**Supplementary Information**

**Spatiotemporal trends and covariates of Lyme borreliosis incidence in Poland, 2010-2019**

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**Supplementary Table S1.** Mean incidence of Lyme borreliosis in Poland 2010-2019

| Voivodeship | Territorial identifier | Districts | Mean incidence (per 100,000 inhabitants) | Mean incidence (per 100,000 inhabitants) log10 transformed |
|---|---|---|---|---|
| Lower Silesia | 0201 | Bolesławiecki | 20.4 | 1.31 |
| | 0202 | Dzierżoniowski | 16.6 | 1.22 |
| | 0203 | Głogowski | 6.9 | 0.84 |
| | 0204 | Górowski | 33.4 | 1.52 |
| | 0205 | Jaworski | 16.3 | 1.21 |
| | 0206; 0261 | Karkonoski aggregated | 12.3 | 1.09 |
| | 0207 | Kamiennogórski | 63.0 | 1.80 |
| | 0208 | Kłodzki | 43.1 | 1.63 |
| | 0209; 0262 | Legnicki aggregated | 16.3 | 1.21 |
| | 0210 | Lubański | 67.8 | 1.83 |
| | 0211 | Lubiński | 30.8 | 1.49 |
| | 0212 | Lwówecki | 18.7 | 1.27 |
| | 0213 | Milicki | 41.6 | 1.62 |
| | 0214 | Oleśnicki | 8.9 | 0.95 |
| | 0215 | Oławski | 10.8 | 1.03 |
| | 0216 | Polkowicki | 10.1 | 1.00 |
| | 0217 | Strzeliński | 10.8 | 1.03 |
| | 0218 | Średzki | 11.8 | 1.07 |
| | 0219 | Świdnicki | 19.6 | 1.29 |
| | 0220 | Trzebnicki | 26.4 | 1.42 |
| | 0221; 0265 | Wałbrzyski aggregated | 29.9 | 1.48 |
| | 0222 | Wołowski | 40.5 | 1.61 |

| | | | | |
|---|---|---|---|---|
| | 0223; 0264 | Wrocławski aggregated | 16.3 | 1.21 |
| | 0224 | Ząbkowicki | 29.4 | 1.47 |
| | 0225 | Zgorzelecki | 40.4 | 1.61 |
| | 0226 | Złotoryjski | 16.9 | 1.23 |
| Kuyavian-Pomeranian | 0401 | Aleksandrowski | 13.7 | 1.14 |
| | 0402 | Brodnicki | 27.4 | 1.44 |
| | 0403; 0461 | Bydgoski aggregated | 23.7 | 1.37 |
| | 0404 | Chełmiński | 19.2 | 1.28 |
| | 0405 | Golubsko-Dobrzyński | 16.9 | 1.23 |
| | 0406; 0462 | Grudziądzki aggregated | 32.4 | 1.51 |
| | 0407 | Inowrocławski | 9.6 | 0.98 |
| | 0408 | Lipnowski | 13.5 | 1.13 |
| | 0409 | Mogileński | 5.8 | 0.76 |
| | 0410 | Nakielski | 23.9 | 1.38 |
| | 0411 | Radziejowski | 4.4 | 0.64 |
| | 0412 | Rypiński | 20.8 | 1.32 |
| | 0413 | Sępoleński | 19.2 | 1.28 |
| | 0414 | Świecki | 52.4 | 1.72 |
| | 0415; 0463 | Toruński aggregated | 19.1 | 1.28 |
| | 0416 | Tucholski | 52.7 | 1.72 |
| | 0417 | Wąbrzeski | 6.4 | 0.81 |
| | 0418; 0464 | Włocławski aggregated | 16.7 | 1.22 |
| | 0419 | Żniński | 13.0 | 1.11 |
| Lublin | 0601; 0661 | Bialski aggregated | 176.5 | 2.25 |
| | 0602 | Biłgorajski | 59.5 | 1.77 |
| | 0603; 0662 | Chełmski aggregated | 150.4 | 2.18 |
| | 0604 | Hrubieszowski | 23.7 | 1.37 |
| | 0605 | Janowski | 75.7 | 1.88 |
| | 0606 | Krasnostawski | 68.0 | 1.83 |
| | 0607 | Kraśnicki | 106.2 | 2.03 |
| | 0608 | Lubartowski | 40.7 | 1.61 |
| | 0609; 0663 | Lubelski aggregated | 32.2 | 1.51 |
| | 0610 | Łęczyński | 29.9 | 1.48 |
| | 0611 | Łukowski | 34.0 | 1.53 |
| | 0612 | Opolski | 75.0 | 1.88 |
| | 0613 | Parczewski | 100.8 | 2.00 |
| | 0614 | Puławski | 44.7 | 1.65 |
| | 0615 | Radzyński | 83.3 | 1.92 |
| | 0616 | Rycki | 25.8 | 1.41 |
| | 0617 | Świdnicki | 40.5 | 1.61 |
| | 0618 | Tomaszowski | 156.4 | 2.19 |
| | 0619 | Włodawski | 158.9 | 2.20 |
| | 0620; 0664 | Zamojski aggregated | 118.3 | 2.07 |

