# GM-UAW Cohort Study

## Standardized mortality ratios

*November 14, 2019*

Table 1: Summary of study population characteristics ($N = 38\,640$; 1.52 million person-years). The cohort was restricted to individuals who were hired in or after 1938 and for whom at least half of their work history data was available. Individuals were considered lost to follow-up once they reach the maximum observed age at death.

| | $n$ | % | |
|---|---|---|---|
| Study population size ($N$) | 38 640 | 100% | |
| Race | | | |
|     White | 31 494 | 82% | |
|     African American | 7 146 | 18% | |
| Sex | | | |
|     Male | 33 876 | 88% | |
|     Female | 4 764 | 12% | |
| Plant[♮] | | | |
|     Gear & Axle | 9 158 | 24% | |
|     HydraMatic | 17 092 | 44% | |
|     Saginaw | 12 390 | 32% | |
| Ever exposed to MWFs | | | |
|     Straight | 20 355 | 53% | |
|     Soluble | 31 832 | 82% | |
|     Synthetic | 12 512 | 32% | |
| Deceased by end of follow-up | 20 616 | 53% | |

| | Median | 25th %tile | 75th %tile |
|---|---|---|---|
| Years of follow-up | 39 | 34 | 47 |
| Year of hire | 1965 | 1952 | 1973 |
| Age at hire (years) | 27.68 | 23.42 | 35.75 |
| Year of birth | 1937 | 1922 | 1948 |
| Year of death among deceased | 1996 | 1984 | 2006 |
| Age at death (years) among deceased | 70 | 60 | 80 |
| Cumulative exposure[♯] to MWFs (mg/m$^3$·y) | | | |
|     Straight | 0.66 | 0.21 | 2.34 |
|     Soluble | 4.4 | 1.74 | 10.69 |
|     Synthetic | 0.44 | 0.15 | 1.56 |

[♮] For individuals who worked at several plants, plant was taken to be the site where they accrued the most work record time.

[♯] Summary statistics calculated for ever-exposed individuals at end of follow-up only. Exposures were lagged 21 years.

Table 2: Standardized mortality ratios calculated for the GM-UAW cohort followed from 1938 to 2015. NIOSH LTAS-extracted reference rates were used for the years 1940 through 2009. CDC Mortality data were used as reference rates for 2010 onwards.

| Cause of death | $N$ | SMR | (95% CI)$^\flat$ |
|---|---|---|---|
| All causes | 20 616 | 0.91 | (0.89, 0.92) |
| All natural causes | 18 901 | 0.89 | (0.88, 0.91) |
| All cancers | 5 482 | 0.96 | (0.94, 0.99) |
|    Esophageal cancer | 184 | 1.06 | (0.92, 1.22) |
|    Stomach cancer | 194 | 1.11 | (0.96, 1.27) |
|    Intestinal cancer | 418 | 0.90 | (0.82, 0.99) |
|    Rectal cancer | 89 | 0.86 | (0.69, 1.05) |
|    Kidney cancer$^\ddagger$ | 63 | 0.46 | (0.36, 0.59) |
|    Bladder and urinary organ cancers | 146 | 0.95 | (0.81, 1.12) |
|    Bile duct, liver, and gallbladder cancers | 162 | 0.88 | (0.75, 1.03) |
|    Pancreatic cancer | 315 | 1.05 | (0.94, 1.17) |
|    Laryngeal cancer | 74 | 1.17 | (0.93, 1.46) |
|    Lung cancer | 1 894 | 1.07 | (1.02, 1.12) |
|    Skin cancer | 73 | 0.66 | (0.52, 0.83) |
|    Prostate cancer | 418 | 0.82 | (0.75, 0.91) |
|    Brain and nervous system cancers | 128 | 0.99 | (0.83, 1.18) |
| Leukemia | 200 | 0.98 | (0.85, 1.12) |
|    All nonmalignant respiratory diseases | 1 687 | 0.84 | (0.81, 0.89) |
|    Chronic obstructive pulmonary disease | 926 | 0.93 | (0.87, 0.99) |
| Pneumonia | 438 | 0.78 | (0.71, 0.86) |
| Cirrhosis and other chronic liver disease | 382 | 0.91 | (0.82, 1.00) |
|    All heart diseases | 6 762 | 0.75 | (0.73, 0.77) |
|    Ischemic heart disease | 5 070 | 0.89 | (0.87, 0.92) |
| Rheumatic heart disease | 50 | 0.64 | (0.48, 0.84) |
| Cerebrovascular disease | 1 082 | 0.83 | (0.78, 0.88) |
|    All external causes | 1 678 | 1.03 | (0.99, 1.08) |
|    Falls, transportation, and medical accidents | 517 | 0.76 | (0.70, 0.83) |
|    Other accidents$^\sharp$ | 624 | 2.01 | (1.85, 2.17) |
|    Homicide | 195 | 0.96 | (0.83, 1.10) |
|    Suicide$^\dagger$ | 65 | 0.77 | (0.60, 0.98) |
|    Overdose$^\dagger$ | 38 | 1.00 | (0.73, 1.38) |

$^\flat$ Variance estimates assume Poisson-distributed rates in the observed population. Reference rates were assumed to be parameters.

$^\ddagger$ Classification of deaths as kidney cancer may be unreliable in the observed population.

$^\sharp$ Other accidents includes deaths not due to falls, transportation, and medical accidents as well as deaths due to poisonings of unknown intent. Poisonings of unknown intent were included both in this category and in overdose.

$^\dagger$ SMRs for suicide and overdose were calculated for the years 2000 onwards only, using CDC Mortality data as reference rates.

