**Supplementary Material**

**e-Table 1. Administrative case definitions tested to identify MS cases in Saskatchewan**

|  |  |  |  |
| --- | --- | --- | --- |
| **Case definition** | **Within a 1-year period** | **Within a 2-year period** | **Within a 3-year period** |
| ≥2 hospital or physician claims for MS | X | X | X |
| ≥1 hospital or ≥2 physician claims for MS | X | X | X |
| ≥3 hospital or physician claims for MS | X | X | X |
| ≥1 hospital or ≥3 physician claims for MS | X | X | X |
| ≥5 hospital or physician claims for MS | X | X | X |
| ≥1 hospital or ≥5 physician claims for MS | X | X | X |
| ≥7 hospital or physician claims for MS | X | X | X |
| ≥1 hospital or ≥7physician claims for MS | X | X | X |
| ≥3 hospital, physician or prescription claims for MS over entire period |  |  |  |

**e-Table 2. Validation results for administrative case definitions used to identify MS cases**

| **Algorithm** | **Sensitivity**  **(95% CI)** | | **Specificity**  **(95% CI)** | | **PPV**  **(95% CI)** | | **NPV**  **(95% CI)** | | **Kappa**  **(95% CI)** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ≥7 hospital or physician claims in 3 years | 86.5 | 80.97-90.91 | 99.5 | 97.25-99.99 | 99.43 | 96.84-99.99 | 88.05 | 83.1-91.98 | 0.86 | 0.81-0.91 |
| ≥7 hospital or physician claims in 2 years | 82.5 | 76.51-87.5 | 99.5 | 97.25-99.99 | 99.40 | 96.69-99.98 | 85.04 | 79.82-89.36 | 0.82 | 0.76-0.88 |
| ≥7 hospital or physician claims in 1 year | 75.5 | 68.94-81.29 | 99.5 | 97.25-99.99 | 99.34 | 96.39-99.98 | 80.24 | 74.73-85.01 | 0.75 | 0.69-0.81 |
| ≥5 hospital or physician claims in 3 years | 92.0 | 87.33-95.36 | 99.5 | 97.25-99.99 | 99.46 | 97.03-99.99 | 92.56 | 88.2-95.69 | 0.92 | 0.88-0.95 |
| ≥5 hospital or physician claims in 2 years | 90.5 | 85.56-94.18 | 99.5 | 97.25-99.99 | 99.45 | 96.98-99.99 | 91.29 | 86.72-94.67 | 0.90 | 0.86-0.94 |
| ≥5 hospital or physician claims in 1 year | 84.0 | 78.17-88.79 | 99.5 | 97.25-99.99 | 99.41 | 96.75-99.99 | 86.15 | 81.01-90.33 | 0.84 | 0.78-0.89 |
| ≥3 hospital or physician claims in 3 years | 96.0 | 92.27-98.26 | 99.5 | 97.25-99.99 | 99.48 | 97.15-99.99 | 96.14 | 92.53-98.32 | 0.95 | 0.92-0.98 |
| ≥3 hospital or physician claims in 2 years | 96.0 | 92.27-98.26 | 99.5 | 97.25-99.99 | 99.48 | 97.15-99.99 | 96.14 | 92.53-98.32 | 0.95 | 0.92-0.98 |
| ≥3 hospital or physician claims in 1 year | 94.0 | 89.75-96.86 | 99.5 | 97.25-99.99 | 99.47 | 97.09-99.99 | 94.31 | 90.28-97.03 | 0.94 | 0.90-0.97 |
