PAD Prevalence: Systematic Review with ☸SAIMSARA.

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Abstract: To systematically review and synthesize the prevalence of "PAD" as reported in the scientific literature, identifying key trends, associated conditions, and demographic variations. The review utilises 250 studies with 2865984 total participants (naïve ΣN). The median prevalence of Peripheral Artery Disease (PAD) in human populations was 8.6%, but varied substantially across different cohorts, ranging from 1.18% to 71%. This review highlights PAD as a widespread condition with significant heterogeneity influenced by demographics, comorbidities, and geographic location. The most significant limitation affecting certainty is the Heterogeneous Diagnostic Criteria, which complicates direct comparisons across studies. Clinicians should maintain a high index of suspicion for PAD, especially in high-risk groups such as diabetics and those with renal disease, and consider comprehensive screening beyond symptomatic presentation.

Review Stats

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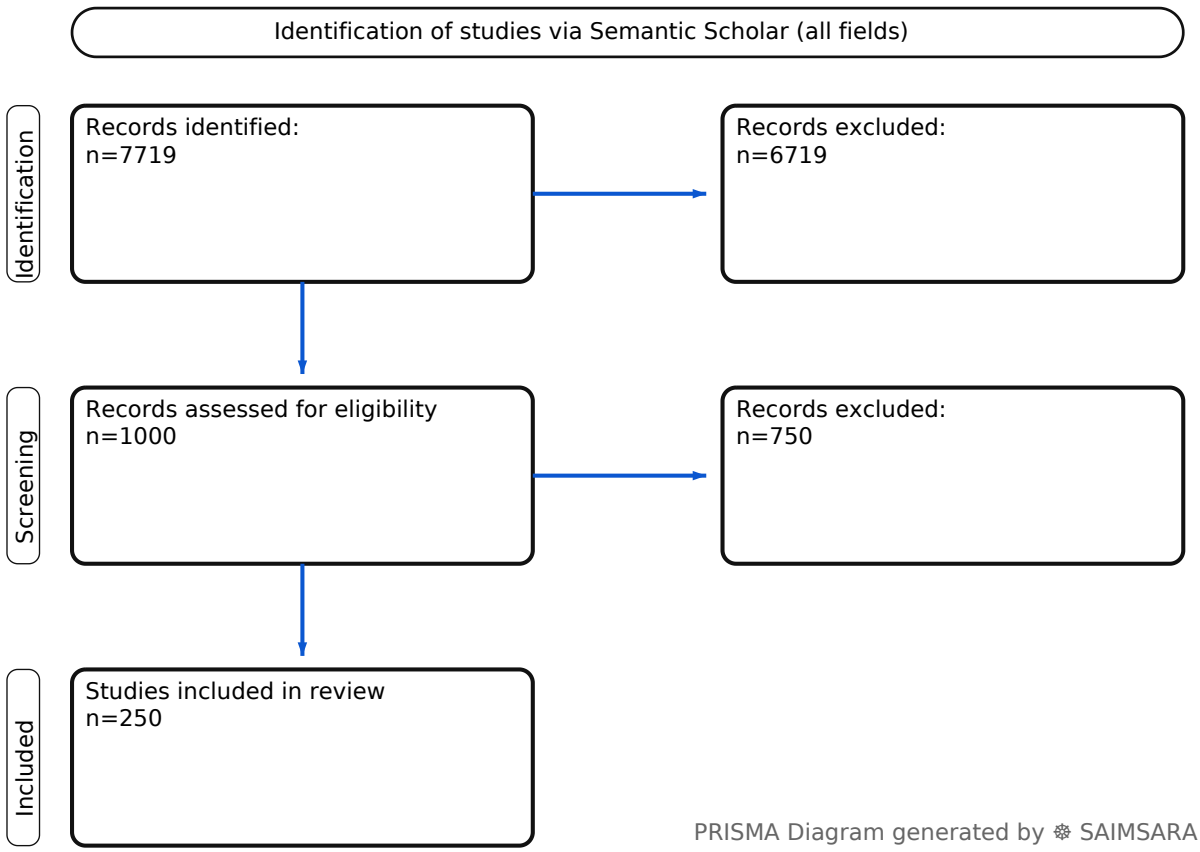
- Plan: Pro (expanded craft tokens; source: Semantic Scholar)
- Source: Semantic Scholar
- Scope: All fields
- Keyword Gate: Fuzzy (≥60% of required terms, minimum 2 terms matched in title/abstract)
- Total Abstracts/Papers: 7719
- Downloaded Abstracts/Papers: 1000
- Included original Abstracts/Papers: 250
- Total study participants (naïve ΣN): 2865984


