Tennessee Intervention for Pregnant Smokers
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Tennessee Intervention for Pregnant Smokers (TIPS) Program:
Year Three Progress Report (March 2007 – March 2010)
Executive Summary

Since it’s inception in March 2007, the Tennessee Intervention for Pregnant Smokers (TIPS) Program has worked to improve birth outcomes in Northeast Tennessee by addressing pregnancy smoking and fetal exposure to smoke. Funded by the Governor’s Office of Children’s Care Coordination through December, 2010, TIPS has implemented many programs to reduce pregnancy smoking in the six counties served: Carter, Hawkins, Johnson, Sullivan, Unicoi, and Washington. This region, which sees approximately 4500 deliveries per year, had a pregnancy smoking rate of over 30% when the program began in 2007, a rate which exceeded 40% in the most rural areas. This compares to 17% of women statewide who smoke during pregnancy, and a national rate of 11%. Consequently, rates of poor birth outcomes, including preterm birth and low birth weight in Northeast Tennessee, are up to 40% higher than nationally. Before the TIPS program began, virtually no programs were available in the region to educate about the dangers of pregnancy smoking or to provide assistance to pregnant women to help them quit smoking.

While the TIPS Program is involved in a multitude of activities to reduce pregnancy smoking in the region, the primary tasks have been:

1. To provide training and support to prenatal care providers in the region so that they can reduce rates of smoking among their pregnant patients. Providers are trained to administer the 5 A’s, a brief smoking cessation intervention that uses motivational interviewing, at every prenatal visit that involves a smoke-exposed pregnancy, and are assisted in their efforts to provide ongoing support to these women and to evaluate their efforts.

   • 209 health care professionals who provide prenatal care for pregnant women in the 6 target counties have received TIPS training on the dangers of pregnancy smoking and how to implement 5 A’s based smoking cessation interventions with prenatal patients. Over 5000 pregnant women have subsequently received prenatal care from those trained. Evaluation data have demonstrated substantial decreases in pregnancy smoking rates following training: 14% reduction in the year following training for patients of physicians and nurse practitioners; 23% for patients of health department nurses and nutrition workers.

   • 411 health care professionals-in-training (nursing and medical students) have received TIPS training on the dangers of pregnancy smoking and how to implement 5 A’s based smoking cessation interventions with prenatal patients. All students have subsequently used the 5 A’s intervention with pregnant patients who smoke, and nearly all (98%) indicate confidence in their abilities to be effective and willingness to use the intervention in the future.

2. To provide ongoing case management services to prenatal patients in the region who smoke, have recently quit smoking, or who are exposed to significant second hand smoke. Three full-time TIPS case managers provide individualized smoking cessation counseling and support for other life issues to pregnant women at six different prenatal care practices, and at one delivery hospital, in the region.

   • 1316 pregnant smokers have received in-depth smoking cessation counseling and assistance with related issues from a TIPS Case Manager. Case Managers see all TIPS eligible women at 6 prenatal care practices and at one regional hospital. Of all eligible women, 82% have been willing to receive some level of service from the program.

   • Smoking rates at delivery have decreased 18.4% across the prenatal care sites with a Case Manager since the beginning of the TIPS program.
• Virtually all (97%) of TIPS participants have rated the case management services they have received as helpful, and 56% indicated case management services contributed to smoking cessation, reduction, or quit attempts.

• Among all TIPS eligible women who entered prenatal care as smokers, 10% quit completely, 53% significantly reduced their amount of smoking, and 24% had at least one quit attempt.

• Among women who met with a Case Manager at least 4 times (project goal for minimum number of contacts), 20% quit smoking completely by delivery, and 35% had at least one quit attempt.

• 17% of participants with significant second hand smoke exposure eliminated this exposure completely, while 47% significantly reduced their exposure.

• Of TIPS participants who began their pregnancy as smokers but had quit by entry into prenatal care, 90% remained smoke free to delivery.

• Women who quit smoking had significantly improved birth outcomes including substantially improved birth weights and a 25% reduction in risk for preterm delivery.

• Women who reduced their smoking had a 24% reduction in risk for preterm delivery and a 44% decrease in risk for their infant to be admitted to the NICU.

• Women who reduced or eliminated second hand smoke exposure had a 47% reduction in risk for preterm delivery, and a 60% reduction in risk for a NICU admission.

• Women who continued second hand smoke exposure had poor birth outcomes comparable to women who themselves smoked throughout pregnancy, and worse than women who smoked early in pregnancy but quit.

3. To provide community based education and support for efforts to reduce pregnancy smoking, and improve birth outcomes in the region. These activities are varied and have included:
   a. Educational classes on smoking during pregnancy and smoking cessation for women and their families
      • Over 600 women have participated in TIPS educational course offerings at 7 separate workshops and as part of prenatal classes throughout the region.
   b. Smoking cessation support groups for pregnant women and their families
   c. Participation in community health fairs and expositions focused on women’s and/or children’s health
      • Approximately 430 women have received pregnancy smoking education and TIPS program information at 4 separate community events.
   d. Development and dissemination of a pregnancy-focused smoking cessation self-help book through local health departments, prenatal care provider offices, and hospitals
      • Over 3000 pregnant women have received our book “Finding New Strength for You and Your baby: TIPS for Becoming Smoke Free.” Over 82% rated the book as useful, and the majority said it contributed to smoking reduction and/or cessation.
   e. Development and dissemination of educational literature and posters focusing on pregnancy smoking and related issues through local health departments, prenatal care provider offices, and hospitals
      • Project designed posters, and project designed and existing educational literature have been widely distributed throughout the region.
   f. Development and maintenance of a program website that provides information and resources for pregnant women, families, prenatal care providers, and researchers
      • The TIPS program website (www.etsu.edu/tips) has been an important resource for pregnant women and health care professionals, with over 450 visitors, and nearly 1500 separate visits.
g. Presentations to community groups, providers, and professional groups to increase awareness of the dangers of pregnancy smoking and services available in the region
   • Over 800 community health professionals have attended TIPS presentations on the program itself, project findings, and pregnancy smoking issues

h. Development of a Physician’s Pregnancy Toolkit and a Community Resource Guide, disseminated to prenatal care practices throughout the region, to assist those who work with pregnant women in providing evidence based care and linkage with relevant resources
   • Over 50 prenatal care providers in the region have received these resources.

i. Involvement of health professions students in project activities
   • Nearly two dozen undergraduate and graduate students have provided over 600 volunteer hours assisting with project tasks, and countless additional hours developing related research projects.

4. To thoroughly evaluate the efforts of the TIPS program, including success rates, service effectiveness, and changes in outcomes. As part of the program evaluation, all participating prenatal patients are tracked and their medical records are reviewed, research interviews are conducted, and providers are surveyed. In addition, detailed data is collected region-wide. Finally, women are followed post-partum and developmental testing is done when their children are 15 months of age.
   • The percentage of women smoking through pregnancy to delivery has decreased 20% across the six-county region since the beginning of the TIPS program. The rate of low birth weight deliveries has dropped 17%, while the rate of preterm deliveries has declined 21%.
   • The decline in preterm deliveries alone has led to a reduction in newborn hospital costs of $2.72 million over the last three years. This amount does not include cost saving related to prenatal care, maternal health problems, and long term health and educational expenses for the children. This cost savings is compared to the $1.44 million cost of the TIPS program over four years.
   • 368 pregnant women have completed research interviews to examine factors related to pregnancy smoking, smoking cessation, birth and developmental outcomes, and smoking recidivism. Analysis of this data has just begun, but will be used to draw conclusions about program effectiveness, to make suggestions for future programs, and to add to the body of research on pregnancy and child outcomes
   • TIPS participants who have delivered are being recruited for a research interview and developmental testing for their child 15 months post-partum. To date, 19 mother-child pairs have been involved. Findings will be used to demonstrate the effects of pregnancy smoking, pregnancy smoking cessation, and pregnancy second hand smoke exposure on child outcomes.
   • 4 peer reviewed papers detailing project findings and outcomes have been published in professional journals. An additional 4 review papers relevant to pregnancy risks and related birth outcomes have also been published, and 17 presentations of TIPS findings have been given at regional and national professional research conferences. All of these have drawn attention to the program and successes that can be achieved with pregnancy smoking cessation interventions.

