**Supplemental Material Content**

A Systematic Review of Spatial and Spatio-temporal Analyses in Public Health Research in Korea

**Supplementary Material 1.** Full strategies for each databases

**Supplementary Material 2**. General study classification of included studies on spatial and spatiotemporal analysis.

**Supplementary Material 3**. Characteristics of included studies on spatial and spatiotemporal analysis.

**Supplementary Material Reference**

**Supplemental Material 1.** Full strategies for each databases

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| **Database** | **Search terms** |
| Pubmed | ("Disease Mapping" OR "Spatial Analysis"[Mesh] OR "Spatial Analysis" OR "Cluster Analysis"[Mesh] OR "Cluster Analysis" OR "Geographic Mapping"[Mesh] OR "Geographic Mapping" OR "Geographic Information Systems"[Mesh] OR "Geographic Information Systems" OR "Spatio-Temporal Analysis"[Mesh] OR "Spatio-Temporal Analysis") AND ("Public Health"[Mesh] OR "Public Health" OR "Epidemiology"[Mesh] OR "Epidemiology" OR "Disease"[Mesh] OR "Disease") AND ("Korea"[Mesh] OR "Korea") |
| Embase | ('disease mapping'/exp OR ‘disease mapping’ OR 'spatial analysis'/exp OR ‘spatial analysis’ OR 'geostatistical analysis'/exp OR ‘geostatistical analysis’ OR 'cluster analysis'/exp OR ‘cluster analysis’ OR 'geographic mapping'/exp OR ‘geographic mapping’ OR 'geographic information system'/exp OR ‘geographic information system’) AND ('public health'/exp OR ‘public health’ OR 'epidemiology'/exp OR ‘epidemiology’ OR 'diseases'/exp OR ‘diseases’) AND ('korea'/exp OR ‘korea’) |
| KoreaMed | (("disease mapping"[ALL]) OR ("spatial analysis"[ALL]) OR ("Cluster Analysis"[ALL]) OR ("Geographic Mapping"[ALL]) OR ("Geographic Information Systems"[ALL]) OR ("Spatio-Temporal Analysis"[ALL])) AND (("disease"[ALL]) OR ("health"[ALL]) OR ("epidemiology"[ALL])) |
| NDSL | "Spatial analy\*\*s"|"Spatio-temporal"|"Geographic Information System\*"|GIS|"disease mapping"|공간분석|공간통계|시공간|지리정보  질병|보건|Disease|Health|역학|epidemiology|"public health"  Korea\*|한국\* |
| RISS | GIS|Geographic Information Systems|공간통계|공간분석|Spatial|공간정보|질병지도|Spatial Analysis|지리정보시스템|공간회귀모형|공간회귀분석|시공간|군집분석|Spatiotemporal  AND  질병|보건|역학 |
| DBPIA | 전체=‘Geographic Information System’|’Geographic Information Systems’|’공간통계’| ‘공간분석’|’공간정보’|’질병지도’|’Spatial Analysis’|’지리정보시스템’|’공간회귀모형’|’공간회귀분석’|’시공간’|’공간군집’|’Spatiotemporal’| ‘Spatio-temporal’|’Spatial Cluster’ AND전체=질병|보건|역학|’Public Health’|epidemiology|disease |

**Supplemental Material 2**. General study classification of included studies on spatial and spatiotemporal analysis.

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| **Authors, year** | | **Research topic** | **Study design** | | **Objective** |
| Ahn et al, 2010 [1] | | Health service utilization | Retrospective observational study | | To determine whether an association exists between the ambulance call volume (ACV), the unavailable-for-response (UFR) interval, and the delayed ambulance response for out-of-hospital cardiac arrest (OHCA) patients |
| Ahn et al, 2019 [2] | | Other chronic diseases | Ecological | | To normalizes the number of child asthma and severe asthma patients by collecting the home-location based insurance claim data |
| Bae et al, 2020 [3] | | Other chronic diseases | Ecological | | To use health statistics to assess the relative risk of asthma-related hospitalization for people living in close proximity to incineration facilities |
| Baek et al, 2020 [4] | | Infectious disease | Cross-sectional | | To study the epidemiological characteristics as well as the chronological and geographical distribution of HFMD in children younger than 6 years of age in Korea |
| Cho et al, 2010 [5] | | Health service utilization | Cross-sectional | | To investigate spatial accessibility to public healthcare services by public transport, focusing on bus travel in Yeoju-gun, Gyeonggi-do |
| Choe et al, 2017 [6] | | Infectious disease | Ecological | | To analyze spatial patterns in mumps incidence to give an indication to the geographical risk |
| Choi et al, 2011 [7] | | Health equity | Ecological | | To examine overall and cause-specific mortality and deprivation at the town level in Busan, thereby identifying towns and causes of deaths to be targeted for improving overall health and alleviating health inequality |
| Choi, 2013 [8] | | Aging | Ecological | | To investigates both the spatial patterns of aging population and its formal regional structure in 2010 |
| Choi, 2014 [9] | | Infectious disease | Ecological | | To reviews a range of Bayesian spatiotemporal models and analyzes Hepatitis A data in Korea |
| Choi, 2016 [10] | | Health behavior | Ecological | | To estimate the effects of socioeconomic factors on obesity proportion by gender, considering the spatial correlation |
| Choi et al, 2017 [11] | | Mental health | Ecological | | To analyze regional disparities in depressive symptoms and identifying the health determinants that require regional interventions |
| Choi et al, 2017 [12] | | Health service utilization | Ecological | | To analyze the spatial accessibility of women in childbearing age to the healthcare organizations (HCOs) providing delivery services in Gangwon-do |
| Choi et al, 2018 [13] | | Mental health | Ecological | | To investigate whether there was a positive causal effect of AD on depression in 16 regions (cities and provinces) in Korea |
| Choi et al, 2019 [14] | | Mortality | Ecological | | To estimate the hotspot areas of age-standardized male suicide mortality from 2008 to 2015 and to analyze the relationship between the hotspot areas and the regional characteristics for study years |
| Choo et al, 2016 [15] | | Health behavior | Cross-sectional | | To determine whether actual features of the neighborhood food and activity environments would be linked to a comprehensive array of eating and activity behaviors and obesity status in vulnerable children |
| Chung et al, 2014 [16] | Health service utilization | | | Ecological | To analyze the spatial characteristics of geriatric hospitals and long-term care facilities in Korea, and analyzed the relationships between their locations and socio-demographic features of regions |
| Chung et al, 2019 [17] | Infectious disease | | | Ecological | To estimate high-risk areas and timing of hepatitis A by using the data about the number of hepatitis A in Korea were analyzed by scan statistics in which Poisson model and space-time model |
| Dong et al, 2017 [18] | Health service utilization | | | Ecological | To analyze the effect of spatial accessibility to the psychiatry department in general hospital on the outpatient visit of mental patients |
| Gwon et al, 2018 [19] | Health behavior | | | Cross-sectional | To describe factors related to the students, the licensed tobacco retailers and the schools and how those factors are associated with adolescent smoking outcomes such as tobacco marketing receptivity, lifetime smoking and current smoking |
| Ha et al, 2017 [20] | Cancer | | | Ecological | To measure indoor radon concentration nationwide at 5553 points during 1989–2009 and spatially interpolated using lognormal kriging |
