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Sociodemographic and economic barriers to initial specialist care for patients with rheumatoid arthritis: a scoping review

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Abstract

Background Rheumatoid arthritis is an autoimmune disease that can cause joint destruction, pain, loss of function, and reduced quality of life. Recent advancements in treatment have made it possible to control the impacts of this once-debilitating disease through early intervention. While numerous studies have examined barriers to rheumatoid arthritis care, no review has synthesized sociodemographic and economic factors across high-, upper middle-, and lower middle-income countries. This gap in the literature highlights the need for a comprehensive review that informs global health interventions. This review explores sociodemographic and economic barriers to initial specialist care for patients with rheumatoid arthritis.

Methods The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines. A search of CINAHL, MEDLINE, Scopus and Emcare was completed in May 2024.

Results Of the 5165 studies identified through the literature search, 121 full-text articles were reviewed, and 25 studies examining sociodemographic and economic barriers to specialist care were selected for analysis. A total of 17 high-income, one upper middle-income and seven lower middle-income countries were represented. Low socioeconomic status, low income and rurality were consistently reported as barriers to initial rheumatologist appointments across all countries in this review.

Conclusion These findings underscore the importance of addressing common barriers such as low socioeconomic status and rurality in global health interventions. Future large prospective studies are essential to better understand the relationship between sociodemographic factors and timely access to care.

Keywords Access to care, Health disparities, Rheumatoid arthritis, Socioeconomic factors

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Background

Rheumatoid arthritis (RA) is a chronic inflammatory disease which, if left untreated, leads to significant morbidity and premature mortality [1]. Over the last two decades, the implementation of more effective treatments has transitioned RA from a disabling and destructive disease to a manageable condition [1–5]. The gold standard of management for RA is a "treat-to-target" approach, focused on achieving disease remission and optimising biochemical markers [2, 3]. Current literature describes an early "window of opportunity" in which the commencement of pharmacotherapy is desired to effectively manage patients with RA [3, 6, 7].

Guidelines across the world differ on recommended frequency of review for people with RA; however, there is a consensus that early diagnosis and targeted intervention by a rheumatologist is required for optimal management [2, 5]. Despite this, some countries report lag times in excess of 20 months from the onset of symptoms to the initial consultation and management from a rheumatologist [7]. Previous studies across numerous countries have observed varying patterns of health service utilisation by people with RA. Various sociodemographic factors such as educational attainment, socioeconomic status (SES), and rurality have been reported to influence access to an appointment with a rheumatologist [8].

Previous reviews conducted in this area have focused primarily on describing the barriers to initial referral and ongoing management of RA [9–11]. Atypical biochemical profiles, a low swollen-joint count and misdiagnosis by non-rheumatologist physicians have been described as barriers to referral in previous studies [12, 13]. Despite the presence of primary literature on sociodemographic barriers to care, no review has been conducted to synthesise the available data across high-, middle- and low-income countries. Furthermore, no review has specifically observed factors impacting the time to an initial consultation with a rheumatologist.

Early intervention in this "window of opportunity" is essential in preventing the development of erosive and irreversible RA [1–3]. Understanding the barriers to both diagnosing RA and commencing initial treatment is crucial in developing strategies to improve patient outcomes. Analysis of literature and identification of demographic factors that impact access to care will enable targeted interventions to mitigate health inequality in at-risk populations. This review aims to synthesise current literature to develop an understanding of sociodemographic and economic barriers to early diagnosis and treatment of RA by a rheumatologist. This review specifically seeks to establish the sociodemographic and economic barriers to early diagnosis of RA across different income-level countries.

Methods

Study design

A scoping review was conducted in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines, using Covidence software [14, 15]. A protocol was written in accordance with Joanna Briggs Institute (JBI) guidelines [16], and registered with Open Science Framework DOI:10.17605/OSF.IO/U4QSY.

Search strategy

A search strategy was developed using a modified PECO (population, exposure, and outcome) model [17]. The search primarily comprised three concepts: (rheumatoid arthritis) AND (sociodemographic OR economic factors) AND (early diagnosis OR access to a rheumatologist). The search was completed using key words filtered to title and abstract, and Medical Subject Headings (MeSH). The complete search strategy is available in *Appendix A*. A systematic search was performed in MEDLINE (Ovid), Emcare (Ovid), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Scopus from inception on the 12th of May 2024. No language or publication date filters were applied to the search. Backward searching of references from included studies and related articles was conducted to identify further eligible studies missed in the initial search.

Article inclusion criteria

Studies reporting either sociodemographic or socioeconomic barriers to initial specialist care for patients with RA were included in this review. "Initial specialist care" was defined as an initial diagnosis of RA by a rheumatologist or the initial prescription of a disease-modifying anti-rheumatic drug (DMARD). Studies were excluded if they observed paediatric populations or examined barriers to care provided by non-rheumatologist physicians. Non-English articles which could not be translated using artificial intelligence, grey literature, reviews, commentaries, and non-peer-reviewed studies were also excluded. Although the exclusion of non-English articles which could not be translated may introduce language bias, this was necessary due to linguistic constraints of authors.

Screening and data extraction

Results from the literature search were imported into Covidence [15] and independently screened by two authors (JA and MB). Duplicates were removed and the remaining articles were screened by 'title and abstract', and then by 'full text'. Disputes at each stage were discussed until a consensus was reached, and when required, a third author (JW) provided a determining vote. A data extraction tool was developed using Microsoft Excel, where variables of interest were collected (JA and MB). Variables for data extraction included manuscript title, first author, year of publication, country of study, study design, sample size and study findings. Sociodemographic variables (age, sex, rurality, income, SES and highest educational attainment) were established prior to the study, based on similar reviews conducted prior on other conditions [18, 19]. No corresponding authors were required to be contacted to retrieve additional data. Studies were then categorised as high-, upper middle- or lower middle-income in accordance with '*The World Bank Group'* Classifications [20].

Critical appraisal

Articles were appraised using JBI critical appraisal tools (*Appendix B*) [21]. Study designs were categorised as qualitative, cohort or cross-sectional and appraised accordingly. If the article was appraised to have a score less than 70.0%, it was excluded. This process ensured low-quality and biased studies did not influence this review. Critical appraisal was independently completed by JA and MB, with conflicts discussed until a consensus was reached.