The Tennessee Intervention for Pregnant Smokers Program has met, or is on target to meet, all project objectives by the end of the current funding period in December, 2010. The program has been highly effective, leading to a reduction in pregnancy smoking rates and improving birth outcomes in the region. It is hoped that additional funding can be secured to continue the TIPS program so that the health improvements seen throughout the region can be maintained and expanded upon.
Provider Training and Support

Practicing Prenatal Care Provider Training

A primary objective of the project was to train area prenatal care providers in administering a brief smoking cessation intervention, based on the 5 A’s model, as part of routine prenatal care with all pregnant smokers. In Year 1 of the project, a two hour training session was developed that covered research on the dangers of pregnancy smoking, nicotine addiction, and relevant regional data. The majority of the session was focused on teaching providers how to effectively administer the brief intervention to their patients. The training also provided local resource and service information, and provided a mechanism for future support and contact between TIPS and the providers. Additionally, providers received information on how to integrate the intervention into their practices, including involving other staff and documentation and reimbursement issues.

Issues related to involving all prenatal care providers in the region in this training were presented in our May 2008 report.

Since the beginning of the project, 62 prenatal care providers have received the TIPS training. These providers consisted of obstetricians, obstetric residents, family physicians, family medicine residents, and nurse practitioners. Only a single group of family physicians was interested in receiving a refresher training session, and this occurred near the end of Year 2.

Unfortunately, efforts to evaluate the effectiveness of the training have proven difficult. The 62 providers trained see nearly 1500 pregnant smokers per year for prenatal care. Thus, in theory, over 3000 pregnant smokers have to date received smoking cessation counseling from their providers as part of their prenatal care. Trained providers were given documentation sheets to go into patient charts on which they were to record their brief intervention encounters with women. A recent audit of prenatal charts at the practices of these providers revealed that the charts of pregnant smokers contained clinical notes indicating that smoking had been “addressed” in nearly 90% of cases. However, only 25% of the charts contained the TIPS documentation forms, so we have no way of knowing whether “addressing” smoking involved provision of the 5 A’s brief intervention. In addition, there is virtually no way to know which women may have attempted to quit smoking or were eventually successful.

Because of these limitations, we have pursued different routes in obtaining information about the potential effectiveness of provider administered brief smoking cessation intervention during pregnancy. For this, as well as for other purposes, delivery charts of all women giving birth in the six-county area are reviewed. To date, we have completed reviews through 2009 for patients from all of the practices where providers have been trained, both those with and without case manager services. Collection of delivery information from women who received care from untrained providers is ongoing and will be complete by Fall 2010. In particular, we were interested in the percentage of women who smoked through pregnancy and to delivery by year at each of the practices. That information is presented in Table 1. In general, pregnancy smoking rates initially decreased in all practices where providers had received
As training. However, those decreases were only maintained in those practices that also had an on-site case manager.

Late in 2007, we also conducted a survey with prenatal care providers across the region to look at practices and attitudes regarding pregnancy smoking. The initial purpose was to try to determine why providers were not interested in our training session, but the survey provided a wealth of additional information. The survey findings were summarized in a previous report (May 2008). Since then, the findings have been presented at multiple professional conferences, and were published in the Southern Medical Journal in 2009 (published paper at the end of this report). We plan a follow-up survey this year to determine if practices and attitudes have changed since the inception of TIPS, particularly among providers who received TIPS training. Those results will be available late in 2010.

Finally, we have asked the prenatal patients themselves about their experiences with their providers related to their smoking. As part of our first post-partum interview with our TIPS research participants, women are asked about the assistance their prenatal care provider offered with respect to smoking and how useful they found that assistance. All of these women are at sites with case managers where the physicians/nurse practitioners participated in TIPS training. Of the 120 patients who have now completed that interview, 97% said their provider asked them if they smoked, and 92% said he/she advised them to quit. Of those who didn’t say they had no interest in quitting, 48% said their provider assisted them in their attempts to quit smoking, and 49% said their provider talked about smoking at most or all prenatal visits. With respect to the utility of the assistance, 83% indicated that the provider advice was somewhat (37%) or very (46%) useful. Finally, when asked if what their provider offered with respect to smoking contributes to reducing or quitting smoking, on a 7-point scale where 1 was “Not at All” and 7 was “A Lot,” 38% of women responded with a 5 or higher. So in summary, it looks like the providers who were trained in the 5 A’s are almost universally Asking and Advising, but only about half are going beyond that to provide Assistance.

Training for Other Health Care Professionals Working with Pregnant Smokers

As part of our provider training efforts, we also offered an abbreviated training session (1 hour) to the nursing and clerical staff at all local practices where providers also completed the training. In total, 54 staff completed this training, which provided information about the dangers of pregnancy smoking and gave an overview of providing 5 A’s counseling and other assistance to pregnant smokers. The goal of these sessions was to provide information so that staff would be able to support providers in their work with pregnant smokers, so no independent evaluation of these efforts was available.

Pregnancy smoking cessation intervention training was also offered to staff at all area health departments. Due to new procedures for addressing and documenting tobacco use that began in 2008, as well as scheduling issues, we were unable to arrange in-person trainings with the 5 health departments in the Northeast Region that were TIPS target counties. However, staff were provided with educational materials and literature for their clients, and the Power Point presentation of the 2 hour
TIPS provider training was made available to all of them (two health departments required that their staff review it as part of staff training efforts).

We were able to conduct an in-person training session with the nursing, nutrition, and home visitation staff from both locations of the **Sullivan County Health Department** in late 2007. A total of **17 staff participated**. As part of this session, we provided resource information and materials for patients, and assisted the supervisory staff with the development of implementation and documentation procedures for addressing pregnancy smoking at every patient contact. A refresher course was conducted in early 2009. Discussions with staff and administrators have revealed that **brief smoking cessation counseling was attempted at nearly 100% of visits with pregnant smokers**! And as demonstrated in a subsequent table, Sullivan County had the biggest drop of all 6 target counties in pregnancy smoking rates from 2007 (34.7%) to 2008 (26.6%) – **a 23.3% decrease in the pregnancy smoking rate in one year**! This gain appears to have been maintained in 2009 with an additional 4% drop in the pregnancy smoking rate. This is especially impressive as providers at only one of five prenatal care practices in that county received TIPS training and case management services for their patients, and thus we attribute much of reduction in pregnancy smoking to the efforts of the health department workers.

Finally, in the fall of 2008 we were invited to provide information about pregnancy smoking and brief cessation interventions as part of a skills fair for employees of one of the two health systems in the region. Attendance at one of the four sessions was required of all labor, delivery, and newborn nursery nurses from the two largest delivery hospitals in the system, and was encouraged for those from the other two hospitals as well as for general pediatric nurses from all four primary hospitals. A total of **76 nurses** received training in 5 A’s smoking cessation counseling with pregnant and post-partum women, and were provided with additional educational information about the dangers of pregnancy smoking and community resources for smokers. We are continuing to work with the nursing supervisors at the hospitals to insure that all patients who smoke receive cessation counseling and information from staff.

**Health Care Professional Student Training**

Because of the general resistance of the regional prenatal care health care provider community to receive training and routinely implement smoking cessation interventions with their patients, in 2008 we added an additional component to the provider training aspect of the project. We reasoned that if already practicing physicians and nurses are opposed to such efforts and educational offerings do not change their mind, then we need to get to providers BEFORE they begin practicing.

We began first with nursing students. Through our collaborative efforts with faculty from the College of Nursing at ETSU, we received permission to provide a 1.5 hour training session for senior undergraduate nursing students beginning their obstetrics clinical rotation. The training is similar to that offered to practicing providers, and details the dangers of pregnancy smoking and the 5 A’s intervention. In order to evaluate the utility of these sessions, we give a knowledge and attitude pre-test prior to the session, and a post-test following the session. Additionally, we give a second post-test four months later at the
end of the clinical rotation. Completion of the post-tests is a course requirement, so compliance was high.

