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RESEARCH BRIEF

Cervical Cancer Death Rates Among U.S.- and Foreign-Born Women: U.S., 2005–2014

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Introduction: Historically, foreign-born women in the U.S. are less likely to be screened and are more likely to die from cervical cancer when compared with their U.S.-born counterparts. In order to inform prevention efforts and reduce this health disparity, mortality data were obtained from the National Center for Health Statistics to describe cervical cancer mortality among U.S.- and foreign-born women.

Methods: Annual population estimates were obtained from the U.S. Census Bureau's American Community Survey from 2005 to 2014. From 2017 to 2018, age-adjusted mortality rates and rate ratios were calculated by nativity status, race/ethnicity, age, geographic region, and country of birth.

Results: From 2005 to 2014, a total of 5,924 deaths from cervical cancer were recorded among the foreign-born population, compared with 33,893 deaths among U.S.-born women. Overall, foreign-born women had a lower cervical cancer mortality rate when compared with the U.S.-born women (rate ratio=0.95, 95% CI=0.92, 0.97). However, older foreign-born women had significantly higher mortality rates compared with U.S.-born women: aged 65–79 years (rate ratio=1.15, 95% CI=1.09, 1.22) and ≥80 years (rate ratio=1.43, 95% CI=1.32, 1.55). Women born in Mexico had significantly elevated rates of cervical cancer mortality (rate ratio=1.35, 95% CI=1.27, 1.42) when compared with U.S.-born women.

Conclusions: Efforts that work to increase cervical cancer screening access and guideline compliance might further reduce the cervical cancer deaths in the U.S., and the excess burden observed among older foreign-born women.

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INTRODUCTION

An estimated 266,000 deaths are attributed to cervical cancer worldwide annually, with a majority (87%) occurring in developing countries.[1] With the introduction of the Pap test and improvements in treatment, cervical cancer deaths in the U.S. have steadily declined from approximately 9,400 deaths occurring in 1970 to 4,115 deaths in 2014.[2,3] Despite declining mortality rates, health disparities persist. Foreign-born individuals are more likely to be uninsured, have lower educational attainment, limited English proficiency, and have incomes below the poverty line when compared with U.S.-born individuals.[4,5] Potentially because of these factors, foreign-born individuals have a lower uptake of cervical cancer screening,[4–6] and historically are more likely to die from cervical cancer when compared with their U.S.-born counterparts.[4,5,7,8] In order to inform prevention efforts and reduce this health disparity, the authors analyzed data from 2005 to 2014 to describe cervical cancer mortality rates among foreign- and U.S.-born women.

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METHODS

Population-based mortality data from 2005 to 2014 were obtained from the National Center for Health Statistics (NCHS) for the 50 states and the District of Columbia. NCHS collects demographic, place of birth, and cause of death information from death certificate files in each state. Birthplace is assigned by NCHS as one of the 50 states, the District of Columbia, Puerto Rico, Virgin Islands, Guam, Northern Mariana Islands, American Samoa, Canada, Cuba, Mexico, or the "remainder of the world." U.S. born was defined as those born in one of the 50 states, the District of Columbia, or the U.S. territories. Foreign born was defined as those with other recorded places of birth. Cases with no recorded place of birth (1.1%) were excluded from all analyses.[9] Deaths for cervical cancer were selected using the ICD-10 code C53.

Annual population estimates were obtained from the U.S. Census Bureau's American Community Survey. Annual American Community Survey public-use microdata sample files were used to estimate the U.S.- and foreign-born populations by age, race/ethnicity, sex, and Census region.

From 2017 to 2018, mortality data and population estimates for 2005–2014 were formatted using the Surveillance Epidemiology End Results Program SEER*Prep[10] software, version 2.4.6, to create a SEER*Stat database.[11] Age-adjusted cancer mortality rates were calculated adjusting to the 2000 U.S. standard population. SEER*Stat (version 8.3.5) was used to calculate mortality rate ratios (RRs) by nativity status, age, race/ethnicity, and geographic location. The average annual percentage change (AAPC) of cancer mortality rates from 2005 to 2014 by nativity status, race/ethnicity, and age was calculated using Joinpoint, version 4.6.0.0.

