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SYSTEMATIC REVIEW

Health-care utilisation for low back pain: a systematic review and meta-analysis of population-based observational studies

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Abstract

Low back pain (LBP) is a major public health problem globally, resulting in a significant personal and societal burden. However, little is known about health-care utilisation for optimal management of LBP. The aim of this systematic review and meta-analysis was to determine the prevalence rate of health-care utilisation for LBP. The electronic databases MEDLINE, EMBASE via Ovid, CINAHL, and Scopus were searched for peer-reviewed articles published in English before March 2018. Meta-analysis was performed using Stata version 14 software. The reported summary statistics including the pooled prevalence rate of health-care utilisation were calculated using a random-effects model. Of 5801 identified records, 20 met the inclusion criteria and were reviewed. The prevalence rate of health-care utilisation for LBP varied regionally, the pooled prevalence rate was 67%, 95% confidence interval (CI) 50–84 in the USA, 47%, 95% CI 39–56 in the UK and 48%, 95% CI 33–63 in Europe. General practitioners, chiropractors and physical therapists were health-care providers commonly engaged in the management of LBP patients, while medication treatment, exercise, massage therapy and spinal manipulation were common prescriptions. A range of factors influencing the decision to seek and use health-care for LBP were also identified. Despite LBP being a common public health problem, a significant proportion of people with the pain fail to use health-care. It is apparent from this review that there is possibly skewed data, as the evidence to date is largely from developed countries. Therefore, it is warranted that future studies investigate the epidemiology of health-care utilisation for LBP in developing countries.

Keywords Low back pain · Health-care utilisation · Population-based observational studies · Systematic review · Meta-analysis

Introduction

Low back pain (LBP) is one of the major challenging public health problems globally [1, 2], resulting in a significant cause of negative social, psychological and economic consequences [3, 4]. Despite this LBP has been seen as a syndrome limited to developed countries until the past few decades, currently the literature [5–7] demonstrates that it is also a major public health problem in developing countries and that it is the leading cause of years lived with disability (YLDs) in every country in the world. When measured by disability-adjusted life years (DALYs), LBP is also one of the major contributors to the global burden of disease [8]. Evidence shows that individuals with LBP frequently present with comorbidities, such as psychological and somatoform disorders [9]. Furthermore, it has been argued that approximately 80% of individuals experience at least one episode of LBP during their lifetime [10]. The prevalence of LBP

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is estimated to be higher in older adults and increases after the age of 30 years [11]. Correspondingly, the population aged 60 years or over is projected to increase in the coming four decades [12]. Partly due to this philosophy, the global prevalence of LBP is suggested to increase significantly over the coming years [13], suggesting that there is a concomitant growing demand on health-care systems. Thus, evidence-based intervention planning is desirable to mitigate against the societal consequences of LBP. The investigation of the health-care needs of the population experiencing LBP and associated factors is important to plan appropriate intervention strategies [14]. In addition, having a clear understanding of the type of health-care preferred by LBP patients and the type of treatment most effective for management of the pain is imperative to integrate these choices in the provision of services [15]. In response to this, research interest in the area of health-care utilisation and factors influencing such behaviours has been increasing over the past three decades [14]. However, the reported results are divergent and often inconclusive, partly due to the variability of methods and the reference periods considered in estimating the prevalence of LBP and related prevalence rates of health-care utilisation. Due to this heterogeneity, the prevalence rate of health-care utilisation for LBP and type of health-care opted for by individuals with LBP remain unclear. This negates preventive strategies and management of LBP conditions. Therefore, it is essential to determine the prevalence rate of health-care utilisation for LBP.

Methods

This review was conducted following a protocol registered in PROSPERO [CRD42018086040]. The methods used in the review conformed to the established Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [16].

Inclusion criteria

This review was initially designed to focus on studies reporting health-care utilisation among people with non-specific LBP, which is the most prevalent form of LBP [11, 17]. However, the reviewed studies were observational studies with questionnaire-based data collection, indicating that none of the studies undertook diagnostic procedure to identify specific and non-specific LBP. Because of this, removing one of the inclusion criteria 'the reported data were collected from people with non-specific LBP', studies that met all of the following three criteria were included in the review: (1) studies reported the number of study participants with LBP and prevalence of health-care utilisation or if it is possible to determine number of people with LBP and prevalence of health-care utilisation from the reported data; (2) the study participants were 15 and above years old who reside in the general population; and (3) full text of the study was in English.

Exclusion criteria

Case reports, reviews, sex and/or age-specific studies, and studies addressing pregnant women and health-care-based patients were excluded.

Literature search strategy and sources

A computerised search of the electronic databases MEDLINE, EMBASE via Ovid, CINAHL, and Scopus was performed for peer-reviewed articles published in English before March 2018. The search engines Google and Google Scholar were also searched for grey literature. In addition, lists of references in the retrieved articles were searched. The search strategy was developed by GKB in consultation with SC and JOB. One expert librarian (LE) was consulted for guidance on how to undertake searching. The optimised search terms used were: "health-care use" OR "health-care seeking" OR "health service use" OR "health service seeking" OR "help seeking behaviour" OR "consultation" OR "health provider visit" AND "low back pain".

Definitions

For the purpose of this review, health-care utilisation was defined as a consultation or a series of consultations of health-care provider(s) for LBP [18]. Similarly, LBP was defined as pain localised below the line of the 12th rib and above the inferior gluteal folds lasting more than 1 day [19].

Data extraction

The data were first extracted by one independent reviewer (GKB) using the Joanna Briggs Institute meta-analysis of statistics assessment and review instrument (JBI-MAStARI) data extraction tool [20]. The second reviewer (JOB) then repeated the procedure, and disagreements were resolved through discussion. The recorded information includes general characteristics of the study (name of authors, year of publication, country of the study, study design, study population, number of participants with LBP, data collection method, response rate, definition of LBP and related health-care utilisation). In addition, specific study information, such as prevalence of health-care utilisation, type of health-care professional consulted, type of treatment prescribed, and factors associated with health-care utilisation were extracted.

Assessment of risk of bias

The risk of bias in each included study was evaluated using a standard risk of bias tool [19]. Originally, the tool covers ten items that address four domains of bias and overall summary of risk of bias assessment. To best fit the tool to this review, adjustment was made by adding the definition of health-care utilisation for LBP (making 11 items). The first four items assess the external validity, selection and nonresponse bias domains of the study in particular. The next 5–11 items assess the internal validity of the study. Specifically, items 5–10 assess the measurement bias domain, and item 11 assesses the domain of bias related to the analysis. Each item 1–11 has a response option of either low or high risk of bias. However, the overall risk of bias of each study was rated as low, moderate or high risk of bias given the responses to the preceding 11 items. Studies scoring greater or equal to 9 low risk of bias out of 11 items were deemed low overall risk of bias, those scoring 6–8 were deemed of moderate overall risk of bias and those scoring less than 6 were deemed high overall risk of bias. The tool demonstrated high interrater agreement, overall agreement 91% and the Kappa statistic 0.82, 95% confidence interval (CI) 0.76–0.86 in assessing risk of bias [19].