| Ha et al, 2018 [21] | Cancer | | | Ecological | To assess the dose of radiation exposure in each individual who participated in the study, and to determine and compare cancer incidence in both the study region where the contaminated roads were included and neighboring regions by using the cancer registry |
| Han et al, 2005 [22] | Other chronic diseases | | | Ecological | To evaluate the factors affecting hospital utilization for respiratory diseases by ecological study design and GIS tool |
| Han et al, 2016 [23] | Health behavior | | | Ecological | To examine the trends of adolescent obesity at the national level in South Korea introducing a new approach for visualizing data at the local level based on linked micromap plot |
| Han et al, 2018 [24] | Health behavior | | | Cross-sectional | To investigate the contribution of public sports facilities to the reduction of the obesity of local residents |
| Heo et al, 2016 [25] | Mortality | | | Cross-sectional | To compare changes in risk during periods without (1996–2000) and with (2008– 2012) heatwave warning forecasts in regions of South Korea with different climate |
| Hong et al, 2008 [26] | Health service utilization | | | Cross-sectional | To analyze the Daegu Korean Fire Department’s ambulances’ response time by use of the Geographic Information System (GIS) and to suggest general factors for quality improvement of EMS |
| Hong et al, 2020 [27] | Health service utilization | | | Cross-sectional | To analyze the Health Service Area in Seoul centered on the patient's disease using the Korea Medical Panel |
| Hwang et al, 2007 [28] | Cancer | | | Ecological | To assess the relationship between long-term exposure to air pollution and lung cancer in the Republic of Korea |
| Hwang et al, 2010 [29] | Health equity | | | Ecological | To provide useful basic data for the decision making of policies related to emergency medical service, by finding out emergency medical service vulnerable areas in Daejeon Metropolitan City and to analyze the correlation between the emergency medical service vulnerability and health care characteristic of the vulnerable areas |
| Hwang et al, 2012 [30] | Health equity | | | Ecological | To define the underserved emergency medical services (EMS) areas in Daejeon metropolitan city, as well as to identify their distinctive characteristics in public health perspectives |
| Hwang et al, 2016 [31] | Infectious disease | | | Ecological | To verify the relationship between meteorological factors and the number of malaria patients in the military in this region |
| Jang et al, 2015 [32] | Other chronic diseases | | | Ecological | To examine regional differences in scaling experience rate |
| Jeong et al, 2016 [33] | Health service utilization | | | Cross-sectional | To analyze and visualize the distribution of patients visiting the periodontology department at a dental college hospital, using a geographic information system (GIS) to utilize these data in patient care and treatment planning, which may help to assess the risk and prevent periodontal diseases |
| Ji et al, 2017 [34] | Infectious disease | | | Ecological | To observe regional distribution of varicella in Korea for 8 years and to determine cluster of risky areas using Monte Carlo hypothesis testing |
| Jin et al, 2013 [35] | Infectious disease | | | Ecological | To analyzes the spatial distribution of scrub typhus in Korea |
| Jo, 2009 [36] | Mental health | | | Ecological | To analyze spatial variations of sociodemographic correlates of health related quality of life using GIS and geographically weighted regression |
| Jo et al, 2016 [37] | Other chronic diseases | | | Ecological | To analyze the relationship between spatial distribution of Diabetes prevalence rates and regional variables |
| Joo et al, 2015 [38] | Health service utilization | | | Cross-sectional | To analyze and to visualize distribution of patients visiting at a dental college hospital, using geographic information system (GIS) |
| Joo, 2016 [39] | Mental health | | | Cross-sectional | To analyze the spatiotemporal pattern and spatial diffusion of elderly suicide by age cohort, in Korea |
| Ju et al, 2017 [40] | Other chronic diseases | | | Ecological | To derive correlation between disease prevalence and geographical adjacency, by using global and local autocorrelation |
| Jun et al, 2018 [41] | Health behavior | | | Cross-sectional | To analyze gender-specific spatial heterogeneity in local obesity |
| Jung et al, 2016 [42] | Other chronic diseases | | | Cohort | To investigated the association between ozone level at an industrial complex in South Korea and lung function with two objectives, one of which is estimating and comparing ozone exposures using four different methods including simple averaging across all monitors in the study area, spatial interpolation by the nearest monitoring station, inverse distance weighting and ordinary kriging and the other of which is evaluating how different methods for estimating exposure inﬂuence health outcomes |
| Kang et al, 2018 [43] | Infectious disease | | | Ecological | To compare the performance of the proposed model to competing models |
| Kang et al, 2018 [44] | Accident | | | Cross-sectional | To analyze how the spatiotemporal characteristics of traffic accidents involving the elderly population in Seoul are changing by time period |
| Kang et al, 2019 [45] | Mortality | | | Ecological | To investigate the associations of PM10 and PM2.5 with mortality throughout South Korea from 2012 to 2015 |
| Kim et al, 2003 [46] | Mortality | | | Ecological | To explore the effects of ecological and socioeconomic factors on the level of mortality and the changing trends of such effects during the period of 1990~2000 |
| Kim et al, 2006 [47] | Health service utilization | | | Cross-sectional | To examine the factors influencing the use of inpatient services by using the GIS |
| Kim et al, 2008 [48] | Mortality | | | Ecological | To compare the standardized mortality ratios among different small areas and to explore the usefulness of standardized mortality ratios in South Korea |
| Kim et al, 2012 [49] | Health policy | | | Cross-sectional | To assess the potential health impacts and improve the quality of the free immunization program in Jinju City by maximizing the predicted positive health gains and minimizing the negative health risks |
| Kim et al, 2014 [50] | Health equity | | | Ecological | To identify neighborhood deprivation indicators associated with health and to test the contextual effects of those indicators on individual health |
| Kim et al, 2014 [51] | Other chronic diseases | | | Cross-sectional | To utilized the Geographic Information System (GIS) which is one of the representative methods for describing visual distribution, to show the distribution of visions of middle and high school students in 16 cities or provinces in Korea |
| Kim et al, 2014 [52] | Infectious disease | | | Ecological | To identify appropriate regression models and suggest relevant space-ecological variables for scrub typhus disease occurrence analysis in Korea |
| Kim et al, 2015 [53] | Health behavior | | | Cross-sectional | To examine the relationship between the built environment and health in Daegu |