To date, four separate groups of nursing students have been trained: Spring 2008, Spring 2009, Fall 2009, and Spring 2010. A total of 386 nursing students have now received the training. An evaluation of pre- and post-test responses revealed the following:

- Prior to training, only 45% of students correctly identified the harmful effects of pregnancy smoking, after training 94% did.
- Prior to training, only 33% of students knew of effective ways to get pregnant women to disclose smoking, after the training 95% did.
- Prior to the training, 55% of students correctly identified best-practice guidelines for addressing pregnancy smoking, after training 98% did.
- Prior to training, only 41% of students believed that brief counseling sessions incorporated into prenatal care could lead to substantial quit rates. After training 79% did.
- Prior to training, only 48% of students said they would be comfortable discussing smoking with pregnant patients and that they would have the skills to be effective. After training, 90% did.
- At the end of semester post-test, 96% of students indicated they felt the degree of health effects on the unborn child from prenatal cigarette exposure was “Severe,” and 96% also believed their role was to discuss smoking with every pregnant smoker at every prenatal visit.
- At the end of the semester post-test, 99% of students indicated they believe second hand smoke is dangerous to the fetus and should be eliminated.
- All students had attempted a brief smoking cessation intervention with a pregnant or immediate post-partum woman (this was built in as a course requirement). 80% felt their intervention efforts were at least moderately beneficial, and 97% said they were likely or very likely to use 5 A’s interventions in the future.

Evaluation of nursing training pre- and post-test data is ongoing and being developed into both a research presentation and a paper for publication in a scientific journal.

Medical student training is our next primary focus. Small groups of medical students who are part of the rural track program have received an two hour educational session on the effects of pregnancy smoking and implementing a 5 A’s brief intervention. In the last two years, 25 medical students have been trained. We currently have a proposal under review to incorporate the training session into the third year medical school curriculum, and we hope to begin those sessions in the Fall of 2010.

**Summary**

The following have received TIPS training on the dangers of pregnancy smoking and how to implement 5 A’s based smoking cessation interventions with prenatal patients:

- 62 physicians and nurse practitioners providing prenatal care in the region. These providers have since seen over 3000 pregnant smokers for prenatal care, and pregnancy smoking rates decreased in their practices the year following training. However, these gains were not maintained long term.
• 54 prenatal practice nursing and clerical staff
• 17 Sullivan County Health Department staff. The county has seen a 23% drop in pregnancy smoking rates since.
• 76 hospital based labor and delivery, newborn, and pediatric nurses
• 386 nursing students from the ETSU College of Nursing. The training was well received and skills learned were immediately put into practice. Knowledge and attitudes increased dramatically, with nearly all students at follow-up indicating they felt it was their role to address smoking with all pregnant patients.
• 25 medical students from the ETSU Quillen College of Medicine
• Total: **620 trained** (209 health care professionals; 411 health professionals-in-training)
Case Management Services

The design of the TIPS Program called for placement of Case Managers in Obstetric practices throughout Northeast Tennessee. Case Managers identify all women eligible for the TIPS program in their practices and offer them program services. Pregnant women are eligible if they are current smokers, have quit smoking within the last two years, or are exposed to significant levels of second hand smoke. Services offered include smoking cessation advice and counseling, assistance with various life stressors and pregnancy health issues, referral assistance, and the provision of self-help materials. Case Managers track all eligible women who are also invited to participate in 4 separate research interviews (first trimester, third trimester, 6 weeks post-partum, 6 months post-partum). The overall goal of these activities is to decrease pregnancy smoking, improve birth outcomes, and evaluate case management efforts.

Case Managers are providing services at 6 different prenatal care provider sites, as well as at the only hospital in the region specializing in high risk pregnancy admissions. The two largest practices have a full-time Case Manager, while another Case Manager (with support from the project Research Assistant and Project Coordinator) provides services on a rotating/on call basis to the other four practices and the hospital.

To date, 1316 pregnant women have received TIPS Case Management services. This number represents 82% of all women eligible that have accepted services. The percentage of women who are still smoking at delivery has decreased substantially at all of the practices where Case Management services are offered. As can be seen from Table 1, smoking rates at delivery have decreased 18.4% across the four primary prenatal care sites with a Case Manager. Specifically, smoking rates at the university affiliated obstetric practice have decreased from 35.1% to 27.8%. Rates at a private obstetric practice have decreased from 32.1% to 26.2%. Rates at a university affiliated family practice have decreased from 45.7% to 36.4%, and rates at a nurse managed clinic have decreased from 52.5% to 42.9%. Clearly, Case Management services have had a substantial impact on pregnancy smoking rates since the TIPS program began.

TIPS Program participants are asked to evaluate the Case Management services they have received as part of the 6 week post-partum research interview. To date, 120 women have completed this interview and provided feedback. When asked how useful they found the information and support offered by their Case Manager, 97% said it was helpful (67% said “Very” helpful, 30% said “Somewhat” helpful). Women were also asked if the efforts of their Case Manager contributed to their smoking cessation or reduction. Responses were provided on a 7-point scale (1=Not at All, 7=A Lot), and 56% of women responded with a 5 or higher. Women were asked to rate the amount of information and amount of support they received from their Case Manager. Nearly 95% of respondents said they received just the right amount of both information and support (as opposed to too little or too much). Finally, women were asked to provide an open ended response of what they did and did not find helpful in their interactions with a Case Manager. Qualitative analysis revealed that the vast majority of responses
indicated encouragement and support were the most helpful things received, followed by specific tips for quitting, and finally information about the dangers of pregnancy smoking. Below are a few specific responses that were given:

- “She helped me better myself and quit smoking. I couldn’t have asked for more. She is to thank for believing and helping me believe in myself. She is awesome!”
- “She was great. Glad to know there are people out there willing to help.”
- “I quit during the pregnancy just for all she said. She was GREAT!”
- “She has given me the tools to quit smoking and now I am smoke free. Thank you!”
- “She helped me most by telling me HOW to do it.”
- “She helped me realize why I smoke so I could change the habit.”
- “All the information she gave me helped me to quit.”
- “She was very supportive of my efforts, very friendly and not judgmental of my lifestyle.”
- “The way she handled the subject makes it easier to talk to her.”
- “She reminded me of the importance of staying quit.”
- “More information = More reasons to quit.”

At the end of Year 2, we began analyzing smoking behavior and birth outcome data from women who had already delivered and who had received prenatal care at practices with Case Managers (688 women total). These findings were presented at two research conference (slides and poster included in this report) and are currently being written up for publication. The goal of these analyses was two-fold: to examine the changes in smoking behavior associated with case management services, and to examine potential improvements in birth outcomes associated with smoking cessation and reduction.

The following were found with respect to changes in smoking behavior and services received (see Table 3 and Figure 3 for additional details):

- Among all program participants who entered prenatal care as smokers, 8% quit smoking completely, 51% significantly reduced their amount of smoking, and 20% had at least one quit attempt.
- Among program participants who met with a Case Manager at least four times (the project goal for minimum number of contacts), 20% quit smoking completely by delivery, and 35% had at least one quit attempt.
- Of the participants with significant second hand smoke exposure, 17% completely eliminated exposure, while 47% significantly reduced their exposure.
- Of women who began their pregnancy as smokers but had quit smoking by entry into prenatal care, 90% remained smoke free to delivery.
- TIPS services most highly associated with smoking cessation, reduction, and quit attempts include multiple case manager sessions, in-depth counseling, provision of information on stress reduction, provision of information on mental health issues and services, provision of information on relapse presentation, provision of information on cessation for family members, and outside referrals.

We have recently begun the same analyses for all women who had delivered by the end of the third year of the program (1488 women, including 158 control group non-smokers). These analyses are
ongoing, but we have found that among all program participants who entered prenatal care as smokers, 10% quit smoking completely, 53% significantly reduced their amount of smoking, and 24% had at least one quit attempt.

Clearly, the more contact and services TIPS participants receive, the more likely they are to quit smoking, attempt to quit smoking, or reduce smoking levels during pregnancy.

