**Data Supplement**

**Title**: Health Care Utilization and All-Cause Mortality in Adults with Epilepsy Prior and During the COVID-19 Pandemic: A Population-Based Study

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**Supplementary Text**:

**Text 1**: Details on the cost calculations from health administrative data.

**Text 2**: Details on mental health status definition.

**Supplementary Tables**

**Table 1**: Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause outpatient visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 2:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause primary care visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 3:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause specialist visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 4:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause outpatient virtual visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 5:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for sleep studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 6:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for electroencephalography (EEG) studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 7**:Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for magnetic resonance (MRI) studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 8:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for computed tomography (CT) studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 9:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause emergency department (ED) visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 10:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause hospitalization rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Table 11:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause mortality rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk.

**Supplementary Figures**

**Figure 1**: Observed versus projected all-cause primary care visit rates per 100,000 people at-risk.

**Figure 2**: Observed versus projected relevant diagnostic test rates per 100,000 people at-risk.

**Figure 3**: Observed versus projected all-cause mortality rates per 100,000 people at-risk.

**References**

**Text 1**: Details on the health system cost calculations from health administrative data.

The standardized previously developed approach (GETCOST macro) was used to determine individual-level health system costs from a public payer's perspective.1 Costsincluded hospital admissions, ED visits, same-day surgery visits, cancer centre treatments and visits, dialysis, other outpatient care (e.g., laboratory services), physician costs, homecare and long-term services, and prescription medications (covered by the Ontario Drug Benefit program for eligible individuals). All costs were standardized using health sector-specific consumer price indices to their equivalent 2021 Canadian dollar value.2

**Text 2**: Details on mental health status definition.

Mental health status was based on a previously developed mental health and addictions-related services classification algorithms for outpatient visits (the Ontario Health Insurance Plan [OHIP]), ED visits (the National Ambulatory Care Reporting System [NACRS]) and inpatient hospitalizations (the Discharge Abstract Database [DAD] and the Ontario Mental Health Reporting System [OMHRS]) for mental health and addictions-related complaints and ICES dementia cohort definition.

|  |  |  |
| --- | --- | --- |
| **Definition of mental health condition at baseline (Y/N)** | One or more mental health hospitalization/ED visit/outpatient visits within the last year OR met dementia definition | |
| **Hospitalizations/ED visits (from CIHI-DAD, NACRS, and OMHRS): Y/N** | | |
| **Hospitalizations/ED visits** | **ICD-10-CA (DAD/NACRS)** | **DSM or provisional diagnoses\* (OMHRS)** |
| Overall, any mental health disorder or addiction | Primary diagnosis at discharge equals F06−F99 (which excludes dementia), or secondary diagnoses fields equal X60−X84, Y10−Y19, Y28 when primary diagnosis is not F06−F99 | **DSM IV (For visits before April 1st, 2016):**   * AXIS1\_DSM4CODE\_DISCH1 = Any OMHRS diagnosis (includes missing; excludes 290.x, 294.x). * Exclude if AXIS1\_DSM4CODE\_DISCH1 missing and PROVDX\_DSM4CODE\_ADM1 =2   **DSM V (visits April 1st, 2016, and after):**   * DSM5CODE\_DISCH1 = Any OMHRS (includes missing; excludes 290.x, 294.0x-294.7x, 294.9x). * Exclude if DSM5CODE\_DISCH1 missing and PROVDX\_DSM5CODE\_ADM1 =17 |
| **Outpatient visits (from OHIP): Y/N** | | |
| **Outpatient visits** | **Algorithm** | **​Qualifying diagnoses codes (DXCODE)** |
| Overall, any mental health disorder or addiction | Psychiatrist [SPEC=19] and outpatient (LOCATION: O, L, H) and non-lab service [substr(FEECODE,1,1) ne 'G'] *OR*  FP/GP [SPEC=00] and MHA diagnosis code [DXCODE] and outpatient (LOCATION: O, L, H) and non-lab service [substr(FEECODE,1,1) ne 'G'] | ​**Psychotic Disorders**   * 295 Schizophrenia * 296 Manic-depressive psychoses, involutional melancholia * 297 Other paranoid states * 298 Other psychoses   **Non-Psychotic Disorders**   * 300 Anxiety neurosis, hysteria, neurasthenia, obsessive-compulsive neurosis, reactive depression * 301 Personality disorders * 302 Sexual deviations * 306 Psychosomatic illness * 309 Adjustment reaction * 311 Depressive disorder   **Substance Use Disorders**   * 303 Alcoholism * 304 Drug dependence   **Social Problems**   * 897 Economic problems * 898 Marital difficulties * 899 Parent-child problems * 900 Problems with aged parents or in-laws * 901 Family disruption/divorce * 902 Education problems * 904 Social maladjustment * 905 Occupational problems * 906 Legal problems * 909 Other problems of social adjustment |
| **Dementia: Y/N** | | |
| Met dementia definition | A person aged 40 to 110 years old is identified with dementia if s/he meets one of the following criteria:   * The person had at least 3 OHIP claims with a dementia diagnosis recorded which were each at least 30 days apart in a 2-year period, or * The person had at least one hospitalization or same day surgery with a dementia diagnosis recorded, or * The person had at least one ODB claim with a dementia medication (SUBCLNAM= CHOLINESTERASE INHIBITORS) dispensed | |

