sold in the U.S., \$4.46 was spent on smoking-attributable medical care and \$4.82 in productivity losses were incurred, for a total of \$9.28 per pack (CDC, 2002a). For Medicaid, the estimated cost of adult smoking (excluding neonatal costs) in 1997 was more than \$22.8 billion (2008 dollars), that is, 12.1% of all Medicaid expenditures (Zhang, Miller, Max, & Rice, 1999).

Several estimates of annual smoking-attributable medical costs for Alabama are presented in Table 8. The middle column presents data for the entire state, and the right-hand column presents data for the Medicaid population. The first set of state estimates are based on data from the Adult SAMMEC website sponsored by CDC for 2004 (CDC, 2008b). The second set of state estimates and the Medicaid estimates are based on 2004 data from the CDC's State Data Highlights (CDC, 2006). As seen here, estimated annual smoking-attributable health costs are approximately \$1800-\$1900 per smoker for the state and approximately \$1500 per smoker when considering the Medicaid population alone.

Table 8. Smoking prevalence and smoking caused health cost estimates for Alabama

	State total 2004		Medicaid 2004
Total population ^a	4,603,594		935,539 eligible
Adults	3,266,063		447,174
Children	1,337,531		488,365
Adult smoking prevalence	24.9% ^b		36% ^c (national rate)
Number of smokers	891,000		178,124
Adults	844,000 ^b		160,982
Youth	47,000 ^b		17,142 ^d
	SAMMEC (2004)	CDC State Highlights (2004)	\$271 million ^b -- State: \$84.5 mill. Federal: \$186.7 million
Annual smoking caused health costs	\$1,638 million	\$1,708 million	
Annual smoking caused cost per smoker	\$1,837 ^e	\$1,917 ^e	\$1,523 ^e

^a Source: Alabama Medicaid Agency report, 2004

^b Source: CDC State Data Highlights (CDC 2006)

^c Source: Riordan (2008b)

^d Estimated as comparable to the state total of 3.51% of all children

^e Computed for this report from figures in preceding rows

Estimates such as these, of excess medical costs for smokers, do not necessarily represent the savings that would accrue if the smokers were to quit. In fact, there have been some suggestions that smokers who quit actually cost the healthcare system more than those who continue smoking. Fishman, Khan, Thompson, and Curry (2003) conducted a nine-year retrospective cohort study to estimate long-term health care costs of former smokers compared with continuing and never smokers. They found that for smokers who quit, costs were significantly greater in the year immediately following cessation compared to those who continued to smoke, but former smokers' costs fell in year two. This decrease was maintained throughout the next six year follow-up period, with costs significantly lower for former smokers by the seventh year after the quit. Costs among both former and continuing smokers were higher than never smokers in each year. As Fishman et al. point out, we should not expect that smoking cessation will immediately reverse the need for health care that results from years of smoking, but there is no evidence from their study that smoking cessation increases health care costs when considering outcomes two years or more after quitting. *Any net increase in costs among former smokers relative to continuing smokers appears to be compensated for within two years.* The initial increase in costs is likely due to cessation occurring in the midst of a serious health episode and to attention to postponed or ignored health care needs from the pre-quitting period. In this study, it also is instructive to note that former smokers had higher Chronic Disease Scores

prior to quitting than continuing smokers or never smokers, which would lead to a prediction that their health care costs would increase over time relative to the other categories. Thus, it is possible that former smokers, while not substantially less expensive than continuing smokers for the first six years, may be less expensive *than they would have been* if they had not quit smoking. This intriguing hypothesis warrants further investigation and analysis.

Treatment costs and potential savings

This section reviews some of the literature regarding costs and potential savings for smoking cessation treatments. All such estimates require making certain assumptions about the utilization and success rates of the treatments as well as the healthcare costs that can be attributed to smoking or could be avoided if smoking were stopped.

In addition to the various assumptions that must be made, cost effectiveness can be measured in a variety of ways. The CDC's *Clinical Practice Guideline* (Fiore et al., 2008) provides the following summary statements about various assessments of cost effectiveness.

- In terms of cost per quality-adjusted-life-year (QALY) saved, the cost of tobacco use treatment has been estimated to range from a few hundred to a few thousand dollars, which compares quite favorably with other prevention and chronic disease interventions (e.g., hypertension, mammography screening). For example, in 1998 Curry, Grothaus, McAfee, and Pabiniak reported the cost per QALY for smoking cessation treatment of \$883, while the cost per QALY for hypertension treatment was \$11,300 (1998 dollars).
- Considering the cost per successful quit, the cost of tobacco use treatments has been modest compared to other interventions, ranging from a few hundred to a few thousand dollars per quit.
- Per member per month (PMPM) cost for tobacco use treatments has been low relative to other covered benefits, ranging from about \$0.20 to about \$0.80 PMPM.
- Pre- and post-quit health care cost comparisons are another way to measure effectiveness. As noted above, health care costs for individuals who quit smoking have been found to be somewhat higher during the year in which the quit takes place, followed by a progressive decline to levels below those of continuing smokers. Studies have found that health care utilization and costs tend to rise just prior to the quit attempt, suggesting that quitting smoking is often a response to a health problem, thus explaining part of the increase in costs during the year in which the cessation occurs.
- Return on investment (ROI) models have shown that tobacco dependence treatments covered by employers provide a timely return on investment when all costs and savings are considered, including healthcare costs, increased productivity, reduced absenteeism, and reduced life insurance payouts. Positive ROI savings can be somewhat more difficult

to show for health plans where only the health care costs are considered. Still tobacco cessation treatment has been found to be cost-effective, particularly in certain populations, such as pregnant women and hospitalized patients.

Different measures are used in different studies, sometimes making direct comparisons difficult.

Relationship between usage and coverage

Although a large percentage of smokers would like to quit, the use of smoking-cessation services varies according to the extent of coverage from insurance plans. The highest rates of use occur among smokers with full coverage for cessation treatment (Curry et al., 1998). In a longitudinal, natural experiment, Curry et al. compared the use and cost effectiveness of four insurance plans for smoking cessation services among seven employers, involving over 90,000 enrollees. The plans ranged from 50% coverage for both nicotine replacement therapy and a behavioral program (reduced coverage) to full coverage of both NRT and behavioral programs. The other two plans covered 100% of either NRT or counseling and 50% of the remaining service. Across these plans, the annual rate of use of services ranged from 2.4 % for the reduced coverage plan to 10 % for the full coverage plan. Thus, removing the copayments (i.e., full coverage) resulted in a tripling of the overall rate of use of services.

