Texas Public Health Journal
A quarterly publication of the
Texas Public Health Association (TPHA)

Volume 65, Issue 1 Winter 2013

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Please visit the Journal page of our website at http://www.texaspha.org for author information and instructions on submitting to our journal.

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President’s Message
Kaye M. Reynolds, MPH

I am very excited about this issue of the Texas Public Health Journal. The partnership with the Cancer Prevention and Research Institute of Texas is a natural for public health workers and agencies across the state. Public Health is based on the monitoring of health status and the causes of ill health with the purpose of implementing programs and interventions that will then reduce the morbidity and mortality due to these causes.

The next four goals promote screening and early detection of cancers to reduce mortality rates. Public and private partnerships, along with adequate funding and infrastructure can make headway with these goals. The partners across communities that make up the larger public health system, not just the local health departments, but academia, research settings, hospitals, community health centers, private physicians, philanthropic foundations, schools, libraries and many others, can all take part in these efforts. Education of the population, provision of adequate and accessible screening programs and appropriate follow up treatment and care, will work for cancers as well as many other public health concerns.

The number of entities funded for cancer prevention, treatment and research programs through CPRIT (504 grants so far) is an example of the collaboration and cooperation needed to tackle challenges of the magnitude of cancer in our populations. Access to quality care, promotion of overall health and development of the infrastructure to carry out these goals are struggles of public health for all health conditions. Some of the funding initiatives from CPRIT encourage hiring the brightest and best and retaining experts in the field of cancer prevention and treatment. It is critical that all of our agencies find ways to maintain and grow the workforce needed for the health and well-being of all Texans.

Just as the voting public determined that there was a need for the Cancer Prevention and Research Institute of Texas, it will take a groundswell of support to provide the needed collaboration, resources and infrastructure to support any large scale public health effort.

It will be educational and useful to review the work of CPRIT funded collaborators in this issue and the next of the Texas Public Health Journal. I appreciate the opportunity and look forward to finding best practices and reproducible models to further the cause of good health for all Texans.

Editor’s Note: The editorial team of the Texas Public Health Journal would like to wish our readers a Happy and Healthy 2013! The Editor wishes to thank all who make this journal possible including the editorial team, who dedicate many hours throughout the year, our volunteer reviewers, those who choose our journal in which to publish their work and YOU, for the work you do every day. The focused issues of this journal help to offset the costs of publishing. If you or your group are interested in working with us on a public health related focus issue please contact Terri at txpha@aol.com.
Commissioner’s Comments
New Year Brings Opportunities for Health in Texas
David L. Lakey, M.D.
Commissioner, Texas Department of State Health Services

2012 was a busy and productive year for public health in Texas. We faced many challenges, and our successes were due to each person involved in public health. Your commitment to the health of Texans is commendable. I am honored to serve as DSHS commissioner and to work with so many dedicated public health professionals.

As a new year begins, I ask that you reflect on the many ways our profession helps individuals, families and communities in Texas. Together, during the past year, we responded to threats such as tuberculosis and West Nile virus outbreaks, worked to reduce infant prematurity and mortality, improved the state’s health registries, implemented initiatives to prevent unnecessary hospitalizations and health care associated infections, improved childhood immunization rates, and launched a newborn screening test to detect Severe Combined Immunodeficiency (SCID). The Texas Association of Local Health Officials, DSHS, and our academic partners implemented Senate Bill 969, which created the Public Health Funding and Policy Advisory Committee. This committee is charged with defining core public health services and identifying opportunities to improve public health in Texas. These are major achievements and these are just a few of the many accomplishments in public health in the past year.

The upcoming legislative session is sure to bring more opportunities for all of us to improve health and well-being in Texas. For this session, DSHS has requested “exceptional item” funding of $266 million in state general revenue to maintain services, comply with federal and state laws and move Texas’ health forward. The requests includes funding for a variety of health needs ranging from mental health services to infectious disease control to programs and services intended to avoid or reduce costs in the state Medicaid budget. Specific to public health, we are working to address needs relating to the prevention, control and treatment of tuberculosis; to shore up our adult immunizations safety net; to provide critical health services for women; to continue working to prevent health care associated infections; and to strengthen tobacco and chronic disease prevention efforts. Our website – www.dshs.state.tx.us – contains more information about the DSHS legislative appropriations request.

This is just the beginning of the legislative process. Nothing is final until the Legislature passes the Appropriations Bill and the governor signs it into law. Changes will no doubt be made as we go through this long and fluid process. Through it all, we must remain true to our mission: to improve the health and well-being of the people of Texas.

Whatever else may change – funding levels, source of funds, program direction – that mission will not. And we look forward to working side by side with you to achieve it in this next year.

Thank you for what you do every day for the health of Texans.

TPHA News and Information

Save the Date: The 2013 TPHA Annual Education Conference (AEC) will be held March 20-22 at the St. Anthony Riverwalk-Wyndham Hotel. For more information and to register visit www.texaspha.org.

Call for NOMINATIONS for the 2013 TPHA AWARDS: All Nomination materials for the Honorary Life Member, James E Peavy Memorial Award, and Legislator of the Year Award for Legislative Excellence must be postmarked no later than January 15, 2013 and mailed to TPHA/Awards Committee, PO Box 201540, Austin, Texas 78720-1540. Awards will be presented at the TPHA Annual Conference in San Antonio during the President’s Reception and Awards Presentations event. Questions call TPHA at (512)336-2520 or email txpha@aol.com.

TPHA Executive Board Actions
The Executive Board met on November 9th via teleconference. The following action items were recorded during the meetings:

The September Executive Board meeting minutes were approved as were the financial reports presented by Jim Swan and included the 2012 operating budget, co-sponsored events and fund balances. Terri Pali presented the proposed 2013 AEC budget, registration fees and sponsor/exhibitor packet. For details about the registration fees/exhibitor costs visit the TPHA website at www.texaspha.org.

TPHA Student Section News
The student section produced its first ever Student Section Newsletter in October 2012. Below is the introduction to the newsletter by Julie Herrmann, Student Section Chair, April 2012-March 2013:

Dear TPHA Student members,
I hope the fall semester is going well for you. I’d like to announce TPHA Journal Volume 63, Issue 1 that TPHA has officially formed a Student Section with active officers that are looking forward to establishing structure and helping connect students like you with TPHA. We are focusing on three areas this year (April 2012 – March 2013).

First, we are developing a communication plan for the TPHA student members including a quarterly newsletter to keep you all in the know. Thanks to our amazing Secretary, Andrea McDonald, for coordinating this effort. The Student Section is also developing an action plan to encourage students at public health schools in Texas to attend the TPHA educational conference. A special thanks to Arianne Rhea for leading the recruitment initiative.

Last, but not least, we are planning the student pre-conference session that occurs at the annual TPHA conference. Our goal is to improve the student session by implementing the feedback received from the student participants at the 2012 TPHA conference. We’re thrilled that Brittany Marshall is leading this effort because she has immense experience with the APHA Student Assembly and the Florida Public Health Association to bring tried and true ideas.

I’m grateful to have a team of student leaders who are willing to build the Student Section within TPHA, and we’re all excited about growing the TPHA student population! – Julie Herrmann (MPH candidate ’14), TPHA Student Section Chair (April 2012- March 2013)

If you missed your copy visit the Texaspha.org website Members Only Section-Student Section to view the newsletter.

TPHA joins in Support of the 2013 Texas Public Health Coalition Priorities
Cancer Prevention and Research Priorities
• Support the Cancer Prevention and Research Institute of Texas’ (CPRIT) funding request for cancer prevention and research. Protect Texas’ public investment by assuring a transparent fund-
ing process that includes an independent and robust scientific review on the merit of all projects.

• Support the Texas Department of State Health Service’s funding request to assure access to breast and cervical screening and detection for uninsured women.

• Support funding for evidence-based interventions to reduce tobacco use.

• Support comprehensive statewide legislation that eliminates exposure to secondhand smoke in all indoor workplaces throughout Texas.

**Healthy Eating and Activity Priorities**

• Preserve funding for the School Health Network within the Texas Department of State Health Services’ budget while also supporting the Chronic Disease Prevention exceptional item related to obesity prevention.

• Restore a half-credit of physical education in high school as well as health as a requirement for graduation.

• Strengthen the Texas Education Agency’s Pre-K health standards related to nutrition and physical activity. Allocate a specified percent of the Texas Department of Agriculture’s health and nutrition grants for programs serving young children.

• Utilize local school health advisory councils to make policy recommendations to school districts concerning the types and quantity of sugar sweetened beverages sold in school sited vending machines and a la carte offerings.

• Support policies that address food insecurity and obesity as they relate to a lack of access to affordable and healthy foods, including the use of vacant state land for community gardens and incentives for private landowners to offer a portion of their land for the same purpose.

• Support the establishment of nutritional content standards and guidelines that set local food procurement targets for foods offered via vending machines and food service programs located in state facilities and agencies.

**Immunization Priorities**

• Support the state’s legislative appropriations request for immunizations, especially for the adult safety net.

• Amend the meningitis vaccination law to bring the statute closer in line to Advisory Committee on Immunization Practices (ACIP) recommendations.

• Allow minor parents (who can consent to their child’s vaccination) the ability to consent to their own vaccination.

• Support the ability of healthcare practitioners to deduct the cost of purchasing vaccine from the state’s margins tax.

• Support a statewide disease prevention and health quality initiative to improve vaccination rates among early-childhood care providers.

• Change ImmTrac, the state’s immunization registry, to an opt-out system.

• Lengthen the amount of time allowed to age 26 to secure the required consent for a patient record to stay in the registry.

**Tobacco Priorities**

• Support comprehensive statewide smoke-free legislation that eliminates exposure to secondhand smoke in all indoor workplaces throughout Texas.

• Support evidence-based programs to discourage tobacco consumption among the public, especially youth, increase cessation.

• Oppose Tobacco Settlement fund securitization and repurposing of funds for anything other than smoking cessation and evidence-based prevention programs.

• Support the Texas Department of State Health Services budget request for the operation of the state quitline to cover all Texans who want to quit.

• Oppose efforts to encourage the use of smokeless tobacco and other tobacco products as less harmful products.

TPHA's Spotlight on Public Health Professionals: TPHA member Brian Collins is among those receiving award

*The following is reprinted with permission from the City of Plano.*

**Plano's QR Coded Health Permits Win State Innovation Award**

At the Texas Municipal League Annual Conference and Exhibition, held in Grapevine on November 14-16, the City of Plano was presented the 2012 Municipal Excellence Award in Management Innovations for cities of more than 25,000 in population. The award recognizes Plano for its project titled “Application of Quick Response (QR) Codes to Health Permits.”

To facilitate accessibility of food service inspection records, the City of Plano developed a QR code to include on Environmental Health Department permits issued to food establishments. When scanned using a smart phone application, the QR code directs a Web browser to the department’s website. Once individuals are on the site, they can access up-to-date inspection details for that particular restaurant, including the current inspection information, history of compliance and the location of the establishment on a map. The QR code is a versatile and cost effective way to provide information to the consumer through a preferred delivery method, while also making it imperative that inspection reports are accurate and timely. Initial public response to the QR codes during the 2011 calendar year was positive, with visits to the restaurant Web page showing a 70 percent increase in activity over the previous calendar year. Accepting the award were Plano City Council Member Lissa Smith, City Manager Bruce Glasscock, Deputy City Manager Frank Turner, Environmental Health Director Brian Collins, Environmental Health Manager Geoffrey Heinicke and Director of Government Relations, Policy & Community Outreach Mark Israelson. The Texas Municipal League is a voluntary association of more than 1,120 Texas cities. Its primary objective is to serve the needs and advocate the interests of Texas cities. It is the largest organization of its kind in the United States. The City of Plano is a member of the Texas Municipal League.

**Mental Health First Aid: A Public Health Imperative**

*Nancy Crider, DrPH, RN*

The recent tragedy in Newtown, Connecticut reminds us that when emergencies and disasters strike it is a public health priority to protect and improve people’s mental health and psychosocial well-being. Today’s fast-paced, mobile society has many stressors and often few built in supports to assist individuals and families to cope in times of crisis. Psychosocial support not only empowers individuals and their communities to tackle emotional reactions to traumatic events, it also creates community cohesion essential for adaptation and progress moving forward after a critical event. Mental health first aid and other psychosocial programs, when planned and implemented correctly, can help communities transform problems into opportunities and prevent or mitigate the impact of natural disasters including hurricanes and wildfires or man-made emergencies including acts of terrorism or the aftermath of active shooter rampage.

The Australian Psychological Society (APS) has developed an easily understood model to remember the skills involved in being psy-
The model’s focus is to AIM for psychological preparedness using three steps:
1. Anticipate scenarios including any anxiety and concerns that may arise
2. Identify uncomfortable or distressing thoughts and feelings that may cause further anxiety, along with ways of managing these situations both physically and psychologically
3. Manage the responses so that the ability to cope remains as effective as possible.

Understanding likely psychological responses in emergency situations can help people feel more in control and better able to cope. Being psychologically prepared can assist people to think more clearly and help them to make rational decisions about how much they can do themselves and when to leave the situation to the expertise of emergency services. Thinking clearly and responding according to a plan can reduce the risk of serious injury and loss of life or property. Remaining calm, cool and collected can also help family members and others who may not be as well-prepared psychologically for what is happening and will help to reduce psychological distress after the crisis has passed.

Mental health first aid courses can teach skills to assist people who need help when faced with an emergency. Since it began in 2001, Mental Health First Aid Australia has been committed to evaluating its training programs using rigorous, scientific studies. Based on the work of Mental Health First Aid Australia, the National Council for Community Behavioral Healthcare, the Maryland Department of Health and Mental Hygiene, and the Missouri Department of Mental Health established Mental Health First Aid USA and has developed a Mental Health First Aid Course. The Mental Health First Aid course is a 12-hour class that is usually broken up into two six-hour seminars or four three-hour segments. For more information on Mental Health First Aid-USA, go to www.mentalhealthfirstaid.org/cs/

The National Child Traumatic Stress Network Psychological First Aid (PFA) online includes a 6-hour interactive course that puts the participant in the role of a provider in a post-disaster scene. This course is for individuals new to disaster response who want to learn the core goals of PFA, as well as for seasoned practitioners who want a refresher. It includes video demonstrations and tips from trauma experts and survivors. PFA online also offers a Learning Community where participants can share about experiences using PFA in the field, receive guidance during times of disaster, and obtain additional resources and training. This project was funded by SAMHSA, NCPTSD, NACCHO, and HHS Office of the Surgeon General, Office of the Civilian Volunteer Medical Reserve Corps. The online course has 6 CE credits available through the National Association of Social Workers, American Psychological Association, California Board of Behavioral Sciences, and the Board of Registered Nursing. It is also approved for a maximum of 6.0 AMA PRA Category 1 CME Credits. http://learn.nctsn.org/course/category.php?id=11

Another resource for public health agencies and practitioners is The International Federation of Red Cross (IFRC) and Red Crescent Societies publication, Psychosocial interventions - A handbook (2009), which provides guidance on how to plan and implement psychosocial interventions in crisis response and development work. To download an electronic copy of the handbook follow the link Psychosocial interventions - A handbook [pdf].

Mental health training DVDs for school nurses and online modules for community health workers are available through the Preparedness and Emergency Response Learning Center (PERLC) located at Texas A&M School of Rural Public Health. Materials can be accessed at http://rural-preparedness.org/index.aspx?page=3f387262-72dd-49f5-8079-523bf06dd61f. To request one or more of the resources, please send an e-mail including your contact information to USACenter@srph.tamhsc.edu.

The mission of the TPHTC is to improve the state’s public health system by strengthening the technical, scientific, managerial and leadership competencies and capabilities of the current and future public health workforce. TPHTC provides face to face and online training that reach audiences across Texas. Monthly Grand Rounds broadcast live from local health departments, regional practice institutes and targeted custom designed courses promise to keep public health practitioners engaged, challenged and up-to-date.

For further information or to schedule onsite training for your organization contact Nancy Crider at nancy.m.crider@uth.tmc.edu; Cara Pennell at elpennell@srph.tamhsc.edu; or Jeffrey Moon at jeff.moon@uthsc.edu Texas Public Health Training Center website www.txphtrainingcenter.org

The “Cinnamon Challenge” - Potentially Serious Consequences of a Popular Dare
Mathias B. Forrester
Texas Department of State Health Services, Austin, Texas

The “Cinnamon Challenge” is a dare where a person attempts to swallow a tablespoon of cinnamon without drinking any water in less than 60 seconds.1,2 Although this activity has been reported since at least 2001, it became particularly popular in late 2011-early 2012.1 The number of cinnamon exposures reported to United States poison centers, Google searches for cinnamon and Cinnamon Challenge, and mentions of Cinnamon Challenge on Twitter showed surges in late 2011-early 2012.1,3 Tens of thousands of individuals, including politicians, athletes, and celebrities, have videotaped their attempt at the Cinnamon Challenge and uploaded the result to social media sites such as YouTube.1,4 Many of the individuals attempting the Cinnamon challenge are adolescents, although adults also often attempt it.2,3

The Cinnamon Challenge can result in serious adverse health effects. The cinnamon may quickly coat and dry the mouth and throat, resulting in gagging, vomiting, coughing, choking, and throat irritation. Individuals who accidentally breathe the cinnamon into their lungs are at risk of developing pneumonia.4,5 Some individuals have required treatment at hospitals.2 The American Association of Poison Control Centers (AAPCC) issued a press release on March 28, 2012, warning of the health risks of this activity.2 Some schools have issued warnings and acted to discourage the Cinnamon Challenge among their students.1,4

During January 2000-November 2012, 34 cinnamon exposures involving adolescents and 34 exposures due to intentional abuse and misuse were reported to Texas poison centers. Figure 1 presents the annual number of these several types of cinnamon exposures. Cinnamon exposures involving adolescents and those where the exposure was intentional abuse or misuse both were relatively uncommon until 2012, when the number greatly increased. During 2012, the num-
ber of both types of exposures peaked in February before declining (Figure 2).

Of the 34 exposures due to intentional abuse and misuse, the mean age was 17 years (range 8-45 years). Twenty-four patients were male and ten female. Twenty-one of the exposures occurred at a home, ten at school, one at a workplace, and two at unknown locations. Although most (18) patients were managed outside of a healthcare facility such as at home or school, six were already at or en route to a healthcare facility when the poison center was contacted, nine were referred to a healthcare facility by the poison center, and one was managed at an unknown location. The most frequently reported clinical effects were vomiting (7), throat irritation (6), cough/choke (4), oral irritation (4), abdominal pain (3), and nausea (3). Other clinical effects reported in one or two patients were hypertension, tachycardia, edema, erythema, dermal irritation, hives, rash, dizziness, drowsiness, headache, ocular irritation, red eye, and generalized pain.

Although the popularity of the Cinnamon Challenge may have faded in Texas, that may change in the future. Thousands of videos of Cinnamon Challenge still can be found on YouTube. Thus, parents, schools, and healthcare providers may want to continue to be vigilant for children attempting the Cinnamon Challenge and educate children about the potential serious consequences of this activity.

REFERENCES

Figure 1. Annual cinnamon exposures reported to the Texas Poison Center Network

Figure 2. Monthly cinnamon exposures reported to the Texas Poison Center Network, 2012
In 2007, Texas voters overwhelmingly approved a constitutional amendment to establish the Cancer Prevention and Research Institute of Texas (CPRIT), authorizing the state to issue $3 billion in bonds to fund groundbreaking cancer research and prevention programs and services in Texas. CPRIT’s goal is to expedite innovation and commercialization in the area of cancer research and to enhance access to evidence-based prevention programs and services throughout the state. Ten percent of the total amount of money CPRIT awards each year for grants is specifically devoted to delivering cancer prevention programs and services in Texas.