DAD, the Discharge Abstract Database; DSM, the Diagnostic and Statistical Manual; ED, emergency department; NACRS, the National Ambulatory Care Reporting System; ODB, the Ontario Drug Benefit; OHIP, the Ontario Health Insurance Plan; OMHRS, the Ontario Mental Health Reporting System.

**Table 1:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause outpatient visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

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| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I**  Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 76922.81 | 73897.67 (69688.25-78361.36) | **71262.71** | 80347.15 (75471.30-85538.66) | 79337.19 | 76357.40 (71533.38-81506.74) | **85,535.37** | 76,620.60 (71,546.91-82,059.42) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 52535.70 | 51597.38 (47643.85-55878.98) | **47785.16** | 54463.18 (50094.24-59213.57) | 53804.34 | 53535.97 (49129.22-58337.99) | **59004.14** | 52340.84 (47822.37-57293.06) |
| 25-34 | 63426.12 | 60805.95 (57421.89-64389.44) | **58491.47** | 65631.11 (61662.11-69856.43) | 64803.68 | 62027.64 (58136.13-66179.63) | **69474.95** | 62518.74 (58413.24-66916.79) |
| 35-49 | 71830.66 | 70960.69 (65918.59-76388.45) | **65531.16** | 74489.82 (69196.96-80187.53) | 71709.91 | 70512.21 (65501.97-75905.67) | **78790.94** | 71403.51 (66118.75-77115.40) |
| 50-64 | 79930.20 | 78935.14 (74148.20-84031.13) | **74217.61** | 84926.69 (79656.32-90545.89) | 81777.95 | 80421.34 (75188.97-86017.83) | **88332.71** | 80990.84 (75473.20-86916.00) |
| 65 and older | 97766.89 | 92996.24 (87855.56-98437.71) | **91780.54** | 104428.22 (98379.66-110849.05) | 104003.96 | 99187.88 (93092.24-105682.67) | **110331.88** | 99370.21 (92918.39-106276.11) |
| Sex subgroups | | | | | | | | |
| Female | 83774.97 | 80638.00 (75770.77-85817.89) | **78478.61** | 88107.17 (82452.20-94150.72) | 87511.37 | 84122.55 (78509.58-90136.83) | **94204.52** | 83931.18 (78059.82-90250.80) |
| Male | 70489.10 | 67786.89 (64151.88-71627.87) | **64497.57** | 72927.82 (68640.79-77483.65) | 71689.96 | 69238.36 (64985.05-73770.06) | **77438.89** | 69727.68 (65241.63-74526.27) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 2:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause primary care visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