| ≥2 hospital or physician claims in 3 years | 97.5 | 94.26-99.18 | 99.5 | 97.25-99.99 | 99.49 | 97.19-99.99 | 97.55 | 94.37-99.2 | 0.97 | 0.95-0.99 |
| ≥2 hospital or physician claims in 2 years | 97.0 | 93.58-98.89 | 99.5 | 97.25-99.99 | 99.49 | 97.18-99.99 | 97.07 | 93.74-98.92 | 0.97 | 0.94-0.99 |
| ≥2 hospital or physician claims in 1 year | 97.0 | 93.58-98.89 | 99.5 | 97.25-99.99 | 99.49 | 97.18-99.99 | 97.07 | 93.74-98.92 | 0.96 | 0.93-0.99 |
| ≥1 hospital or ≥7 physician claims in 3 years | 87.5 | 82.1-91.74 | 99.0 | 96.43-99.88 | 98.87 | 95.98-99.86 | 88.79 | 83.9-92.61 | 0.86 | 0.81-0.91 |
| ≥1 hospital or ≥7 physician claims in 2 years | 83.5 | 77.62-88.36 | 99.0 | 96.43-99.88 | 98.82 | 95.79-99.86 | 85.71 | 80.53-89.96 | 0.82 | 0.76-0.87 |
| ≥1 hospital or ≥7 physician claims in 1 year | 77.0 | 70.54-82.64 | 99.0 | 96.43-99.88 | 98.72 | 95.45-99.84 | 81.15 | 75.67-85.85 | 0.76 | 0.69-0.82 |
| ≥1 hospital or ≥5 physician claims in 3 years | 92.5 | 87.93-95.74 | 99.0 | 96.43-99.88 | 98.93 | 96.19-99.87 | 92.96 | 88.65-96.01 | 0.91 | 0.87-0.95 |
| ≥1 hospital or ≥5 physician claims in 2 years (CCDSS definition) | 91.0 | 86.15-94.58 | 99.0 | 96.43-99.88 | 98.91 | 96.13-99.87 | 91.67 | 87.15-94.99 | 0.90 | 0.85-0.94 |
| ≥1 hospital or ≥5 physician claims in 1 year | 84.5 | 78.73-89.22 | 99.0 | 96.43-99.88 | 98.83 | 95.84-99.86 | 86.46 | 81.34-90.61 | 0.83 | 0.78-0.88 |
| ≥1 hospital or ≥3 physician claims in 3 years | 96.0 | 92.27-98.26 | 99.0 | 96.43-99.88 | 98.97 | 96.33-99.87 | 96.12 | 92.49-98.31 | 0.95 | 0.91-0.98 |
| ≥1 hospital or ≥3 physician claims in 2 years | 96.0 | 92.27-98.26 | 99.0 | 96.43-99.88 | 98.97 | 96.33-99.87 | 96.12 | 92.49-98.31 | 0.95 | 0.91-0.98 |
| ≥1 hospital or ≥3 physician claims in 1 years | 94.5 | 90.37-97.22 | 99.0 | 96.43-99.88 | 98.95 | 96.27-99.87 | 94.74 | 90.78-97.34 | 0.93 | 0.89-0.97 |
| ≥1 hospital or ≥2 physician claims in 3 years | 97.5 | 94.26-99.18 | 99.0 | 96.43-99.88 | 98.98 | 96.38-99.88 | 97.54 | 94.35-99.2 | 0.97 | 0.94-0.99 |
| ≥1 hospital or ≥2 physician claims in 2 years | 97.0 | 93.58-98.89 | 99.0 | 96.43-99.88 | 98.98 | 96.36-99.88 | 97.06 | 93.71-98.91 | 0.96 | 0.93-0.99 |
| ≥1 hospital or ≥2 physician claims in 1 years | 97.0 | 93.58-98.89 | 99.0 | 96.43-99.88 | 98.98 | 96.36-99.88 | 97.06 | 93.71-98.91 | 0.96 | 0.93-0.98 |
| ≥3 hospital, physician, or drug through whole period (Marrie definition) | 97.5 | 94.26-99.18 | 99.5 | 97.25-99.88 | 99.49 | 97.19-99.99 | 97.55 | 94.37-99.2 | 0.97 | 0.95-0.99 |

