GEOMETRIC TRENDS IN CERVICAL CANCER INCIDENCE AND MORTALITY IN KENTUCKY, 1995-2000

Stephen W. Wyatt, DMD, MPH; Bin Huang, MS, ABD; Thomas C. Tucker, PhD, MPH; Jennifer Redmond, BA, MPH; Claudia Hoppenhain, PhD, MPH

Background: Kentucky's elevated cervical cancer incidence and mortality rates are well documented. However, in Kentucky, as in the United States as a whole, cervical cancer incidence and mortality have been decreasing. Methods: To determine if the incidence and mortality declines in Kentucky are similar in different geographic regions of the state, incidence and mortality data for the six-year period 1995-2000 were analyzed by five geographic subdivisions. Results: Overall, both incidence and mortality rates declined during the six-year period; however, there were variations in the decline by geographic subdivisions. In 1995-2000, the greatest percentage decrease (43%) in incidence rates among the geographic subdivisions occurred in Fayette/ Jefferson counties while their mortality rates increased (12%). Conversely, the Appalachian region of the state had a lower percentage decrease (11%) in incidence with a concurrent percentage decrease in mortality (45%). Conclusions: Intensified screening efforts may have resulted in increased detection of early stage cervical disease; which provided a subsequent reduction in mortality for the Appalachian region of the state, while Fayette/ Jefferson County has a mortality rate that slopes upward necessitating additional investigation.

METHODS

Cancer incidence data for the years 1995-2000 were obtained from the Kentucky Cancer Registry (KCR) based at the University of Kentucky. The KCR has been awarded "the highest level of certification" (gold) by the North American Association of Central Cancer Registries in every year since a formal certification program was established to objectively evaluate the completeness, accuracy, and timeliness of data collected by population-based cancer registries. In 2002, the KCR successfully competed to become a part of the National Cancer Institute's SEER (Surveillance, Epidemiology, and End Results) program. Mortality data for the years 1995-2000 were obtained from the Kentucky Department for Public Health. The incidence and mortality rates were stan-
dardized to the year 2000 US population. Linear regression was used for the linear trend analysis on the six-year age-adjusted rates by geographic subdivisions. The geographic subdivisions for this analysis were made by county of residence of incident cases and deaths. Four geographic subdivisions of the state were selected: Appalachian counties, non-Appalachian counties, non-Appalachian counties minus Fayette/Jefferson counties, and Fayette/Jefferson counties. The Appalachian county subdivision was determined by counties designated as being a part of the region in the year 2000 by the Appalachian Regional Commission and consisted of 49 counties in Kentucky. The counties of Fayette and Jefferson include the state’s two largest cities, Lexington and Louisville, respectively, which have the largest population of African Americans in the state. Historically, incidence and mortality rates for cervical cancer are elevated among African Americans. The geographic unit of analysis of non-Appalachian counties minus Fayette and Jefferson was constructed to look at trends in the non-Urban counties of the state that are not part of the Appalachian region. An analysis of incidence and mortality by race, black and white, was conducted; however, the small number of incident cases and deaths among African Americans in each of the geographic subdivisions made the subsequent rates extremely unstable; therefore, they are not included in this analysis.

**RESULTS**

Table 1 indicates the number of incident cases of invasive cervical cancer among Kentucky residents declined from 303 in 1995 to 228 in 2000. The statewide incidence rate decreased by 28% from 1995 to 2000 (14.8 per 100,000 to 10.7 per 100,000). A more in-depth review of trends in the incidence of invasive cervical cancer by the selected geographic subdivisions shows significant variations in the percentage decrease. The greatest percentage decrease in incidence rates among the geographic subdivisions occurred in Fayette/Jefferson counties, where the incidence rate decreased from 16.8 per 100,000 in 1995 to 9.5 per 100,000 in 2000, a 43% decrease. The number of incident invasive cases in these two urban counties decreased every year during the six-year period, from a high of 82 cases in 1995 to 48 in 1998. The percentage decrease between 1995 and 2000 occurred in the Appalachian re-
region of Kentucky, an 11% decrease. In all four years between 1995 and 2000 the incidence rate for this region was higher than the rate in 1995. The number of incident cases in the Appalachian region decreased from 76 in 1995 to 67 in the year 2000. However, in 1996 and 1998 the number of cases actually increased above the 1995 baseline. The linear regression analysis shows there is a statistically significant decline in the incidence rates over the six-year period for statewide, non-Appalachian and Fayette-Jefferson county rates.

The mortality rate from cervical cancer in Kentucky decreased by 38% from 1995 to 2000, as Table 2 shows. Statewide, the number of deaths from cervical cancer decreased from 102 in 1995 to 67 in 2000. From 1995 to 2000, mortality rates for all of the geographic subdivisions in this analysis except Fayette/Jefferson counties decreased. The mortality rate for Fayette/Jefferson counties increased by 12% from 1995 to 2000. The mortality rate for the Appalachian region of Kentucky decreased by 45% between 1995 and 2000, from a mortality rate of 6.7 per 100,000 in 1995 to a rate of 3.7 per 100,000 in 2000. The only statistically significant decline occurred in the statewide mortality rate during the six-year period.

CONCLUSIONS

The statewide decreases in cervical cancer incidence and mortality in Kentucky are encouraging. The small number of annual incident cases and deaths in the four geographic subdivisions make the subsequent rates unstable.

The variability of the Appalachian region incidence rate over the six-year period is somewhat expected with the small number of incident cases. The consistent trend of decreasing mortality rates in the Appalachian region is certainly positive. One potential explanation for this divergence in incidence and mortality rate trends for the Appalachian region is that increased screening may have occurred in the region through local and district health departments starting in 1996. The screening programs received funding through the Kentucky Department for Public Health and the Centers for Disease Control and Prevention's National Breast and Cervical Cancer Early Detection Program. The intensified screening efforts may have resulted in increased detection of early stage cervical disease, which provides a subsequent reduction in mortality. Thus, these trends
could potentially be viewed as a major public health success story. The opposite case could be made for the incidence and mortality rate trends in Fayette/Jefferson counties. The significant decline in incidence rates over the six-year period, combined with a mortality rate trend that actually slopes upward, is of concern and worthy of additional investigation.

REFERENCES