# Time Trends

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Time Trends

Changes that occurred in cancer incidence and cancer mortality in Michigan over a ten to fifteen-year period are illustrated in this section. Data on new cancer cases from 1989 to 2003 and deaths due to cancer from 1990 to 2004 were made available from the statewide cancer registry at the Michigan Department of Community Health. The Estimated Annual Percent Change (EAPC) in age-adjusted incidence and mortality rates over multiple-year periods were calculated by regressing the calendar year on the natural log of age-adjusted incidence and mortality rates. Rates were calculated by direct age-adjustment using the 2000 US population age distribution as the standard population. In the regression equation \( y=mx+b \), \( x=\text{year} \) and \( y=\ln(\text{rate}) \). The EAPC\(^{1}\)=100\*((\text{e}^m)-1). To test EAPC for statistical significance, \( t \) tests were used to test the hypothesis that the slope of the regression line is equal to zero, using two-sided \( p=0.05 \). The EAPC in mortality rates was calculated over the period 1995 to 2004 and EAPC in incidence rates was calculated over the period 1994 to 2003.

The EAPC in mortality and incidence rates for Michigan and the United States over the period 1994 to 2003 are presented for comparison.\(^{4}\)

Summary

Figures 1 through 3 show the EAPC in mortality rates for the total population, and for women and men for the relevant cancer sites. From 1994 to 2003, Michigan total mortality rates due to breast, cervical, colorectal, lung and prostate cancer all decreased. All changes were statistically significant at \( p<0.05 \). Lung cancer mortality rates decreased among men, but increased among women (statistically significant changes at \( p<0.05 \)).

Figure 4 shows EAPC in mortality rates for Michigan next to EAPC in mortality rates for the United States. Over the time period from 1994 to 2003, both Michigan and the United States had similar EAPC for breast, cervical, colorectal, lung and prostate cancer rates.

Figures 5 through 7 track yearly mortality rates for each cancer site from 1990 to 2004. The mortality rates followed over time are presented for the total population and by gender.

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2 Annual state population estimates based on the actual size of the Michigan population in years 1985 through 2004 were used in calculating rates. Population data provided by the Department of Management and Budget, received February 15, 2005.
4 Michigan Department of Community Health (MDCH), Vital Records and Health Data Development Section..
Figures 8 through 10 show the EAPC in incidence rates for the total population, women only and men only for the relevant cancer sites. In the period from 1994 to 2003, breast, cervical, colorectal, and lung cancer incidence rates in Michigan all decreased; the decrease in the rates for cervical, colorectal, and lung cancer sites were statistically significant at $p \leq 0.05$. Lung cancer incidence among men decreased, while the incidence rate among women increased by 0.7% per year; changes in EAPC among males were statistically significant at $p \leq 0.05$.

Figure 11 shows EAPC in incidence rates for Michigan and EAPC in incidence rates for the United States. From 1994 to 2003, the greatest difference in EAPC was in lung cancer incidence. EAPC for the U.S. was more negative than that of Michigan. The EAPC in breast, cervical, colorectal, and prostate cancer incidence rates were similar in Michigan and nationally.

Figures 12 through 14 follow the yearly incidence rates by cancer site from 1989 to 2003 for the total population, and women and men separately.
Estimated Annual Percent Change in Mortality Rates by Cancer Site, Michigan 1995-2004

* The EAPC is significantly different from zero (p<.05).
Rates are age-adjusted and computed by gender for breast, cervical and prostate cancer.
Estimated Annual Percent Change in Mortality Rates by Cancer Site, Michigan Females 1995-2004

- Breast: *-2.8%
- Cervix: *-3.9%
- Colorectal: *-2.1%
- Lung: *0.7%

* The EAPC is significantly different from zero (p≤.05).
Rates are age-adjusted and computed by gender.
Figure 3.

Estimated Annual Percent Change in Mortality Rates by Cancer Site, Michigan Males 1995-2004

* -5.1%  
* -2.1%  
* -3.2%

* The EAPC is significantly different from zero (p<0.05).
Rates are age-adjusted and computed by gender.
Figure 4.

Estimated Annual Percent Change in Mortality Rates, Michigan vs. US 1994-2003

The EAPC is significantly different from zero (p<.05).
Rates are age-adjusted and computed by gender breast, cervical and prostate cancer.
Figure 5.

Total Mortality Rates by Cancer Site, 
Michigan 1990-2004

Rates are age-adjusted per 100,000 population and computed by gender for breast, cervical and prostate cancer.
Female Mortality Rates by Cancer Site, Michigan 1990-2004

Rates are age-adjusted per 100,000 gender-specific population.
Figure 7.

Male Mortality Rates by Cancer Site, Michigan 1990-2004

Mortality Rate per 100,000

Year


Mortality Rate per 100,000

0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

Colorectal Lung Prostate

Rates are age-adjusted per 100,000 gender-specific population.
Estimated Annual Percent Change in Incidence Rates by Cancer Site, Michigan 1994-2003

* The EAPC is significantly different from zero (p<.05).
Rates are age-adjusted and computed by gender for breast, cervical and prostate cancer.
Figure 9.

Estimated Annual Percent Change in Incidence Rates by Cancer Site, Michigan Females 1994-2003

* The EAPC is significantly different from zero (p≤0.05).
Rates are age-adjusted and computed by gender.
Figure 10.

Estimated Annual Percent Change in Incidence Rates by Cancer Site, Michigan Males 1994-2003

* The EAPC is significantly different from zero (p≤.05).
Rates are age-adjusted and computed by gender.
Figure 11.

Estimated Annual Percent Change in Incidence Rates, Michigan vs. US 1994-2003

Cancer Site

- Prostate
  - Michigan 1994-2003 EAPC: 0.4%
  - US (SEER) 1994-2003 EAPC: 0.5%

- Lung
  - Michigan 1994-2003 EAPC: -1.2%
  - US (SEER) 1994-2003 EAPC: -0.7%

- Colorectal
  - Michigan 1994-2003 EAPC: -1.0%
  - US (SEER) 1994-2003 EAPC: -0.8%

- Cervix
  - Michigan 1994-2003 EAPC: -3.2%
  - US (SEER) 1994-2003 EAPC: -3.6%

- Breast
  - Michigan 1994-2003 EAPC: -0.5%
  - US (SEER) 1994-2003 EAPC: -0.3%

* The EAPC is significantly different from zero (p<.05).
Rates are age-adjusted and computed by gender for breast, cervical and prostate cancer.
Figure 12.

Total Incidence Rates by Cancer Site,
Michigan 1989-2003

Rates are age-adjusted per 100,000 population and computed by gender for breast, cervical and prostate cancer.
Female Incidence Rates by Cancer Site, Michigan 1989-2003

Rates are age-adjusted per 100,000 gender-specific population.
Figure 14.

Male Incidence Rates by Cancer Site, Michigan 1989-2003

Rates are age-adjusted per 100,000 gender-specific population.