Data synthesis

For each included study, health-care utilisation was determined as a prevalence rate and the 95% CI. Meta-analysis was performed using Stata version 14 software. The literature indicates that health-care utilisation data could vary between studies according to geographic location [21, 22], study population, reference period over which health-care utilisation was measured [23] and how the concept of health-care utilisation was defined [18]. For this reason, subgroup meta-analyses were performed based on these factors, and a random-effects model was used to pool the prevalence of health-care utilisation for LBP across studies. Heterogeneity among the studies was assessed using the I^2 statistics, which reflects the percentage of variation not because of sampling error across studies [24]. Publication bias was graphically assessed using funnel plot and Egger's test.

To identify factors associated with health-care utilisation for LBP, textual narrative analysis was performed following tabulation of the key significant factors of all studies. This method of analysis was chosen because of heterogeneity among studies in terms of variables categorisation and the reported summary measures of association among the covariates and health-care utilisation for LBP.

Results

Search results

The electronic database and other sources search strategy identified 5801 potentially relevant records. After duplicates excluded, 4012 records remained to be eligible. Screening for title and abstract resulted in a further exclusion of 3901 records. The application of inclusion and exclusion criteria to the remaining 111 records deemed eligible for full text analysis led to the removal of 91 records. Thus, a total of 20 records met the inclusion criteria and were included in the review (Fig. 1).

Description of the included studies

The 20 included studies were reported from 11 countries. Specifically, while six studies [25–30] were conducted in the USA, three studies [31–33] were conducted in the UK. Of four other studies, two [34, 35] were carried out in the Netherlands and two [36, 37] in Greece. The remaining seven studies were carried out in Switzerland [38], Belgium [39], Ireland [40], Israel [41], Australia [42], Japan [43] and Turkey [44]. Almost all ($n=18$) of the studies employed cross-sectional study design, while the two remaining studies used a prospective longitudinal follow-up study design (Table 1). The overall risk of bias was low in three studies [38, 42, 43] and high in two studies [33, 40]. Seven studies [26, 27, 33, 38, 39, 42, 44] included more than 1000 people with LBP, and the total number of people with LBP who participated in all studies were 19,086. All of the studies collected their data directly from the study participants as opposed to proxy. As demonstrated by the funnel plot symmetry (Fig. 2) and insignificant Egger test ($p=0.139$), there was no evidence of small study bias and publication bias.

Health-care utilisation for LBP

All of the 20 reviewed studies reported the prevalence rate of health-care utilisation among people with LBP. The prevalence rate of health-care utilisation for LBP was found to vary among studies from 28% [38] to 92% [26]. Considering heterogeneity among studies, subgroup meta-analyses were performed based on a priori decisions, to disaggregate the effect of factors such as geographic region, study population, reference period and the way that health-care utilisation for LBP was conceptualised.

When health-care utilisation was disaggregated according to geographic region, the pooled prevalence rate of health-care utilisation was 67%, 95% CI 50–84 in the USA, 47%, 95% CI 39–56 in the UK and 48%, 95% CI 33–63 in Europe

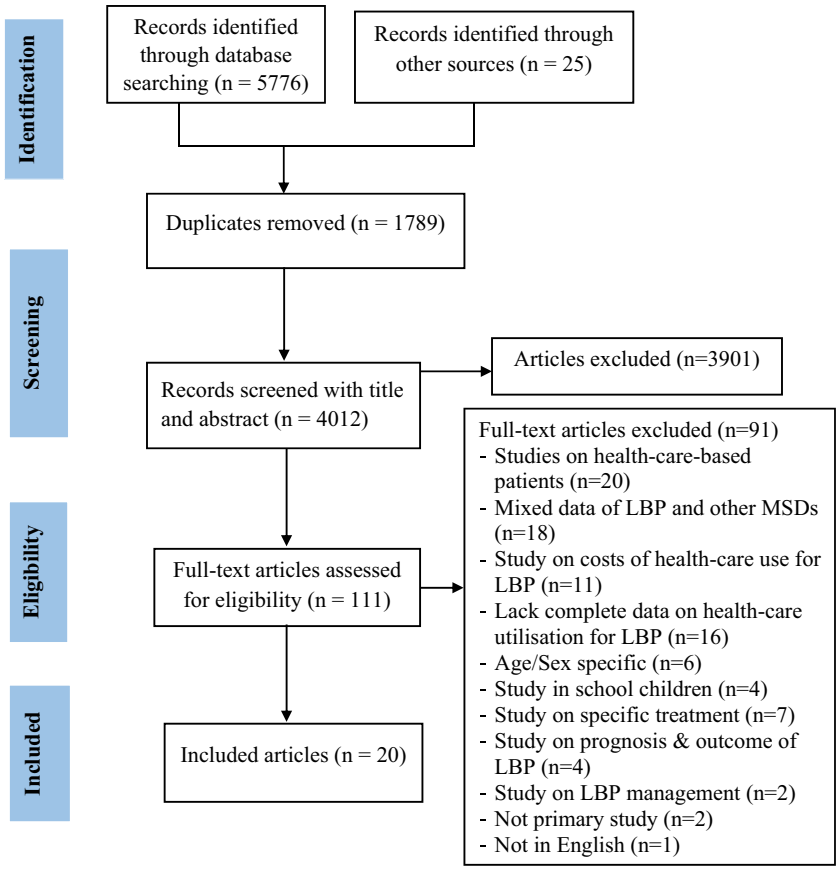


Fig. 1 Summary of study selection flow diagram

(Fig. 3). Alternatively, a subgroup meta-analysis referring to the study population demonstrated that the prevalence rate of health-care utilisation in the general population and workers was 56%, 95% CI 45–67 and 50%, 95% CI 26–75, respectively (Fig. 4).

The reference period over which the health-care utilisation was measured also varied across studies. Some studies measured health-care utilisation in the past 1 year, whilst others measured the history of health-care utilisation in the past 6 months, 4 months or 4 weeks prior to commencement of the study. The 1-month prevalence rate of health-care utilisation was 30%, 95% CI 28–33, while the annual prevalence was 51%, 95% CI 40–62 (Fig. 5).