An additional aspect of evaluating the effectiveness of Case Management services has been to examine how quitting or reducing smoking and second hand smoke exposure translates into improvements in birth outcomes. These analyses have been conducted for participants who had delivered by the end of the second year of the program and are ongoing for more recently recruited women.

A comparison of birth outcomes among women who continued smoking, reduced smoking, and quit smoking completely are presented in Table 4. Outcomes associated with second hand smoke exposure continuation and elimination are also presented, as are findings related to amount of exposure and timing of cessation and reduction. Some of the highlights include:

- Compared to TIPS eligible women who continued to smoke through pregnancy, women who quit smoking gave birth to infants a half pound (227 gm) heavier, more than half an inch (1.5 cm) longer, and were 25% less likely to be born preterm (13.7% vs 18.2%). In addition, compared to over 6% of smokers who experienced a fetal or neonatal loss, all of the women who quit smoking gave birth to a child that survived to hospital discharge. The biggest improvements in birth outcomes were seen for women who quit smoking by 20 weeks gestation.
- Compared to TIPS eligible women who continued to smoke at the same level through pregnancy, women who significantly reduced their level of smoking were 24% less likely to give birth preterm (13.9% vs 18.2%), and 44% less likely to have their newborn admitted to the NICU (4.8% vs 9.1%). Again, improvements were most significant for women who reduced their smoking prior to 20 weeks gestation.
- Compared with women who had significant second hand smoke exposure throughout pregnancy, women who reduced or eliminated their SHS exposure were 47% less likely to give birth preterm (11.7% vs 22.0%), and their babies were 60% less likely to be admitted to the NICU (8.7% vs 21.4%).
- Finally, continued second hand smoke exposure had a significant impact on birth outcomes. Babies born to women with continued SHS exposure had birth outcomes similar to those born to women who themselves smoked (nearly identical birth weights, lengths, and preterm birth rates). In addition these babies fared worse than those born to women who smoked early in pregnancy, but quit smoking by 20 weeks gestation. Indeed, they had lower birth weights (.2 lb), a nearly doubled risk for preterm delivery (22.0% vs 13.7%), and a nearly tripled risk for NICU admission (21.4% vs 7.7%).


Additional Project Activities

Educational Classes

In the spring of 2008, all TIPS program staff participated in a two-day American Lung Association training session, and all are now Certified Freedom from Smoking Facilitators. This training provided the staff with additional skills and resources to conduct and facilitate effective smoking education classes, smoking cessation classes, and smoking cessation support groups.

TIPS staff have offered educational classes on the dangers of pregnancy smoking and practical advice for quitting to several different groups:

- A course at Holston Counseling Center in Sullivan County as part of Mother Child Connection (March 2008) – 9 attendees
- A course at Fresh Start of Tennessee in Washington County, a non-profit agency, as part of a weekly New Mom’s Workshop (April 2008) – over 30 attendees
- Abortion Alternatives, a non-profit agency – conducted 4 separate classes (March, April, September, October, 2008) – 72 total attendees
- A TIPS designed session on pregnancy smoking was integrated into all prenatal classes offered by Mountain States Health Alliance at all their area hospitals, beginning in April 2008. As of December 2009, these classes have been attended by over 500 expectant women and their support person
- Hope House in Sullivan County – conducted two separate classes for pregnant and new moms (May 2009, August 2009) – 21 attendees

In total, over 600 women have participated in TIPS educational course offerings since the program began.

Smoking Cessation Support Groups

Since there has been such a strong community response to other TIPS activities, in 2008 we began organizing support groups for pregnant women with an interest in quitting smoking. These types of groups have been well received and highly successful at improving quit rates in other parts of the country.

An interdisciplinary group of ETSU students in rural track programs worked with TIPS to organize a series of support groups in Carter County as part of a course they were taking taught by Dr. Bailey. They advertised extensively and researched the latest support group methods in the development of the program. A month long weekly series was offered in the fall of 2008, and space was made available at the Carter County Health Department for the sessions. Unfortunately, despite the fact that dinner and child care were offered, only one woman showed up for the first class, and no one showed up for the second. The group was subsequently cancelled, and the one woman who had been interested was referred to work individually with a TIPS case manager.

In the fall of 2008, TIPS case managers also began developing a support group series to offer to women in Washington County. These were scheduled weekly over a six week period at one of our prenatal practice sites in Washington County. These sessions were advertised through all Washington County prenatal practices, the Washington County Health Department, Washington County hospitals, and area
churches. Unfortunately, no one showed up for these sessions either, despite the fact that dinner and child care were offered. TIPS case managers asked their patients over the next month why they were not interested in attending support group sessions. Most women cited transportation issues and lack of interest in sharing their issues with people they did not know. We have finally concluded that support groups to encourage smoking cessation in this region are not an accepted or effective option for addressing pregnancy smoking.

**Health Fairs and Expositions**

TIPS has sought out opportunities to increase program visibility in the region and to provide additional education related to pregnancy smoking and cessation. TIPS has participated in the following:

- Health Fair sponsored by Alpha Omega Alpha (Medical School Honor Society) and Wal-Mart in Washington County (April 2008) – TIPS had a booth where we distributed educational and program information materials, and talked individually with interested people; individual discussions were held with 30 attendees and over 75 took materials from the booth
- Joint event sponsored by Nicotine Free Mountain Empire and Kingsport Tomorrow “Stop Smoking and Second Hand Smoke” Event in Sullivan County (May 2008) – TIPS had a booth where educational and program information materials were distributed; staff also talked individually with interested people; 55 people visited the booth
- Sullivan County Baby Expo (June 2008) – TIPS had a booth where we distributed educational and program information materials, and talked individually with interested people; over 200 women visited the table, most interested in smoking cessation
- Appalachian Fair Baby Expo in Washington County (March 2009) – TIPS had a booth where we distributed educational and program information materials, and talked individually with interested people; smoking cessation information was provided to approximately 100 women

In total, over 430 women received educational and TIPS program information at community events since the program began.

**Smoking Cessation Self-Help Book**

When we began training physicians in the 5 As and offering case management services to prenatal patients, we found that may patients were wanting self-help materials addressing smoking cessation, relapse prevention, and second hand smoke exposure. We started researching the materials that were available and quickly realized that while there are many different types of pamphlets available, very few of the materials addressed the needs of our population. We decided to design something ourselves, based on materials known to be effective and on feedback we had received from area providers and patients. The result was our self-help book titled “Finding New Strength for You and Your Baby: TIPS for Becoming Smoke Free.” This 58 page book, a step-by-step guide to help pregnant women quit smoking, contains educational information about the dangers of pregnancy smoking, advice for quitting including evaluation of habits surrounding smoking and nicotine addiction. It includes a smoking contract and a count down to quit date, tips on managing withdrawal, and information about relapse prevention. Education on the dangers of second hand smoke and advice for reducing exposure are included, as are lists of community resources. The book is encouraging and interactive, and was tailored to address and be sensitive to unique characteristics of a Southern Appalachian audience.
Nearly 3000 copies of the book have now been distributed. The book is given to all women eligible for the program at our case manager sites. Case managers often use the book as an interactive basis for counseling sessions, pointing out and explaining how the information in the book can be used. In addition, the book is available to women at most obstetric provider sites in the area, as well as on labor and delivery floors of area hospitals. Finally, the books are being distributed to interested women by WIC and HUGS staff at the health departments, and as part of prenatal classes at area hospitals, in all six of our target counties.

