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Uptake of patient enrolment in primary care and associated factors: a systematic review and meta-analysis

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Abstract

Background Patient enrolment in primary care refers to the formal process of registering patients with a specific primary care provider, team, or practice. This approach is often expected to enhance continuity and coordination of care. However, limited information exists on the uptake of patient enrolment and its associated characteristics. This review aimed to estimate the uptake of patient enrolment in primary care and examine factors associated with decisions around enrolment.

Methods Eight electronic databases (PubMed, Cochrane Register of Systematic Reviews, Embase, CINAHL, PsycINFO, PAIS, Web of Science, and Scopus) were searched for peer-reviewed articles published from January 2014 to July 2024. Findings from included studies were extracted and synthesised, with uptake estimated through meta-analysis and factors associated with enrolment summarised narratively. Review registration: PROSPERO CRD42024597078.

Results Ten studies across nine publications were included. Of these, eight studies with 27,919,216 participants were included in the meta-analysis. The results showed a pooled patient enrolment uptake rate of 71.4% (95% Confidence Interval [CI]: 13.6–97.5%). There was no significant difference in enrolment rates between population-wide and program-based enrolment (72.4% vs. 73.5%; $p = 0.980$). Several associated factors were identified in three publications. Women showed higher enrolment rates than men (adjusted odds ratio [aOR] = 1.07, 95% CI: 1.07–1.08), while recently arrived immigrants in a country had lower enrolment rates than the established population (aOR = 0.40, 95% CI: 0.40–0.41). Patients living in small urban/suburban/rural areas had higher enrolment rates than those in large urban/metropolitan regions (aORs: 1.17–2.18). Higher socioeconomic level was associated with increased rates of enrolment. Patients with some specific chronic health conditions, such as those with diagnosed mental illness or substance use disorders, had lower enrolment rates.

Conclusions The findings reveal that more than two-thirds of patients were enrolled with a primary care provider or practice; enrolment was influenced by demographic, geographic, socioeconomic, and clinical factors. Lower enrolment among men, recent immigrants, individuals living in large urban/metropolitan areas, lower socioeconomic groups, and those with certain health conditions may indicate potential barriers to health service access and

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opportunities for enrolment. Addressing these disparities is essential to promote equitable access and enhance opportunities for continuity and coordination of primary care.

Keywords Patient enrolment, Primary care, Associated factors, Systematic review, Meta-analysis

Background

Primary care is a key component of high-performing health care systems [1, 2]. Accessible and comprehensive primary care can enable prevention, early detection, treatment, and effective chronic disease management [1, 2]. In addition to improving individual and population health, this can reduce pressure on, and the cost of, more specialised treatments and hospitalisations [3, 4].

Improving continuity and coordination of primary care strengthens the longitudinal relationship between patients and primary care providers and can improve health outcomes [5–7]. The relationship between a patient and provider can be formalised through enrolment systems, which involve patients registering with specific providers or practices [8, 9]. Patient enrolment can be realised through patient rostering or empanelment [8–10]. This process defines who is included in a particular care arrangement and may involve assigning responsibility for patients to a designated primary care provider (e.g. family physician, general practitioner [GP], or primary care team), rostering practices to the whole populations, or enrolling a subgroup of the population with targeted health programs tailored to their needs, such as chronic disease management or preventive care [9].

Enrolment systems or mechanisms vary by country and region and do not operate in isolation. For example, in Aotearoa New Zealand and Quebec Canada, enrolment is voluntary, allowing patients to choose their preferred GP or practice [9, 11, 12]. In contrast, countries such as the United Kingdom and Ontario Canada use a mandatory enrolment model, where patients are assigned to a GP or practice based on their geographic location, although they may retain some flexibility to change providers [9]. In addition to having different levels of choice about whether to register, or who to register with, health systems are organised and funded differently, with different enablers and barriers to enrolment [13].

The research on patient enrolment largely focuses on the effectiveness of population-wide and program-based enrolment systems [6, 14–18]. This includes some limited data on patient enrolment with varied sample sizes, regions, and population characteristics. There has been little reporting of factors influencing patient enrolment [12, 15].

This systematic review with meta-analysis examines the uptake of, and factors (defined as characteristics, conditions, or variables that have impact on the uptake) associated with, patient enrolment in primary care. This may provide an evidence base for those responsible for designing strategies to improve levels of patient enrolment in primary care.

Methods

The conduct and reporting of this systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Supplementary Table 1) [19]. The protocol was registered in PROSPERO (CRD42024597078).

Literature search strategy

Relevant articles assessing the uptake of patient enrolment and factors affecting enrolment in primary care published between 1st January 2014 to 12th July 2024 were identified by searching the following databases: PubMed, the Cochrane Register of Systematic Reviews, Embase, CINAHL, PsycINFO, PAIS, Web of Science, and Scopus. The 10-year window ensured the review captured recent evidence, reflecting current policies, guidelines, and practices for patient enrolment, while avoiding outdated information. Search terms including key words in titles and abstracts were related to patient enrolment ('patient registration' OR 'patient enrolment' OR 'patient empanelment' OR 'patient rostering'), and primary care ('primary care' OR 'general practice' OR 'primary health care' OR 'primary healthcare'). The detailed search string is shown in Supplementary Table 2. Additionally, the bibliographies of all in scope articles were manually checked for additional relevant articles. The Cochrane Register of Systematic Reviews database was included to capture relevant reviews, enabling further screening of their bibliographies for eligible original research articles. Search results were restricted to English-language publications.

Inclusion and exclusion criteria

After the removal of duplicates, retrieved articles were independently screened for titles/abstracts and full texts by two authors (JL and SB). Disagreements were resolved within the team. Studies that reported patient enrolment uptake and/or associated factors in primary care settings were included in the title/abstract screening. For full-text screening, studies were included if they were peer-reviewed and original studies and reported the uptake of patient enrolment and/or associated factors in primary care settings. Excluded criteria were: (1) ineligible study types– reviews, editorials, commentaries, conference abstracts, viewpoints, research protocols, and qualitative studies; (2) ineligible study populations– healthcare providers, practice/clinic administrators or policymakers; (3) ineligible settings– hospital or specialist settings; and (4) ineligible outcomes– not related to enrolment or factors associated with enrolment.

Quality assessment

The study quality was assessed by two authors (JL and SB) using the 22-item checklist Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) [20]. The checklist was operationalised into a series of questions for the study design (Supplementary Table 3). This checklist is widely used in systematic reviews [21]; each checklist item was answered with "not applicable", "not reported", "some information mentioned but unclear", or "clear and detailed information provided".