Health-care utilisation for LBP was also conceptualised differently in different studies. Specifically, two studies [31, 33] limited the concept of health-care utilisation for LBP to consulting a general practitioner alone in contrast to the majority of the studies that defined the concept broadly as consulting any health-care provider for LBP. The highest prevalence (58%, 95% CI 45–72) was observed in those studies that measured health-care utilisation as seeking consultation from any health-care provider. When health-care utilisation was limited to seeking consultation from a general practitioner alone, the prevalence rate decreased to 51%, 95% CI 50–52 (Fig. 6).

Health-care provider commonly consulted, and treatment prescribed for the optimal management of LBP

Of the total reviewed articles, nine studies provided information on the type of health-care providers consulted for LBP condition [26, 27, 29, 30, 35, 38, 40–42]. Different categories of health-care providers were engaged in treating individuals with LBP. Consulting multiple health-care providers for the episode of LBP was also considerably noted. The type of health-care providers involved in the management of LBP patients varied among the studies. However, chiropractors in six studies [26, 27, 29, 30, 40, 42] and general practitioners in five studies [27, 35, 38, 40, 42] were reported. In addition, physical therapists and orthopaedic surgeons were noted in five studies [26, 29, 30, 35, 42] and three studies [29, 30, 41], respectively. It is noteworthy that in all the five studies [27, 35, 38, 40, 42], general practitioners were reported as health-care providers accounting for the highest number of consultations, and thus this group of health-care professionals play a significant role in the management of LBP patients. Regarding the common type of treatments prescribed, six studies [27, 29, 30, 41, 42, 44] provided the information, and all of them indicated medication treatment while exercise was

Table 1 Characteristics of the included studies

Study	Country	Study participants (with LBP)	Response rate (%)	Study design	Data collection method	Definition of LBP	Definition of health-care use for LBP	Prevalence rate of health-care utilisation (%)	Risk of bias
Mannion et al. [38]	Switzerland	Population (1071)	88	Cross-sectional study	Mailed survey	Self-reported current LBP	Visitation to any health practitioner during the last 4 weeks due to LBP	28	Low
Merlino et al. [28]	USA	Construction workers (542)	84.8	Cross-sectional study	Self-administered questionnaire	Self-reported 12 months history of LBP	Visiting physician for low back symptoms	30.8	Moderate
Alexopoulos et al. [37]	Greece	Hospital nurse (180)	78	Cross-sectional study	Self-administered questionnaire	Pain in the past 12 months, which had continued for at least a few hours	At least one visit to physician or physiotherapist in the past 12 months due to LBP	32	Moderate
Ijzelenberg et al. [35]	Netherlands	Nursing homes and homes for the elderly workers in the Netherlands (305)	68	Prospective longitudinal study	Self-administered questionnaire	At least one episode of LBP in the past 12 months for at least a few hours	Consulting whether a general practitioner, occupational physician, a specialist or a physical therapist for LBP in the past 12 months	33	Moderate
Ono et al. [43]	Japan	Residents in Japan (841)	66.6	Cross-sectional study	Self-administered interview	Pain located anywhere from the second and the third lumbar interspaces through the gluteal area that lasted longer than 24 h during the past 1 month prior to the study	Medical care visit at either a medical clinic or complementary/alternative medical clinic for LBP within the past month	33.9	Low
Carey et al. [25]	USA	Civilian residents (485)	79	Cross-sectional study	Telephone interview	Pain that leads to the respondent being unable to perform his or her usual daily activities for at least 1 day	Seeking any health-care during the most recent episode of acute severe LBP	39	Moderate

Table 1 (continued)

Study	Country	Study participants (with LBP)	Response rate (%)	Study design	Data collection method	Definition of LBP	Definition of health-care use for LBP	Prevalence rate of health-care utilisation (%)	Risk of bias
Walsh et al. [31]	UK	General population (963)	59.2	Cross-sectional study	Postal survey	Pain in an area between the 12th ribs and the gluteal folds, which lasted for more than 24 h and which was not associated exclusively with febrile illness, menstrual periods or pregnancy during the past year	Consulting a general practitioner for LBP in the past year	40.2	Moderate
Ijzelenberg et al. [34]	Netherlands	Industrial workers (252)	86	Cross-sectional study	Self-administered questionnaire	Any pain or discomfort in the area below the lower ribs and above the gluteal folds at least a day during the past 12 months	Consulting whether a general practitioner, a specialist (neurologists, neurosurgeons and orthopaedic surgeons) or a physical therapist for LBP in the past 12 months	44.4	Moderate
Walker et al. [42]	Australia	Adult population (1228)	69.1	Cross-sectional study	Mailed interview	Pain in the last ribs to the base of the gluteal folds in the past 6 months	Seeking any health-care for LBP in the past 6 months	44.5	Low
Waxman et al. [32]	UK	Population (782)	70	Cross-sectional study	Postal survey	Pain between the lowest rib and the gluteal folds that lasted for more than a day in the past 12 months	Visiting general practitioner, hospital doctor, workplace doctor or nurse, pain clinic or accident and emergency department for LBP in the past 12 months	48.1	Moderate

Table 1 (continued)

Study	Country	Study participants (with LBP)	Response rate (%)	Study design	Data collection method	Definition of LBP	Definition of health-care use for LBP	Prevalence rate of health-care utilisation (%)	Risk of bias
Alexopoulos et al. [36]	Greece	Shipyard employees (314)	98.5	Cross-sectional study	Self-administered questionnaire	Pain that had continued for at least a few hours during the past 12 months	Seeking care from any health-care provider in the past 12 months for LBP	51	Moderate
Macfarlane et al. [33]	UK	Adult population (4187)	32	Cross-sectional study	Postal survey	Pain situated between the 12th rib and the lower glutei folds in the last month that has lasted for 1 day or longer	Consulting GPs in the past year	53.7	High
Szpalski et al. [39]	Belgium	Adult population (2660)	Not reported	Cross-sectional study	Personal interview	Self-reported history of LBP	Visit to health professional for the current or the previous episode of LBP	63	Moderate
Carey et al. [30]	USA	Civilian residents (269)	79	Cross-sectional study	Telephone interview	Pain in the back anywhere between waist and buttocks in the past few years	Seeking care for LBP from any health-care provider in the year before the interview	73.1	Moderate
Jacob et al. [41]	Israel	Adult inhabitants (555)	69.8	Cross-sectional study	Self-administered questionnaire	Pain situated between the 12th rib and the lower glutei folds in the last month, which lasted at least 1 day and interfered regular activity	Yes or no to treatment utilisation including physician's office visit for the most recent LBP episode	78.7	Moderate
Carey et al. [29]	USA	Adult residents (706)	57%	Cross-sectional study	Telephone interviews	Symptoms lasting greater than 3 months or over 24 separate episodes of back pain in the previous year	At least one visit to any health-care provider during the previous year	84	Moderate