RESULTS

From 2005 to 2014, a total of 5,924 deaths from cervical cancer were recorded among the foreign-born women, compared with 33,893 deaths among U.S.-born women. Differences in cervical cancer mortality rates by birthplace, age, race/ethnicity, geographic location, and country of birth are displayed in Table 1. Foreign-born women had lower cervical cancer mortality rates when compared with the U.S.-born population (RR=0.95, 95% CI=0.92, 0.97). Overall, cervical cancer mortality rates significantly decreased during the study period (AAPC= −0.87, 95% CI= −1.56, −0.18). When stratified by birthplace, a significant decline in cervical cancer mortality was observed among foreign-born women (AAPC= −1.68, 95% CI= −2.53, −0.82) but not among U.S.-born women (AAPC= −0.67, 95% CI= −1.43, 0.09).

Stratified by age, foreign-born women had similar or lower cervical cancer mortality rates among women aged <65 years compared with their U.S. counterparts. Foreign-born women aged 65–79 years (RR=1.15, 95% CI=1.09, 1.22) and ≥80 years (RR=1.43, 95% CI=1.32, 1.55), however, had significantly higher cervical cancer mortality rates when compared with the U.S.-born population (Table 1, Figure 1). By age, significant declines in cervical cancer mortality were observed for foreign-born women aged 35–64 years, whereas significant declines were observed in the U.S.-born population among women aged ≥65 years (Figure 1). When stratified by race/ethnic group, foreign-born women had similar or lower cervical cancer mortality rates across all races/ethnicities (Figure 2). Of note, non-Hispanic black and Hispanic women had the highest cervical cancer mortality rates among the U.S.- and foreign-born populations.

Comparing cervical cancer mortality rates for women born in Canada, Cuba, Mexico, and the remainder of the world to U.S.-born women, women born in Mexico had significantly elevated rates of cervical cancer mortality (RR=1.35, 95% CI=1.27, 1.42), with no elevation of mortality rates observed among women born in other areas (Table 1).

DISCUSSION

For the first time since the 1980s, foreign-born women in the U.S. had lower cervical cancer mortality rates than U.S.-born women overall.[4,5,7,8] However, higher cervical cancer mortality rates were observed among select groups: older foreign-born women and those born in Mexico. When analyzing overall trends by birthplace, cervical cancer mortality rates significantly declined among the foreign-born women, with no significant changes observed among U.S.-born women. Although previous studies have found higher rates of cervical cancer mortality among foreign-born women overall, and particularly among Asian/Pacific Islanders and Hispanics, this was not observed in this study.[4,5,7,8] The findings in this study are likely explained by a combination of factors, including global improvements in cervical cancer screening[12] and long-term changes in immigration policies and patterns that have favored the entry of people from higher SES who have more favorable health profiles.[5,7] The latter dynamic may be particularly pertinent for Asians and Pacific Islanders. During the period of time covered by the data in this analysis, individuals from Asia were by far the largest group entering the U.S. through skill-based programs such as the H-1B process.[13]

The higher mortality rates observed among older foreign-born women could potentially be attributed to differences in cervical cancer screening uptake. Currently, the U.S. Preventive Service Task Force recommends that women aged 21–65 years be screened every 3 years with

Table 1. Cervical Cancer Mortality Rates in the U.S. by Nativity Status: 2005–2014[a]