The feedback we have received on the book has been very positive. All women who participate in research interviews are asked at the 6 week post partum assessment about the usefulness of the book and what they liked and didn’t like about it. To date, a total of 120 women have completed these interviews. Overall 82% of these women rated the book as useful (55% “Very Useful,” 27% “Somewhat Useful”). Almost all (92%) said the book provided the right amount of information (not too little, not too much). On a 7-point scale, with 1 being “Not at All,” and 7 being “A Lot,” 52% of women rated the book as a 5 or higher when asked if it contributed to them quitting or reducing smoking. Finally, the women were asked an open ended question about what they liked and didn’t like about the book. Over 70 women provided comments, and NONE of them were negative. In general, the aspects of the book most frequently mentioned as helpful were the description of all of the chemicals in a cigarette, specific short and long term harms to the fetus, specific advice for dealing with cessation pitfalls including cravings and social situations, and the dangers of second hand smoke. Several women remarked that the booklet gave them something concrete to share with family members about the danger they were putting her and the baby in by smoking around her. Overall, we were very pleased with the many and detailed comments, as they clearly indicated that the majority of women had read and used the book. Below are a few specific comments from the women:

- “It gave me lots of tips to help me reduce and cope”
- “Made me more aware of the effects on my health and the baby. It gave me more options and ideas on how to change the habit.”
- “Very useful information and facts I didn’t know about”
- “It helped me realize the stresses that made me smoke, so I tried to limit the stresses.”
- “The book had me quit for several days!”
- “It helped keep me on the right track”
- “I didn’t feel like I was being told WHAT to do, but HOW to do what I should already want to do.”
- “I took everything my case manager said and thought about it a lot. But the thing that I would say helped me the most would be the booklet she gave me. Because when I felt like smoking I could refer to it.”

Educational Literature and Posters

As part of our efforts to educate our participants and the community, we have used many existing pamphlets as handouts at our sites and throughout the community. In addition, we have developed several posters to educate about the dangers of pregnancy smoking and to inform people about the TIPS program. These have been distributed to all prenatal practices and hospitals in the region, and to all of the health departments. Additional details about these efforts were provided in our May 2008 report.
Program Web-Site

During the first six months of the project a TIPS webpage was developed (www.etsu.edu/tips), and we provided details about the site in our May 2008 report. The site contains a significant amount of educational and resource information for pregnant women, health professionals, and researchers. The site is regularly updated with project happenings and findings. We have a detailed web-page counter that went live in March of 2008. Data from the web-site counter reveal the following:

- We had **1467 visits and 458 unique visitors**. Our highest number of visits per day was 38.
- The average amount of time spent on the site was just over 6 minutes, and the average number of pages viewed per visitor was 6. The bounce rate was less than 20%.
- 95% of our visits came from within the United States, with the rest coming from Canada, Brazil, and several countries in Asia, Europe, and Africa.
- 85% of our U.S. visitors were from Tennessee, with the rest from 37 other states including the bulk from Virginia, North Carolina, and Kentucky.
- Of the Tennessee visitors, about one half were from Washington County, with the rest, in descending order of frequency, from Sullivan, Carter, Unicoi, Hawkins, Greene, Davidson, Knox, Shelby, Hamilton, Montgomery, and several other counties.
- Nearly half of our visitors arrived at our website directly, with one third arriving by search engine (mostly Google and Yahoo), and the remainder arriving through referring sites including ETSU’s webpage, the Mountain States Health Alliance webpage, and the webpage for the Northeast Tennessee Perinatal Coalition.

As so many of our visitors arrive at our site directly, and the vast majority are from our six-county target area, it appears that we have managed to get the word out about our website as a resource for local women and the professionals involved in their prenatal care, with **over 450 separate visitors to the website, and a significant number of repeat visitors**.

Presentations

Many community and professional presentations have been given on the TIPS program and on project outcomes and findings. In the first year of the project, we were most focused on letting groups know who we were and what we had to offer. More recently, we have tried to provide information about what the project has accomplished. These presentations are outside of informational meetings and training sessions conducted with groups of area prenatal care providers, and in additional to presentations at research meetings. The following presentations have been given:

- Intermountain Psychological Association, a regional group of clinical psychologists (May 2007) – Provided regional data on pregnancy smoking and outcomes, and information about the TIPS program and referring patients; approximately 20 attendees
- ETSU Department of Obstetrics and Gynecology Grand Rounds (May 2007) – Provided regional data on pregnancy smoking and outcomes, and information about the TIPS program and referring patients; approximately 50 attendees
- Primary Care Research Day, a regional forum for primary care providers and researchers (September 2007) – Gave a presentation about the TIPS program and successes from the first 6 months; approximately 70 attendees
- Mountain States Health Alliance regional nursing staff meeting (January 2008) – Provided information about the TIPS program, how to refer patients, and how to work with pregnant smokers; approximately 120 attendees
• ETSU Department of Psychiatry Grand Rounds (January 2008) – Provided research data on long term child behavioral and psychiatric outcomes of prenatal cigarette exposure, and information about the TIPS program and referring patients; approximately 60 attendees
• Carter County Health Council Bi-Monthly Meeting (February 2008) – Provided community health leaders with regional data on pregnancy smoking and outcomes, and information about the TIPS program and referring patients; approximately 30 attendees
• REACH (Regional Education and Action Coalition for Health) Bi-Monthly Meeting (February 2008) – Provided community health leaders with regional data on pregnancy smoking and outcomes, and information about the TIPS program and referring patients; approximately 25 attendees
• Psychiatry in the Mountains, regional meeting of Psychiatrists (October 2008) – Gave a presentation on the outcomes associated with prenatal cigarette exposure, nicotine addiction in pregnancy women, an overview of the TIPS program, and TIPS program outcome data from the first year and a half of the program; approximately 100 attendees
• Tennessee Conference on Social Welfare, social worker training conference in Northeast Tennessee (November 2008) – Presentation titled “Pregnant Women and Smoking: Considering the 5 A’s as a Counseling Approach” – this presentation also provided information about the TIPS program and referring patients; approximately 50 attendees
• ETSU Department of Obstetrics and Gynecology Grand Rounds (January 2009) – Provided regional data on pregnancy smoking and outcomes, information about the TIPS program and referring patients, and findings from the first two years of the program; approximately 50 attendees
• ETSU Department of Psychology Invited Speaker Series (March 2009) – Provided information about the effects of pregnancy smoking, and TIPS and other services available in the region for smokers and children suffering the consequences of prenatal cigarette exposure; approximately 80 attendees
• Regional Breastfeeding Conference (April 2009) – Gave a presentation to women’s health professionals on the regional link between maternal smoking and failure to initiate breastfeeding (based on findings from TIPS data collection), as well as on current recommendations regarding breastfeeding and smoking; approximately 100 attendees
• ETSU Department of Public Health Invited Speaker Series (December 2009) – Gave a presentation on the regional link between maternal smoking and depression (based on findings from TIPS data collection), as well as on the TIPS program and other area resources for pregnant and parenting women who are depressed; approximately 20 attendees
• Johnson County Health Council Bi-Monthly Meeting (originally scheduled for January 2009, rescheduled for March 2009) – Presentation of regional data on pregnancy smoking and information about the TIPS program and referring patients; typical attendance is approximately 25

In total, over 800 community health professionals have attended our presentations about the TIPS program and findings, and on pregnancy smoking issues in general, since the program began.

**Physician’s Pregnancy Toolkit and Community Resource Guide**

Both of these tools were developed early in the project to provide resources for providers, prenatal patients, and others working with them. They were distributed throughout the region to over 50
prenatal care providers and are in use by our staff. Additional details were provided in our May 2008 report.

**Involvement of Health Professions Students**

Given our affiliation with East Tennessee State University, we have been able to involve over two dozen students in the TIPS program. The TIPS program benefits from the labor and ideas of student workers, and from examination of specific aspects of the program through their research projects that might not otherwise be looked at. The students and university benefit from this additional training opportunity. Undergraduate students from the Department of Psychology, and the Colleges of Nursing and Public Health; graduate students from the Department of Psychology and the College of Public Health; and medical students from the Quillen College of Medicine have all been involved in the TIPS program.

Involvement of students in the program falls generally into two categories: those who have worked directly for us assisting our project coordinator, case managers, and research assistant, and those who with Dr. Bailey have developed research projects as part of the program.

In total, 8 undergraduate students and 1 graduate student have worked directly for us. Instead of pay, they work for independent study course credit, for which Dr. Bailey serves as instructor. To date, these students have provided over 600 hours of assistance with chart reviews, data entry, patient tracking and follow up, and general clerical tasks. The graduate student in clinical psychology has also assisted with patient interviews, and a senior undergraduate honors student has assisted with the developmental follow up testing.