Data extraction

The following data from the included studies were extracted into a spreadsheet (Excel version 2408): author, year of publication, study location, data source, study design, sample size, participant characteristics (e.g. age, health condition), and detail of patient enrolment (e.g. definition, type, uptake rate, factors) (see Supplementary Table 4 for details).

Data analysis

Overall uptake rates, as well as rates by characteristics such as age and sex, were presented and visualised using forest plots. To obtain the pool uptake rate of patient enrolment and corresponding 95% confidence interval (CI), a meta-analysis was performed using a random effects model [22]. The homogeneity of the pooled results was examined using the Cochran's Q test where a $P < 0.05$ indicates heterogeneity [23]. Heterogeneity across studies was also estimated by calculating the quality of I^2 for the percentage variation (I^2 value $> 50\%$ indicates substantial heterogeneity) [23]. Subgroup analysis was used to identify sources of between-study heterogeneity if the number of studies permitted. To identify potential moderators of heterogeneity, meta-regression was performed using study-level characteristics, including publication year, study location, study design, and enrolment form. Factors associated with uptake rates, including rate differences assessed using statistical analyses such as logistic regression models, were narratively summarised and presented.

Publication bias was evaluated using the funnel plot, Begg's rank correlation test, and Egger's linear regression test, with $p < 0.05$ indicating potential bias. All analyses were conducted using R version 4.4.1 (R Core Team 2017, Vienna, Austria).

Results

Study selection

A total of 464 articles were screened from eight scientific databases (Fig. 1). After screening the abstracts and titles, 398 were excluded due to irrelevance and duplicates. The remaining 66 articles underwent full-text review; nine articles were deemed eligible for this review. The nine articles [12, 15, 16, 24–29] relate to ten studies, with one article including two studies [12]. Of which, eight studies reported the enrolment data and were eligible for meta-analysis [12, 15, 16, 24, 25, 27, 29].

Study characteristics

Table 1 shows characteristics of the total ten studies from six regions within four countries (the United Kingdom, the United States of America, Canada, and New Zealand). Five were cross-sectional, two were retrospective cohort studies, two were quasi-experimental in design, and one was an ecological study. Five studies reported on program-based enrolment, targeting specific populations based on criteria such as health conditions, risk factors, or demographic characteristics. In contrast, the remaining five studies focused on population-wide enrolment, a universal approach where the entire population, or a broad group without specific eligibility criteria, was enrolled. Four studies focused on people over the age of 40 years. In terms of data sources, most studies used claims-based data or electronic medical records ($N = 8$). For studies suitable for meta-analysis ($N = 8$), 27,919,216 participants were included from five regions.

Summary of descriptive results reporting uptake of patient enrolment

Across the eight articles included in the meta-analysis, the patient enrolment uptake rate ranged from 15.5 to 100.0%. Due to significant heterogeneity among the studies ($p < 0.001$, I^2=100.0%), a random-effects model was applied, yielding a pooled enrolment rate of 71.4% (95% CI: 13.6–97.5%) (Fig. 2). A subgroup analysis by enrolment form revealed no significant difference in enrolment rates between population-wide enrolment (72.4%, 95% CI: 56.6–84.0%) and program-based (73.5%, 95% CI: 1.0-99.9%) ($p = 0.980$) (Fig. 2).

Eight studies reported the enrolment rates according to characteristics such as age, residency, ethnicity, socioeconomic status, and health conditions (Figs. 3 and 4). Enrolment rates tended to increase with age in some studies [12, 24], whereas another study observed a U-shaped relationship, with higher rates among both younger and older individuals [28]. Two New Zealand studies reported enrolment rates decreased with lower socioeconomic levels [26, 28], whereas this relationship was not observed in one of the Canadian studies [12]. One Canadian study reported the enrolment rate was lower among

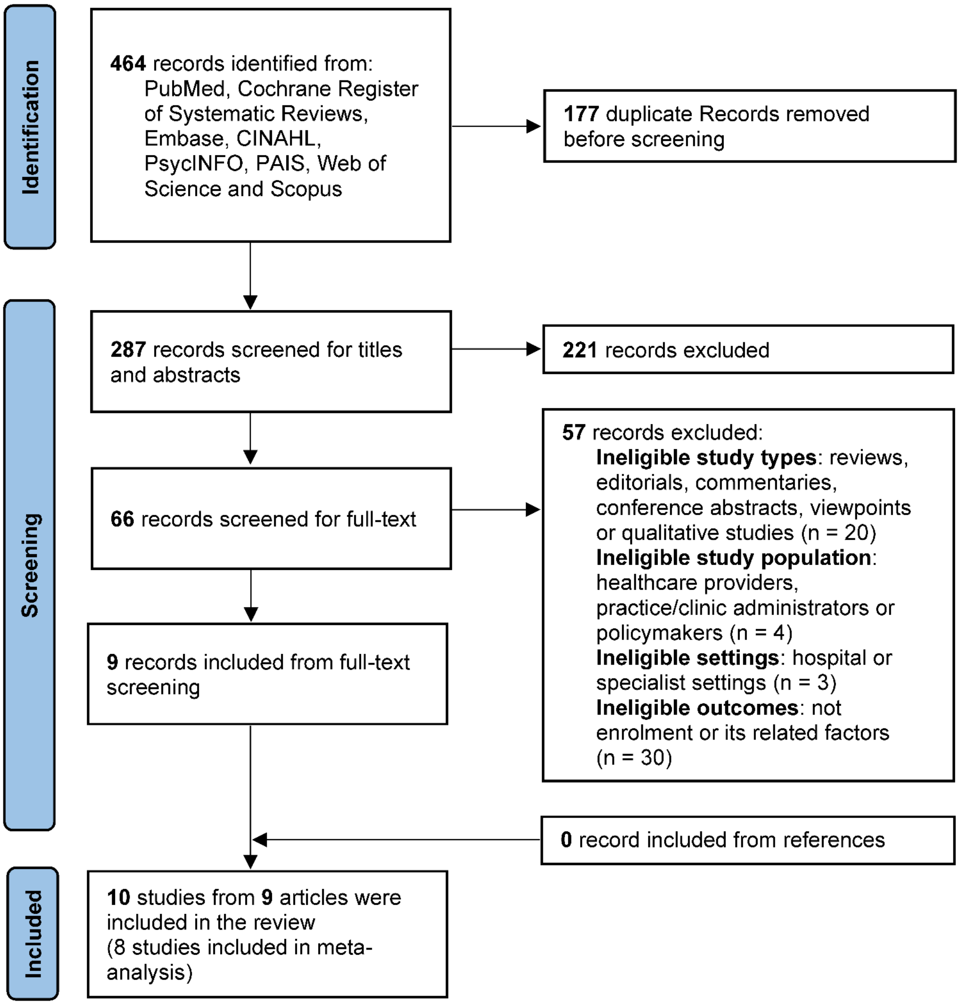


Fig. 1 Flow diagram of article screening and inclusion

immigrants compared to long-term residents in Ontario [15]. Notably, enrolment rates were lower among Māori people compared to other ethnic groups in the New Zealand studies [26, 28]. Three studies reported enrolment rates in relation to health conditions [12, 27, 29]: one found higher rates among individuals with diabetes but lower rates among those with serious mental illness [27]; another reported lower enrolment rates among individuals with intellectual and developmental disabilities [29]; and a Canadian study found lower enrolment rates among individuals with mental illness or substance use disorders in Quebec, but higher rates in British Columbia [12]. No clear trends were observed in relation to geographic residency [12].