The CPRIT prevention grants program funds programs and services in Texas that challenge the status quo through delivery of culturally appropriate and evidence-based information and services to the people of Texas. The goal of the prevention program is to fund projects that will have a measurable impact on public health in areas of the state in greatest need and ensure:

- Texans receive culturally appropriate and accurate information and referral services to reduce their risk of developing cancer
- Texans receive state-of-the-art preventive and screening services that could prevent or detect cancer as early as possible
- Health Professionals receive education and training that will improve their knowledge, skills, and practice behavior; and will ultimately improve the health of their patients
- Cancer survivors receive evidence-based information and services that will lead to significant improvement in their quality of life

In the first three years of operation, CPRIT has awarded 105 Prevention grants, for a total award amount of $85,898,582. Of currently active grants, just over half (57%) are spearheaded by program directors affiliated with academic institutions, while 43% reside with community programs such as county health systems, federally qualified health centers, and community non-profit organizations. To date, CPRIT’s prevention grantees have provided programs and services to almost one million Texans, with over 621,000 Texans receiving education and training and 233,000 receiving clinical services. To help reach as many Texans as possible, programs leverage existing resources and form new academic-community partnerships to maximize reach into the community. Through this innovative strategy, CPRIT prevention grantees have connected over 38,000 Texans with screening services for breast, cervix, and colorectal cancer who had never before been screened for the disease. Mechanisms such as CPRIT’s annual conference, regularly scheduled conference calls, and community forums allow CPRIT to actively collaborate with prevention grantees to provide them with opportunities to network, discuss best practices and to share results.

CPRIT accepts applications and awards grants for a wide variety of cancer-related research and for the delivery of cancer prevention programs and services by public and private entities located in Texas. More information about CPRIT is available on its website, www.cprit.state.tx.us.

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The editorial team of the Texas Public Health Journal thank our guest editors for their guidance and assistance with this focused section of our winter 2013 issue. Many thanks to: Barbara C. Pence, PhD, CCRP; Professor and Vice Chair, Department of Pathology, Texas Tech University, Health Sciences Center, Lubbock, Texas and Ramona Magid, Prevention Program Director, Cancer Prevention and Research Institute of Texas, Austin, TX
Cancer Screenings throughout Texas, 2008 and 2010 Behavioral Risk Factor Surveillance System

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ABSTRACT

Objective: The Cancer Prevention and Research Institute of Texas (CPRIT) was founded in 2007 when Texas voters approved a constitutional amendment to position Texas as a leader in cancer research and prevention efforts. CPRIT began funding evidence-based prevention programs in 2010. This purpose of this data analysis project was to establish and document baseline estimates of cancer screening proportions throughout Texas.

Methods: The data results were obtained utilizing the query system on the Texas Behavioral Risk Factor Surveillance System website. Since data were reported in the negative (e.g., never having a sigmoidoscopy/colonoscopy) and not the affirmative, prevalence rates and confidence intervals were obtained by subtracting from 100%. The proportion of adults reporting cancer screenings were examined by geographic location.

Results: The estimated rates of mammography screening among 40+ year old women for the state decreased from 72.6% in 2008 to 70.0% in 2010, although it was not a significant change. The colorectal cancer screening rates were higher in 2010 than in 2008 for all of the geographic areas analyzed with the exception of Dallas-Plano-Irving Primary Metropolitan Statistical Areas (PMSA), which stayed the same. Although not significant, all areas, except Amarillo Metropolitan Statistical Area (MSA), Ft. Worth-Arlington PMSA, Austin-Round Rock-San Marcos MSA, and McAllen-Edinburg-Mission MSA had a decline in cervical cancer screening rates between the two years.

Conclusion: While statistically significant changes are hard to show with the smaller sample sizes of specific geographic locations, monitoring changes statewide and throughout the state is vital for programming purposes.

INTRODUCTION

Cancer is the second leading cause of death in Texas, significantly impacting individuals, families, and communities in Texas. In 2011, the Texas Cancer Registry estimated that more than 107,000 Texans were diagnosed with cancer.1 Cancer of the breast in females and colon and rectal cancer in both females and males account for more than 20% of the new cases diagnosed annually. Cancers of the breast, colon/rectum, and cervix are cancers that have evidence-based screening technologies/tools that provide for the detection of these cancers at earlier, more treatable stages. Based upon this science, Maciosek and colleagues argue that screening tests for the early detection of cancers of the breast, cervix, and colon/rectum are prioritized clinical services that can significantly impact cancer disease burden in the United States.2 The United States Preventive Services Task Force (USPSTF) routinely reviews evidence on the effectiveness of specific clinical preventive services for asymptomatic individuals, updating its recommendations on a regular basis.3 The USPSTF assesses documented benefits and harms of the specific clinical service in developing its recommendation, which assigns a “grade” for the clinical services which they have assessed. In addition the USPSTF provides a “definition” for each “grade” and a “level of certainty regarding net benefit assessment.” The current set of “grade definitions” and “levels of certainty” were developed in 2007. The assigned “grades” for evaluated clinical services range from “A-D” with “A” being the most positive recommendation with a high level of certainty the benefit is positive. The “B grade” provides a positive recommendation with moderate certainty of net benefit.4 For cancers of the breast, cervix, and colon/rectum, the USPSTF recommends (A or B grade) screening using the following clinical services and guidelines:

• Screening for Breast Cancer (2009 Release Date); biennial screening mammography for women aged 50-74 years, Grade B recommendation.4
• Screening for Cervical Cancer (2012 Release Date); screening for cervical cancer in women ages 21-65 years with cytology (Pap Smear) every three years or, for women ages 30 to 65 years who want to lengthen the screening interval, screening with a combination of cytology and human papillomavirus (HPV) testing every 5 years, Grade A recommendation.3
• Screening for Colorectal Cancer (2008 Release Date); screening for colorectal cancer (CRC) using fecal occult blood testing, sigmoidoscopy or colonoscopy, in adults, beginning at age 50 years and continuing until age 75 years, Grade A recommendation.6

The Cancer Prevention Research Institute of Texas (CPRIT) was formed when Texas voters approved a constitutional amendment to position Texas as a leader in cancer research and prevention efforts. CPRIT was authorized to spend $3 billion over 10 years, with 90% of the funding going towards cancer research and 10% for prevention programs. CPRIT, through its prevention program, has initiated community-based efforts to increase evidence-based screening for cancers of the breast, cervix, and colon and rectum. CPRIT began funding evidence-based prevention programs in 2010. The funded programs are providing public and healthcare provider education efforts on the value of early detection, screening and diagnostic services for the target population as defined by each grantee, and system navigation and survivorship services. The need for expanded efforts is recognized nationally by cancer prevention and control leaders. Plescias and colleagues argue in a recent editorial in CA: A Cancer Journal for Clinicians: “The infrastructure to promote and ensure cancer screening in the United States must be expanded to achieve desired goals.”7 To establish baseline estimates of screening rates in the state, and as one evaluation measure for progress in increasing screening for these three cancers among Texans, the Department for State Health Services (DSHS) and CPRIT analyzed relevant data from the Behavioral Risk Factor Surveillance System (BRFSS), for the years 2008 and 2010. The BRFSS is an established and routine survey of risk behaviors in the U.S. for the adult, non-institutionalized population and is guided by the Centers for Disease Control and Prevention (CDC) and state health agencies. The BRFSS is the world’s largest, ongoing telephone survey system, tracking health conditions and risk behaviors in the U.S. annually since 1984.

METHODS

The Texas BRFSS is a state-based, landline telephone survey that collects information on preventive health practices, health behaviors, and chronic conditions among non-institutionalized adults aged 18 years and older.8 A total of 10,716 respondents participated in the 2008 Texas BRFSS in which 3.9% were partial completes, meaning the respondents at least finished the demographics section. The can-
Women’s health and colorectal cancer screening questions are asked in the CDC core questionnaire on even years. Three calculated variables related to Healthy People 2010 objectives were created utilizing the 2008 and 2010 Texas BRFSS data files:

- Had a mammogram within the last two years, women aged 40 years and older (Target: 70%)
- Ever had a Sigmoidoscopy/Colonoscopy, adults aged 50 years and older (Target: 50%)
- Had a Pap smear within the last three years, women aged 18 years and older (Target: 90%)

The data results were obtained utilizing the query system on the Texas BRFSS website (http://www.dshs.state.tx.us/chs/brfss). Since data were reported in the negative (e.g., never having a sigmoidoscopy/colonoscopy) and not the affirmative, prevalence rates and confidence intervals were obtained by subtracting from 100%. The proportion of adults reporting cancer screenings were examined by geographic location. Specifically, the analysis was conducted for all Texas Health Service Regions (HSRs), selected Metropolitan Statistical Areas (MSAs), Primary Metropolitan Statistical Areas (PMSAs), and Harris and Bexar counties (Figure 1). Estimates presented on the website are weighted to adjust for the probabilities of selection and a post-stratification weighting factor that adjusted for the distribution of Texas adults by age, sex, and white/non-white at each geographic stratum specified in the sampling frame. Screening rates on the website are not age-adjusted, which is typically used to account for differences in age distributions by geographic location. For comparisons between areas and across years, if confidence intervals did not overlap, they were considered to be statistically significant, which is a conservative rule in statistics. The relatively modest size of the survey sample in the sub-regions results in broad confidence intervals. Since the public-use database includes no identifiers of survey respondents, institutional review board review/approval was not required.

RESULTS

Table 1 provides the sample sizes, screening rate estimates, and 95% confidence intervals for screening mammography among Texas women, for 2008 and 2010, within the last two years from BRFSS for the State of Texas, Texas HSRs, MSAs, PMSAs, and two counties. All MSAs, PMSAs, and the two counties included in the analysis had a designated stratum in the sampling plan to stabilize the number of interviews conducted in that area. As previously noted, Figure 1 provides a map of Texas Health Service Regions and MSAs as a reference.

The estimated rates of mammography screening among 40+ year old women for the state decreased from 72.6% in 2008 to 70.0% in 2010, although it was not a significant change (Table 1). The range for the MSAs, PMSAs, HSRs, and counties was 62.8%-81.2% in 2008 and 63.7%-77.1% in 2010. With the survey design, small increases or decreases in estimated screening rates are to be expected. In 2010, Ft. Worth-Arlington MSA [77.1% (70.9 – 82.3)] had a higher screening rate than McAllen-Edinburg-Mission MSA [63.7% (56.4 – 70.5)]. Figure 2 graphically presents the screening rate estimates for the geographic regions, including HSRs, PMSAs, and MSAs.

Table 2 provides sample sizes, screening estimates, and 95% confidence intervals for ever having had a sigmoidoscopy or colonoscopy among those aged 50 years and older for the same years and geographic locations.
DISCUSSION

For 2008, the range of screening estimates for having had a Pap Smear within the last 3 years among women aged 18 years and older with an intact uterine cervix was 70.7%-87.5% (Table 3). In 2010 the screening estimates ranged from 71.3%-88.1%. Although not significant, all areas, except Amarillo MSA, Ft. Worth-Arlington PMSA, Austin-Round Rock-San Marcos MSA, and McAllen-Edinburg-Mission MSA, had a decline in cervical cancer screening rates between the two years. Figure 4 graphs the screening rate estimates for this question.

TABLE 1
Screening Mammogram within the last two years, 40 years of age and older women

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Prevalence</th>
<th>95% Confidence Interval</th>
<th>Sample Size</th>
<th>Prevalence</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas-statewide</td>
<td>5,221</td>
<td>72.6%</td>
<td>(70.8 - 74.4)</td>
<td>9,024</td>
<td>70.0%</td>
</tr>
<tr>
<td>PH Region 1</td>
<td>576</td>
<td>67.7%</td>
<td>(60.9 - 73.9)</td>
<td>1,000</td>
<td>69.4%</td>
</tr>
<tr>
<td>Amarillo MSA</td>
<td>260</td>
<td>69.5%</td>
<td>(62.5 – 75.8)</td>
<td>424</td>
<td>70.5%</td>
</tr>
<tr>
<td>Lubbock MSA*</td>
<td>246</td>
<td>74.5%</td>
<td>(66.8 – 79.9)</td>
<td>516</td>
<td>71.7%</td>
</tr>
<tr>
<td>PH Region 2/3</td>
<td>1,100</td>
<td>73.3%</td>
<td>(69.3 – 76.9)</td>
<td>1,364</td>
<td>73.5%</td>
</tr>
<tr>
<td>Dallas-Plano-Irving PMSA</td>
<td>368</td>
<td>77.6%</td>
<td>(71.6 – 82.6)</td>
<td>346</td>
<td>75.6%</td>
</tr>
<tr>
<td>Ft Worth-Arlington PMSA</td>
<td>321</td>
<td>70.7%</td>
<td>(64.0 – 76.6)</td>
<td>374</td>
<td>77.1%</td>
</tr>
<tr>
<td>Wichita Falls MSA</td>
<td>266</td>
<td>76.5%</td>
<td>(70.2 – 81.8)</td>
<td>440</td>
<td>75.1%</td>
</tr>
<tr>
<td>PH Region 4/5N</td>
<td>500</td>
<td>71.9%</td>
<td>(65.8 – 77.3)</td>
<td>932</td>
<td>63.7%</td>
</tr>
<tr>
<td>PH Region SS/6</td>
<td>746</td>
<td>74.1%</td>
<td>(70.0 – 77.9)</td>
<td>1,381</td>
<td>70.3%</td>
</tr>
<tr>
<td>Houston-Sugar Land-Baytown MSA**</td>
<td>676</td>
<td>74.0%</td>
<td>(69.7 – 78.0)</td>
<td>1,287</td>
<td>70.2%</td>
</tr>
<tr>
<td>Harris County</td>
<td>434</td>
<td>78.3%</td>
<td>(73.1 – 82.6)</td>
<td>689</td>
<td>70.8%</td>
</tr>
<tr>
<td>PH Region 7</td>
<td>589</td>
<td>78.9%</td>
<td>(74.1 – 83.0)</td>
<td>682</td>
<td>72.3%</td>
</tr>
<tr>
<td>Austin-Round Rock-San Marcos MSA</td>
<td>416</td>
<td>81.2%</td>
<td>(76.1 – 85.4)</td>
<td>462</td>
<td>75.8%</td>
</tr>
<tr>
<td>PH Region 8</td>
<td>1,011</td>
<td>75.6%</td>
<td>(71.3 – 79.5)</td>
<td>1,162</td>
<td>67.4%</td>
</tr>
<tr>
<td>Bexar County</td>
<td>552</td>
<td>78.4%</td>
<td>(74.0 – 82.2)</td>
<td>490</td>
<td>72.6%</td>
</tr>
<tr>
<td>San Antonio-New Braunfels MSA**</td>
<td>725</td>
<td>76.4%</td>
<td>(72.1 – 80.3)</td>
<td>563</td>
<td>69.0%</td>
</tr>
<tr>
<td>PH Region 9/10</td>
<td>328</td>
<td>64.1%</td>
<td>(56.7 – 70.9)</td>
<td>1,333</td>
<td>65.0%</td>
</tr>
<tr>
<td>El Paso MSA</td>
<td>236</td>
<td>69.7%</td>
<td>(62.3 – 76.1)</td>
<td>437</td>
<td>71.8%</td>
</tr>
<tr>
<td>PH Region 11</td>
<td>179</td>
<td>67.5%</td>
<td>(58.0 – 75.7)</td>
<td>958</td>
<td>65.3%</td>
</tr>
<tr>
<td>McAllen-Edinburg-Mission MSA*</td>
<td>52</td>
<td>62.8%</td>
<td>(45.5 – 77.3)</td>
<td>279</td>
<td>63.7%</td>
</tr>
</tbody>
</table>

* The Lubbock-Cooper ISD was oversampled in 2010 rather than the Lubbock MSA.
** These two MSAs were sampled slightly different in 2008 and 2010, but the estimates should not be affected by the difference.
# McAllen-Edinburg-Mission MSA was not its own geographic stratum until 2009.
PH Region = Texas Health Service Region; MSA = Metropolitan Statistical Area; PMSA = Primary Metropolitan Statistical Area

For 2008, the range of screening estimates for having had a Pap Smear within the last 3 years among women aged 18 years and older with an intact uterine cervix was 70.7%-87.5% (Table 3). In 2010 the screening estimates ranged from 71.3%-88.1%. Although not significant, all areas, except Amarillo MSA, Ft. Worth-Arlington PMSA, Austin-Round Rock-San Marcos MSA, and McAllen-Edinburg-Mission MSA, had a decline in cervical cancer screening rates between the two years. Figure 4 graphs the screening rate estimates for this question.
Table 2

<table>
<thead>
<tr>
<th>Region</th>
<th>Sample Size</th>
<th>Prevalence</th>
<th>95% Confidence Interval</th>
<th>Sample Size</th>
<th>Prevalence</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas-statewide</td>
<td>6,360</td>
<td>56.2%</td>
<td>(54.3 – 58.0)</td>
<td>11,280</td>
<td>61.5%</td>
<td>(59.7 – 63.3)</td>
</tr>
<tr>
<td>PH Region 1</td>
<td>728</td>
<td>53.8%</td>
<td>(47.7 – 59.8)</td>
<td>1,292</td>
<td>60.0%</td>
<td>(55.0 – 64.9)</td>
</tr>
<tr>
<td>Amarillo MSA</td>
<td>327</td>
<td>60.8%</td>
<td>(54.2 – 67.1)</td>
<td>545</td>
<td>66.5%</td>
<td>(61.6 – 71.1)</td>
</tr>
<tr>
<td>Lubbock MSA*</td>
<td>311</td>
<td>61.1%</td>
<td>(54.5 – 67.4)</td>
<td>670</td>
<td>64.1%</td>
<td>(59.4 – 68.6)</td>
</tr>
<tr>
<td>PH Region 2/3</td>
<td>1,354</td>
<td>59.3%</td>
<td>(55.2 – 63.2)</td>
<td>1,756</td>
<td>62.0%</td>
<td>(57.1 – 66.7)</td>
</tr>
<tr>
<td>Dallas-Plano-Irving PMSA</td>
<td>454</td>
<td>59.9%</td>
<td>(53.6 – 65.8)</td>
<td>426</td>
<td>60.0%</td>
<td>(52.1 – 67.5)</td>
</tr>
<tr>
<td>Ft Worth-Arlington PMSA</td>
<td>388</td>
<td>64.6%</td>
<td>(58.3 – 70.5)</td>
<td>475</td>
<td>68.1%</td>
<td>(62.2 – 73.4)</td>
</tr>
<tr>
<td>Wichita Falls MSA</td>
<td>323</td>
<td>58.0%</td>
<td>(51.8 – 64.0)</td>
<td>599</td>
<td>64.5%</td>
<td>(58.8 – 69.8)</td>
</tr>
<tr>
<td>PH Region 4/5N</td>
<td>682</td>
<td>57.2%</td>
<td>(51.3 – 63.0)</td>
<td>1,212</td>
<td>66.4%</td>
<td>(62.2 – 70.5)</td>
</tr>
<tr>
<td>PH Region 5S/6</td>
<td>858</td>
<td>56.0%</td>
<td>(51.7 – 60.2)</td>
<td>1,668</td>
<td>61.4%</td>
<td>(58.2 – 64.6)</td>
</tr>
<tr>
<td>Houston-Sugar Land-Baytown MSA**</td>
<td>772</td>
<td>56.6%</td>
<td>(52.0 – 61.0)</td>
<td>1,553</td>
<td>61.8%</td>
<td>(58.4 – 65.1)</td>
</tr>
<tr>
<td>Harris County</td>
<td>513</td>
<td>56.7%</td>
<td>(51.2 – 62.1)</td>
<td>830</td>
<td>59.3%</td>
<td>(55.1 – 63.4)</td>
</tr>
<tr>
<td>PH Region 7</td>
<td>716</td>
<td>61.9%</td>
<td>(56.6 – 66.9)</td>
<td>899</td>
<td>67.2%</td>
<td>(62.4 – 71.6)</td>
</tr>
<tr>
<td>Austin-Round Rock- San Marcos MSA</td>
<td>496</td>
<td>66.3%</td>
<td>(60.1 – 72.0)</td>
<td>567</td>
<td>71.0%</td>
<td>(64.4 – 76.8)</td>
</tr>
<tr>
<td>PH Region 8</td>
<td>1,241</td>
<td>59.1%</td>
<td>(55.0 – 63.1)</td>
<td>1,400</td>
<td>63.9%</td>
<td>(59.1 – 68.5)</td>
</tr>
<tr>
<td>Bexar County</td>
<td>676</td>
<td>62.2%</td>
<td>(57.6 – 66.5)</td>
<td>609</td>
<td>70.5%</td>
<td>(65.5 – 75.1)</td>
</tr>
<tr>
<td>San Antonio-New Braunfels MSA**</td>
<td>879</td>
<td>62.6%</td>
<td>(58.4 – 66.5)</td>
<td>705</td>
<td>66.8%</td>
<td>(61.0 – 72.0)</td>
</tr>
<tr>
<td>PH Region 9/10</td>
<td>359</td>
<td>47.4%</td>
<td>(40.9 – 53.9)</td>
<td>1,725</td>
<td>50.4%</td>
<td>(46.4 – 54.4)</td>
</tr>
<tr>
<td>El Paso MSA</td>
<td>250</td>
<td>48.3%</td>
<td>(40.4 – 56.3)</td>
<td>554</td>
<td>49.2%</td>
<td>(44.3 – 54.1)</td>
</tr>
<tr>
<td>PH Region 11</td>
<td>214</td>
<td>48.7%</td>
<td>(40.4 – 57.0)</td>
<td>1,072</td>
<td>52.4%</td>
<td>(47.5 – 57.2)</td>
</tr>
<tr>
<td>McAllen-Edinburg-Mission MSA*</td>
<td>57</td>
<td>50.2%</td>
<td>(34.8 – 65.5)</td>
<td>322</td>
<td>53.8%</td>
<td>(47.0 – 60.5)</td>
</tr>
</tbody>
</table>

* The Lubbock-Cooper ISD was oversampled in 2010 rather than the Lubbock MSA.
** These two MSAs were sampled slightly different in 2008 and 2010, but the estimates should not be affected by the difference.
* McAllen-Edinburg-Mission MSA was not its own geographic stratum until 2009.
PH Region = Texas Health Service Region; MSA = Metropolitan Statistical Area; PMSA = Primary Metropolitan Statistical Area
and for 2010 the U.S. screening rate of 81.0% is higher than the Texas statewide rate estimate of 79.8%.

