# Results

* Study selection flow



* Methods list
  + Article description ( Table 1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Grouped by Epoch | | | | | | | | |
|  |  | **Missing** | **Overall** | **2010-2013** | **2014-2016** | **2017** | **2018** | **2019** |
| Total papers, n |  |  | 175 | 35 | 35 | 35 | 35 | 35 |
| Study Design Type,  n (%) | **Retrospective chart review** | 0 | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **cost-benefit analysis** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **cross-sectional study** |  | 1 (0.6) | 1 (2.9) |  |  |  |  |
| **prospective cohort** |  | 1 (0.6) |  |  | 1 (2.9) |  |  |
| **prospective cohort study** |  | 11 (6.3) | 4 (11.4) |  | 3 (8.6) | 1 (2.9) | 3 (8.6) |
| **prospective controlled study** |  | 1 (0.6) | 1 (2.9) |  |  |  |  |
| **retrospective case–control study** |  | 8 (4.6) |  | 3 (8.6) | 2 (5.7) |  | 3 (8.6) |
| **retrospective chart review** |  | 14 (8.0) | 2 (5.7) | 4 (11.4) | 2 (5.7) | 4 (11.4) | 2 (5.7) |
| **retrospective cohort study** |  | 120 (68.6) | 24 (68.6) | 25 (71.4) | 23 (65.7) | 26 (74.3) | 22 (62.9) |
| **retrospective cross-sectional study** |  | 13 (7.4) | 3 (8.6) |  | 4 (11.4) | 4 (11.4) | 2 (5.7) |
| **retrospective database study** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **retrospective review** |  | 3 (1.7) |  | 3 (8.6) |  |  |  |
| Country/district ,  n (%) | **Australia** | 0 | 3 (1.7) | 1 (2.9) |  |  |  | 2 (5.7) |
| **Brazil** |  | 1 (0.6) |  |  |  | 1 (2.9) |  |
| **Canada** |  | 3 (1.7) | 3 (8.6) |  |  |  |  |
| **China** |  | 7 (4.0) |  | 2 (5.7) |  | 3 (8.6) | 2 (5.7) |
| **Croatia** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **Denmark** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **France** |  | 5 (2.9) |  |  | 2 (5.7) | 2 (5.7) | 1 (2.9) |
| **Israel** |  | 6 (3.4) |  | 2 (5.7) | 1 (2.9) | 1 (2.9) | 2 (5.7) |
| **Italy** |  | 1 (0.6) |  | 1 (2.9) |  |  |  |
| **Japan** |  | 3 (1.7) |  |  |  |  | 3 (8.6) |
| **Japan** |  | 1 (0.6) |  |  |  | 1 (2.9) |  |
| **Korea** |  | 7 (4.0) | 2 (5.7) | 3 (8.6) | 2 (5.7) |  |  |
| **Malawi** |  | 1 (0.6) |  |  | 1 (2.9) |  |  |
| **Mexico** |  | 1 (0.6) |  | 1 (2.9) |  |  |  |
| **Netherlands** |  | 1 (0.6) |  | 1 (2.9) |  |  |  |
| **Oman** |  | 2 (1.1) |  | 1 (2.9) | 1 (2.9) |  |  |
| **Portugal** |  | 1 (0.6) |  | 1 (2.9) |  |  |  |
| **Singapore** |  | 4 (2.3) |  |  |  | 3 (8.6) | 1 (2.9) |
| **Spain** |  | 4 (2.3) | 1 (2.9) | 1 (2.9) |  | 1 (2.9) | 1 (2.9) |
| **Sweden** |  | 2 (1.1) | 1 (2.9) |  |  |  | 1 (2.9) |
| **Switzerland** |  | 1 (0.6) |  |  | 1 (2.9) |  |  |