Summary of statistical analyses assessing associated factors of patient enrolment

Three articles examined factors associated with patient enrolment [12, 15, 16] (Table 2). Four studies were identified from the Lavergne et al. article, as it investigated four different enrolment programs and presented the results separately [12]. The enrolment uptake rate was higher among women than men (adjusted odds ratio [aOR] = 1.07, 95% CI: 1.07–1.08) [15]. Compared to long-term residents, immigrants had lower enrolment rates (aOR = 0.40, 95% CI: 0.40–0.41) [15].

Geographic residency was also associated with enrolment rates. One study showed that people residing in suburban (aOR = 2.18, 95% CI: 2.17–2.29) or rural areas (aOR = 2.99, 95% CI: 2.97–3.01) had higher enrolment rates than those in urban areas [15]. One study showed that people living in smaller urban areas had higher enrolment rates (aORs: 1.17–2.82) than those in metropolitan areas [12]. Finally, another study found that enrolled patients were more likely to reside in peripheral (44.2% vs. 37.2%, $p < 0.005$), intermediate (27.2% vs. 19.4%, $p < 0.005$), or remote regions (5.0% vs. 4.3%, $p < 0.005$) [16].

Socioeconomic levels also affected enrolment rates. One study found that people living in higher

Table 1 Characteristics of included articles

First author, Publication year	Location	Study design	Data source	Study period	Study population	No. population	Definition of enrolment
Barker, 2016	United Kingdom	Quasi-experimental design (Regression discontinuity design)	Clinical Practice Research Datalink	2014	Patients aged between 65 and 85 years	255,469	Program-based enrolment. Patients received a named accountable GP.
Christiansen, 2016	United States (Northern Calif)	Quasi-experimental design	Aggregate deidentified data from eClinical Works, the practice's electronic medical record	NA	Patients with at least two visits at any of the three centres during the previous 18 months	6,023	Program-based enrolment. Patient empanelment defined as percentage of Federally-Qualified Community Health Centers (FQHCs) established patients assigned to a primary care provider and a designated care team.
Ouellette-Kuntz, 2015	Canada (Ontario)	Cross-sectional study	Administrative health and social services datasets	2008–2010	Ontario residents aged 50–64 years	807,583	Population-wide enrolment. Patient enrolment is a process whereby an individual formally agrees to receive all their primary care from a specific provider (or team), who in turn agrees to provide comprehensive primary care to that individual.
Batista, 2019	Canada (Ontario)	Retrospective cohort study	Linked health administrative and immigration databases	2003–2012	Adults aged 18 years or older, eligible for coverage under the province's health insurance program	9,231,840	Population-wide enrolment. Patients were formally rostered to a primary care physician practicing in a patient enrolment model.
Bayoumi, 2023	Canada (Ontario)	Retrospective cohort study	Population-level administrative data	2016–2018	Adult Ontario residents eligible for publicly funded health insurance	1,006,692	Population-wide enrolment. Patients were attributed to a physician if they were formally enrolled (rostered) or had attended a minimum of 3 visits with the same primary care provider during the study period (virtually rostered).
Strumpf, 2017	Canada (Quebec)	Cross-sectional study	Population-based billing records from Quebec's provincial public insurer	2002–2005	Residents	1,159,082	Program-based enrolment. Patients registered with a GP in the family medicine groups.
Lavergne, 2022	Canada (Quebec)	Cross-sectional study	Linked administrative data	2003–2013	Adults aged 40 years or more who registered for health insurance for more than 75% of the 2 years before and the 2 years after program implementation	4,043,955	Program-based enrolment. Physician agrees to take charge of patient regularly and provide required follow-up care.
Lavergne, 2022	Canada (British Columbia)	Cross-sectional study	Linked administrative data	2003–2013	Adults aged 40 years or more who registered for health insurance for more than 75% of the 2 years before and the 2 years after program implementation	1,953,390	Program-based enrolment. Physician bills code accepting responsibility for chronic disease management for 1 year, or Physician bills code indicating willingness to provide "full-service family practice" and confirms relationship with patient through "standardized conversation".

Table 1 (continued)

First author, Publication year	Location	Study design	Data source	Study period	Study population	No. population	Definition of enrolment
Irurzun-Lopez, 2021	New Zealand	Ecological study	Annual data on the proportion of people enrolled in a primary health care	2015–2019	Census population data	NA	Population-wide enrolment. People enrolled in a primary health care.
Pledger, 2023	New Zealand	Cross-sectional study	Aggregated data from the Te Whatu Ora Health New Zealand (TWO HNZ)	2016–2023	Census population data	NA	Population-wide enrolment. People enrolled in a primary health care.