We also have several undergraduate and graduate students who have worked with Dr. Bailey and the TIPS program to obtain data for research projects required for their degrees. To date, 7 students have done research projects in conjunction with the program. All students that are taken on are required to give at least one regional or national research presentation of their findings, and are provided assistance with writing up their findings for publication. Two ETSU doctoral candidates in clinical psychology are doing their dissertation projects with the program, an undergraduate honors student in nursing is doing her senior honors thesis with the program, and an undergraduate student in public health did her senior community research project with TIPS. We also have an undergraduate McNair Scholar who has been with us for the last year developing a research project and assisting with the developmental follow up. Our former research assistant, now in her second year of medical school at ETSU, also continues to develop research projects with Dr. Bailey and TIPS. Finally, a student in a joint MD/MPH program at University of California Berkley and San Francisco has been working with the project for nearly two years. The data for her thesis is being collected as part of the TIPS research interviews, and she works for us during summers filling in for Case Manager vacations and maternity leave. All of the presentations and papers developed by the students are included on the presentation and publication pages later in this report.

In addition to the students mentioned above, in 2008 a group of 6 interdisciplinary graduate students in the rural track program at ETSU worked in conjunction with the TIPS program for their two semester community research sequence. These students targeted pregnancy smoking in Carter County and developed and implemented community and professional education sessions, pregnancy smoking workshops, and smoking cessation support groups. They also developed and conducted a survey of pregnant women in the county focusing on describing smoking behavior and needs related to cessation.
Finally, involvement of students has led to collaborations between many university faculty and the TIPS program. In particular, two psychology faculty and one nursing faculty member have become an integral part of the TIPS program, providing guidance with smoking cessation counseling protocols, measures for our research interviews, assistance with analyzing and disseminating research findings, advice related to ongoing project issues, and invaluable assistance with efforts to sustain the project.
Program Evaluation and Research

A significant aspect of TIPS involves evaluation of the effectiveness of the program. As described in previous sections of this report, women throughout the region, women who receive care from TIPS-trained providers, and women who receive case management services, are all tracked for pregnancy behaviors and birth outcomes. In addition, prenatal care providers are surveyed, all in an attempt to determine how well the TIPS program is working and how it could be improved to decrease pregnancy smoking and improve birth outcomes in the region. Please refer to earlier sections for a description of our evaluation to date of the specific effectiveness of our provider training, case management services, and other activities.

Since the beginning of the TIPS program, the percentage of women in the six county region who smoke throughout pregnancy has gone from a decade high in 2007 of 31.9% to a low of 25.8% in 2009. This represents a **20% decrease in pregnancy smoking in the region**, and compares to a statewide decrease of only 2% during the same period. A breakdown by county is shown in the subsequent table. All counties demonstrated significant decreases in pregnancy smoking rates, with Hawkins County experiencing the largest decline at 30.8% over a three year period.

Rates of low birth weight births and preterm deliveries have also decreased since the TIPS program began. The percentage of **low birth weight deliveries** has dropped from 9.8% to 8.1%, a **17.3% decline**. In comparison, the state of Tennessee has seen a decrease in low birth weight births of 4.2% from 2006 to 2008. The percentage of **preterm deliveries** in the TIPS service area has **dropped** from 13.4% to 10.6%, or **20.9%** during this time. A breakdown by county is presented in the table, with the biggest declines seen in Hawkins, Johnson, and Unicoi Counties, the counties with the highest percentage of at-risk women. For example, Hawkins County has seen a 56.5% decrease in preterm deliveries, while Johnson County has seen a 40.1% decrease in low birth weight births.

It is our hope to gain access to TennCare information about medical costs for pregnant women and their children in the region, so that a precise cost benefit analysis of the program can be conducted. However, we can use published cost information to estimate the impact of the reduction of preterm births seen in the region since the beginning of the TIPS program. Based on the number of preterm births eliminated per year, and the average increase hospital costs associated with a preterm delivery, a region-wide cost reduction of $907,200 is realized. Over the 3 year period, this results in a savings in newborn hospital costs of $2,721,600. This of course does not include costs savings due to reduced need for additional prenatal care services due to smoking cessation, reduction in short and long term child health care costs due to non-exposure to smoking, reduction in long term maternal health care costs due to smoking cessation, reduction in long term behavioral health and educational expenses for children due to non-exposure to smoking, the overall improvements in quality of life for women, children, families, and communities, and the decreased burden on the health care system. **Thus, looking at an estimate of only one cost indicator – reduction in newborn hospital costs due to preterm delivery – the TIPS program has resulted in a $2.72 million reduction in health care costs over a three year period relative to the**
$1.44 million cost of the program. While we cannot be certain that these reductions are not also a result of other efforts within the community, we do believe that because of the significant reduction in pregnancy smoking in the region, the TIPS program has been a major factor in improving birth outcomes in the region.

Part of the TIPS program involves in-depth interviews with eligible women at practices served by case managers. These interviews will allow us to examine in more detail smoking behavior and aspects of women and their environments that influence pregnancy smoking, cessation, and birth outcomes. To date, 368 women have agreed to participate in the research arm of the project and have completed at least one interview. This total includes a comparison group of 79 non-smokers. Women are interviewed twice during pregnancy, at 6 weeks post partum, and at 6 to 8 months postpartum. We will continue to enroll women in the research arm until June of 2010, and hope to be able to include at least 500 women. We have had significant success in retaining women in the research sequence, as 88% of those who have now delivered completed third trimester interview, 86% completed the 6 week post partum interview, and 82% of those now eligible have completed the 6 to 8 months postpartum interview.

Analysis of the research interview data is preliminary at this time, and will be finalized once this arm of the project closes to enrollment. This data analysis and dissemination will be a high priority in the final months of the project and will be continued by Dr. Bailey after December 2010. Initial analyses suggest:

- Pregnant smokers are very willing to disclose smoking behavior, and the vast majority want to quit smoking. Fewer than 10% of smokers deny smoking, and more than three quarters express interest at entry into prenatal care in becoming smoke free.
- Women experiencing significant life stressors, including intimate partner violence, are significantly less likely to quit smoking or reduce their amount of smoking than women experiencing less stress.
- Women who smoke during pregnancy are significantly more likely than non-smokers to consume alcohol and use other drugs. However, reduction or cessation of smoking is significantly associated with discontinuation of the use of these other substances too.
- Pregnancy depression appears to be the biggest barrier to smoking reduction and cessation. Women who receive treatment and experience a reduction in their levels of depression are significantly more likely to reduce or quit smoking than those who do not.
- Pregnancy smoking doubles the likelihood that a woman will not initiate breastfeeding when her child is born. We are currently working with the local breastfeeding coalition to ensure that even smokers are encouraged by prenatal care providers and hospital delivery staff to breastfeed.
- Several factors are associated with successful elimination of second hand smoke exposure during pregnancy including higher levels of self-esteem, higher levels of social support, lower levels of relationship conflict, and lower levels of depression.
- Resumption of smoking following delivery after successful cessation during pregnancy remains a significant problem in the region. While addressing smoking recidivism was not a specific goal of the project, smoking resumption after delivery is assessed as part of the research interviews. At six weeks post-partum, 39% of TIPS participants who had quit smoking during pregnancy had relapsed and begun smoking again. However, of those smoking at this time, 79% were at least considering quitting smoking (again or for the first time), and 15% were actively trying to quit. Clearly, the immediate post-partum period is a critical time to address smoking-related issues.
• All of these, and other related findings, will inform future pregnancy smoking cessation interventions with women in the region, and hopefully lead to even greater successes with respect to pregnancy smoking and birth outcomes.

Finally, in late 2009 we began recruiting former research participants to be part of a 15 month post-partum follow-up. While this involves surveying the women about current smoking behavior and other lifestyle issues, the primary focus is a developmental assessment of their children. We are particularly interested in examining how prenatal smoke exposure, prenatal second hand smoke exposure, and pregnancy smoking cessation all impact cognitive and behavioral outcomes by 15 months. To date, 19 mother-child pairs have participated in the follow-up and we expect to enroll at least 80 by December 2010. We hope these findings, and those from the detailed pregnancy and post-partum interviews, will lay the groundwork for a longitudinal study of the impact of pregnancy smoking, smoke exposure, and cessation on long term child and family outcomes.