Through the partnership between the federal public health system (CDC) and state health agencies, the United States invests in a surveillance system for risk/health behaviors that allows for monitoring of trends over time and across geographic regions. There are numerous challenges for any ongoing surveillance system, and for the BRFSS two noteworthy issues that may impact prevalence estimates are worthy of brief mention. As noted in the methods section of this article, the BRFSS system is dependent upon self-reports of risk behaviors during a telephone interview, which since the inception of the surveillance system has been “landline” based. During recent years, as the prevalence of cell phones has increased in the United States and around the world, the validity of prevalence data obtained through interviews over “landlines” has been explored. As of the 2011 national BRFSS, cell phones are a required supplement, but the targeted number of cell phone surveys varies by state. In addition, sample sizes are an issue that impacts data validity and statistical reliability, and sample size impacts the cost of the survey.

**Acknowledgements:**

We acknowledge the support and assistance of Leon Kincy from the Geographic Information Systems Team at the Center for Health Statistics, Texas Department of State Health Services, for his work on the Texas map (Figure 1). This research was supported by cooperative agreements U58DP001992 and U58SO000046 from the Centers for Disease Control and Prevention (CDC), with funding support from the following CDC centers/offices: Office of The Director, National Center for Environmental Health, Public Health Informatics and Technology Program Office; and National Center for Chronic Disease Prevention and Health Promotion. The contents of this journal article are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention and the centers/offices listed.

**REFERENCES**

### Table 3

Pap Smear within the last three years, 18 years of age and older

<table>
<thead>
<tr>
<th>Region</th>
<th>Sample Size</th>
<th>Prevalence 95% Confidence Interval</th>
<th>Sample Size</th>
<th>Prevalence 95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas-statewide</td>
<td>4,388</td>
<td>81.5% (79.5 – 83.3)</td>
<td>7,119</td>
<td>79.4% (77.6 – 81.0)</td>
</tr>
<tr>
<td>PH Region 1</td>
<td>435</td>
<td>82.2% (75.8 – 87.2)</td>
<td>678</td>
<td>76.5% (69.7 – 82.2)</td>
</tr>
<tr>
<td>Amarillo MSA</td>
<td>202</td>
<td>78.5% (68.9 – 85.8)</td>
<td>282</td>
<td>80.1% (73.4 – 85.4)</td>
</tr>
<tr>
<td>Lubbock MSA*</td>
<td>183</td>
<td>79.4% (70.8 – 85.9)</td>
<td>335</td>
<td>75.3% (66.7 – 82.3)</td>
</tr>
<tr>
<td>PH Region 2/3</td>
<td>875</td>
<td>83.7% (79.5 – 87.2)</td>
<td>930</td>
<td>81.9% (77.9 – 85.3)</td>
</tr>
<tr>
<td>Dallas-Plano-Irving PMSA</td>
<td>337</td>
<td>87.5% (81.9 – 91.5)</td>
<td>293</td>
<td>83.4% (77.6 – 88.0)</td>
</tr>
<tr>
<td>Ft Worth-Arlington PMSA</td>
<td>264</td>
<td>82.0% (72.9 – 88.5)</td>
<td>266</td>
<td>84.4% (78.2 – 89.0)</td>
</tr>
<tr>
<td>Wichita Falls MSA</td>
<td>168</td>
<td>82.9% (74.5 – 89.0)</td>
<td>243</td>
<td>74.2% (64.1 – 82.2)</td>
</tr>
<tr>
<td>PH Region 4/5N</td>
<td>359</td>
<td>83.0% (73.2 – 89.7)</td>
<td>592</td>
<td>81.3% (75.8 – 85.7)</td>
</tr>
<tr>
<td>PH Region 5S/6</td>
<td>661</td>
<td>81.4% (76.7 – 85.3)</td>
<td>1,160</td>
<td>79.6% (75.9 – 82.9)</td>
</tr>
<tr>
<td>Houston-Sugar Land-Baytown MSA**</td>
<td>610</td>
<td>81.6% (76.6 – 85.7)</td>
<td>1,096</td>
<td>79.8% (76.1 – 83.1)</td>
</tr>
<tr>
<td>Harris County</td>
<td>408</td>
<td>84.1% (79.2 – 88.0)</td>
<td>612</td>
<td>78.9% (73.5 – 83.4)</td>
</tr>
<tr>
<td>PH Region 7</td>
<td>530</td>
<td>85.2% (80.3 – 89.1)</td>
<td>586</td>
<td>86.1% (81.2 – 89.9)</td>
</tr>
<tr>
<td>Austin-Round Rock- San Marcos MSA</td>
<td>402</td>
<td>86.4% (80.2 – 90.9)</td>
<td>426</td>
<td>88.1% (82.2 – 92.3)</td>
</tr>
<tr>
<td>PH Region 8</td>
<td>869</td>
<td>80.8% (75.9 – 84.9)</td>
<td>961</td>
<td>73.2% (67.2 – 78.4)</td>
</tr>
<tr>
<td>Bexar County</td>
<td>491</td>
<td>83.6% (78.8 – 87.5)</td>
<td>387</td>
<td>79.1% (72.1 – 84.8)</td>
</tr>
<tr>
<td>San Antonio-New Braunfels MSA**</td>
<td>603</td>
<td>80.4% (75.3 – 84.7)</td>
<td>439</td>
<td>73.9% (67.1 – 79.7)</td>
</tr>
<tr>
<td>PH Region 9/10</td>
<td>299</td>
<td>76.8% (67.4 – 84.1)</td>
<td>1,062</td>
<td>71.3% (65.3 – 76.5)</td>
</tr>
<tr>
<td>El Paso MSA</td>
<td>230</td>
<td>78.5% (69.5 – 85.4)</td>
<td>424</td>
<td>77.2% (72.1 – 81.5)</td>
</tr>
<tr>
<td>PH Region 11</td>
<td>179</td>
<td>78.0% (70.1 – 84.3)</td>
<td>962</td>
<td>75.6% (71.3 – 79.4)</td>
</tr>
<tr>
<td>McAllen-Edinburg-Mission MSA#</td>
<td>54</td>
<td>70.7% (54.0 – 83.2)</td>
<td>277</td>
<td>71.9% (65.2 – 77.8)</td>
</tr>
</tbody>
</table>

* The Lubbock-Cooper ISD was oversampled in 2010 rather than the Lubbock MSA.
** These two MSAs were sampled slightly different in 2008 and 2010, but the estimates should not be affected by the difference.
# McAllen-Edinburg-Mission MSA was not its own geographic stratum until 2009.

PH Region = Texas Health Service Region; MSA = Metropolitan Statistical Area; PMSA = Primary Metropolitan Statistical Area

Reducing Breast Cancer Screening Barriers Among Underserved Women in South Dallas
Kathryn M. Cardarelli, PhD¹, Allison Ottenbacher; PhD¹, Kim Linneer; MPA², Marcy Paul, MA⁴, Marcus Martin, PhD⁵, Oladimeji Akinbòro, MPH¹, Jing Chen¹, Nikita Phillips, DrPH¹, and the Dallas Cancer Disparities Coalition Community Advisory Board³

¹Texas Prevention Institute - Center for Community Health, University of North Texas Health Science Center
²2M Research Services, LLC
³Community Advisory Board: Stacy Welk, Chair, Roy Lopez, Vice Chair, Cheryl Boswell, Marva Epperson-Brown, Ruth Hendrickson, Vicky Henry, Lakeye Hurd, Estoria Miller, Johnrice Newton, Deborah Parish, Johnnie Pearce, Chyrel Roseborough, Preston Weaver, Allison Vo

ABSTRACT

Objective: To identify breast cancer screening barriers in an underserved population and evaluate the changes in barriers and knowledge that result from attending a breast cancer prevention program. Participants: Medically underserved women, age 40 or older, residing in South Dallas, Texas, who were eligible to receive a screening mammogram and had no personal history of cancer.

Methods: Participants attended an 8-week program on breast cancer prevention, early detection, and overall healthy lifestyle education. Women were also invited to receive a screening mammogram. Pre- and post-surveys were administered to collect information, including breast cancer screening knowledge, attitudes, barriers, access to health care, and self-efficacy.

Results: At baseline (N = 430), women reported an average of 2.8 (standard error 0.12) breast cancer screening barriers. The most commonly reported barrier was “I am not aware of any free or reduced-cost resources in my community where I can get a mammogram” (47%). For each previous breast cancer screening behavior (mammogram, self-exam, clinical exam), significantly greater barriers were reported among women who reported no screening. After adjustment, the odds of ever having a mammogram decreased by 14% for each additional barrier (OR: 0.86 [95% CI: 0.79-0.95]). Total barriers were reduced from 2.7 (0.16) at baseline to 1.7 (0.13) (p<0.01) at follow-up. Total knowledge increased from 5.0 (0.08) to 5.7 (0.08) (p<0.01) pre- to post-program. In total 185 women received a mammogram at some time during the 2-year prevention program.

Conclusions: Awareness, cost, availability, and transportation are major factors hindering this population from receiving a screening mammogram. After participating in a breast cancer prevention program, women reported a smaller number of barriers and greater knowledge about breast cancer. More importantly, the most common barriers reported at baseline were reduced through this prevention program.

INTRODUCTION

Breast cancer is the most common female [non-skin] cancer, and the second leading cause of cancer death in women in the United States. In spite of progress in screening mammography practices in the general population, lower screening rates are observed in several sub-groups of women in the United States. Breast cancer screening barriers, including personal and system-level barriers, have been inversely associated with screening rates. Personal barriers are the psychological factors that hinder making a decision to obtain mammography. System barriers are structural, such as difficulties encountered in accessing the health system for screening mammography, or obstacles related to cost and affordability of a mammogram. Few attempts have been made to identify and remove these barriers in an underserved urban population using a community-based participatory research (CBPR) approach. Therefore, using a CBPR approach, we designed a program to address breast cancer screening barriers among women living in an underserved area in South Dallas, Texas, an area with high late-stage breast cancer diagnosis and high breast cancer mortality.

POPULATION AND METHODS

The Dallas Cancer Disparities Coalition (DCDC) was created in 2007 through an academic-community partnership to address high cancer mortality rates in South Dallas. The Coalition represents organizations such as nonprofits, neighborhood associations, and hospital systems and is led by a Community Advisory Board, the members of which are co-investigators for all related studies. In 2010, the Coalition was awarded a prevention program grant by the Cancer Prevention and Research Institute of Texas to provide breast health education to women through group classes and to provide mammography services. The prevention program aimed to (1) increase knowledge of the chief factors contributing to breast cancer and steps to reduce breast cancer risk, and (2) increase breast cancer screening practices. The program was modeled after two community-based research-tested interventions, and resulted from a breast cancer prevention pilot study in South Dallas. Additionally, based on the needs of this population and barriers identified by focus groups held prior to the pilot study, two theories helped to guide the program: the Health Belief Model and Social Cognitive Theory. The program consisted of eight breast health education classes (each 1.5 hours), held weekly in community locations, including YMCA’s, schools, neighborhood centers, and senior living facilities. Over the 2-year program, we held nine different cycles of the 8-week program. Class size per cycle varied from 26 to 63. The classes covered primary and secondary prevention of breast cancer, including facts about and risk factors for breast cancer, methods of early detection, how to talk to your doctor and how to eat healthy on a budget. The program curriculum used in this study was developed by investigators in collaboration with the Community Advisory Board and was first implemented in the pilot study. The program specifically addressed barriers related to awareness and access of local reduced-cost mammography screening sites. The program also taught participants what to expect during the mammogram. Participants received a $10 gift card for completing each session, and another $10 gift card was offered for completion of each of two surveys, one prior to the first class and one at the end of the program. Weekly door prizes were offered for those participants who returned their homework assignment and incentives were given for perfect attendance. Transportation was provided to participants, and each woman was encouraged to receive a screening mammogram during the program. If a screening mammogram indicated the need for further diagnostic work-up, lay health educators acted as patient navigators to assist participants in obtaining further diagnostic services. Participants needing follow-up treatment were linked with local health care systems in the Dallas area.

Participating women had to be age 40 and older, eligible to receive a screening mammogram (i.e., 1 or more years since their last mammogram, and not symptomatic), speak English or Spanish, have no personal history of cancer, and reside in South Dallas (zip codes 75210, 75215, and 75223). Lay health educators were responsible...
for recruitment and retention, coordinating the sessions, and providing one-on-one communication with participants between the group sessions. Although the program cycles were conducted in several different locations, the lay health educators followed structured materials that were used in all sessions, in order to maintain program fidelity. They also scheduled mammograms and assisted the women in navigating various healthcare systems and follow-up medical visits. Participants completed a 30-minute verbally-administered survey, prior to the program and again at completion, that assessed their knowledge of breast cancer and previous receipt of breast cancer screening. Other factors measured included psychosocial characteristics of participants, including self-efficacy, health behavior and sociodemographic characteristics. Breast cancer screening barriers were identified by 15 individual questions adapted from Paskett et al. For each barrier question, a response of “yes” indicated a screening barrier. Knowledge items were measured by seven questions modified from existing scales. Each question had a correct response of “true” or “false”. The barriers and knowledge questions were modified from existing scales based on feedback from the target population. No factor analysis was conducted on the modified questions; however they were implemented in the pilot study in South Dallas. Previous breast cancer screening behaviors were assessed by three questions: “have you ever had a mammogram,” “have you performed breast self-examination in the last month,” and “have you had a clinical breast examination in the previous year?” Response options were “yes,” “no,” or “don’t know.” A response of “no” or “don’t know” was categorized as the absence of the screening behavior.

Frequency and percentage distributions were calculated for participant demographic characteristics. At baseline, frequencies were calculated for individual barrier items, and summed to compute total barriers. Multiple t-tests were used to test for associations between previous screening behaviors and the mean number of baseline barriers. Crude and adjusted logistic regression were also used to test the association between previous screening behaviors and total number of barriers, controlling for variables associated with screening (age, health insurance, income, marital status, and personal medical doctor). Separate sub-analyses were conducted on individuals who completed both the pre- and post-surveys for barriers and knowledge. Change in individual barriers from pre to post was assessed with the McNemar test. Change in total barriers, and change in total knowledge, was evaluated with paired t-tests. The percentage of participants reporting each barrier at pre and post was displayed in Figure 1.

RESULTS
Demographic characteristics of the 430 individuals who consented and completed the baseline survey are shown in Table 1. Participants’ ages ranged from 40 to 91, with a mean age of 53.2 (standard de-
Almost all participants were African American (93%), and most (70%) reported a family income below $10,000. On average, participants reported 2.8 barriers (standard error 0.12, max of 15) (Table 2). The most frequently reported screening barrier among participants (47%) was “I am not aware of any free or reduced-cost resources in my community where I can get a mammogram.” Other top-rated barriers included, “I cannot afford to get a mammogram” (40%), “there are no places close to me where I can get a mammogram” (36%), and “I cannot get transportation to get a mammogram” (35%).

There was a statistically significant association between total number of barriers and previous screening behavior (Table 3). For each screening behavior, those who reported “no” also reported a greater number of barriers. Among women who reported never having a mammogram, the mean number of barriers was 3.6 (standard error 0.23), compared to 2.4 (0.14) barriers among women who had undergone mammography screening in the past (p<0.01). A similar association was observed for breast self-examination in the last month (p<0.01), and clinical breast examination in the last year (p<0.01).

Aside from barriers, other variables including age, health insurance, income, marital status, and having a personal medical doctor were significantly associated with previous screening behavior. To account for this, we performed multiple logistic regression (Table 4). Even after adjustment, there was a significant association between screening barriers and all three previous screening behaviors. For example, the odds of ever having a mammogram were decreased by 14% for each additional barrier (OR: 0.86 [95% CI: 0.79-0.95]), after adjustment. Similar associations were found for breast self-examination (OR: 0.88 [95% CI: 0.81-0.96]) and clinical breast-examination (OR: 0.87 [95% CI: 0.79-0.96]).

There was a statistically significant reduction in barriers among participants who completed the pre- and post-survey (N=244) (Figure 1). At baseline, the average number of barriers reported was 2.7 (standard error 0.16), compared to 1.7 (0.13) at the post survey (p<0.01). The percentage reporting individual barriers also decreased from pre to post. Significant decreases (p<0.05) were observed in multiple barriers. Finally, overall knowledge increased from the pre-to post-survey among participants who completed both (N = 243). The baseline knowledge score was 5.0 (0.08), and at post-survey knowledge was 5.7 (0.08) (p<0.01).

