**Joinpoint parameters:**

All joinpoint modeling was performed in Joinpoint Regression Program (Version 4.8.0.1). Age-adjusted rates were calculated from data files containing age-specific incident cases and population by sex, year, and topographic/histological sites, adjusted to the 2011 Canadian standard population. Independent variable was selected as “Year”. Heteroscedastic Error Option was selected as "Standard Error (Calculated)". Log Transformation was set to default “Yes {ln(y) = xb}. Minimal number of observations from

a joinpoint to either end of the data was set at the default of 2. Minimal number of observations between two joinpoints was set at the default of 2. Number of points to place between adjacent observed x values in the grid search was set at the default of 0. Number of joinpoints was set at a minimum of 0 and a maximum of 2. Permutation test with an overall significance level of 0.05 and 4499 permutations was selected for the model selection method. Autocorrelated errors option was selected to default “Fit an uncorrelated errors model”. APC confidence interval was estimated with the default parametric Method. AAPC segment ranges was set to the entire range. No advanced analyses were set in the "Advanced Analysis Tools" tab.

**Supplemental Table 1.** Age-specificaverage annual percent changes in the incidence of topographical sites of colorectal cancer from 2000 to 2017 in Canada (excluding Quebec) by sex.

|  |  |  |  |
| --- | --- | --- | --- |
| **Age group** | **Proximal Colon** | **Distal Colon** | **Rectum** |
| **AAPC (95% CI)** | **AAPC (95% CI)** | **AAPC (95% CI)** |
| **Female** |  |  |  |
| 20-39 |  1.3 (-0.8 to 3.4) |  2.3 (0.6 to 4.0) |  4.9 (3.3 to 6.5) |
| 40-49 |  0.7 (-0.7 to 2.1) |  1.1 (0.1 to 2.0) |  2.5 (1.8 to 3.3) |
| 50-59 |  -0.7 (-1.4 to 0.0) |  -0.7 (-1.0 to -0.4) |  0.8 (-0.4 to 2.1) |
| 60-69 |  -1.5 (-2.8 to -0.1) |  -2.6 (-3.8 to -1.3) |  -1.2 (-1.8 to -0.6) |
| 70-79 |  -0.3 (-1.0 to 0.5) |  -2.3 (-3.6 to -0.9) |  -2.3 (-3.1 to -1.6) |
| 80-89 |  -0.1 (-1.3 to 1.1) |  -1.8 (-3.5 to -0.2) |  -1.7 (-2.3 to -1.1) |
| 90+ |  -0.2 (-1.7 to 1.3) |  -0.1 (-2.5 to 2.4) |  -2.4 (-4.0 to -0.8) |
|  |  |  |  |
| **Male** |  |  |  |
| 20-39 |  1.2 (-0.8 to 3.2) |  3.2 (1.2 to 5.2) |  4.2 (2.3 to 6.2) |
| 40-49 |  0.8 (-0.2 to 1.7) |  2.6 (1.7 to 3.5) |  2.5 (1.9 to 3.2) |
| 50-59 |  -0.6 (-1.0 to -0.2) |  -0.2 (-0.9 to 0.4) |  0.8 (-0.1 to 1.7) |
| 60-69 |  -0.6 (-1.5 to 0.3) |  -1.8 (-2.6 to -1.0) |  -2.0 (-2.6 to -1.3) |
| 70-79 |  -0.4 (-1.7 to 0.9) |  -2.2 (-2.9 to -1.4) |  -2.5 (-3.5 to -1.5) |
| 80-89 |  0.1 (-0.7 to 1.0) |  -1.1 (-2.6 to 0.5) |  -2.2 (-3.3 to -1.0) |
| 90+ |  -1.2 (-4.5 to 2.3) |  -0.8 (-2.1 to 0.5) |  -1.1 (-3.4 to 1.3) |

Abbreviations: AAPC = Average annual percent change; CI = confidence interval

**Supplemental Table 2.** Age-specificaverage annual percent changes in the incidence of histological types of colorectal cancer from 2000 to 2017 in Canada (excluding Quebec) by sex.