Table 1 (continued)

Study	Country	Study participants (with LBP)	Response rate (%)	Study design	Data collection method	Definition of LBP	Definition of health-care use for LBP	Prevalence rate of health-care utilisation (%)	Risk of bias
Deyo et al. [27]	USA	General population (1516)	Not reported	Cross-sectional study	Interview	Ever having pain in the lower back on most days for at least 2 weeks	Visiting any health-care professional for LBP	84.6	Moderate
O'Sullivan et al. [40]	Ireland	Farmers (77)	52	Cross-sectional study	Self-administered questionnaire	Self-reported history of LBP	Seeking any health-care provider for LBP	86	High
Côté et al. [26]	USA	Workers who made a workers' compensation claim for work-related back pain (1104)	51	Prospective cohort study	Telephone interview	Injured workers who filed workers' compensation claims for LBP	Receiving any care from a health-care provider for back injury in the first 4–16 weeks after filing a workers' compensation claim	92	Moderate
Karahan et al. [44]	Turkey	Hospital Staff (1052)	63	Cross-sectional study	Self-administered questionnaire	Discomfort in the spinal area (between the lower costal margins and gluteal folds) with or without radiation into the leg to below the knee for at least 1 day during the preceding 12 months	Seeking medical care for LBP	33.3	Moderate

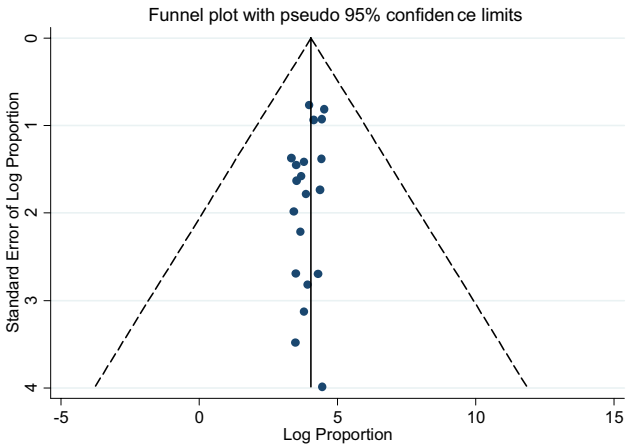


Fig. 2 Funnel plot with pseudo 95% confidence limits

noted in four studies [27, 29, 30, 42]. Massage therapy and spinal manipulation were both used in three studies [29, 30, 42], and bed rest in three studies [27, 30, 42] was also revealed as common prescriptions. In addition, transcutaneous electrical nerve stimulation (TENS), ultrasound [29, 30] and hot/cold packs [27, 30] were prescribed (Table 2).

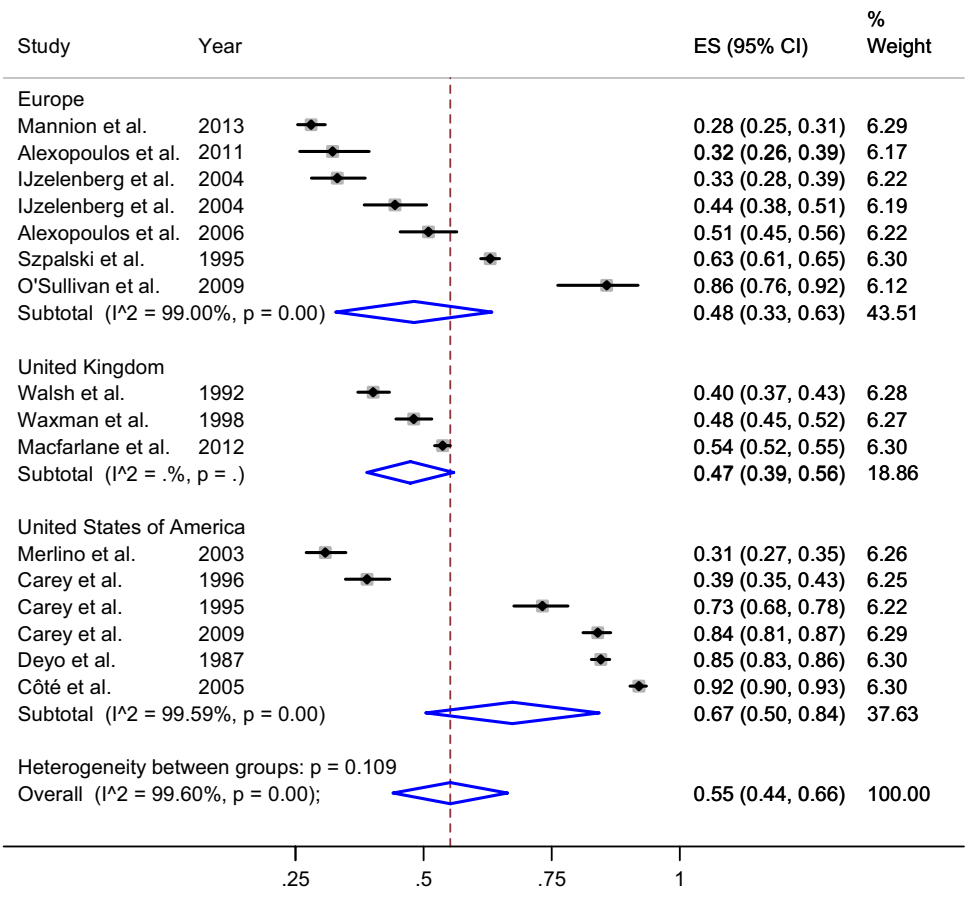
Factors associated with health-care utilisation for LBP

A range of factors influencing health-care utilisation for LBP were reported by 13 studies. Eleven of these studies [26, 30–32, 34, 36–39, 42, 43] conducted logistic regression analyses and computed odds ratio (OR) with 95% CI to determine the statistical significance of the association between the covariates and health-care utilisation. The remaining two studies reported the association of different factors with health-care utilisation based on Chi square test [41] and *p* value [25]. In general, the identified factors can be categorised into socio-demographic factors, health behaviours and beliefs about the pain, pain and health-related factors as discussed below (Table S1).