Table 1. South Dallas Breast Cancer Prevention Program Participant Characteristics, 2010-2012 (N = 430)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>40 - 49</td>
<td>164 (38)</td>
</tr>
<tr>
<td>50 - 64</td>
<td>222 (52)</td>
</tr>
<tr>
<td>65 - 74</td>
<td>27 (6)</td>
</tr>
<tr>
<td>≥75</td>
<td>16 (4)</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>393 (93)</td>
</tr>
<tr>
<td>White</td>
<td>12 (3)</td>
</tr>
<tr>
<td>Other</td>
<td>16 (4)</td>
</tr>
<tr>
<td>Missing or refused</td>
<td>9</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;$10,000</td>
<td>297 (70)</td>
</tr>
<tr>
<td>$10,000-$20,000</td>
<td>78 (18)</td>
</tr>
<tr>
<td>≥$20,000</td>
<td>49 (12)</td>
</tr>
<tr>
<td>Refused</td>
<td>6</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>≤11th grade</td>
<td>155 (36)</td>
</tr>
<tr>
<td>Grade 12 or GED</td>
<td>179 (42)</td>
</tr>
<tr>
<td>Some college or higher</td>
<td>95 (22)</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>74 (17)</td>
</tr>
<tr>
<td>Never married</td>
<td>101 (24)</td>
</tr>
<tr>
<td>Other</td>
<td>252 (59)</td>
</tr>
<tr>
<td>Missing or refused</td>
<td>3</td>
</tr>
<tr>
<td><strong>Health insurance</strong></td>
<td></td>
</tr>
<tr>
<td>No health insurance</td>
<td>156 (37)</td>
</tr>
<tr>
<td>Has health insurance</td>
<td>269 (63)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>5</td>
</tr>
<tr>
<td><strong>Having a personal medical doctor</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>199 (46)</td>
</tr>
<tr>
<td>Yes</td>
<td>231 (54)</td>
</tr>
</tbody>
</table>
### Table 2. South Dallas Breast Cancer Prevention Program Screening Barriers at Baseline

<table>
<thead>
<tr>
<th>Barrier</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not aware of any free or reduced-cost resources in my community where I can get a mammogram</td>
<td>202 (47)</td>
</tr>
<tr>
<td>I cannot afford to get a mammogram</td>
<td>171 (40)</td>
</tr>
<tr>
<td>There are no places close to me where I can get a mammogram</td>
<td>155 (36)</td>
</tr>
<tr>
<td>I cannot get transportation to get a mammogram</td>
<td>150 (35)</td>
</tr>
<tr>
<td>I don’t know how to go about getting a mammogram</td>
<td>116 (27)</td>
</tr>
<tr>
<td>I don’t understand what will be done during the mammogram</td>
<td>113 (26)</td>
</tr>
<tr>
<td>I am afraid to have a mammogram because I might find out something is wrong</td>
<td>102 (24)</td>
</tr>
<tr>
<td>Exposing my breast during the test bothers me</td>
<td>35 (8)</td>
</tr>
<tr>
<td>Lack of privacy during the x-ray bothers me</td>
<td>32 (7)</td>
</tr>
<tr>
<td>Having a mammogram exposes me to unnecessary radiation</td>
<td>31 (7)</td>
</tr>
<tr>
<td>I have other problems more important than getting a mammogram</td>
<td>26 (6)</td>
</tr>
<tr>
<td>The closeness of the x-ray staff during the test bothers me</td>
<td>25 (6)</td>
</tr>
<tr>
<td>Having a mammogram is embarrassing</td>
<td>23 (5)</td>
</tr>
<tr>
<td>I am too old to need a routine mammogram</td>
<td>13 (3)</td>
</tr>
<tr>
<td>Having a mammogram takes too much time</td>
<td>12 (3)</td>
</tr>
<tr>
<td>Total (mean, standard error) (N = 426)</td>
<td>2.80 (0.12)</td>
</tr>
</tbody>
</table>

### Table 3. Baseline Association between Screening Barriers and Previous Breast Cancer Screening Behaviors

<table>
<thead>
<tr>
<th></th>
<th>Barriers</th>
<th>Mean (standard error)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammogram</td>
<td></td>
<td></td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Yes (n = 296)</td>
<td></td>
<td>2.4 (0.14)</td>
<td></td>
</tr>
<tr>
<td>No (n = 129)</td>
<td></td>
<td>3.6 (0.23)</td>
<td></td>
</tr>
<tr>
<td>Self-exam</td>
<td></td>
<td></td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Yes (n = 194)</td>
<td></td>
<td>2.3 (0.15)</td>
<td></td>
</tr>
<tr>
<td>No / don’t know (n = 231)</td>
<td></td>
<td>3.2 (0.18)</td>
<td></td>
</tr>
<tr>
<td>Clinical exam</td>
<td></td>
<td></td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Yes (n = 157)</td>
<td></td>
<td>2.2 (0.17)</td>
<td></td>
</tr>
<tr>
<td>No / don’t know (n = 269)</td>
<td></td>
<td>3.2 (0.16)</td>
<td></td>
</tr>
</tbody>
</table>

*a Have you ever had a mammogram?

*b Have you performed a breast self-examination in the last month?

*c Have you had a clinical breast examination in the previous year?

### Table 4. Association between Baseline Screening Barriers and Previous Screening Behaviors (baseline total barriers is the independent variable in each model)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Crude Odds Ratio (95% CI)</th>
<th>Adjusted Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammogram</td>
<td>0.83 (0.76 – 0.90)</td>
<td>0.86 (0.79 – 0.95)</td>
</tr>
<tr>
<td>Breast self-examination</td>
<td>0.85 (0.78 – 0.92)</td>
<td>0.88 (0.81 – 0.96)</td>
</tr>
<tr>
<td>Clinical breast examination</td>
<td>0.84 (0.77 – 0.92)</td>
<td>0.87 (0.79 – 0.96)</td>
</tr>
</tbody>
</table>

*a Have you ever had a mammogram? Adjusted for age, health insurance, income, marital status, and personal medical doctor.

*b Have you performed a breast self-examination in the last month? Adjusted for health insurance, income, personal medical doctor.

*c Have you had a clinical breast examination in the previous year? Adjusted for education, health insurance, personal medical doctor.

*d Adjusted for age, health insurance, income, marital status, and having a personal medical doctor.
DISCUSSION

In this study of underserved women, economic and structural barriers to breast cancer screening were commonly reported, including the cost of mammography, poor awareness of free or reduced-cost facilities, poor geographic access, and lack of transportation to mammography sites. Women reporting a higher number of barriers were less likely to report previous screening mammography. Following the intervention, there was a significant increase in breast cancer knowledge and a reduction in the average number of barriers reported by the participants, as well as a reduction in the proportion of participants reporting each barrier.

Previous studies of underserved women, or women who underutilize mammography, reported cost and distance as common barriers to receiving mammography.11–23 However, even when mammography facilities are available and conveniently located, and even after taking economic barriers into consideration, structural barriers relating to access, awareness of mammography facilities, and the sociocultural contexts of women may be important factors affecting mammography utilization.24–29 The multifaceted nature of our prevention program took into account the sociocultural contexts of participants and addressed some of the barriers that have been commonly reported in the literature, including transportation and cost of mammography. Lay health educators helped participants navigate the local health care system to schedule mammograms and transported them to mammography sites. If participants required follow-up diagnostic testing, the lay health educators assisted them with the process. This approach and our findings suggest that prevention education programs that target multiple dimensions of barriers may be successful in decreasing barriers and increasing mammography in underserved women.

One limitation to the interpretation of our study findings is that the reductions in these barriers are not necessarily indicative of improved mammogram screening rates. Women were able to receive a mammogram during the program, and didn’t have to wait until they completed it. We therefore cannot determine whether or not reduction in barriers was causally associated with mammography screening. However, studies have shown that having fewer barriers is predictive of higher mammography rates. Another limitation is that the scales we used to measure barriers and knowledge were modified from other studies; their reliability and validity are therefore not fully known. Finally, there were nine total cycles of the 8-week program. There may have been slight differences in program implementation that are not accounted for in this analysis. The participant retention rate from pre- to post-surveys was 57%. In spite of these limitations, our study has several strengths. First, our study population was comprised of underserved women in an urban area, most of whom were African American, a historically understudied population for breast cancer prevention. Second, this study was conducted using a community-based participatory approach, which has created a network of businesses, community leaders, and participants working together to bring breast cancer prevention to an underserved population.

CONCLUSION

The breast cancer prevention program among underserved women in South Dallas was successful at reducing self-reported barriers and increasing knowledge among participants. These changes may ultimately lead to reduce cancer health disparities among underserved women. The Coalition’s long-term goal is to create sustainable cancer prevention models that can be replicated in other parts of Texas in similar communities to reduce breast cancer disparities.

ACKNOWLEDGMENTS:

This project was funded by the Cancer Prevention and Research In-
stitute of Texas (PP100069). We acknowledge the contributions to the prevention program by the Susan G. Komen for the Cure Dallas County Affiliate, Methodist Health System, Dallas Housing Authority, Whole Foods Market, Mintyards Grocery Store, St. Phillips Academy, YMCA affiliates, Juanita Craft Community Center, and Carpenter’s Point Residential Community. Finally, this work would not be possible without the tireless efforts of our Lay Health Educators: Ana Hall, Camille Lafayette, Veronica Ingram, Phyllis Harris, and Aja Johnson.

REFERENCES


TPHA Journal Volume 65, Issue 1


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Promotores and ÉPICO: A Model for Implementing a Cancer Training and Education Program Among Hispanics with Increased Cancer Risk

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ABSTRACT

Objective. This paper describes the development and implementation of a cancer training and education program entitled: ÉPICO: Education to Promote Improved Cancer Outcomes. Led by the Center for Community Health Development and funded by the Cancer Prevention Research Institute of Texas (CPRIT), ÉPICO aims to increase the utilization of comprehensive cancer services by developing a replicable training program on prevention, early detection, treatment, and healthy survivorship for colorectal, breast, and cervical cancers. ÉPICO trains promotores (i.e., Community Health Workers [CHWs]) to educate Hispanic residents in the colonias along the South Texas-Mexico border.

Methods. ÉPICO promotores received training in focus group moderation and conducted 12 focus groups with colonia residents and outside agency promotores to inform the development of the training modules. Next, project promotores completed a CHW instructor certification program, including certified training on message tailoring. The ÉPICO team then developed, pilot tested, and revised bilingual training modules covering prevention/early detection, treatment, and survivorship for breast, cervical, and colorectal cancers. Project promotores conducted training sessions with outside agency promotores, who then implemented the tailoring-based training in their outreach activities and administered evaluation tools.

Results. Project promotores completed a Texas Department of State Health Services (DSHS) certified CHW/Promotor/a Instructor course and assisted in developing and delivering 20 approved DSHS CHW/ Promotor/a CEU cancer education modules. During year one, 335 promotores received 461 units of ÉPICO training modules (2,273 DSHS-certified CHW/Promotor/a CEUs), constituting more than 1,000 South Texas colonia residents received 1,431 units of ÉPICO training modules by outside agency promotores who attended the ÉPICO Promotor/a training events.

Conclusion. ÉPICO provides culturally relevant, tailored strategies to promote cancer prevention, early detection, treatment, and healthy survivorship in South Texas colonias. The project fills a gap in the existing CEU material available for DSHS-certified promotores while simultaneously addressing the cancer education needs of colonia residents.

Key terms: Promotores, Hispanics, cancer training and education

INTRODUCTION

This process paper describes the development and implementation of a cancer training and education program entitled: ÉPICO: Education to Promote Improved Cancer Outcomes. ÉPICO aims to develop a replicable training program on prevention, early detection, treatment options, and healthy survivorship for colorectal, breast, and cervical cancers that can be delivered by promotores (i.e., Community Health Workers [CHWs]) to Hispanic residents at risk for developing cancer, with the goal of increasing knowledge of behaviors that can reduce the cancer burden in this population. Previous research has demonstrated that improved outcomes for patients with cancer diagnoses are related to early detection and treatment for colorectal, breast, and cervical cancers.1 ÉPICO has three overarching aims: 1) equip promotores to educate residents on prevention, treatment, and survivorship related to colorectal, breast, and cervical cancers; 2) enable promotores to use message tailoring strategies to improve their outreach efforts; and 3) improve residents’ prevention, treatment, and healthy survivorship behaviors.

Although cancer is the second leading cause of death (20%) among U.S. Hispanics,2 Hispanics are less likely than other ethnic groups to participate in cancer prevention (e.g., screening)3-4 and are often diagnosed and treated at later stages.3-5 Hispanics have higher mortality rates for breast, cervical, and colorectal cancers than non-Hispanic Whites, and the survival rates for these cancers improve the earlier the cancer is detected.6,7 Furthermore, Hispanics experience greater cancer survivorship issues than non-Hispanic Whites (e.g., lower quality of life).8,9 Factors contributing to worse cancer outcomes for Hispanics include poverty, lack of education and information, lack of health insurance,10-12 language barriers,13-18 and low health literacy.19-26 Accordingly, research has shown the need for culturally appropriate education, communication, and outreach strategies for cancer interventions that decrease barriers and improve cancer-related outcomes. Employing strategies to reduce cancer mortality rates,27-28 ÉPICO aims to address the major barriers regarding cancer among Hispanics through an integration of two culturally appropriate, evidence-based intervention strategies: 1) using promotores to conduct outreach and education;29-34 and 2) message tailoring.35-38

Previous literature documents that promotores can increase the cancer-related knowledge and screening behaviors of underserved populations at risk of developing cancer through the use of cancer prevention and intervention programs.39-41 This effectiveness has been attributed to their cultural similarity and understanding of the populations they serve. The subsequent trust that residents have in them comes largely because promotores traditionally reside in the communities they serve.42,43 The ÉPICO project engages promotores to educate Hispanic residents on cancer prevention, early detection, treatment, and healthy survivorship strategies through tailoring messages to the unique needs and characteristics of individual in the target population. Tailoring is the use of information and change strategies that are intended to reach one specific person based on the person’s individual characteristics.44 Cancer prevention interventions based in tailoring, particularly those on risk factors and screening, have been demonstrated to be effective, particularly among ethnic minorities.45-48 Based on these findings, ÉPICO promotor(a) instructors trained promotores to use tailoring techniques to educate their constituents about cancer prevention, early detection, treatment, and survivorship issues. Thus, the ÉPICO project uses the culturally appropriate intervention strategies of promotores and message tailoring to address the problems of lack of education, language barriers, and low health literacy among Hispanic residents in the colonias with increased cancer risk.

This paper describes the process of developing and implementing the ÉPICO cancer education model among Hispanic residents with increased cancer risk. We also address theoretical and practical considerations such as certification and training experiences.

METHODS

Population

ÉPICO targets Hispanic adults (ages 18+) living in colonias,45 which are unincorporated areas lacking basic infrastructure, in Cameron, Hidalgo, Starr, and Willacy Counties along the U.S.-Mexico border.
in South Texas. The Lower Rio Grande Valley (LRGV) has more than 1.1 million residents, 90% of whom are of Hispanic origin, and contains more than 75% of Texas’ 2,300-plus colonias. LRGV residents face significant barriers to positive health outcomes, such as low educational attainment, low socioeconomic status, mono-lingual (Spanish) status, poor health status, and high rates of chronic diseases, including cancer. At its onset, ÉPICO employed six part-time, DSHS-certified promotores with at least 10 years of promotor/a experience. The project promotores, recruited outside agency promotores from local networks, coalitions, and partnerships. Promotores recruited residents using a variety of techniques including a random sample in the four counties, door-to-door recruitment, and partnerships with other agencies.

**Module Development**

The ÉPICO strategy included training and utilizing promotores to improve the access and utilization of comprehensive cancer services for Hispanic LRGV residents. Based on an evidence-based adult learning model, ÉPICO uses an interactive environment centered on discussion and skill-building exercises as opposed to primarily didactic delivery. Sources of information utilized in the development of the training modules include the American Cancer Society and National Institutes of Health. The ÉPICO staff—including the certified Promotor(a) Instructors, principal investigator (bilingual, native to the target population, and a certified Promotor/a Instructor), and the co-principal investigator (expert in health messaging)—developed and implemented three training modules (prevention, treatment, survivorship issues) for colorectal, breast, and cervical cancers, making up a total of 20 certified training modules and providing continuing education units (CEUs) for promotores to apply for certification renewal.

Before developing the training materials, project promotores completed a 160-hour Texas Department of State Health Services (DSHS) certified Promotor/a Instructor course, including additional training in focus group moderation and interviewing. ÉPICO promotor/a then conducted 12 focus groups with colonia residents and outside agency promotores (N=125) to inform the development of the cancer training modules, including cultural influences and attitudes critical for message tailoring. This procedure ensured that the modules were built upon input from the residents and promotores and permitted an assessment of what individual characteristics (e.g., culture, language, gender) should be used to best tailor messages for colonia residents. Focus group data were used to develop and refine tailoring-based training modules, with input by content experts in cancer control, health messaging, and promotor/a training. Next, ÉPICO promotores completed a DSHS-certified Promotor/a CEU course on message tailoring in order to educate residents using the ÉPICO cancer education modules. ÉPICO promotores pilot tested each module in their outreach work in the LRGV, and then the team revised the curriculum based on feedback. The modules were then submitted to DSHS for CEU certification approval. Table 1 describes the content of the ÉPICO promotor/a and resident training modules.

**Promotor/a Training**

Upon receiving DSHS CEU approval, ÉPICO promotores organized and conducted three separate cancer-specific trainings on cancer prevention/early detection, treatment options, and survivorship for breast, cervical, and colorectal cancers. Project promotores conducted eight-hour trainings in Hidalgo and Cameron Counties. The trainings included pre/post-tests, cancer education, the ÉPICO training modules for educating residents, and a post-training evaluation and follow-up survey. Participants were provided instructions, a flipchart of the training module, and evaluation tools to use in their resident training sessions. Participants completing the trainings received a certificate, as well as a $25 Wal-Mart gift card, if they completed pre/post tests and evaluations with at least 10 residents. This paper does not examine evaluation results from the pre/post-tests or follow-up surveys, which will be the subject of future research papers.

**Year Two**

ÉPICO promotores are currently focusing on training LRGV residents in year two of the project. Residents complete a pre/post-test and an evaluation, and a randomly selected subset will complete a demographic survey. A subset of residents completing the demographic survey will be contacted to conduct a two-month post-training telephone interview. Also in year two, ÉPICO staff are packaging the curriculum for dissemination to promotores in other areas of Texas and conducting statewide promotor/a trainings with the ÉPICO modules in six metropolitan areas: Dallas/Ft. Worth, El Paso, Houston, Laredo, Lubbock, and San Antonio/Austin. The project team will analyze evaluation data from promotor/a trainings and outreach to residents and prepare a report for dissemination. This strategy is a feasible and sustainable method, resulting in more residents educated than an approach that relies solely on paid project staff. This strategy also creates a measure of sustainability because outside agency promotores who received training in the ÉPICO modules can continue to use these modules at no incurred cost in their future health outreach, education, and promotion strategies. This project was approved by the Institutional Review Board at Texas A&M University.

**RESULTS**

Table 2 shows the numbers of promotores and residents trained in the ÉPICO modules during year one. In addition, six ÉPICO promotores became DSHS-certified Promotor/a Instructors and then had a key role in developing and delivering cancer education training modules for promotores and residents, further enabling them to improve the effectiveness of their outreach efforts. Finally, ÉPICO project staff developed, submitted, and obtained approval for 20 DSHS-certified Promotor/a modules of varying CEU lengths. In total, during year one, 335 promotores received 461 units of training with the ÉPICO CHW curricula (as some received more than one ÉPICO module) and a total of 2,273 CEUs (as some attendees did not attend the entire training and received CEUs only for the training portions attended). In addition, more than 1,000 South Texas colonia residents received 1,431 units of training.

**CONCLUSION**

This paper describes the process of developing and implementing cancer education project designed and funded to train and educate promotores and, in turn, Hispanic community residents. The strategy of training outside agency promotores and providing copies of the evaluation tools to educate community residents was effective, with more than a thousand residents trained with the ÉPICO modules in four months by outside agency promotores. This strategy also holds promise as a sustainable and replicable method of cancer education. In summary, the ÉPICO project is a model for providing culturally relevant, tailored strategies to promote cancer prevention, early detection, treatment, and survivorship in the South Texas colonias. The project fills a gap in the existing CEU material available for DSHS-certified promotores while simultaneously addressing the cancer education needs of colonia residents.