NA, Not available; GP, General practitioner

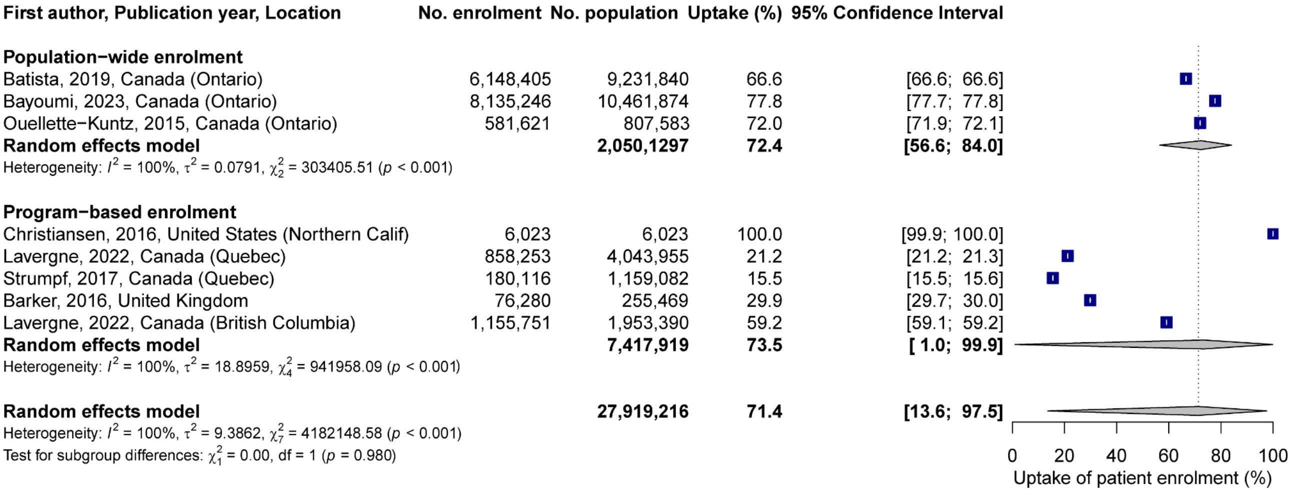


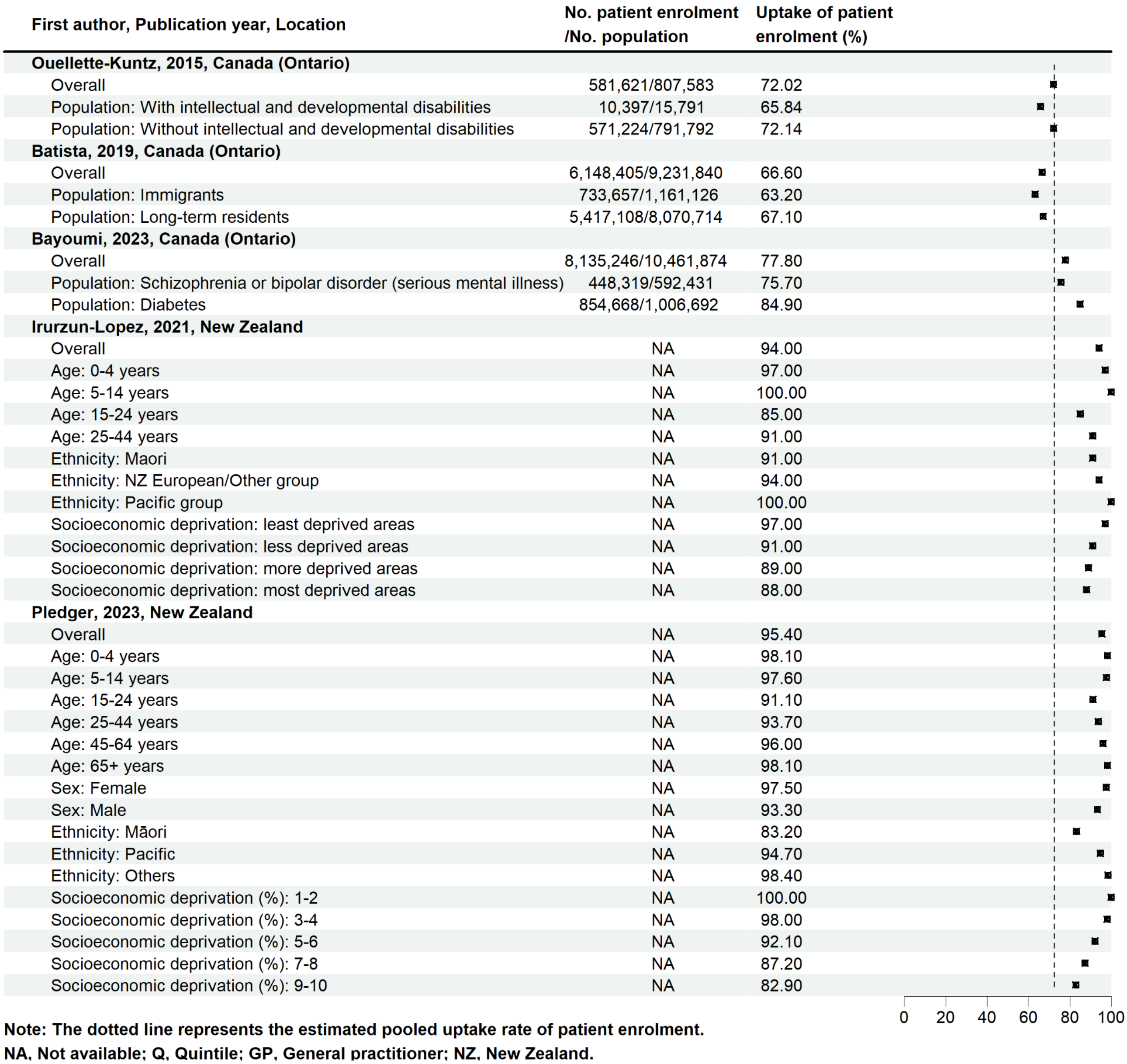
Fig. 2 Meta analysis of the overall uptake of patient enrolment in primary care

neighbourhood income quintiles had higher enrolment rates compared to those in the lowest neighbourhood income quintile, with aORs ranging from 1.03 to 1.67 [12]. Another study also reported lower enrolment rates among people living in lower neighbourhood income levels (aORs: 0.81–0.83) compared to those in the highest neighbourhood income level [15].

The number of morbidities was associated with enrolment rates. One study reported a higher number of morbidities were associated with lower enrolment rates [15]. Compared to people without morbidity, those with morbidities had lower enrolment rates (aORs: 0.63–0.92), with the lowest enrolment rate observed among those with more than 10 morbidities (aOR = 0.63, 95% CI: 0.62–0.64) [15]. Two studies explored this association in terms of specific morbidities. One showed people with mental illness (aOR = 0.94, 95% CI: 0.92–0.96) or substance use disorder (aOR = 0.60, 95% CI: 0.58–0.63) had lower enrolment rates [12]. Another reported that enrolled patients were less likely to have hypertension (27.2% vs. 30.5%, $p < 0.005$), asthma (3.4% vs. 4.2%, $p < 0.005$), or chronic obstructive pulmonary disease (COPD) (6.6% vs. 7.0%, $p < 0.005$) [16].

Quality assessment

The quality assessment summary for each STROBE checklist item across the ten studies indicates that most studies provided clear and detailed information about titles, abstracts, background, objectives, study design, setting, data source, variables, bias, statistical methods, descriptive data, outcome data, discussion, key results, limitations and interpretations, though details on participants and the main results were sometimes lacking (Supplementary Fig. 1). Overall, study quality was rated as good. A breakdown of each checklist item's assessment for each study is available in Supplementary Table 5.