Characteristics	U.S.-born			Foreign-born			Rate ratio[c] (95% CI)
	Cases, *n*	Person-years of observation	Average annual rate (95% CI)[b]	Cases, *n*	Person-years of observation	Average annual rate (95% CI)[b]	
Overall[d]	33,893	1,348,844,831	2.35 (2.33, 2.38)	5,924	210,619,585	2.23 (2.17, 2.29)	**0.95 (0.92, 0.97)**
Age, years							
<35	1,758	638,618,052	0.31 (0.29, 0.32)	220	72,079,064	0.16 (0.14, 0.19)	**0.51 (0.45, 0.62)**
35–49	8,755	258,475,560	3.32 (3.25, 3.39)	1,493	65,091,638	2.30 (2.18, 2.42)	**0.69 (0.66, 0.73)**
50–64	11,877	251,520,595	4.70 (4.62, 4.79)	2,100	43,407,675	4.82 (4.62, 5.03)	1.03 (0.98, 1.07)
65–79	7,441	137,308,777	5.42 (5.30, 5.55)	1,360	21,904,936	6.25 (5.92, 6.59)	**1.15 (1.09, 1.22)**
≥80	4,062	62,921,847	6.43 (6.23, 6.63)	751	8,136,272	9.19 (8.55, 9.87)	**1.43 (1.32, 1.55)**
Race/ethnicity							
Non-Hispanic white	23,928	955,956,571	2.07 (2.04, 2.10)	1,412	47,470,908	1.87 (1.77, 1.98)	**0.90 (0.85, 0.96)**
Non-Hispanic black	7,172	179,759,474	4.24 (4.15, 4.34)	591	16,626,125	3.42 (3.14, 3.73)	**0.81 (0.74, 0.88)**
Non-Hispanic API	190	23,347,274	1.91 (1.64, 2.21)	1,275	53,237,644	1.92 (1.81, 2.04)	1.01 (0.86, 1.19)
Hispanic	2,217	151,323,551	2.85 (2.73, 2.97)	2,634	89,046,883	2.71 (2.60, 2.82)	0.95 (0.90, 1.01)
Regions of the U.S.							
Northeast	5,726	237,191,206	2.13 (2.07, 2.18)	1,203	46,059,361	1.92 (1.82, 2.04)	**0.91 (0.85, 0.97)**
South	14,815	512,513,036	2.72 (2.67, 2.76)	1,851	66,119,864	2.33 (2.22, 2.44)	**0.86 (0.82, 0.90)**
West	5,651	283,903,676	2.03 (1.97, 2.08)	2,281	74,936,141	2.35 (2.26, 2.46)	**1.16 (1.10, 1.22)**
Midwest	7,701	315,236,913	2.21 (2.16, 2.26)	589	23,504,219	2.15 (1.98, 2.34)	0.97 (0.89, 1.06)
Country of birth[e]							
U.S.	33,893	1,348,844,831	2.35 (2.33, 2.38)	—	—	—	ref
Canada	—	—	—	126	5,175,633	1.47 (1.20, 1.87)	**0.62 (0.51, 0.79)**
Mexico	—	—	—	1,603	53,688,734	3.17 (3.00, 3.25)	**1.35 (1.27, 1.42)**
Cuba	—	—	—	193	5,369,753	2.17 (1.84, 2.85)	0.92 (0.78, 1.21)
Remainder of the world	—	—	—	4,002	146,385,465	2.06 (2.00, 2.13)	**0.88 (0.85, 0.91)**

Source: National Vital Statistics System, mortality files.
Note: Boldface indicates statistical significance ($p<0.05$).
[a]Cervical cancer deaths were defined by underlying cause of death using ICD-10 code C53.
[b]Rates are age-adjusted to 2000 standard U.S. population and shown per 100,000.
[c]U.S.-born were used as a reference group to generate rate ratios.
[d]Columns may not sum to total because of missing values.
[e]Birthplace is assigned by NCHS as one of the 50 states, the District of Columbia, Puerto Rico, Virgin Islands, Guam, Northern Mariana Islands, American Samoa, Canada, Cuba, Mexico, or the "remainder of the world."
API, Asian and Pacific Islander.

a Pap smear, or for women aged 30–65 years to be screened with a Pap smear and a human papillomavirus (HPV) test every 5 years.[14] Screening should end at age 65 years only if women have been adequately screened (three consecutive negative Pap smears or two consecutive negative HPV tests) in the last 10 years.[14] It has