A list of all publications and professional meeting research presentations based on findings from the TIPS project can be found in the final section of this report. Also included in that section are copies of the papers and many of the individual presentations.
Publications and Presentations of TIPS Program Findings

Peer Reviewed Publications in Professional Journals

Original Research Reports:


Reviews:


Presentations at National/International Research Conferences


Clements AD, Bailey BA, Wright HN, Ermakova A. Prayer/Religiosity as primary stress coping strategy predicts health-related pregnancy and birth factors in a rural Appalachian sample. To be presented at the Society for Spirituality, Theology, and Health annual meeting, June 2010, Durham, NC.

Carlosh K, Allen S, Dalton WT, Bailey B. Weight concerns and body image as related to compensatory behavior among rural pregnant smokers. To be presented at the Association of Behavioral and Cognitive Therapies annual meeting, November 2010, San Francisco, CA.

Presentations at Regional Research Conferences

Bailey B, Jones Cole LJ. Implementing a pregnancy smoking cessation program: Challenges and recommendations from the first six months of TIPS. Presented at Primary Care Research Day, Johnson City, TN, September 2007.

Wright HN, Bailey B, Jones Cole LK. Access to obstetric care in rural Northeast Tennessee: Association with birth outcomes. Presented at the Appalachian Student Research Forum, Johnson City, TN, April, 2008. This poster won first place in the Medical Student category.


Table 1. Changes in Pregnancy Smoking Rates by Prenatal Care Practice: Case Manager and Non-Case Manager Sites 2006-2009

<table>
<thead>
<tr>
<th>Smoking Rates (%)</th>
<th>ETSU OB</th>
<th>Johnson City OB</th>
<th>Bristol FP</th>
<th>Mountain City NP Clinic</th>
<th>Practice 1 – Metro</th>
<th>Practice 2 - Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>33.2</td>
<td>30.0</td>
<td>45.7</td>
<td>51.2</td>
<td>14.9</td>
<td>52.2</td>
</tr>
<tr>
<td>2007</td>
<td>35.1</td>
<td>32.1</td>
<td>44.2</td>
<td>52.5</td>
<td>16.9</td>
<td>42.4</td>
</tr>
<tr>
<td>2008</td>
<td>28.7</td>
<td>29.4</td>
<td>36.4</td>
<td>44.1</td>
<td>13.3</td>
<td>39.1</td>
</tr>
<tr>
<td>2009</td>
<td>27.8</td>
<td>26.2</td>
<td>37.2</td>
<td>42.9</td>
<td>14.8</td>
<td>48.7</td>
</tr>
</tbody>
</table>

* refers to the percentage of women who smoke throughout pregnancy and are still smoking at delivery

- For purposes of comparison, data collection is underway for 2 practices WITHOUT Case Manager Services and WITHOUT trained providers (i.e. providers who did not participate in a TIPS smoking cessation counseling training). Data collection and analysis for 2006-2009 will be complete by Fall 2010.

- When the TIPS program began offering provider trainings and case management services in 2006 and into early 2008, pregnancy smoking rates were generally RISING in the region (i.e. increase from 2006 to 2007).

- TIPS case management services were offered beginning in mid-2007 at ETSU OB. By the end of 2008, pregnancy smoking rates had dropped 18.2% among patients at the practice, and this decline continued in 2009 for a **two year decrease of 20.8%**.

- TIPS case management services were offered beginning early in 2008 at Johnson City OB. Pregnancy smoking rates dropped 8.4% from 2007 to 2008, and continued to drop significantly in 2009, to a **total decrease of 18.4%** in pregnancy smoking at this practice since TIPS began serving patients there.

- TIPS case management services were offered beginning mid-2007 at Bristol Family Practice. However, due to staffing issues, consistent and complete services were not being offered to patients until mid-2008. From 2007 to 2008, pregnancy smoking rates dropped 17.6%, with a **two year decrease in pregnancy smoking rates of 16.0%**.

- TIPS case management services were offered beginning spring 2008 at the nurse managed Mountain City Extended Hours Clinic. Pregnancy smoking rates dropped 16.0% from 2007 to 2008, and dropped again in 2009 for a **two year decrease in pregnancy smoking rates of 18.3%**.

- **Across all four practice sites, the introduction of TIPS of case management services has led to an overall decrease in the rate of pregnancy smoking of 18.4%**.

- In comparison, two practices without case management services, but with providers who were trained by TIPS to offer brief smoking cessation counseling to their patients were examined. After training in late 2007, pregnancy smoking rates dropped in both practices in 2008 by an average of 14.6% compared to 2007 rates. However, in late 2008 providers at both practices declined refresher courses and additional TIPS support for their efforts, and pregnancy smoking rates ROSE in both practices in 2009 by an average of 18.0%.

- **These data demonstrate the general effectiveness of both case management services offered by TIPS staff and brief smoking cessation counseling offered by providers in reducing the number of women who continue to smoke during pregnancy. However, case management services coupled with provider counseling add additional benefit over provider counseling alone. In addition, training providers in a brief smoking cessation intervention appears to initially lead to a reduction in the number of women who continue to smoke during pregnancy. However, these successes do not appear to be maintained over time with a single initial training session.**
Table 2. Regional Changes in Pregnancy Smoking and Birth Outcomes by County of Residence: TIPS Target Counties 2006-2009