| Kim et al, 2015 [54] | Mortality | | | Ecological | To explore trends in mortality inequality among areas |
| Kim et al, 2015 [55] | Health service utilization | | | Ecological | To analyze the spatial characteristics of rehabilitation clinics and orthopedic clinics in Korea, and the relationships between their distribution and the regional characteristics |
| Kim et al, 2016 [56] | Health equity | | | Cross-sectional | To determine unhealthy food consumption indicators based on the Korean literature and available data for the purpose of detecting food deserts in the Korean context |
| Kim et al, 2016 [57] | Health behavior | | | Ecological | To analyze the relationship between regional obesity rates and regional variables |
| Kim et al, 2016 [58] | Cancer | | | Ecological | To identify areas with higher and lower risks of major cancer mortality in Korea, based on the geographical patterns from each analysis, as these findings can facilitate cancer prevention planning |
| Kim et al, 2016 [59] | Infectious disease | | | Ecological | To observed associations of norovirus outbreaks with various outcomes of human activities, including discharge of poorly treated sewage, overcrowding of people during winter season, and compactness of land development, which might help prioritize target regions and strategies for the management of norovirus outbreaks |
| Kim et al, 2016 [60] | Cancer | | | Ecological | To show spatial effects in an association between artificial light at night(ALAN) and breast cancer |
| Kim et al, 2017 [61] | Health equity | | | Ecological | To explore the effect of deprivation on life expectancy and healthy life expectancy at the district level |
| Kim et al, 2018 [62] | Other chronic diseases | | | Ecological | To examine bivariate correlation between outdoor air pollutants and the prevalence of allergic diseases, highlighting the limitation of a non-spatial correlation measure, and suggesting an alternative to address spatial autocorrelation |
| Kim et al, 2018 [63] | Mental health | | | Ecological | To analyze regional variations in antidepressant consumption and adherence, suicide rate, prevalence of suicide related mental disorders, and access to relevant healthcare services |
| Kim et al, 2018 [64] | Infectious disease | | | Ecological | To analyze spatio-temporal patterns of scrub typhus incidence and to identify environmental risk factors in South Korea from 2009 to 2013 using hierarchical Bayesian Poisson model |
| Kim et al, 2018 [65] | Health service utilization | | | Ecological | To proposes a new healthcare accessibility measurement method for Seoul named, Seoul Enhanced 2-Step Floating Catchment Area (SE2SFCA) method |
| Kim et al, 2019 [66] | Infectious disease | | | Ecological | To examine geographic variation and factors associated with hospitalization for bacterial pneumonia in Korea |
| Kim et al, 2019 [67] | Health behavior | | | Ecological | To spatialize the gap between obesity levels through the body mass index, an objective indicator of the level of health among vulnerable people |
| Kim et al, 2019 [68] | Health service utilization | | | Cross-sectional | To investigate the overall ACSC hospitalization rate in the country and its trends over recent years |
| Kim et al, 2019 [69] | Aging | | | Ecological | To identify spatio-temporal patterns of population aging community in Korea. In particular, classify areas of severe aging and make comparative analysis characteristics of each region |
| Kim et al, 2019 [70] | Infectious disease | | | Ecological | To investigates the spatial factors determining malaria occurrences in order to understand and control malaria risks in Korea |
| Kim et al, 2020 [71] | Infectious disease | | | Ecological | To explore any insufficiency and spatial disparity of NPIRs in South Korea in response to infectious disease outbreaks based on a simple analytic approach |
| Kim et al, 2020 [72] | Health service utilization | | | Cross-sectional | To examine the accessibility of emergency rooms according to the population density and distance in Daegu Metropolitan City to help improve the quality and emergency medical accessibility problems in Daegu Metropolitan City |
| Kim et al, 2020 [73] | Infectious disease | | | Ecological | To assess how coronavirus disease 2019 (COVID-19) clustered across districts in South Korea and to assess whether the pattern and duration of clusters changed following the country's containment strategy |
| Ko et al, 2016 [74] | Cancer | | | Cross-sectional | To analyzed all cancer including four major cancers (stomach cancer, colorectal cancer, lung cancer, liver cancer) |
| Ko et al, 2019 [75] | Other chronic diseases | | | Cross-sectional | To analyze temporal and spatial variations of atopic dermatitis and to identify major factors |
| Kwag et al, 2019 [76] | Birth outcomes | | | Ecological | To identify the differences in the Low Birth Weight (LBW) rate according to land use rate among the 25 autonomous regions of Seoul |
| Kwon et al, 2014 [77] | Infectious disease | | | Ecological | To verified the nationwide distribution of hepatitis C infection for effective prevention and management |
| Lee et al, 2001 [78] | Other chronic diseases | | | Cross-sectional | To examine public dental health problems and to help setting priorities of dental health programs of Kangnung-city |
| Lee et al, 2006 [79] | Health service utilization | | | Intervention | To evaluate visiting nursing care and to advocate the usefulness of planning and evaluating visiting nursing programs using Exploratory Spatial Data Analysis (ESDA) with GIS technology |
| Lee et al, 2011 [80] | Health service utilization | | | Cross-sectional | To characterize the use of medical service and medical costs of each cluster categorized by its discharge disposition pattern |
| Lee et al, 2013 [81] | Health service utilization | | | Ecological | The study undertaken analyzed the disparity in the spatial distribution of clinics within the metropolitan city of Daejeon, South Korea |
| Lee et al, 2014 [82] | Health behavior | | | Ecological | To examine the influence of local community's geospatial and socio-demographic factors on drinking |
| Lee et al, 2014 [83] | Health service utilization | | | Ecological | To assess the situation in a metropolitan area with a population exceeding 10 million |
| Lee et al, 2015 [84] | Mental health | | | Cross-sectional | To evaluate the social economic and geographic influences on Internet addiction in Korean youth using the Korean Youth Risk Behavior Web-Based Survey |
| Lee et al, 2015 [85] | Mental health | | | Ecological | To calculate the suicide rate of older adults in each city |
| Lee et al, 2016 [86] | Health service utilization | | | Cross-sectional | To analyze and understand how spatial accessibility of patients influenced the number of outpatient visits for the internal medicine of a hospital |
| Lee et al, 2017 [87] | Other chronic diseases | | | Cross-sectional | To estimate the risks of smoking and passive smoking on cardiovascular morbidity at the national and regional levels |
| Lee et al, 2018 [88] | Health behavior | | | Ecological | To examine the association between objectively measured built environments and physical activity (PA) |