Results

A total of 3242 unique articles were identified in the literature search. After title and abstract screening 3120 articles were not included. Of the 121 studies that underwent full-text review, 24 articles were selected for data extraction. Full texts were excluded largely due to inappropriate variables, differing outcomes (general practitioner diagnosis and management) and observing barriers to receiving biologic DMARDs. A backwards search identified an additional three studies [7, 22, 23]. Two studies were excluded due to lack of recognition of confounding variables and poor data representation [7, 22]. A total of 25 articles (Table 1) met final inclusion criteria and were analysed. The process for article selection is illustrated in Fig. 1 below.

Description of included studies

Overall, there were 25 studies selected and these were published between 1998–2023. A range of high-, upper middle- and lower middle-income countries were represented. There were 17 high-income countries (HIC) [United States (n = 7) [26, 29, 31–34, 38], Canada (n = 6) [12, 24, 25, 27, 30, 35], Saudi Arabia (n = 1) [28], Spain (n = 1) [36], South Korea (n = 1) [37] and Japan (n = 1) [23], one upper middle-income country (UMIC) [Brazil (n = 1) [39], and seven lower middle-income countries (LMIC) [India (n = 3) [41, 42, 45], Pakistan (n = 2) [43, 44], Egypt (n = 1) [46] and Tunisia (n = 1) [40]. The majority of studies were quantitative (n = 19), with three qualitative studies (n = 3) [25, 41, 45] and two mixed-methods studies (n = 2) [30, 40]. All studies examined sociodemographic and economical barriers to receiving an initial appointment and management from a rheumatologist. Tabulated findings of each respective variable can be observed in Table 2.

Data standardisation

Variables of interest were not consistently defined across studies. For example, "higher" level of educational attainment was either classified as "post-secondary school" or "secondary school or more". To standardise this, whilst ensuring it remains country- and context-specific, the level of educational attainment was reported according to each study's definition, thus was not reclassified. Variability was also seen in the classification of ethnicity, with studies reporting the percentage of "white" patients or "Caucasian" patients. To allow for data extrapolation, "Caucasian" ethnicity will be considered synonymous with "white" in this review. The inherent limitations of this simplification will be addressed in the discussion.

Variability in the reporting of sociodemographic variables was also seen. Nine of the included studies reported SES, whereas 10 studies reported income level. Although there is no fixed method of measuring SES, the term is often defined as a metric comprised of education, income and type of job [47, 48]. Due to the inconsistent methods of measuring SES across the world, each study has often had its own way of characterising SES. For this reason, SES was reported according to the definition provided in the respective study. Additionally, studies which did not report SES, often reported educational status and income as separate variables, which, as per the commonly accepted definition, contribute to a patient's SES.

Findings of included studies

Age

All HIC studies, comprising 682,678 patients, investigated whether patient age influenced time to an initial rheumatology consultation [12, 23–38]. Three studies found that younger age facilitated early diagnosis and commencement of pharmacotherapy [25, 27, 32]. Conversely, three studies reported that younger patients experienced longer delays and less equitable care than older patients [26, 33, 37]. Two studies reported that patients with an older age of symptom onset had reduced wait times to initial rheumatology consultations [24, 36]. Molina *et al.* reported that older patients faced longer wait times in the US relative to younger counterparts [29]. Eight studies found no significant correlation between patient age and time to an initial rheumatology consultation [12, 23, 28, 30, 31, 34, 35, 38]. One study observed the impact of age on access to care in UMICs; however, it found that there was no significant impact [39].

Table 1 Summary of characteristics and sociodemographic factors observed in included studies (n = 25)

Reference	First Author (Year)	Study Design	No. Patients	Country	Factors Observed	Quality Apprais-al (High/ Low)
High-Income Countries						
1 [24]	Barnabe et al. (2014)	Quantitative, Retrospective Cohort	1142	Canada	• Sex • Age • Ethnicity • Educational attainment • Personal income	High
2 [25]	Bernatsky et al. (2010)	Qualitative, Focused group interviews	72	Canada	• Sex • Age • Rurality	High
3 [26]	Cifaldi et al (2016)	Quantitative, Retrospective Cohort	693	US	• Sex • Age • Ethnicity • Educational Attainment • Personal income	High
4 [27]	Feldmen et al. (2007)	Quantitative, Retrospective Cohort	13237	Canada	• Sex • Age • Rurality • SES	High
5 [28]	Hussain et al. (2016)	Quantitative,Retrospective Cohort	250	Saudi Arabia	• Sex • Age • Educational • Attainment • SES	High
6 [12]	Jamal et al. (2011)	Quantitative,Retrospective Cohort	204	Canada	• Sex • Age • Ethnicity • Educational • Attainment	High
7 [29]	Molina et al. (2015)	Quantitative,Prospective Cohort	1209	US	• Sex • Age • Ethnicity • Rurality • SES	High
8 [30]	Nair et al. (2016)	Mixed methods,Structured Interviews	100	Canada	• Sex • Age • Rurality	High
9 [23]	Pappas et al. (2015)	Quantitative,Retrospective Cohort	35485	US/Canada/Japan	• Sex • Age • Ethnicity	High
10 [31]	Polinski et al. (2014)	Quantitative,Retrospective Comparative Study	26590	US	• Sex • Age • Ethnicity • Rurality • SES	High
11 [32]	Saag et al. (1998)	Quantitative,Telephone Survey	488	US	• Sex • Age • Ethnicity • Rurality • Educational Attainment • Personal income	High
12 [33]	Seyferth et al. (2022)	Quantitative,Retrospective Cohort Study	581770	US	• Sex • Age • Personal income	High
13 [34]	Suarez-Almazor et al. (2007)	Quantitative,Retrospective Cohort Study	285	US	• Sex • Age • Ethnicity • SES	High

Table 1 (continued)