Table 3: Other accidents in detail.

| Description | ICD | N |
|---|---|---|
| Accidents due to fires and flames | 890 to 899 | 44 |
| Accidents due to natural and environmental factors | 900 to 909 | 4 |
| Accidents caused by submersion, suffocation, and foreign bodies | 910 to 915 | 36 |
| Struck accidentally by falling object | 916 | 4 |
| Striking against or struck accidentally by objects or person | 917 | 2 |
| Caught accidentally in or between object | 918 | 1 |
| Accidents caused by machine | 919 | 2 |
| Accidents caused by explosions, firearms, and projectiles | 921 to 923 | 17 |
| Accident caused by electric current | 925 | 2 |
| Overexertion and strenuous movement | 927 | 2 |
| Other and unspecified environmental and accidental cause | 928 | 8 |
| Poisoning, undetermined intent | 980 to 981 | 11 |
| Poisoning, undetermined intent | Y10 to Y19 | 11 |
| Accidental poisoning by and exposure to noxious substances | 981 to 982 | 2 |
| Injury by firearms air guns and explosivs, undetermined intent | 985 | 2 |
| Falling from high place, undetermined intent | 987 | 2 |
| Injury by other and unspecified means, undetermined intent | 988 | 3 |
| Injury resulting from operations of war | 990 to 999 | 402 |
| Exposure to inanimate mechanical forces | W20 to W49 | 2 |
| Accidental non-transport drowning and submersion | W65 to W74 | 11 |
| Other accidental threats to breathing | W75 to W84 | 20 |
| Exposure to smoke, fire and flames | X0 to X8 | 13 |
| Exposure to unspecified smoke, fire and flames | X9 | 1 |
| Contact with venomous animals and plants | X20 to X29 | 1 |
| Exposure to forces of nature | X30 to X39 | 6 |
| Exposure to unspecified factor | X59 | 22 |
| Event of undetermined intent | Y21 to Y33 | 1 |
| Unspecified event, undetermined intent | Y34 | 1 |
| Sequelae of other accidents | Y86 | 2 |
| Total | | 635 |

Table 4: Standardized mortality ratios by plant. The individuals who worked at several plants are not tabulated here.

| Cause of death | Gear & Axle | | HydraMatic | | Saginaw | |
|---|---|---|---|---|---|---|
| | $N$ | SMR | $N$ | SMR | $N$ | SMR |
| All causes | 6 020 | 0.93 | 9 593 | 0.93 | 4 958 | 0.83 |
| All natural causes | 5 512 | 0.92 | 8 779 | 0.91 | 4 569 | 0.84 |
| All cancers | 1 535 | 0.97 | 2 458 | 0.99 | 1 472 | 0.92 |
| Esophageal cancer | 58 | 1.03 | 60 | 0.91 | 64 | 1.26 |
| Stomach cancer | 65 | 1.05 | 98 | 1.32 | 31 | 0.80 |
| Intestinal cancer | 129 | 1.02 | 174 | 0.82 | 115 | 0.93 |
| Rectal cancer | 22 | 0.80 | 42 | 0.87 | 25 | 0.89 |
| Kidney cancer[‡] | 12 | 0.35 | 26 | 0.44 | 25 | 0.59 |
| Bladder and urinary organ cancers | 30 | 0.77 | 68 | 0.94 | 48 | 1.13 |
| Bile duct, liver, and gallbladder cancers | 47 | 0.89 | 63 | 0.83 | 50 | 0.90 |
| Pancreatic cancer | 94 | 1.16 | 137 | 1.05 | 84 | 0.96 |
| Laryngeal cancer | 31 | 1.49 | 33 | 1.28 | 10 | 0.60 |
| Lung cancer | 531 | 1.06 | 870 | 1.15 | 484 | 0.94 |
| Skin cancer | 11 | 0.51 | 36 | 0.72 | 26 | 0.67 |
| Prostate cancer | 166 | 0.88 | 166 | 0.80 | 84 | 0.76 |
| Brain and nervous system cancers | 28 | 1.02 | 48 | 0.83 | 51 | 1.17 |
| Leukemia | 42 | 0.83 | 85 | 0.91 | 72 | 1.18 |
| All nonmalignant respiratory diseases | 447 | 0.81 | 811 | 0.87 | 427 | 0.83 |
| Chronic obstructive pulmonary disease | 233 | 0.96 | 424 | 0.91 | 267 | 0.94 |
| Pneumonia | 143 | 0.83 | 210 | 0.78 | 85 | 0.71 |
| Cirrhosis and other chronic liver disease | 129 | 1.11 | 166 | 0.93 | 87 | 0.69 |
| All heart diseases | 2 025 | 0.79 | 3 222 | 0.75 | 1 498 | 0.72 |
| Ischemic heart disease | 1 458 | 0.94 | 2 435 | 0.88 | 1 166 | 0.87 |
| Rheumatic heart disease | 17 | 0.83 | 22 | 0.53 | 11 | 0.67 |
| Cerebrovascular disease | 352 | 0.86 | 510 | 0.83 | 219 | 0.80 |
| All external causes | 497 | 1.09 | 796 | 1.20 | 381 | 0.76 |
| Falls, transportation, and medical accidents | 135 | 0.75 | 237 | 0.83 | 145 | 0.69 |
| Other accidents[♯] | 189 | 1.95 | 329 | 2.64 | 104 | 1.16 |
| Homicide | 113 | 1.24 | 49 | 0.81 | 33 | 0.63 |
| Suicide[†] | 10 | 0.73 | 34 | 0.94 | 21 | 0.60 |
| Overdose[†] | 5 | 0.77 | 27 | 1.49 | 6 | 0.45 |

[♯] Other accidents includes deaths not due to falls, transportation, and medical accidents as well as deaths due to poisonings of unknown intent. Poisonings of unknown intent were included both in this category and in overdose.

[†] SMRs for suicide and overdose were calculated for the years 2000 onwards only, using CDC Mortality data as reference rates.