Identification of studies via Semantic Scholar (all fields)
Identification
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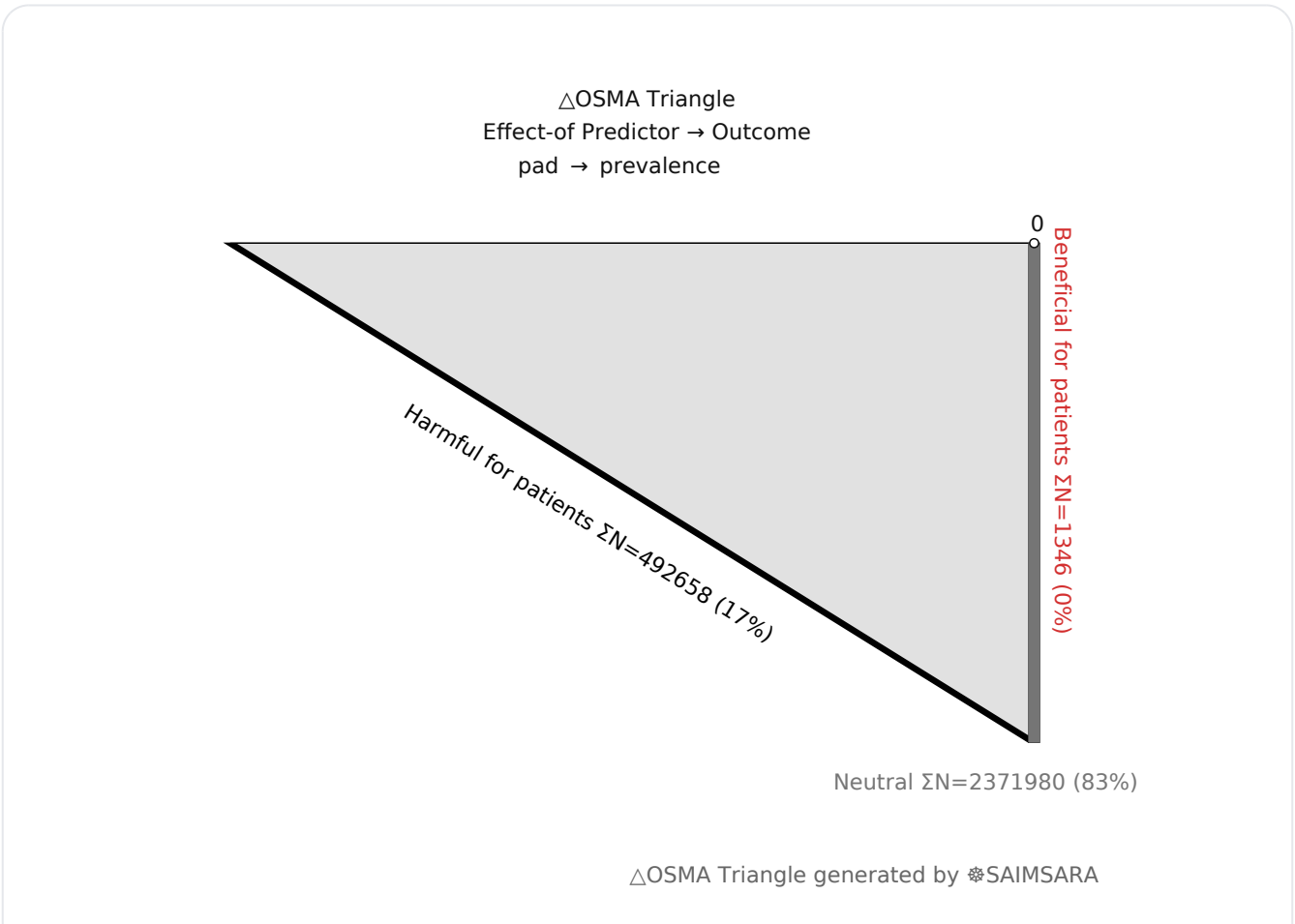
Records excluded:
n=6719
Screening
Records assessed for eligibility
n=1000
Records excluded:
n=750
Included
Studies included in review
n=250
PRISMA Diagram generated by ☸ SAIMSARA