Reference	First Author (Year)	Study Design	No. Patients	Country	Factors Observed	Quality Appraisal (High/Low)
14 [35]	Widdifield et al. (2014)	Quantitative,Retrospective Cohort Study	19760	Canada	• Sex • Age • Rurality • Personal income	High
15 [36]	Hernandez-Garcia et al. (2000)	Quantitative,Retrospective Cohort Study	527	Spain	• Sex • Age (at diagnosis of RA) • Educational attainment	High
16 [37]	Cho et al. (2019)	Quantitative,Retrospective Cohort Study	714	Korea	• Sex • Age • Educational attainment • Personal income	High
17 [38]	Raid et al. (2020)	Quantitative,Retrospective Cohort Study	152	Mexico	• Sex • Age • Ethnicity	High
18 [22]	Palm et al. (2005)	Quantitative,Prospective Cohort	44	Norway	• Age • Sex	Low
19 [7]	Saad et al. (2020)	Quantitative,Retrospective Cohort	66	Bahrain	• Age • Sex • Ethnicity • Educational attainment	Low
Upper Middle-Income Countries						
1 [39]	Gomes et al. (2018)	Quantitative, Cross Sectional Study	296	Brazil	• Sex • Age • Educational attainment • Personal income	High
Lower Middle-Income Countries						
1 [40]	Fazaa et al. (2022)	Mixed Methods,Cross Sectional Study	100	Tunisia	• Sex • Age • Rurality • Educational attainment • Personal income*	High
2 [41]	Jain et al. (2020)	Qualitative,Semi-Structured Interviews	20	India	• Sex • Age • Educational attainment • SES	High
3 [42]	Jain et al. (2023)	Quantitative,Longitudinal Observational Study	323	India	• Sex • Age • Rurality • Educational attainment	High
4 [43]	Javaid et al. (2023)	Quantitative,Cross Sectional Study	120	Pakistan	• Sex • Age • Rurality • Educational attainment • SES	High
5 [44]	Naeem et al. (2021)	Quantitative,Cross sectional Study	102	Pakistan	• Sex • Age • Rurality • Educational attainment • SES	High

Table 1 (continued)

Reference	First Author (Year)	Study Design	No. Patients	Country	Factors Observed	Quality Appraisal (High/Low)
6 [45]	Pati et al. (2019)	Qualitative,Structured Interviews	13	India	• Sex • Age • Rurality • Educational attainment	High
7 [46]	Sarah et al. (2023)	Quantitative,Cross Sectional Study	167	Egypt	• Sex • Age • Rurality • Educational attainment • Personal income	High

*insurance level used as surrogate for personal income

All LMIC studies observed the impact of age as a demographic variable [40–46]. Two studies concluded that older patients experienced prolonged wait times to see a rheumatologist [43, 44]. Five studies found that patient age had no correlation with delay in diagnosis or initial rheumatology consultation [40–42, 45, 46].

Sex

Sex was reported as a variable in all studies conducted in HICs, with 682,678 patients across five countries included in this review [12, 23–38]. Fourteen studies reported no statistically significant association between sex and time to diagnosis or initial consultation with a rheumatologist [12, 23–26, 28–32, 34–38]. Feldman *et al.* found that females received an initial consultation with a rheumatologist faster; however, as age increased, the hazard ratio for delayed consultation for male sex reduced [27]. Seyferth *et al.* reported that being male was a barrier to receiving a timely diagnosis [33]. Sex was explored as a variable in one UMIC study, which found that there was no significant relationship between sex and time to initial consultation with a rheumatologist [39].

All studies in LMICs observed sex as a variable, accounting for 945 participants [40–46]. Two studies found that females faced barriers in receiving an initial appointment with a rheumatologist [45, 46]. Pati *et al.* identified that this was likely a result of cultural norms in India, where females must be accompanied by males to medical appointments [45]. The remaining studies found that patient sex did not influence wait times to an initial rheumatology consultation [40–44].

Rurality

Eight studies investigated the impact of rurality on the timing of an initial rheumatology consultation in HICs [25, 27–32, 35]. Six studies reported that patients residing in rural areas were more likely to experience delays in accessing an initial appointment with a rheumatologist [25, 27, 28, 30, 31, 35]. Nair *et al.* found that despite delays in receiving initial care from a rheumatologist, rural patients had higher satisfaction with consultations than their urban counterparts [30]. Two studies found that living in urban regions facilitated shorter wait times to an initial rheumatology consultation [27, 32]. Molina *et al.* initially reported that patients in rural regions had reduced wait times to an appointment with a rheumatologist, but once confounders were accounted for this relationship was insignificant [29].

Six studies conducted in LMICs investigated the relationship between rurality and delay in consultation with a rheumatologist [40, 42–46]. Two studies found that rural patients faced longer wait times for an initial rheumatology consultation than their urban counterparts [40, 46]. A longitudinal observational study conducted in India found that residing in urban regions was a facilitator to earlier care from a rheumatologist [42]. The remaining three studies found no relationship between rurality and diagnostic or therapeutic delay [43–45].

Ethnicity

Nine HIC studies in analysed the effect of patient's ethnicity on time to a rheumatology consultation [12, 23, 24, 26, 29, 31, 32, 34, 38]. One US study found that patients from ethnic minorities ("non-White" patients) faced delays in receiving an initial appointment and commencement of DMARDs from a rheumatologist [34]. Another study conducted in the US found that Hispanic patients were more likely to experience longer delays to diagnosis from a rheumatologist than their white counterparts [38]. Raid *et al.* also reported that Hispanic patients often presented with a more severe disease phenotype joints [38]. Other studies which investigated ethnicity concluded that it did not influence delays in receiving an rheumatology appointment [12, 23, 24, 26, 29, 31, 32].