Table 5: Standardized mortality ratios by gender.

| Cause of death | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | $N$ | SMR | (95% CI)$^\flat$ | $N$ | SMR | (95% CI)$^\flat$ |
| All causes | 18 663 | 0.90 | (0.89, 0.92) | 1 953 | 0.91 | (0.87, 0.95) |
| All natural causes | 17 047 | 0.89 | (0.88, 0.91) | 1 854 | 0.90 | (0.86, 0.94) |
| All cancers | 4 911 | 0.95 | (0.93, 0.98) | 571 | 1.06 | (0.97, 1.15) |
| Esophageal cancer | 176 | 1.05 | (0.90, 1.22) | 8 | 1.36 | (0.68, 2.71) |
| Stomach cancer | 180 | 1.10 | (0.95, 1.27) | 14 | 1.27 | (0.75, 2.15) |
| Intestinal cancer | 382 | 0.92 | (0.83, 1.02) | 36 | 0.74 | (0.53, 1.02) |
| Rectal cancer | 83 | 0.87 | (0.70, 1.08) | 6 | 0.69 | (0.31, 1.53) |
| Kidney cancer | 57 | 0.45 | (0.34, 0.58) | 6 | 0.68 | (0.30, 1.51) |
| Bladder and urinary organ cancers | 141 | 0.96 | (0.82, 1.14) | 5 | 0.68 | (0.28, 1.63) |
| Bile duct, liver, and gallbladder cancers | 155 | 0.91 | (0.78, 1.07) | 7 | 0.48 | (0.23, 1.00) |
| Pancreatic cancer | 275 | 1.02 | (0.91, 1.15) | 40 | 1.33 | (0.97, 1.81) |
| Laryngeal cancer | 73 | 1.18 | (0.94, 1.49) | 1 | 0.56 | (0.08, 3.96) |
| Lung cancer | 1 705 | 1.03 | (0.98, 1.08) | 189 | 1.60 | (1.39, 1.85) |
| Skin cancer | 69 | 0.66 | (0.52, 0.84) | 4 | 0.60 | (0.23, 1.61) |
| Prostate cancer | 418 | 0.82 | (0.75, 0.91) | 0 | NaN | (NaN, NaN) |
| Breast cancer | 0 | NaN | (NaN, NaN) | 76 | 0.79 | (0.63, 0.99) |
| Brain and nervous system cancers | 115 | 0.98 | (0.81, 1.17) | 13 | 1.15 | (0.67, 1.98) |
| Leukemia | 184 | 0.98 | (0.85, 1.13) | 16 | 0.94 | (0.58, 1.53) |
| All nonmalignant respiratory diseases | 1 504 | 0.83 | (0.79, 0.87) | 183 | 0.97 | (0.84, 1.13) |
| Chronic obstructive pulmonary disease | 812 | 0.90 | (0.84, 0.97) | 114 | 1.23 | (1.02, 1.47) |
| Pneumonia | 393 | 0.77 | (0.70, 0.86) | 45 | 0.82 | (0.61, 1.09) |
| Cirrhosis and other chronic liver disease | 361 | 0.91 | (0.82, 1.01) | 21 | 0.80 | (0.52, 1.22) |
| All heart diseases | 6 206 | 0.76 | (0.74, 0.78) | 556 | 0.70 | (0.65, 0.76) |
| Ischemic heart disease | 4 714 | 0.90 | (0.87, 0.92) | 356 | 0.84 | (0.76, 0.94) |
| Rheumatic heart disease | 46 | 0.68 | (0.51, 0.91) | 4 | 0.38 | (0.14, 1.01) |
| Cerebrovascular disease | 962 | 0.84 | (0.79, 0.90) | 120 | 0.75 | (0.62, 0.89) |
| All external causes | 1 584 | 1.03 | (0.98, 1.08) | 94 | 1.17 | (0.96, 1.43) |
| Falls, transportation, and medical accidents | 483 | 0.76 | (0.69, 0.83) | 34 | 0.87 | (0.62, 1.22) |
| Other accidents$^\sharp$ | 592 | 2.00 | (1.85, 2.17) | 32 | 2.06 | (1.46, 2.92) |
| Homicide | 183 | 0.93 | (0.80, 1.07) | 12 | 1.71 | (0.97, 3.01) |
| Suicide$^\dagger$ | 63 | 0.77 | (0.60, 0.98) | 2 | 0.68 | (0.17, 2.73) |
| Overdose$^\dagger$ | 37 | 1.09 | (0.79, 1.50) | 1 | 0.25 | (0.04, 1.77) |

$^\flat$ Variance estimates assume Poisson-distributed rates in the observed population. Reference rates were assumed to be parameters.

$^\sharp$ Other accidents includes deaths not due to falls, transportation, and medical accidents as well as deaths due to poisonings of unknown intent. Poisonings of unknown intent were included both in this category and in overdose.

$^\dagger$ SMRs for suicide and overdose were calculated for the years 2000 onwards only, using CDC Mortality data as reference rates.

Table 6: Standardized mortality ratios by race.