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| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 45761.40 | 45729.83 (42787.47-48874.53) | **43975.48** | 48139.30 (45041.90-51449.69) | 48261.52 | 46270.24 (43293.11-49452.10) | **50765.80** | 46415.54 (43303.85-49753.31) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 29362.96 | 29228.79 (26956.75-31692.33) | **25431.95** | 30414.38 (27988.40-33050.71) | 29316.58 | 29758.01 (27350.41-32377.54) | 31815.42 | 29524.73 (27072.96-32199.58) |
| 25-34 | 36742.16 | 36197.72 (33974.66-38566.23) | **33828.19** | 38528.04 (36136.42-41077.96) | 37589.07 | 36683.53 (34277.45-39258.51) | **39946.85** | 37101.55 (34555.25-39837.13) |
| 35-49 | 43440.23 | 41720.43 (39176.68-44429.35) | **40218.42** | 43619.03 (40858.10-46566.67) | 43462.96 | 41480.97 (38708.76-44451.76) | **47140.32** | 41718.14 (38622.61-45065.31 |
| 50-64 | 47251.19 | 47074.61 (44167.49-50173.08) | **46206.92** | 49845.06 (46709.08-53191.65) | 50354.65 | 47657.12 (44563.20-50965.86) | **52802.23** | 47817.96 (44513.72-51370.38) |
| 65 and older | 59362.36 | 58191.05 (54680.62-61926.85) | 59679.16 | 62067.06 (58299.29-66078.34) | **65480.24** | 60743.14 (56999.18-64733.02) | **67015.21** | 60622.43 (56653.96-64872.69) |
| Sex subgroups | | | | | | | | |
| Female | 49770.57 | 49102.11 (46161.51-52230.03) | **48486.94** | 52484.01 (49284.58-55891.21) | 53363.07 | 50784.47 (47530.46-54261.26) | **56256.33** | 50711.74 (47311.28-54358.93) |
| Male | 41997.07 | 41260.66 (39517.83-43080.34) | **39745.87** | 44200.62 (42308.79-46177.04) | 43488.88 | 41838.87 (39979.88-43784.32) | **45637.94** | 42769.55 (40594.59-45070.57) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 3:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause specialist visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 31161.92 | 29960.56 (28338.30-31675.68) | **27287.23** | 32630.78 (30423.56-35001.12) | 31076.01 | 31138.68 (28856.00-33601.93) | **34769.57** | 31288.92 (28923.82-33848.76) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 23172.73 | 23115.36 (21047.31-25386.61) | 22353.22 | 23906.14 (21675.19-26366.93) | 24487.76 | 23845.39 (21577.52-26351.61) | **27188.72** | 23068.34 (20764.07-25632.83) |
| 25-34 | 26683.96 | 25127.30 (23073.07-27364.42) | **24663.28** | 28036.02 (25744.19-30531.87) | 27216.61 | 26204.93 (24062.87-28537.66) | **29528.10** | 26520.91 (24225.73-29038.41) |
| 35-49 | 28390.43 | 27550.55 (25650.75-29591.06) | **25312.74** | 29220.89 (26985.78-31642.06) | 28246.96 | 27768.74 (25551.60-30178.26) | **31650.62** | 28121.87 (25783.84-30674.44) |
| 50-64 | 32679.01 | 32440.45 (31126.26-33810.12) | **28010.69** | 34116.35 (32648.87-35649.91) | 31423.30 | 32343.12 (30832.50-33928.03) | **35530.48** | 32828.13 (30941.86-34829.45) |
| 65 and older | 38406.56 | 36812.07 (34134.56-39699.61) | **32101.38** | 42427.41 (39213.52-45904.93) | 38523.72 | 39423.17 (36385.12-42714.88) | 43316.67 | 40033.18 (36797.97-43557.46) |
| Sex subgroups | | | | | | | | |
| Female | 34004.40 | 32107.83 (30041.25-34316.58) | **29991.67** | 35966.49 (33369.41-38766.91) | 34148.30 | 34177.05 (31591.65-36974.03) | **37948.18** | 34178.87 (31488.82-37101.33) |
| Male | 28493.03 | 27609.86 (25914.46-29416.19) | **24751.70** | 29850.46 (27774.63-32082.51) | 28201.74 | 28235.11 (26171.07-30461.94) | **31800.95** | 28694.11 (26513.01-31056.62) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 4:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause outpatient virtual visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 2095.12 | 1951.95 (1808.70-2095.20) | **40590.38** | 2154.37 (2006.51-2302.23) | **46017.95** | 2227.40 (2037.05-2417.74) | **48091.56** | 2357.71 (2110.30-2605.13) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 1605.45 | 1422.85 (1181.94-1663.75) | **31428.56** | 1505.47 (1264.45-1746.48) | **36814.28** | 1597.02 (1354.22-1839.82) | **39217.65** | 1718.16 (1463.68-1972.64) |