| Lee et al, 2018 [89] | Other chronic diseases | | | Ecological | To assess the relationship between particulate matter and eye disease, this study analyzes the concentration data obtained from spatial analysis of particulate matter and emergency visit data |
| Lee et al, 2018 [90] | Health behavior | | | Ecological | To analyze effect of public sports facilities on obesity rate and physical activity rate of local community using GIS and spatial statistics |
| Lee et al, 2019 [91] | Infectious disease | | | Ecological | To characterize the pattern of the MERS outbreak in South Korea based on a basic reproductive ratio, the probability of ultimate extinction of the disease, and the spatio-temporal proximity of occurrence between patients |
| Lee et al, 2019 [92] | Other chronic diseases | | | Cross-sectional | To investigate temporal and regional trends of hypertension management in Korea |
| Lee et al, 2019 [93] | Health behavior | | | Cross-sectional | To examine the association between neighborhood greenness of children's residential area and their neurobehavioral health |
| Leem et al, 2006 [94] | Birth outcomes | | | Cross-sectional | To investigate the association between preterm delivery (PTD) and exposure to air pollutants using spatial and temporal modeling to better infer individual exposures |
| Lim et al, 2014 [95] | Mortality | | | Ecological | To examine the spatial distribution of PM 10 concentrations and cardiovascular mortality and to investigate the spatial correlation between PM 10 and cardiovascular mortality using spatial scan statistic (SaTScan) and a regression model |
| Lim et al, 2015 [96] | Other chronic diseases | | | Ecological | To analyze the spatial distribution and characteristics of an environmental disease using the data provided by National Health Insurance Corporation in 2009 |
| Lim et al, 2019 [97] | Infectious disease | | | Ecological | To analyse the spatial characteristics of human brucellosis and its associated factors, including the risk of bovine brucellosis |
| Min et al, 2018 [98] | Mental health | | | Cohort | To investigated whether long-term exposure to particulate matter of ≤10μm in diameter (PM 10 ), nitrogen dioxide (NO 2 ), and sulfur dioxide (SO 2 ) would be associated with a greater risk of death by suicide |
| Min et al, 2019 [99] | Other chronic diseases | | | Retrospective cohort study | To investigate whether exposure to air pollution, particularly to particles with a mass median aerodynamic diameter of ≤10 µm (PM10 ), is associated with diagnosis of childhood glaucoma |
| Nam et al, 2010 [100] | Health service utilization | | | Ecological | To have detailed data of the distribution, locations, and the amount of people in the waiting line of the nursing home. And to study the accessibility to the facilities by using Web GIS to analyze the transit time it takes from the nursing home to health center and hospitals |
| Namgung et al, 2019 [101] | Other chronic diseases | | | Cross-sectional | To examine the eﬀect of the built environment on obesity in older adults, taking into consideration gender diﬀerence |
| Noh et al, 2012 [102] | Infectious disease | | | Ecological | To determine Plasmodium vivax malarial transmission pattern in Korea from 2001-2011 |
| Noh et al, 2013 [103] | Infectious disease | | | Ecological | To estimate the transmission pattern of scrub typhus from 2001 to 2011 in the Republic of Korea, based on spatial and temporal correlation |
| Oh et al, 2008 [104] | Health service utilization | | | Ecological | To evaluate the optimal regional distribution of major health manpowers in Korea and to find policy implications regarding the establishment of health care workforce policy by region |
| Oh et al, 2016 [105] | Multiple diseases | | | Ecological | To analyzes and compares spatial patterns of 24 different diseases in South Korea using prevalence rate data provided by Community Health Survey in 2012 |
| Oh et al, 2018 [106] | Other chronic diseases | | | Cross-sectional | To explore the geographical variations and influential factors of cardiometabolic disease prevalence with respect to 230 administrative districts in South Korea |
| Oh et al, 2019 [107] | Health service utilization | | | Ecological | To examine the inflow and outflow patterns of emergency department patients with si-gun-gu in the Gwangju, Jeonbuk, and Jeonnam areas |
| Park et al, 1999 [108] | Infectious disease | | | Ecological | To check the spatial distribution of malaria occurrence using geographic information systems |
| Park et al, 2014 [109] | Mental health | | | Cross-sectional | To analyze the relationships between regional factors and suicide rates with spatial analysis model |
| Park et al, 2014 [110] | Physiologic status | | | Cross-sectional | To suggest an approach that integrates multilevel models and eigenvector spatial filtering methods and apply it to a case study of self-rated health status in South Korea |
| Park, 2016 [111] | Health service utilization | | | Ecological | To use the ecological study design and geographically weighted regression(GWR) to identify regional factors regarding metropolitan concentration factors on health care utilization and investigate the utility of GWR |
| Park et al, 2016 [112] | Infectious disease | | | Ecological | To analyze TB mortality rates in Korea from 2000 to 2011 using one of bayesian spatio-temporal models |
| Park et al, 2016 [113] | Mortality | | | Cross-sectional | To analysed the relationship between the standardized hypertensive disease mortality rate (SHDMR) and regional factors sing traditional ordinary least square (OLS) regression and geographically weighted regression (GWR) |
| Park et al, 2016 [114] | Other chronic diseases | | | Cross-sectional | To analyze the regional variation of Community-Acquired Pneumonia (CAP) occurrences and the relationships between the CAP occurrences and regional factors using spatial analysis method |
| Park et al, 2017 [115] | Mental health | | | Cross-sectional | To analyze the impact of neighborhood-level physical environment on resident's depression |
| Park et al, 2018 [116] | Health service utilization | | | Ecological | To assess the imbalances in the geographic distribution of neurosurgeons across Korea |
| Park et al, 2018 [117] | Health service utilization | | | Cross-sectional | To analyze the spatial accessibility of mental health institutions in Ganwon-Do using Geographic Information System and to suggest policy implications |
| Park et al, 2019 [118] | Health service utilization | | | Ecological | To analyze people's accessibility to medical institutions providing national gastric cancer screening services in Ganwon-do using a geographic information system (GIS) |
| Park et al, 2020 [119] | Other chronic diseases | | | Ecological | To analyze the effects of air pollutants, such as particular matter, to the number of outpatient visits for allergic rhinitis in eup, myeon, and dong administrative boundaries. |
| Park et al, 2020 [120] | Mortality | | | Cross-sectional | To analyze the relationship between the regional characteristics and the age-adjusted cardio-cerebrovascular disease mortality rates (SCDMR) in 229 si·gun·gu administrative region |