Education

Eight studies observed the impact of level of educational attainment on access to rheumatologists in HICs [12, 23, 24, 26, 28, 32, 36, 37]. Five studies reported no statistically

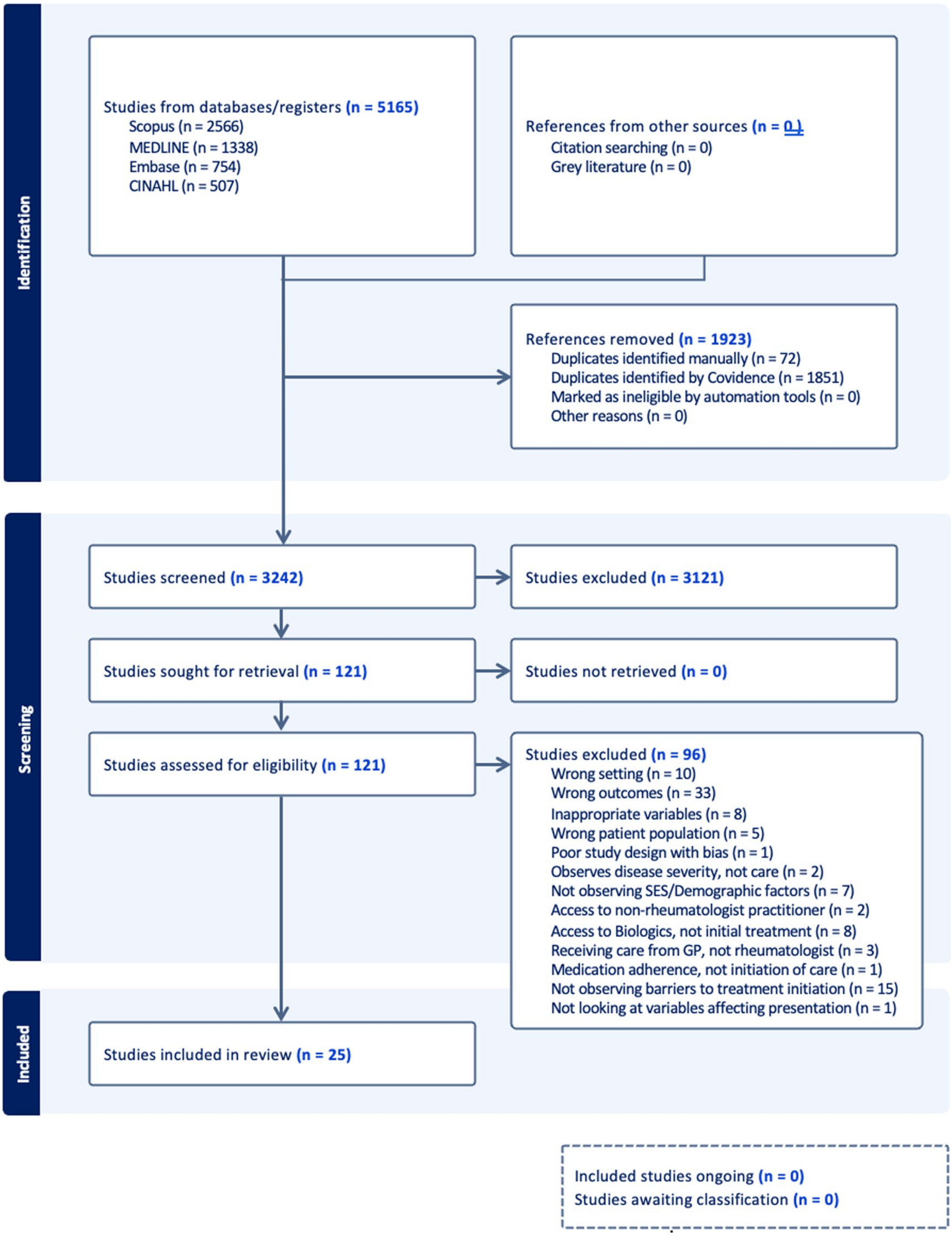

Fig. 1 PRISMA article selection

significant relationship between level of education and time to rheumatology consultation after symptom onset [12, 24, 26, 28, 32]. One study reported that patients who were less educated faced longer wait times for an initial appointment [23]. Two studies found that higher education facilitated earlier diagnosis for patients with RA [36, 37].

One study in an UMIC observed the impact of level of educational attainment on time to a rheumatology appointment [39]. In this study, 35.9% of patients received more than nine years of education, with the majority of patients falling into the lower education group [39]. Low educational attainment was found to have a direct association with delayed diagnosis [39].

Table 2 Summary of findings for the impact of sociodemographic variables on access to care

Sociodemographic Variable	Total number of studies (ref)	Total participants	Summary of findings
High-Income Countries			
Sex	17 [12, 23–38]	682,678	• Most studies reported no association between sex and time to diagnosis and intervention for rheumatoid arthritis [12, 23–26, 29–32, 34–38]. • One study reported females were more likely to experience increased time to initial consultation with a rheumatologist [27]. • One study reported males were more likely to experience delays in receiving initial diagnosis and care from a rheumatologist [33].
Age	17 [12, 23–38]	682,678	• Most studies did not find an association between age and time to diagnosis and intervention for rheumatoid arthritis [12, 23, 28, 30, 31, 34, 35, 38]. • Three studies found that younger age was associated with early diagnosis and therapy [25, 27, 32]. • Three studies reported that older age was associated with shorter time to diagnosis [24, 36, 37]. • Two studies reported that younger age was associated with delays in initial consultation with a rheumatologist [26, 33]. • One study reported increased age was a barriers to diagnosis [29].
Ethnicity	9 [12, 23, 24, 26, 29, 31, 32, 34, 38]	66,248	• Most studies did not find an association between ethnicity and time to diagnosis and intervention for rheumatoid arthritis [12, 23, 24, 26, 29, 31, 32]. • One study found that ethnic minorities (non-White patients) experienced barriers to receiving pharmacotherapy from a rheumatologist [34]. • One study reported Hispanic ethnicity was associated with increased time to initial presentation and diagnosis [38].
Rurality	8 [25, 27–32, 35]	61,384	• Six studies reported that rural patients were more likely to experience delays in receiving an initial rheumatologist appointment and diagnosis [25, 27, 28, 30, 31, 35]. • Two studies found that living in an urban location was associated with receiving care earlier [27, 32].
Educational attainment	8 [12, 23, 24, 26, 28, 32, 36, 37]	39,503	• Most studies reported educational attainment was not associated with time to receiving initial care from a rheumatologist [12, 24, 26, 28, 32]. • Two studies reported high educational attainment was associated with early diagnosis of RA [36, 37]. • One study reported low educational attainment was associated with delays in initial consultation with a rheumatologist [23].
Personal income	7 [23, 24, 26, 32, 33, 35, 37]	640,052	• Four studies found low personal income was associated with increased wait times to initial appointment/diagnosis from a rheumatologist [23, 24, 26, 33]. • Three studies reported high income was associated with receiving earlier care [32, 35, 37].
Socioeconomic status (SES)	6 [25, 27–29, 31, 34]	41,643	• Two studies found high SES was associated with shorter time to diagnosis [27, 31]. • Three studies found low SES was associated with longer time to diagnosis and care from a rheumatologist [25, 29, 34]. • One study found SES was not associated with time to initial rheumatologist consultation [28].
Upper Middle-Income Countries			
Sex	1 [38, 39]	448	• Sex was not associated with time to diagnosis and intervention for rheumatoid arthritis [38, 39].
Age	0 [38, 39]	448	• Age was not associated with time to diagnosis and intervention for rheumatoid arthritis [38, 39].
Ethnicity	0	0	Not available
Rurality	0	0	Not available
Educational attainment	1 [39]	296	• Lower educational attainment was associated with delayed diagnosis and care [39].
Personal income	1 [39]	296	• Low personal income was not associated with time to diagnosis and intervention for rheumatoid arthritis [39].
Socioeconomic Status	0	0	Not available
Lower Middle-Income Countries			
Sex	8 [38, 40–46]	1097	• Six studies found sex was not associated with time to diagnosis or initial consultation [38, 40–44]. • Two studies reported females were more likely to experience increase in time to diagnosis and intervention for rheumatoid arthritis [45, 46].
Age	8 [38, 40–46]	1097	• Six studies reported age was not associated with time to diagnosis [38, 40–42, 45, 46]. • Two studies reported older age was associated with delayed diagnosis and treatment of rheumatoid arthritis [43, 44]. • One study reported older age of onset of rheumatoid arthritis was associated with reduced time to diagnosis [37].
Ethnicity	0	0	Not available