△OSMA Triangle
Effect-of Predictor → Outcome
pad → prevalence
0
Beneficial for patients ΣN=1346 (0%)
Harmful for patients ΣN=492658 (17%)
Neutral ΣN=2371980 (83%)
△OSMA Triangle generated by ☸SAIMSARA

Outcome-Sentiment Meta-Analysis (OSMA): *(LLM-only)*
Frame: Effect-of Predictor → Outcome • *Source*: Semantic Scholar
Outcome: prevalence Typical timepoints: 10-y, peri/post-op. Reported metrics: %, CI, p.
Common endpoints: Common endpoints: complications, mortality, healing.
Predictor: pad — exposure/predictor. Doses/units seen: 0.856 mg, 25 g, 25 kg, 30 mg. Routes seen: iv. Typical comparator: healthy children, the control group, control, those without diabetic….

- **1) Beneficial for patients** — prevalence with pad — [15], [245] — ΣN=1346
- **2) Harmful for patients** — prevalence with pad — [1], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [16], [18], [19], [20], [22], [23], [24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [42], [43], [44], [45], [46], [47], [48], [49], [50], [51], [54], [55], [56], [57], [58], [59], [60], [61], [62], [63], [64], [65], [66], [67], [68], [69], [70], [71], [72], [73], [74], [75], [98], [101], [102], [103], [104], [105], [106], [108], [109], [110], [111], [112], [113], [114], [115], [116], [117], [118], [119], [120], [121], [122], [123], [124], [125], [204], [209], [210], [211], [212], [218], [219], [220], [221], [222], [223], [224], [231], [232], [233], [234], [235], [237], [241], [244], [248], [250] — ΣN=492658
- **3) No clear effect** — prevalence with pad — [2], [17], [21], [41], [52], [53], [76], [77], [78], [79], [80], [81], [82], [83], [84], [85], [86], [87], [88], [89], [90], [91], [92], [93], [94], [95], [96], [97], [99], [100], [107], [126], [127], [128], [129], [130], [131], [132], [133], [134], [135], [136], [137], [138], [139], [140], [141], [142], [143], [144], [145], [146], [147], [148], [149], [150], [151], [152], [153], [154], [155], [156], [157], [158], [159], [160], [161], [162], [163], [164], [165], [166], [167], [168], [169], [170], [171], [172], [173], [174], [175], [176], [177], [178], [179], [180], [181], [182], [183], [184], [185], [186], [187], [188], [189], [190], [191], [192], [193], [194], [195], [196], [197], [198], [199], [200], [201], [202], [203], [205], [206], [207], [208], [213], [214], [215], [216], [217], [225], [226], [227], [228], [229], [230], [236], [238], [239], [240], [242], [243], [246], [247], [249] — ΣN=2371980

1) **Introduction**

Peripheral artery disease (PAD) represents a significant global health burden, characterized by the narrowing of peripheral arteries, most commonly in the legs. Its prevalence is a critical indicator of cardiovascular health within populations, reflecting the cumulative impact of various risk factors and comorbidities. Understanding the varied prevalence across different demographics, clinical

conditions, and geographical regions is essential for effective public health strategies, early diagnosis, and targeted interventions. This paper synthesizes current research on PAD prevalence, highlighting its diverse manifestations and associated factors.

2) **Aim**

To systematically review and synthesize the prevalence of "PAD" as reported in the scientific literature, identifying key trends, associated conditions, and demographic variations.

3) **Methods**

Systematic review with multilayer AI research agent: keyword normalization, retrieval & structuring, and paper synthesis (see SAIMSARA About section for details).

- **Bias:** Qualitatively inferred from study design fields. Cross-sectional studies are prone to selection and recall bias, while cohort studies may have attrition bias. Retrospective designs are susceptible to confounding and data availability bias. Many studies did not specify directionality, limiting bias assessment.