| Cause of death | White[◇] | | | African American | | |
|---|---|---|---|---|---|---|
| | N | SMR | (95% CI)[♭] | N | SMR | (95% CI)[♭] |
| All causes | 16 870 | 0.93 | (0.91, 0.94) | 3 746 | 0.83 | (0.80, 0.85) |
| All natural causes | 15 479 | 0.91 | (0.90, 0.93) | 3 422 | 0.82 | (0.80, 0.85) |
| All cancers | 4 435 | 0.97 | (0.94, 1.00) | 1 047 | 0.95 | (0.89, 1.00) |
|   Esophageal cancer | 143 | 1.11 | (0.94, 1.31) | 41 | 0.92 | (0.68, 1.25) |
|   Stomach cancer | 144 | 1.16 | (0.99, 1.37) | 50 | 0.98 | (0.74, 1.29) |
|   Intestinal cancer | 328 | 0.87 | (0.78, 0.97) | 90 | 1.05 | (0.85, 1.29) |
|   Rectal cancer | 76 | 0.88 | (0.70, 1.10) | 13 | 0.73 | (0.43, 1.26) |
|   Kidney cancer[‡] | 54 | 0.46 | (0.35, 0.60) | 9 | 0.46 | (0.24, 0.88) |
|   Bladder and urinary organ cancers | 132 | 0.98 | (0.82, 1.16) | 14 | 0.75 | (0.44, 1.26) |
|   Bile duct, liver, and gallbladder cancers | 131 | 0.95 | (0.80, 1.12) | 31 | 0.67 | (0.47, 0.96) |
|   Pancreatic cancer | 240 | 0.99 | (0.87, 1.12) | 75 | 1.31 | (1.04, 1.64) |
|   Laryngeal cancer | 53 | 1.13 | (0.86, 1.48) | 21 | 1.26 | (0.82, 1.94) |
|   Lung cancer | 1 554 | 1.08 | (1.03, 1.14) | 340 | 1.02 | (0.91, 1.13) |
|   Skin cancer | 67 | 0.64 | (0.50, 0.81) | 6 | 1.06 | (0.48, 2.37) |
|   Prostate cancer | 287 | 0.78 | (0.70, 0.88) | 131 | 0.93 | (0.78, 1.10) |
|   Brain and nervous system cancers | 115 | 0.98 | (0.82, 1.18) | 13 | 1.07 | (0.62, 1.85) |
| Leukemia | 173 | 0.98 | (0.84, 1.13) | 27 | 0.97 | (0.67, 1.42) |
|   All nonmalignant respiratory diseases | 1 461 | 0.88 | (0.84, 0.93) | 226 | 0.67 | (0.59, 0.77) |
|   Chronic obstructive pulmonary disease | 825 | 0.94 | (0.88, 1.01) | 101 | 0.85 | (0.70, 1.03) |
| Pneumonia | 360 | 0.81 | (0.73, 0.90) | 78 | 0.65 | (0.52, 0.81) |
| Cirrhosis and other chronic liver disease | 315 | 0.94 | (0.84, 1.05) | 67 | 0.77 | (0.61, 0.98) |
|   All heart diseases | 5 627 | 0.77 | (0.75, 0.79) | 1 135 | 0.67 | (0.64, 0.71) |
|   Ischemic heart disease | 4 349 | 0.91 | (0.88, 0.94) | 721 | 0.80 | (0.74, 0.86) |
| Rheumatic heart disease | 41 | 0.61 | (0.45, 0.83) | 9 | 0.78 | (0.41, 1.51) |
| Cerebrovascular disease | 839 | 0.85 | (0.79, 0.91) | 243 | 0.78 | (0.69, 0.89) |
|   All external causes | 1 362 | 1.09 | (1.04, 1.15) | 316 | 0.84 | (0.75, 0.93) |
|   Falls, transportation, and medical accidents | 442 | 0.80 | (0.73, 0.88) | 75 | 0.60 | (0.48, 0.75) |
|   Other accidents[♯] | 522 | 2.26 | (2.08, 2.47) | 102 | 1.27 | (1.04, 1.54) |
|   Homicide | 105 | 1.22 | (1.01, 1.48) | 90 | 0.76 | (0.62, 0.94) |
|   Suicide[†] | 62 | 0.78 | (0.61, 1.00) | 3 | 0.54 | (0.17, 1.67) |
|   Overdose[†] | 26 | 0.95 | (0.65, 1.39) | 12 | 1.13 | (0.64, 2.00) |

[◇] Individuals of race "Unknown" were included into the White category.

[♭] Variance estimates assume Poisson-distributed rates in the observed population. Reference rates were assumed to be parameters.

[♯] Other accidents includes deaths not due to falls, transportation, and medical accidents as well as deaths due to poisonings of unknown intent. Poisonings of unknown intent were included both in this category and in overdose.

[†] SMRs for suicide and overdose were calculated for the years 2000 onwards only, using CDC Mortality data as reference rates.

Table 7: Standardized mortality ratios by years since start of follow-up.

| Years of follow-up | Esophageal cancer | | Stomach cancer | | Rectal cancer | | Laryngeal cancer | | Pancreatic cancer | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ |
| $[0, 10)$ | 0.28 | 1 | 1.01 | 9 | 0.48 | 2 | 1.11 | 2 | 0.79 | 5 |
| $[10, 20)$ | 1.02 | 14 | 1.12 | 25 | 0.88 | 10 | 1.10 | 7 | 0.88 | 20 |
| $[20, 30)$ | 1.13 | 35 | 1.02 | 36 | 0.81 | 16 | 1.08 | 14 | 1.16 | 57 |
| $[30, 40)$ | 1.15 | 59 | 1.09 | 49 | 0.78 | 22 | 1.44 | 27 | 1.04 | 88 |
| 40+ | 1.01 | 75 | 1.18 | 75 | 0.96 | 39 | 1.02 | 24 | 1.05 | 145 |
| *Total* | 1.06 | 184 | 1.11 | 194 | 0.86 | 89 | 1.17 | 74 | 1.05 | 315 |

Table 8: Standardized mortality ratios by entry year.

| Year of entry | Esophageal cancer | | Stomach cancer | | Rectal cancer | | Laryngeal cancer | | Pancreatic cancer | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ |
| 1940–1949 | 0.84 | 34 | 1.17 | 70 | 0.90 | 27 | 1.24 | 21 | 1.02 | 76 |
| 1950–1959 | 1.08 | 63 | 1.14 | 69 | 0.75 | 26 | 1.35 | 30 | 0.96 | 100 |
| 1960–1969 | 1.20 | 55 | 0.86 | 28 | 0.91 | 18 | 0.99 | 15 | 1.14 | 79 |
| 1970 onwards | 1.12 | 32 | 1.32 | 27 | 0.50 | 7 | 0.91 | 8 | 1.15 | 58 |
| Total | 1.06 | 184 | 1.11 | 194 | 0.79 | 79 | 1.16 | 74 | 1.05 | 315 |

Table 9: Standardized mortality ratios by calendar period.

| Calendar period | Esophageal cancer | | Stomach cancer | | Rectal cancer | | Laryngeal cancer | | Pancreatic cancer | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ |
| 1940–1954 | 0.99 | 1 | 1.11 | 5 | 1.11 | 2 | | 0 | 0.57 | 1 |
| 1955–1969 | 0.63 | 6 | 1.03 | 22 | 1.03 | 11 | 1.23 | 6 | 0.68 | 12 |
| 1970–1984 | 0.92 | 28 | 1.03 | 41 | 0.65 | 14 | 1.40 | 20 | 0.90 | 46 |
| 1985–1999 | 1.09 | 61 | 1.12 | 64 | 1.10 | 33 | 1.11 | 24 | 1.12 | 102 |
| 2000 onwards | 1.15 | 88 | 1.18 | 62 | 0.73 | 29 | 1.08 | 24 | 1.11 | 154 |
| Total | 1.06 | 184 | 1.11 | 194 | 0.86 | 89 | 1.17 | 74 | 1.05 | 315 |