Successful smoking cessation rates among the four plans ranged from 28% (full coverage) to 38% (full NRT, 50% counseling). Based on utilization and quit rates, the estimated percentage of all smokers who would quit smoking per year as a result of using services ranged from 0.7% (reduced coverage) to 2.9% (full coverage). Average cost to the health plan per user who quit was \$1,052 to \$1,547. The annual cost per smoker ranged from \$7.92 (reduced coverage) to \$43.59 (full coverage), and the annual cost per enrollee ranged from \$1.18 (reduced coverage) to \$6.50 (full coverage).

Although the rate of smoking cessation among those with full coverage was actually lower than the rates among users with plans requiring copayments (likely due to a difference in motivation levels), the effect on the overall prevalence of smoking was greater with full coverage because the utilization rate was higher. Thus even with a slightly lower smoking-cessation rate under full coverage, it was estimated that at least one and a half times as many smokers would quit per year under full coverage as under any of the other three coverage plans. This increase would cost a health plan about \$3.49 to \$5.32 more per enrollee per year (or \$0.29 to \$0.45 per enrollee per month).

Savings for heart disease and stroke

Policy makers tend to take a short-term view of spending issues and find it difficult to justify current expenditures to save money far in the future. Therefore, as noted by Lightwood and Glantz (1997), investments in reducing smoking prevalence among adults often are not viewed as attractive because of the time it takes to see reductions in treatment costs due to prevention of

cancers and lung diseases. When considering the impact of smoking cessation on heart disease and stroke, however, the benefits actually accumulate more rapidly. Treatment of heart attacks and strokes is quite expensive, and excess risk of myocardial infarction or stroke falls by 50% within the first two years after a person stops smoking. Thus the prevention of heart attacks and strokes provides an opportunity for nearly immediate savings or financial returns.

Lightwood and Glantz (1997) estimated short-term savings in direct medical expenditures and short-term rehabilitation due to reductions in acute myocardial infarction (AMI) and stroke following smoking cessation. Their estimates showed an immediate savings (within 1 year) if there was a 1% absolute reduction in smoking prevalence among 35-64 year olds (this corresponds to 3%-4% quit rate). According to their computations, an individual who quits smoking will reduce anticipated medical costs associated with AMI and stroke by \$66.40 in the first year, with a discounted present value of \$1,205 during a 7-year-period. In other words, quitting smoking reduces anticipated medical costs associated with these two conditions by \$1,205 during the next 7 years.

Lightwood, Fleishmann, and Glantz (2001) further argue that the benefits of smoking cessation in patients who already have heart failure also accrue rapidly, and in these cases, smoking cessation is more appropriately considered therapy rather than a prevention intervention. Where smoking cessation treatment is therapy for tobacco dependence as a contributory factor to a primary smoking-related disease, it should be, and often is, covered by insurance programs. In fact, Suskin, Sheth, Negassa, and Yusuf (2001) demonstrated that smoking cessation among smokers with heart failure was as effective as treatment with medications. Lightwood et al. (2001) also reported for a statewide California smoking cessation program that the short-term savings in direct medical costs associated with reductions in heart attacks and strokes alone was enough to pay for a major public tobacco control program.

Costs for quitline services

Telephone counseling services, often referred to as quitlines, are widely used to provide smoking cessation counseling. Like all states in the U.S., Alabama has a statewide quitline counseling service, which is administered by the Alabama Department of Public Health. Costs for quitline counseling and nicotine replacement therapy (NRT) provided by a quitline have been estimated here based on data from the Alabama Quitline for the one-year period from June 30, 2007 through June 29, 2008 (Hare, 2008). For this period, the total annual operating costs were \$363,759; total annual cost for NRT was \$95,922 (1,764 patients received full NRT at a rate of \$58 for four weeks of nicotine patch); yielding total program costs of \$459,681.

Over the one year period, the overall call volume was 19,931 calls, including inquiries, intakes, counseling, and follow-up calls. Additional miscellaneous calls and failed contacts yielded a total in and out call volume of 56,604. There were 6,239 independent inquiries made to the Quitline; 3,482 intakes were completed (19.4% were covered by Medicaid or by both

Medicare and Medicaid); 2,762 individuals started treatment; 1,735 completed four telephone counseling sessions; 922 were abstinent 30 days after quitting; and 384 were still abstinent 6 months after quitting. Using these figures, Tables 9 and 10 present the treatment outcomes and treatment costs for Alabama’s quitline. In these tables, if the individual could not be contacted for follow-up, relapse is assumed; thus these are conservative estimates of successful quitters and therefore may overestimate costs per successful quit, as there may be more successful quitters than is recorded.

Table 9. Treatment outcomes for Alabama’s quitline

Completed treatment	62.8% (of those who started treatment)
Quit at 30 days	33.4% (of those who started treatment)
Quit at 30 days	53.1% (of those who completed treatment)
Quit at 6 months	22.1% (of those who completed treatment)
Quit at one year	10.6% (of those who completed treatment)

Table 10. Treatment costs for Alabama’s quitline

Cost per call (excluding NRT costs)	\$18.25
Cost per call with NRT expenditures	\$23.06
Cost per person beginning treatment	\$166
Cost per person completing treatment	\$265
Cost per successful quit at 30 days	\$499
Phone costs only	\$395
NRT costs	\$104
Cost per successful quit at 6 months	\$1,197
Phone costs only	\$947
NRT costs	\$250
Cost per person quit at 1 year	\$2,498

The Quitline counselors are available 60 hours per week, for a total of 3,120 hours per year, assuming they are available 52 weeks of the year. This results in \$116.59 in operating costs per hour at the current operating levels. On average, 6.39 calls are completed per hour (18.14 calls per hour, considering total in and out call volume).

Overall savings and return on investment estimates

The Campaign for Tobacco-Free Kids has published a number of factsheets and other informational documents that use available data to estimate costs and savings for implementing tobacco cessation programs. One such publication (Lindblom, 2002a), estimates that reducing the adult smoking rate in Alabama by one percentage point would result in a 5-year savings from

fewer smoking-caused heart attacks and strokes of \$14.9 million; this would produce Medicaid savings of \$1.99 million; and the state share of Medicaid savings of \$581,080. Savings from reductions in other diseases would also accrue.