Table 2 (continued)

Sociodemographic Variable	Total number of studies (ref)	Total participants	Summary of findings
Rurality	6 [40, 42–46]	925	• Three studies found there was no association between rurality and diagnostic or therapeutic delay [43–45]. • Three studies found rurality was associated with delayed diagnosis compared with urban areas [40, 42, 46].
Educational attainment	8 [38, 40–46]	1097	• One study found that higher educational attainment was a facilitator for earlier diagnosis of Rheumatoid arthritis [42]. • Four studies reported low educational attainment was associated with increased time to diagnosis and treatment of rheumatoid arthritis [41, 43, 44, 46]. • Two studies reported level of educational attainment was not associated with time to diagnosis and management of rheumatoid arthritis [40, 45].
Personal income	2 [40, 46]	267	• Two studies reported low personal income was associated with increased time to diagnosis and intervention from a rheumatologist [40, 46].
Socioeconomic status (SES)	3 [41, 43]	140	• One study reported cost of appointments was a barrier to accessing rheumatology appointments [41]. • One study found low SES was associated with delayed initial appointment with a Rheumatologist [43].

All studies conducted in LMICs observed education as a variable [38, 40–46]. Four of these studies found that patients with lower educational attainment faced longer wait times for initial rheumatologist appointments [41, 43, 44, 46]. One quantitative study found that more educated patients experienced reduced delays between RA symptom onset and initial appointment with a rheumatologist [42]. The remaining three studies did not observe a relationship between educational attainment and time to care [38, 40, 45].

Level of income

Seven studies investigated the impact of patient income on access to care in HICs [23, 24, 26, 32, 33, 35, 37]. Four studies found that patients with lower income or no insurance faced delays in receiving initial rheumatology care [23, 24, 26, 33]. Seyferth *et al.* found that whilst low-income patients were less likely to receive a timely rheumatologist appointment, they were more likely to be prescribed DMARDs than high-income patients [33]. Three studies found that patients in the high-income cohort had shorter wait times to an initial rheumatology appointment [32, 35, 37]. One study observed the impact of income on access to care in UMICs, and found no significant relationship [39].

Income was investigated as a variable in two LMICs studies, generating a sample size of 267 patients [40, 46]. Sarah *et al.* reported that patients with a low personal income experienced delayed initial care [46]. A Tunisian mixed methods study also reported that patients with low income faced prolonged wait times to initial rheumatology care [40]. In this study, lack of social security was used as a surrogate to predict patient income [40].

Socio-economic status (SES)

Six studies observed SES as a variable in HICs [25, 27–29, 31, 34]. Three studies concluded that low SES patients faced longer delays in receiving an initial rheumatologist appointment [25, 29, 34]. Two studies identified that high SES patients experienced a reduced wait to see a rheumatologist [27, 31]. A Saudi Arabian study with 250 patients did not observe a statistically significant relationship between SES and time to initial consultation with a rheumatologist [28].

Two studies described the impact of SES on the time to initial consultation with a rheumatologist in LMICs [41, 43, 44]. A qualitative study conducted in India reported that participants found the cost of a rheumatologist appointment a barrier to accessing initial care [41]. Forty percent of the participants in this study were of low socioeconomic background [41]. One quantitative study conducted in Pakistan found that patients with low SES faced longer delays to receiving a diagnosis from a rheumatologist [43].

Discussion

In HICs, there was significant variability amongst studies when reporting the impact of sex, age, rurality and ethnicity on time to an initial appointment or RA diagnosis with a rheumatologist [12, 23–38]. However, it was evident that patients with low income and low SES faced longer delays in receiving care from a rheumatologist [23–26, 29, 33, 34]. Additionally, high income and SES was reported as facilitators to early diagnosis in HICs [27, 31, 32, 35, 37]. Interpretation of trends observed in LMICs is challenging due to small sample sizes. Although 28.0% of the studies included were from low-income countries, they accounted for approximately a mere 0.2%

of the total sample size of this review, with 945 patients [40–46]. Similar themes to HICs were identified, with low income and SES being reported as barriers to care; educational attainment was also frequently reported as a barrier [40, 41, 43, 44, 46]. A qualitative study explored how societal norms of different countries may also affect access to rheumatological care; however, this was not examined in other studies [45].