**Acknowledgment**

The authors would like to acknowledge the funder of this project—the Cancer Prevention and Research Institute of Texas (CPRIT). The project is supported by Cooperative Agreement Number PP110241 from CPRIT. This project is also supported by The Center for Community Health Development, Texas A&M School of Rural Public Health, which is a member of the Prevention Research Centers Pro.
<table>
<thead>
<tr>
<th>Title</th>
<th>Content Outline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breast Cancer</strong>&lt;br&gt;Prevention/Early detection</td>
<td>Explanation breast cancer and general cancer terms&lt;br&gt;Types and stages of breast cancer&lt;br&gt;Breast cancer statistics in Hispanics&lt;br&gt;Breast cancer risk factors and common misconceptions (myths versus facts)&lt;br&gt;Breast cancer screenings and exams&lt;br&gt;Preventative measures</td>
</tr>
<tr>
<td><strong>Breast Cancer Treatment Options</strong></td>
<td>Factors affecting breast cancer prognosis and treatment&lt;br&gt;Description of breast cancer stages&lt;br&gt;Tests to diagnose breast cancer&lt;br&gt;Types of breast cancer treatment options&lt;br&gt;Barriers to obtaining breast cancer treatment and breast cancer treatment resources</td>
</tr>
<tr>
<td><strong>Breast Cancer Survivorship</strong></td>
<td>Survivor definition&lt;br&gt;Prognosis, survival rates, and recurrence&lt;br&gt;Factors affecting recovery and treatment&lt;br&gt;Life after treatment and lifestyle changes&lt;br&gt;Survivorship plans and resources</td>
</tr>
<tr>
<td><strong>Cervical Cancer</strong>&lt;br&gt;Prevention/Early detection</td>
<td>Explanation cervical cancer and general cancer terms&lt;br&gt;Types and stages of cervical cancer&lt;br&gt;Cervical cancer statistics in Hispanics&lt;br&gt;Cervical cancer risk factors and common misconceptions (myths versus facts)&lt;br&gt;Human Papilloma Virus (transmission, treatment, prevention)&lt;br&gt;Cervical cancer screenings and exams&lt;br&gt;Preventative measures</td>
</tr>
<tr>
<td><strong>Cervical Cancer Treatment Options</strong></td>
<td>Factors affecting cervical cancer prognosis and treatment&lt;br&gt;Description of cervical cancer stages&lt;br&gt;Tests to diagnose cervical cancer&lt;br&gt;Types of cervical cancer treatment options&lt;br&gt;Barriers to obtaining breast cancer treatment and breast cancer treatment resources</td>
</tr>
<tr>
<td><strong>Cervical Cancer Survivorship</strong></td>
<td>Survivor definition&lt;br&gt;Prognosis, survival rates, and recurrence&lt;br&gt;Factors affecting recovery and treatment&lt;br&gt;Life after treatment and lifestyle changes&lt;br&gt;Survivorship plans and resources</td>
</tr>
<tr>
<td><strong>Colorectal Cancer</strong>&lt;br&gt;Prevention/Early detection</td>
<td>Explanation colorectal cancer and general cancer terms&lt;br&gt;Types and stages of colorectal cancer&lt;br&gt;Colorectal cancer statistics in Hispanics&lt;br&gt;Colorectal cancer risk factors and common misconceptions (myths versus facts)&lt;br&gt;Colorectal cancer screenings and exams&lt;br&gt;Preventative measures</td>
</tr>
<tr>
<td><strong>Colorectal Cancer Treatment Options</strong></td>
<td>Factors affecting colorectal cancer prognosis and treatment&lt;br&gt;Description of colorectal cancer stages&lt;br&gt;Tests to diagnose colorectal cancer&lt;br&gt;Types of colorectal cancer treatment options&lt;br&gt;Barriers to obtaining breast cancer treatment and breast cancer treatment resources</td>
</tr>
<tr>
<td><strong>Colorectal Cancer Survivorship</strong></td>
<td>Survivor definition&lt;br&gt;Prognosis, survival rates, and recurrence&lt;br&gt;Factors affecting recovery and treatment&lt;br&gt;Life after treatment and lifestyle changes&lt;br&gt;Survivorship plans and resources</td>
</tr>
<tr>
<td><strong>What You Must Know About Pregnancy and Cancer</strong></td>
<td>Common types of cancer in pregnancy&lt;br&gt;Gestational trophoblastic tumor&lt;br&gt;Ovarian masses in pregnancy&lt;br&gt;Risk factors for getting cancer while pregnant&lt;br&gt;Signs and symptoms of cancer during pregnancy&lt;br&gt;Cancer treatment during pregnancy: a multi-disciplinary team approach&lt;br&gt;Risks and benefits of diagnostic tests and treatment options during pregnancy&lt;br&gt;The cancer patient post-pregnancy&lt;br&gt;Support and resources for pregnant women with cancer</td>
</tr>
<tr>
<td><strong>HOPE for Cancer Survivors: Fertility &amp; Pregnancy</strong></td>
<td>Fertility risks for cancer survivors&lt;br&gt;Cancer treatments and risk of fertility damage for men and women&lt;br&gt;Pregnancy issues for cancer survivors (timeframes, recurrence, pregnancy health risks, and birth defect risks)&lt;br&gt;Special considerations for certain age groups, cancer types, and populations&lt;br&gt;Parenthood options&lt;br&gt;Questions to ask the healthcare team&lt;br&gt;Advocating on behalf of cancer survivors and their rights</td>
</tr>
</tbody>
</table>
Table 2: Number of Promotores and Residents trained with ÉPICO Cancer modules in Year 1

<table>
<thead>
<tr>
<th>Modules</th>
<th>Promotores</th>
<th>Residents**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Tailoring</td>
<td>5</td>
<td>438</td>
</tr>
<tr>
<td>Breast Cancer Prevention/Early Detection, Treatment Options, and Survivorship Issues</td>
<td>94</td>
<td>38</td>
</tr>
<tr>
<td>Cervical Cancer Prevention/Early Detection, Treatment Options, and Survivorship Issues</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td>Colorectal Cancer Prevention/Early Detection, Treatment Options, and Survivorship Issues</td>
<td>80</td>
<td>15</td>
</tr>
<tr>
<td>HPV and Cervical Cancer Prevention</td>
<td>80</td>
<td>15</td>
</tr>
<tr>
<td>Cancer Prevention/Early Detection, and Survivorship for Pregnant Residents</td>
<td>87</td>
<td>15</td>
</tr>
<tr>
<td>Fertility and Pregnancy Options for Cancer Survivors</td>
<td>40</td>
<td>15</td>
</tr>
</tbody>
</table>

* Some attendees did not attend the entire training and received CEUs only for the training portions attended.

** Trained by outside agency promotores.

gram, supported by the Centers for Disease Control and Prevention cooperative agreement number 5U48 DP000045. The findings and conclusions in this paper are those of the author(s) and do not necessarily represent the official position of the Cancer Prevention and Research Institute of Texas and the Centers for Disease Control and Prevention.

The authors would also like to acknowledge the ÉPICO promotores for their contribution in the development and implementation of the ÉPICO cancer education modules: Aracely Garibay, Lupita Garza, Leticia Gutierrez, Dinorah Martinez, Gabriela Robinson, and Paula Saldana.

REFERENCES


TPHA Journal Volume 65, Issue 1
Breast Screening and Patient Navigation in Rural Texas Counties—Strategic Steps
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1 University of Texas Southwestern Medical Center, Moncrief Cancer Institute
2 University of Texas Southwestern Medical Center Harold C. Simmons Cancer Center
3 Department of Clinical Sciences, UT Southwestern Medical Center

ABSTRACT
Objective: To increase access to breast screening and patient navigation by reducing geographic and financial barriers for rural and underserved women in Denton, Wise, Parker, Hood and Johnson counties.

Methods: The Breast Screening and Patient Navigation (BSPAN) program’s engages with local community leaders and health care providers to enable on-going access for breast cancer screening, diagnostic mammograms, and biopsies for the underserved. BSPAN’s community framework utilized both mobile and local providers for screening mammograms, as well as diagnostic services for women with abnormal screening results. Additionally, it filled the critical diagnostic gap for women with breast symptoms who are clinically ineligible for breast cancer screening.

Results: A total of 3,308 screening mammograms and 2,042 diagnostic mammograms were provided over two years in five underserved counties covering 3800 square miles. Ninety-nine breast cancers were diagnosed with 80% found in early stage. 22% had either never been screened or had not been screened in 10 years. 93% reported incomes less than 200% of the Federal poverty level and 85% lacked any health insurance. Navigators streamlined referral to needed services and reduced time to clinical resolution to 13-21 days.

Conclusions: Through extensive outreach, education and community involvement, BSPAN provided culturally-appropriate information on breast cancer prevention and detection that resulted in a measurable increase in screening mammograms, a reduction in time to diagnosis, diagnosis at earlier stage and navigation to follow-up care. Judicious use of multiple funding streams expanded our success. Successful implementation of BSPAN has demonstrated the feasibility of this engaged partnership model to provide breast cancer screening and patient navigation across multiple rural and underserved counties. It has provided programmatic foundation for a CPRIT competitive renewal to evolve into a decentralized regional delivery model expanding breast health services into 12 additional rural and underserved counties.

Key Words: Breast Screening, Navigation, Underserved, Rural, Community Engagement

INTRODUCTION
Breast cancer is a critical public health problem in North Texas, one of two regions in the state with the highest age-adjusted rates for female breast cancer1. The call to action in both the 2005 and 2012 Texas Cancer Plan places clear emphasis on the priority of prevention, screening and early detection for breast cancer2,3. Studies indicate that routine mammography screening can significantly reduce deaths from breast cancer4-8. A recent survey reported that 21% of women age 40 and older in the counties surrounding Fort Worth had not had a mammogram within the last two years7. The Cancer Prevention and Research Institute of Texas (CPRIT) award to the UT Southwestern’s Moncrief Cancer Institute (Moncrief) supported our aim of impacting breast cancer incidence and severity by providing screening mammograms, diagnostic follow-up procedures and navigation to underserved communities. We designed strategic methods of community engagement, screening and patient navigation to implement a new program, Breast Screening and Patient Navigation (BSPAN) in five adjacent counties: Denton, Wise, Parker, Hood and Johnson. BSPAN proposed creating a regional delivery system with Moncrief positioned to serve as a regional hub and provide a referral destination for patients requiring tertiary care. Several of these counties meet state or federal criteria for a rural service designation and represent wholly or partially medically underserved areas9,10. The catchment area covers approximately 3,800 square miles, with an estimated female population of over 109,00010-14. The average high school completion rate is 84%, and approximately 10% of the population lives below the poverty level15. We estimated that the number of screen-eligible women who had not received a screening mammogram in the previous 24 months ranged from 44,000 to 69,00016. Suboptimal adherence to cancer screening guidelines in these communities was consistent with other public health programs and was due in part to a lack of access to breast health services, distance from providers, lack of adequate insurance and language barriers17,18.

The use of community-led, structured interventions to provide access to cancer screening and patient navigation presents particular challenges in rural, medically underserved areas. Our BSPAN program sought to systematically: a) establish trusting relationships with key leaders in local areas, b) initiate grassroots community outreach and education, c) implement nurse-guided clinical navigation to assist women through multiple steps of breast healthcare and d) reduce both geographic and financial access barriers to clinical preventive mammography services.

Pursuant to recommendations of the Folsom Report19, we recognized early in the process that a successful screening and navigation program would require sensitivity to each county’s local values and culture, particularly with regard to established patterns of health care communication. Our Moncrief community advocates immersed themselves in these diverse communities, and recognized the key to success was the willingness of each county to become a collaborating partner at multiple levels. Utilizing a community engagement framework, we met with local government officials, hospital systems and CEO’s, clinics, primary care physicians, community organizations and foundations to provide a “top down, bottom up” approach to community engagement and stakeholder involvement20.

METHODS
Three strategic steps were essential to the successful implementation of BSPAN: we created engaged partnership within all levels of each targeted county, assured smooth facilitated clinical services for women and provided nurse-guided navigation for all women with abnormal symptoms and results using proven best practices.

Engaged Partnership
In order to meet the individual county’s complex medical challenges, it was critical to gain an understanding of the political structure. Each county has an elected County Judge and four County Commissioners who work cooperatively to form a system for addressing medical needs. The State of Texas Indigent Health Care and Treatment Act requires that each county establish a safety net to provide basic medical care for its indigent population21. To introduce BSPAN, formal meetings took place between the Principal Investigator and each County Judge and Commissioners Court. During these meetings, the program was introduced, financing mechanisms were explained, and concerns were addressed. In most instances, support for the program was quickly offered by the county stakeholders. Most of the targeted counties are rural, ranching and farming communities made up of tight-knit small towns with strong cultures of self-reliance. Sen-
sitivity to these cultural traits and characteristics proved essential: grass-roots community engagement was successfully conducted by Moncrief’s community advocates using networks of local fraternal organizations, women’s clubs, business organizations and school districts.

Breast Health Awareness education, per BCCS contractor requirements, regarding the importance of consistent screening and follow-up was provided to all women regardless of funding source.

**Facilitated Clinical Service: Screening and Diagnostics**

There is a standardized clinical pathway for the detection of breast cancer. The sequenced steps include a screening mammogram for screen-eligible asymptomatic women. If an abnormality is identified in this screening that requires further imaging or a woman presents with breast symptoms, the diagnostic process with nurse navigation is initiated. The diagnostic process includes: a clinical breast examination, followed by a diagnostic mammogram providing enhanced radiologic views of the abnormality and finally needle or excisional biopsy. Once the biopsy tissue has been examined by a pathologist, if breast cancer is diagnosed, the woman is navigated to the recommended treatment options.

Moncrief Cancer Institute developed a centralized system and streamlined processes that provided local screening mammograms and diagnostic services for abnormal results. Women seeking a mammogram initiated a call to our centralized scheduling and registration desk using our toll-free telephone number. This provided a pre-assessment opportunity to identify women who were screen-eligible, and those with active breast symptoms not eligible for a screening mammogram. Our Community Advocates addressed logistical barriers to routine screening early in our partnering relationships within the community. Vouchers providing free mammography to qualified women were dispersed using grass roots community organizations and local venues. Women were able to choose a local screening site and appointment time. Three digital mobile mammography units were dispatched to reach into these counties and used to maximum capacity. The rate of “no shows” for screening mammograms was 6% with no statistical difference noted between ethnic groups. All women screened through the study were non-adherent to screening guidelines per the U.S. Preventive Services Task Force recommendations.

Our navigation structure was developed to offer screening and follow-up diagnostic services with existing facilities and providers including hospital systems, free standing radiology groups, low cost clinics, and primary care physicians. Those women who presented with breast symptoms and did not qualify for routine breast screening as well as those with abnormal screening results, were most in need of nurse navigation to seamlessly assist in the next appropriate step in the diagnostic process. These women were provided access to care including diagnostic services to clinical resolution and treatment when indicated. By the end of the grant period, formal collaborations included 20 Letters of Agreement (LOA) and 12 fully executed contracts. Each LOA and/or contract covered multiple community providers spanning the five targeted counties and enabled the uninterrupted exchange of patient information.

**Nurse-guided Navigation**

Patient navigation has been associated with improved adherence to screening and diagnostic processes for the underserved. The provision of “barrier focused” interventions enabled resolutions to such problems as access to care, logistics, transportation and anxiety levels surrounding diagnosis. BSPAN’s team of registered nurse navigators became involved in patient interaction only when a breast abnormality was identified. The navigators worked with local community resources to ensure that every screen-positive patient was carefully tracked, and all patient and community interventions were documented with attention to social, cultural, economic and geographic barriers. Patients were triaged based on case complexity, and bilingual RN patient navigation was used to accelerate clinical resolution. Furthermore, to avoid duplication in effort or services, Moncrief developed a customized patient tracking database in order to document each patient encounter so that every member of the breast health team remained updated in regard to each patient’s current status and needed next steps.

Reimbursement streams were carefully coordinated in order to maximize multiple funding sources. Moncrief provides screening for women regardless of insurance status or immigration status. Reimbursement streams include: Komen for the Cure®, Careity Foundation, local philanthropic funds, state funding via Breast and Cervical Cancer Services (BCCS) and federal funding through the Centers for Disease Control (CDC). Moncrief Cancer Institute successfully applied to become a BCCS provider for the purpose of augmenting funding for mammography services.

**RESULTS**

We sought to reach screen-eligible women over 40 years of age who had not received a mammogram in the last 24 months (N=44,000-69,000). Our results from the five underserved counties over the two year funding period indicates that, of the 3308 women receiving a screening mammogram, more than 22% percent (N=728) of participants were either never screened or had not had a mammogram in ten years. 93% reported incomes less than 200% of the Federal poverty level and 85% lacked any health insurance. Our demographic data demonstrate the diversity of our target population (Table 1). As expected, the participant numbers of Black, Asian and American Indian women is smaller overall but reflects the projections that we anticipated in these geographies. However, our Hispanic participation averaged one-third higher than what we had projected according to 2010 census figures. Our success is reflected in our female Hispanic participation rate representing more than one-third of our total participants. We increased our bilingual staffing capacity as a result.

**Table 1. Demographics**

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Screening Mammograms</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>176</td>
<td>5%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1174</td>
<td>36%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>1635</td>
<td>49%</td>
</tr>
<tr>
<td>Asian</td>
<td>48</td>
<td>2%</td>
</tr>
<tr>
<td>Am. Indian</td>
<td>7</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>268</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>3308</td>
<td>100%</td>
</tr>
</tbody>
</table>

Women found to have an abnormal mammogram plus those who presented to our clinic with symptoms, (N=2042) continued through the navigation process for clinical diagnostic services as shown in Table 2.

The time to clinical resolution for screened asymptomatic women (N=932) averaged 21.5 days; compared to the BCCS standard of 60 days 26. In symptomatic women navigated directly to diagnostic mammogram (N=1110), the time to clinical resolution averaged just 13.5 days.

Of the 99 women found to have cancer in this unscreened population, 80% were diagnosed with early stage breast cancer (Stage 0, I, II) in contrast to the historical average for the intervention counties where 68% were diagnosed at early stage.
Table 2. Clinical/Diagnostic Services Provided

<table>
<thead>
<tr>
<th>Service</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Clinical Breast Exams</td>
<td>2,255</td>
</tr>
<tr>
<td>Diagnostic Mammograms</td>
<td>2,042</td>
</tr>
<tr>
<td>Breast Biopsies</td>
<td>403</td>
</tr>
<tr>
<td>Cancers</td>
<td>99</td>
</tr>
</tbody>
</table>

DISCUSSION

BSPAN provided 119% of projected screening mammograms, exceeded anticipated diagnostic mammograms by 54% and completed 9% fewer breast biopsies than anticipated. The time to clinical resolution for screened asymptomatic women averaged 21.5 days; compared to the BCCS standard of 60 days\(^b\). In symptomatic women navigated directly to diagnostic mammogram the time to clinical resolution averaged just 13.5 days.

One limitation of our BSPAN program is our dependency on the continued existence of the CDC’s National Breast & Cervical Cancer Early Detection Program and their ability to provide ongoing BCCS funding to state breast and cervical programs in Texas. With the underestimated consequences of the implementation of the Affordable Care Act and its effect on rural cancer control, long term funding resources are provisional.

CONCLUSION

Through extensive outreach, education and community involvement, BSPAN provided culturally-appropriate information on breast cancer prevention and detection that resulted in a measurable increase in screening mammograms, a reduction in time to diagnosis, diagnosis at earlier stage and clinical navigation to follow-up care.

Importantly, our screening program worked in collaboration with local leadership and county organizations to create an engaged partnership network to leverage state and federal funding while provide high quality care through local community providers.

Our program clinical outcomes demonstrate the feasibility of this engaged partnership model to provide breast cancer screening and patient navigation across multiple rural and underserved counties. With additional CPRIT support through a competitive renewal (PP120097 PI: Lee)\(^a\), we are evolving the BSPAN program to a decentralized regional delivery model to expand services into 12 additional rural and underserved counties. BSPAN2 will develop tools to assess county capacity and the training curricula to enable new partners to capitalize on existing strengths and local resources to provide high-quality cancer prevention services to vulnerable communities across North Texas.