Another publication (Lindblom, 2002b, 2004) estimates the savings from a 25% reduction in state smoking levels, which is comparable to reducing the current rate by 5-6 percentage points. For Alabama, the short-term cost savings would yield \$7.75 million in reduced annual smoking caused Medicaid program costs, and \$2.3 million in the state government share of savings. Estimated long-term cost savings would be \$59.6 million in overall Medicaid program costs and \$18.9 million in annual state Medicaid costs.

Lindblom (2006a) provides an estimate of long-term savings in health care costs from adult smoking declines. Assuming a five percentage point decline in the prevalence of adult smokers over the first four years of a program, and assuming \$10,473 in lifetime reduced health care costs for former smokers, there would be an estimated savings of \$1.82 billion. Medicaid's share of the reduced costs would equal \$244 million, and the state Medicaid share of the reduced costs would be \$71 million. Therefore, the State of Alabama could save \$71 million in long term Medicaid costs if smoking were lowered by five percentage points.

Another estimate of healthcare savings from providing cessation benefits comes from Barry (2002). These researchers focused on estimates of both the monetary costs and the healthcare savings from providing Medicare and Medicaid cessation benefits. They suggest that in the context of total spending, the costs of treatment for tobacco dependence are minimal. In Medicare, such a benefit could constitute as little as one half of one percent of current program spending and nearly pay for itself over the course of a 10-year budget window. In Medicaid, the benefit could constitute as little as one-tenth of one percent of current spending. Their estimates for a Medicaid program covering counseling and limited NRTs, with 10% utilization and 20% quit rates, over 10 years were as follows: Federal Medicaid costs = \$1.32 billion; State Medicaid costs = \$982 million; Federal Medicaid savings = \$1,060 million; State Medicaid savings = \$799 million; non-Medicaid savings (other programs, out-of-pocket expenses, etc.) = \$1.4 billion. Thus, when all savings are considered, they far exceed the costs. Considering savings to Medicaid only, the savings would cover 80% of the program costs in 10 years.

One of the most useful tools for estimating costs and savings is a return-on-investment simulation calculator developed by America's Health Insurance Plans (AHIP) and the Center for Health Research, Kaiser Permanente Northwest (CHR). This calculator estimates the incremental return on investment of smoking cessation interventions for health insurance plans and employers using state-specific data or numbers entered by the user. Their research found that health plans investing fully in smoking cessation (5A's plus prescription medication and proactive telephone counseling) for a working population could be expected to have a positive ROI within 2-3 years. ROI per cessation service recipient for the health plan was \$898-\$1,340 after 5 years (America's Health Insurance Plans, 2008).

Using this ROI calculator and 2006 Medicaid population estimates for Alabama, we find a positive return on investment in two years. This is based on Medicaid covering the cost of 5A's through the primary care provider, Quitline counseling, and NRT for four weeks through the Quitline, at the costs presented previously for Alabama's Quitline. With initial intervention costs of \$2,877,909 to provide benefits to all Medicaid smokers (right-hand column), by Year 2, the medical savings were estimated to be \$6,700,347, for a net savings of \$3,822,438, and a return-on investment of over \$2 for every \$1 spent. By Year 5, the return on the initial investment is \$7 to \$1. Table 11 below shows the results from the ROI calculator for Years 1, 2, and 5.

Table 11. ROI Calculator Results for Health Insurance Plans Applied to the Alabama Medicaid Population

Year 1	Usual Care 2 A's	5 A's	5 A's + Medication	5A's + Quitline	5 A's+ Quitline + Medication
Total Medicaid Population	464,679	464,679	464,679	464,679	464,679
Expected Total Participants	43,388	54,235	54,235	54,235	54,235
Full Regimen		12,474	12,474	9,979	9,979
Brief Advice	43,488	41,761	41,761	44,26	44,256
Quitters	5,074	5,678	6,215	5,768	6,286
Total Intervention Cost	\$273,941	\$833,921	\$1,767,330	\$2,131,182	\$2,877,909
Cost PMPM		\$0.14	\$0.31	\$0.38	\$0.51
Medical Savings		\$0	\$0	\$0	\$0
Medical Savings PMPM		\$0.00	\$0.00	\$0.00	\$0.00
Incremental ROI PMPM		(\$0.08)	(\$0.26)	(\$0.36)	(\$0.48)
Incremental ROI per Participant		(\$45.12)	(\$133.13)	(\$175.04)	(\$246.11)
Year 2					
Medical Savings		\$7,209,743	\$6,759,957	\$7,133,875	\$6,700,347
Medical Savings PMPM		\$1.28	\$1.20	\$1.27	\$1.20
Incremental ROI PMPM		\$1.20	\$0.95	\$0.93	\$0.72
Incremental ROI per Participant		\$616.26	\$486.99	\$479.39	\$368.54
Year 5					
Medical Savings		\$20,453,349	\$20,310,653	\$20,429,280	\$20,291,741
Medical Savings PMPM		\$3.64	\$3.61	\$3.64	\$3.61
Incremental ROI PMPM		\$3.55	\$3.35	\$3.29	\$3.14
Incremental ROI per Participant		\$1,831.16	\$1,730.06	\$1,699.04	\$1,615.34

Note: In the absence of firm estimates for the age x gender smoking rates for the Medicaid population, the default state smoking prevalence rates were used in calculations, rather than higher estimates that would be expected for the Medicaid population. This would tend to underestimate the program costs and the medical savings. On the other hand, the medical expenditures are based on private payer rates which are typically higher than Medicaid payments, thus overestimating these costs.

Treatment effectiveness

Smoking cessation greatly reduces the short- and long-term risks of smoking-related disease and death for men and women of any age. Although 70% of smokers report that they want to quit, and 44% attempt to quit each year, less than 5% of those who attempt to quit are likely to be successful at the one-year point. While a majority of smokers who attempt to quit do not use recommended cessation methods, success rates increase significantly when evidence-based interventions are employed.