| Ro et al, 2015 [121] | Other chronic diseases | | | Cross-sectional | To estimate the true incidence rate of Out-of-Hospital Cardiac Arrest(OHCA) and to investigate characteristics of regions with overestimated and underestimated OHCA incidence rates |
| Roh, 2013 [122] | Health service utilization | | | Ecological | To analyze the association between areas of Korea Train Express (KTX) region and external medical service use in Korean society using spatial statistical model |
| Roh, 2017 [123] | Mental health | | | Ecological | To compare changes in suicide rates among Korean regions since the late 1990s, to reveal whether there is a persistent pattern of suicidal risk level at the spatio-temporal level |
| Seo et al, 2007 [124] | Birth outcomes | | | Ecological | To determine the relationship between maternal exposure to air pollution and low birth weight |
| Seo et al, 2010 [125] | Birth outcomes | | | Cross-sectional | To understand the preventable fraction of low birthweight (LBW) deliveries due to maternal exposure to air pollution during pregnancy in Korea |
| Seo et al, 2015 [126] | Mental health | | | Ecological | To analyze the regional disparities of suicide mortality by gender and the association between local characteristics and suicide mortality |
| Seo et al, 2016 [127] | Other chronic diseases | | | Cross-sectional | To investigate spatial correspondence between the level of PM10 and allergic diseases at the sub-district level in Seoul, Korea, in order to evaluate whether the impact of PM10 is observable and spatially varies across the subdistricts |
| Seo, 2017 [128] | Infectious disease | | | Ecological | To analyze the regional units for better infection control based on the similarities in the infectious disease outbreaks in each region using the annual incidence rates of regional infectious disease as objective indicators |
| Shin et al, 2006 [129] | Other chronic diseases | | | Ecological | To show the fact that some degree of increasing or decreasing trends of asthmatic prevalence already exists in the experimental sites |
| Shin, 2011 [130] | Infectious disease | | | Ecological | To investigate the impact of weather factors on municipal malaria patient numbers, and to predict the future prevalence rate of malaria |
| Shin et al, 2012 [131] | Other chronic diseases | | | Ecological | To examine the regional disparity of ambulatory health care utilization considering spatio-temporal variation in South Korea during 1996-2008 using Bayesian hierarchial spatio-temporal model |
| Shin et al, 2019 [132] | Other chronic diseases | | | Nested case-control cohort | To investigate the effect of air pollutants on the development of adult rheumatoid arthritis |
| Shin et al, 2020 [133] | Multiple diseases | | | Ecological | To calculate oral cleft prevalence and understand the association between area-level indicators and the prevalence of oral clefts in South Korea |
| Shon et al, 2015 [134] | Infectious disease | | | Cross-sectional | To compared the prevalence of hepatitis C virus (HCV) infection in the Republic of Korea and estimated the high-risk regions and towns |
| Sohn, 2012 [135] | Mortality | | | Ecological | To find meaningful patterns in the cause specific age-standardized regional death rates related to ten types of male cancers by applying an exploratory analysis based on Self Organizing Map and GIS |
| Sohn et al, 2019 [136] | Infectious disease | | | Ecological | To identify the association between social deprivation, outdoor air pollution, and tuberculosis (TB) incidence rate or mortality rate |
| Son et al, 2010 [137] | Other chronic diseases | | | Cross-sectional | To investigate how different methods of estimating exposure may influence health effect estimates in a case study of lung function data |
| Song et al, 2014 [138] | Infectious disease | | | Ecological | To analyze the tuberculosis patient cluster |
| Um, 2010 [139] | Other chronic diseases | | | Ecological | To assess whether the impervious surface as a thematic parameter of analysis is realistically based on the nature of the childhood asthma burdens |
| Um et al, 2014 [140] | Other chronic diseases | | | Cross-sectional | To investigated the spatial epidemiological pattern of dry eye disease prevalence in South Korea |
| Um et al, 2015 [141] | Mental health | | | Cross-sectional | To examined the community-specific spatial pattern of the prevalence of CSD(chronic sleep deprivation) and the presence of clustered spatial hotspots among the Korean elderly population in Gyeongbuk Province, South Korea, revealing CSD hotspots and underscoring the importance of geography-focused prevention strategies |
| Won et al, 2018 [142] | Cancer | | | Ecological | To describe the temporal trends and district-level geographical variations in cancer incidences throughout Korea during 1999-2013 |
| Woo et al, 2019 [143] | Mortality | | | Ecological | To describe the trends of colorectal cancer mortality by region |
| Yang, 2013 [144] | Other chronic diseases | | | Ecological | To compare and analyze regional accessibility of Korean primary school students to oral health services from the perspective of public health geography by using geographic information system in which the choropleth map has been regarded as the most popular method |
| Yang, 2015 [145] | Health service utilization | | | Ecological | To analyze geographical distribution of Korean dental hygienists to provide the geographical basis of supply-side policy for dental hygienists from the perspective of dental geography by using Geographic Information System (GIS) in which the choropleth map has been regarded as the most popular method |
| Yeom, 2019 [146] | Mental health | | | Ecological | To estimate the contextual effects of population level alcohol consumption on the average suicide mortality rate (SMR) in South Korea from 2013 to 2015 |
| Yi et al, 2014 [147] | Mortality | | | Cohort | To examined the prevalence of various disorders of the endocrine, nervous, circulatory, respiratory, and digestive systems, and evaluated the hazardous effects of Agent Orange exposure on human health by exploring associations between Agent Orange exposure and specific morbidities, after adjusting for major health-related covariates |
| Yoo et al, 2015 [148] | Other chronic diseases | | | Cross-sectional | To investigate trends in the prevalence of allergic disease over a 9-year period |
| Yoon et al, 2015 [149] | Mental health | | | Ecological | To examine the association of community characteristics with suicide in the 424 neighborhoods of Seoul, South Korea |
| Yu et al, 2020 [150] | Other chronic diseases | | | Cross-sectional | To identify the chemical risk hotspots in Ulsan based on spatial analyses for nine factors related to chemical risks |

**Supplemental Material 3**. Characteristics of included studies on spatial and spatiotemporal analysis.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Refer** | **Data type** | **Unit of analysis** | **Software** | **Map (Y/N)** | **Spatial methods** | **Specific methods used** |
| [1] | Point | N/A | ArcGIS 9.0 | N | Proximity | Multivariate logistic regression |
| [2] | Area | Town | R, ArcGIS 10.5 | Y | Aggregation, Clustering, Spatial regression | SLM, SEM, General spatial model, Moran's I, OLS, VIF |