| 25-34 | 3267.59 | 3233.53 (2953.75-3513.31) | **35845.46** | 3447.45 (3162.31-3732.59) | **41062.76** | 3581.01 (3280.26-3881.76) | **43636.30** | 3702.94 (3377.86-4028.01) |
| 35-49 | **3352.97** | 2899.05 (2537.99-3260.11) | **39953.33** | 3220.03 (2848.71-3591.35) | **45375.57** | 3281.50 (2880.71-3682.29) | **48520.56** | 3532.22 (3072.25-3992.20) |
| 50-64 | 1785.76 | 1257.03 (716.93-2204.00) | **43009.51** | 1413.06 (805.92-2477.57) | **48066.03** | 1430.70 (815.99-2508.51) | **49743.80** | 1422.14 (800.57-2529.76) |
| 65 and older | 792.56 | 805.17 (692.14-918.20) | **45793.23** | 836.24 (718.68-953.81) | **51761.44** | 874.54 (743.51-1005.57) | **52829.60** | 930.17 (775.59-1084.74) |
| Sex subgroups | | | | | | | | |
| Female | 2071.55 | 1936.18 (1767.30-2105.06) | **45463.36** | 2108.15 (1929.66-2286.64) | **51450.90** | 2186.29 (1954.28-2418.31) | **53843.28** | 2323.58 (2020.10-2627.05) |
| Male | 2117.26 | 1967.95 (1791.81-2144.09) | **36022.34** | 2111.20 (1935.05-2287.34) | **40935.26** | 2182.21 (2006.07-2358.35) | **42719.80** | 2295.07 (2115.74-2474.40) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 5:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for sleep studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I**  Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 207.16 | 210.28 (181.88-243.11) | **52.92** | 216.05 (186.21-250.67) | **114.38** | 214.09 (184.10-248.97) | 184.11 | 208.15 (179.03-242.00) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 87.85 | 116.18 (47.97-184.39) | **36.88** | 117.13 (47.90-186.36) | 117.60 | 130.02 (60.79-199.25) | 102.36 | 114.76 (44.79-184.72) |
| 25-34 | 180.71 | 185.92 (123.14-280.73) | **54.87** | 172.12 (113.31-261.44) | 120.66 | 170.45 (112.21-258.91) | 194.60 | 174.61 (114.44-266.43) |
| 35-49 | 233.82 | 246.09 (186.15-325.34) | **62.51** | 251.84 (189.73-334.28) | **113.60** | 250.31 (187.06-334.96) | 253.41 | 249.88 (186.48-334.84) |
| 50-64 | 266.58 | 276.39 (214.34-356.41) | **60.17** | 276.39 (214.34-356.41) | **141.61** | 276.39 (214.34-356.41) | **205.03** | 276.39 (214.34-356.41) |
| 65 and older | 193.07 | 181.18 (128.95-254.55) | **43.10** | 204.94 (145.42-288.84) | **81.68** | 203.15 (144.15-286.31) | 133.48 | 186.83 (132.13-264.18) |
| Sex subgroups | | | | | | | | |
| Female | 192.80 | 186.60 (148.37-234.68) | **44.15** | 202.68 (160.60-255.78) | **112.72** | 198.23 (157.08-250.17) | 171.53 | 187.47 (148.17-237.19) |
| Male | 220.64 | 236.12 (194.04-287.34) | **61.13** | 223.56 (181.24-275.78) | **115.94** | 229.63 (183.59-287.21) | 195.86 | 224.92 (176.82-286.12) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 6:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for electroencephalography (EEG) studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 1808.74 | 1825.91 (1688.09-1975.00) | **700.13** | 1922.09 (1771.35-2085.68) | **1199.39** | 1798.59 (1649.30-1961.39) | **1347.96** | 1792.12 (1636.33-1962.76) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 3168.06 | 2754.43 (2157.72-3516.17) | **974.84** | 3111.40 (2437.35-3971.86) | **1630.25** | 2865.22 (2244.50-3657.59) | **2094.40** | 2761.72 (2163.42-3525.47) |
| 25-34 | 2523.12 | 2429.60 (1924.64-3067.05) | **926.14** | 2427.03 (1891.21-3114.88) | 1821.61 | 2296.53 (1774.28-2972.50) | 1825.92 | 2198.77 (1693.95-2854.11) |