According to the *Clinical Practice Guideline*, “Tobacco dependence treatments are both clinically effective and highly cost-effective relative to interventions for other clinical disorders. Providing coverage for these treatments increases quit rates significantly. Insurers and purchasers should ensure that all insurance plans include the counseling and medication identified as effective in this Guideline as covered benefits” (Fiore et al., 2008, p. viii). The *Guideline* further indicates that the various tobacco dependence treatments have been found to be effective across a broad range of populations, and thus, clinicians should encourage *every* patient willing to make a quit attempt to use these effective counseling treatments and medications. This section reviews some of the evidence for the effectiveness of the recommended treatments.

Physician advice and counseling

Evidence shows that physician advice to quit smoking significantly increases abstinence rates. In a meta-analysis, even brief advice (3-5 minutes) from a physician increased long-term abstinence rates from 7.9% to 10.2%. More intensive interventions (i.e., more sessions, longer sessions) are more effective than less intensive interventions, with four or more sessions being especially effective. Abstinence rates reach over 25% with greater contact (> 30 minutes) (Fiore et al., 2008).

In a study identifying the most valuable clinical preventive services that can be offered in medical practice, tobacco use screening and brief intervention was among the top three services in terms of impact and cost effectiveness (Maciosek et al., 2006). The other top services were the widely offered services of immunizing children and discussing aspirin use with high-risk adults. This information should be considered when decision makers are choosing where to focus their efforts and resources.

The *Clinical Practice Guideline* (Fiore et al., 2008) concludes that brief tobacco dependence treatment is effective and that clinicians should offer every patient who uses tobacco at least the brief treatments shown to be effective. They should start this advice with the 3A’s: Ask about tobacco use status; Advise users to quit; Assess willingness to quit. If the patient is willing to quit, the clinician should continue with the remaining 2A’s of the 5A’s treatment: Assist the patient in quitting by providing counseling and medication; then Arrange for follow-up contacts.

In terms of the types of counseling that might be used with a patient who is attempting to quit, the *Clinical Practice Guideline* suggests that individual, group, and telephone counseling are all effective, and their effectiveness increases with treatment intensity. Two components of counseling are especially effective: (1) practical counseling including problem solving and skills training; and (2) social support delivered as part of treatment. These should both be used when counseling patients making a quit attempt (Fiore et al., 2008).

Two early reviews of physician-based cessation treatment found that such interventions significantly reduce tobacco use (Kottke, Battista, DeFriese, & Brekke, 1988; Ockene & Zapka, 1997). They further found that increasing the number and duration of the counseling sessions, in-person advice, and using multiple approaches (e.g., counseling and NRT) were related to greater cessation rates. By 1998, the American College of Preventive Medicine Policy Statement reported that over 100 randomized controlled clinical trials had demonstrated a statistically significant, albeit modest, positive effect of physician counseling on tobacco-cessation rates (Kattapong, Locher, Secker-Walker, & Bell, 1998). This policy statement noted that by that time virtually all health care agencies and associations had policies recommending routine tobacco use cessation counseling for adults and adolescents. These associations included: American College of Physicians, American Academy of Family Physicians, American Academy of Pediatrics, American College of Obstetricians and Gynecologists, American Medical Association, American Dental Association, American Cancer Society, American Heart Association, American Lung Association, National Cancer Institute, National Institutes of Health, and the Agency for Health Care Policy and Research. The recommendations of the American College of Preventive Medicine were that (a) clinicians should provide tobacco use cessation counseling at every clinical encounter; (b) the counseling should be personal, medically oriented, clear and strong; (c) they should assist smokers who are willing to quit; and (d) they should provide motivational interventions for smokers who are not willing to quit. These basic recommendations continue to be at the heart of the *Clinical Practice Guideline* through the 2008 update.

More recent reviews have continued to confirm the effectiveness of physician counseling for tobacco cessation. In a meta-analysis, Gorin and Heck (2004) evaluated 37 rigorous trials of smoking cessation counseling delivered by health care providers (physicians, nurses, dentists, and teams). Their analysis showed that receiving counseling from any health care professional produced a small increase in quit rates, with the greatest success coming when a physician provided the counseling. Multiprovider teams were next most effective, followed by dentists, then nurses. It would be helpful to conduct studies investigating these differences in success for the different clinician groups, as the most highly paid of the providers, the physician, appears to have the strongest impact. Determining ways to increase the impact of nurses, for example, could reduce the cost of intervention and improve the cost-benefit ratio.

In a study of dental practices, Gordon, Andrews, Crews, Payne, and Severson (2007) found a significant effect for 5A's counseling by dentists. In another review, including 41 studies,

Stead, Bergson, and Lancaster (2008) assessed the effectiveness of physician advice. They found a small but significant increase in the rate of quitting for brief advice compared to no advice or usual care, and a larger effect for intensive advice compared to no advice. They also reported a small benefit for follow-up visits. An earlier review of relapse prevention interventions had failed to find evidence of their effectiveness. Most of the studies in this group, however, were not based on physician counseling for follow-up (Hajek, Stead, West, & Jarvis, 2005). Still, as Hajek et al. suggest, until there are better relapse interventions, it may be more efficient to focus on the initial cessation attempts.

Seventy percent of smokers visit a physician at least annually, thus there are many opportunities for physicians to provide counseling. Furthermore, counseling from a physician has been shown to improve cessation rates and has been shown to be cost effective. Over the years consensus has built within the health care community that providing treatment for smoking cessation in the form of physician advice and nicotine replacement therapy is an effective strategy for reducing smoking and the health care burden that results from smoking. The *Clinical Practice Guideline* for treating tobacco use and dependence recommends that healthcare providers should employ the 5A's technique with their patients, as well as the use of pharmacotherapy, such as NRT, to supplement their counseling efforts (Fiore et al, 2008). In spite of this consensus, it is not clear the extent to which the strategy is actually followed. Several recent studies have investigated the reach of provider delivery of smoking cessation treatments.

Using data from an annual survey of outpatient visits, Ferketich, Khan and Wewers (2006), found that 32% of patient charts did not include information about the patient's tobacco use status, and for over 80% of identified smokers, there was no documentation of offering tobacco cessation assistance. In this study it was found that patients covered by Medicaid were more likely to have documented cessation assistance compared to patients with private insurance. The authors suggest this difference could be related to the payment coverage of tobacco cessation which was part of the Medicaid program in many states at the time of the data collection for this study.

