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Original Research

Individual- and county-level predictors of cervical cancer screening: a multi-level analysis

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ABSTRACT

Objectives: Despite the gains in cervical cancer screening, there remain persistent socio-economic, geographical, racial, and ethnic disparities. This study examines the combined effect of individual- and county-level characteristics on the use of cervical cancer screening tests such as Papanicolaou (Pap) tests in Texas.

Study design: Cross-sectional study.

Methods: Individual-level information was obtained from 2014–2015 Texas Behavioral Risk Factor Surveillance System (BRFSS). Using the county of residence of the study population, the BRFSS data were linked to the American Community Survey (2010–2014) and the Area Health Resources File (2015). Women aged between 21 and 65 years, with no history of hysterectomy, and residing in 47 counties in Texas were included in the study ($n = 4276$). Multi-level logistic regression was used to assess the independent influences of individual- and county-level covariates on receipt of a Pap test in the past 3 years.

Results: The odds of timely Pap testing were lower among women aged greater than 50 years, single women, and those with low education and income (<\$25,000). Black women who reside in counties with higher percentages of Hispanics (quartile 4) were less likely to be screened compared with black women living in counties with a low Hispanic population (adjusted odds ratio [OR] = 0.08 [95% confidence interval [CI]: 0.02–0.37]). County-level socio-economic status, although associated with timely screening in bivariate analysis, was not a significant predictor of screening after controlling for individual characteristics.

Conclusions: There are significant disparities in the uptake of cervical cancer screening across Texas counties. Individual-level socio-economic disparities as well as the number of obstetric-gynecologic physicians in a county are predictors of these disparities.

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Introduction

Over the past 4 decades, the incidence of cervical cancer and rates of associated mortality have declined steadily in the United States. Incidence rates have dropped by more than 50 percent, from 17.2 cases per 100,000 women in 1973 to 7.6 cases in 2013.¹ Mortality rates associated with cervical cancer have also declined significantly over the past five decades, from 13.1 deaths per 100,000 women in 1950 to 2.3 deaths in 2014.^{1,2} These positive gains have been attributed to increased use of cervical cancer screening tests, such as the Papanicolaou (Pap) test, which increases the likelihood of earlier diagnosis, treatment, and survival.³ The US Preventive Task Force (USPTF) recommends that women aged between 21 and 65 years obtain a Pap test every 3 years.⁴ However, it has been shown that Pap testing varies considerably by age, race and ethnicity, socio-economic status (SES), education, and health insurance status.^{5–9}

In addition to individual-level characteristics, one's residential cultural environment and local health system capacity, including work force also influences adherence to screening guidelines.^{10–14} Across the United States, the southern region of the United States has a higher cervical cancer incidence (8.5 per 100,000), and death rate (2.7 per 100,000) compared to other regions.¹⁵ In terms of Pap testing, Texas ranks near the bottom (48th), for Pap test screening uptake, with an overall screening rate of just 77.7% of all women who should have been screened in 2014. This is 4.7% below the national average of 82.6%.¹⁶ Texas women also are shown to be among the very highest in diagnosed cervical cancer in the US, with an age-adjusted incidence rate of 8.3 per 100,000 population in 2013, compared to the national average of 7.5 per 100,000 women for the same year.¹⁷

Texas, like many states, has been experiencing a flux of policy changes since the passage of the Affordable Care Act in 2010, which have adversely affected access to women's health services. In 2011, the Texas legislature issued an 'Affiliate Ban Rule,' which prohibited organizations performing abortions, including all Planned Parenthood affiliated clinics, from participating in the 1115 Medicaid Waiver program that provided certain women's health services.¹⁸ As a result, the Centers for Medicare and Medicaid Services (CMS) revoked the federal waiver citing the 'freedom of choice' policy which permits Medicaid beneficiaries the option of getting their care from any participating Medicaid provider.¹⁸ This forced Texas to transition from a combined state and federally funded Medicaid Waiver program to state-only funding without any federal support for women's health services from Medicaid.¹⁸ The state-funded family planning program, called 'The Texas Women's Health Program' replaced the CMS Medicaid family planning program in 2013 but offers only a limited scope of services for women aged between 15 and 44 years.¹⁹ This policy change has created additional challenges for low-income women to access cervical cancer screening.

While the literature has reported troubling findings related to lower rates of Pap testing and higher incidence and mortality associated with cervical cancer in Texas, there is no published literature exploring whether there might be variations in geographical, socio-economic, or work-force shortage-related

patterns of Pap testing. If such disparities exist, then factors associated with these disparities, whether at the individual or county level, will help policy-makers in directly addressing factors associated with suboptimal cervical cancer screening use. This study adds to the contextual analysis of health literature by examining variations in the use of cervical cancer screening within the Texas population and the combined associations between individual- and county-level characteristics and uptake of Pap testing in Texas.

Methods

Sample selection and survey administration

We used data from the 2014 and 2015 Texas Behavioral Risk Factor Surveillance System (BRFSS) survey for this study. The BRFSS is a cross-sectional telephone survey consisting of both landline and cellular phone respondents, sponsored by the Centers for Disease Control and Prevention (CDC). To ensure a representative sample, multistage cluster sampling, and random digit dialing are used to survey non-institutionalized US civilians who are 18 years or older. Weighting is used to account for the differences in the probability of selection, non-response bias, non-coverage, and overlapping sample frames. The estimated response rate for the Texas BRFSS was 35.4% for 2014 and 34.4% for 2015. The response rate is the percent of complete or partial interviews out of the entire eligible sample. Although lower than the national average response rates for BRFSS (45.8% in 2014 and 47.1% in 2015), the data are considered appropriate for cross-sectional sampling. The validity and reliability testing of the BRFSS survey supports the utility of the data.²⁰

Cross-sectional data were pooled across 2014 and 2015 survey periods to increase the sample size for analysis. Based on USPTF recommendations, we restricted our inclusion criteria to women aged between 21 and 65 years, who had not had a hysterectomy (Fig. 1). There were 18,064 women in the survey, of which 5418 met the criteria. Of the subset sample, 1142 women did not report their county of residence, and thus their information could not be linked to a county, and 53 women had no information on Pap testing. This resulted in a final sample of 4276 women residing in 47 counties.

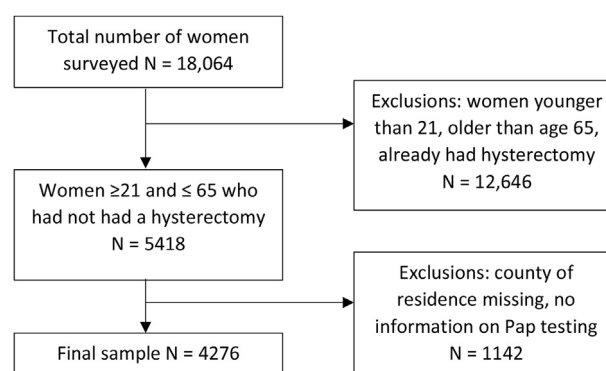


Fig. 1 – Inclusion criteria flowchart.

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