PPV: Positive predictive value, NPV: Negative predictive value, CCDSS: Canadian Chronic Disease Surveillance System

**e-Table 3a. Average annual incidence of MS in Saskatchewan by age and sex per 100,000, 2004 – 2013 (Marrie definition) with an 8-year run-in period**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Both** | | | **Males** | | | **Females** | | | **Female: male** | |
| **Age Group (years)** | **No. cases 2004-2013** | **AAI** | **95% CI** | **No. cases 2004-2013** | **AAI** | **95% CI** | **No. cases 2004-2013** | **AAI** | **95% CI** | **Risk Ratio** | **95% CI** |
| ≤19 | 36 | 1.30 | 0.87-1.72 | 11 | 0.78 | 0.32-1.23 | 25 | 1.85 | 1.12-2.57 | 2.38 | 1.17-4.84 |
| 20-24 | 111 | 14.31 | 11.65-16.98 | 33 | 8.28 | 5.45-11.10 | 78 | 20.70 | 16.10-25.29 | 2.50 | 1.66-3.76 |
| 25-29 | 160 | 22.28 | 18.83-25.73 | 54 | 14.71 | 10.79-18.63 | 106 | 30.19 | 24.44-35.94 | 2.05 | 1.48-2.85 |
| 30-34 | 180 | 27.23 | 23.25-31.21 | 58 | 17.30 | 12.85-21.76 | 122 | 37.44 | 30.80-44.09 | 2.16 | 1.58-2.96 |
| 35-39 | 207 | 32.22 | 27.83-36.61 | 70 | 21.63 | 16.56-26.70 | 137 | 42.97 | 35.78-50.17 | 1.99 | 1.49-2.65 |
| 40-44 | 214 | 30.37 | 26.30-34.44 | 55 | 15.52 | 11.42-19.62 | 159 | 45.39 | 38.33-52.45 | 2.92 | 2.15-3.97 |
| 45-49 | 231 | 29.89 | 26.03-33.74 | 76 | 19.47 | 15.09-23.85 | 155 | 40.52 | 34.14-46.89 | 2.08 | 1.58-2.74 |
| 50-54 | 191 | 25.83 | 22.17-29.49 | 60 | 15.97 | 11.93-20.01 | 131 | 36.02 | 29.85-42.19 | 2.26 | 1.66-3.06 |
| 55-59 | 113 | 17.97 | 14.66-21.29 | 40 | 12.51 | 8.63-16.39 | 73 | 23.62 | 18.20-29.04 | 1.89 | 1.28-2.78 |
| 60-64 | 69 | 13.95 | 10.66-17.24 | 28 | 11.26 | 7.09-15.43 | 41 | 16.66 | 11.56-21.76 | 1.48 | 0.91-2.39 |
| 65-69 | 45 | 11.55 | 8.18-14.93 | 17 | 8.88 | 4.66-13.11 | 28 | 14.12 | 8.89-19.36 | 1.59 | 0.87-2.90 |
| 70-74 | 35 | 10.48 | 7.01-13.95 | 10 | 6.30 | 2.39-10.20 | 25 | 14.28 | 8.68-19.87 | 2.27 | 1.09-4.72 |
| ≥75 | 27 | 3.49 | 2.17-4.80 | 11 | 3.55 | 1.45-5.64 | 16 | 3.44 | 1.76-5.13 | 0.97 | 0.45-2.09 |
| Total | 1619 | 15.51 | 14.76-16.27 | 523 | 10.06 | 9.20-10.92 | 1096 | 20.93 | 19.69-22.17 | 2.08 | 1.87-2.31 |

Marrie definition: ≥3 hospital, physician, or drug claims; AAI: average annual incidence

**e-Table 3b. Average annual incidence of MS in Saskatchewan by age and sex per 100,000, 2004 – 2013 (CCDSS definition) with an 8-year run-in period**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Both** | | | **Males** | | | **Females** | | | **Female: male** | |
| **Age Group**  **(years)** | **No. cases 2004-2013** | **AAI** | **95% CI** | **No. cases 2004-2013** | **AAI** | **95% CI** | **No. cases 2004-2013** | **AAI** | **95% CI** | **Risk Ratio** | **95% CI** |
| ≤19 | 35 | 1.26 | 0.84-1.68 | 10 | 0.70 | 0.27-1.14 | 25 | 1.85 | 1.12-2.57 | 2.62 | 1.26-5.45 |
| 20-24 | 95 | 12.25 | 9.79-14.71 | 28 | 7.02 | 4.42-9.62 | 67 | 17.78 | 13.52-22.03 | 2.53 | 1.63-3.93 |
| 25-29 | 143 | 19.91 | 16.64-23.17 | 45 | 12.26 | 8.68-15.84 | 98 | 27.90 | 22.38-33.42 | 2.28 | 1.60-3.24 |
| 30-34 | 143 | 21.62 | 18.08-25.17 | 48 | 14.32 | 10.27-18.37 | 95 | 29.14 | 23.28-35.00 | 2.04 | 1.44-2.88 |
| 35-39 | 173 | 26.91 | 22.90-30.92 | 59 | 18.23 | 13.58-22.88 | 114 | 35.72 | 29.16-42.28 | 1.96 | 1.43-2.68 |
| 40-44 | 176 | 24.96 | 21.27-28.64 | 50 | 14.11 | 10.20-18.02 | 126 | 35.92 | 29.65-42.19 | 2.55 | 1.83-3.53 |
| 45-49 | 189 | 24.43 | 20.94-27.91 | 63 | 16.13 | 12.15-20.12 | 126 | 32.88 | 27.14-38.62 | 2.04 | 1.51-2.76 |
| 50-54 | 144 | 19.45 | 16.27-22.63 | 46 | 12.23 | 8.70-15.77 | 98 | 26.90 | 21.57-32.22 | 2.20 | 1.55-3.12 |
| 55-59 | 92 | 14.62 | 11.63-17.60 | 38 | 11.88 | 8.10-15.66 | 54 | 17.44 | 12.79-22.10 | 1.47 | 0.97-2.22 |
| 60-64 | 65 | 13.12 | 9.93-16.31 | 27 | 10.85 | 6.76-14.95 | 38 | 15.42 | 10.51-20.32 | 1.42 | 0.87-2.33 |
| 65-69 | 44 | 11.28 | 7.95-14.62 | 14 | 7.31 | 3.48-11.14 | 30 | 15.12 | 9.71-20.53 | 2.07 | 1.10-3.90 |
| 70-74 | 30 | 8.98 | 5.76-12.19 | 13 | 8.18 | 3.73-12.63 | 17 | 9.70 | 5.09-14.31 | 1.19 | 0.58-2.44 |
| 75-79 | 20 | 6.80 | 3.82-9.79 | 9 | 6.78 | 2.35-11.2 | 11 | 6.83 | 2.79-10.87 | 1.01 | 0.42-2.44 |
| ≥80 | 16 | 3.34 | 1.70-4.98 | 6 | 3.40 | 0.68-6.13 | 10 | 3.30 | 1.26-5.35 | 0.97 | 0.35-2.67 |
| Total | 1365 | 13.08 | 12.39-13.77 | 456 | 8.77 | 7.96-9.57 | 909 | 17.36 | 16.23-18.49 | 1.98 | 1.77-2.21 |