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|---|---|---|---|---|
| Lubusz | 0801; 0861 | Gorzowski aggregated | 30.7 | 1.49 |
| | 0802 | Krosnieński | 52.4 | 1.72 |
| | 0803 | Międzyrzecki | 33.8 | 1.53 |
| | 0804 | Nowosolski | 34.1 | 1.53 |
| | 0805 | Słubicki | 36.8 | 1.57 |
| | 0806 | Strzelecko-drezdenecki | 33.6 | 1.53 |
| | 0807 | Sulęciński | 59.4 | 1.77 |
| | 0808 | Świebodziński | 49.3 | 1.69 |
| | 0809; 0862 | Zielonogórski aggregated | 92.8 | 1.97 |
| | 0810 | Żagański | 55.6 | 1.74 |
| | 0811 | Żarski | 73.7 | 1.87 |
| | 0812 | Wschowski | 15.7 | 1.20 |
| Łódź | 1001 | Bełchatowski | 52.2 | 1.72 |
| | 1002 | Kutnowski | 7.6 | 0.88 |
| | 1003 | Łaski | 18.2 | 1.26 |
| | 1004 | Łęczycki | 8.8 | 0.94 |
| | 1005 | Łowicki | 5.3 | 0.72 |
| | 1006; 1061 | Łódzki aggregated | 11.8 | 1.07 |
| | 1007 | Opoczyński | 14.8 | 1.17 |
| | 1008 | Pabianicki | 46.1 | 1.66 |
| | 1009 | Pajęczański | 4.2 | 0.62 |
| | 1010; 1062 | Piotrkowski aggregated | 33.6 | 1.53 |
| | 1011 | Poddębicki | 9.0 | 0.96 |
| | 1012 | Radomszczański | 35.8 | 1.55 |
| | 1013 | Rawski | 12.7 | 1.10 |
| | 1014 | Sieradzki | 5.4 | 0.73 |
| | 1015; 1063 | Skierniewicki aggregated | 68.5 | 1.84 |
| | 1016 | Tomaszowski | 13.6 | 1.13 |
| | 1017 | Wieluński | 26.0 | 1.42 |
| | 1018 | Wieruszowski | 8.5 | 0.93 |
| | 1019 | Zduńskowolski | 19.6 | 1.29 |
| | 1020 | Zgierski | 5.8 | 0.77 |
| | 1021 | Brzeziński | 16.2 | 1.21 |
| Lesser Poland | 1201 | Bocheński | 119.6 | 2.08 |
| | 1202 | Brzeski | 99.6 | 2.00 |
| | 1203 | Chrzanowski | 138.4 | 2.14 |
| | 1204 | Dąbrowski | 19.7 | 1.29 |
| | 1205 | Gorlicki | 61.4 | 1.79 |
| | 1206; 1261 | Krakowski aggregated | 46.7 | 1.67 |
| | 1207 | Limanowski | 104.0 | 2.02 |
| | 1208 | Miechowski | 57.4 | 1.76 |
| | 1209 | Myślenicki | 126.7 | 2.10 |
| | 1210; 1262 | Nowosądecki aggregated | 21.2 | 1.33 |

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|---|---|---|---|---|
| | 1211 | Nowotarski | 6.8 | 0.83 |
| | 1212 | Olkuski | 70.6 | 1.85 |
| | 1213 | Oświęcimski | 71.2 | 1.85 |
| | 1214 | Proszowicki | 10.6 | 1.02 |
| | 1215 | Suski | 192.3 | 2.28 |
| | 1216; 1263 | Tarnowski aggregated | 82.0 | 1.91 |
| | 1217 | Tatrzański | 3.7 | 0.57 |
| | 1218 | Wadowicki | 104.3 | 2.02 |
| | 1219 | Wielicki | 61.7 | 1.79 |
| Masovian | 1401 | Białobrzeski | 22.4 | 1.35 |
| | 1402 | Ciechanowski | 22.2 | 1.35 |
| | 1403 | Garwoliński | 34.0 | 1.53 |
| | 1404 | Gostyniński | 27.6 | 1.44 |
| | 1405 | Grodziski | 49.3 | 1.69 |
| | 1406 | Grójecki | 13.1 | 1.12 |
| | 1407 | Kozienicki | 31.0 | 1.49 |
| | 1408 | Legionowski | 35.7 | 1.55 |
| | 1409 | Lipski | 76.9 | 1.89 |
| | 1410 | Łosicki | 195.6 | 2.29 |
| | 1411 | Makowski | 26.9 | 1.43 |
| | 1412 | Miński | 18.4 | 1.26 |
| | 1413 | Mławski | 5.8 | 0.76 |
| | 1414 | Nowodworski | 4.2 | 0.63 |
| | 1415; 1461 | Ostrołęcki aggregated | 41.6 | 1.62 |
| | 1416 | Ostrowski | 63.5 | 1.80 |
| | 1417 | Otwocki | 52.7 | 1.72 |
| | 1418 | Piaseczyński | 3.2 | 0.51 |
| | 1419; 1462 | Płocki aggregated | 82.3 | 1.92 |
| | 1420 | Płoński | 28.0 | 1.45 |
| | 1421 | Pruszkowski | 34.9 | 1.54 |
| | 1422 | Przasnyski | 40.3 | 1.61 |
| | 1423 | Przysuski | 70.4 | 1.85 |
| | 1424 | Pułtuski | 56.4 | 1.75 |
| | 1425; 1463 | Radomski aggregated | 16.0 | 1.20 |
| | 1426; 1464 | Siedlecki aggregated | 276.2 | 2.44 |
| | 1427 | Sierpecki | 18.8 | 1.27 |
| | 1428 | Sochaczewski | 21.2 | 1.33 |
| | 1429 | Sokołowski | 79.1 | 1.90 |
| | 1430 | Szydłowiecki | 25.5 | 1.41 |
| | 1432; 1465 | Warszawski aggregated | 28.5 | 1.46 |
| | 1433 | Węgrowski | 133.5 | 2.13 |
| | 1434 | Wołomiński | 21.1 | 1.33 |
| | 1435 | Wyszkowski | 73.1 | 1.86 |