| [3] | Area | Town | ArcGIS 9.3, SaTScan | Y | Proximity | RIF, Space-time Scan Statistics, ISRR |
| [4] | Area | County | SaTScan 9.6, QGIS 2.18 | Y | Clustering | Kulldorff’s spatial scan statistics, Log-likelihood ratio based on MCMC, RR |
| [5] | Area | Town | Not mentioned | Y | Proximity, Interpolation | Areal interpolation, regression analysis |
| [6] | Area | Province | GeoDa 1.8 | Y | Clustering, Aggregation, Spatial regression | GWR, Moran's I, LISA analysis |
| [7] | Area | Town | ArcGIS 9.2, GeoDa 0.95, WinBUGS 1.4.3, STATA 11.1 | Y | Aggregation | Gaussian CAR, Moran's I, SMR, MCMC |
| [8] | Area | County | SPSS 21.0, ArcGIS 10.0 | Y | Clustering | OLS, Simple linear regression, Factor analysis (varimax method) |
| [9] | Area | County | WinBUGS | Y | Spatial regression | GLM, MCMC, CAR, DIC, MSPE |
| [10] | Area | Town | WinBUGS, R | Y | Spatial regression | Bayesian spatial model, Non spatial model, ICAR, proper CAR, MCMC, DIC, MSPE |
| [11] | Area | County | ArcGIS 10.1 | Y | Aggregation, Interpolation, Spatial regression | GWR, Moran's I, Adaptive kernel |
| [12] | Area | Town | ArcGIS 10.0 | Y | Proximity | Service area analysis, OD-cost Matrix |
| [13] | Area | County | R 3.4.2 | Y | Aggregation | Propensity score matching, Conditional logistic regression, Random-effect multivariate meta-analysis |
| [14] | Area | County | ArcGIS 10.0, SAS 9.4, STATA 12.0 | Y | Clustering | Hot spot analysis (Getis-Ord Gi\*), logistic panel regression |
| [15] | Point | N/A | SPSS 23.0, ArcGIS 10.3.1 | Y | Proximity | Logistic regression, Qualitative content analysis |
| [16] | Point | N/A | ArcMap 10.2, SPSS 21.0 | Y | Spatial regression | GWR, OLS, Geocoding method, AIC |
| [17] | Point | N/A | SaTScan 9.6 | Y | Clustering | Poisson model, Space-time permutation, MCMC, scan statistics |
| [18] | Area | County | ArcMap 10.0, SAS 9.4 | Y | Proximity | Network analysis, Multivariate regression |
| [19] | Point | N/A | ArcGIS 10.2, SPSS 22 | N | Proximity | Univariate/multivariate multiple regression model |
| [20] | Area | County | ArcGIS 10.0, WinBUGS 1.4.3 | Y | Interpolation, Spatial regression | MCMC, Exploratory data analysis, Ordinary lognormal kriging, SIR, Regional deprivation index, CAR |
| [21] | Area | Town | R 2.15.2, SAS 9.1 | Y | Clustering | Stone's test |
| [22] | Area | County | ArcView GIS 3.3, SPSS 11.0 | Y | Aggregation | Multiple linear regression |
| [23] | Area | Province | Not mentioned | Y | Aggregation | Exploratory data analysis method, Two-sample t-test, LM plots, Rank correlation analysis, Fitted regression models, Spearman's rho |
| [24] | Area | County | R, GeoDa | Y | Aggregation, Clustering, Spatial regression | Global Moran's I, LISA analysis, OLS, SLM, SEM, Spatial Durbin error model, General spatial model |
| [25] | Area | Province | ArcMap 10.2, SAS 9.3, R | Y | Clustering, Spatial regression | Hot spot analysis, GAM, Getis Ord Gi statistics, Piecewise regression, Kruskal-Wallis test, Meta regression analysis |
| [26] | Point | N/A | SPSS 12.0 | Y | Proximity | Student t-test |
| [27] | Area | Town | R | Y | Proximity | Network analysis (Dijkstra algorithm) |
| [28] | Area | County | STATA SE 9ver | N | Clustering, Spatial regression | Moran's I, Random intercept Poisson regression using empirical Bayes method, Splus/SpatialStat, Generalized Linear Latent And Mixed Models |
| [29] | Point | N/A | Arc GIS 9.2, SPSS 17.0 | Y | Proximity | Cost weighted distance, Non-parametric t-test (Mann-Whitney test), Multiple regression |
| [30] | Point | N/A | ArcGIS 9.3, SPSS 17.0 | Y | Proximity | Cost weighted distance algorithm with a GIS, Chi-square test |
| [31] | Area | County | SPSS12.0, GeoMedia Professional 6.1, R 3.0.3, SAS 9.3 | Y | Clustering | Moran's I, Sparman's rank correlation coefficient, Augmented Dickey-Fuller test, Granger causality test |
| [32] | Area | County | SPSS 20.0, Map Wizard for Excel 10.0 | Y | Aggregation | Descriptive statistics, Box plot, GIS of scaling experience rate |
| [33] | Area | Town | ArcGIS 10.1, SAS 9.3, Excel | Y | Proximity, Spatial regression | Multiple regression, Logistic regression analysis, GWR |
| [34] | Area | County | ArcGIS 10.2, SaTScanTM9.1.2 | Y | Clustering, Aggregation | Scan statistics, MCMC |
| [35] | Area | County | ArcGIS | Y | Clustering | Spatial clustering, Spatial correlation, Hierarchical clustering, Region-growing segmentation |
| [36] | Area | County | ArcGIS | Y | Clustering, Spatial regression | Pearson's R, Moran's I, GWR |
| [37] | Area | County | ArcGIS 10.2.2, SPSS 21.0 | Y | Aggregation, Clustering, Spatial regression | Moran's I, Pearson’s correlation analysis, OLS, GWR, AIC |
| [38] | Area | County | SAS 9.3, ArcGIS 10.1 | Y | Spatial regression | GWR, GIS analysis |
| [39] | Area | County | Python Spatial Analysis Library | Y | Clustering, Spatial regression | Gi\* score, Spatial Markov matrix, Spatial dynamic panel data model, Chi squared test, Hot spot analysis |
| [40] | Area | County | GeoDa 1.6.7 | Y | Clustering | Global, local Moran's I |
| [41] | Area | County | Not mentioned | Y | Aggregation, Clustering, Spatial regression | Moran's I, LISA, GWR |
| [42] | Area | County | SAS 9.2, R 3.0.1 | Y | Interpolation | Kriging, Inverse distance weighting interpolation, Spherical variogram, RMSE, Simple averaging, Nearest neighbor |
| [43] | Area | County | WinBUGS | Y | Interpolation, Aggregation, Spatial regression | Kriging, Bayesian zero-inflated spatio-temporal model |
| [44] | Point | N/A | ArcMap 10.5, ArcPro 1.5, Python, Voxler | Y | Clustering, Aggregation | Space-time kernel density estimation, Hot spot analyses, Space-time cube, Emerging hotspot, Space-time kernel density estimation |
| [45] | Area | County | WinBUGS, R | Y | Aggregation, Clustering, Spatial regression | Two-stage Bayesian hierarchical spatio-temporal model, MCMC, CAR, AR, Gelman–Rubin statistic, MSPE, DIC, Moran's I |
| [46] | Area | County | ARCVIEW | Y | Aggregation | ANOVA, regression |
| [47] | Point | N/A | GIS tool (TransCAD), SAS | Y | Proximity, Aggregation | T-test, ANOVA |
| [48] | Area | Town | MapWizard, SAS v9.1 | Y | Proximity, Aggregation | N/A |
| [49] | Area | Town | Not mentioned | N | Aggregation | Geographic information systems-assisted analysis of the immunization service coverage area |
| [50] | Area | Town | Not mentioned | Y | Aggregation | Stepwise method, Multilevel model, SMR, HGLM, HLM |
| [51] | Area | County | ArcGIS 9.2, SAS 8.01 | N | Aggregation | Paired t-test, Paired correlation analysis, Unpaired t-test, Chi-square test, ANOVA, Choropleth map |
| [52] | Area | County | ArcGIS 10.1, R, Geoda | Y | Aggregation, Clustering, Spatial regression | OLS, Eigenvector spatial filtering model, SEM, LISA, Moran's I, Poisson model, Pearson's correlation analysis, VIF, Shapiro-Wilk test, Breusch-Pagan test, Residual plot |
| [53] | Point | N/A | GeoDa | Y | Aggregation, Clustering | Hot spot analysis, Pearson's correlation test, T-test, LISA, Moran's I |
| [54] | Area | Town | GIS program | Y | Aggregation | Log deviation, life table |
| [55] | Area | County | SPSS 21.0, ArcMap 10.2 | Y | Smoothing, Spaital regression | OLS, GWR, AIC, Adaptive kernel function |