Pollak, McBride, Scholes, Grothaus, Civic, and Curry (2002) analyzed telephone survey data from women smokers following a health checkup visit with their physician. They concluded that providers were most likely to direct their cessation advice to those who were most likely to quit, i.e., those who were more ready to quit or already considering quitting and those who were more prevention oriented. They suggested that physicians are not giving enough attention or advice to those who are unmotivated to quit and who need it the most. They also found that racial/ethnic minorities were less likely to receive provider advice to quit smoking.

Another telephone survey of Medicaid-enrolled smokers and recent quitters found that less than 10% reported receiving all 5A's from their health care provider (Chase, McMenamin, & Halpin, 2007). The providers tended to deliver the first 3A's, "ask, assess, and advise"

components of counseling, to the majority of their patients; but they were much less likely to provide the other two components: assistance through counseling, referral, or prescription; and arrangement of a follow-up visit or telephone call. Furthermore, receipt of the 5A's varied as a function of health status, race, and ethnicity. This study suggests that Medicaid should strive to increase the delivery of all components of the recommended 5A's treatment to patients, and particularly to those demographic groups that tend to receive lower levels of treatment.

In further indication of low levels of assistance with smoking cessation and disparities in these offers, Browning, Ferketich, Salsberry, and Wewers (2008) found that only 38% of smokers who received advice to quit smoking were offered assistance with quitting. Those who were least likely to receive assistance were younger, black, or economically disadvantaged (lower education, lower income, less insurance).

Nicotine replacement therapy and other medications

Nicotine replacement therapy (NRT) is intended to assist an individual who wants to quit smoking by replacing some of the nicotine from cigarettes and thus reducing nicotine withdrawal symptoms and motivation to smoke. NRT is most often used in combination with counseling interventions.

Based on extensive reviews of research, the *Clinical Practice Guideline* concludes that numerous effective medications are available for tobacco dependence, and clinicians should encourage all patients who are attempting to quit smoking to use these medications, except when medically contraindicated. Five nicotine replacement therapies and two non-nicotine medications have been found reliably to increase long-term smoking abstinence rates when used alone: nicotine gum, nicotine inhaler, nicotine lozenge, nicotine nasal spray, nicotine patch, bupropion, and varenicline. Some combinations of pharmacotherapies have been found to be more effective than single medications, reaching abstinence rates of over 30%; thus, clinicians also should consider using combinations of medications with patients who are attempting to quit (Fiore et al., 2008).

In a review of 111 trials on the effectiveness of NRT in aiding smoking cessation, Stead, Perera, Bullen, Mant, and Lancaster (2008) concluded that all of the available forms of NRT can help increase the chances of successful smoking cessation. The various forms of NRT increased the rate of quitting by 50%-70%. Furthermore, these effects appeared to be independent of the amount of additional support provided or the setting in which it was offered. More intense levels of support are important for increasing the likelihood of quitting, but it appears they are not important for the success of NRT. There was evidence that combining a nicotine patch with a rapid delivery form (e.g., gum, nasal spray) was more effective than a single form of NRT.

Other studies have considered the use of antidepressants for smoking cessation, and bupropion and nortriptyline have been found to help smokers who are trying to quit. They appear

to be equally effective, in that both medications doubled the odds of successful cessation, and they are of similar efficacy to NRT (Hughes, Stead, & Lancaster, 2007).

In investigating ways to promote the use of smoking cessation treatments, a recent study considered the effect of physician payments and patient drug costs on smoking cessation in 82 medical practices in Germany (Twardella & Brenner, 2007). In comparison to usual care, physicians who received training in smoking cessation methods and received direct payments for every participant who was not smoking 12 months after recruitment achieved no better cessation rates (3% for both groups). In contrast, when physicians received training and participants received direct reimbursements for pharmacy costs for NRT or bupropion, smoking abstinence at 12 months was significantly higher (12%). Thus one of the keys to the success of NRT, apparently, is to reduce the immediate financial burden on the smoking patient. This may appear illogical, as the cost of smoking for 4-8 weeks is equal to or more than the cost of the NRT (typical cost of smoking for 6 weeks, 1 pack a day, \$150-\$200; cost of NRT patch \$132, gum \$213, lozenge \$277), and there is the prospect of great financial savings after quitting. The initial outlay of money for NRT, however, presents a psychological barrier for many, and a substantial financial hardship for some, when compared to the cost of a single pack of cigarettes purchased individually.

The length of treatment using medications, short-term versus long-term treatment, is an issue of consideration. Hall, Humfleet, Reus, Muñoz, and Cullen (2004) conducted a study in which patients were given either 12 weeks or 12 months of medication and counseling for smoking cessation. At 24, 36, and 52 weeks, fewer of the subjects in the extended treatment group were smoking compared to subjects in the 12 week treatment. While the greatest success came in the group receiving both nortriptyline and counseling, extended treatment with placebo and counseling was nearly as effective, pointing to the importance of prolonged counseling in producing long-term effects. As Zickler (2006) notes in regard to this study, smoking and tobacco addiction are complex behavioral issues, and the long-term combination treatment of medication and psychological support is likely to facilitate addressing these complexities. It should be noted, however, that some studies (e.g., Stead et al., 2008) have not shown an effect for long-term support; thus, some of the effect seen by Hall et al. may have been due to a medication placebo effect as well.

Quitlines

The *Clinical Practice Guideline* (Fiore et al., 2008) states that telephone quitline counseling is effective with diverse populations and has broad reach. Clinicians and health care delivery systems should ensure patient access to quitlines and promote quitline use. Research shows that quitlines significantly increase abstinence rates compared to minimal or no counseling. Furthermore, quitline counseling plus medication is more effective than medication alone, suggesting an independent effect of quitline counseling.

Telephone based cessation services are available worldwide, including all states in the U.S. and Canadian provinces. A survey of 52 U.S. and 10 Canadian quitlines found that they operate an average of 96 hours per week, and nearly all (98%) use proactive multisession counseling (Cummins, Bailey, Campbell, Koon-Kirby, & Zhu, 2007). In this survey, over 70% of quitlines reported conducting regular evaluations of their outcomes. In spite of their wide availability, however, only 1%-2% of smokers across all states utilize a quitline in a given year. A strong correlation exists between funding levels for quitlines and smokers' utilization ($r=.74$), which probably reflects the impact of capacity and promotion of quitlines on utilization rates.