| 35-49 | 1935.63 | 2001.22 (1523.03-2479.40) | **575.40** | 1987.89 (1508.76-2467.02) | **1078.44** | 1916.47 (1435.49-2397.46) | **1378.10** | 1957.79 (1471.66-2443.93) |
| 50-64 | 1325.09 | 1408.08 (1154.48-1717.38) | **670.06** | 1613.19 (1320.53-1970.70) | **967.59** | 1370.35 (1079.18-1740.09) | **1062.80** | 1542.20 (1199.98-1983.51) |
| 65 and older | 1131.88 | 1282.33 (1057.50-1554.95) | **565.66** | 1280.42 (1055.89-1552.70) | **935.84** | 1277.46 (1053.42-1549.15) | **972.20** | 1277.46 (1053.42-1549.15) |
| Sex subgroups | | | | | | | | |
| Female | 1794.46 | 1874.73 (1687.82-2082.34) | **694.59** | 2026.19 (1821.33-2254.09) | **1138.42** | 1872.73 (1683.39-2083.37) | **1358.84** | 1861.38 (1671.29-2073.10) |
| Male | 1822.15 | 1686.47 (1433.64-1983.87) | **705.32** | 1803.65 (1533.26-2121.72) | **1256.43** | 1677.29 (1425.84-1973.08) | **1337.82** | 1682.75 (1429.68-1980.62) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 7**:Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for magnetic resonance (MRI) studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 2024.73 | 2006.34 (1912.39-2104.90) | **1353.05** | 2068.11 (1969.86-2171.26) | **1870.51** | 1998.60 (1903.66-2098.29) | 2112.39 | 2040.84 (1942.85-2143.77) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 1374.04 | 1526.29 (1269.39-1835.20) | **1000.53** | 1478.80 (1225.89-1783.91) | 1326.67 | 1507.10 (1241.59-1829.37) | 1638.93 | 1507.10 (1241.59-1829.37) |
| 25-34 | 1623.10 | 1697.07 (1532.89-1878.83) | **1025.11** | 1659.13 (1493.70-1842.91) | 1561.92 | 1633.62 (1464.07-1822.80) | 1755.07 | 1675.81 (1500.37-1871.77) |
| 35-49 | 2241.86 | 2150.54 (1910.57-2420.64) | **1422.92** | 2199.97 (1951.96-2479.49) | 2001.25 | 2081.71 (1845.68-2347.92) | 2270.26 | 2171.71 (1920.02-2456.51) |
| 50-64 | 2428.70 | 2344.44 (2168.07-2535.16) | **1705.47** | 2409.97 (2226.06-2609.09) | 2198.51 | 2352.17 (2172.67-2546.51) | 2497.04 | 2384.35 (2200.50-2583.56) |
| 65 and older | 1975.21 | 1965.28 (1808.63-2135.51) | **1303.51** | 2100.07 (1926.82-2288.91) | **1866.96** | 2043.11 (1871.34-2230.64) | 2035.40 | 2090.67 (1914.51-2283.05) |
| Sex subgroups | | | | | | | | |
| Female | 2137.96 | 2093.64 (1940.23-2259.17) | **1373.17** | 2222.81 (2059.74-2398.79) | **1905.58** | 2101.89 (1947.11-2268.97) | 2204.10 | 2168.21 (2006.81-2342.60) |
| Male | 1918.41 | 1915.61 (1785.27-2055.47) | **1334.17** | 1922.84 (1791.80-2063.47) | 1837.70 | 1900.91 (1770.73-2040.66) | 2026.73 | 1922.26 (1789.33-2065.06) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 8:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for computed tomography (CT) studies’ rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 3884.55 | 3879.68 (3647.37-4126.78) | **2926.87** | 4199.82 (3948.34-4467.31) | **3875.36** | 4140.35 (3892.43-4404.06) | 4096.44 | 4130.12 (3878.41-4398.19) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 1624.01 | 1529.00 (1206.16-1851.83) | **1055.86** | 1462.34 (1126.46-1798.23) | 1558.67 | 1433.49 (1079.97-1787.02) | 1587.01 | 1420.60 (1063.01-1778.18) |
| 25-34 | 1871.03 | 2036.31 (1777.08-2295.53) | **1440.82** | 2060.70 (1799.07-2322.34) | 2066.54 | 2014.05 (1746.28-2281.83) | 2217.23 | 2003.70 (1724.33-2283.06) |
| 35-49 | 3027.59 | 2784.28 (2451.73-3161.94) | **2135.94** | 2938.23 (2587.29-3336.77) | 2973.85 | 2901.48 (2554.93-3295.04) | 3037.75 | 2878.71 (2529.51-3276.21) |
| 50-64 | 4349.61 | 4297.42 (4031.71-4580.65) | **3565.61** | 4719.99 (4415.19-5045.84) | 4383.93 | 4604.11 (4300.22-4929.47) | 4675.67 | 4564.95 (4262.30-4889.08) |
| 65 and older | 6454.21 | 6518.71 (5975.71-7111.05) | **4738.44** | 6718.20 (6147.74-7341.60) | 6321.39 | 6574.11 (5985.97-7220.05) | 6714.55 | 6578.53 (5931.47-7296.56) |
| Sex subgroups | | | | | | | | |