First author, Publication year, Location	No. patient enrolment /No. population	Uptake of patient enrolment (%)
Ouellette-Kuntz, 2015, Canada (Ontario)		
Overall	581,621/807,583	72.02
Population: With intellectual and developmental disabilities	10,397/15,791	65.84
Population: Without intellectual and developmental disabilities	571,224/791,792	72.14
Batista, 2019, Canada (Ontario)		
Overall	6,148,405/9,231,840	66.60
Population: Immigrants	733,657/1,161,126	63.20
Population: Long-term residents	5,417,108/8,070,714	67.10
Bayoumi, 2023, Canada (Ontario)		
Overall	8,135,246/10,461,874	77.80
Population: Schizophrenia or bipolar disorder (serious mental illness)	448,319/592,431	75.70
Population: Diabetes	854,668/1,006,692	84.90
Irurzun-Lopez, 2021, New Zealand		
Overall	NA	94.00
Age: 0-4 years	NA	97.00
Age: 5-14 years	NA	100.00
Age: 15-24 years	NA	85.00
Age: 25-44 years	NA	91.00
Ethnicity: Maori	NA	91.00
Ethnicity: NZ European/Other group	NA	94.00
Ethnicity: Pacific group	NA	100.00
Socioeconomic deprivation: least deprived areas	NA	97.00
Socioeconomic deprivation: less deprived areas	NA	91.00
Socioeconomic deprivation: more deprived areas	NA	89.00
Socioeconomic deprivation: most deprived areas	NA	88.00
Pledger, 2023, New Zealand		
Overall	NA	95.40
Age: 0-4 years	NA	98.10
Age: 5-14 years	NA	97.60
Age: 15-24 years	NA	91.10
Age: 25-44 years	NA	93.70
Age: 45-64 years	NA	96.00
Age: 65+ years	NA	98.10
Sex: Female	NA	97.50
Sex: Male	NA	93.30
Ethnicity: Māori	NA	83.20
Ethnicity: Pacific	NA	94.70
Ethnicity: Others	NA	98.40
Socioeconomic deprivation (%): 1-2	NA	100.00
Socioeconomic deprivation (%): 3-4	NA	98.00
Socioeconomic deprivation (%): 5-6	NA	92.10
Socioeconomic deprivation (%): 7-8	NA	87.20
Socioeconomic deprivation (%): 9-10	NA	82.90

Note: The dotted line represents the estimated pooled uptake rate of patient enrolment.
NA, Not available; Q, Quintile; GP, General practitioner; NZ, New Zealand.

Fig. 3 Uptake of population-wide enrolment in primary care, by characteristics

Publication bias

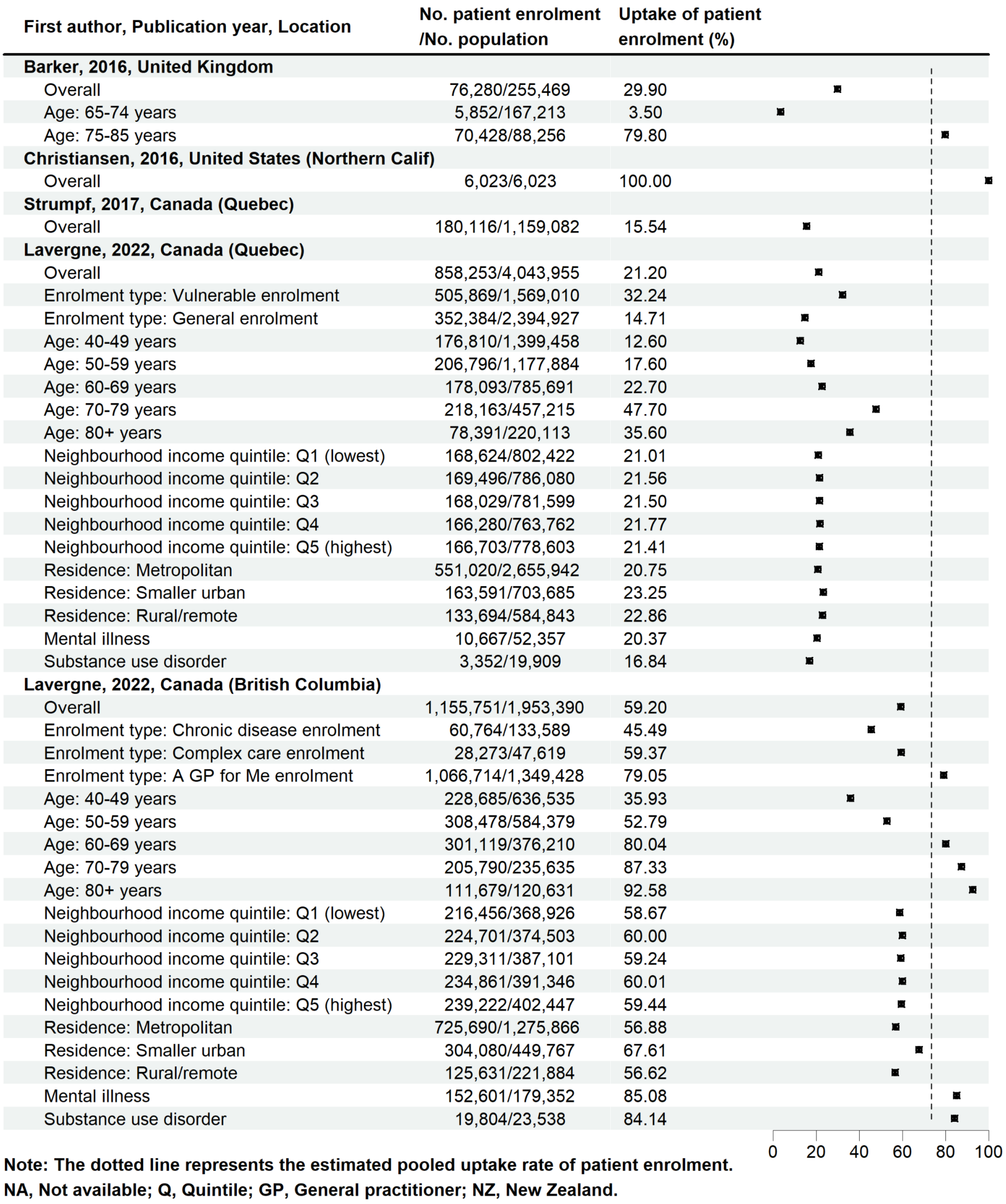
The funnel plot shows that most studies fall within the confidence interval, and the plot's shape does not indicate obvious asymmetry (Supplementary Fig. 2). Additionally, Begg's test ($p = 0.548$) and Egger's test ($p < 0.001$) were conducted to quantitatively assess publication bias. These results suggest that potential publication bias may be present.