Socio-demographic factors

Of the 13 studies that determined factors influencing health-care utilisation for LBP, 4 studies [26, 31, 38, 42] revealed statistically significant association between gender and health-care utilisation. Four of them consistently reported that females were more likely to utilise health-care for their LBP symptoms than males. However, this finding was not

Fig. 3 Subgroup meta-analysis based on geographic region



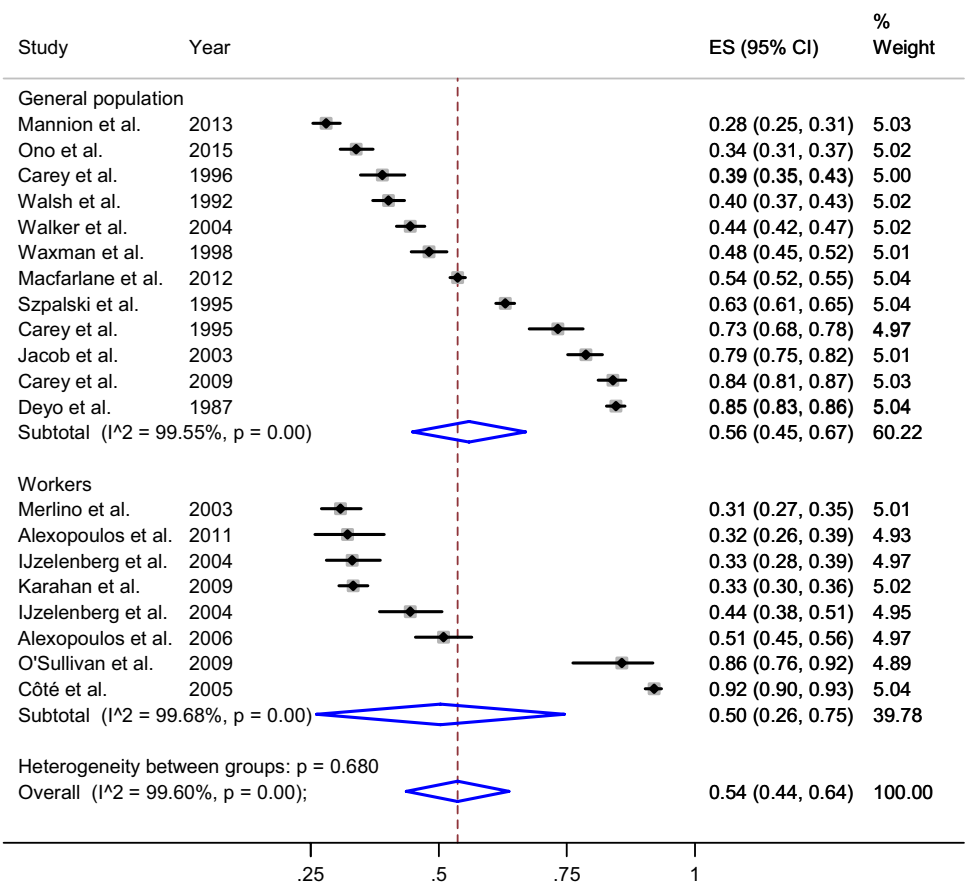


Fig. 4 Subgroup meta-analysis based on study population

further observed in the other eight studies [25, 30, 32, 34, 36, 39, 41, 43] that reported statistically no significant association between gender and health-care utilisation. Further, the authors of one study [34] concluded that there was no association between the individual characteristics and health-care utilisation for LBP.

A positive association between increasing age and prevalence of health-care utilisation for LBP was observed in three studies [39, 41, 43]. Notably, in two of the studies [41, 43], being ≥ 60 years of age raised the history of reporting health-care utilisation for LBP. Further, in the other study [39], increasing age from 20 years showed a dose–response relationship with health-care utilisation to optimise the pain. Alternatively, the other nine studies [25, 26, 30–32, 34, 36–38] did not find a statistically significant association between age and health-care utilisation for LBP, while one of the studies [42] did not provide evidence in this regard.

The only two studies [42, 43] that presented the information about marital status of individuals and history of health-care utilisation for LBP reported different results. While one of the studies [42] presented an inverse association between being never married and health-care utilisation, the other study [43] showed no statistically significant association between marital status and health-care utilisation for LBP. Similarly, the findings reported on the influence of employment status and ethnic group on health-care utilisation for LBP lack consistency. While a higher prevalence rate of health-care utilisation for LBP was observed among unemployed or retired [32] and 'black ethnic group' [25] in the respective two studies, the other three studies [30, 38, 43] presented that the association between employment/working status and health-care utilisation was statistically not significant. No statistically significant association between race and health-care utilisation for LBP management was also seen in one study [30].

Surprisingly, those living in metropolitan cities were 21% less likely to utilise health-care compared to their counterparts in rural areas (AOR = 0.79, 95% CI 0.64–0.97) [39]. However, the finding of another study [25] showed that there was no statistically significant association between residential area and health-care utilisation. The evidence documented on educational status [25, 36, 38, 43] and income level [25, 38] as socioeconomic factors associated with health-care utilisation for LBP was also statistically not significant.