4) **Results**

4.1 **Study characteristics:**

The included studies predominantly employed cross-sectional (n=60) and cohort (n=47) designs, with some mixed (n=20), randomized controlled trials (RCTs) (n=5), case-control (n=2), and unspecified designs (n=66). Populations ranged from general community samples (e.g., 45 to 74 years old [1], older adults [113]) to highly specific clinical groups such as diabetic patients (e.g., Type 2 Diabetes Mellitus (T2DM) [8, 13, 19]), chronic hemodialysis patients [2, 26], HIV-infected individuals [22, 30], and patients with specific cardiovascular conditions [55, 145]. Follow-up periods varied from short-term (e.g., 6 months [34]) to long-term (e.g., 10 years [148, 55]), or were not applicable for cross-sectional designs.

4.2 **Main numerical result aligned to the query:**

The median prevalence of Peripheral Artery Disease (PAD) in human populations was 8.6% [114], with a wide range observed from 1.18% [241] in a managed care population to 71% [165] among patients undergoing lower extremity amputation. This significant heterogeneity reflects diverse study populations, diagnostic criteria, and geographic settings. Other forms of "PAD" included foot pad dermatitis (FPD) in poultry, with prevalence as high as 97.7% in fattening turkeys [3], periampullary diverticula (PAD) at 57.92% in bile duct stone patients [158], and posterior arch deficiency (PAD) at 5.03% in a Turkish orthodontic population [242].

4.3 **Topic synthesis:**

- **General Population & Geographic Variation:** PAD prevalence in general populations varied widely, from 1.18% in a managed care setting [241] to 22.9% in Italian subjects with moderate cardiovascular risk [69]. Specific regional estimates include 3.81% in a general population sample [1], 1.71% in Japanese rural areas [65], 5.2% in a Thai population [76], and an increasing trend in South Korea from 3.93 to 23.55 per 1000 persons (2011-2018) [5]. No cases were found in the Tsimane Amazonian population [139].
- **Diabetes Mellitus as a Major Correlate:** PAD prevalence is notably higher in diabetic patients, ranging from 3.2% in Korean diabetic patients [66] to 66.1% in patients with diabetic Charcot foot [28]. Other studies reported prevalence in T2DM patients at 11.2% [8], 16% [13, 27], 18.6% [14], 32.6% [19], 52.5% in Nigerian diabetics [60], and 38.5% in northern Nigeria [97].
- **Renal Disease and Dialysis:** Patients with chronic kidney disease (CKD) and those undergoing dialysis exhibit elevated PAD prevalence. It was 44% in predialysis CKD patients [169], and 35.3% in hemodialysis patients [26]. Hemodialysis patients had a significantly higher prevalence (21.8%) compared to peritoneal dialysis patients (4.8%) [175], and dialysis treatment was independently associated with higher PAD prevalence (64% vs 43%) [106].
- **Cardiovascular and Metabolic Risk Factors:** PAD is strongly associated with traditional cardiovascular risk factors. These include hypertension (56.8% in PAD patients [184], 34.2% in Jeddah [160]), diabetes (35% [184], 33.3% [160]), smoking (OR 2.04 [1], associated with subclinical PAD [104]), dyslipidemia [51, 65], and obesity (OR 1.88 [114], 72.4% overweight/obese [184]). Elevated serum uric acid (OR 4.31 [1]) and high heart rate (OR 4.16 [1]) are also significant.
- **Age and Sex-Specific Prevalence:** PAD prevalence generally increases with age [65, 170, 75]. While some studies show higher prevalence in men (5.17% vs 2.78% in general population [1]), others report higher rates in women (9% vs 4% in Thai population [76], 4.1% vs 2.6% in Life Line Screening for ABI≤0.9 [116]). Projections suggest PAD prevalence could surge to 21.7% in women and 14.8% in men aged ≥65 years by 2050 [46].
- **Comorbidities and Clinical Outcomes:** PAD is frequently co-occurs with other serious conditions. Obstructive sleep apnea (OSA) was diagnosed in 48% of PAD patients [39], nonalcoholic fatty liver disease (NAFLD) in 59% of PAD patients [129], and inflammatory arthritis in 16.4% of primary antibody deficiency patients [102]. PAD is also associated with significantly lower limb salvage rates in diabetic foot ulcer patients (48.3% vs 82.3%) [10], and higher rates of major adverse cardiovascular events (MACE) and mortality following myocardial infarction (MI) [98].