|  |  |  |  |
| --- | --- | --- | --- |
| **Age group** | **Non-mucinous Adenocarcinoma** | **Mucinous Adenocarcinoma** | **Carcinoid Tumors** |
| **AAPC (95% CI)** | **AAPC (95% CI)** | **AAPC (95% CI)** |
| **Female** |  |  |  |
| 20-39 |  3.3 (2.4 to 4.1) |  -1.1 (-3.5 to 1.4) | 18.7 (13.6 to 24.0) |
| 40-49 |  1.6 (0.9 to 2.2) |  -2.6 (-4.0 to -1.3) |  6.5 (0.8 to 12.5) |
| 50-59 |  -0.5 (-1.4 to 0.3) |  -4.2 (-5.3 to -3.2) | 11.1 (5.8 to 16.8) |
| 60-69 |  -2.0 (-2.6 to -1.4) |  -5.6 ( -6.4 to -4.9) |  8.3 (5.7 to 10.8) |
| 70-79 |  -1.6 (-2.4 to -0.9) |  -3.9 ( -5.6 to -2.3) |  5.6 (3.2 to 8.1) |
| 80-89 |  -0.9 (-1.6 to -0.1) |  -4.3 ( -5.4 to -3.2) |  3.0 (0.2 to 5.9) |
| 90+ |  -0.7 (-1.8 to 0.3) |  -4.3 (-6.6 to -1.9) |  -4.7 (-4.8 to -4.5) |
|  |  |  |  |
| **Male** |  |  |  |
| 20-39 |  3.0 (2.2 to 3.8) |  -0.8 (-2.6 to 1.1) | 18.0 (13.0 to 23.1) |
| 40-49 |  2.0 (1.5 to 2.6) |  -2.3 (-4.1 to -0.5) |  7.8 (4.6 to 11.0) |
| 50-59 |  -0.1 (-0.6 to 0.4) |  -4.4 (-5.6 to -3.3) |  8.9 (6.3 to 11.6) |
| 60-69 |  -1.7 (-2.3 to -1.2) |  -5.1 (-5.8 to -4.3) |  6.4 (3.7 to 9.1) |
| 70-79 |  -1.9 (-2.7 to -1.1) |  -5.3 (-6.2 to -4.4) |  5.4 (2.0 to 8.8) |
| 80-89 |  -1.0 (-1.5 to -0.5) |  -4.7 (-5.8 to -3.6) |  -0.5 (-2.9 to 2.0) |
| 90+ |  -1.2 ( -2.6 to 0.3) |  -7.6 (-12.7 to -2.2) |  -9.9 (-10.2 to -9.6) |

Abbreviations: AAPC = Average annual percent change; CI = confidence interval

**Supplemental Table 3.** Age-specific (5-year age groups) risk of being diagnosed with a late stage (III and IV versus I and II) early-onset colorectal, colon or rectal cancer compared to the average screening age (55-74) from 2011 to 2017 in Canada (excluding Quebec)

|  |  |  |  |
| --- | --- | --- | --- |
|   | **Colorectal Cancer** | **Colon Cancer** | **Rectal Cancer** |
|   | **RR (95% CI)** | **RR (95% CI)** | **RR (95% CI)** |
| **Sex** |  |  |  |
| Female | ref (1.0) | ref (1.0) | ref (1.0) |
| Male | 1.02 (1.00-1.04) | 0.98 (0.96-1.01) | 1.06 (1.02-1.09) |
| **Age** |  |  |  |
| 50-74 | ref (1.0) | ref (1.0) | ref (1.0) |
| 20-24 | 0.54 (0.43-0.68) | 0.30 (0.21-0.43) | 0.62 (0.37-1.03) |
| 25-29 | 0.90 (0.77-1.04) | 0.68 (0.54-0.84) | 1.32 (1.05-1.66) |
| 30-34 | 1.13 (1.03-1.24) | 1.03 (0.92-1.17) | 1.17 (1.02-1.34) |
| 35-39 | 1.17 (1.09-1.26) | 1.10 (1.00-1.22) | 1.22 (1.10-1.34) |
| 40-44 | 1.14 (1.08-1.20) | 1.10 (1.02-1.19) | 1.18 (1.09-1.28) |
| 45-49 | 1.19 (1.14-1.24) | 1.18 (1.12-1.25) | 1.18 (1.11-1.25) |
| 50-54 | 1.09 (1.05-1.12) | 1.07 (1.03-1.12) | 1.08 (1.03-1.14) |