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|---|---|---|---|---|
| | 1436 | Zwoleński | 54.4 | 1.74 |
| | 1437 | Żuromiński | 37.3 | 1.57 |
| | 1438 | Żyrardowski | 61.4 | 1.79 |
| Opole | 1601 | Brzeski | 34.2 | 1.53 |
| | 1602 | Głubczycki | 48.8 | 1.69 |
| | 1603 | Kędzierzyńsko-Kozielski | 65.3 | 1.81 |
| | 1604 | Kluczborski | 37.1 | 1.57 |
| | 1605 | Krapkowicki | 89.2 | 1.95 |
| | 1606 | Namysłowski | 34.4 | 1.54 |
| | 1607 | Nyski | 70.1 | 1.85 |
| | 1608 | Oleski | 28.7 | 1.46 |
| | 1609; 1661 | Opolski aggregated | 46.9 | 1.67 |
| | 1610 | Prudnicki | 31.9 | 1.50 |
| | 1611 | Strzelecki | 54.4 | 1.74 |
| Subcarpathian | 1801; 1808 | Bieszczadzki & Leski aggregated | 39.5 | 1.60 |
| | 1802 | Brzozowski | 86.5 | 1.94 |
| | 1803 | Dębicki | 55.4 | 1.74 |
| | 1804 | Jarosławski | 37.5 | 1.57 |
| | 1805 | Jasielski | 41.5 | 1.62 |
| | 1806 | Kolbuszowski | 155.4 | 2.19 |
| | 1807; 1861 | Krośnieński aggregated | 90.7 | 1.96 |
| | 1809 | Leżajski | 57.9 | 1.76 |
| | 1810 | Lubaczowski | 139.8 | 2.15 |
| | 1811 | Łańcucki | 53.4 | 1.73 |
| | 1812 | Mielecki | 14.8 | 1.17 |
| | 1813 | Niżański | 73.7 | 1.87 |
| | 1814; 1862 | Przemyski aggregated | 25.8 | 1.41 |
| | 1815 | Przeworski | 30.2 | 1.48 |
| | 1816 | Ropczycko-Sedziszowski | 27.7 | 1.44 |
| | 1817; 1863 | Rzeszowski aggregated | 34.3 | 1.54 |
| | 1818 | Sanocki | 34.3 | 1.54 |
| | 1819 | Stalowowolski | 26.7 | 1.43 |
| | 1820 | Strzyżowski | 24.8 | 1.40 |
| | 1821; 1864 | Tarnobrzeski aggregated | 40.5 | 1.61 |
| Podlachian | 2001 | Augustowski | 87.0 | 1.94 |
| | 2002; 2061 | Białostocki aggregated | 82.8 | 1.92 |
| | 2003 | Bielski | 163.5 | 2.21 |
| | 2004 | Grajewski | 144.1 | 2.16 |
| | 2005 | Hajnowski | 196.1 | 2.29 |
| | 2006 | Kolneński | 60.6 | 1.78 |
| | 2007; 2062 | Łomżyński aggregated | 36.0 | 1.56 |
| | 2008 | Moniecki | 50.1 | 1.70 |