In both high- and lower middle-income counties, low income and SES were consistently reported as barriers to accessing an initial rheumatology appointment, whereas high income and SES were generally facilitators [23–27, 29, 31–35, 37, 40, 41, 43, 44, 46]. These findings, whilst important, should be considered with caution as the US and Canada accounted for most of the literature observing the impact of SES and income. Additionally, due to the small sample size in UMICs, it is unknown if the same effect of SES and income is seen in these regions. In the US, health care is often unattainable without adequate insurance or a high income [49]. Consequently, patients with lower paying jobs who may not have insurance coverage often face barriers in receiving timely health care. A study conducted in the US by *Seyferth et al.* reported that although patients with a low household income faced delays in receiving care, they were more likely to receive a prescription for DMARDs [33]. The increased likelihood of DMARD prescription may be a result of presenting later, with more severe disease. Canadian studies reported similar findings despite the nation offering free health care, with no private health sector [50]. This is likely attributable to epidemiological factors, as there is a higher proportion of patients with low SES residing in rural areas, and less health practitioners [51]. Thus, although health care may be free, patients may not be able to afford travel and accommodation costs, as well as time off work to attend a rheumatology appointment.

Both studies from both high- and lower middle-income countries reported that patients residing in rural areas faced delays in receiving an initial consultation with a rheumatologist [25, 27, 28, 30, 31, 35, 40, 46]. This relationship is well documented in current literature across a magnitude of countries [52, 53]. Possible reasons for this association include an inability to afford transport, accommodation and time off work, as well as a shortage of rural rheumatology services. Canadian studies most frequently reported rurality as a barrier to initial consultation with a rheumatologist [25, 27, 30, 35]. This may be a result of the various geographic and cultural barriers locally, together with a lack of health practitioners in rural areas [51, 54]. Furthermore, a literature review conducted in Canada observing the use of telehealth for rural patients found that due to the high cost of fast internet in rural Canada, low-income households are further disadvantaged [55]. In LMICs, similar healthcare barriers associated with rural living are often observed, such as health workforce shortage, and financial constraints [56].

Although studies in HICs had a larger sample size, the most recent study completed was during 2022. With the rapid development of telehealth since COVID-19, no robust studies have assessed the impact of telemedicine on access to care for RA patients. However, a literature review conducted in 2023 observed the use of telehealth services in global emergencies across an array of high-, middle- and low-income countries; pertaining to COVID-19 [57]. This study found that although beneficial in delivering care, all countries still faced several unique challenges in adopting telemedicine which need to be addressed [57]. A study assessing the effectiveness of telehealth in mitigating rural barriers for patients with RA would be valuable, as this may be a method of reducing health inequity in rural populations.

A variable effect of education attainment was observed between high- and lower middle-income countries. In HICs, most of the articles suggested that education had no impact on the time to an initial appointment with a rheumatologist [12, 24, 26, 28, 32]. Interestingly, this is in contrast to findings presented by other studies, which observed access to health care across all diseases – not just RA. Large studies in the US have reported that irrespective of sex or ethnicity, low educational attainment is associated with poorer health outcomes [58]. Low education attainment was found to be a barrier to initial rheumatological care in LMICs, with higher educational attainment found to facilitate early diagnosis [40, 46]. Similar findings were established in the one UMIC study (Brazilian) where low educational attainment was associated with delayed initial care [39]. Due to the economic climate in Brazil, it was speculated patients with a lower educational attainment were from a lower SES [39]. These patients likely utilise the public health system and are inherently subjected to longer waits for specialist appointments.

Findings on the influence of sex on time to initial rheumatology consultation were inconsistent. Although most HIC studies reported that sex did not influence access to care, the largest and most recent study conducted by Seyferth *et al.* found that males faced longer wait times to an initial appointment [12, 23–37]. A large-scale prospective cohort study is required to assess the validity of these findings. Studies conducted in LICs yielded inconsistent results regarding the influence of patient sex on access to care [40–44]. An all-female study conducted in India suggested that delayed presentation of females may be due to cultural practices that limit their capacity to attend appointments without male accompaniment [45]. The suggestion that cultural beliefs, and clinical cultural competency impacts access to care is a well-supported assertion [59]. Presumably due to difficulties quantifying this, cultural beliefs were not considered as a confounder in any quantitative studies.

Ethnicity was only investigated in high-income countries [34, 38]. One high-income country study found that ethnic minorities were less likely to receive pharmacological intervention when compared to a white population [34]. Another study conducted in the US found that Hispanics often faced delays in receiving an appointment with a rheumatologist and often experienced a more severe disease phenotype then white counterparts [33]. However, most studies found that ethnicity did not impact time to care in HIC [12, 23, 24, 26, 29, 31, 32]. Interestingly, no studies in UMICs of LMICs investigated the impact of ethnicity on the provision of specialist care for patients with RA. This is a significant gap in the literature as the effect of ethnicity on access to care in these low-income countries remains unknown.

Patient age was reported to have inconsistent impacts on time to initial consultation with a rheumatologist in both high- and lower middle-income countries [12, 23–38, 40–46]. Although most studies found age had no impact on access to rheumatological care, some identified that younger age was associated with earlier consultation with a rheumatologist [25, 27, 32]. This finding is plausible as erythematous, swollen and painful joints in a younger patient is atypical, thus will be triaged for an urgent rheumatology consultation. In contrast, painful, immobile joints in an older patient is more likely to be misdiagnosed as a more common disease such as osteoarthritis. Hence older patients presenting with symptoms of RA may be subject to longer delays in specialist care due to misdiagnosis in primary care.

As the management of RA is time-sensitive, it is important that both patient and health system barriers are identified to allow early intervention and therefore more positive outcomes [2–4, 58]. Several articles included in this review identified a delay between symptom onset and GP referral to a rheumatologist, which is likely a result of misdiagnosis and institutional factors [60]. Targeted interventions need to be implemented at a health system level to reduce delays in referral times from GPs to rheumatologists. These studies should be country specific, as inherently each health system will face unique institutional challenges causing in referral delays.

This review had several limitations which must be considered. Studies often used different definitions for level of SES, income, ethnicity and level of educational attainment. Consequently, a patient who may have been deemed low SES in one study, may have been deemed higher SES in another study. As the intervals for these variables are set relative to the societal standards within that respective country, it is unlikely that this affected the findings of this review. The assumption that "Caucasian" was synonymous with "white" for ethnicity may have impacted the validity of findings for ethnicity as a variable. Most of the studies were retrospective in nature which has inherent limitations including incomplete data sets, recall bias and selection bias. Cohorts included in this review often had comparable demographics to those typically affected by RA, consequently reducing the risk of selection bias. Only one prospective study was included in this review, which makes establishing the relative risk of specific variables challenging [29]. Additionally, it is important to consider that there may be unpublished articles, and non-English publications, that could not be translated, which were not accounted for in this review.