Meta regression

The meta-regression analyses indicate that enrolment uptake rates were not influenced by publication year, study design, or enrolment form. However, study location had a significant impact, highlighting geographic variations in health system structure, policies, healthcare awareness, and accessibility (Supplementary Table 6).

Discussion

The review estimated a pooled patient enrolment uptake rate of 71.4% in primary care, with no significant difference observed between program-based and population-wide enrolment type (73.5% vs. 72.4%; $p = 0.980$). Demographic, geographic, socioeconomic, and clinical factors were found to influence whether patients enrolled. Lower enrolment rates were associated with being male, a recent immigrant, living in large urban or metropolitan areas, living in lower socioeconomic level areas, and those with a higher number of comorbidities.



First author, Publication year, Location	No. patient enrolment /No. population	Uptake of patient enrolment (%)
Barker, 2016, United Kingdom		
Overall	76,280/255,469	29.90
Age: 65-74 years	5,852/167,213	3.50
Age: 75-85 years	70,428/88,256	79.80
Christiansen, 2016, United States (Northern Calif)		
Overall	6,023/6,023	100.00
Strumpf, 2017, Canada (Quebec)		
Overall	180,116/1,159,082	15.54
Lavergne, 2022, Canada (Quebec)		
Overall	858,253/4,043,955	21.20
Enrolment type: Vulnerable enrolment	505,869/1,569,010	32.24
Enrolment type: General enrolment	352,384/2,394,927	14.71
Age: 40-49 years	176,810/1,399,458	12.60
Age: 50-59 years	206,796/1,177,884	17.60
Age: 60-69 years	178,093/785,691	22.70
Age: 70-79 years	218,163/457,215	47.70
Age: 80+ years	78,391/220,113	35.60
Neighbourhood income quintile: Q1 (lowest)	168,624/802,422	21.01
Neighbourhood income quintile: Q2	169,496/786,080	21.56
Neighbourhood income quintile: Q3	168,029/781,599	21.50
Neighbourhood income quintile: Q4	166,280/763,762	21.77
Neighbourhood income quintile: Q5 (highest)	166,703/778,603	21.41
Residence: Metropolitan	551,020/2,655,942	20.75
Residence: Smaller urban	163,591/703,685	23.25
Residence: Rural/remote	133,694/584,843	22.86
Mental illness	10,667/52,357	20.37
Substance use disorder	3,352/19,909	16.84
Lavergne, 2022, Canada (British Columbia)		
Overall	1,155,751/1,953,390	59.20
Enrolment type: Chronic disease enrolment	60,764/133,589	45.49
Enrolment type: Complex care enrolment	28,273/47,619	59.37
Enrolment type: A GP for Me enrolment	1,066,714/1,349,428	79.05
Age: 40-49 years	228,685/636,535	35.93
Age: 50-59 years	308,478/584,379	52.79
Age: 60-69 years	301,119/376,210	80.04
Age: 70-79 years	205,790/235,635	87.33
Age: 80+ years	111,679/120,631	92.58
Neighbourhood income quintile: Q1 (lowest)	216,456/368,926	58.67
Neighbourhood income quintile: Q2	224,701/374,503	60.00
Neighbourhood income quintile: Q3	229,311/387,101	59.24
Neighbourhood income quintile: Q4	234,861/391,346	60.01
Neighbourhood income quintile: Q5 (highest)	239,222/402,447	59.44
Residence: Metropolitan	725,690/1,275,866	56.88
Residence: Smaller urban	304,080/449,767	67.61
Residence: Rural/remote	125,631/221,884	56.62
Mental illness	152,601/179,352	85.08
Substance use disorder	19,804/23,538	84.14

Note: The dotted line represents the estimated pooled uptake rate of patient enrolment.
NA, Not available; Q, Quintile; GP, General practitioner; NZ, New Zealand.

Fig. 4 Uptake of program-based enrolment in primary care, by characteristics

Table 2 Factors associated with patient enrolment in primary care

First author, Publication year, Location	Study population	Definition of enrolment	Factors	Statistical analysis	Adjusted covariates
Batista, 2019, Canada (Ontario)	9,231,840 adults aged 18 years or older	Patients being formally rostered to a primary care physician practicing in a patient enrolment model	• Immigrants had lower odds of being registered in these practices than long-term residents (aOR = 0.40, 95% CI: 0.40–0.41). People with lower neighbourhood income (Ref: Q5 highest; aORs: 0.81–0.83), and those with high morbidity (Ref: 0; 1–5: aOR = 0.92, 95% CI: 0.92–0.93; 6–9: aOR = 0.77, 95% CI: 0.76–0.77; 10+: aOR = 0.63, 95% CI: 0.62–0.64) had lower odds of being enrolled. • Women (Ref: men; aOR = 1.07, 95% CI: 1.07–1.08), residents in suburban (Ref: urban; aOR = 2.18, 95% CI: 2.17–2.29) or rural areas (Ref: urban; aOR = 2.99, 95% CI: 2.97–3.01) had higher odds of being enrolled.	Logistic regression	Age, gender, rurality, income and comorbidity score
Strumpf, 2017, Canada (Quebec)	1,159,082 residents	Patients registered with a GP	• Patients with registered GPs were less likely to live in university region (23.6% vs. 39.1%, $p < 0.005$), be with material deprivation index most advantaged (12.2% vs. 16.3%, $p < 0.005$), hypertension (27.2% vs. 30.5%, $p < 0.005$), asthma (3.4% vs. 4.2%, $p < 0.005$), and COPD (6.6% vs. 7.0%, $p < 0.005$). • They were more likely to live in peripheral region (44.2% vs. 37.2%, $p < 0.005$), intermediate region (27.2% vs. 19.4%, $p < 0.005$), and remote region (5.0% vs. 4.3%, $p < 0.005$).	Difference-in-differences models	NA
Lavergne, 2022, Canada (Quebec)	1,569,010 adults aged 40 years or more who registered for health insurance	Physician agrees to take charge of patient regularly and provide required follow-up care	• Neighbourhood income quintile (Ref: Q1 [lowest]): Q2 (aOR = 1.03, 95% CI: 1.02–1.04), Q3 (aOR = 1.04, 95% CI: 1.04–1.05), Q4 (aOR = 1.04, 95% CI: 1.03–1.06), Q5 [highest] (aOR = 0.95, 95% CI: 0.94–0.96). • Residence (Ref: metropolitan): Smaller urban (aOR = 1.62, 95% CI: 1.60–1.63), Rural/remote (aOR = 1.37, 95% CI: 1.36–1.39). • Mental illness (aOR = 0.94, 95% CI: 0.92–0.96). • Substance use disorder (aOR = 0.60, 95% CI: 0.58–0.63).	Logistic regression	Age, sex or gender, and number of comorbidities
Lavergne, 2022, Canada (Quebec)	2,394,927 adults aged 40 years or more who registered for health insurance	Physician agrees to take charge of patient regularly and provide required follow-up care	• Neighbourhood income quintile (Ref: Q1 [lowest]): Q2 (aOR = 1.10, 95% CI: 1.09–1.11), Q3 (aOR = 1.18, 95% CI: 1.16–1.19), Q4 (aOR = 1.18, 95% CI: 1.17–1.20), Q5 [highest] (aOR = 1.21, 95% CI: 1.20–1.23). • Residence (Ref: metropolitan): Smaller urban (aOR = 0.76, 95% CI: 0.79–0.80), Rural/remote (aOR = 0.93, 95% CI: 0.92–0.94).	Logistic regression	Age, sex or gender, and number of comorbidities
Lavergne, 2022, Canada (British Columbia)	133,589 adults aged 40 years or more who registered for health insurance	Physician bills code accepting responsibility for chronic disease management for 1 year	• Neighbourhood income quintile (Ref: Q1 [lowest]): Q2 (aOR = 1.03, 95% CI: 0.99–1.06), Q3 (aOR = 1.06, 95% CI: 1.03–1.10), Q4 (aOR = 1.09, 95% CI: 1.05–1.12), Q5 [highest] (aOR = 1.03, 95% CI: 1.00-1.07). • Income assistance (aOR = 1.01, 95% CI: 0.97–1.05). • Residence (Ref: metropolitan): Smaller urban (aOR = 1.17, 95% CI: 1.14–1.19), Rural/remote (aOR = 0.80, 95% CI: 0.78–0.83). • Mental illness (aOR = 0.98, 95% CI: 0.94–1.02). • Substance use disorder (aOR = 0.72, 95% CI: 0.65–0.80).	Logistic regression	Age, sex or gender, and number of comorbidities