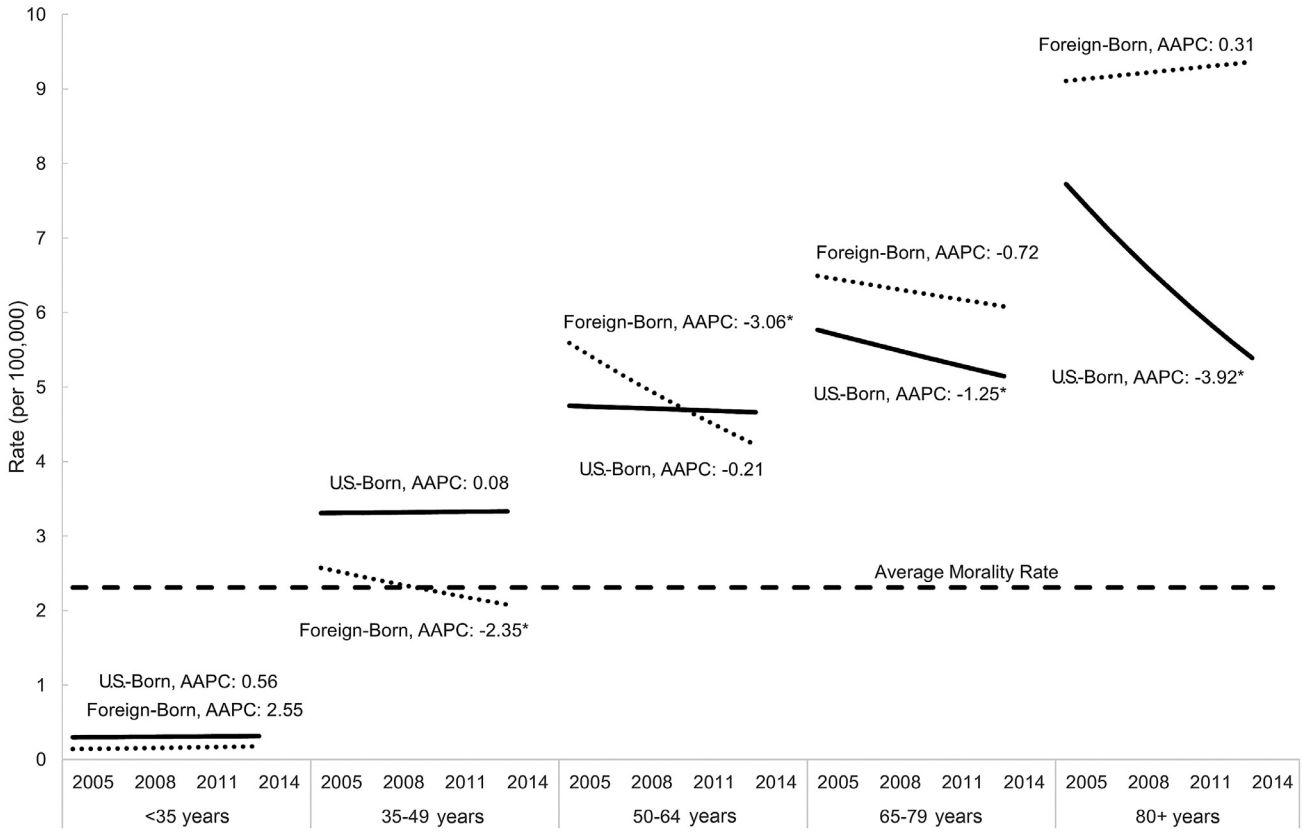

Figure 1. Overall trends in cervical cancer mortality rates by birthplace and age in the U.S., 2005–2014.[a]
Source: National Vital Statistics System, mortality files.
*AAPC is significantly different from 0.
[a]Cervical cancer deaths were defined by underlying cause of death using ICD-10 code C53.
[b]Rates are age-adjusted to 2000 standard U.S. population and shown per 100,000.
AAPC, average annual percentage change.

been well established that the uptake of cervical cancer screening is lower among foreign-born women when compared with their U.S.-born counterparts.[4–6,15,16] The results from this study suggest that older foreign-born women who stop screening at age 65 years may not have been adequately screened previously. Work by Endeshaw et al.[17] further supports this conclusion, finding that 17.1% of foreign-born women older than age 65 years have never been screened for cervical cancer, compared with 6.0% of U.S.-born women older than age 65 years.

Limitations

The greatest strength of this study is that it provides cervical cancer mortality rates by birthplace, age, race/ethnicity, and geographic region for the entire U.S. population over the last decade. From the data from death certificates, one limitation of this study is the lack of immigration and demographic information, such as length of residency, health insurance status, socioeconomic position, education level, or specific country of birth, all of which likely impact mortality rates. Including country-specific information in future work may help identify countries or regions with particularly high cervical cancer mortality risk.