Acknowledgement

This prevention program, is partially funded by the Cancer Prevention and Research Institute of Texas, #PP100022, PI: K. Argenbright.

REFERENCES

Impact of Community Outreach on Stage Distribution of Breast Cancer in the Texas Panhandle

Rakhshanda Layeequr Rahman, MD¹, Sybil Crawford, PhD², Sharon Felts, MS¹, Edna Wishkaemper, MS¹, Billy Phillip, PhD¹

¹Texas Tech University Health Sciences Center, ²University of Massachusetts

ABSTRACT

Background: Increased screening and early detection are the most significant impacts to reducing breast cancer mortality. Unfortunately, screening mammography guidelines are less likely to be adhered to among the socio-economically disadvantaged and in rural areas resulting in disproportionate rates of late stage diagnoses among these women. Access to Breast Care for West Texas (ABC4WT) program targeted outreach for the underserved community of the Texas Panhandle to enhance breast health through education and screening. This paper presents an analysis of stage distribution over 3 and 1/2 years of the ABC4WT project.

Methods: This is a longitudinal study of prospectively maintained databases to examine the number of community events, women reached, and stage distribution of all cancers treated at the Breast Center of Excellence between 2009 and 2012. The Cochran-Mantel-Haenszel test was used to test the significance of shift in stage of breast cancer; and ordinal option Cochran-Armitage trend test was used to analyze the time trends for early versus late stage at diagnosis.

Results: A total of 1,150 women were reached via 226 outreach events between January 1, 2009 and June 30, 2012. Five hundred and seventy-one (49.6%) were Hispanics; median (interquartile) household income was $1,400 (1,350) per month. Three hundred and seventy-eight women were diagnosed and treated for breast cancer at the Breast Center of Excellence during the same time frame. The earlier stage at diagnosis of cancer rose from 78.7% (37/47) in early January 2009 to 95.4% (42/44) by 2012; similarly the later stage at presentation dropped from 21.2% (10/47) to 4.5% (2/44) over the same period [p = 0.0114].

Conclusions: Targeted evidence-based community outreach programs were potentially associated with earlier stage of cancer at diagnosis.

INTRODUCTION

In 2012, an estimated 226,870 women will be diagnosed with breast cancer in the United States¹ and despite declining mortality; almost 40,000 women will die from the disease². Whereas, the overall country-wide decrease in breast cancer mortality can be attributed to intensive screening and early detection efforts; accessibility issues such as cost, geography, and convenience remain a major barrier for adequate screening and early detection¹. The most persistent association between breast cancer incidence and mortality is socio-economic position and racial disparities in the continuum of healthcare delivery, specifically screening¹.

Texas Panhandle comprises of the northernmost 26 counties of the state³; this region represents a multicultural population with a large proportion of Hispanics, low socio-economic status, and settlements that are geographically distant from healthcare facilities.⁴ In comparison to the entire state, the Texas Panhandle has a relatively higher rate of mortality (14/100,000 in the Panhandle versus 12.5/100,000 in Texas) despite similar incidence (62.1/100,000 in Panhandle versus 61.1/100,000 in Texas) of invasive breast cancer⁵. Coupling these data with 30% of the Texas Panhandle population representing ethnic minorities and, 29.6% Hispanics, and 23.8% African Americans falling below federal poverty line, it is prudent to focus more research efforts on these populations.⁶ Given the projected increase in this underserved population, the Texas Tech University Health Sciences Center, Breast Center of Excellence (TTUHSC-BCE) in Amarillo established a comprehensive community outreach program. The purpose was to reduce the barriers to screening mammography in the region and thus lower the stage at diagnosis. Access to Breast Care for West Texas (ABC4WT) program was designed to raise breast cancer awareness, increasing screening mammography and enhance patient navigation addressing the process of receiving prevention and treatment services with specific focus on financial counseling. This program was funded by the Cancer Prevention and Research Institute of Texas (CPRIT) in 2010.

The aim of this study was to analyze a prospectively maintained database for this reference population during the course of the ABC4WT program to examine the impact of community outreach on stage distribution of breast cancer in the Texas Panhandle.

POPULATION AND METHODS

This section describes the community outreach program (ABC4WT), data sources, study design, and statistical analyses.

Community outreach program (ABC4WT):
The ABC4WT project began in August 2010 as a collaborative effort between several community organizations including Amarillo Area Breast Health Coalition (AABHC) and TTUHSC-BCE. This program expanded upon a pilot project by the AABHC called the Women, Inspiring, Serving and Educating (WISE) program which trained lay community activists called WISE Women, through a formal curriculum designed by the TTUHSC-BCE focusing on breast cancer screening, prevention, and etiology of common breast symptoms (pain, lump and nipple discharge). ABC4WT expanded the program to (i) increase the cadre of WISE Women from 5 to 15, and thus allowed educational outreach services to be extended to all 26 counties of the Texas Panhandle; and (ii) provide financial support for screening mammography for underserved and uninsured women who do not qualify for other resources such as Breast and Cervical Cancer Screening (BCCS) program. The WISE Women were trained in breast cancer screening guidelines, risk assessment and prevention and common presentations of breast disease in addition to basic training on communication skills for one-on-one and group sessions. They were also provided with financial resource tools and contact numbers for navigation services focusing on screening. The project utilized targeted small media campaign, one-on-one and group sessions, and reminder call systems for screening appointments to maximize success of the intervention.

TTUHSC Breast Center of Excellence and Data Sources:
The TTUHSC-BCE is a nationally accredited breast center of excellence by the American College of Surgeons. TTUHSC-BCE maintains two prospective database; one for all patients treated at the center with breast cancer [ICD-9 codes 233.0 (carcinoma in situ) and 174.x (malignant neoplasm of female breast)] and one for all women reached via community outreach programs. Data on breast cancer stage at diagnosis⁷ were obtained from the TTUHSC-BCE cancer database. This database maintains real-time data on 135 elements from 2 major hospitals, and 2 free standing cancer centers which include information on patient demographics, socioeconomic status, school education, insurance status, and treatment outcome.
and stage at diagnosis. Demographic and screening data on women reached via community outreach was obtained from the TTUHSC-BCE outreach database. This database maintains real-time data on 47 elements from outreach events. Texas Tech University Health Sciences Center Internal Review Board (IRB) approved this study as an expedited, minimal risk study (A11-3649). HIPAA waiver was obtained to authorize the research team to obtain protected health information.

**Study Design:**
Longitudinal study of prospectively maintained databases was conducted between January 1, 2009 and June 30, 2012. Data was collected regarding stage of cancer at the time of diagnosis; and characteristics of women served via community outreach.

**Statistical Analysis:**
Data was analyzed using SAS statistical package (SAS Institute Inc. Cary, NC). The shift in stage distribution of cancer over three and a half years was calculated and tested for statistical significance using Cochran-Mantel-Haenszel test. Ordinal level Cochran-Armitage trend test was performed to analyze the shift from early (0, I and II) to late (III, IV) stage breast cancer.

**RESULTS**
Over three and half years, 1,150 women were reached by either the WISE Woman project or the ABC4WT project. Between January 1, 2009 and June 30, 2010, the WISE Woman project conducted 73 community outreach events (in the 7 most populous counties of the Texas Panhandle). Between August 2010 and June 30, 2012, the ABC4WT project conducted a total of 226 outreach events throughout the 26 counties of the Texas Panhandle. The outreach events included group sessions where breast health information and screening guidelines were presented to the community women by the WISE Women, women completed the data questionnaire, and age-eligible women (who were 40 years and older) signed up for screening mammograms. Pre-negotiated block times with the mammogram providers were available such that women left the event with a screening appointment. Mammogram providers did the reminder calls and TTUHSC-BCE performed follow up on all mammograms performed and navigated appropriate patients for treatment. Table 1 describes the socio-economic characteristics of the women who attended the community outreach events. Fifty-six percent of women reached represent ethnic minorities and 41.3% of age-eligible women reported having a mammogram within last 5 years. Table 2 depicts the stage distribution of all breast cancers treated at the TTUHSC-BCE during the study period. The earlier stage at diagnosis of cancer rose from 78.7% (37/47) in early January 2009 to 95.4% (42/44) by 2012; similarly the later stage at presentation dropped from 21.2% (10/47) to 4.5% (2/44) over the same period [p = 0.0114]. The non-zero correlation for shift in stages of breast cancer between 2009 and 2012 was significant at 0.0001. Figure 1 shows the distribution of early versus late cancers diagnosed throughout the study period.

**DISCUSSION**
Early detection is vital to increasing the survival of patients with breast cancer. Despite major advances in cancer therapeutics, the 5-year survival for stage IV disease remains between 20% and 30% compared with more than 90% for early stage disease. It is there-

<table>
<thead>
<tr>
<th>Characteristics (N=1,150 women)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age – Median (interquartile)</strong></td>
</tr>
<tr>
<td><strong>Race - n (%)</strong></td>
</tr>
<tr>
<td>American Indians</td>
</tr>
<tr>
<td>Asians</td>
</tr>
<tr>
<td>Africans / African-Americans</td>
</tr>
<tr>
<td>Caucasians</td>
</tr>
<tr>
<td>Hispanics</td>
</tr>
<tr>
<td><strong>Household Income - Median (interquartile)</strong></td>
</tr>
<tr>
<td><strong>Screening Mammogram History [eligible women ≥ 40; n=1,107] – n (%)</strong></td>
</tr>
<tr>
<td>Never</td>
</tr>
<tr>
<td>Within last 5 years</td>
</tr>
<tr>
<td>Between 5-10 years ago</td>
</tr>
<tr>
<td>More than 10 years ago</td>
</tr>
<tr>
<td>Do not remember</td>
</tr>
</tbody>
</table>
Table 2. Stage distribution of breast cancers in Texas panhandle between 2009 and 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>AJCC Stage at Diagnosis n (%)</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early Stage</td>
<td>Late Stage</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>I</td>
</tr>
<tr>
<td>2009</td>
<td>Jan - Jun</td>
<td>4 (8.5)</td>
</tr>
<tr>
<td></td>
<td>Jul - Dec</td>
<td>8 (13.5)</td>
</tr>
<tr>
<td>2010</td>
<td>Jan - Jun</td>
<td>7 (10.9)</td>
</tr>
<tr>
<td></td>
<td>Jul - Dec</td>
<td>10 (17.5)</td>
</tr>
<tr>
<td>2011</td>
<td>Jan - Jun</td>
<td>12 (22.2)</td>
</tr>
<tr>
<td></td>
<td>Jul - Dec</td>
<td>8 (15)</td>
</tr>
<tr>
<td>2012</td>
<td>Jan - Jun</td>
<td>7 (15.9)</td>
</tr>
</tbody>
</table>

- Cochran-Mantel-Haenszel test p= 0.0001

Figure 1. Trend of Change in Stage Distribution of Breast Cancer in Texas Panhandle
fore imperative that women undergo recommended screening with mammography for this highly survivable cancer in order to allow for detection at an early stage. Self-reported screening data in the current paper found 32.8% women over the age of 40 who were never screened. Overall, the at least two-thirds of this population was non-compliant with screening guidelines. This is in variance with about 70% self-reported compliance after age adjustment. However, Njai et al have documented that self-reporting not only overestimates the use of screening mammography but this discrepancy is wider amongst ethnic minorities. Community organizations should be committed to enhance breast health by focusing on addressing barriers to mammographic screening for their respective populations. Factors that are associated with late stage at diagnosis (and therefore high risk of mortality) of breast cancer are racial and socioeconomic disparities that exist in healthcare delivery systems. The ABC4WT project was specifically designed to address the barriers to breast cancer screening for a largely underserved population of the Texas Panhandle by incorporating evidence-based strategies of identifying racially and ethnically concordant community activists, focusing on continued health education, and creating and maintaining a strong partnership between community and medical settings. Specifically, evidence-based strategies such as involving the local community, targeted small media campaign, group and one-on-one breast health education, and reminder systems were employed for successful implementation of the intervention. In a recent review of community interventions and screening mammography found that several components of interventions by the trained community health workers have shown variable success rates with increasing screening mammography, including health education, reminder calls for screening appointments, racially and ethnically concordant health workers and medical settings for recruitment. Most importantly, strategies incorporating multiple components of outreach are likely to be more successful.

Additionally, specific steps were taken to bridge the gap between community organizations and the university setting to allow for better healthcare delivery systems. The ABC4WT project maintains very close relationships with community organizations and serves as an academic partner to the AABHC. Over the period of three and a half years, the project had (i) trained health workers from lay communities in geographically distant areas (WISE Women); (ii) multiple partnerships with local screening mammogram providers, (iii) negotiated block times for screening of underserved women, such that they could leave with screening appointments at the time of first contact at community outreach events, and (iv) build a system of reminder calls and accountability with all participants. The strategy of negotiating block times with mammogram providers was an innovative approach adopted by the ABC4WT project in 2011. This allowed the program staff to schedule screening mammogram appointments in real time at the outreach event. Since this approach was one of the many components of outreach, it is difficult to identify how much of the success is attributable to this strategy. However, the project observed that before implementation of this strategy in 2010, 47% of women who were reached by the program did not follow through with the screening. This rate dropped to 14.7% once the program staff was able to schedule mammograms at first contact.

The aim of this study was to quantify the effect of the ABC4WT project by examining if there was any migration in disease stages at presentation between 2009 and 2012. This study demonstrates a clinically and statistically significant shift from 80% early and 20% late stage presentation in 2009 to 95% early and 5% late stage at presentation by mid-2012. Moreover, because the overall number of breast cancers diagnosed remained stable throughout this time period, this suggests a clinically relevant change as opposed to “over-diagnosis” of occult disease. These data suggest that community education and outreach initiatives targeted specifically to the underserved communities may have had an impact on the observed stage migration, given the fact that 54% of all breast cancers treated by the TTUHSC-BCE represent underserved segments of population.

Despite the limitation of the current study to establish a cause-effect relationship between community outreach and stage migration, there is a temporal relationship wherein the women heard messages at events prior to the initiation of screening, which gives a logical sequence of events between outreach and participation in screening. Further research will continue to collect prospective data on women diagnosed via the ABC4WT program and to test for time trends to clarify the explicit link between outreach and screening adherence.

REFERENCES

TPHA Journal Volume 65, Issue 1
Adherence to Physical Activity Guidelines After Cancer Diagnosis Among Cancer Survivors Ages 45-64 in Texas

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2Department of General Internal Medicine, The University of Texas MD Anderson Cancer Center
3Health Promotion and Behavioral Sciences Department, The University of Texas Health Science Center at Houston

ABSTRACT

Background: Advances in cancer treatment have improved 5-year survival rates. However, late effects resulting from cancer treatment can adversely affect cancer survivors’ quality of life. Evidence suggests that regular physical activity (PA) among cancer survivors is associated with improved health outcomes. In this study, we examined whether cancer survivors adhere to PA guidelines and assessed health-related quality of life (HRQOL) of survivors who did adhere to PA guidelines compared with those who did not. In addition, we identified factors that may influence adherence to PA guidelines.

Methods: We used data from the 2009 Behavioral Risk Factor Surveillance System survey and analyzed them using SAS procedures to account for the complex sampling design. The sample consisted of 451 adult cancer survivors, at least 1 year since diagnosis, residing in Texas, and 45-64 years old. A multivariable analysis was conducted to examine the adherence to PA recommendations among cancer survivors by sex, education, race, body mass index (BMI), and comorbidities.

Results: About 48% of cancer survivors reported adhering to recommended PA guidelines. Cancer survivors not adhering to PA recommendations reported poorer HRQOL than cancer survivors who met the recommendations. Cancer survivors who were overweight (OR, 2.09; 95% CI, 1.04-4.22; p = 0.038) or obese (OR, 4.45; 95% CI, 1.98-10.01; p<0.001) were more likely to not adhere to PA recommendations.

Conclusion: Most of the cancer survivors did not meet the PA guidelines. Thus, identifying ways to increase PA through targeted interventions is imperative, particularly for those groups of cancer survivors we have identified as not adhering to PA recommendations.

INTRODUCTION

In 2012, about 110,470 new cases of cancer were diagnosed in Texas.1 The relative 5-year survival rate in Texans—the percentage of patients who live for at least 5 years after their cancer is diagnosed—is 62.7%, as indicated by Texas Cancer Registry reports.2 About 35% of the cancer survivor population is between 45 and 64 years old.3 Haversing cancer during the prime and middle years of adulthood greatly compromises a survivor’s ability to carry out his or her family and work-related responsibilities. The most common malignancies affecting this age cohort are cancers of the female breast, prostate, and lung; melanoma; non-Hodgkin lymphoma; and cervical cancer.3

Many cancer treatments carry a substantial risk of long-term or late effects from chemotherapy.4 Evidence suggests that most cancer survivors die of causes other than cancer, particularly cardiovascular disease (CVD).5 This could be attributable to individual risk factors and adverse effects of chemotherapy, as indicated in the Institute of Medicine report “From Cancer Patient to Cancer Survivor: Lost in Transition.”6 Therefore, reducing the risk of CVD may further improve cancer survival rates.7,9

Studies suggest that, for cancer survivors, engaging in 30 minutes of moderate physical activity (PA) 5 or more days per week or 20 minutes of vigorous activity 3 days per week has a positive impact on cardiac health and lowers the risk of cancer recurrence.10-13 PA improves health outcomes and survival through multiple pathways, such as lowered cholesterol and lipid levels, hypertension, and stress levels and decreased insulin resistance.14,15 Engaging in moderate to vigorous level physical activity may improve the physical and mental wellbeing and quality of life of cancer survivors. Despite this evidence that PA promotes health, the vast majority of adult cancer survivors remain physically inactive.16,17 Previous population-based studies among adult cancer survivors age 40-64 years in the United States reported that fewer than half of cancer survivors met the minimal recommendations for PA as outlined by the American Cancer Society.18,19 The factors associated with not meeting these recommendations need to be characterized, in order to identify the subset of cancer survivors who may benefit from targeted PA interventions.

We thus sought 1) to determine the prevalence of adherence to recommended PA guidelines among cancer survivors in Texas, 2) to assess the health-related quality of life (HRQOL) between cancer survivors who adhere to PA guidelines and survivors who did not, and 3) to examine predictors for not meeting PA guidelines among cancer survivors 45-64 years old in Texas.

METHODS

We used data from the 2009 Behavioral Risk Factors Surveillance System (BRFSS), an annual state-based telephone survey of a representative sample of non-institutionalized adults in the United States and US Territories. A core questionnaire is administered to all respondents and consists of a fixed set of questions related to current health behavior practices. For this study, we selected respondents who were 45-64 years old residing in Texas and who answered the PA questions. In the year 2009 the BRFSS survey included six items about PA in the core questionnaire that collected information on two types of PA: vigorous and moderate (Table 1). Responses to these items were used to determine adherence to recommended PA guidelines, the main outcome of interest for this study. Vigorous activities were defined as those causing large increases in breathing or heart rate, and moderate activities were defined as those causing small increases in breathing or heart rate. The questions included information on the duration, frequency, and intensity of moderate to vigorous PA. Respondents who answered “yes” to the question, “Were you ever diagnosed with cancer?” were labeled as cancer survivors and included in the analyses. To eliminate bias due to patients who were noncompliant with PA guidelines because they were still receiving active cancer treatment, we excluded cancer survivors who were within 1 year of their cancer diagnoses.20-22 This study was approved by the Institutional Review Board of The University of Texas MD Anderson Cancer Center.

Outcome Measures

PA guidelines: The main outcome of interest was adherence to PA recommendations. Respondents who reported doing moderate PA for 30 or more minutes per day for 5 or more days per week or doing vigorous activity for 20 or more minutes per day for 3 or more days per week were categorized as demonstrating PA adherence.23 Respondents who reported doing less than 30 minutes per day for fewer than 5 days per week of moderate PA or doing less than 20 minutes per day for fewer than 3 days per week of vigorous activity were categorized as not demonstrating PA adherence.