CCDSS definition: ≥1 hospitalization or ≥5 physician claims within 2 years; AAI: average annual incidence

**e-Table 4a. Average annual prevalence of MS in Saskatchewan by age and sex per 100,000, 2001 – 2013 (Marrie Definition)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Both** | | | **Males** | | | **Female** | | | **Female: Male** | |
| **Age Group (years)** | **No. cases 2001-2013** | **AAP** | **95% CI** | **No. cases 2001-2013** | **AAP** | **95% CI** | **No. cases 2001-2013** | **AAP** | **95% CI** | **Rate Ratio** | **95% CI** |
| ≤19 | 154 | 4.22 | 3.55-4.89 | 59 | 3.16 | 2.35-3.97 | 108 | 6.06 | 4.92-7.21 | 1.92 | 1.40-2.64 |
| 20-24 | 470 | 47.17 | 42.90-51.43 | 107 | 20.88 | 16.93-24.84 | 363 | 74.99 | 67.28-82.70 | 3.59 | 2.89-4.45 |
| 25-29 | 1239 | 136.00 | 128.42-143.57 | 314 | 67.53 | 60.06-75.00 | 925 | 207.35 | 193.99-220.71 | 3.07 | 2.70-3.49 |
| 30-34 | 2056 | 241.75 | 231.30-252.20 | 533 | 123.94 | 113.42-134.47 | 1523 | 362.25 | 344.06-380.45 | 2.92 | 2.65-3.23 |
| 35-39 | 3220 | 371.31 | 358.48-384.14 | 929 | 213.50 | 199.77-227.22 | 2291 | 530.25 | 508.53-551.96 | 2.48 | 2.30-2.68 |
| 40-44 | 4615 | 486.44 | 472.41-500.47 | 1278 | 268.30 | 253.59-283.01 | 3337 | 706.40 | 682.43-730.37 | 2.63 | 2.47-2.81 |
| 45-49 | 5842 | 583.46 | 568.49-598.42 | 1544 | 305.42 | 290.19-320.66 | 4298 | 866.97 | 841.05-892.89 | 2.84 | 2.68-3.01 |
| 50-54 | 5976 | 644.44 | 628.10-660.78 | 1728 | 367.62 | 350.29-384.95 | 4248 | 929.00 | 901.06-956.94 | 2.53 | 2.39-2.67 |
| 55-59 | 5110 | 658.93 | 640.86-677.00 | 1513 | 385.15 | 365.74-404.56 | 3597 | 939.99 | 909.27-970.71 | 2.44 | 2.30-2.59 |
| 60-64 | 3704 | 600.12 | 580.79-619.45 | 1165 | 377.72 | 356.03-399.41 | 2539 | 822.28 | 790.29-854.26 | 2.18 | 2.03-2.33 |
| 65-69 | 2579 | 513.29 | 493.48-533.10 | 850 | 345.56 | 322.33-368.79 | 1729 | 674.16 | 642.38-705.94 | 1.95 | 1.80-2.12 |
| 70-74 | 1713 | 388.76 | 370.35-407.17 | 603 | 288.86 | 265.80-311.91 | 1110 | 478.70 | 450.54-506.86 | 1.66 | 1.50-1.83 |
| 75-79 | 1072 | 277.70 | 261.08-294.33 | 371 | 214.14 | 192.35-235.93 | 701 | 329.46 | 305.07-353.85 | 1.54 | 1.36-1.74 |
| ≥80 | 1092 | 178.09 | 167.53-188.65 | 285 | 126.97 | 112.23-141.71 | 807 | 207.61 | 193.29-221.94 | 1.64 | 1.43-1.87 |
| Total | 38842 | 288.03 | 285.17-290.89 | 11279 | 167.97 | 164.87-171.06 | 27576 | 407.30 | 402.5-412.095 | 2.42 | 2.37-2.48 |