CONCLUSIONS

Foreign-born women in the U.S. have lower cervical cancer mortality rates when compared with U.S. -born women, despite lower cervical cancer screening uptake and numerous sociodemographic disparities. Efforts that work to increase cervical cancer screening access and guideline compliance might further reduce the cervical cancer burden in the U.S., and the excess burden observed among older foreign-born women.

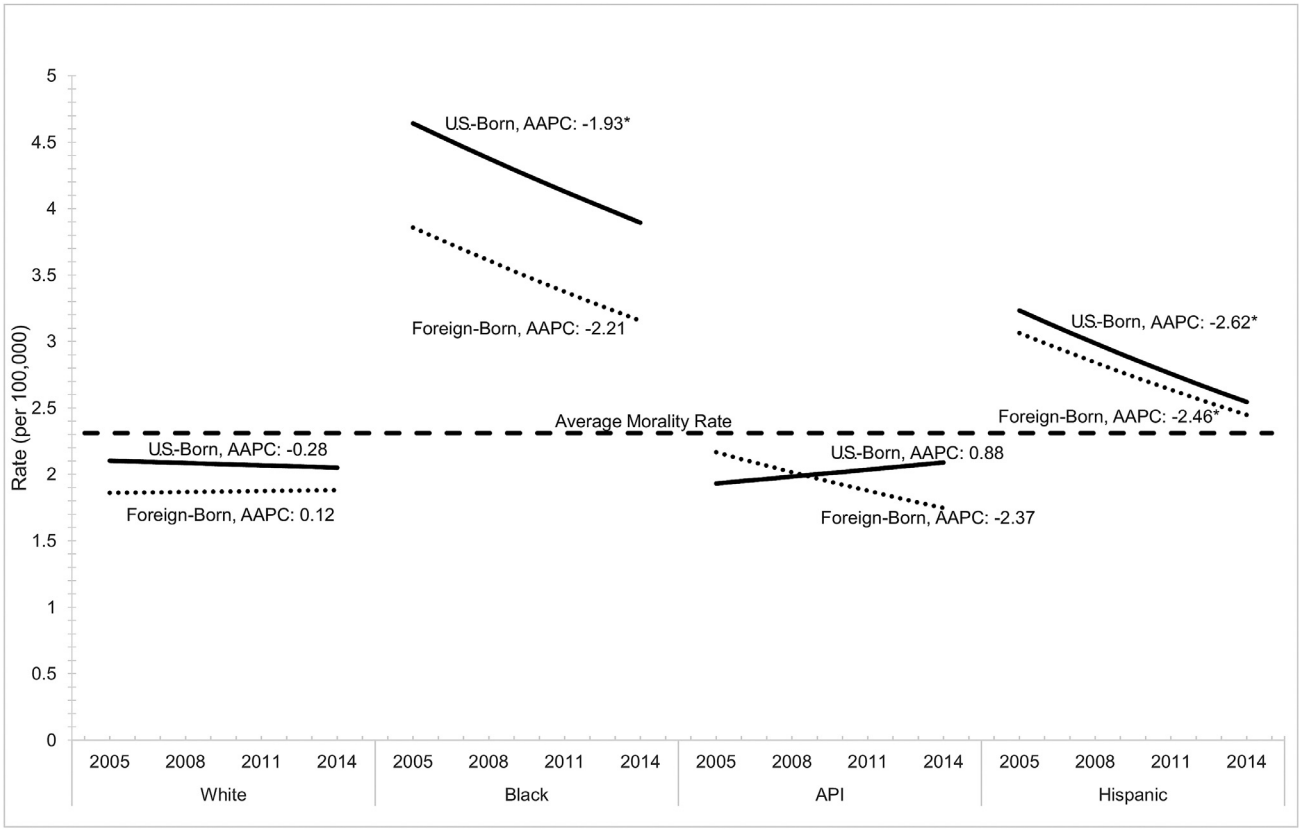

Figure 2. Overall trends in cervical cancer mortality rates by birthplace and race/ethnicity in the U.S. 2005–2014.[a]
Source: National Vital Statistics System, mortality files.
*AAPC is significantly different from 0.
[a]Cervical cancer deaths were defined by underlying cause of death using ICD-10 code C53.
[b]Rates are age-adjusted to 2000 standard U.S. population and shown per 100,000.
API, Asian/Pacific Islanders; AAPC, average annual percentage change.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2019.01.007.

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