Quitlines have been adopted widely because there is good clinical evidence of their effectiveness, especially with multiple sessions. Reviews have found that among smokers who contacted helplines, quit rates were significantly higher for those who were randomized to receive multiple sessions of proactive call-back counseling compared to those who received only one contact (odds ratio 1.41) (Stead, Perera, & Lancaster, 2006; 2007). A single session produced higher rates of quitting than no counseling, and three or more calls were found to be most effective in increasing the odds of quitting compared to minimal interventions. With proactive follow-up calls, once a smoker makes an initial call to a quitline, all subsequent calls are made on a proactive, outbound basis. It is possible, however, to add a proactive *recruitment* strategy in which smokers, who are identified by their clinicians, are contacted proactively by counselors from the quitline, rather than waiting for the smoker to make the initial call to the quitline. The referral is usually handled by fax, whereby the clinician faxes contact information for a consenting identified smoker directly to the quitline. In a short time, usually within 48 hours, a quitline counselor will make a proactive, outbound call to the smoker to encourage participation in a telephone-based cessation program. This fax referral system increases continuity of care, removes the clinician burden to deliver the "assist" part of the 5A's protocol, and increases the number of smokers who receive cessation services (Rohweder et al., 2007). Smokers recruited to a quitline through a fax referral system or otherwise recruited without initiating a call themselves may be somewhat less motivated to quit than those who make their own call, but telephone counseling in this situation has been shown to increase quitting, with an odds ratio of 1.33 (Stead et al., 2006) compared to minimal intervention. Furthermore, proactive recruitment can greatly increase the use of quitline services among referred patients, by a factor of ten or more (Anderson & Zhu, 2007).

Telephone quitlines have a number of distinct advantages over other forms of cessation counseling. They offer an efficient means of delivering evidence-based treatment to large numbers of tobacco users, while eliminating barriers to access, such as lack of transportation, child care challenges, and inability to pay for treatment. As a result, they can help to reduce tobacco related health disparities by reaching people who tend to be underserved by more traditional programs. In addition, quitlines are easy to promote and meet with broad acceptance by the public (Anderson & Zhu, 2007). Due to these characteristics telephone quitlines might be ideal for reaching Medicaid populations.

Although state-sponsored quitlines may be an available source of free, proactive counseling services for Medicaid enrollees, many quitlines do not have the capacity to provide comprehensive services to the population of Medicaid eligible smokers along with the larger statewide population they serve. Thus, Medicaid partnerships with state quitlines and Medicaid funding for coverage of telephone counseling and medications could help support the quitlines and ensure that Medicaid recipients are able to receive the services that will maximize their chances of quitting successfully (CDC, 2008e).

In spite of all of their benefits and strengths, quitlines currently serve only a small fraction (1%-2%) of tobacco users in the U.S. It will be difficult to increase that percentage substantially without additional funds. Given the positive return on investment that can be shown for telephone counseling, both the private and public sector could do more to fund such services. A model suggested by Anderson and Zhu (2007) calls for public funds to be used to establish the statewide quitline infrastructure, to promote the quitline, and to pay for service for the uninsured and publicly insured; while private health plans or employers pay the cost of their own members' or employees' services.

Combined treatments

Based on the results of extensive research, counseling and medication are each effective when used independently for treating tobacco dependence. Research has also shown that the combination of counseling and medication is more effective than either one alone. Thus, according to the *Clinical Practice Guideline*, clinicians should encourage all individuals making a quit attempt to use both counseling and medication (Fiore et al., 2008).

Several states have tested programs that combined NRT and quitline counseling. Ohio, for example, added up to four weeks of free nicotine patches to the existing quitline program for members of participating insurance companies and employer groups. With this program came both an increase in utilization of the quitline and an increase in cessation rates. Quit rates were 13.5% for those receiving counseling alone (previous quit rate had been 10.3%) and 20.2% for those receiving counseling and NRT (Tinkelman, Wilson, Willett, & Sweeney, 2007).

Oregon also implemented a two-week "free patch initiative" with its quitline services, which led to a doubling of calls from tobacco users, a fourfold increase in the number of quitters, and a near doubling of the 30-day abstinence at 6-month quit rate, going from 8.2% prior to the initiative to 15.7% for initiative participants (Fellows, Bush, McAfee, & Dickerson, 2007). Treatment costs for this program were \$104 for one 30-minute counseling session, \$49 for two weeks of NRT, and <\$4.50 for promotion costs of the initiative (the quitline used only unpaid media and worked with providers to disseminate information), for a total of \$157 per smoker. Because so many more people were served, the total cost of the free patch program was higher than the pre-initiative costs, but the total cost per quit was reduced from \$4,260 pre-initiative to \$1,197 for free NRT recipients (including promotion costs). This cost is the same as the \$1,197

cost per quit with NRT for the Alabama quitline using the 6-month quit data. The Oregon free-patch initiative was utilized by 2.6% of smokers in the state, compared to 1.2% during the pre-initiative period. Thus the free-patch initiative was a highly cost effective program, increasing the reach and effectiveness of the quitline program.

In a further investigation of the effects of telephone counseling and free nicotine patches, the Oregon tobacco quitline conducted a randomized study in which callers were assigned to brief, moderate, or intensive counseling sessions, with or without free nicotine patches (Hollis, McAfee, Fellows, Zbikowski, Stark, & Riedlinger, 2007). At 6 months and 12 months, those receiving NRT had higher quit rates than those who did not receive NRT, and those who received intense (five proactive calls) or moderate (one 30-minute call and one follow-up call) counseling had higher quit rates than those who received brief (one 15-minute call) counseling. Twelve month quit rates were as follows: brief counseling, no NRT 12%; moderate counseling, no NRT 14%; intensive counseling, no NRT 14%; brief, with NRT 17%; moderate, NRT 20%; intensive, NRT 21%. Thus, offering free NRT and multisession telephone support led to higher quit rates compared to less intensive protocols. Cost per participant ranged from \$76 for brief counseling with no NRT to \$305 for intensive counseling with NRT. Participants receiving moderate or intensive counseling and those offered NRT were more satisfied with the quitline and more likely to report they received the right amount of contact. Thus abstinence rates and satisfaction improved with free NRT patches and/or more intensive counseling with follow-up calls.