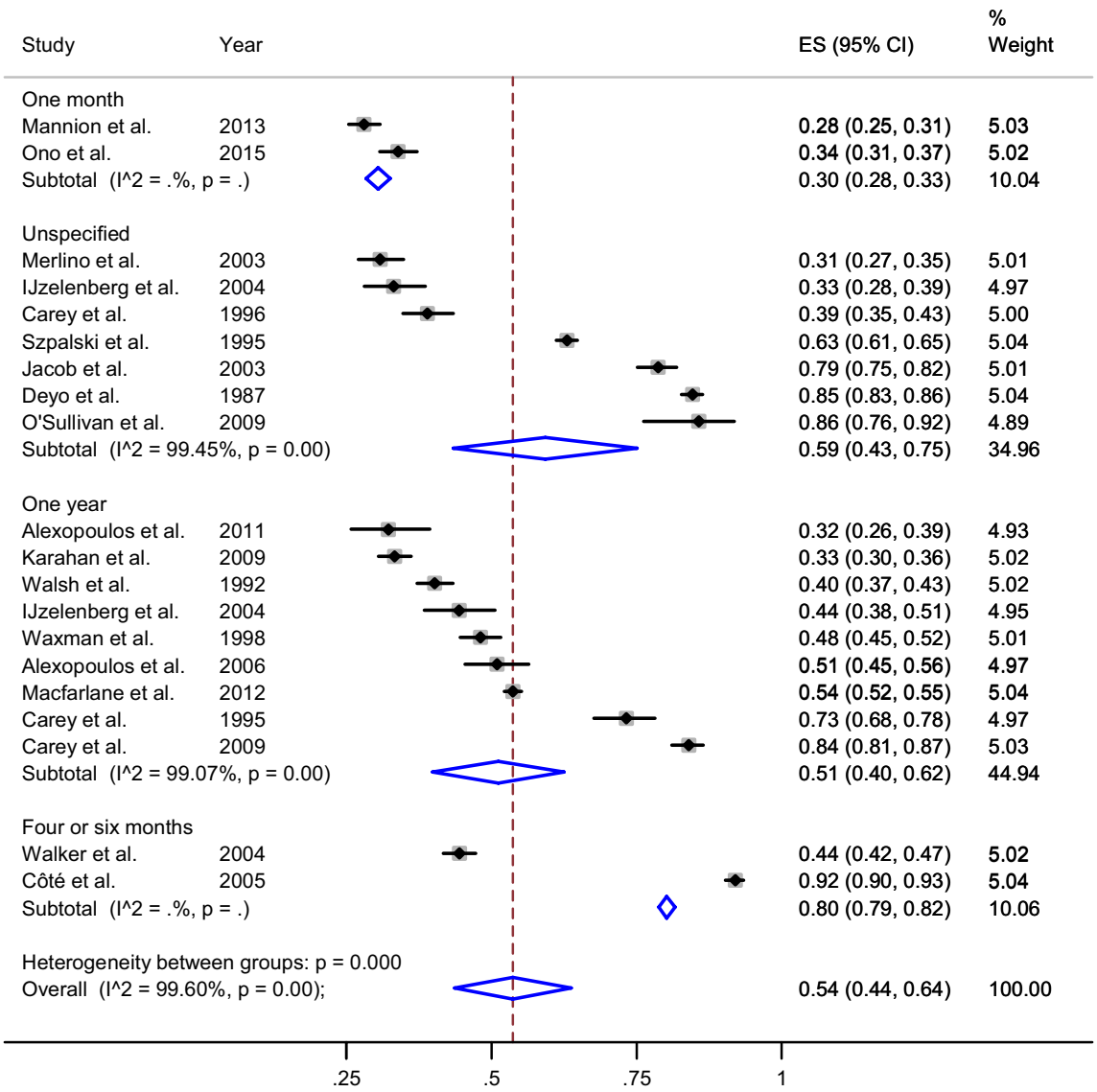


Fig. 5 Subgroup meta-analysis based on the reference period over which health-care utilisation was measured

Health behaviours and beliefs about the pain

Under this category of factors influencing health-care utilisation for LBP, only few were studied. Specifically, being fearful that LBP could impair capacity to work [38, 42], having externalised locus of control for pain management [32] and having the belief that LBP would be a lifelong problem [39] were indicated to increase the odds of utilising health-care for the condition. Smoking status [43], drinking status [43] and body mass index (BMI) [36, 43] were identified as factors that have no association with history of health-care utilisation for LBP.

Pain-related factors

Higher pain score/higher intensity of pain [25, 32, 34, 38, 41, 43] and functional limitation [26, 38] were demonstrated as the most common factors increasing the prevalence rate of health-care utilisation for LBP. Similarly, five studies [30, 31, 34, 41, 42] ascertained that higher severity/disabling LBP was a significant factor leading people with LBP to utilise health-care. As opposed to this notion, only one study [26] reported that individuals with higher severity of LBP were 14% less likely to utilise health-care compared to their counterparts (AOR = 0.86, 95% CI

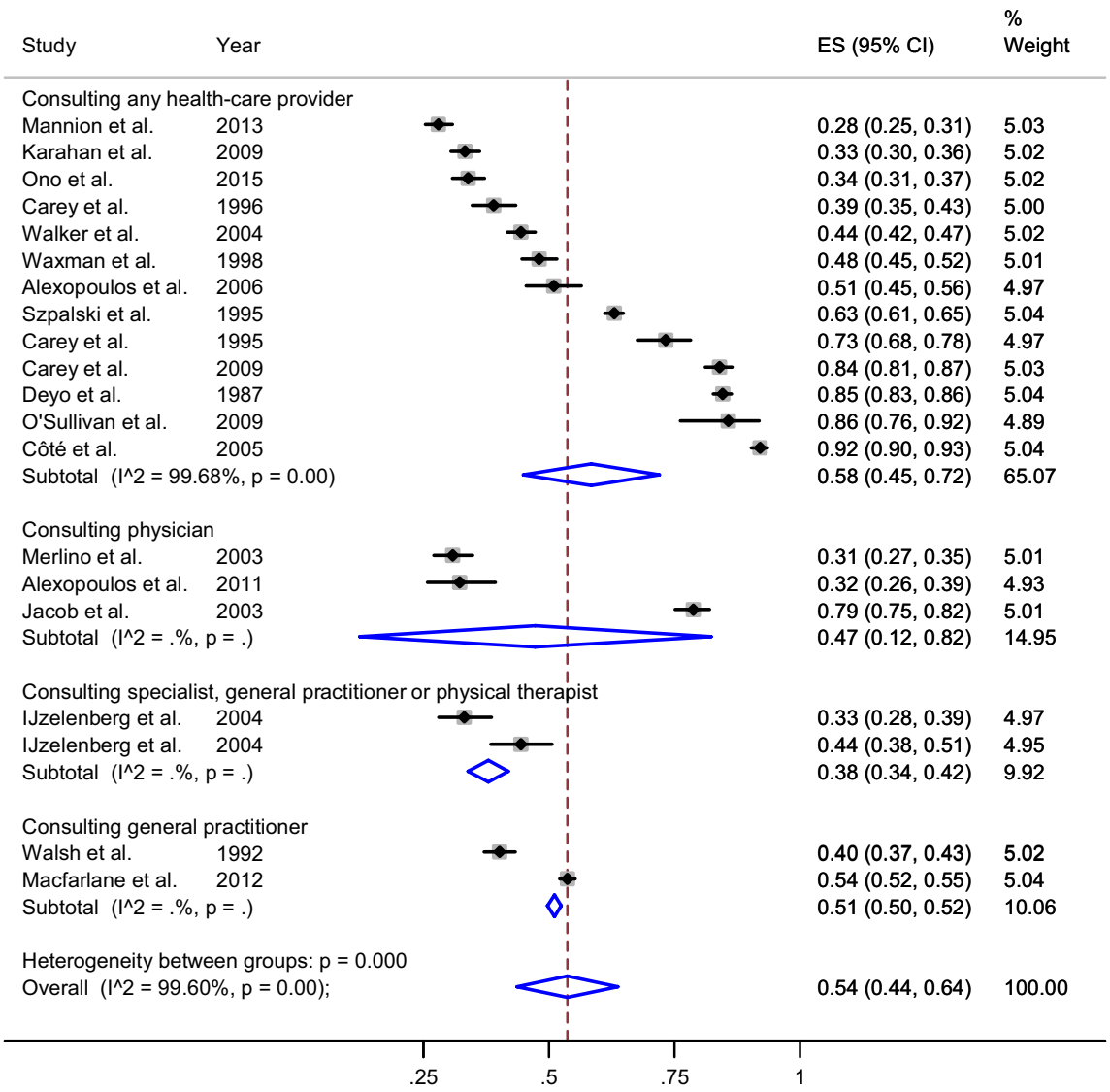


Fig. 6 Subgroup meta-analysis based on the concept of health-care utilisation for LBP