| Female | 3773.38 | 3774.71 (3562.15-3999.96) | **2830.50** | 4106.21 (3858.00-4370.43) | **3689.86** | 4007.69 (3743.20-4290.87) | 3899.63 | 4008.34 (3732.44-4304.64) |
| Male | 3988.93 | 3887.72 (3513.85-4301.36) | **3017.21** | 4084.66 (3691.86-4519.26) | 4048.90 | 4016.05 (3629.85-4443.35) | 4280.29 | 3964.54 (3574.85-4396.85) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 9:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause emergency department (ED) visit rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 10100.69 | 10068.26 (9784.08-10360.69) | **7493.03** | 10732.22 (10424.83-11048.68) | **9521.78** | 11212.29 (10891.15-11542.90) | **8665.09** | 10421.43 (10119.82-10732.04) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 10635.96 | 10406.63 (9514.42-11382.50) | **6920.14** | 10689.30 (9772.86-11691.68) | **8823.35** | 11143.63 (10188.23-12188.61) | **8329.43** | 10774.22 (9837.51-11800.24) |
| 25-34 | 10883.78 | 10561.66 (9953.70-11206.76) | **8174.95** | 11976.97 (11212.84-12793.49) | **9790.89** | 12469.92 (11603.33-13401.23) | **9020.75** | 11456.07 (10652.73-12319.99) |
| 35-49 | 10794.69 | 10671.54 (9966.06-11426.95) | **7978.22** | 11348.54 (10561.48-12194.35) | **10134.04** | 12070.14 (11123.99-13096.85) | **9533.79** | 11103.14 (10081.62-12228.82) |
| 50-64 | 9550.07 | 9497.15 (9063.98-9951.03) | **7375.21** | 10268.54 (9754.42-10809.85) | **9727.70** | 10759.18 (10182.51-11368.52) | **8299.70** | 9838.96 (9304.23-10404.44) |
| 65 and older | 9331.92 | 9390.75 (8902.21-9906.11) | **7004.47** | 9954.36 (9434.83-10502.50) | **8921.56** | 10134.67 (9600.67-10698.37) | **8218.92** | 9574.99 (9062.68-10116.26) |
| Sex subgroups | | | | | | | | |
| Female | 10872.34 | 10678.63 (10235.94-11140.48) | **7477.15** | 11263.43 (10789.72-11757.95) | **9447.19** | 11626.72 (11137.72-12137.19) | **8699.14** | 10968.44 (10502.28-11455.28) |
| Male | 9376.17 | 9355.86 (9004.28-9721.17) | **7507.85** | 10078.15 (9654.03-10521.18) | **9591.56** | 10662.91 (10055.23-11307.49) | **8633.30** | 9756.32 (9026.57-10545.57) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 10:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause hospitalization rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 2286.45 | 2272.71 (2141.90-2411.51) | **1754.93** | 2302.32 (2169.81-2442.93) | 2130.06 | 2243.01 (2113.91-2380.00) | 2190.15 | 2279.70 (2145.83-2421.94) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 1258.26 | 1149.99 (933.50-1416.67) | **815.68** | 1218.22 (977.34-1518.60) | 949.36 | 1198.81 (930.29-1544.94) | 1012.71 | 1278.25 (944.15-1731.47) |
| 25-34 | 1601.58 | 1523.98 (1344.67-1727.19) | **1173.16** | 1706.02 (1495.92-1945.65) | 1566.18 | 1627.78 (1423.77-1861.03) | 1469.25 | 1659.24 (1449.37-1899.51) |
| 35-49 | 1713.85 | 1612.76 (1425.64-1824.43) | **1261.04** | 1687.11 (1485.55-1916.03) | 1646.16 | 1604.38 (1409.13-1826.70) | 1669.55 | 1646.82 (1443.87-1878.34) |
| 50-64 | 2360.06 | 2347.80 (2145.36-2569.34) | **1869.30** | 2340.50 (2136.77-2563.65) | 2197.30 | 2340.04 (2135.30-2564.42) | 2250.24 | 2340.05 (2135.30-2564.43) |
| 65 and older | 3599.06 | 3758.63 (3434.18-4113.73) | **2849.11** | 3716.07 (3395.30-4067.15) | 3355.08 | 3622.29 (3309.61-3964.51) | 3543.37 | 3700.21 (3375.84-4055.80) |
| Sex subgroups | | | | | | | | |
| Female | 2281.23 | 2294.19 (2112.72-2491.25) | **1769.21** | 2295.62 (2105.77-2502.60) | 2100.16 | 2289.69 (2096.18-2501.06) | 2128.69 | 2289.69 (2096.18-2501.06) |
| Male | 2291.35 | 2236.10 (2070.79-2414.61) | **1741.55** | 2309.28 (2122.08-2513.07) | 2158.04 | 2230.24 (2041.19-2436.80) | 2247.58 | 2279.01 (2077.09-2500.83) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