Table 10: Standardized mortality ratios for deaths due to *all causes* by age at entry into follow-up and by number of years of follow-up.

| | [0,15) | | [15,30) | | [30,45) | | [45,60) | | 60+ | | Total | |
| | SMR | N | SMR | N | SMR | N | SMR | N | SMR | N | SMR | N |
| Age at entry | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [0,20) | 0.61 | 97 | 0.76 | 260 | 0.85 | 680 | 0.95 | 725 | 0.84 | 223 | 0.85 | 1,985 |
| [20,30) | 0.73 | 382 | 0.87 | 1,276 | 0.97 | 2,998 | 1.03 | 3,062 | 0.85 | 876 | 0.95 | 8,594 |
| [30,40) | 0.73 | 334 | 0.92 | 1,291 | 1.04 | 2,430 | 0.88 | 1,553 | 0.61 | 142 | 0.93 | 5,750 |
| [40,50) | 0.70 | 352 | 0.91 | 1,143 | 0.96 | 1,403 | 0.63 | 291 | 0.08 | 4 | 0.86 | 3,193 |
| [50,60) | 0.61 | 189 | 0.88 | 528 | 0.81 | 301 | 0.23 | 10 | | 0 | 0.78 | 1,028 |
| 60+ | 0.62 | 23 | 0.63 | 35 | 0.54 | 8 | 0.00 | 0 | | 0 | 0.61 | 66 |
| Total | 0.69 | 1,377 | 0.89 | 4,533 | 0.97 | 7,820 | 0.94 | 5,641 | 0.79 | 1,245 | 0.91 | 20,616 |

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Table 11: Standardized mortality ratios for deaths due to *all causes* by calendar year of entry into follow-up and by number of years of follow-up.

| | [0,15) | | [15,30) | | [30,45) | | [45,60) | | 60+ | | Total | |
| | SMR | N | SMR | N | SMR | N | SMR | N | SMR | N | SMR | N |
| Year of entry | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1940–1944 | 0.49 | 22 | 0.82 | 100 | 0.84 | 170 | 0.81 | 172 | 0.77 | 99 | 0.79 | 563 |
| 1945–1949 | 0.62 | 133 | 0.80 | 402 | 0.82 | 554 | 0.81 | 543 | 0.68 | 241 | 0.78 | 1,873 |
| 1950–1954 | 0.79 | 188 | 0.93 | 626 | 0.99 | 1,033 | 0.95 | 1,049 | 0.79 | 327 | 0.93 | 3,223 |
| 1955–1959 | 0.69 | 245 | 0.92 | 896 | 1.00 | 1,634 | 0.97 | 1,889 | 0.87 | 282 | 0.95 | 4,946 |
| 1960–1964 | 0.68 | 74 | 0.90 | 229 | 1.07 | 428 | 0.96 | 370 | | 0 | 0.96 | 1,101 |
| 1965–1969 | 0.74 | 128 | 0.87 | 359 | 0.97 | 738 | 0.97 | 488 | | 0 | 0.93 | 1,713 |
| 1970–1974 | 0.70 | 127 | 0.88 | 385 | 1.09 | 861 | 1.04 | 215 | | 0 | 0.98 | 1,588 |
| 1975 onwards | 0.66 | 267 | 0.88 | 917 | 0.96 | 1,307 | | 0 | | 0 | 0.89 | 2,491 |
| Total | 0.69 | 1,377 | 0.89 | 4,533 | 0.97 | 7,821 | 0.94 | 5,646 | 0.79 | 1,247 | 0.90 | 20,624 |

Table 12: Standardized mortality ratios for deaths due to *all external causes* by age at entry into follow-up and by number of years of follow-up.

| | Years of follow-up | | | | | | | | | | | |
| | $[0, 15)$ | | $[15, 30)$ | | $[30, 45)$ | | $[45, 60)$ | | 60+ | | Total | |
| Age at entry | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $[0, 20)$ | 0.61 | 65 | 0.76 | 74 | 0.71 | 54 | 0.78 | 23 | 0.24 | 2 | 0.69 | 218 |
| $[20, 30)$ | 0.83 | 207 | 1.06 | 269 | 0.98 | 175 | 0.91 | 80 | 0.83 | 24 | 0.95 | 755 |
| $[30, 40)$ | 1.06 | 99 | 1.58 | 160 | 1.27 | 90 | 0.86 | 39 | 0.48 | 3 | 1.24 | 391 |
| $[40, 50)$ | 1.30 | 61 | 1.90 | 91 | 1.60 | 59 | 0.97 | 11 | 0.00 | 0 | 1.54 | 222 |
| $[50, 60)$ | 1.35 | 21 | 2.70 | 45 | 1.59 | 15 | 0.91 | 1 | | 0 | 1.92 | 82 |
| 60+ | 3.73 | 5 | 2.02 | 3 | 5.46 | 2 | 0.00 | 0 | | 0 | 3.10 | 10 |
| Total | 0.89 | 458 | 1.24 | 642 | 1.06 | 395 | 0.88 | 154 | 0.65 | 29 | 1.03 | 1,678 |

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Table 13: Standardized mortality ratios for deaths due to *all external causes* by calendar year of entry into follow-up and by number of years of follow-up.