| [56] | Area | Town | ArcGIS 10.2, STATA 14.0 | Y | Aggregation | Independent sample t-tests, Chi-square tests, GIS map |
| [57] | Area | County | ArcGIS 10.3, SPSS 21.0 | Y | Aggregation, Clustering, Spatial regression | GWR, OLS, AIC, VIF, Moran's I |
| [58] | Area | County | SaTScan, GeoDa, R | Y | Aggregation, Clustering | Spatial scan statistics (MCMC, SaTScanO, SaTScanE), Tango's method (MEET), LISA, Nonparametric Approach (SMR), Moran's I |
| [59] | Area | County | ArcGIS 10.0, MATLAB R2015b | Y | Aggregation, Clustering, Interpolation | Moran's I, Principal component regression model, Categorical regression model, Digital elevation model, Kriging, Spatial clustering, AIC, Logistic regression model, Artificial neural network model, ROC, AUC |
| [60] | Area | County | ArcGIS, WinBUGS 1.4.3 | Y | Aggregation, Spatial regression | Poisson regression analysis, Intrinsic CAR model, DIC |
| [61] | Area | County | QGIS, R 3.4.1 | Y | Clustering, Spatial regression | Global, local Moran's I, CAR, OLS |
| [62] | Area | Town | GeoDa | Y | Smoothing, Aggregation, Clustering | Global Moran's I, Pearson's R statistics, Lee's L statistic for bivariate spatial association |
| [63] | Area | Province | SAS 9.4, SPSS 23.0, GIS | Y | Aggregation | Independent t-test, Pearson correlation analysis, Chi-squared test |
| [64] | Area | County | ArcMap 10.1, WinBUGS | Y | Aggregation, Spatial regression | Hierarchical Bayesian Poisson Model, CAR, MCMC |
| [65] | Area | Town | QGIS | Y | Proximity | Seoul Enhanced 2-Step Floating Catchment Area (SE2SFCA) |
| [66] | Area | County | SAS 9.3, SPSS 23, GeoDa 1.12.1.161 | Y | Aggregation, Clustering, Spatial regression | Moran's I, Spatial error model, OLS |
| [67] | Area | Town | Not mentioned | Y | Clustering | Hot spot analysis, Spatial cluster analysis, Getis ord Gi statistics |
| [68] | Area | County | ArcGIS 10.5 | Y | Aggregation, Clustering, Spatial regression | Global Moran's I, GWR, OLS |
| [69] | Area | County | ArcGIS | Y | Clustering | Mann-Kendall trend test, Hot Spot Analysis, Getis-Ord Gi statistics, OLS |
| [70] | Area | County | ArcGIS 10.4, R 3.4.2 | Y | Aggregation, Clustering | Multilevel model, Logistic regression, Eigenvector spatial filtering, MGLM, OLS, AIC, Moran's I |
| [71] | Area | Town | ArcGIS | Y | Proximity | Two-step floating catchment area (2SFCA) method, chronological GIS mapping |
| [72] | Area | Town | R 3.6.2 | Y | Clustering | ANOVA, Post hoc test (Scheffe test) |
| [73] | Area | Town | ArcMap v 10.6.1, Open GeoDa v 1.14 | Y | Clustering | Global Moran's I, MCMC, k-nearest neighborhood, Space-time scan statistic method |
| [74] | Area | Town | WinBUGS | Y | Aggregation, Clustering, Spatial regression | GLMM, MCMC, Moran's I, CAR, DIC, Gelman Rubin Statistics (Brooks Gelman Rubin ratio) |
| [75] | Area | County | ArcGIS 10.1, SPSS 20 | Y | Aggregation, Clustering, Spatial regression | Correlation analysis, Moran's I, GWR, OLS, External Quotient, Chi-squared analysis, GIS |
| [76] | Area | Town | R 3.4.3 | Y | Clustering | Baron and Kenny method, GLM, Cluster analysis |
| [77] | Area | County | Microsoft Excel 2007, OpenGeoDa 0.9.9.11 | Y | Aggregation, Clustering | Age-adjusted prevalence ratio, Spatial autocorrelation analysis (Moran's I), LISA |
| [78] | Area | Town | Adobe illustrator 8.0, SPSS 9.0 | Y | Aggregation | N/A |
| [79] | Area | Town | ArcView, GIS, GeoDa 0.95i, SPSS | Y | Clustering, Aggregation | Exploratory Spatial data analysis, Paired t-test, Chi-square test, ANOVA, Moran's I |
| [80] | Area | Town | MATLAB 7.4, SPSS 19.0 K | N | Clustering | K-means cluster, Independent t-test, Chi-square test, Fisher Exact test |
| [81] | Area | Town | ArcMap 10, SPSS 19.0 | Y | Proximity | Buffer analysis, Multivariate analysis, Hot spot analysis, GLM, Getis-Ord G i \* statistics, Multiple regression analysis |
| [82] | Area | County | ArcGIS 10.2.1, SPSS 18.0 | Y | Aggregation, Clustering, Spatial regression | Spatial autocorrelation analysis (Moran's I), GWR, OLS |
| [83] | Area | Town | ArcGIS, GIS software, SAS 9.2, ArcMap 10 | Y | Proximity, Aggregation, Clustering, Spatial regression | Grid model, GWR, AIC, OLS, Moran's I, VIF, Pearson's correlation |
| [84] | Area | County | PASW Statistics version 18.0, Quantum GIS 2.0 | Y | Aggregation | Two-stage stratified complex sampling, Complex sample logistic regression, Cronbach's alpha |
| [85] | Area | County | Not mentioned | Y | Aggregation | Gibbs sampling, Grid method, SMR, Simultaneous CAR model, MCMC, EPD (posterior expected predictive deviance), PPL (minimum posterior predictive loss approach) |
| [86] | Point | N/A | ArcGIS 10.0, SAS 9.3 | Y | Clustering | Geocoding method, Grid modeling approach, Hot spot analysis, GLM, Getis Ord Gi statistics, Multivariable regression, Poisson regression, Negative binomial regression |
| [87] | Area | County | R version 3.2.2 | Y | Aggregation, Spatial regression | Generalized linear mixed model, Bayesian hierarchical model |
| [88] | Area | Town | ArcGIS, SPSS 21.0, SAS version 9.4 | N | Proximity | Chi-square test, Logistic regression, Multilevel logistic regression |
| [89] | Area | Town | ArcGIS 10.4.1, SPSS 23 | Y | Interpolation | IDW interpolation, Independent sample t-test, Simple linear regression analysis, Multiple regression analysis, Pearson correlation analysis |
| [90] | Area | County | R 3.5.0 | Y | Aggregation, Clustering, Spatial regression | Moran's I, Hot spot analysis, Simultaneous autoregressive model, OLS |
| [91] | Point | N/A | Not mentioned | Y | Proximity | Survival function method (Gold standard determination of R, Basic reproductive rate (R)), Stochastic branching process model, Spatio-temporal analysis |
| [92] | Area | Province | SAS 9.4, R 3.4.4 | Y | Aggregation | Multivariate logistic regression |
| [93] | Point | N/A | ArcGIS Desktop 10.5, R 3.4.4 | Y | Aggregation, Smoothing | Loess smoothing, Likelihood ratio test, Survey-weighted regression, Mediation analysis, Bootstrapping |
| [94] | Area | Town | ArcGIS | N | Interpolation | Kriging (block kriging), log-binomial regressions |
| [95] | Area | Province | ArcGIS 10.1, SaTScan 9.0, OpenGeoDa | Y | Clustering, Interpolation, Spatial regression | Kriging, Moran's I, Poisson model, SMR, GWR |
| [96] | Area | County | ArcGIS 9.0 | Y | Aggregation, Clustering | Hot spot analysis, Moran's I, LISA |
| [97] | Area | County | R 3.2.4, GeoDa 1.12 | Y | Clustering, Smoothing, Spatial regression | Poisson model (Bayes smoothing method), Univariate cluster analyses, Bayesian spatial zero-inflated model, LISA, BiLISA, SIR, MCMC, Logistic regression, Multivariable regression, AIC, DIC, Choropleth map |
| [98] | Area | County | SAS 9.4 | N | Interpolation | Kriging interpolation method, Cox-proportional hazards regression for multivariable analysis |
| [99] | Point | N/A | ArcGIS 10.4, SAS 9.2 | N | Interpolation | Kriging, the Cox-proportional hazards regression model |
| [100] | Point | N/A | Web GIS (Daum, Naver) | N | Proximity, Aggregation | N/A |
| [101] | Area | County | Not mentioned | Y | Spatial regression | GWR, OLS |
| [102] | Area | County | MapWizard, R | Y | Smoothing, Aggregation, Spatial regression | Hierarchical Generalized Linear Model, Spatial and temporal correlation |