**Table 11:** Observed and projected monthly rates and 95% confidence intervals (CI) estimated by ARIMA Models for all-cause mortality rates in individuals with epilepsy: rates were calculated as the number of events per 100,000 people at risk. Similar periods in previous years (2016-2019) were used to calculate projected rates.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Population of interest** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** | **Observed** | **Projected**  **(95% CI)** |
| **Pre-COVID**  Jan-Feb 2020 | | **Wave I** Mar-May 2020 | | **Summer Lull**  Jun-Aug 2020 | | **Wave II** Sep 2020 - Mar 2021 | |
| Total population | 332.72 | 327.38 (292.97-365.83) | **355.78** | 308.78 (276.33-345.05) | 301.28 | 276.44 (247.39-308.91) | 342.71 | 320.15 (286.50-357.75) |
| Age subgroups, years old | | | | | | | | |
| 18-24 | 36.99 | 35.93 (7.01-64.84) | 33.85 | 35.93 (7.01-64.84) | 30.91 | 35.93 (7.01-64.84) | 42.53 | 35.93 (7.01-64.84) |
| 25-34 | 73.49 | 54.21 (18.31-90.12) | 62.87 | 52.11 (15.97-88.26) | 64.36 | 54.16 (17.67-90.66) | 62.66 | 56.09 (19.43-92.76) |
| 35-49 | 115.72 | 103.91 (65.99-163.61) | 105.74 | 103.91 (65.99-163.61) | 127.97 | 103.91 (65.99-163.61) | 127.08 | 103.91 (65.99-163.61) |
| 50-64 | 294.04 | 300.36 (233.29-386.73) | 307.57 | 268.39 (208.45-345.56) | 276.59 | 254.48 (197.65-327.66) | 292.37 | 276.93 (214.44-357.66) |
| 65 and older | 857.70 | 868.91 (752.01-1004.00) | **950.48** | 809.41 (700.51-935.24) | 746.93 | 711.18 (615.49-821.74) | 886.76 | 830.92 (719.12-960.10) |
| Sex subgroups | | | | | | | | |
| Female | 329.85 | 306.25 (241.92-387.68) | 323.14 | 286.88 (226.55-363.28) | 273.13 | 248.11 (195.93-314.19) | 310.82 | 294.30 (231.67-373.88) |
| Male | 335.42 | 343.02 (282.96-415.84) | 386.39 | 350.44 (288.79-425.24) | 327.61 | 284.87 (234.62-345.87) | 372.50 | 344.87 (280.53-424.31) |

In bold: observed rates outside the projected 95% confidence intervals of projected rates were considered as significantly different.

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**Figure 1**: Observed versus projected all-cause primary care visit rates per 100,000 people at-risk.

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**Figure 2**: Observed versus projected relevant diagnostic test rates per 100,000 people at-risk.

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**Figure 3**: Observed versus projected all-cause mortality rates per 100,000 people at-risk.

**References**

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