| | Years of follow-up | | | | | | | | | | | |
| | $[0, 15)$ | | $[15, 30)$ | | $[30, 45)$ | | $[45, 60)$ | | 60+ | | Total | |
| Year of entry | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ | SMR | $N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1940–1944 | 0.65 | 5 | 1.60 | 15 | 1.04 | 8 | 0.91 | 5 | 1.12 | 4 | 1.09 | 37 |
| 1945–1949 | 1.10 | 31 | 1.57 | 53 | 1.97 | 46 | 1.14 | 18 | 0.91 | 8 | 1.42 | 156 |
| 1950–1954 | 1.15 | 56 | 1.66 | 102 | 1.39 | 55 | 0.66 | 20 | 0.65 | 8 | 1.25 | 241 |
| 1955–1959 | 0.94 | 69 | 1.75 | 153 | 0.95 | 56 | 0.91 | 49 | 0.61 | 6 | 1.17 | 333 |
| 1960–1964 | 0.71 | 18 | 1.06 | 25 | 1.04 | 17 | 1.26 | 16 | | 0 | 0.97 | 76 |
| 1965–1969 | 0.84 | 50 | 0.62 | 31 | 0.90 | 35 | 0.90 | 17 | | 0 | 0.80 | 133 |
| 1970–1974 | 0.93 | 60 | 0.82 | 43 | 0.79 | 34 | 0.83 | 7 | | 0 | 0.85 | 144 |
| 1975 onwards | 0.74 | 101 | 0.99 | 127 | 0.90 | 82 | | 0 | | 0 | 0.87 | 310 |
| Total | 0.89 | 458 | 1.24 | 642 | 1.06 | 395 | 0.89 | 155 | 0.69 | 31 | 1.04 | 1,681 |

# Expected and observed counts

All causes



Figure 1: Change in the standardized mortality ratio for deaths due to all causes over age and calendar time.
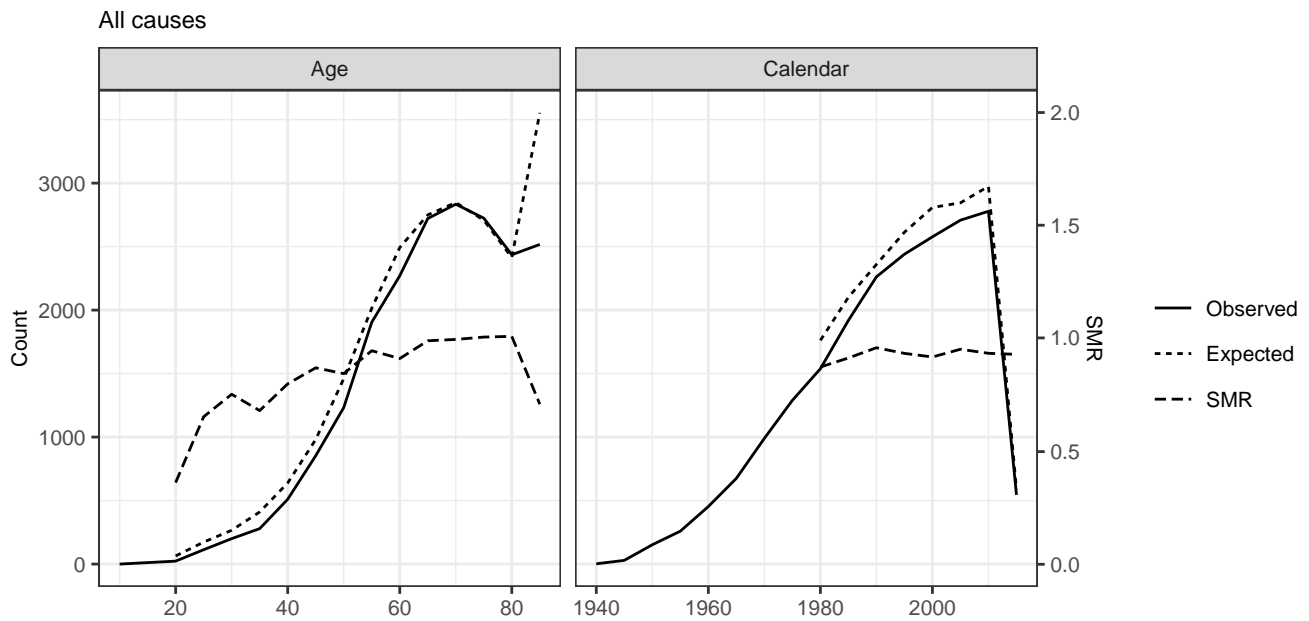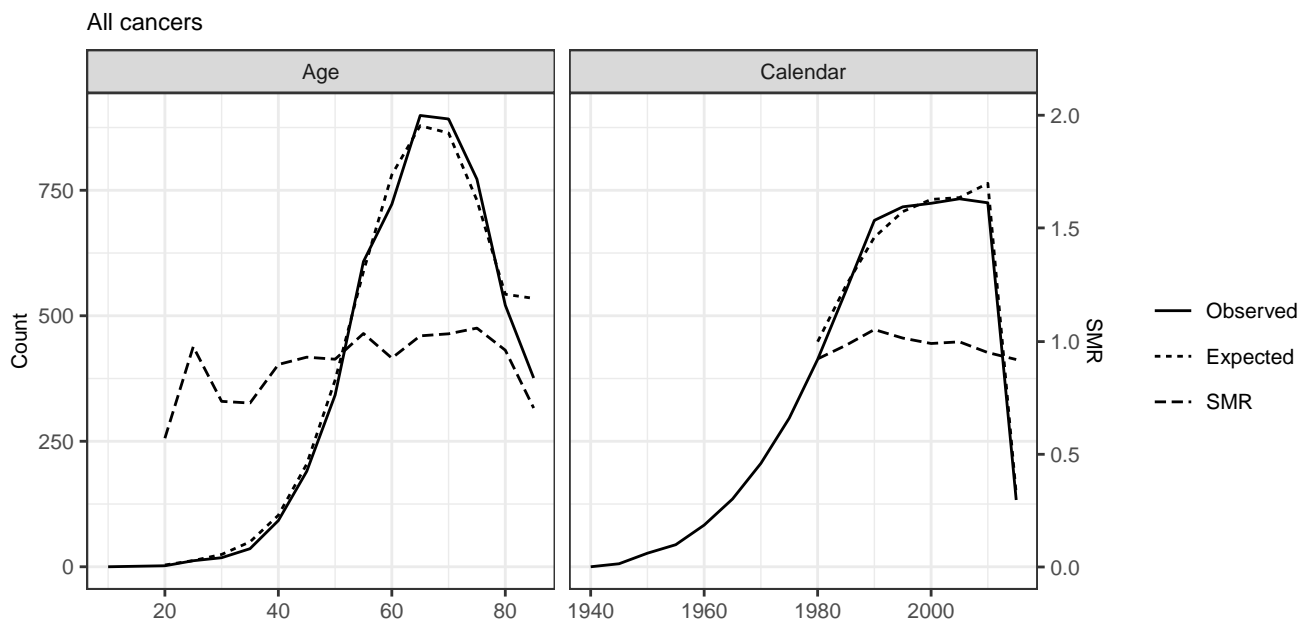
All cancers