Abbreviations: CI = confidence interval; RR = Relative Risk

**Supplemental Table 4.** Age-specificaverage annual percent changes in colorectal cancer-specific mortality of from 2000 to 2018 in Canada by sex and tumor subsite.

|  |  |  |  |
| --- | --- | --- | --- |
| **Age group** | **Colorectal** | **Colon** | **Rectum** |
| **AAPC (95% CI)** | **AAPC (95% CI)** | **AAPC (95% CI)** |
| **Female** |  |  |  |
| 20-39 | 0.6 (-0.8 to 1.9) |  -0.7 (-2.3 to 0.9) | 3.9 (1.5 to 6.4) |
| 40-49 |  -0.2 (-1.0 to 0.6) |  -1.7 (-2.6 to -0.8) |  3.7 (2.2 to 5.4) |
| 50-59 |  -2.1 (-2.6 to -1.6) |  -3.4 (-3.9 to -2.8) |  2.0 (0.8 to 3.2) |
| 60-69 |  -2.5 (-3.0 to -2.0) |  -4.1 (-6.2 to -1.9) |  0.9 (0.2 to 1.7) |
| 70-79 |  -2.6 (-3.4 to -1.8) |  -3.2 (-4.0 to -2.4) |  0.1 (-1.1 to 1.4) |
| 80+ |  -1.4 (-1.6 to -1.2) |  -2.0 (-2.2 to -1.7) |  1.2 (0.7 to 1.8) |
|  |  |  |  |
| **Male** |  |  |  |
| 20-39 | 1.8 (0.5 to 3.0) | 0.4 (-1.1 to 1.9) | 4.9 (2.8 to 7.1) |
| 40-49 |  0.1 (-0.7 to 0.9) |  -1.3 (-2.3 to -0.3) |  3.1 (2.0 to 4.3) |
| 50-59 |  -2.4 (-2.9 to -2.0) |  -3.9 (-4.2 to -3.5) |  1.2 (0.2 to 2.1) |
| 60-69 |  -3.1 (-3.4 to -2.8) |  -4.0 (-4.4 to -3.7) |  -0.5 (-0.9 to -0.2) |
| 70-79 |  -2.8 (-3.2 to -2.4) |  -3.7 (-4.3 to -3.2) |  0.3 (-0.1 to 0.7) |
| 80+ |  -1.5 (-1.7 to -1.3) |  -2.2 (-2.4 to -1.9) |  0.9 (0.5 to 1.3) |

Abbreviations: AAPC = Average annual percent change; CI = confidence interval

****

**Supplemental Figure 1.** Age-specific (20-39 and 40-49) incidence trends of topographical sites of colorectal cancer in Canada (excluding Quebec) from 2000-2017 by sex. “^” after APC indicates that the trend is associated with a p-value < 0.05.

****

**Supplemental Figure 2.** Age-specific (20-39 and 40-49) incidence trends of histological types of colorectal cancer in Canada (excluding Quebec) from 2000-2017 by sex. “^” after APC indicates that the trend is associated with a p-value < 0.05.

****

**Supplemental Figure 3.** Age-specific (20-39 and 40-49) mortality trends for colorectal cancer, colon cancer, and rectal cancer in Canada from 2000-2018 by sex. “^” after APC indicates that the trend is associated with a p-value < 0.05.