HRQOL: Respondents were asked to report the total number of days during the previous 30 days when they felt that their physical or men-
The sample consisted of slightly more women, predominantly white, from higher income levels, and of individuals who had survived cancer for 10 or more years. Of the cancer survivors who reported not adhering to PA guidelines, most were minority, had an education of high school or less, or had an annual income of less than $50,000 (Table 2). About 42.03% in the group who did adhere to PA recommendations had a higher (36.37%) co-morbidity burden (>2 co-morbidities) than those who did adhere to guidelines (20.49%). The bivariate analyses indicated significant differences between the cancer survivors who adhere to PA guidelines and those who do not for factors such as education, income, comorbidity, and BMI (Table 2).

Our results indicate that only about 48% of cancer survivors adhered to PA guidelines. Overall, survivors who met PA guidelines reported a higher HRQOL (Table 3). Specifically, physical health status was statistically significantly higher (p < 0.05) for survivors adhering to PA guidelines than for survivors not meeting PA guidelines. We found that cancer survivors who adhered to PA guidelines had fewer days of poor physical health in the preceding 30 days (mean ± SE, 3.24 ± 0.75 days) than cancer survivors not meeting PA guidelines (mean ± SE, 7.01 ± 0.95 days).

Table 4 displays the results from the multivariable analyses. After adjusting for sex, race, education, and comorbidity, multivariate logistic regression indicated that cancer survivors who were overweight

Table 1. Behavioral Risk Factor Surveillance System Survey, 2009 - questions on physical activity

<table>
<thead>
<tr>
<th>Questions</th>
<th>Response option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate activity</td>
<td>Now, thinking about the moderate activities you do in a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate?</td>
</tr>
<tr>
<td>How many days per week do you do these moderate activities for at least 10 minutes at a time?</td>
<td>_ _ Days per week</td>
</tr>
<tr>
<td>On days when you do moderate activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities?</td>
<td>_ _ Hours and minutes per day</td>
</tr>
<tr>
<td>Vigorous Activity</td>
<td>Now, thinking about the vigorous activities you do in a usual week, do you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate?</td>
</tr>
<tr>
<td>How many days per week do you do these vigorous activities for at least 10 minutes at a time?</td>
<td>_ _ Days per week</td>
</tr>
<tr>
<td>On days when you do vigorous activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities?</td>
<td>_ _ Hours and minutes per day</td>
</tr>
</tbody>
</table>
Table 2. Demographic characteristics of cancer survivors (N=451) and physical activity (PA) guidelines

<table>
<thead>
<tr>
<th></th>
<th>Adherence to PA guidelines</th>
<th>Nonadherence to PA guidelines</th>
<th>Chi-sq p value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Study Sample (n=216)</td>
<td>Pop. Estimate (n=223,935; 47.89%)</td>
<td>Study Sample (n=235)</td>
</tr>
<tr>
<td><strong>Age, yr</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>87 (107,419 (47.97))</td>
<td>93 (116,354 (47.75))</td>
<td></td>
</tr>
<tr>
<td>55-64</td>
<td>129 (116,515 (52.03))</td>
<td>142 (127,303 (52.25))</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>76 (95,684 (42.73))</td>
<td>78 (112,953 (46.36))</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>140 (128,251 (57.27))</td>
<td>157 (130,704 (53.64))</td>
<td></td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>183 (180,697 (80.69))</td>
<td>181 (166,482 (68.41))</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>33 (43,237 (19.31))</td>
<td>53 (76,871 (31.59))</td>
<td></td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤High school</td>
<td>98 (103,638 (46.28))</td>
<td>147 (170,539 (69.99))</td>
<td></td>
</tr>
<tr>
<td>&gt;High school</td>
<td>118 (120,296 (53.72))</td>
<td>88 (73,118 (30.01))</td>
<td></td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $25,000</td>
<td>35 (32,540 (15.96))</td>
<td>48 (38,542 (18.19))</td>
<td></td>
</tr>
<tr>
<td>$25,000 to $49,000</td>
<td>24 (16,491 (8.09))</td>
<td>49 (40,840 (19.28))</td>
<td></td>
</tr>
<tr>
<td>$50,000 or more</td>
<td>137 (154,847 (75.96))</td>
<td>111 (132,473 (62.53))</td>
<td></td>
</tr>
<tr>
<td><strong>Time since diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>42 (40,337 (18.01))</td>
<td>34 (41,653 (17.10))</td>
<td></td>
</tr>
<tr>
<td>2-5</td>
<td>34 (34,272 (15.30))</td>
<td>46 (63,736 (26.16))</td>
<td></td>
</tr>
<tr>
<td>5-10</td>
<td>46 (54,231 (24.22))</td>
<td>46 (36,067 (14.80))</td>
<td></td>
</tr>
<tr>
<td>&gt;10</td>
<td>94 (95,095 (42.47))</td>
<td>109 (102,200 (41.94))</td>
<td></td>
</tr>
<tr>
<td><strong>Co-morbidity count</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>50 (39,678 (17.72))</td>
<td>44 (36,256 (14.88))</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>126 (138,381 (61.80))</td>
<td>121 (118,773 (48.75))</td>
<td></td>
</tr>
<tr>
<td>&gt;2</td>
<td>40 (45,876 (20.49))</td>
<td>70 (88,628 (36.37))</td>
<td></td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>80 (90,725 (42.03))</td>
<td>50 (39,635 (17.15))</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>89 (75,620 (35.04))</td>
<td>82 (73,087 (31.62))</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>39 (49,490 (22.93))</td>
<td>90 (118,426 (51.23))</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at <0.05

Table 3. Health-related quality of life among cancer survivors and adherence to physical activity (PA) guidelines

<table>
<thead>
<tr>
<th>Health-related quality of life</th>
<th>Adhere to PA guidelines (Mean no. of days/month ± SE)</th>
<th>Do not adhere to PA guidelines (Mean no. of days/month ± SE)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor general health</td>
<td>5.83 (1.37)</td>
<td>7.43 (1.44)</td>
<td>0.400</td>
</tr>
<tr>
<td>Poor physical health</td>
<td>3.24 (0.75)</td>
<td>7.01 (0.95)</td>
<td>0.002</td>
</tr>
<tr>
<td>Poor mental health</td>
<td>3.08 (0.65)</td>
<td>4.48 (0.88)</td>
<td>0.200</td>
</tr>
</tbody>
</table>
In our study, HRQOL was based on these factors and high school Reference 0.040*. Predictors for noncompliance to physical activity guidelines were actively receiving treatment. Hence, we excluded people who were within 1 year post diagnosis as they would likely be receiving treatment. Despite these weaknesses, our study has several notable strengths. To our knowledge, this is first study to examine the PA behavior of cancer survivors 45-64 years old in Texas. Also, our population-based sample allows generalizing the results to all cancer survivors in Texas within this age group.

**DISCUSSION**

**Prevalence of PA among cancer survivors**

Evidence indicates that engaging in moderate to vigorous levels of PA may improve the health and quality of life in cancer survivors. Despite these well-documented benefits, our findings indicate that a large number of cancer survivors (52%) between 45 and 64 years old in Texas did not adhere to recommended guidelines for PA. Our findings are similar to those of Richardson et al., who used the BRFSS 2000-2002 survey and found that 54% of cancer survivors in the United States in almost the same age group did not adhere to PA guidelines. However, our study differs from the study by Blanchard et al., who examined PA among cancer survivors ages 18 and over using survey data from the American Cancer Society’s Study of Cancer Survivors. They found a PA adherence ranging from 29% to 47%. The lower PA adherence in their study is likely due to a restricted sample that included older survivors (mean age 67 years) of only six cancer types (breast, colorectal, bladder, uterine, or melanoma), whereas our sample was restricted to survivors 45-64 years old, age may influence adoption of physical activity. Moreover, this study sample included all cancer type. The exercise prevalence rate of our study is similar to those of other studies that examined the prevalence of PA among cancer survivors of various cancer types, which have found that approximately half of the adult cancer survivors do not meet PA recommendations.38, 27, 28

**Physical activity and HRQOL**

Cancer survivors who adhere to PA guidelines reported better HRQOL than those not meeting PA guidelines. Our results concur with those of previously published studies reporting poor HRQOL among cancer survivors not meeting PA guidelines compared to cancer survivors who do. In our study, HRQOL was based on self-report of unhealthy days due to poor physical or mental health. Previous studies have shown that improved HRQOL is due to improved physical health, psychological health, weight management, less fatigue, and better cardiac fitness.13, 14, 31, 32 These factors and overall improved HRQOL have also been associated with improved survival among cancer survivors who engage in PA. A study that examined adherence to lifestyle recommendations and its association with HRQOL indicated PA to be more strongly associated with HRQOL than nutrition and smoking prevention behavior among cancer survivors.26 Our study is cross-sectional and explores one aspect of the complex relationship between physical activity and HRQOL.

**Predictors for noncompliance to PA guidelines**

Education levels and weight status were independently associated with meeting PA guidelines among cancer survivors. Those reporting education levels of high school or less were less likely to meet PA guidelines. Being overweight or obese was associated with not meeting PA guidelines among cancer survivors. The percentage of cancer survivors meeting PA guidelines varied by BMI categories, such that overweight cancer survivors reported significantly better adherence to PA guidelines than obese cancer survivors. Another study indicated a significant association between BMI and leisure walking, with obese individuals reporting less leisure walking. Previous studies reported higher rates of obesity among cancer survivors than among people with no history of cancer; only about 37% of cancer survivors indicated maintaining a normal weight. The prevalence of obesity, along with the lack of PA, may increase risks of adverse health outcomes for this group of cancer survivors. This study has several limitations and some notable strengths. First, the BRFSS interviews non-institutionalized individuals with landline telephones; hence the findings of this study cannot be generalized to institutionalized persons or those using mobile phones instead of landlines. Second, the information collected is self-reported and thus subject to inaccuracy. For example, cancer survivors who are overweight or obese may overestimate their PA levels. Third, this is a cross-sectional survey and thus does not allow an examination of causation. Finally, we could not determine whether cancer survivors were actively receiving treatment. Hence, we excluded people who were within 1 year post diagnosis as they would likely be receiving treatment. Despite these weaknesses, our study has several notable strengths. To our knowledge, this is first study to examine the PA behavior of cancer survivors 45-64 years old in Texas. Also, our population-based sample allows generalizing the results to all cancer survivors in Texas within this age group.

---

**Table 4. Predictors for noncompliance to physical activity guidelines**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Adjusted odds ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Reference</td>
<td>0.829</td>
</tr>
<tr>
<td>Female</td>
<td>1.07 (0.58-1.96)</td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>Reference</td>
<td>0.569</td>
</tr>
<tr>
<td>Other</td>
<td>1.25 (0.57-2.74)</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;High school</td>
<td>Reference</td>
<td>0.040*</td>
</tr>
<tr>
<td>&gt;High school</td>
<td>0.54 (0.29-0.97)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
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<td></td>
</tr>
<tr>
<td>Normal</td>
<td>Reference</td>
<td>0.001*</td>
</tr>
<tr>
<td>Overweight</td>
<td>2.09 (1.04-4.22)</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>4.45 (1.98-10.01)</td>
<td></td>
</tr>
<tr>
<td>Co-morbidity count</td>
<td>1.08 (0.84-1.38)</td>
<td>0.544</td>
</tr>
</tbody>
</table>

*Significant at < 0.05

(OR, 2.09; 95% CI, 1.04-4.22; p= 0.038) or obese (OR, 4.45; 95% CI, 1.98-10.01; p<0.001) were significantly less likely to meet PA recommendations. Education level was associated with physical inactivity (p<0.040), such that individuals with high school education or less reported not meeting PA guidelines less often than individuals with college education.
CONCLUSION
Addressing health behavior changes should be an integral part of any cancer survivor’s care plan. Most cancer survivors between the ages of 45 and 64 years living in Texas do not meet recommended PA guidelines. Since cancer and its treatment may impose limitations on what exercise and activities cancer survivors can do, a one-size-fits-all approach may not work with this population. Cancer survivors who do not adhere to PA guidelines have higher comorbidity burden, tend to be overweight, and have poor physical health status. These factors must be taken into account when planning PA interventions for cancer survivors.

This study highlights the subgroup of cancer survivors who may be in most need of PA and thus may require special attention. Cancer survivors who are overweight or obese and those with a high school education or less are at greatest risk and need to be identified in clinical practice and may benefit from targeted interventions to improve their adherence to PA guidelines. Health care providers may benefit from referring to the report published by the American Cancer Society, which provides information on how to help survivors make informed choice related to PA and discusses issues related to PA during the entire cancer trajectory. Public health professionals can use data to identify and define population needs, while the primary care providers have the potential to promote adoption of physical activity among their patients by referring them to counselors or directing them to resources. Public health professionals and primary-care providers through common goal may improve adherence to PA recommendations in this growing population.

Acknowledgment
This research was supported by funds from the University Cancer Foundation and the Duncan Family Institute for Cancer Prevention and Risk Assessment via the Cancer Survivorship Research Seed Money Grants at The University of Texas MD Anderson Cancer Center and from the Cancer Prevention and Research Institute of Texas through the CERCIT grant (Grant RP101207 P04 02 - L. Elting, PI) to the University of Texas Medical Branch at Galveston.

The authors would like to acknowledge the editorial assistance of Ms. Virginia Mohiere.

REFERENCES
County-level estimates of human papillomavirus vaccine coverage among young adult women in Texas, 2008

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ABSTRACT

Purpose: The purpose of this study is to describe the county-level geographic distribution of human papillomavirus (HPV) vaccine coverage among young women aged 18-26 in Texas using multilevel, small area estimation.

Methods: Multilevel (individual, county, public health region) random-intercept logit models were fit to HPV vaccination data (receipt of ≥ 1 dose Gardasil®) from the 2008 Behavioral Risk Factor Surveillance System and a number of secondary sources. Using the parameters from the final model, we simulated HPV vaccine coverage in each county.

Results: Indirect county-level estimates ranged from 1.9-23.8%, with a weighted state average of 11.4%. The counties with the highest and lowest coverage estimates were Orange County, TX and Webb County, TX respectively. Significant correlations were observed between HPV vaccination and age, Hispanic ethnicity, and the percentage of uninsured at the county and public health region levels.

Conclusions: Small area analyses have been used in a variety of settings to assess a variety of health outcomes, and as shown in this study, can be used to highlight geographic disparities and opportunities for intervention in HPV vaccine coverage.

INTRODUCTION

The U.S. Food and Drug Administration (FDA) approved the use of Gardasil® (HPV4), a quadrivalent vaccine against four prevalent strains of human papillomavirus (HPV), for females 9-26 years old in June 2006 1. The Advisory Committee on Immunization Practices soon thereafter recommended routine vaccination of females aged 11-12 and catch-up vaccination of females aged 13-26 2. Since 2008, over 30 peer-reviewed articles have examined HPV vaccine uptake in the U.S. and other countries. Most have focused on adolescent females. Surveillance of young adult women has not kept pace, leaving gaps in our knowledge of uptake and its predictors in this population. Although national uptake is known (by 2007, 10% of women aged 18-26 had received ≥1 dose HPV4 3, 4), no studies to our knowledge have explored geographic variation in uptake among young adult women. This information is critical for 1) identifying areas with low vaccine uptake, 2) developing geographic-specific interventions to increase vaccine uptake, and 3) strategic resource allocation, program planning, and policy-making.

The purpose of this study was to describe the geographic distribution of HPV vaccine coverage in Texas. We applied a multilevel, small area model of HPV vaccine initiation using the 2008 Texas Behavioral Surveillance System (TX BRFSS) 5, 6 to provide county-level estimates of HPV vaccine coverage among females aged 18-26 years. Given the results of previous studies, we expected to find a negative association between age and HPV vaccination and a greater likelihood of vaccination among whites than among racial/ethnic minorities 3, 7, 8.

METHODS

Small area estimation (SAE) operates on the assumption that areas with the same characteristics will have similar outcomes. Thus, statistically we could borrow information from the population-based model to derive local estimates. Place-based random-effects are increasingly included in these population-based models to allow for location-specific patterns. In this study, we utilized multilevel (individual, county, and health service region (HSR)) SAE to derive county-level estimates of HPV vaccine coverage among Texas females aged 18-26. In Texas, there are 254 counties nested within 11 HSRs, which represent state-designated boundaries for the administration of public health services and resources. Hierarchical level data and a random intercept term were included to improve model fit and ensure the correct selection of group-level covariates and parameter estimates.

We used multiple data sources to facilitate our methodological approach. The individual-level dataset used to obtain the outcome (i.e., ever received ≥ 1 dose HPV4) and level 1 covariates (i.e., age, race/ethnicity, and educational attainment) was the 2008 TX BRFSS. The group-level covariates (i.e., county and HSR, where available) to be tested were obtained from the U.S. Census Bureau (percentage of uninsured adults aged 18-64 and percentage of total population in poverty), the Texas Cancer Registry (cervical cancer incidence rate), the Association of Religion Data Archives (evangelical religious adherence rate), and U.S. Office of Management & Budget (rurality index). The auxiliary dataset, which enumerates the population in each county by age, sex, and race/ethnicity, was obtained from the National Vital Statistic System 9. This dataset serves as the foundation for predicting vaccine coverage for both sampled and unsampled counties.

We constructed a series of increasingly complex, multilevel random-intercept logit models of HPV vaccination (ever received ≥1 dose HPV4, yes or no) in MLwiN Version 2.20 10. Adding covariates sequentially by level allows one to examine the contribution of covariate sets and how their addition changes the parameter estimates of the previous model. A total of 277 sampled women aged 18-26 from 61 Texas counties were included. Weights were incorporated at each level and scaled as recommended by Carle (Method A 11) and Goldstein 12. A variance component term was included at the county and HSR level to ensure the correct selection of covariates and the accuracy of their parameter values.

After fitting the empty model, we added all level 1 covariates to the model. Retaining them regardless of statistical significance, we then evaluated level 2 covariates one by one. County-level covariates with p-values ≤0.10 were retained for further examination. Next, we evaluated level 3 (HSR level) covariates one by one, retaining...
only those with p-values ≤0.10. First order marginal quasi-likelihood was used to estimate all models in MLwiN. The preliminary model included all level 1 covariates and statistically significant (p-value ≤0.05) group-level covariates. Because the individual-level educational attainment was not available in the auxiliary dataset, it was removed in the final model and later adjusted for at the county level, as suggested by Congdon. The regression coefficients for educational attainment from the preliminary model were used to calculate the weighted total of the regression coefficients in county j (i.e., variable \( L \)). This weighted total is used to adjust the county-level estimates by their respective educational characteristics in the simulation process described below.

Using the estimated regression coefficients and standard errors from the final model, we simulated 10,000 datasets for each regression coefficient from the normal distribution and applied them to the logit model to estimate the vaccination rate for each Race- and Age-specific group in county j (\( \text{RA}_j \)), adjusted for county j’s educational characteristics (multiplied by \( L \)). Subsequently, we calculated the mean and standard deviation of the 10,000 \( \text{RA}_j \) adjusted probabilities. To obtain summary estimates for each county, we took the population weighted mean of the 10,000 \( \text{RA}_j \) adjusted probabilities (technical documentation available upon request). Thus, we weighted the probability for each demographic subgroup by their respective population distribution in county j. HSR random effects were not estimated due to insignificant variability in the final model and were ignored in the simulations. County random effects were only estimated for the 61 sampled counties in the 2008 TX BRFSS (non-sampled counties were assigned the simulated mean value). Simulations were conducted using SAS Version 9.2.

**RESULTS**

In the TX BRFSS study population of 277 young women aged 18-26 years, the mean age was 22.7 years. Other demographic characteristics were as follows: 42.5% were non-Hispanic white, 8.3% were non-Hispanic black, 38.3% were Hispanic, 19.8% had less than a high school education, and 38.9% reported a lack of insurance. Compared to the state level estimates obtained from U.S. Census Bureau, BRFSS demographic estimates were similar.