| **Taiwan** |  | 1 (0.6) |  |  | 1 (2.9) |  |  |
| **Turkey** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **UK** |  | 20 (11.4) | 2 (5.7) | 3 (8.6) | 8 (22.9) | 4 (11.4) | 3 (8.6) |
| **USA** |  | 97 (55.4) | 25 (71.4) | 19 (54.3) | 18 (51.4) | 19 (54.3) | 16 (45.7) |
| Mention Missing Data,  n (%) | **No** | 0 | 94 (53.7) | 19 (54.3) | 23 (65.7) | 14 (40.0) | 20 (57.1) | 18 (51.4) |
| **Yes, data cleaning** |  | 34 (19.4) | 6 (17.1) | 6 (17.1) | 11 (31.4) | 6 (17.1) | 5 (14.3) |
| **Yes, data description** |  | 25 (14.3) | 5 (14.3) | 3 (8.6) | 6 (17.1) | 5 (14.3) | 6 (17.1) |
| **Yes, limitation** |  | 20 (11.4) | 5 (14.3) | 3 (8.6) | 4 (11.4) | 3 (8.6) | 5 (14.3) |
| **Yes, no missing** |  | 2 (1.1) |  |  |  | 1 (2.9) | 1 (2.9) |
| Handled Missing Data  , n (%) | **No** | 0 | 136 (77.7) | 27 (77.1) | 28 (80.0) | 22 (62.9) | 29 (82.9) | 30 (85.7) |
| **Yes, Imputation** |  | 17 (9.7) | 3 (8.6) | 2 (5.7) | 5 (14.3) | 4 (11.4) | 3 (8.6) |
| **Yes, excluded** |  | 15 (8.6) | 3 (8.6) | 5 (14.3) | 3 (8.6) | 2 (5.7) | 2 (5.7) |
| **Yes, excluded** |  | 4 (2.3) | 1 (2.9) |  | 3 (8.6) |  |  |
| **Yes, sensitivity analysis** |  | 3 (1.7) | 1 (2.9) |  | 2 (5.7) |  |  |
| Followed Check List,  n (%) | **No** | 0 | 171 (97.7) | 34 (97.1) | 34 (97.1) | 34 (97.1) | 35 (100.0) | 34 (97.1) |
| **STROBE** |  | 4 (2.3) | 1 (2.9) | 1 (2.9) | 1 (2.9) |  | 1 (2.9) |
| Analytic Tools Used ,  n (%) | **CART Salford Predictive Miner** | 0 | 1 (0.6) | 1 (2.9) |  |  |  |  |
| **Didn't mention** |  | 28 (16.0) | 6 (17.1) | 5 (14.3) | 8 (22.9) | 3 (8.6) | 6 (17.1) |
| **EZR** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **Excel** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **GraphPad Prism** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **JMP** |  | 1 (0.6) | 1 (2.9) |  |  |  |  |
| **Mplus** |  | 1 (0.6) | 1 (2.9) |  |  |  |  |
| **NCSS** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **MedCalc** |  | 1 (0.6) |  | 1 (2.9) |  |  |  |
| **Epidata** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **R** |  | 20 (11.4) |  | 2 (5.7) | 5 (14.3) | 9 (25.7) | 4 (11.4) |
| **SAS** |  | 41 (23.4) | 8 (22.9) | 8 (22.9) | 10 (28.6) | 10 (28.6) | 5 (14.3) |
| **SigmaPlot** |  | 1 (0.6) |  |  |  |  | 1 (2.9) |
| **SPSS ( & PASW Statistics)** |  | 50 (28.6) | 11 (31.4) | 13 (37.1) | 10 (28.6) | 10 (28.6) | 6 (17.1) |
| **Stata** |  | 37 (21.1) | 7 (20.0) | 10 (28.6) | 3 (8.6) | 8 (22.9) | 9 (25.7) |
| **Statistica** |  | 1 (0.6) | 1 (2.9) |  |  |  |  |
| **Statview** |  | 1 (0.6) | 1 (2.9) |  |  |  |  |