Conclusion

Sociodemographic factors appear to have an impact on the time between RA symptom onset and initial contact with a rheumatologist. Although the impact of low income, Low SES and rurality is consistently negative across all countries, the role other variables exert on this wait time differs. Furthermore, the impact of ethnicity in UMICs and LMICs should be investigated, as there is minimal literature surrounding this at present. Although difficult to quantify, a qualitative study exploring the impact of ethnicity, culture, and religious beliefs would aid in the provision of culturally sensitive care across all countries. Whilst these findings are not novel, this review highlights the sociodemographic barriers to receiving specialist rheumatology care which required attention at an individual and public health level. There are now highly effective therapies available for RA, which should be implemented earlier to allow those affected to live a normal life. Understanding such barriers and how they pertain to different countries is an important social justice and health equity issue of global importance that, will help improve outcomes for those living with this chronic condition. Policy efforts should focus on increasing access to rheumatologists in rural areas through telemedicine and mobile health clinics. Ensuring equitable healthcare access is essential for improving outcomes and preventing long-term disability.

Appendix A: Search Strategy

- **PEO:P:** Patients with rheumatoid arthritis
- **E:** Sociodemographic status, socioeconomical barriers
- **O:** Reduced access to care

#1 Population	#2 Exposure	#3 Outcome
Rheumatoid arthritis	Rural or poverty or income or Social or economic or socio?economic or socio-economic or socioeconomic or racial or race or sociodemographic or ethnicity or indigenous or "first nation*" or "1st nations" or aborigin*	Diagnosis OR diagnoses OR rheumatologist* OR appointment* OR consultation OR accessibility OR inequality OR Disparit*

[1] Search for "Mesh OR key terms" for each concept

[2] #1 AND #2 AND #3

	Population	Exposure	Outcome
MEDLINE	**Key term** rheumatoid arthritis.ab,kf,ti. **MESH term** arthritis, rheumatoid/	**Key term** (Rural or poverty or income or Social or economic or socio?economic or socio-economic or socioeconomic or racial or race or sociodemographic or ethnicity or indigenous or "first nation*" or "1st nations" or aborigin*).ab,kf,ti. **MESH term** Ethnicity/ or exp health services accessibility/ or healthcare disparities/ or exp Rural Health Services/ or exp Rural Health/ or exp Rural Population/ or Poverty/ or "ethnic and racial minorities"/ or exp socioeconomic factors/ or sociodemographic factors/ or Racial groups/ or "alian aboriginal and torres strait islander people"/ or Race Factors/ or Minority Groups/ or Minority Health/ or exp indigenous peoples/	**Key term** (Diagnosis or diagnoses or rheumatologist* or appointment* or consultation or accessibility or inequality or Disparit*).ab,kf,ti. **MESH term** Diagnosis/ or Delayed Diagnosis/ or Early Diagnosis/ or Rheumatologist/ or exp "Appointments and Schedules"/
CINAHL	**Key term** TI "rheumatoid arthritis" OR AB "rheumatoid arthritis" **MESH term** (MH "Arthritis, Rheumatoid")	**Key term** TI (Rural or poverty or income or Social or economic or socio?economic or socio-economic or socioeconomic or racial or race or sociodemographic or ethnicity or indigenous or "first nation*" or "1st nations" or aborigin*) OR AB (Rural or poverty or income or Social or economic or socio?economic or socio-economic or socioeconomic or racial or race or sociodemographic or ethnicity or indigenous or "first nation*" or "1st nations" or aborigin*) **MESH term** (MH "Ethnic Groups") or (MH "Health Services Accessibility +") or (MH "Healthcare Disparities") or (MH "Rural Health Services") or (MH "Rural Population") or (MH "Poverty") or (MH "Low Socioeconomic Status") OR (MH "Socioeconomic Factors +") OR (MH "Marital Status") or (MH "Racial Equality") or (MH "Sociodemographic Factors") or (MH "Race Factors") or (MH "Minority Groups") or (MH "Indigenous Peoples") OR (MH "Indigenous Health") OR (MH "Health Services, Indigenous") OR (MH "First Nations of Australia")	**Key term** TI ((Diagnosis or diagnoses or rheumatologist* or appointment* or consultation or accessibility or inequality or Disparit*)) OR AB ((Diagnosis or diagnoses or rheumatologist* or appointment* or consultation or accessibility or inequality or Disparit*)) **MESH term** (MH "Diagnosis") or (MH "Diagnosis, Delayed") or (MH "Early Diagnosis") or (MH "Rheumatologists") or (MH "Appointments and Schedules +")
EMCARE	**Key term** rheumatoid arthritis.ab,kf,ti. **EMTREE term** arthritis, rheumatoid/	**Key term** (Rural or poverty or income or Social or economic or socio?economic or socio-economic or socioeconomic or racial or race or sociodemographic or ethnicity or indigenous or "first nation*" or "1st nations" or aborigin*).ab,kf,ti **EMTREE term** health care access/ or right to health/ or exp health care disparity/ or rural health/ or rural health care/ or rural population/ or poverty/ or exp socioeconomics/ or exp sociodemographics/ or marriage/ or exp ancestry group/ or population group/ or australoid/ or indigenous people/ or minority health/ or minority group/ or race/	**Key term** (Diagnosis or diagnoses or rheumatologist or rheumatologists or appointment or access or accessibility).ab,kf,ti. **EMTREE term** diagnosis/ or early diagnosis/ or delayed diagnosis/ or rheumatologist/ or consultation/
Scopus	**Key term** rheumatoid arthritis.ab,kf,ti.	**Key term** (Rural or poverty or income or Social or economic or socio?economic or socio-economic or socioeconomic or racial or race or sociodemographic or ethnicity).ab,kf,ti.	**Key term** (Diagnosis or diagnoses or rheumatologist or rheumatologists or appointment or access or accessibility).ab,kf,ti.