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|---|---|---|---|---|
| | 2009 | Sejneński | 213.3 | 2.33 |
| | 2010 | Siemiatycki | 103.5 | 2.02 |
| | 2011 | Sokólski | 169.7 | 2.23 |
| | 2012; 2063 | Suwalski aggregated | 134.5 | 2.13 |
| | 2013 | Wysokomazowiecki | 47.1 | 1.67 |
| | 2014 | Zambrowski | 29.6 | 1.47 |
| Pomeranian | 2201 | Bytowski | 142.9 | 2.15 |
| | 2202 | Chojnicki | 24.8 | 1.39 |
| | 2203 | Człuchowski | 22.0 | 1.34 |
| | 2204; 2261 | Gdański aggregated | 30.0 | 1.48 |
| | 2205 | Kartuski | 33.6 | 1.53 |
| | 2206 | Kościerski | 69.4 | 1.84 |
| | 2207 | Kwidzyński | 35.5 | 1.55 |
| | 2208 | Lęborski | 48.8 | 1.69 |
| | 2209 | Malborski | 10.2 | 1.01 |
| | 2210 | Nowodworski | 19.9 | 1.30 |
| | 2211 | Pucki | 37.0 | 1.57 |
| | 2212; 2263 | Słupski aggregated | 67.4 | 1.83 |
| | 2213 | Starogardzki | 22.8 | 1.36 |
| | 2214 | Sztumski | 25.7 | 1.41 |
| | 2215 | Tczewski | 15.6 | 1.19 |
| | 2216 | Wejherowski | 40.5 | 1.61 |
| | 2262 | Gdyński | 17.0 | 1.23 |
| | 2264 | Spocki | 39.8 | 1.60 |
| Silesia | 2402; 2461 | Bielsko-Biała aggregated | 47.5 | 1.68 |
| | 2413; 2462; 2471 | Bytom & Piekary Śląskie & Tarnogórski aggregated | 30.0 | 1.48 |
| | 2463; 2476 | Chorzów & Świętochłowice aggregated | 20.3 | 1.31 |
| | 2403 | Cieszyn | 101.1 | 2.00 |
| | 2404; 2464 | Częstochowski aggregated | 20.5 | 1.31 |
| | 2401; 2465 | Dąbrowa Górnicza & Będzin aggregated | 42.3 | 1.63 |
| | 2405; 2466; 2478 | Gliwice & Zabrze aggregated | 49.5 | 1.69 |
| | 2468 | Jaworzno | 120.1 | 2.08 |
| | 2469; 2470; 2474 | Katowice & Mysłowice & Siemianowice Śląskie | 50.3 | 1.70 |
| | 2406 | Kłobuck | 26.0 | 1.42 |
| | 2407 | Lubliniec | 42.3 | 1.63 |
| | 2409 | Myszków | 32.2 | 1.51 |
| | 2411 | Racibórz | 56.7 | 1.75 |
| | 2472 | Ruda Śląska | 28.5 | 1.46 |
| | 2412; 2473; 2479 | Rybnicki & Żory aggregated | 30.1 | 1.48 |
| | 2475 | Sosnowiec | 28.0 | 1.45 |

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|---|---|---|---|---|
| | 2414; 2408; 2410; 2477 | Tychy & Bieruńsko-Lędziński & Pszczyński & Mikołowski aggregated | 23.7 | 1.37 |
| | 2415; 2467 | Wodzisław Śląski & Jastrzębie aggregated | 103.4 | 2.01 |
| | 2416 | Zawiercie | 47.2 | 1.67 |
| | 2417 | Żywiec | 96.9 | 1.99 |
| Świętokrzyskie | 2601 | Buski | 27.5 | 1.44 |
| | 2602 | Jędrzejowski | 3.9 | 0.60 |
| | 2603 | Kazimierski | 10.8 | 1.03 |
| | 2604; 2661 | Kielecki aggregated | 50.3 | 1.70 |
| | 2605 | Konecki | 11.2 | 1.05 |
| | 2606 | Opatowski | 28.2 | 1.45 |
| | 2607 | Ostrowiecki | 15.7 | 1.20 |
| | 2608 | Pińczowski | 20.3 | 1.31 |
| | 2609 | Sandomierski | 12.0 | 1.08 |
| | 2610 | Skarżyski | 53.8 | 1.73 |
| | 2611 | Starachowicki | 26.1 | 1.42 |
| | 2612 | Staszowski | 44.1 | 1.64 |
| | 2613 | Włoszczowski | 20.8 | 1.32 |
| Warmian-Masurian | 2801 | Bartoszycki | 51.8 | 1.71 |
| | 2802 | Braniewski | 95.3 | 1.98 |
| | 2803 | Działdowski | 33.8 | 1.53 |
| | 2804; 2861 | Elbląski aggregated | 17.5 | 1.24 |
| | 2805 | Ełcki | 85.1 | 1.93 |
| | 2806 | Giżycki | 143.3 | 2.16 |
| | 2818 | Gołdapski | 87.2 | 1.94 |
| | 2807 | Iławski | 41.7 | 1.62 |
| | 2808 | Kętrzyński | 44.9 | 1.65 |
| | 2809 | Lidzbardzki | 41.3 | 1.62 |
| | 2810 | Mrągowski | 147.3 | 2.17 |
| | 2811 | Nidzicki | 41.6 | 1.62 |
| | 2812 | Nowomiejski | 29.6 | 1.47 |
| | 2813 | Olecki | 86.4 | 1.94 |
| | 2814; 2862 | Olsztyński aggregated | 55.6 | 1.74 |
| | 2815 | Ostródzki | 141.4 | 2.15 |
| | 2816 | Piski | 98.3 | 1.99 |
| | 2817 | Szczycieński | 113.2 | 2.05 |
| | 2819 | Węgorzewski | 156.8 | 2.20 |
| | 3001 | Chodzieski | 28.0 | 1.45 |
| | 3002 | Czarnkowsko-Trzcianecki | 5.4 | 0.73 |
| | 3003 | Gnieźnieński | 8.0 | 0.91 |
| | 3004 | Gostyński | 2.8 | 0.44 |
| | 3005 | Grodziski | 11.7 | 1.07 |