* + Distribution of journals , impact factors ( Haven’t finished)
* Chart, bar chart

  Description automatically generated
* Proportion table
  + - List of RWE methods non 0 frequency -with frequencies

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 2010-2013 | 2014-2016 | 2017 | 2018 | 2019 |
| Included\_Number | 35 | 35 | 35 | 35 | 35 |
| Real-World\_Method | 8 | 13 | 14 | 8 | 7 |
| Sensitivity\_Analysis | 4 | 10 | 10 | 3 | 4 |
| Handled\_Missingness | 8 | 7 | 14 | 8 | 5 |
| Mentioned\_Missingness | 16 | 13 | 21 | 15 | 17 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 2010-2013 | 2014-2016 | 2017 | 2018 | 2019 |
| Real-World\_Method | 22.86%  (8.95%, 36.77%) | 37.14%  (21.13%, 53.15%) | 40.00%  (23.77%, 56.23%) | 22.86%  (8.95%, 36.77%) | 20.00%  (6.75%, 33.25%) |
| Sensitivity\_Analysis | 11.43%  (0.89%, 21.97%) | 28.57%  (13.60%, 43.54%) | 28.57%  (13.60%, 43.54%) | 8.57%  (0, 17.85%) | 11.43%  (0.89%, 21.97%) |
| Handled\_Missing\_Data | 22.86%  (8.95%, 36.77%) | 20.00%  (6.75%, 33.25%) | 40.00%  (23.77%, 56.23%) | 22.86%  (8.95%, 36.77%) | 14.29%  (2.69%, 25.88%) |
| Mentioned\_Missing\_Data | 45.71%  (29.21%, 62.22%) | 37.14%  (21.13%, 53.15%) | 60.00%  (43,77%, 76.23%) | 42.86%  (26.46%, 59.25%) | 48.57%  (32.01%, 65.13%) |

Chart, box and whisker chart

Description automatically generated

* + Supplement all methods we look for
* Meta-regression result

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| name | estimate | se | z-score | p-value | ci\_0.025 | ci\_0.975 |
| intercept | 0.32 | 0.36 | 0.89 | 0.37 | -0.39 | 1.03 |
| Real-World Methods | 0.00 | 0.02 | -0.14 | 0.89 | -0.05 | 0.04 |
| intercept | 6.42 | 3.29 | 0.19 | 0.85 | -58.83 | 71.68 |
| Sensitivity Analysis | 0.00 | 0.02 | -0.19 | 0.85 | -0.04 | 0.03 |
| intercept | 8.93 | 41.75 | 0.21 | 0.83 | -72.89 | 90.75 |
| Missing Data | 0.00 | 0.02 | -0.21 | 0.83 | -0.04 | 0.04 |
| name | estimate | se | z-score | p-value | ci\_0.025 | ci\_0.975 | |
| intercept | 0.32298 | 0.362353 | 0.89134 | 0.372747 | -0.38722 | 1.033178 | |
| Real-World Methods | -0.00306 | 0.021632 | -0.14123 | 0.887688 | -0.04545 | 0.039342 | |
| intercept | 6.4248103 | 3.293761 | 0.192973 | 0.84698 | -58.829762 | 71.6793821 | |
| Sensitivity Analysis | -0.003114 | 0.01651 | -0.188608 | 0.8504 | -0.035473 | 0.029245 | |
| intercept | 8.930046 | 41.747102 | 0.213908 | 0.830619 | -72.89277 | 90.7528621 | |
| Missing Data | -0.004318 | 0.020702 | -0.208564 | 0.834788 | -0.044893 | 0.036257 | |

* Consistency -breadth

Method list:

|  |  |  |
| --- | --- | --- |
| Analytic\_Method\_ID | Analytic\_Method\_Name | Method\_Category |
| 1 | Confounding | Real-World Evidence |
| 2 | Non-adherence | Real-World Evidence |
| 3 | Immortal Time | Real-World Evidence |
| 4 | Causal Inference | Real-World Evidence |
| 5 | Inverse Probability | Real-World Evidence |
| 6 | Adjusting | Real-World Evidence |
| 7 | Bias Analysis | Real-World Evidence |
| 8 | Sensitivity Analysis | Real-World Evidence |
| 9 | Trimming | Real-World Evidence |
| 10 | Propensity Score | Real-World Evidence |
| 11 | Instrumental Variable | Real-World Evidence |
| 12 | G-Estimation | Real-World Evidence |
| 13 | Marginal Structure Models | Real-World Evidence |
| 14 | Doubly Robust Methods | Real-World Evidence |
| 15 | Targeted Maximum Likelihood Estimation | Real-World Evidence |
| 16 | Active Comparator | Real-World Evidence |
| 17 | Negative Control | Real-World Evidence |
| 18 | High-dimentional Proxy Adjustment | Real-World Evidence |
| 19 | Reverse Causation | Real-World Evidence |
| 20 | Depletion of Susceptible | Real-World Evidence |
| 21 | Pseudo Treatment | Real-World Evidence |
| 22 | (Manski's) Partial Identification | Real-World Evidence |
| 23 | Empirical Calibration | Real-World Evidence |
| 24 | Regression Discontinuity | Real-World Evidence |
| 25 | Missing Cause | Real-World Evidence |
| 26 | Perturbation Variable | Real-World Evidence |
| 27 | Difference in Difference | Real-World Evidence |
| 28 | Trend in Trend | Real-World Evidence |
| 29 | Bayesian Twin Regression | Real-World Evidence |
| 30 | Multiple Imputation | Real-World Evidence |
| 31 | DAG/ADMG | Real-World Evidence |
| 32 | Identification | Real-World Evidence |
| 33 | Missing Data | Real-World Evidence |
| 34 | Mixed -effects Regression Model | 0 |
| 35 | Logistic Regression | 0 |
| 36 | Multivariate logistic regression | 0 |
| 37 | Empirical Bayes estimates | 0 |
| 38 | Kaplan-Meier method | 0 |
| 39 | Linear Regression | 0 |
| 40 | Cox proportional hazard models | 0 |
| 41 | Discriminant function analysis | 0 |
| 42 | Individual growth curve (IGC) analysis | 0 |
| 43 | Descriptive statistics | 0 |
| 44 | Intention-to-Treat Analysis | 0 |
| 45 | retrospective chart review | 0 |
| 46 | Post-hoc anaysis | 0 |
| 47 | Multivariate linear regression | 0 |
| 48 | Hypothesis test | 0 |
| 49 | one-way analysis of variance (ANOVA) | 0 |
| 50 | Multiple logistic regression | 0 |
| 51 | Linear mixed effect model | 0 |
| 52 | LASSO regression | 0 |
| 53 | Multilevel logistic regression | 0 |
| 54 | Generalized Estimating Equations | 0 |
| 55 | Poisson regression | 0 |
| 56 | recursive partitioning (RP) model | 0 |
| 57 | C-Statistics | 0 |
| 58 | Decision Curve Analysis | 0 |
| 59 | Random Forest | 0 |
| 60 | latent class growth modeling (LCGM) | real-world evidence |
| 61 | multivariable generalized linear mixed model | 0 |
| 62 | Chi-Square Automatic Interaction Detector | 0 |
| 63 | multiple correspondence analysis | 0 |
| 64 | Hierarchic cluster analysis | 0 |
| 65 | Difference-in-difference analysis | 0 |
| 66 | group-based multitrajectory analysis | 0 |
| 67 | Optimal Classification Trees | 0 |
| 68 | AdaBoost | 0 |
| 69 | multilevel quantile regression | 0 |
| 70 | Statistic Testing | 0 |
| 71 | Long Short Term Memory (LSTM) Network | 0 |
| 72 | Gamma Regression | 0 |
| 73 | Multivariate analysis of variance (MANOVA) | 0 |
| 74 | hierarchical generalized linear model | 0 |
| 75 | interrupted time series analysis | 0 |
| 76 | Growth mixture modelling | 0 |
| 77 | multivariable negative binomial regression | 0 |
| 78 | Subgroup Analysis |  |
| 79 | life-table analysis |  |
| 80 | Latent Class Analysis |  |