- **Asymptomatic Nature and Diagnostic Challenges:** A significant proportion of PAD cases are asymptomatic, with 71.3% being asymptomatic in diabetic subjects in Nigeria [60] and 22.4% asymptomatic versus 8% symptomatic in a Brazilian tertiary hospital [191]. The prevalence of previously unrecognized PAD was 12.8% in patients undergoing coronary angiography [23], underscoring the need for comprehensive diagnostic approaches including both Ankle Brachial Index (ABI) and Skin Perfusion Pressure (SPP) measurements [4].

5) **Discussion**

5.1 **Principal finding:**

The median prevalence of Peripheral Artery Disease (PAD) in human populations was 8.6% [114], but varied substantially across different cohorts, ranging from 1.18% [241] to 71% [165], indicating a widespread yet heterogeneously distributed health concern.

5.2 **Clinical implications:**

- **Targeted Screening:** Given the high prevalence of asymptomatic PAD (e.g., 71.3% in Nigerian diabetics [60]), routine screening for PAD using ABI should be considered for high-risk groups, including diabetic patients [8, 13, 27], those with chronic kidney disease [26, 169], and elderly individuals [75, 174].
- **Multifactorial Risk Management:** The strong association of PAD with multiple cardiovascular risk factors like hypertension, diabetes, smoking, and obesity [1, 97, 160] necessitates a comprehensive, multifactorial approach to risk factor modification in clinical practice.
- **Early Intervention for Comorbidities:** The high co-occurrence of PAD with conditions like diabetic foot ulcers [10], Charcot neuro-arthropathy [11], and coronary artery disease [145] suggests that early detection and management of PAD can potentially mitigate severe outcomes such as amputations and major adverse cardiovascular events [10, 98].
- **Diagnostic Accuracy:** Relying solely on symptomatic presentation is insufficient due to the high rate of asymptomatic PAD [60, 191]. The use of both ABI and SPP measurements may be necessary for accurate diagnosis, especially in complex patient populations like incident hemodialysis patients [4].

5.3 **Research implications / key gaps:**

- **Standardized Global Prevalence:** There is a need for large-scale, methodologically consistent studies to establish a more precise global and regional prevalence of PAD,

especially in underrepresented populations like children with nephrotic syndrome (44.0% prevalence reported [12]) or specific ethnic groups [212].

- **Longitudinal Impact of Asymptomatic PAD:** Further prospective cohort studies are needed to quantify the long-term clinical outcomes and progression rates of asymptomatic PAD in various high-risk populations, such as diabetic patients [189] and those with moderate cardiovascular risk [69].
- **Cost-Effectiveness of Screening:** Research should evaluate the cost-effectiveness of widespread PAD screening programs in diverse healthcare settings, considering the economic burden of PAD-related hospitalizations and complications [241, 223].
- **Intervention Efficacy in Diverse Populations:** Studies are needed to assess the effectiveness of lifestyle and pharmacological interventions for PAD risk factors in specific populations, such as HIV-infected individuals (14.6% prevalence [22]) or those in low-income areas [105], where unique challenges may exist.
- **Biomarker Validation:** Further validation of novel biomarkers (e.g., serum uric acid [1], VCAM-1 [118], fetuin-A [234]) and genetic risk scores [93] for early PAD detection and risk stratification is warranted across diverse cohorts.

5.4 **Limitations:**

- **Heterogeneous Definitions** — Varied diagnostic criteria for PAD (e.g., ABI thresholds, symptomatic vs. asymptomatic) across studies limit direct comparability and meta-analysis.
- **Diverse Study Populations** — Prevalence estimates are highly dependent on the specific population studied (e.g., general population vs. high-risk clinical cohorts), affecting generalizability.
- **Geographic and Temporal Variation** — Significant differences in prevalence across countries and over time (e.g., decreasing trends in UK [15], increasing in South Korea [5]) make global generalization challenging.
- **Limited Longitudinal Data** — Many studies are cross-sectional, providing prevalence snapshots but not capturing incidence, progression, or long-term outcomes effectively.
- **Confounding Factors** — The presence of multiple comorbidities and risk factors makes it difficult to isolate the independent effect of specific variables on PAD prevalence.

5.5 **Future directions:**

- **Harmonize Diagnostic Criteria** — Implement standardized ABI thresholds and diagnostic protocols across international studies to improve data comparability.