Internet-based treatments

Some of the newest innovations in smoking cessation interventions incorporate internet or web-based treatment programs. The *Journal of Medical Internet Research* recently devoted an entire issue to the topic of web-assisted tobacco interventions. Such interventions have a number of potential advantages that make them attractive as a self-help strategy for treating tobacco dependence. These include broad access to information, minimal burden to providers, cognitive engagement through interactivity, personal relevance of information through tailoring or customization, and access to social support via methods such as chat rooms and email (McDaniel & Stratton, 2006). As with quitlines or telephone counseling, web-assisted interventions can reach populations that may not choose to use clinical services for a variety of reasons including lack of health insurance coverage, stigma of seeking counseling, inconvenience, and transportation issues. These programs can reach into the homes of smokers and are available any time of day or night to meet the needs of the user.

There are relatively few studies of smoking outcomes for internet-based programs, but several evaluations have shown promising results (e.g., Feil, Noell, Lichtenstein, Boles, & McKay, 2003; Graham, Cobb, Raymond, Sill, & Young, 2007; Swartz, Noell, Schroeder, Ary, 2006; Zbikowski, Hapgood, Barnwell, & McAfee, 2008). These evaluations, however, tend to lack a no-treatment control group, or the follow-up time period is relatively short. Yet, these

evaluations do show support for the usefulness of evidence-based, online smoking cessation interventions, achieving higher quit rates (12%-20%) than are generally reported for smokers who receive no treatment (typically around 5%). Some studies have compared different versions of an online program (Strecher, McClure, Alexander, Chakraborty, Nair, Konkel, Greene, Collins, Carlier, Wiese, Little, Pomerleau, & Pomerleau, 2008), but there are no comparisons of online vs. other formats, such as telephone counseling or in-person counseling interventions. The best results are for multi-faceted programs, offering websites as a supplement to other methods, including NRT and personal counseling. Zbikowski et al. (2008) reported six-month quit rates of 20.5% for an intervention that included both telephone counseling and online services. They noted that participants used phone counseling more than the online services, but those who chose to supplement their telephone counseling with web services appeared to have better outcomes. Studies also show that higher use of the web site was associated with better cessation outcomes, even after controlling for baseline motivation (Graham et al., 2007)

Reviews of smoking cessation websites have also revealed some of the weaknesses of these programs (Bock, Graham, Whiteley, & Stoddard, 2008; Etter, 2006; McDaniel & Stratton, 2006). In particular, the quality of the programs and accuracy of information offered are inconsistent; they often fail to utilize technologies that could make them truly interactive or tailored to individual users; and there are concerns about the potential for privacy and security breaches. Furthermore, there are so many websites (numbering in the hundreds) that a lay person might have trouble identifying one that is effective and provides an evidence-based program. Individuals seeking help with smoking are most likely to encounter websites that do not offer treatment – instead they offer product sales, static information, or links to other resources. Thus the high potential for web-based programs is rarely met. As these reviewers have suggested, it is important to incorporate the best evidence for treatment of nicotine dependence with principles of user-centered information design (McDaniel & Stratton, 2006).

Overall, there is good reason to add web-based tobacco interventions to the range of approaches to treatment for tobacco dependence. It is relatively inexpensive, with some estimates as low as under \$1 per smoker who accesses a program (McDaniel & Stratton, 2006), and has a wider reach than many other strategies. However, in spite of the promise and potential shown for online smoking cessation services, at this time these programs are not a feasible method for reaching certain populations who have limited access to computers and internet services. This would especially apply to low income groups, where lack of resources limits online access, and to older populations, where lack of knowledge and interest might limit access to the internet.

Comprehensive programs for Medicaid

According to the Surgeon General's report, *Women and Smoking* (U.S. Department of Health and Human Services, 2001), comprehensive statewide tobacco control programs work. As noted in the report, California was the first state to establish a comprehensive statewide tobacco control program in 1990. Between 1988 and 1997, the incidence rate of lung cancer among

women declined by 4.8% in California, while it increased by 13.2% in other regions of the United States (CDC, 2000). Similarly, Fichtenberg and Glantz (2000) concluded that the California program was associated with 33,300 fewer deaths from heart disease between 1989 and 1997 among women and men combined than would have been predicted if trends like those observed in the rest of the country had continued.

Further analysis of the California Proposition 9 program showed that during the first seven years, reduced smoking produced an estimated savings of \$390 million in direct medical costs from reductions in heart attacks and strokes and \$107 million from reduced low birth weight infants. These savings alone, a total of \$497 million in 1998, were greater than the program costs over that period of time (\$411 million) without considering possible savings in any other areas of healthcare (Lightwood et al., 1999). The California Department of Health estimated that for every \$1 spent on its comprehensive tobacco control program between 1990 and 1998, an estimated \$3.62 in direct medical costs was avoided.

The *Clinical Practice Guideline* (Fiore et al., 2008) recommends that treatments shown to be effective should be included as covered services in public and private health benefit plans. Providing tobacco dependence treatments (both medication and counseling) as a paid or covered benefit by health insurance plans has been shown to increase the proportion of smokers who use cessation treatment, attempt to quit, and successfully quit. Studies emphasize that removing all cost barriers yields the highest rates of treatment utilization and smoking abstinence. A Cochrane review of healthcare financing interventions (Kaper, Wegena, Severens, & Van Schayck, 2005) also concluded there is some evidence that offering a full financial benefit to smokers can increase abstinence rates at relatively low costs when compared with a partial benefit or no benefit.

In correspondence with these findings, a related Healthy People 2010 objective is to increase insurance coverage of evidence-based treatment for nicotine dependency to 100%. As stated in the *Clinical Practice Guideline*, this will require additional collaboration among many partners: “Some evidence indicates that institutional or systems support improves the rates of clinical interventions. . . Unfortunately, the potential benefits of a collaborative partnership among health care organizations, insurers, employers, and purchasers have not been fully realized. Neither private insurers nor state Medicaid programs consistently provide comprehensive coverage of evidence-based tobacco interventions” (Fiore et al., 2008, pp. 67-68).