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|---|---|---|---|---|
| | 3006 | Jarociński | 10.5 | 1.02 |
| | 3007; 3061 | Kaliski aggregated | 8.8 | 0.94 |
| | 3008 | Kępiński | 15.1 | 1.18 |
| | 3009 | Kolski | 6.0 | 0.78 |
| | 3010; 3062 | Koniński aggregated | 7.0 | 0.84 |
| | 3011 | Kościański | 4.1 | 0.61 |
| | 3012 | Krotoszyński | 11.5 | 1.06 |
| | 3013; 3063 | Leszczyński aggregated | 8.8 | 0.94 |
| | 3014 | Międzychodzki | 12.2 | 1.09 |
| | 3015 | Nowotomyski | 21.9 | 1.34 |
| | 3016 | Obornicki | 6.7 | 0.83 |
| | 3017 | Ostrowski | 9.6 | 0.98 |
| | 3018 | Ostrzeszowski | 8.6 | 0.93 |
| | 3019 | Pilski | 26.5 | 1.42 |
| | 3020 | Pleszewski | 3.6 | 0.55 |
| | 3021; 3064 | Poznański aggregated | 17.0 | 1.23 |
| | 3022 | Rawicki | 9.1 | 0.96 |
| | 3023 | Słupecki | 6.9 | 0.84 |
| | 3024 | Szamotulski | 10.1 | 1.00 |
| | 3025 | Śremski | 11.7 | 1.07 |
| | 3026 | Średzki | 14.6 | 1.16 |
| | 3027 | Turecki | 6.1 | 0.79 |
| | 3028 | Wągrowiecki | 3.9 | 0.60 |
| | 3029 | Wolsztyński | 14.0 | 1.15 |
| | 3030 | Wrzesiński | 12.9 | 1.11 |
| | 3031 | Złotowski | 13.9 | 1.14 |
| West Pomeranian | 3201 | Białogardzki | 24.1 | 1.38 |
| | 3202 | Choszczeński | 20.2 | 1.30 |
| | 3203 | Drawski | 75.2 | 1.88 |
| | 3204 | Goleniowski | 21.1 | 1.32 |
| | 3205 | Gryficki | 61.0 | 1.79 |
| | 3206 | Gryfiński | 24.4 | 1.39 |
| | 3207 | Kamieński | 64.5 | 1.81 |
| | 3208 | Kołobrzeski | 32.5 | 1.51 |
| | 3209; 3261 | Koszaliński aggregated | 11.0 | 1.04 |
| | 3218 | Łobeski | 46.6 | 1.67 |
| | 3210 | Myśliborski | 29.9 | 1.48 |
| | 3211 | Policki | 34.7 | 1.54 |
| | 3212 | Pyrzycki | 13.6 | 1.13 |
| | 3213 | Sławieński | 40.7 | 1.61 |
| | 3214 | Stargardzki | 29.1 | 1.46 |
| | 3262 | Szczeciński | 29.4 | 1.47 |
| | 3215 | Szczecinecki | 24.6 | 1.39 |

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|---|---|---|---|---|
| | 3216 | Świdwiński | 44.1 | 1.64 |
| | 3263 | Świnoujście | 88.0 | 1.94 |
| | 3217 | Wałecki | 58.6 | 1.77 |

**Supplementary Table S2.** Posterior distribution statistics from the most parsimonious model.

| Variable | Mean | 2.5% | 97.5% |
|---|---|---|---|
| Forest cover (%) | 0.0049 | 0.0025 | 0.0074 |
| Public parks and private green areas (%) | 0.0583 | 0.0327 | 0.0829 |
| Minimum monthly temperature (°C) | 0.0425 | 0.0012 | 0.0800 |
| Mean monthly precipitation (Log10 mm/month) | 0.2730 | -0.0282 | 0.5645 |
| 8-day gross primary productivity ($gC/m^2$) | 0.0243 | 0.0117 | 0.0375 |
| Human population density (Log10 ind/km2) | -0.2640 | -0.3468 | -0.1789 |
| Nu2 | 0.0139 | 0.0114 | 0.0167 |
| Tau2 | 0.1450 | 0.1304 | 0.1609 |
| Rho.S | 0.7447 | 0.6468 | 0.8353 |
| Rho.T | 0.8797 | 0.8505 | 0.9046 |