<table>
<thead>
<tr>
<th></th>
<th>Washington</th>
<th>Sullivan</th>
<th>Carter</th>
<th>Unicoi</th>
<th>Johnson</th>
<th>Hawkins</th>
<th>6 County Total*</th>
<th>TN</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pregnancy Smoking (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>25.0</td>
<td>33.3</td>
<td>36.6</td>
<td>33.9</td>
<td>36.4</td>
<td>41.3</td>
<td>30.9</td>
<td>19.2</td>
<td>11.4</td>
</tr>
<tr>
<td>2007</td>
<td>25.4</td>
<td>34.7</td>
<td>38.4</td>
<td>35.8</td>
<td>38.0</td>
<td>38.1</td>
<td>31.2</td>
<td>19.4</td>
<td>-</td>
</tr>
<tr>
<td>2008</td>
<td>21.3</td>
<td>26.6</td>
<td>36.0</td>
<td>35.6</td>
<td>33.8</td>
<td>35.7</td>
<td>26.9</td>
<td>18.8</td>
<td>-</td>
</tr>
<tr>
<td>2009</td>
<td>20.2</td>
<td>25.5</td>
<td>34.1</td>
<td>28.7</td>
<td>30.5</td>
<td>28.6</td>
<td>25.8</td>
<td></td>
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<tr>
<td><strong>Low Birth Weight (%)</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2006</td>
<td>9.3</td>
<td>9.5</td>
<td>10.4</td>
<td>9.9</td>
<td>16.2</td>
<td>9.3</td>
<td>9.8</td>
<td>9.6</td>
<td>8.3</td>
</tr>
<tr>
<td>2007</td>
<td>9.3</td>
<td>10.6</td>
<td>9.6</td>
<td>6.9</td>
<td>11.4</td>
<td>9.9</td>
<td>9.6</td>
<td>9.4</td>
<td>8.2</td>
</tr>
<tr>
<td>2008</td>
<td>7.7</td>
<td>10.4</td>
<td>10.8</td>
<td>3.8</td>
<td>9.5</td>
<td>8.1</td>
<td>9.2</td>
<td>9.2</td>
<td>9.0</td>
</tr>
<tr>
<td>2009</td>
<td>6.9</td>
<td>9.1</td>
<td>10.5</td>
<td>5.6</td>
<td>9.8</td>
<td>8.4</td>
<td>8.1</td>
<td></td>
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<tr>
<td><strong>Preterm Birth (%)</strong></td>
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<tr>
<td>2006</td>
<td>11.8</td>
<td>14.5</td>
<td>14.6</td>
<td>11.7</td>
<td>18.2</td>
<td>15.4</td>
<td>13.4</td>
<td>14.8</td>
<td>12.8</td>
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<tr>
<td>2008</td>
<td>10.0</td>
<td>10.9</td>
<td>11.0</td>
<td>8.3</td>
<td>13.1</td>
<td>10.9</td>
<td>11.2</td>
<td></td>
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</tr>
<tr>
<td>2009</td>
<td>9.9</td>
<td>11.7</td>
<td>12.7</td>
<td>6.3</td>
<td>12.8</td>
<td>6.7</td>
<td>10.6</td>
<td></td>
<td></td>
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<tr>
<td><strong>Death/NICU Adm (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>2006</td>
<td>1.3/6.5</td>
<td>.7/6.4</td>
<td>1.3/8.6</td>
<td>1.2/11.1</td>
<td>-/9.1</td>
<td>-/8.7</td>
<td>1.1/7.0</td>
<td></td>
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<tr>
<td>2007</td>
<td>1.1/6.0</td>
<td>1.0/6.9</td>
<td>1.2/9.3</td>
<td>2.3/7.9</td>
<td>-/8.8</td>
<td>-/8.6</td>
<td>1.2/6.3</td>
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</tr>
<tr>
<td>2008</td>
<td>1.0/6.1</td>
<td>2.0/10.7</td>
<td>.6/8.1</td>
<td>0/7.0</td>
<td>-/7.1</td>
<td>-/6.3</td>
<td>1.0/8.0</td>
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<tr>
<td>2009</td>
<td>1.6/5.5</td>
<td>1.9/10.7</td>
<td>1.0/7.8</td>
<td>0/5.9</td>
<td>-/7.7</td>
<td>-/6.7</td>
<td>1.4/6.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Breastfeeding (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>63.4</td>
<td>46.7</td>
<td>54.8</td>
<td>50.0</td>
<td>45.9</td>
<td>57.0</td>
<td>58.8</td>
<td>73.9</td>
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<tr>
<td>2007</td>
<td>66.8</td>
<td>54.2</td>
<td>49.6</td>
<td>59.0</td>
<td>52.0</td>
<td>48.0</td>
<td>59.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>67.7</td>
<td>68.6</td>
<td>51.2</td>
<td>59.9</td>
<td>50.0</td>
<td>63.2</td>
<td>63.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>68.7</td>
<td>66.4</td>
<td>51.0</td>
<td>56.5</td>
<td>56.8</td>
<td>64.3</td>
<td>63.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data Source for TIPS Counties: Delivery chart review at areas hospitals (note: data from Sullivan County hospitals not yet complete for all years)

Data Sources for TN and USA Averages: March of Dimes Peristats; National Vital Statistics; State of Tennessee Health Department; CDC Nutrition Reports

* See Figure 2 for graphical representation
Table 3. TIPS Program Participation and Smoking Status at Delivery

<table>
<thead>
<tr>
<th>Program Activity</th>
<th>Significantly Reduced Smoking</th>
<th>Attempted to Quit Smoking</th>
<th>Successfully Quit Smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Participants</td>
<td>53%</td>
<td>24%</td>
<td>10%</td>
</tr>
<tr>
<td>2+ Case Mgr Sessions</td>
<td>55%</td>
<td>28%</td>
<td>10%</td>
</tr>
<tr>
<td>4+ Case Mgr Sessions</td>
<td>60%</td>
<td>35%</td>
<td>20%</td>
</tr>
<tr>
<td>In-depth Counseling</td>
<td>92%</td>
<td>25%</td>
<td>9%</td>
</tr>
<tr>
<td>Info on Stress Reduction</td>
<td>71%</td>
<td>13%</td>
<td>8%</td>
</tr>
<tr>
<td>Info on Mental Health &amp; Services</td>
<td>59%</td>
<td>35%</td>
<td>8%</td>
</tr>
<tr>
<td>Info on Relapse Prevention</td>
<td>71%</td>
<td>23%</td>
<td>8%</td>
</tr>
<tr>
<td>Info on Cessation for Family</td>
<td>62%</td>
<td>24%</td>
<td>8%</td>
</tr>
<tr>
<td>Outside Referrals</td>
<td>63%</td>
<td>34%</td>
<td>12%</td>
</tr>
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</table>

Table 4. TIPS Participant Pregnancy Smoking Behavior and Birth Outcomes

<table>
<thead>
<tr>
<th>Birth Outcome</th>
<th>Continued Smoking</th>
<th>Reduced Smoking</th>
<th>Quit Smoking</th>
<th>NS-Continued SHS Exposure</th>
<th>NS-Reduced/ Eliminated SHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Weight (lb)</td>
<td>6.68</td>
<td>6.76</td>
<td>7.18</td>
<td>6.84</td>
<td>7.03</td>
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<tr>
<td>Birth Length (in)</td>
<td>19.3</td>
<td>19.2</td>
<td>19.9</td>
<td>19.3</td>
<td>19.6</td>
</tr>
<tr>
<td>Preterm Birth (%)</td>
<td>18.2</td>
<td>13.9</td>
<td>13.7</td>
<td>22.0</td>
<td>11.7</td>
</tr>
<tr>
<td>NICU Admission (%)</td>
<td>9.1</td>
<td>4.8</td>
<td>7.7</td>
<td>21.4</td>
<td>8.7</td>
</tr>
<tr>
<td>Fetal/Neonatal Death (%)</td>
<td>6.3</td>
<td>4.6</td>
<td>0</td>
<td>5.7</td>
<td>4.7</td>
</tr>
</tbody>
</table>
* TIPS participants were asked post-partum: “How useful did you find the information and advice offered to you by _____ about smoking cessation and second hand smoke?” Separate questions were asked for their TIPS Case Manager, their prenatal care provider, and the TIPS self-help book.
* Since the beginning of the TIPS project in mid-2007, pregnancy smoking rates in the region have decreased 20.0%, compared to a statewide decrease of only 2.1% during that time.

* Also during that time, preterm birth rates have dropped 20.9%, and low birth weight rates have dropped 17.3%. Statewide, rates on low birth weight births have only dropped only 4.2%.
A recent meta-analysis of pregnancy smoking cessation interventions revealed a **15.1% quit rate by delivery** for interventions comparable to or more intense than the TIPS equivalent of 4 or more Case Manager sessions (Lumley et al., 2008).
Year 4 Plans and Goals

During the final year of TIPS funding our primary efforts will be to continue to provide services, continue evaluation efforts to demonstrate the effectiveness of the program, and to secure funding for program continuation. To this end, we plan to engage in the following specific tasks and meet these specific goals:

- Provide case management services to a total of 2000 women by December 2010. This was our original objective in our project proposal, and we expect to reach that goal.
- Enroll a total of 500 women in the research arm of the project and follow them through at least 6 months post-partum. While completion of the pregnancy interviews for 500 women is feasible, the follow up goal cannot be met by December 2010. Dr. Bailey will continue these efforts, with or without additional funding, using university resources.
- Enroll a total of 80 mother-child pairs in the 15 month developmental follow-up.
- Continue review of prenatal and delivery charts for TIPS participants and women throughout the region.
- Conduct a follow up survey with all prenatal care providers in the region to look for potential changes in behaviors and attitudes related to pregnancy smoking and cessation efforts.
- Gain access to TennCare service and cost data to more thoroughly evaluate the cost benefit of the TIPS program.
- Continue efforts to secure continuation funding for the project. To date, grants have been applied for to continue the project on some level from both the March of Dimes, the National Institutes of Health, and the U.S. Department of Health and Human Services. None of these applications were funded. However, we have an additional grant application going to the National Institutes of Health this month, and another to the Templeton Foundation next month. The DHHS application, which received a fairly high score, will be revised and resubmitted this fall. We also hope, with the assistance of GOCCC, to pursue state sources of continuation funding as well.
- Continue to analyze data from the project to demonstrate effectiveness and discover potential changes to future interventions to increase their effectiveness. These efforts will culminate in research meeting presentations and peer reviewed publications.