Appendix B: Joanne Briggs Institute Article Appraisal Tool

Cohort studies

Article Reference	Were the two groups similar and recruited from the same population?	Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Was the exposure measured in a valid and reliable way?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Were the outcomes measured in a valid and reliable way?	Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Were strategies to address incomplete follow up utilized?	Was appropriate statistical analysis used?	Include?
[24]	Y	Yes - diagnosed in 1st or 2nd six months of disease	Y	Y	Y	N - cohort identified in Canadian database of inflammatory arthritis	Y	Y	N/A	N/A	Y	**Yes**
[37]	Y	As above - early vs. late diagnosis	Y	Y	Y	N - as above, patients from known database	Y	Y	N/A	N/A	Y	**Yes**
[26]	Y	Yes - those with RA then compared with other factors	Y	Y	Y	N - from known database	Y	Y	N/A	N/A	Y	**Yes**
[27]	Y	Y	Y	Y	Y	N - coded RA visits	Y	Y	N/A	N/A	Y	**Yes**
[28]	Y	Y	Y	Y	Y	N - patients had symptoms of RA but diagnosed in course	Y	Y	N/A	N/A	Y	**Yes**
[42]	Y	Y	Y	Y	Y	N	Y	Y	N/A	N/A	Y	**Yes**
[12]	Y	Y	Y	Y	Y	N - patients with RA, considering delay to DMARD initiation	Y	Y	N/A	N/A	Y	**Yes**
[43]	Y	Y	Y	Y	Y	N - considering delay to diagnosis (patients known RA)	Y	Y	N/A	N/A	Y	**Yes**
[29]	Y	Y	Y	Y	Y	N - with RA, considering treatment delay	Y	Y	N/A	N/A	Y	**Yes**

Appendix B (continued)

Cohort studies

Article Reference	**Were the two groups similar and recruited from the same population?**	**Were the exposures measured similarly to assign people to both exposed and unexposed groups?**	**Was the exposure measured in a valid and reliable way?**	**Were confounding factors identified?**	**Were strategies to deal with confounding factors stated?**	**Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?**	**Were the outcomes measured in a valid and reliable way?**	**Was the follow up time reported and sufficient to be long enough for outcomes to occur?**	**Was follow up complete, and if not, were the reasons to loss to follow up described and explored?**	**Were strategies to address incomplete follow up utilized?**	**Was appropriate statistical analysis used?**	**Include?**
[44]	Y	Y	Y	Y	Y	N - met RA criteria, considering delay to diagnosis and treatment	Y	Y	N/A	N/A	Y	**Yes**
[30]	N - no clear	Y	Y	Y	Y (via statistical methods)	N - pre-diagnosed w/RA	Y	Y	N/A	N/A	Y	**Yes**
[23]	Y - similar in symptoms with one on treatment vs one delayed treatment	Y - delays to treatment	Y	Y	Y	N	Y	Y	N/A	N/A	Y	**Yes**
[31]	Y	Y	Y	Y	Y	N - patient diagnosed with RA prior to stusy	Y	Y	N/A	N/A	Y	**Yes**
[38]	Y	Y	Y	Y	Y	N - coded RA visits	Y	Y	N/A	N/A	Y	**Yes**
[32]	Y	Y - distance (rural vs. metro)	Y	Y	Y	N - self-reported arthritis	Y	Y	N/A	N/A	Y	**Yes**
[33]	Y	Y	Y	Y	Y	N - insurance claims	Y	Y	N/A	N/A	Y	**Yes**
[34]	Y	Y - time to initiation of treatment	Y	Y	Y	N - patient diagnosed with RA prior to study	Y	Y	N/A	N/A	Y	**Yes**
[35]	Y	Y - 3, 6, 12 months cohort entry	Y	Y	Y	? Unclear - high degree of suspicion for disease as family physician referrals	Y	Y	N/A	N/A	Y	**Yes**
[36]	Y	Y	Y	Y	Y	N	Y	Y	N/A	N/A	Y	**Yes**
[22]	y	Y	Y	N	N	N	Y	Y	N/A	N/A	N	**No**
[7]	Y	Y	Y	N	N	N	Y	Y	N/A	N/A	N	**No**

Qualitative analysis

Article Reference	Is there congruity between the stated philosophical perspective and the research methodology?	Is there congruity between the research methodology and the research question or objectives?	Is there congruity between the research methodology and the methods used to collect data?	Is there congruity between the research methodology and the representation and analysis of data?	Is there congruity between the research methodology and the interpretation of results?	Is there a statement locating the researcher culturally or theoretically?	Is the influence of the researcher on the research, and vice-versa, addressed?	Are participants, and their voices, adequately represented?	Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	Include?
[25]	Y	Y	Y	Y	Y	Y - describes Canada's health-care system	Y - independent study group facilitator rather than investigators	Y - via purposive samples; input of member from arthritis society in focus groups	Y - McGill university ethics approval	Y	**Yes**
[41]	Y	Y	Y	Y	Y	Y	Y - investigator first met patient at time of interview	Y - 13 male and 7 female (slight skewed sample)	Y	Y	**Yes**
[30]	Y	Y	Y	Y	Y	Y	Y	Y - largely female sample	Y	Y	**Yes**
[45]	Y	Y	Y	Y	Y	Y	Y - last author facilitated recruitment of some participants	Y	Y	Y	**Yes**

Cross Sectional Studies

Article Reference	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and the setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?	Include?
[40]	Y	Y	Y	Y	Y	Y	Y	Y	**Yes**
[39]	Y	Y	Y	Y	Y	Y	Y	Y	**Yes**
[46]	Y	Y	Y	Y	Y	Y	Y	Y	**Yes**

Abbreviations

RA	Rheumatoid arthritis
DMARD	Disease modifying anti-rheumatic drug
SES	Socioeconomic status
JBI	Joanna Briggs Institute
LMIC	Lower Middle-Income Country
UMIC	Upper Middle-Income Country
HIC	High Income Country

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Author contributions

J.A., J.W. and I.I conceived the study; J.A and Z.M formulated the search strategy; J.A. and M.B. independently selected and screened articles; J.A. wrote the manuscript draft, analysed and interpreted data; J.A., M.B., I.I, J.W. and Z.M. revised the final version of the manuscript.

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Data availability

All data generated or analysed during this study will be available upon request.

Declarations

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