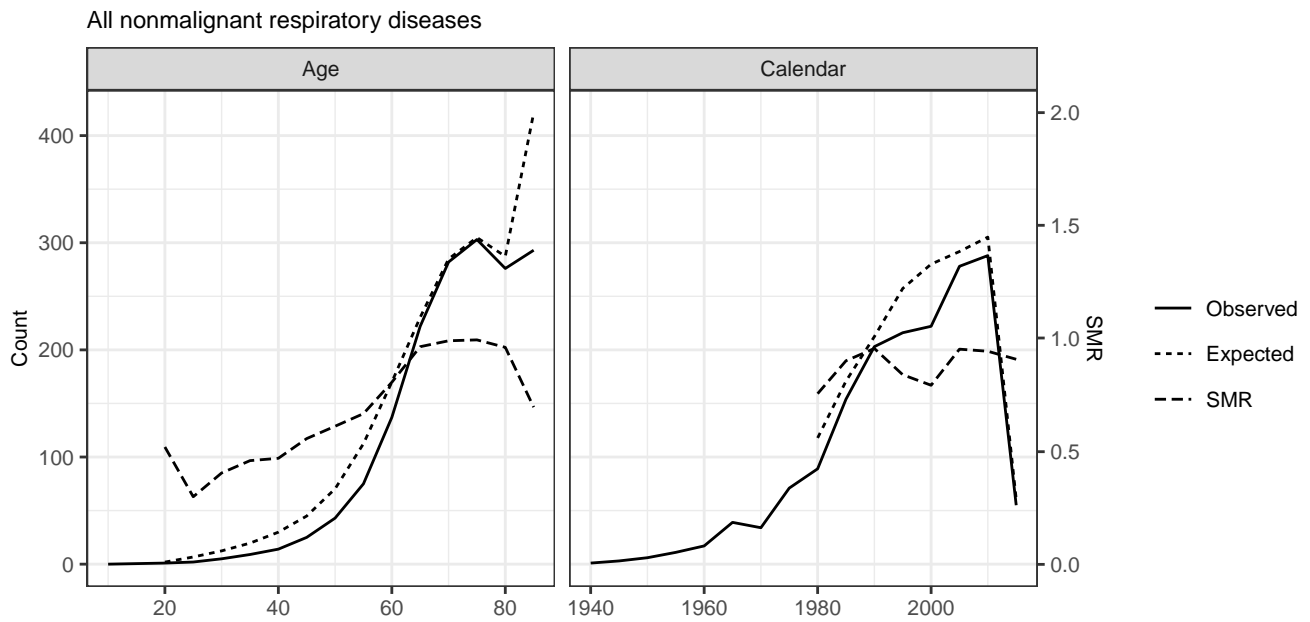Figure 2: Change in the standardized mortality ratio for deaths due to cancers over age and calendar time.

Figure 3: Change in the standardized mortality ratio for deaths due to nonmalignant respiratory disease over age and calendar time.
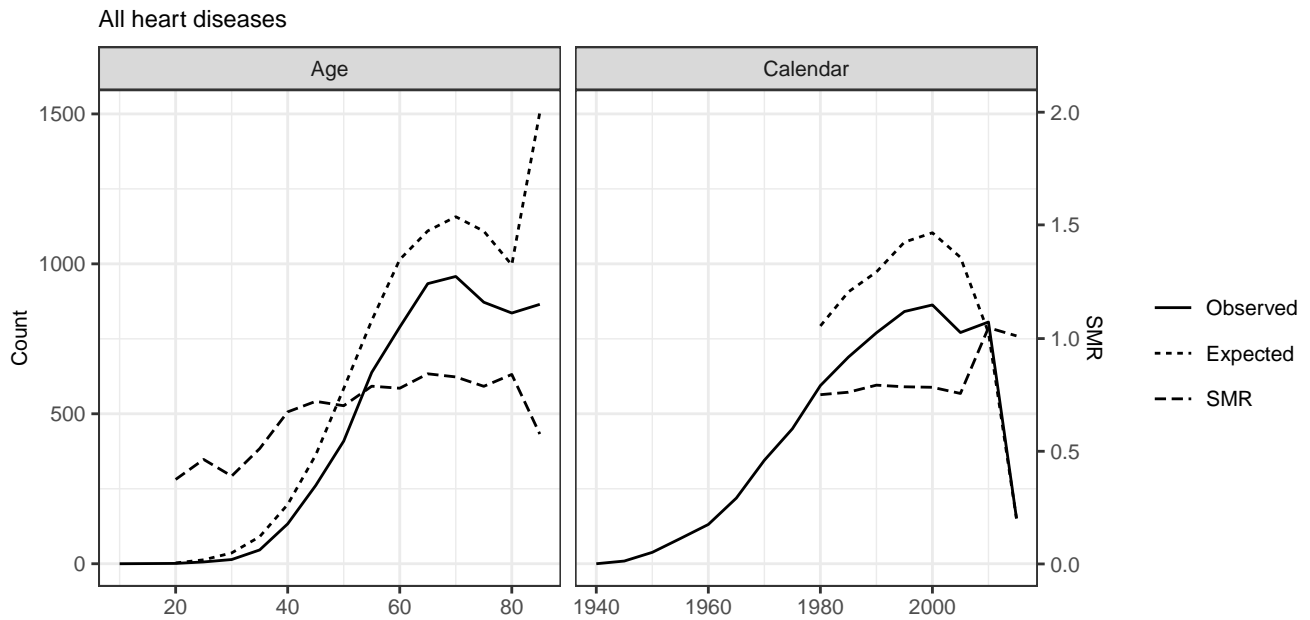