- **Longitudinal Cohort Studies** — Conduct large-scale, long-term prospective studies in general populations to track PAD incidence and progression.
- **Cost-Benefit Analysis** — Evaluate the economic impact and clinical benefits of early PAD screening and intervention programs in diverse healthcare systems.
- **Integrate AI Diagnostics** — Develop and validate AI-powered tools for early, non-invasive PAD detection, particularly in primary care settings.
- **Address Health Disparities** — Focus research on understanding and mitigating disparities in PAD prevalence and outcomes across socioeconomic and ethnic groups.

6) **Conclusion**

The median prevalence of Peripheral Artery Disease (PAD) in human populations was 8.6% [114], but varied substantially across different cohorts, ranging from 1.18% [241] to 71% [165]. This review highlights PAD as a widespread condition with significant heterogeneity influenced by demographics, comorbidities, and geographic location. The most significant limitation affecting certainty is the **Heterogeneous Diagnostic Criteria**, which complicates direct comparisons across studies. Clinicians should maintain a high index of suspicion for PAD, especially in high-risk groups such as diabetics and those with renal disease, and consider comprehensive screening beyond symptomatic presentation.

References

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Figure 1. Publication-year distribution of included originals

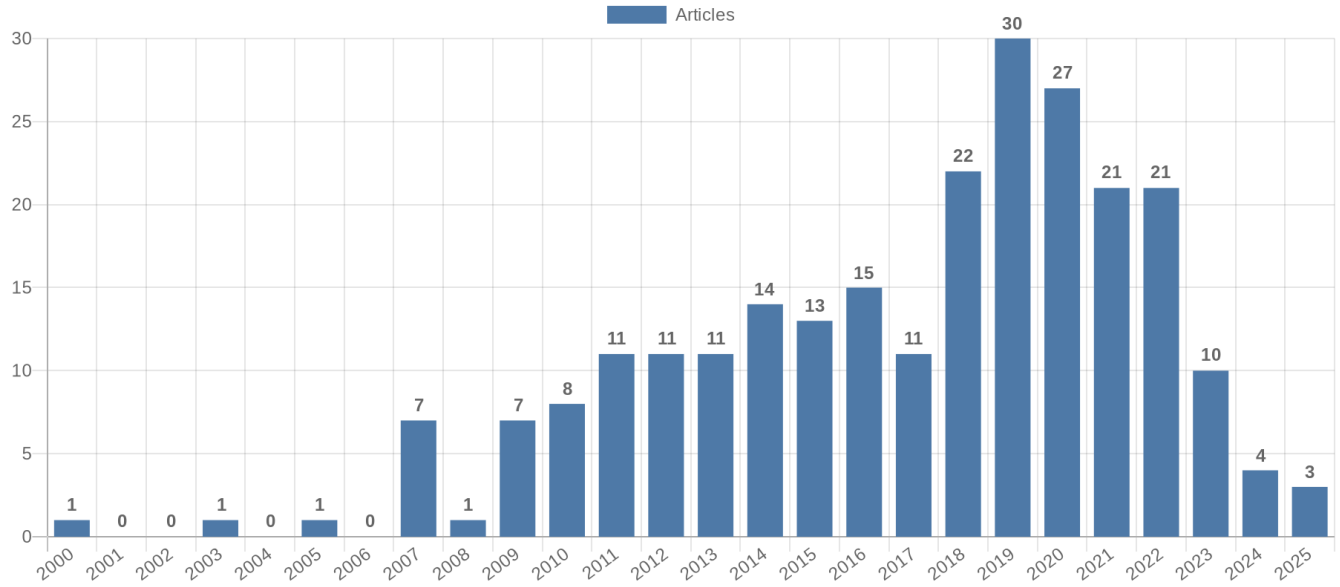

Figure 2. Study-design distribution of included originals

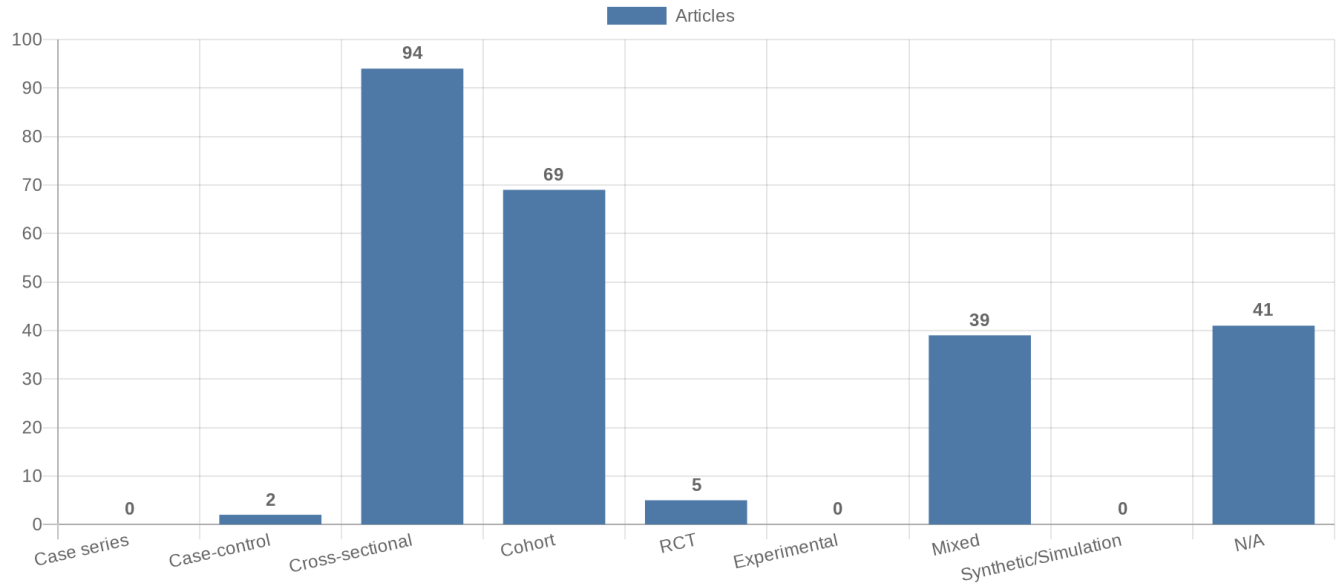

Figure 3. Study-type (directionality) distribution of included originals

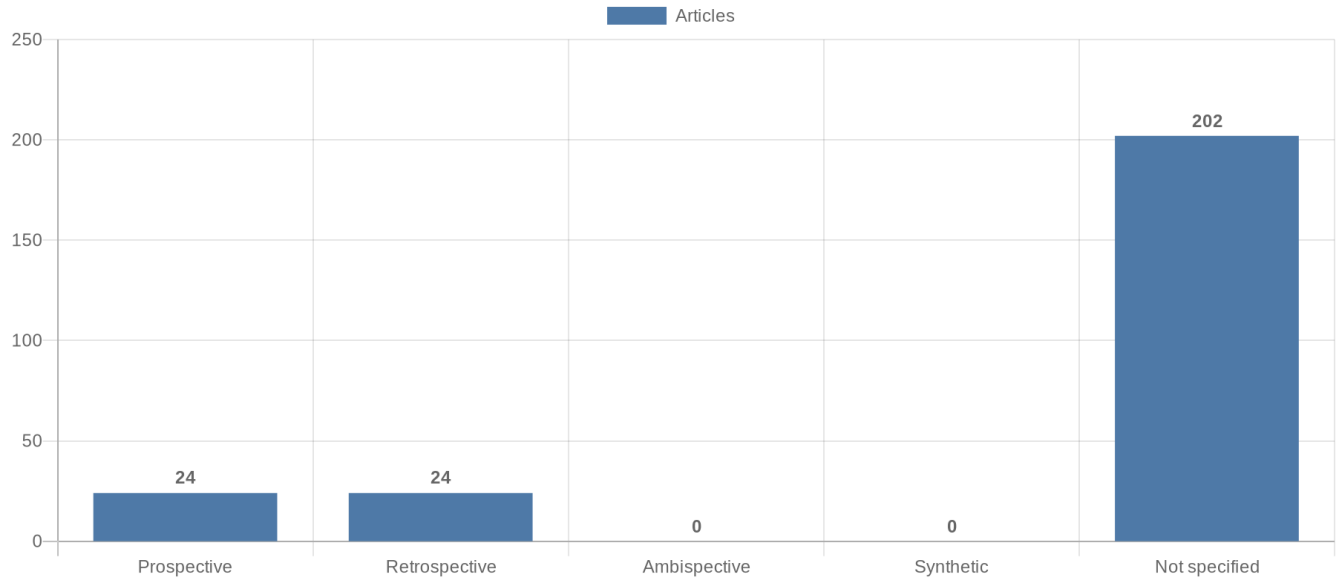

Figure 4. Main extracted research topics

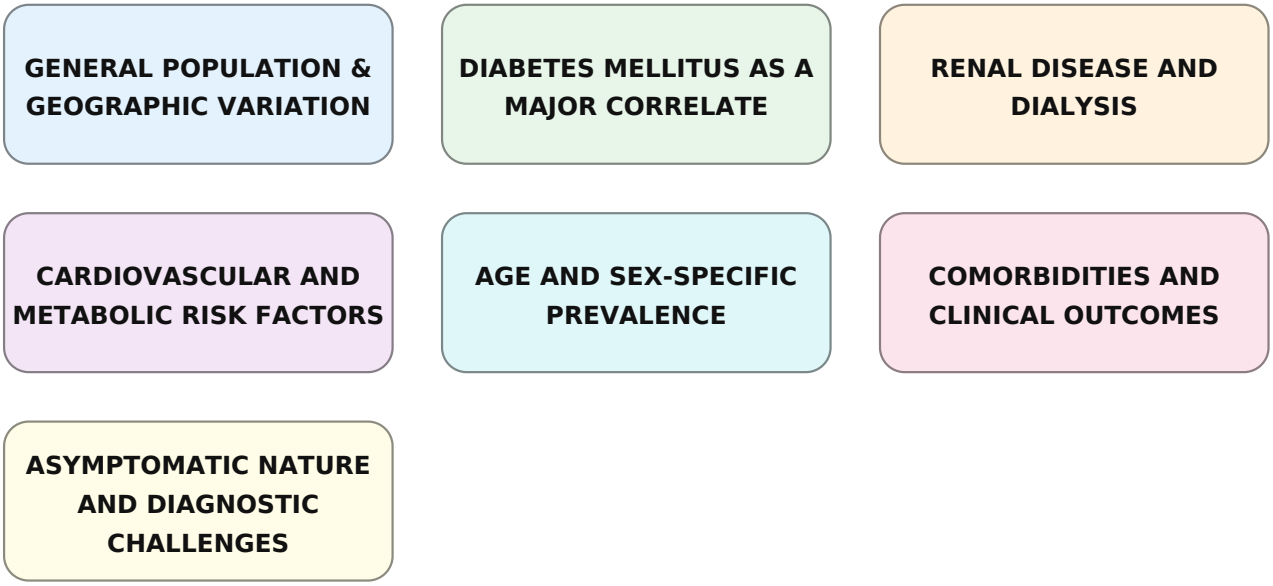

Figure 5. Limitations of current studies (topics)

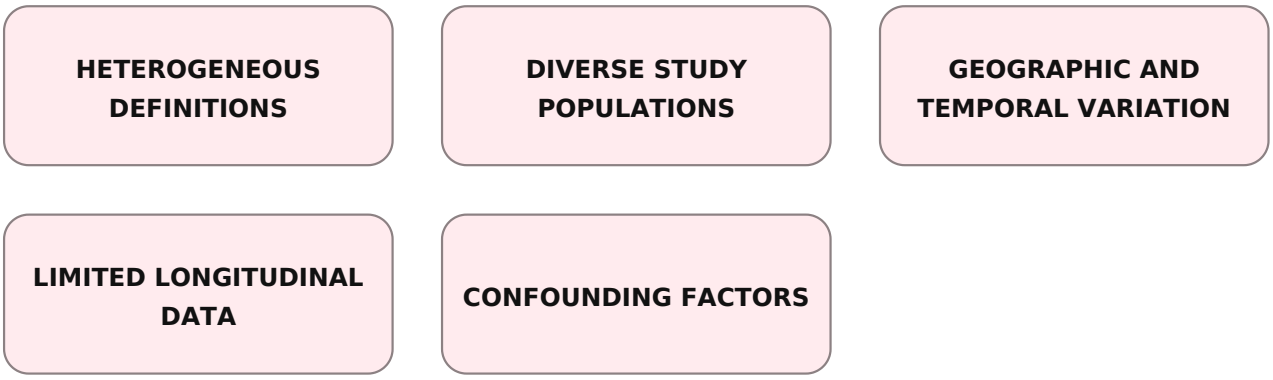

Figure 6. Future research directions (topics)