**Supplementary Table S3.** Potential covariates of Lyme borreliosis incidence

| Category | Description (unit) | Rationale | Data source (reference) | Data resolution |
|---|---|---|---|---|
| Vegetation characteristics | Share of district area with forest cover (%) | Forests provide tick favorable habitat and increase chances of human-tick contact and sustain diverse ticks' hosts populations [6,7] | Local Data Bank [1] | District level |
| | Share of district area with forest cover dominated by deciduous tree species (%) | Deciduous forests and their permanent leaf litter layer generally provide suitable habitats and microclimate for ticks [6,8] | Forest Data Bank [2] | District level |
| | Share of district area with forest cover dominated by coniferous tree species (%) | Compared to deciduous forests, coniferous forests provide less suitable conditions for ticks in terms of humidity, frost susceptibility and temperature [6] | Forest Data Bank [2] | District level |
| | The share of district area covered by parks, lawns and green areas of the housing estates (%) | Green spaces increase both tick populations and the risk of tick-human contact, especially in parks and gardens [9,10] | Local Data Bank [1] | District level |
| | The density of large and small | Large and small wild mammals are suitable | Forest Data Bank [2] | District level |

| | | | | |
|---|---|---|---|---|
| | wild mammal species (n/km$^2$) | hosts for ticks and essential to maintain *Ixodes* populations [14] | | |
| Climate | Yearly minimum and maximum of monthly mean temperatures ($^o$C) | Ticks' host questing and tick development are influenced by temperature and its fluctuations by prolonging duration of ticks activity (also in winter) and increasing risk of tick-host contact and pathogen transmission [14-17]<br>Range of LB risk expands as increasing temperature shift local faunal abundance and diversity influencing ticks' host populations [14-18];<br>Ticks mortality increases if they are exposed to extreme or prolonged low temperatures [19] | TerraClimate [3] | ~4 km, data aggregated to district level (using the mean) |
| | Yearly mean precipitation (mm/month) $Log_{10}$ transformed | Humidity is the principal determinant of inter-stadial mortality during the ticks development periods on the ground [13,20] | TerraClimate [3] | ~4 km, data aggregated to district level (using the mean) |
| | Days with snow cover (n/year) | Snow cover may protect ticks in winter however, persistence of snow cover can delay the start of ticks' seasonal activity [17,19] | MODIS MOD10A1 [4,22] | 500 m, data aggregated to district level (using the mean) |
| | Yearly mean 8-day gross primary productivity (GPP) (gC/m$^2$) | Plant productivity supports tick host abundance [23] | MODIS MOD17A2H [4,22] | 500 m, data aggregated to district level (using the mean) |
| | Growing degree days (GDD) ($^o$C) $Log_{10}$ transformed | A longer growing season supports ticks' hosts populations and may give ticks more time to acquire the blood meal that enhances survivorship [24];<br>The timing of the activity peak and duration of the LB season are associated | ERA5 daily [5] | 0.25 degree (~25 km), data aggregated to district level (using the mean) |

| | | | | |
|---|---|---|---|---|
| | | with cumulative growing degree days [25] | | |
| Socio-economic | Number of medical staff (doctors and nurses) per 100,000 inhabitants $Log_{10}$ transformed | May potentially be used to correct for observation bias as there is relationship between increasing number of LB cases and number of medical staff we can assume that disease detection is to low; A higher density of medical staff may increase LB diagnostics and health care access [26]; A higher number of tick-borne diseases-educated medical staff can increase prevention behaviors [27] | Local Data Bank [1] | District level |
| | Human population density ($n/km^2$) $Log_{10}$ transformed | Transformation of natural environments into urban settlements negatively affect biodiversity and influence on tick-borne pathogens transmission [28], but increasing urbanization and the human behavior of encroaching on peri-urban surroundings rises the exposition of humans to vector ticks and tick-transmitted pathogens [9] | Local Data Bank [1] | District level |