Figure 4: Change in the standardized mortality ratio for deaths due to heart disease over age and calendar time.
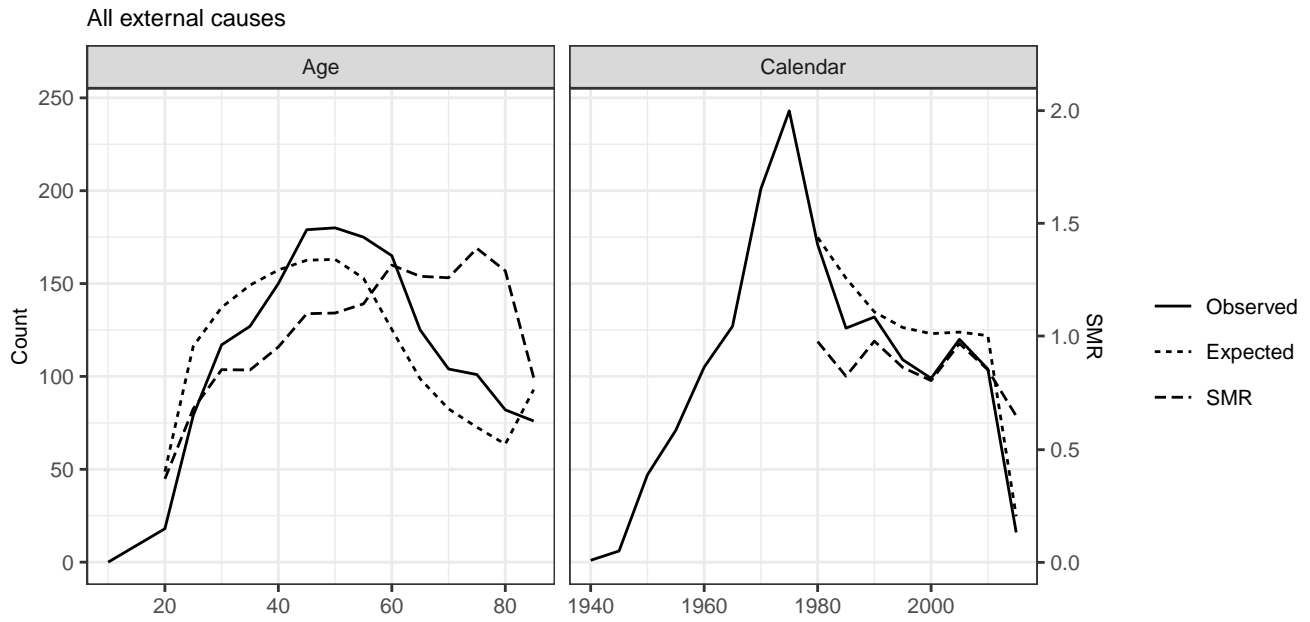
Figure 5: Change in the standardized mortality ratio for deaths due to external causes over age and calendar time.
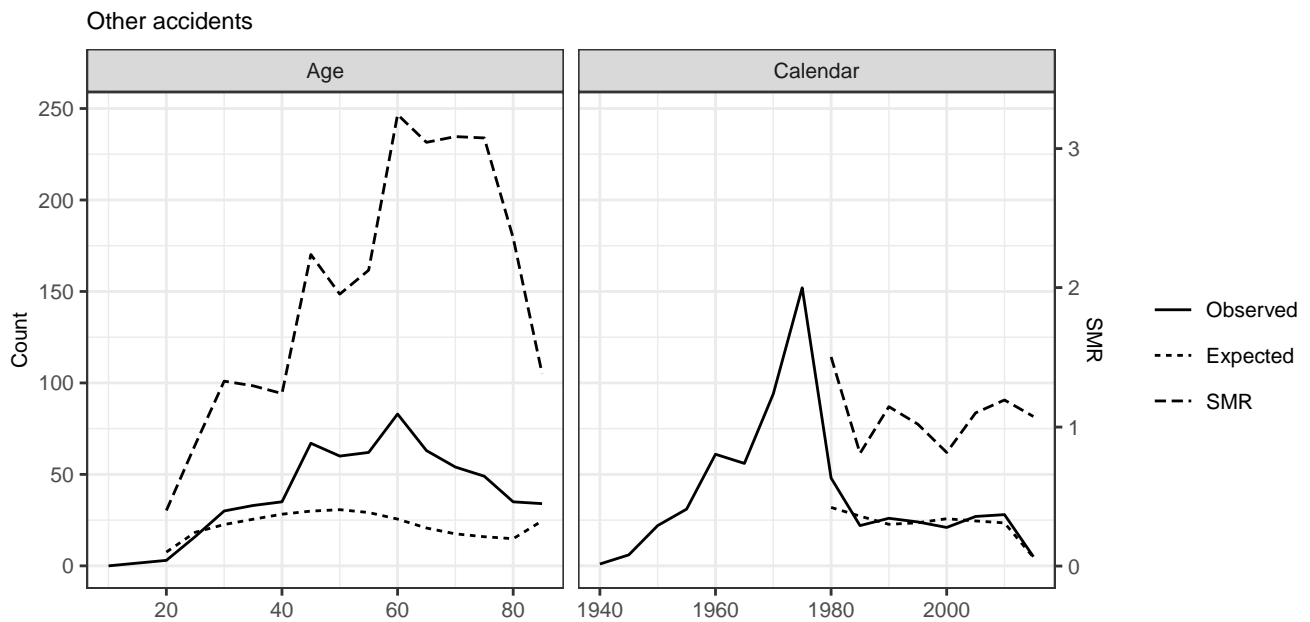


Figure 6: Change in the standardized mortality ratio for deaths due to other accidents over age and calendar time.