In 2008, 12.0% (95% CI: 6.2, 17.7) of Texas women aged 18-26 reported having ever received at least one dose of HPV4 (direct estimation from the 2008 TX BRFSS). At the county-level, indirect estimates ranged from 1.9-23.8% (Figure 1; county-specific estimates available upon request). Aggregated to the state level, we obtained a population weighted average of 11.4% (95% CI: 10.3, 12.5), a value which, as expected, lies within the confidence interval of the direct estimate of HPV vaccine coverage in Texas. The county with the lowest vaccine coverage (Webb) was about 10 percent lower than the direct state estimate, while the county with the highest vaccine coverage (Orange) was about 12 percent higher than the direct state estimate.

Although the purpose of model-based SAE is to provide small area estimates, model results are also important because they contribute to the formulation of the indirect estimates. Table 1 provides the results of the series of increasingly-complex multilevel models previously described. Compared to non-Hispanic whites, Hispanics...
were significantly more likely to be vaccinated against HPV (OR = 1.83, 95% CI: 1.35, 2.46). For age, we found an inverse association (OR = 0.80, 95% CI: 0.66, 0.95), indicating that the odds of receiving ≥1 dose HPV4 decreased with increasing age. This association was consistent across all models. Among tested group-level covariates, we found significant inverse associations between county- and HSR-level lack of insurance and HPV vaccination. The statistical significance and relative effect size of these covariates (i.e., age, Hispanic ethnicity, and county- and HSR-level lack of insurance) did not change with the removal of education from the final model.

**DISCUSSION**

County-level estimates of HPV vaccine coverage among women aged 18-26 varied from 1.9-23.8% (Figure 1), with a population weighted state average of 11.4%. In this study, Hispanic women were more likely to be vaccinated against HPV than their White counterparts. This relationship was not found in other studies conducted nationally or in other regions, which suggests either fundamental differences in the characteristics of Hispanics living in Texas versus other regions or conversely, better education and outreach initiatives targeting these individuals. In previous studies done by JME, Hispanic ethnicity was also a significant correlate among adolescent Texas females. The group-level covariates of importance differed, however. For example, county-level poverty was strongly and positively associated with vaccination in adolescent females, but not in young adult women. We suspect this is because high poverty counties have a large proportion of low income families, and income is inversely associated with eligibility for publicly-financed health insurance and services for children and adolescents. Through these publicly-funded programs (e.g., Children’s Health Insurance Program and Vaccines for Children), children and adolescents whose families meet certain income limits can received free or low cost vaccines including HPV4. Given that women aged 18 years and older are generally not covered by these programs, it is not surprising that county-level poverty does not equate to greater likelihood of HPV vaccination in this age group. Insurance coverage, on the other hand, may be very important for young women aged 18 years and older given the high cost of the vaccine series (currently $360 for 3 doses). Our research supports this association, although we were only able to include insurance coverage at the county level. Additional factors such as awareness of and access to Merck’s Vaccine Patient Assistance Program and other financing options (e.g., under/uninsured young women can receive HPV4 from Federally Qualified Health Centers or Family Planning Clinics in Texas) may also be important, although these variables were not available for examination in our sample. Due to the self-reported nature of the survey used in this study, it is possible that the data are subject to recall bias. We should also note that our primary outcome, initiation of the HPV vaccine, is only a preliminary measure of vaccine coverage; future studies should use more current data to examine estimates of vaccine completion at the county-level. Finally, the seemingly contradictory finding that Hispanic ethnicity is positively associated with vaccination, while many border counties with large Hispanic populations have low vaccination rates is likely due to the strong influence of insurance coverage in the model.

Small sample size and privacy concerns often plague local health studies. Through the application of model-based SAE to survey data on HPV vaccination, we have shown how local health statistics can be derived and discussed their potential uses for both research and public health surveillance and control activities. In this study, we utilized a multilevel SAE framework to highlight geographic disparities and opportunities for intervention in HPV vaccine coverage among young women aged 18-26. This outcome is particularly well-suited for small area analysis because 1) receipt of the HPV vaccine and documentation of vaccination status are not required by most states

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**Table 1:** Random-intercept logit model of HPV vaccination (≥1 dose HPV4) among young women, aged 18-26: Texas, 2008

<table>
<thead>
<tr>
<th>Model Parameters</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
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<tr>
<td>Fixed Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.13</td>
<td>0.04</td>
<td>2.63</td>
<td>23.59</td>
<td>46.85</td>
</tr>
<tr>
<td></td>
<td>(0.09, 0.20)</td>
<td>(0.01, 0.14)</td>
<td>(1.11, 60.76)</td>
<td>(1.49, 374.13)</td>
<td>(4.18, 525.15)</td>
</tr>
<tr>
<td>Mean Centered Age</td>
<td>0.78</td>
<td>0.78</td>
<td>0.78</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.64, 0.95)</td>
<td>(0.66, 0.94)</td>
<td>(0.65, 0.94)</td>
<td>(0.66, 0.95)</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic black</td>
<td>1.59</td>
<td>1.87</td>
<td>1.86</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.57, 4.48)</td>
<td>(0.44, 8.11)</td>
<td>(0.51, 6.74)</td>
<td>(0.40, 5.95)</td>
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<td>Hispanic</td>
<td>1.53</td>
<td>2.08</td>
<td>1.95</td>
<td>1.83</td>
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<tr>
<td></td>
<td>(1.00, 2.35)</td>
<td>(0.84, 5.17)</td>
<td>(1.39, 2.72)</td>
<td>(1.35, 2.46)</td>
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</tr>
<tr>
<td>Other races</td>
<td>0.58</td>
<td>0.95</td>
<td>0.90</td>
<td>1.15</td>
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<tr>
<td></td>
<td>(0.18, 1.85)</td>
<td>(0.13, 7.00)</td>
<td>(0.37, 2.14)</td>
<td>(0.44, 2.98)</td>
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<td>Ref</td>
<td>Ref</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS graduate</td>
<td>1.87</td>
<td>1.81</td>
<td>1.88</td>
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</tr>
<tr>
<td></td>
<td>(0.71, 4.94)</td>
<td>(0.46, 7.15)</td>
<td>(0.68, 5.21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college or more</td>
<td>2.96</td>
<td>2.58</td>
<td>2.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.22, 7.16)</td>
<td>(0.68, 9.82)</td>
<td>(1.09, 6.47)</td>
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<td></td>
</tr>
<tr>
<td>Lack of insurance</td>
<td>0.86</td>
<td>0.87</td>
<td>0.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(County)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of insurance</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(HSR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Footnote:
1. HS = High School
(including Texas) making it difficult to accurately estimate HPV vaccine coverage in local areas, 2) geographic variation in adolescent vaccine coverage has been documented in recent studies16,18, and 3) interest in increasing HPV vaccine uptake through local advocacy efforts, health education programs, and policies is on the rise. Although our study showed county-level differences in HPV vaccine coverage, even the county with the highest estimate had <25% of women aged 18-26 initiating HPV4, indicating that state-level policies might be more effective at bringing up coverage across the board. We propose that future small area studies on HPV vaccination examine the sensitivity of other modeling strategies in estimating county HPV vaccine coverage, estimate county HPV vaccine coverage among males, who can now receive the vaccine19, and assess whether coverage is increasing over time.

Acknowledgements

Dr. Jan M. Eberth was the recipient of two National Cancer Institute fellowships during the course of this study: the Cancer Education and Career Development Pre-doctoral Fellowship (R25-CA957712, Patricia Dolan-Mullen, PhD, Principal Investigator) and the Cancer Prevention Training Program (R25-CA57730, Shine Chang, PhD, Principal Investigator). Additionally, we acknowledge support from the National Institutes of Health MD Anderson Cancer Center Support Grant (CA4016672, Ronald DePinho, MD, Principal Investigator). The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Cancer Institute, the National Institutes of Health, or the Centers for Disease Control and Prevention. Gardasil® is a registered trademark of Merck & Co., Inc.

REFERENCES

In 2012, well over half a million Americans are expected to die of cancer, more than 1,500 people a day. Cancer is the second most common cause of death in the US, exceeded only by heart disease and accounting for nearly 1 of every 4 deaths. Although survival statistics vary by cancer type and stage at diagnosis, the 5-year relative survival rate for all cancers diagnosed between 2001 and 2007 is 67%.

Unfortunately, many Americans do not receive the cancer care they need. People may receive care too late or without regard for treatment preferences or values. Differences in age, ethnicity, income, insurance status, and geographic area may influence how much cancer affects a certain group, how many people get cancer or how often cancer causes death. Health disparities may also be due to differences in access to care, provider biases, poor provider-patient communication, or poor health literacy.

Making care safer and intervening to reduce health disparities is a difficult mission. It will take the collective and coordinated actions of providers, policy makers, educators and researchers to reduce the burden of cancer in Texas. To reduce overall cancer incidence and mortality, we must promote healthier lifestyles, increase early detection, and help reduce inequalities for those groups at greatest risk. Safety-net health systems must be committed to offering health care for those with limited or no access by providing service excellence for eligible patients. Aside from inpatient and ambulatory services, community services are essential to reduce cancer incidence and mortality.

The provision of cancer care depends on community needs, research and best practices. The Partnership Network for Prevention and Control and numerous community partners are developing and implementing innovative, evidence-based strategies to deliver high quality, patient centered cancer interventions. These comprehensive programs include a continuum of services and system changes to provide patient education, clinical workflow improvements, patient social and emotional support, behavior modification, outreach, navigation and delivery of cancer prevention and screenings services. Projects are enhanced by collaborations that bring together health care providers from and around South Texas to work to prevent and control cancer. By promoting cancer prevention programs, “The Partnership” aims to create positive lifestyle and behavior changes to ultimately reduce cancer incidence and mortality in residents of South Texas. The following summary describes one example of such a program that is between University Health Systems (UHS) and University of Texas Health Science Center in San Antonio (UTHSCSA) which is focusing on reducing barriers for cervical, breast and colorectal cancer prevention and screening through 6 cancer prevention program awards funded by the state agency, Cancer Prevention & Research Institute of Texas (CPRIT). Programs include open-access scheduling of screening services to eliminate institutional barriers including physician referrals and long appointment wait times. Work and transportation related barriers are addressed by extending both clinic hours and cancer screening services to clinics in close proximity to patients’ homes. Social and emotional barriers are addressed by employing behavior change strategies including social cognitive theory, behavioral journalism and outreach techniques to frame community based participatory planning, tailored communica-

tion and motivational interviewing.

Cervical Cancer Prevention

From March 2010 through February 2012, UHS implemented our first innovative cervical cancer prevention program. Using a proven health prevention and education model, the A Su Salud Cervical Cancer Prevention Program combined mass media with interpersonal communication to successfully promote Pap test screening. The program focused on CareLink women ages 18 to 64; CareLink is UHS’ financial assistance program for uninsured Bexar County residents. Activities included dissemination of tailored print materials in English and Spanish, mass media messages via Spanish television news, social media public service announcements, targeted client reminders and persuasive communication using text messaging, automated telephone reminders, and bilingual community outreach.

During the 2 year program, 8,039 women received Pap Tests increasing the post intervention cervical cancer screening rate for a cohort of 32,807 CareLink women from 33% to 42%, a 9% increase. Program impact was evaluated based on relative risk. Women in the cohort were categorized into risk groups based on time since last Pap test at the start of the program. High risk included women without a Pap test 5 or more years; average risk included those with a Pap test within 3-5 years and low risk, no Pap test within 3 years. By the end of the program, the number of women in the high and average risk groups decreased by 13% and 10% respectively from baseline and the number of women in the low risk group increased by 26% from baseline.

Table 1: Program Impact Summary by Risk Group summarizes the net effect of migration between risk groups based on pap risk status.

The percent change from baseline indicates a fair amount of activity between groups, and suggests the program was effective for women in the high and average risk groups. This is further illustrated in Figure 2: Program Migration of Women between Risk Groups. The right side of the figure shows the total number of women in each group at baseline and the left side shows the totals post intervention. During the intervention (middle column) each group splits into the total number of women receiving Pap Tests (highlighted gray) and those who did not (no highlight).

Leveraging resources and lessons learned from our initial CPRIT award for cervical cancer prevention, we developed a more comprehensive, community-based program to implement health promotion and primary and secondary prevention of cervical cancer. The UHS Cervical Cancer Prevention Program includes mass media health promotion, outreach, patient navigation, open-access scheduling, Pap test screening and HPV vaccine services. It is designed to address multiple barriers unique to Hispanic women to receive HPV vaccinations and complete cervical screening to reduce cervical cancer incidence and mortality. HPV vaccination messages are aimed at parents of 9–18 year olds and uninsured women ages 19-26 years. Cervical cancer screening health promotion messages are aimed at women ages 18-64. Health promotion activities, including mass media, print and social media are underway. Patients are now being navigated and scheduled into Pap test screenings and HPV vaccination services.
Breast Cancer Prevention

Constant and sustained early detection efforts are vital to continue the downward trend in cancer deaths. In women, screening tests can help detect breast and cervical cancers in early stages. Using patient navigation and one-on-one education, the UHS Mammography Utilization Program targeted women age 50-64 who attended UHS clinics. This in-reach effort focused on breast cancer screening services. The program was integrated into our existing breast health services and allowed us to optimize funding from multiple sources to provide both screening and diagnostic mammograms to uninsured women. The program increased mammography screening by 50% system-wide and led to a documented, standardized process for diagnostic and cancer treatment support services. In addition, the development of our breast health services infrastructure and recent funding from CPRIT allowed us to expand our breast cancer prevention program to our highest need women in Bexar County.

The highest breast cancer incidence and mortality rates, and consequently late stage diagnoses, occur in 6 Bexar County urban zip codes. Most residents in these zip codes are eligible for subsidized health care based on poverty levels. Poor breast health outcomes indicate multiple barriers to screening other than proximity to care and funding. Building on previous outcomes, the strategy of the newly-awarded A Su Salud Breast Health Program is to create positive changes in lifestyle and personal behaviors that will increase breast cancer screening and reduce breast cancer incidence and mortality rates in Bexar County metropolitan areas who share economic, cultural and institutional barriers to health care. Specific aims of the program are to: 1) increase breast cancer screening rates in uninsured and underinsured minority women age 40 and older, 2) improve screening access in areas of Bexar County with a high risk of breast cancer, 3) increase community awareness of screenings and the need for social and family support, and 4) develop a sustainable, comprehensive, institutional commitment to breast cancer prevention programming.

In 2011, UHS expanded its breast health program to the community by investing in a mobile mammography coach, the Healthy U Express. Local agencies are eligible for screening events and women can obtain a mammogram without visiting their doctor for a written referral, unless required by their insurance company. The minimal time a mobile mammogram takes to complete is 15–20 minutes, including registration. This allows women to minimize their time away from work. UHS uses digital mammography equipment with direct capture so images are available within seconds after being taken. This full-field digital system delivers high contrast images for accurate diagnoses. If the screening mammogram shows something that needs attention, follow-up diagnostic appointments are immediately available, can be scheduled at the woman’s convenience or as allowed by the insurance company. We expect the mobile mammography to have a significant impact on breast cancer screening rates especially for working women where transportation and time away from work are major barriers to obtaining a mammogram.

UHS has a history as a primary source of breast cancer services for women in our community. For 25 years, UHS has been the Breast and Cervical Cancer Services Client Services (BCCS) Contracting Unit with Texas Department of State Health Services. BCCS provides breast cancer screening and diagnostic services, including case management for uninsured women of Bexar County. BCCS offers clinical breast examinations, mammograms, pelvic examinations and Pap tests at little to no cost for uninsured patients. This CDC funded breast cancer screening program has been in place for several years, and the success rate is excellent.

### Table 1: Program Impact Summary by Risk Group

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Baseline</th>
<th>Post Intervention</th>
<th>% Change From Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk</td>
<td>18,887</td>
<td>16,362</td>
<td>-13%</td>
</tr>
<tr>
<td>Average Risk</td>
<td>3,073</td>
<td>2,774</td>
<td>-10%</td>
</tr>
<tr>
<td>Low Risk</td>
<td>10,847</td>
<td>13,671</td>
<td>+26%</td>
</tr>
<tr>
<td>Total</td>
<td>32,807</td>
<td>32,807</td>
<td></td>
</tr>
</tbody>
</table>

### Figure 2: Program Migration of Women between Risk Groups

TPHA Journal  Volume 65, Issue 1
program is essential to cover comprehensive breast cancer prevention services. UHS manages BCCS services with other funding sources such as CPRIT, Susan G. Komen for the Cure, and Medicaid to provide comprehensive screening, diagnostic and cancer treatment services for uninsured patients in need.

Colorectal Cancer Prevention
Hispanics suffer from both high incidence and high mortality when compared to Texas state rates of colorectal cancer (CRC). Higher mortality indicates late screening, which often leads to late stage diagnosis and premature death. The A Su Salud Colorectal Cancer Education, Outreach and Health Promotion Program targets over 22,000 people 50 years and older in Bexar County. This program seeks to increase CRC screening and decrease the number of patients diagnosed with advanced cancer through early detection and timely referrals to treatment. Formative research consisted of bilingual focus group interviews to uncover knowledge about CRC, CRC screening and perceived barriers specific to the community. Information from this research was used to develop tailored messages targeting our Hispanic community and their personal networks, encouraging CRC screening.

Program components include mass media consisting of bilingual public service announcements available through social media and small media including newsletters and billing inserts. Each insert contains a reminder to obtain screening with instructions to call to obtain a colonoscopy. In addition, we conducted automated telephone calls to ask recipients to call their doctor or the A Su Salud line for more information. “Claudia,” our bilingual virtual patient navigator answers calls while providing culturally competent CRC screening education, information and appointment scheduling.

From January 2006 to August 2010, only 16% of Hispanic men 50 and older at UHS were screened for CRC. The impact of low screening rates and elevated CRC incidence and mortality for adult Hispanic men in Bexar County is magnified by the fact that they represent over 25% of the total population.1 UHS is making the screening process easier and more affordable by giving patients the emotional, social and logistical support they need to complete a colonoscopy. The UHS Colorectal Cancer Screening Male Navigation Program activities are targeted to at-risk men. The program provides: open-access endoscopy scheduling, patient navigation, one-on-one patient education, transportation to and from screening appointments and colonoscopy services provided by bilingual, Hispanic, qualified specialists. Since fall 2011, this program has achieved a 37% successful screening rate by navigating over 230 men through the screening process.

Summary
Culturally sensitive efforts toward the prevention and early detection of cancer are fundamental to the reduction of cancer deaths among Hispanics. UHS recently assessed the cultural and linguistic competence of its outpatient environment. Leadership at both the senior staff level and board of managers is ethnically representative of the local community and committed to pursuing activities at all levels to achieve patient-centered care. Our workforce is ethnically and racially diverse, especially medical leadership in primary care settings. There is growing community awareness and local support, as evidenced in educational course offerings, training opportunities and extramural grant funding to foster UHS’ organizational commitment to become a more culturally and linguistically competent health care organization. These strengths enable us to continue meeting the needs of our community.

Cancer health is and will always remain a priority for UHS professionals, board, leadership and staff. Our commitment to cancer prevention is confirmed through our UHS Cancer Committee represented by Departments of Surgery, Radiology, Pathology, Medical Oncology, Radiation Oncology, Pain/Palliative Care, Cancer Liaison, Orthopaedics, Hospital Administration (Cancer Program Administrator), Patient Care Service (Oncology), Social Work, Tumor Registry, Quality/Risk Management and Research. As UHS continues to develop and maintain these evidence-based programs, we advance cancer prevention and reduce the risks of developing cancer in vulnerable populations. Ultimately, we aim to reduce cancer incidence and mortality and improve the lives of the people of Bexar County and South Texas.

Acknowledgments
We wish to acknowledge the Cancer Prevention & Research Institute of Texas for program funding.

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