0.77–0.96). On episodes of pain, two studies [38, 42] provided the evidence that frequent LBP increases history of health-care utilisation. However, one study reported that individuals with greater number of LBP episodes were less likely to use health-care [25]. Alternatively, Côté et al. [26] documented that there was no statistically significant association between episodes of pain and health-care utilisation. The influence of history of back surgery [25] on health-care utilisation for the current LBP was not statistically significant.

Longer duration of the pain was also noted as a factor that has positive association with health-care utilisation [25, 32, 41]. In particular, the association between chronicity of LBP and health-care utilisation demonstrated a dose-dependent relationship [32, 36]. Thus, as the duration of pain increases from acute to chronic phase, the odds of utilising health-care to optimise the pain was noted to rise.

Health-related factors

Two studies [26, 37] presented a statistically significant association between general health status and health-care utilisation. The studies showed that being in a better health status reduces the history to report seeking health-care for LBP (AOR = 0.46, 95% CI 0.31–0.68) [26]; or moderate/bad perceived general health increases the likelihood to use health-care (AOR = 3.45, 95% CI 1.94–6.12) [37]. However, this concept was not further supported in three studies [30, 36, 38] reporting that there was no association between general/overall health status and health-care utilisation for

Table 2 Summary of the most common type of health-care professionals consulted and treatments prescribed for optimal management of LBP

Study	The most common type of health-care professionals consulted	The most common type of treatments prescribed
Mannion et al. [38]	Either exclusively or in addition to other practitioners, 52% health-care seekers sought general practitioners, while 43%, 42% and 30% sought physiotherapists, other types of therapists and specialists, respectively	
Carey et al. [29]	In their respective order (from the highest to the lowest), primary care providers, orthopaedic/neurologic surgeons, physical therapists, doctor of chiropractics, physical medicine and rehabilitation, anaesthesiologists, rheumatologists, neurologists and psychiatrists/psychologists were health-care providers consulted and provided the required treatments for LBP patients	Exercise, cold packs, heat, traction or corset or TENS, injection, spinal manipulation, electrostimulation, corset or brace, dietary instruction, ultrasound, therapeutic massage, shoe insert, acupuncture, and in spine rehabilitation/work hardening programme were the most common treatments prescribed and utilised
O'Sullivan et al. [40]	General practitioners followed by physiotherapists, consultants/specialists, and chiropractors were the most common health-care professionals that provided treatments for LBP complainants	
Côté et al. [26]	Of those individuals who received health-care for their LBP, 89% were treated by medical physicians alone or in combination with physical therapists or chiropractors	
Ijzelenberg et al. [35]	The highest proportion of workers with LBP sought health-care from general practitioners followed by physical therapists Only few numbers of LBP complainants sought occupational physicians and specialists	
Walker et al. [42]	General practitioners, chiropractors, massage therapists, physiotherapists and pharmacists were health-care providers commonly consulted for LBP	Back exercise/stretching, massage, prescribed medication, spinal manipulation or adjustment, non-prescription medication and bed rest were the common treatments prescribed
Jacob et al. [41]	58% of health-care users for LBP visited family physicians and 53.9% visited orthopaedic surgeons Approximately, one-quarter of health-care users sought alternative medicine, predominantly acupuncture, followed by reflexology	Nearly one-third of health-care users were prescribed analgesics, non-steroid inflammatory agents or a combination of both
Carey et al. [30]	Majority of health-care seekers for chronic LBP sought medical doctors, followed by physical therapists and chiropractors	In their respective order (from the most frequent to the least frequent), pain medications or muscle relaxants, bed rest, back exercise, massage, corset or brace, back injection, ultrasound, physical therapy, spinal manipulation, TENS unit and traction were the received treatments
Deyo et al. [27]	General practitioners, orthopaedic surgeons, chiropractors, osteopaths, internists and rheumatologists treated 58.6%, 36.9%, 30.8%, 13.8%, 7.6% and 2.5% of people with LBP, respectively	Specific treatments including rest (80.8%), hot packs/heating pads (73.9%), aspirin (58.2%), stiff mattress (57.9%), exercise/physical therapy (40.5%), bed board (36.1%), braces (27%), traction (20.7%), diathermy/paraffin (16.7%), cold packs/ice (7.2%), and splints/casts (3.6%) were widely prescribed
Karahan et al. [44]		Rest (43.7%) and analgesia (37.6%) were the most common interventions taken to relieve LBP

TENS transcutaneous electrical nerve stimulation

LBP. The associations of factors such as comorbidity [43] and depression/anxiety [38, 43] with health-care utilisation for LBP management were also statistically not significant.

Discussion

An increasing amount of evidence has demonstrated that LBP is a considerable public health problem [11, 45–47] and that it has a significant impact on health-related quality of life [48–50]. The data on health-care utilisation for LBP is helpful to design appropriate intervention strategies. However, there is no comprehensive estimate of the prevalence rate of health-care utilisation among people with LBP. For this reason, this comprehensive systematic review and meta-analysis was undertaken to generate evidence that can be used for designing and implementing preventive strategies.

Utilisation of health-care for LBP requires appropriate medical diagnosis and management of the pain to reduce the subsequent social and economic burden. However, this review reflected that the prevalence rate of health-care utilisation for optimal management of LBP significantly varies between geographic regions. The highest prevalence rate was observed in the USA. This geographical variation in prevalence of health-care utilisation for LBP could be attributed to a number of factors. Firstly, the differences in health-care systems [51, 52] including health-care capacity, the approaches for reimbursing costs of health-care services and financial incentives contribute differently [21]. Secondly, the insurance system and the distribution of uninsured population across regions considerably influence the prevalence rate of health-care utilisation. The distribution of uninsured population is not homogeneous across regions and even within a region. However, evidence demonstrates that uninsured people have limited access to health-care needs in societies with high uninsured rates than do they in societies with comparatively low rates [53]. Thirdly, availability and accessibility of health-care services including skilled and experienced health-care providers, appropriate diagnostic testing and treatment could also largely explain the observed variation in prevalence rate of health-care utilisation for LBP. Finally, there is evidence arguing that individual factors such as age, level of education, income and the socioeconomic differences between geographic regions have different predictive power on explaining differences in prevalence of health-care utilisation [54, 55].