Table 2 (continued)

First author, Publication year, Location	Study population	Definition of enrolment	Factors	Statistical analysis	Adjusted covariates
Lavergne, 2022, Canada (British Columbia)	47,619 adults aged 40 years or more who registered for health insurance	Physician bills code indicating willingness to provide "full-service family practice" and confirm relationship with patient through "standardized conversation	• Neighbourhood income quintile (Ref: Q1 [lowest]): Q2 (aOR = 1.02, 95% CI: 0.97–1.08), Q3 (aOR = 1.05, 95% CI: 0.99–1.11), Q4 (aOR = 1.06, 95% CI: 1.00-1.13), Q5 [highest] (aOR = 1.10, 95% CI: 1.04–1.17). • Income assistance (aOR = 1.02, 95% CI: 0.95–1.09). • Residence (Ref: metropolitan): Smaller urban (aOR = 1.27, 95% CI: 1.22–1.33), Rural/remote (aOR = 0.62, 95% CI: 0.58–0.66). • Mental illness (aOR = 0.87, 95% CI: 0.82–0.93). • Substance use disorder (aOR = 0.64, 95% CI: 0.56–0.72).	Logistic regression	Age, sex or gender, and number of comorbidities
Lavergne, 2022, Canada (British Columbia)	1,349,428 adults aged 40 years or more who registered for health insurance	Physician bills code indicating willingness to provide "full-service family practice" and confirm relationship with patient through "standardized conversation	• Neighbourhood income quintile (Ref: Q1 [lowest]): Q2 (aOR = 1.09, 95% CI: 1.08–1.11), Q3 (aOR = 1.33, 95% CI: 1.31–1.34), Q4 (aOR = 1.50, 95% CI: 1.48–1.52), Q5 [highest] (aOR = 1.67, 95% CI: 1.64–1.69). • Income assistance (aOR = 0.76, 95% CI: 0.75–0.78). • Residence (Ref: metropolitan): Smaller urban (aOR = 2.82, 95% CI: 2.78–2.85), Rural/remote (aOR = 1.92, 95% CI: 1.89–1.95). • Mental illness (aOR = 1.14, 95% CI: 1.13–1.16). • Substance use disorder (aOR = 0.61, 95% CI: 0.59–0.63).	Logistic regression	Age, sex or gender, and number of comorbidities

NA, Not available; GP, General practitioner; Ref: Reference; OR, Odds ratio; aOR, Adjusted odds ratio; CI, Confidence interval; COPD, Chronic obstructive pulmonary disease

Furthermore, patients with specific conditions, such as mental illness or substance use disorders, also had lower enrolment rates.

The ideal rate of patient enrolment in primary care is not defined but generally aims to be as high as feasible as high levels of enrolment in primary care may help maximise continuity and improve equitable access, which in turn enhance health system performance and patient outcomes [1, 7, 30]. The pooled enrolment rate observed in the review may be considered suboptimal, suggesting a considerable portion of the population may not be fully accessing the breadth of primary care services available to them. Although enrolment rates did not differ significantly between program-based and population-wide enrolment, the rates for program-based enrolment varied widely, from 15.5 to 100.0%. This variability may be due to differences in factors such as health system structures, funding models, targeted populations, and enrolment eligibility criteria [12, 16, 24, 25]. For example, unlike universal healthcare countries (e.g. the UK, Canada, Australia) where primary care enrolment is often a prerequisite for specialist care, in the US, enrolment depends on healthcare models adopted by individual practices or insurers. Empanelment-based models help mitigate some of the fragmentation in US healthcare by ensuring that patients receive ongoing primary care coordination, even in the absence of a national gatekeeping system. Specifically, in the US study, the enrolment program was based on patient empanelment, where individual patients who were enrolled in the practice were assigned to a primary care provider and a designated care team by the participating practices [25]. This assignment resulted in a high enrolment rate, as patients did not have the option to choose their own provider. In contrast, Quebec in Canada has several different enrolment programs, including *Family Medicine Groups*, *Vulnerable Enrolment*, and *General Enrolment*, where practitioners operate under a blended funding model combining capitation payments with fee-for-services [12, 16]. Patients can choose where to enrol as long as the practitioners agree to take responsibility for their regular care and required follow-up [12, 16]. In British Columbia in Canada, three voluntary enrolment programs are in place: the *Chronic Disease Incentive*, the *Complex Care Incentive*, and *a GP for Me* [12]. These programs use a capitation funding model, where practitioners receive payments based on the number of patients they are responsible for, encouraging them to take on and manage patient care responsibilities [12]. In Canada, different programs offer choice and target specific priority populations; however, many of the practices are at capacity and waiting lists manage unenrolled patients, providing a potential explanation for relatively low enrolment rates [31].