**References of Supplementary Table S3**


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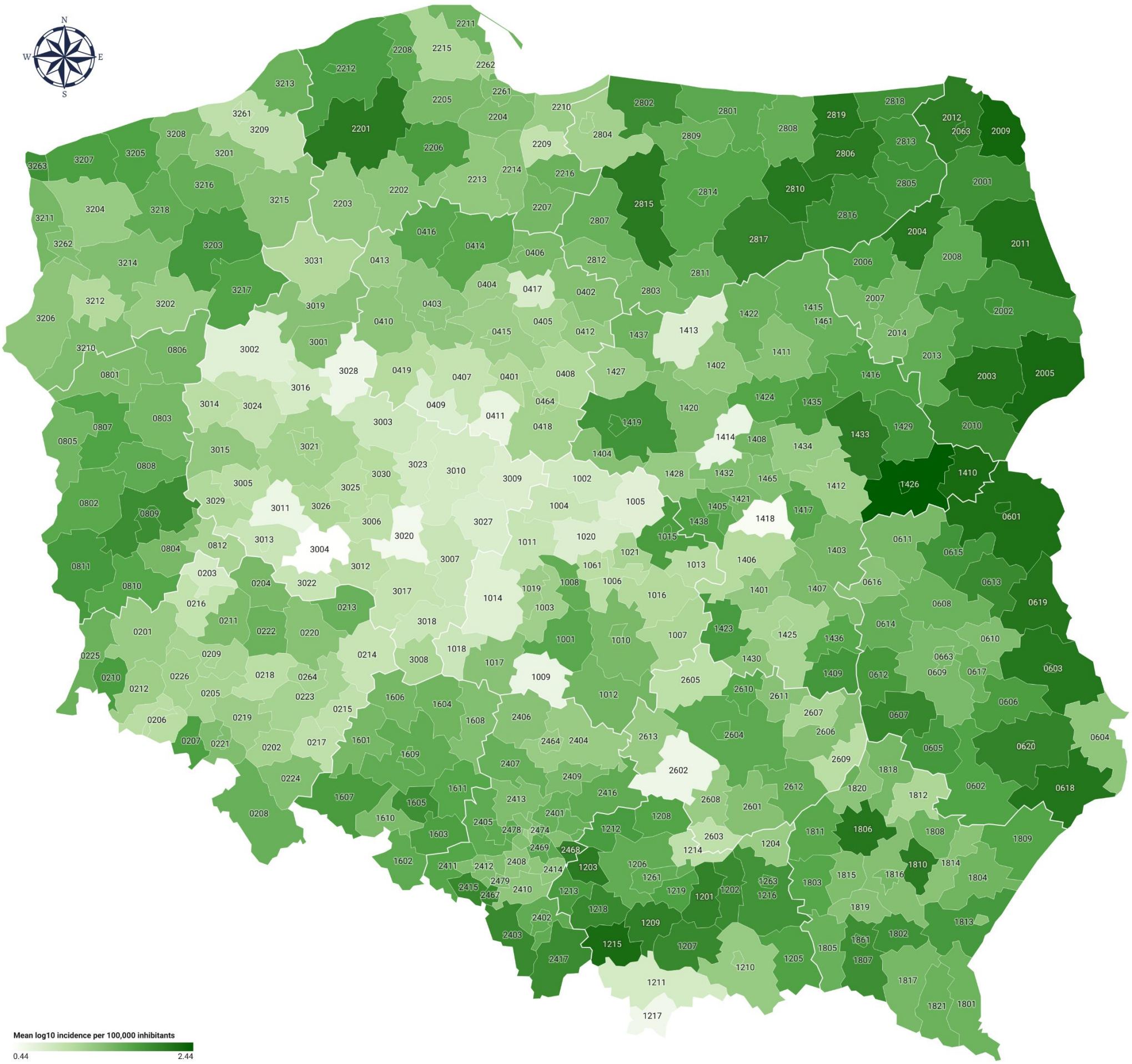
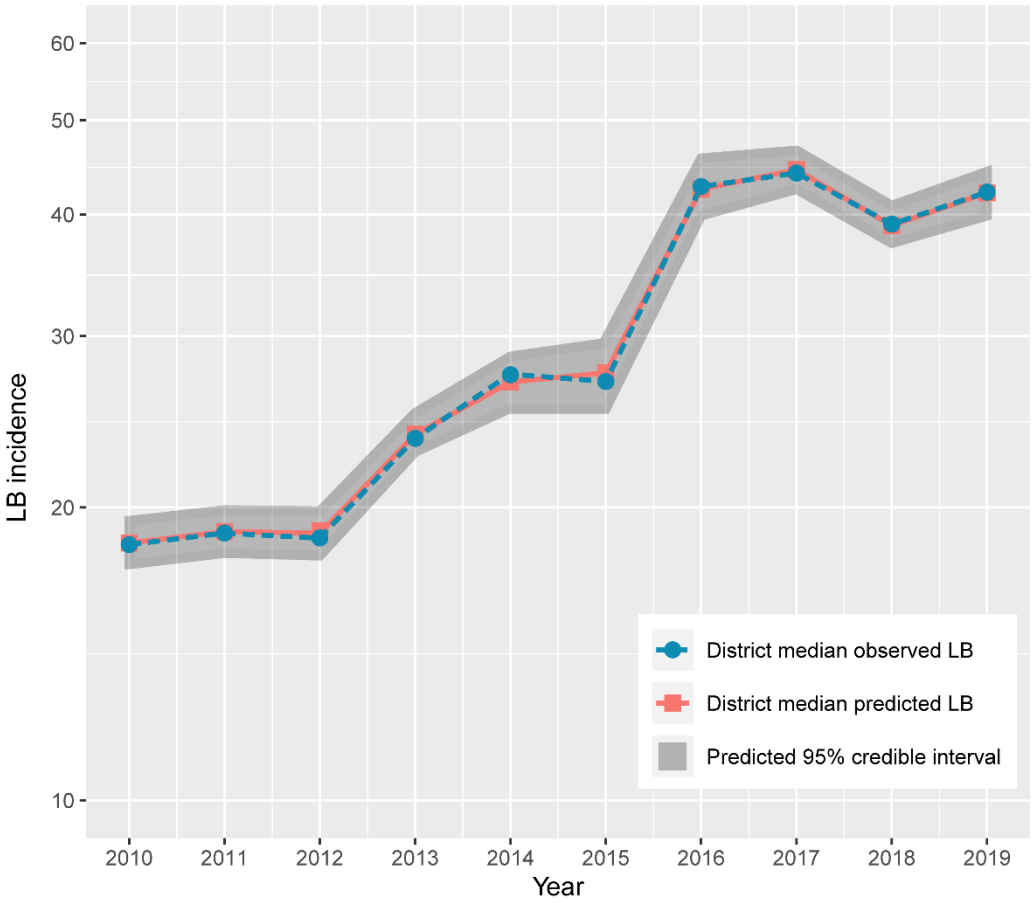
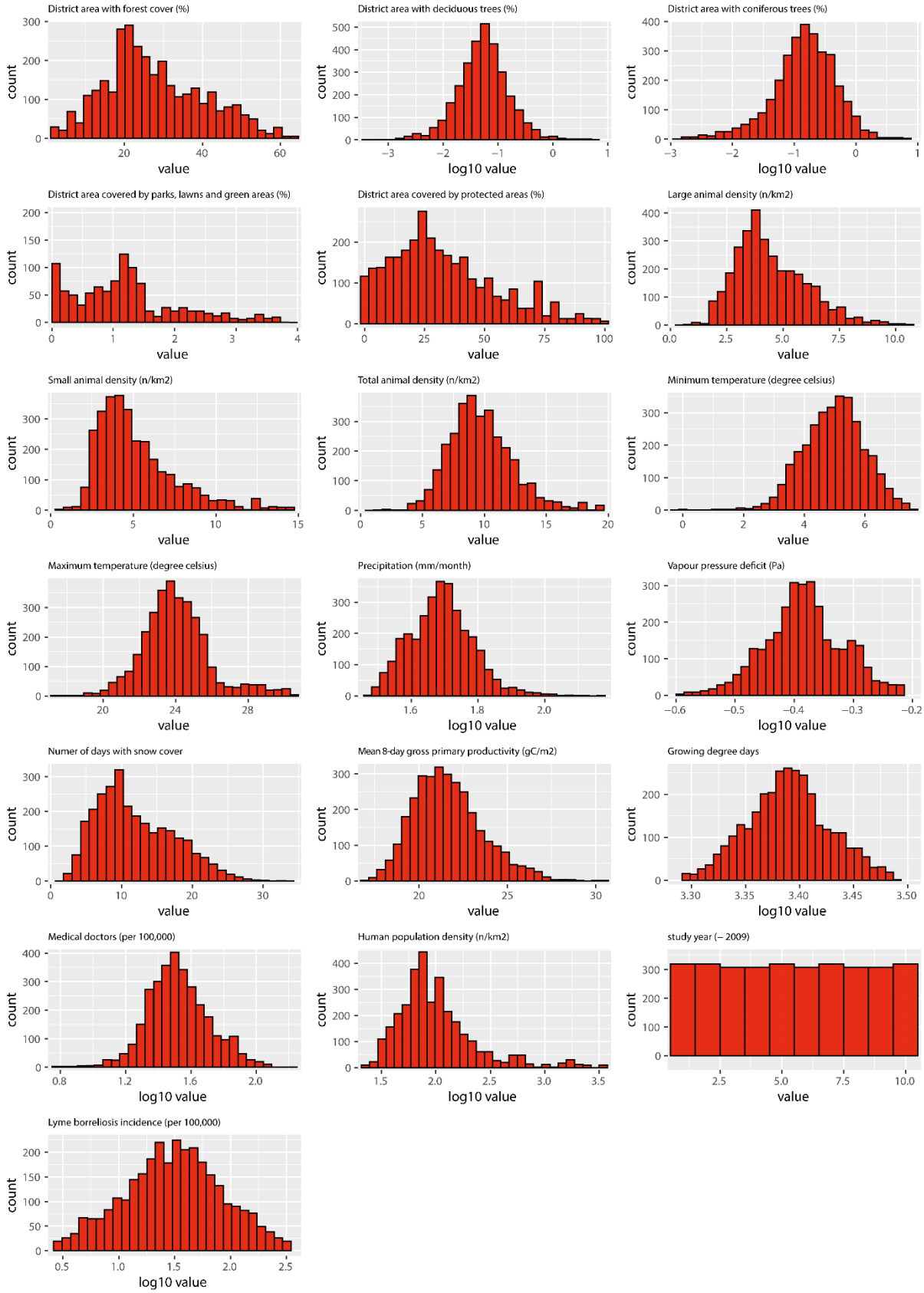
**Supplementary Figure S1.** Mean Lyme borreliosis incidence per 100,000 inhabitants ($log_{10}$ transformed) from 2010 to 2019 for 320 aggregated districts. Territorial identifiers correspond to Supplementary Table S1. This map was generated based on the compiled LB incidence data with the use of an online tool (https://www.datawrapper.de/).



**Supplementary Figure S2.** Observed and predicted time trends of LB incidence. Blue dots represent the yearly specific observed LB incidence calculated as the median over all Polish districts, red squares depict the median predicted LB incidence for all districts. This figure was generated with use of R (version 4.3.2) using ggplot2 (version 3.4.4).



**Supplementary Figure S3.** Histograms of the covariates and LB incidence used for model selection.



**Supplementary Figure S4.** The trace and density plots of the MCMC samples from 3 chains for the intercept and all variables included in the final model.