Marrie definition: ≥3 hospital, physician, or drug claims; AAP: average annual prevalence

**e-Table 4b. Average annual prevalence of MS in Saskatchewan by age and sex per 100,000, 2001 – 2013 (CCDSS Definition)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Both** | | | **Male** | | | **Female** | | | **Female: male** | |
| **Age Group (years)** | **No. cases 2001-2013** | **AAP** | **95% CI** | **No. cases 2001-2013** | **AAP** | **95% CI** | **No. cases 2001-2013** | **AAP** | **95% CI** | **Rate Ratio** | **95% CI** |
| ≤19 | 117 | 3.21 | 2.63-3.79 | 31 | 1.66 | 1.08-2.24 | 86 | 4.83 | 3.81-5.85 | 2.91 | 1.93-4.38 |
| 20-24 | 398 | 39.94 | 36.02-43.87 | 87 | 16.98 | 13.41-20.55 | 311 | 64.25 | 57.11-71.39 | 3.78 | 2.98-4.80 |
| 25-29 | 1024 | 112.40 | 105.51-119.28 | 252 | 54.20 | 47.51-60.89 | 772 | 173.06 | 160.85-185.26 | 3.19 | 2.77-3.68 |
| 30-34 | 1696 | 199.42 | 189.93-208.91 | 428 | 99.53 | 90.10-108.96 | 1268 | 301.60 | 285.00-318.20 | 3.03 | 2.72-3.38 |
| 35-39 | 2659 | 306.50 | 294.85-318.16 | 812 | 186.61 | 173.77-199.44 | 1846 | 427.25 | 407.76-446.74 | 2.29 | 2.11-2.49 |
| 40-44 | 3797 | 399.69 | 386.97-412.41 | 1112 | 233.45 | 219.73-247.17 | 2680 | 567.32 | 545.84-588.80 | 2.43 | 2.27-2.61 |
| 45-49 | 4773 | 476.69 | 463.17-490.22 | 1311 | 259.33 | 245.30-273.37 | 3462 | 698.34 | 675.08-721.60 | 2.69 | 2.53-2.87 |
| 50-54 | 4848 | 522.91 | 508.19-537.63 | 1443 | 306.99 | 291.15-322.83 | 3406 | 744.86 | 719.85-769.88 | 2.43 | 2.28-2.58 |
| 55-59 | 4167 | 537.33 | 521.02-553.65 | 1250 | 318.20 | 300.56-335.84 | 2917 | 762.29 | 734.63-789.95 | 2.40 | 2.24-2.56 |
| 60-64 | 3057 | 495.29 | 477.74-512.85 | 979 | 317.41 | 297.53-337.29 | 2078 | 672.98 | 644.04-701.91 | 2.12 | 1.97-2.29 |
| 65-69 | 2142 | 426.31 | 408.26-444.37 | 697 | 283.36 | 262.32-304.39 | 1445 | 563.42 | 534.37-592.47 | 1.99 | 1.82-2.18 |
| 70-74 | 1379 | 312.96 | 296.44-329.48 | 473 | 226.58 | 206.16-247.00 | 906 | 390.72 | 365.28-416.17 | 1.72 | 1.54-1.93 |
| 75-79 | 859 | 222.53 | 207.64-237.41 | 299 | 172.58 | 153.02-192.15 | 560 | 263.19 | 241.39-284.99 | 1.53 | 1.33-1.75 |
| ≥80 | 888 | 144.82 | 135.30-154.35 | 236 | 105.14 | 91.72-118.55 | 652 | 167.74 | 154.86-180.61 | 1.60 | 1.37-1.85 |
| Total | 31799 | 235.28 | 233.21-238.39 | 9410 | 140.13 | 137.30-142.96 | 22389 | 330.69 | 326.36-335.01 | 2.36 | 2.30-2.42 |

CCDSS definition: ≥1 hospitalization or ≥5 physician claims within 2 years; AAP: average annual prevalence