In this review, the overall prevalence rate of health-care utilisation in the general population and in the workers is comparable. However, the reported prevalence of health-care utilisation for worker groups largely varies in reference to whether the workers are entitled to claim workers' compensation. The prevalence rate of health-care utilisation is considerably higher in workers entitled to claim workers' compensation, which may be due to workers' compensation health-care coverage. There is evidence demonstrating that after seeking the required health-care, workers entitled to claim workers' compensation were significantly associated with greater overall adherence to health-care compared to workers who were not entitled to claim workers' compensation [56]. This is because workers entitled to claim workers' compensation are covered for health-care for work-related injuries including work-related LBP, and thus, the so-called cost-sharing methods used by the health insurers to limit health-care utilisation do not apply [26].

This review showed that general practitioners were the health-care providers that had a considerable involvement in the management of LBP patients, which is consistently reported within the literature [57, 58]. In addition, many individuals with LBP consulted and received treatment from a number of health-care providers, including physical therapists, chiropractors, massage therapists and orthopaedic surgeons. This finding is in accordance with the concept that the provision of health-care for individuals with LBP is characterised by the diversity of health-care providers offering a range of therapies [59] including pain medications or muscle relaxants, back exercise, bed rest, massage therapy and application of hot/cold packs. Such a multidisciplinary LBP management approach is argued to be linked with two main conditions [60]. First, LBP care is often fragmented [61]. Because of this, health-care professionals from different specialities are involved and often work independently, assess patients on the basis of their own experience and field of expertise, and design treatment plans accordingly. Second, LBP care is rarely provided in a consistent manner due to the differences in the clinical guidelines [60, 62]. Despite that several guidelines have been established by the involved disciplines, these guidelines have variations and are not accepted or followed universally [63]. Therefore, it is not surprising that patients may receive different recommendations and prescriptions based on the experience and field of the treating clinician.

This review demonstrated that the findings of most studies on factors associated with health-care utilisation for LBP are divergent, particularly with regard to social factors. The overall findings of this review support a previous study that concluded the inadequacy of evidence to support the common wisdom that socio-demographic characteristics of individuals impact on health-care utilisation for LBP management [14]. In those studies investigating social factors influencing health-care utilisation, few of them noted that being female and in an older age group significantly led to report a higher history of health-care utilisation for LBP. Freburger et al. [64] argued that the frequency of health-care utilisation for LBP could be a function of the prevalence of LBP condition. Consistent with this concept, there is an increasing amount of evidence [65–68] demonstrating

that the prevalence of musculoskeletal pain including LBP is higher in females than males, which possibly raises the odds of health-care utilisation to optimise subsequent impact of the pain. There is also little evidence to argue that women are more enthusiastic to seek health-care for their problems than men [23, 69]. Alternatively, the finding that the older age groups use health-care more than younger people is not in concordance with previous evidence that describes older people as reluctant to seek health-care and to use treatment for their complaints [70], due to normalisation of their symptoms in relation to their age [71]. However, the authors of a study conducted in Norway documented that the use of health-care for musculoskeletal disorders (MSDs) is higher among older men and women [65].

The fear-avoidance model indicates that fear is an emotional reaction that leads towards an avoidance goal [72]. This may explain how individuals perceive, evaluate and respond to the conditions of LBP. A previous study also argued that health locus of control is associated with treatment benefit for LBP patients [73]. In this review, however, a limited number of studies provided information regarding the association between beliefs about LBP and health-care utilisation for the pain, suggesting the need for further investigation.

A higher intensity of pain and limitation in activities of daily living were determined as major pain related factors strongly associated with a higher frequency of health-care utilisation for LBP. Moreover, duration/chronicity of the pain that demonstrated a dose–response relationship with history of health-care utilisation is an important finding which calls for attention. Other than the direct health consequences, health-care costs attributed to chronic LBP management are also significantly high [9], and thus this finding shows a need for prompt intervention to prevent the transition of pain condition from the acute to the chronic phase. Unlike the case of social factors, the majority of the reviewed studies consistently showed that pain-related factors themselves are major factors associated with health-care utilisation for the optimal management of LBP. Therefore, it is worth noting that the overall evidence of this review is in concordance with the general view in the body of literature that pain-related factors are the main drivers of health-care utilisation to optimise the consequences of LBP [15, 74].

In another back pain study, depressive symptoms were found to be significantly associated with increased use of health-care providers, such as general and specialist physician services and physiotherapist services [75]. Similarly, the authors of a study in Japan concluded that depression was associated with higher frequency of health-care utilisation, higher degree of pain, poorer health-related quality of life and reduced labour productivity in chronic LBP patients [76]. However, the results of this systematic review do not support the presence of a statistically significant association among most of the health-related factors including comorbidity, anxiety, depression and health-care utilisation for LBP symptoms.

Strengths and limitations

The strengths of this systematic review and meta-analysis lie in its methods such as a comprehensive search of the electronic databases including search engines Google, Google Scholar and searching of lists of references in the retrieved articles. However, the estimates of factors associated with health-care utilisation for LBP were not pooled due to heterogeneity among studies in terms of variables categorisation and the reported summary measures of association among the covariates and health-care utilisation for LBP. In addition, due to the heterogeneity of the studies, the pooled prevalence rates of health-care utilisation for LBP need to be interpreted with caution.

Conclusions

Despite a growing body of evidence demonstrating that LBP is a common public health problem globally, a significant number of individuals with the condition fail to seek and use health-care for optimal management. The prevalence rate of health-care utilisation varies between geographic regions, study population, reference periods over which health-care utilisation was measured and definitions of health-care utilisation for LBP. The decision to seek and use health-care for LBP also depends upon an array of factors such as higher intensity of the pain, limitation in activities of daily living and chronicity of the pain. It is apparent from this review that there is possibly skewed data, as the evidence to date are largely from developed countries. Therefore, it is warranted that future studies investigate the epidemiology of health-care utilisation for low back pain in developing countries.

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Compliance with ethical standards

Conflict of interest The authors have no conflict of interests to declare.

Ethical approval Because this study was a systematic review and meta-analysis, ethical approval was not required.

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