INPLASY

INPLASY2026110015

doi: 10.37766/inplasy2026.11.0015

Received: 5 November 2026

Published: 5 November 2026

Prevalence of Cardiometabolic Multimorbidity Across Different Definitions: A Systematic Review and Meta-analysis of Community and General Populations

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ADMINISTRATIVE INFORMATION

Support - No support.

Review stage at the time of initial registration - Completed but not published.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2026110015

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 5 November 2026 and was last updated on 5 November 2026.

INTRODUCTION

Review question / Objective What is the prevalence of cardiometabolic multimorbidity (CMM) in community/general and clinical/specific populations, and how do prevalence estimates vary according to the operational disease definitions used in the original studies? This systematic review aims to summarize CMM prevalence and, where data permit, pool prevalence estimates separately for community/general populations by definition category.

Rationale CMM prevalence estimates may vary according to the diseases included in the definition, the characteristics of the study population, and the sampling design. Existing CMM reviews have mainly examined risk factors, disease progression, biomarkers, prognosis, or interventions. This review addresses the prevalence evidence by classifying studies according to the disease lists reported in the original articles and by analyzing community/general populations separately from clinical or other specific populations. This approach is intended to clarify the range of published estimates and the populations and definitions to which they apply.

Condition being studied Cardiometabolic multimorbidity (CMM) refers to the co-occurrence of at least two cardiovascular or metabolic diseases in the same individual. There is no universally accepted operational definition. Studies commonly include diabetes, coronary heart disease or ischemic heart disease, and stroke; some also include hypertension, dyslipidaemia, obesity, chronic kidney disease, heart failure, or other cardiometabolic conditions. This review classifies definitions from the disease lists and thresholds reported in each original study.

METHODS

Participant or population Individuals included in original observational studies reporting CMM

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prevalence. Eligible populations include community/general populations and clinical or other disease-specific populations. Studies were required to provide an identifiable target population and a CMM prevalence estimate or sufficient case and denominator data.

Intervention Not applicable. This is a systematic review of prevalence, not an intervention review.

Comparator Not applicable. No intervention comparator is required for this prevalence review.

Study designs to be included Original observational studies, including cross-sectional studies and cohort or registry studies reporting CMM prevalence at baseline or study entry.

Eligibility criteria Studies were eligible if they reported CMM prevalence in an identifiable population and provided a prevalence estimate or extractable case and denominator data. Cohort studies reporting incident CMM only, without prevalence at baseline or study entry, were not eligible for prevalence pooling. Studies with inaccessible full text, preprints, Chinese-language journal or database records, conference abstracts, and supplements were excluded. For overlapping datasets, the largest eligible estimate was prioritized for the main meta-analysis.

Information sources PubMed, Embase, Scopus, Web of Science, and the Cochrane Library were searched from inception to 4 November 2026. Reference lists of included studies and relevant reviews were also examined to identify additional records.

Main outcome(s) The main outcome is the prevalence of CMM, defined as the co-occurrence of at least two cardiometabolic diseases. Prevalence estimates and 95% confidence intervals were extracted as reported or calculated from the reported number of cases and sample size when appropriate. Studies were classified by the disease lists in their original definitions.

Quality assessment / Risk of bias analysis Methodological quality was assessed using the nine-item Joanna Briggs Institute Critical Appraisal Checklist for Studies Reporting Prevalence Data. One reviewer assessed each eligible study using "Yes," "No," "Unclear," or "Not applicable." The total score was the number of "Yes" responses (0–9). As the JBI checklist does not establish a universal total-score threshold, scores were reported without assigning overall quality categories.

Strategy of data synthesis For community/general populations, prevalence estimates were pooled separately for strict (S), expanded (N), and broad (B) CMM definitions. Studies classified as mixed/other (M) were not included in these definition-specific pooled analyses. Clinical or disease-specific populations were not combined with community/general populations; the clinical B group was pooled as an exploratory analysis, while clinical S studies were reported individually.

Analyses used a logit transformation and random-effects models. Between-study variance was estimated using restricted maximum likelihood (REML), and 95% confidence intervals for pooled estimates were calculated using the modified Hartung–Knapp method. Estimates were back-transformed to the prevalence scale. Heterogeneity was described using I^2 and τ^2, with 95% prediction intervals also reported. Analyses were conducted using Python 3.12.14.

Subgroup analysis Exploratory subgroup analyses were conducted by population or data source when data permitted. The only subgroup with a quantitative pooled estimate comprised four Chinese regional cross-sectional surveys in the N definition category. Subgroups with too few studies were not pooled and were described individually or narratively.

Sensitivity analysis Sensitivity analyses included leave-one-out analyses and an alternative between-study variance estimator using the DerSimonian–Laird method with modified Hartung–Knapp confidence intervals. A further analysis excluded studies using CHARLS, CHNS, CLHLS, or Iran STEPS data to assess their influence on pooled estimates. This exclusion analysis does not constitute design-based variance correction for the remaining studies.

Country(ies) involved China.

Keywords Cardiometabolic multimorbidity; prevalence; systematic review; meta-analysis; disease definition; multimorbidity. 2:20.

Contributions of each author

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