Smokers make up a significant percentage of Medicaid recipients. In 2006, approximately one third of adult Medicaid recipients were tobacco users, a prevalence that is 50% higher than the general population (CDC, 2008e). Smoking-related expenditures for Medicaid are increasing rapidly. From 1993 to 1998, annual Medicaid costs for smoking related expenditures quadrupled from \$12.9 billion to \$52.8 billion (\$69.7 billion in 2008 dollars). On average across all states, 14% of all Medicaid expenditures are related to smoking. It is important to find ways to reduce these costs for the Medicaid program. The *Clinical Practice Guideline* (Fiore et al., 2008) reports

a meta-analysis of studies using smoking cessation treatments with low SES/limited education populations. The results showed that counseling is effective in treating smokers in this group. Studies also show that low SES smokers express interest in quitting and appear to benefit from evidence-based treatment. Yet, only 25% of smokers on Medicaid reported receiving any assistance with quitting.

In recent years, most states (Alabama being one of the few exceptions) have added benefits for the Medicaid population to cover the cost of smoking cessation treatment. Yet, it may still be the case that providers and patients are unaware of these benefits and thus, do not take advantage of them. Murphy, Mahoney, Hyland, Higbee, and Cummings (2005) conducted an investigation of this concern in New York State three years after implementation of a Medicaid pharmacotherapy benefit for smokers. They found that less than half (45%) of Medicaid participants were aware that Medicaid covered any medication to assist in quitting smoking. Medicaid smokers were also much less likely than smokers in the general population to report ever using any pharmacotherapy (Medicaid: 20%; general population: 41%). Thus, it is important to be sure people know about covered benefits; but that might not be sufficient to increase use of the benefit, if they are not motivated to quit and educated about the advantages of pharmacotherapy in the quitting process.

In a companion study to promote knowledge of a Medicaid smoking cessation pharmacotherapy benefit, Murphy, Mahoney, Cummings, Hyland, and Lawvere (2005) found that simply letting people know about the Medicaid benefit increased the likelihood they would use smoking cessation medication, and across all groups, medication users were nearly three times more likely to be successful at stopping smoking compared to those who did not use medication. They further found that a case management intervention was more than twice as likely to lead to quitting, when compared to a minimal information condition and an enhanced information condition; but the sample was small and the differences did not reach the criterion for statistical significance.

Massachusetts and Wisconsin are examples of two states with a Medicaid benefit for smoking cessation that successfully implemented promotion strategies among Medicaid enrollees and providers to increase utilization of covered cessation services (Bjornson, White, Redmond, Meyer, Warner, & Corcoran, 2007). Alabama and other states may need to follow their lead and that of other state programs mentioned in this report for providing and promoting tobacco dependence treatment. With cessation benefits provided, smoking rates will decline, and in time, medical costs for these former smokers will decline.

The bottom line in treatment, according to the *Clinical Practice Guideline*, is that *all* smokers should be identified, *all* smokers should be encouraged to quit, and *all* smokers should be offered appropriate evidence-based treatment of counseling and medications.

CONCLUSIONS

This report has gathered together and summarized a large amount of the research regarding smoking-attributable healthcare costs and the cost effectiveness of treating tobacco dependence. There is a great deal more research that could be cited as well. Unfortunately, in spite of all this research, there is no single number that indicates the exact cost of successfully treating tobacco dependence or the exact savings of successfully treating tobacco dependence. All estimates and models reported here and elsewhere are based on a variety of assumptions that must be made regarding the number of smokers who will utilize a service, the number who will begin treatment, the number who will complete treatment, the number who will quit smoking, and the number who will remain abstinent at whatever follow-up point is chosen. Furthermore, there are assumptions about the costs for personnel and training to deliver a service, the proportion of healthcare costs that can be attributed to smoking, and the amount of these costs that would be saved if an individual stopped smoking. Nevertheless, across all three areas reviewed – pregnant women, children and secondhand smoke, and the general population, there is strong agreement that cost effective treatments are available and that a positive return on investment is feasible within a few years.

With regard to pregnant women and neonatal costs, the newest estimates from the CDC's SAMMEC database lowered the estimated smoking-attributable expenditures for neonatal costs from its earlier estimates, but there are still substantial neonatal costs related to smoking. Analysis based on these estimates indicates that if an additional 4.5% of pregnant smokers in Alabama quit smoking early in their pregnancy, the smoking-attributable neonatal cost savings for a year would be \$144,288. If an additional 4.5% of pregnant smokers in the Medicaid program quit, the savings within a year would be over \$107,630. When costs from birth through the first year to infant and mother are considered, the total annual medical savings for Medicaid births are estimated to be \$392,735 (see Table 3, p. 13). Net annual savings for Medicaid, considering moderately estimated program costs, are projected to be \$220,115.

Children of adult smokers are vulnerable to secondhand smoke exposure. The most direct problems are related to respiratory complications. If 4.5% of smoking mothers quit during pregnancy or following the birth of their child, nearly \$86,000 in respiratory care for young children could be averted in a year; and for Medicaid mothers, the savings would be over \$61,000 if 4.5% of smoking mothers were able to quit (see Table 7, p. 22).

For the general population, short-term medical care savings are a result primarily of reductions in heart disease and strokes, while long-term savings come largely from reductions in cancers and lung disease. Short-term savings have been estimated at \$1,205 over seven years per person who quits, \$14.9 million in Alabama for a reduction of one percentage point in the adult smoking rate, and \$1.99 million in Medicaid savings for a one percentage point reduction. Using the return-on-investment calculator developed by AHIP and CHR, a positive return on

investment was projected by Year 2 of a full intervention including 5A's, four weeks of NRT medication, and quitline counseling for the Medicaid population (see Table 11, p. 34).

The CDC and the *Clinical Practice Guideline* recommend that tobacco dependence treatments shown to be effective should be included as covered services in both public and private health benefit plans. As suggested by many of the researchers cited here, the *Clinical Practice Guideline*, and the Surgeon General's reports, partnerships will be necessary to meet the needs of all smokers. Some models and partnerships are already in place; but there is a need in Alabama to expand these programs to provide coverage for all of Alabama's residents. An effective quitline has been established by the Alabama Department of Public Health, but it is operating at full capacity, while serving only a small fraction of smokers. To expand its capacity would require significant additional funding, which could come from insurers, both public and private. If the insurers (including Medicaid and Medicare) provided reimbursement for counseling and medications, the Quitline could serve many more callers. Physicians and other healthcare providers would also be more likely to provide the initial intervention and counseling if reimbursement was likely and coverage for medications was available to their patients. When such coverage is in place, it will also be necessary to educate recipients and providers about the coverage, thus maximizing the chances that treatment will be offered and accepted.

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