Identifying the barriers to patient enrolment could help with the design of effective strategies to improve enrolment in primary care. Enrolment rates have been shown to vary by sex, with lower rates among men than women observed in one Canadian study [15]. Differences in health-seeking behaviour and preventive care utilisation, such as men may seek healthcare less frequently and less proactively than women, may contribute to this discrepancy [32, 33].

Other demographic factors, such as migration status, have been associated with enrolment rates, with recent immigrants showing lower enrolment uptake compared to long-term residents in Canada [15]. Commonly known barriers that hinder recent immigrants from effectively accessing primary care include unfamiliarity with the local health care system, language and communication challenges, lack of culturally appropriate services, poor previous healthcare experiences, and financial constraints [34–36]. The centralised waiting lists in Canadian systems, where practices assign patients from a queue to the next available provider within a pool of participating practitioners, may further affect enrolment rates for immigrants. Recent immigrants might not meet prioritisation criteria due to limited healthcare utilisation history or records within the Canadian system [31]. Additionally, recent immigrants may have lower health literacy specific to their new home country, which can affect their awareness of their rights to access health care, their understanding of primary care services available, and their understanding of enrolment options and benefits of enrolment [36, 37].

Studies have found that enrolment rates varied by geographic residency, with people in large urban or metropolitan areas having lower enrolment rates than those in small urban, suburban, rural, or remote regions [12, 15, 16]. This may be due to the wider availability and choice in healthcare providers in urban areas, which diminishes the need for structured enrolment systems aimed at improving access in underserved regions [38]. Moreover, urban populations may be more transient, with frequent moves and job changes that can disrupt continuity in primary care enrolment [39]. Higher patient loads in large urban or metropolitan areas may limit healthcare provider capacity for enrolment, leading patients to seek alternatives such as walk-in clinics or specialists, further lowering enrolment incentives [38, 40].

Studies also indicated that socioeconomic factors, such as neighbourhood income levels, influence enrolment uptake. Individuals residing in higher-income neighbourhoods typically show higher enrolment rates compared to those in lower-income areas [12, 15]. This variation could be linked to factors such as better access to healthcare, increased awareness of services, and reduced financial barriers to care in higher-income neighbourhoods [41, 42].

In addition to demographic and socioeconomic factors, the number and type of morbidity was associated with enrolment rates, with a higher number of morbidities associated with lower uptake rates in one study [15]. Individuals with multiple health conditions may face greater barriers in accessing and navigating healthcare systems. These barriers can include physical limitations, financial constraints, lack of awareness about available services, and the complexity of managing care across multiple disciplines and specialties, reducing their likelihood of enrolling in primary care [43–45]. Patients with higher morbidities may prioritise urgent health issues over preventive or continuous primary care enrolment, further reducing the likelihood of enrolment [45]. In terms of specific morbidities, people with mental illness or substance use disorder had lower rates of enrolment [12], possibly because these conditions often require specialised care beyond what primary care may offer [46–48], combined with known barriers such as physical limitations, social stigma, financial constraints, lack of awareness of services, and the complexities of managing multiple health needs, which can make consistent engagement with primary care challenging [49–51]. In contrast, patients with chronic conditions such as hypertension, asthma, and chronic obstructive pulmonary disease (COPD) have higher rates of enrolment [16], as these conditions require regular monitoring and ongoing management such as pharmaceutical treatment that primary care is well-suited to provide [52, 53].

Efforts to improve enrolment rates should focus on addressing the specific barriers to enrolment through targeted strategies. From a policy perspective, offering incentives such as easy access to primary care, discounted or no-cost primary care services, subsidised specialist care, or additional services like after-hours care or post-hospitalisation follow-up may encourage enrolment [13]. For each observed factor, men's lower enrolment could be improved by increasing health awareness, while culturally tailored outreach and language support may enhance enrolment among immigrant populations. Geographic factors may also play a role, as urban residents have lower enrolment rates, likely due to a wider range of healthcare options and frequent relocations that can disrupt continuity. Flexible enrolment policies that allow easy transfer of enrolment when individuals move can help maintain informational continuity despite frequent relocations, making primary care a more accessible and stable option for urban populations. Socioeconomic disparities, evidenced by lower enrolment in low-income areas, could be reduced by addressing financial and access-related challenges, such as offering subsidies, expanding health insurance coverage for low-income individuals, and implementing outreach programs in low-income communities. For those with complex health needs, providing more holistic health care, by integrating mental health and substance use services with primary care, could be beneficial. Advancements in technology have led to the development of digital health tools, such as telemedicine and patient portals, which have demonstrated benefits in improving healthcare accessibility, flexibility, communication, and engagement [54, 55]. These tools have the potential to reduce barriers related to distance, convenience, health literacy, and financial limitations, making it easier for individuals to enrol in health programs. Addressing these varied barriers can promote more equitable access and improve health outcomes across demographic, socioeconomic, and clinical groups.

Our study has several limitations. First, grey literature or publications in languages other than English were not searched, which may introduce potential publication bias. Second, a significant heterogeneity regarding uptake of patient enrolment was observed, which is an inherent characteristic of proportion meta-analysis [56]. Differences in study design, study populations, regions, enrolment process and funding models (including financial incentives and disincentives for both practices and patients) were noted. Analysing data using the subgroup analysis did not significantly reduce the heterogeneity within studies; however, the quality assessment indicated that the included studies were generally of good quality, supporting the reliability of the findings. Finally, it is worth mentioning that all the included studies were conducted in high income and developed countries. Therefore, the generalisability of our findings to lower to middle income nations is limited, and caution should be exercised when applying these results to populations in different socioeconomic and healthcare contexts.

In summary, the findings reveal a moderate level of patient enrolment in primary care where this is available. Enrolment rates appear to be associated with demographic, geographic, socioeconomic, and clinical factors. Disparities are evident, with lower enrolment rates among men, immigrants, large urban or metropolitan residents, lower socioeconomic groups, and individuals with specific morbidities. Given the potential benefits of patient enrolment in enhancing continuity and coordination of primary care, addressing these barriers is essential to promote equitable access and ensure all populations benefit from strengthened primary care.

Supplementary Information

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Supplementary Material 1

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Author contributions

JL, SB, LA and MK designed the study. JL and SB carried out the screening and data extraction. JL analysed the data. JL wrote the original draft. MK supervised the study. All authors contributed to reviewing and editing the manuscript. All authors approved the final version of the manuscript.

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Data availability

Data is provided within the manuscript or supplementary information files.

Declarations

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Not applicable.

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Competing interests

The authors declare no competing interests.

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