| [103] | Point | N/A | R | Y | Aggregation | Hierarchical generalized linear model, AIC |
| [104] | Area | County | ArcView 3.2 | Y | Aggregation | OLS |
| [105] | Area | County | ArcGIS 10.3 | Y | Clustering | Geocoding method, Moran's I, Choropleth map |
| [106] | Area | County | R, ArcGIS | Y | Aggregation, Clustering | Moran's I, Decision tree analysis (CART algorithm) |
| [107] | Point | N/A | R 3.3.1 | N | Clustering | Relevance index, Commitment index, NbClust, Cluster analysis (K-means), Kruskal-Wallis test |
| [108] | Area | Town | Map algebra | Y | Interpolation, Aggregation | Exploratory Spatial analysis (Data driven analysis), Confirmatory Spatial analysis (Model-driven analysis), IDW method, Focal Mean method, Generalized Linear Model |
| [109] | Area | County | ArcGIS 10.2, SAS9.3 | Y | Smoothing, Spatial regression | Pearson's correlation analysis, SMR, Adaptive kernel, AIC, GWR, OLS |
| [110] | Area | County | R | Y | Aggregation, Clustering, Spatial regression | Spatially filtered multilevel model, Eigenvector spatial filtering, Moran's I, Spatial lag model, SAR, AIC |
| [111] | Area | Province | ArcGIS 10.2.2, SAS 9.3 | Y | Clustering, Smoothing, Spatial regression | Correlation analysis, GWR, Adaptive spatial kernel, AIC, Moran's I, OLS |
| [112] | Area | County | R | Y | Aggregation, Spatial regression | Spatio-temporal model, ICAR, Choropleth map, DIC |
| [113] | Area | County | ArcGIS 10.0, SAS 9.3 | Y | Aggregation, Clustering, Spatial regression | Pearson’s correlation coefficients, Moran's I, VIF, GWR, OLS, AIC |
| [114] | Area | County | ArcGIS, SAS | Y | Aggregation, Clustering, Spatial regression | GWR, OLS, Pearson's correlation analysis, Moran's I |
| [115] | Area | Town | ArcMap, R, STATA 13.1 | N | Aggregation | Multilevel logistic regression analysis |
| [116] | Area | County | Web GIS ( X-Ray Map) | Y | Aggregation | ANOVA |
| [117] | Point | N/A | ArcGIS 10.0 | Y | Proximity | Network analysis (service area analysis, OD-cost Matrix) |
| [118] | Area | Town | ArcGIS 10.3 | Y | Proximity | Service area analysis, Origin-Destination cost matrix |
| [119] | Area | Town | ArcGIS ver. 10.0, SAS ver. 9.4, STATA ver. 15.0 | N | Interpolation | Kriging, Panel regression, VIF |
| [120] | Area | Town | ArcGIS ver. 10.3, SAS ver. 9.4 | Y | Spatial regression | OLS, GWR, Origin-destination-cost matrix, AIC, Moran's Index, Jarque-Bera statistics |
| [121] | Area | County | Not mentioned | Y | Aggregation | Conventional age-standardized incidence rates, Daytime corrected age-standardized incidence rate |
| [122] | Area | County | GeoDa 1.4.1, SAS 9.1 | Y | Clustering, Spatial regression | Kruskal-Wallis test, Correlation, Moran’s I, Hot spot analysis, Ordinary linear regression, Spatial lag, Spatial error analysis, log likelihood, AIC, Schwarz criterion |
| [123] | Area | County | Not mentioned | Y | Aggregation, Clustering | Global, local Moran's I, trajectory clustering analysis, multinomial logistic regression |
| [124] | Area | County | ArcView 3.1 | Y | Interpolation, Aggregation | Linear regression, logistic regression, California Puff model, CALMET model |
| [125] | Area | Province | ArcGIS | N | Interpolation | Kriging, Simple logistic regression model, Multiple logistic regression |
| [126] | Area | County | ArcGIS 10.3, SAS 9.3, SPSS 21.0 | Y | Clustering | Hot spot analysis, Chi-square analysis, Getis Ord Gi statistics, Negative binomial regression analysis |
| [127] | Area | Town | Not mentioned | Y | Spatial regression | OLS, GWR |
| [128] | Area | Province | R 3.3.3 | Y | Clustering | K-means cluster |
| [129] | Area | Town | AutoCAD MAP 2000, ArcGIS | Y | Aggregation | Choropleth map (natural breaks method) |
| [130] | Area | County | Not mentioned | Y | Aggregation | Generalized Estimation Equation, Generalized linear model for a time-series of Poisson distribution |
| [131] | Area | County | WinBUGS 1.4, R 2.10.1 | Y | Aggregation, Spatial regression | Bayesian hierarchical spatio-temporal model (convolution CAR for spatial correlation, Ornstein-Uhlenbeck for temporal correlation), MCMC, global Moran's I |
| [132] | Area | County | ArcGIS 9.3, SAS 9.4 | N | Interpolation | Kriging, Propensity score-matched, Interpolation technique, Binary logistic regression |
| [133] | Area | Town | R 3.4 | Y | Spatial regression | Ecological regression, Gaussian Markov Random Field models, R-INLA |
| [134] | Area | County | Not mentioned | Y | Aggregation | Directed method to calculate age-adjusted prevalence |
| [135] | Area | County | Matlab SOM Toolbox | Y | Aggregation, Clustering | Self-Organizing Map (visualizing feature space, clustering feature space), K-means cluster, Moran's I |
| [136] | Area | Town | ArcMap 10, R 3.0.2 | Y | Aggregation | GIS analysis, Random effects Poisson regression |
| [137] | Point | N/A | R 2.8.1, SAS 9.2 | Y | Interpolation | Spatial interpolation (average across all monitors, nearest monitors, inverse distance weighing, kriging), linear regression |
| [138] | Area | Town | Quantum GIS | Y | Clustering | Generalized lasso, SMR, OLS |
| [139] | Area | Town | SPSS, ArcGIS, MS Excel, SQL-queries | Y | Aggregation | Time sequential analysis, Pearson bi-variate correlation, Multiple choropleth maps |
| [140] | Area | County | ArcGIS 10.1, SAS 9.2 | Y | Aggregation | Post-hoc subgroup analyses, Weighted analyses, Serial multiple logistic regression |
| [141] | Area | Town | ArcGIS 10.1, SAS 9.2 | Y | Aggregation, Clustering | Hot spot analysis, Moran's I, LISA |
| [142] | Area | County | SAS 9.3, STATA, ArcMap 9.1 | Y | Aggregation | Age-standardized incidences |
| [143] | Area | Province | Joinpoint Regression Program version 4.2.0.1 | Y | Aggregation | Join point regression model |
| [144] | Area | County | ArcGIS 9.2 | Y | Proximity | Choropleth map, Classification (Statistical proximity) |
| [145] | Area | County | ArcGIS 9.2 | Y | Aggregation | GIS method (Choropleth map) |
| [146] | Area | County | GeoDa 1.12.1.59, QGIS 2.18.19 | Y | Aggregation, Clustering, Spatial regression | LISA, Moran's I, SEM |
| [147] | Point | N/A | SAS 9.2 | Y | Proximity | Chi-squared test, ANOVA, Logistic regression |
| [148] | Area | County | SAS 9.3 | Y | Aggregation | Small Area Variation Analysis, GIS method |
| [149] | Area | Town | WinBUGS 1.4, STATA 13.0, R 3.1.1, QGIS 1.80 | Y | Spatial regression | Bayesian hierarchical model, MCMC, Multiple logistic, CAR |
| [150] | Area | Town | WindNinja | Y | Clustering, Interpolation | Global Moran’s I, Average nearest neighbor, Kernel density estimation, Radiative transfer equation, Hot spot analysis |
| AIC; Akaike information criterion, OLS; Ordinary least squares regression, ANOVA; Analysis of variance,  CAR; Conditional autoregressive models, GLMM; Generalized linear mixed models, GWR; Geographically weighted regression,  IDW; Inverse distance weighting, ISRR; Indirectly standardized relative risk,  LISA; Local Indicators of Spatial Association, MSPE; Mean Square Prediction Error,  RIF; Rapid Inquiry Facility, RR; Relative risk, SIR; Standardized incidence ratio, SLM; Spatial lag model, SEM; Spatial error model,  MCMC; Markov chain Monte Carlo, VIF; Variance Inflation Factor | | | | | | |

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