

The Epidemiology and Economic Consequences of Pain

Nicholas Henschke, BAppSc(Physiotherapy)(Hons), PhD;
Steven J. Kamper, BAppSc(Physiotherapy), PhD;
and Chris G. Maher, BAppSc(Physiotherapy), GradDipAppSc, PhD

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From the Institute of Public Health, University of Heidelberg, Heidelberg, Germany (N.H.); George Institute for Global Health, Sydney Medical School, University of Sydney, Sydney, Australia (N.H., S.J.K., C.G.M.); and EMGO+ Institute, VU University Medical Centre, Amsterdam, the Netherlands (S.J.K.).

Abstract

Pain is considered a major clinical, social, and economic problem in communities around the world. In this review, we describe the incidence, prevalence, and economic burden of pain conditions in children, adolescents, and adults based on an electronic search of the MEDLINE and EMBASE databases for articles published from January 1, 2000, through August 1, 2014, using the keywords *pain*, *epidemiology*, *burden*, *prevalence*, and *incidence*. The impact of pain on individuals and potential risk factors are also discussed. Differences in the methodology and conduct of epidemiological studies make it difficult to provide precise estimates of prevalence and incidence; however, the burden of pain is unquestionably large. Improved concepts and methods are needed in order to study pain from a population perspective and further the development of pain prevention and management strategies.

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Pain is the defining feature for many disease diagnoses. It can serve as an index of the severity and activity of an underlying condition, a prognostic indicator, and a determinant of health service use.¹ The International Association for the Study of Pain and the World Health Organization define pain as “an

unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”²

In this article, we provide an overview of the epidemiology and economic burden of pain conditions in children, adolescents, and adults. Estimates of the incidence and prevalence of

pain conditions, as well as risk factors and the impact of pain on individuals, are described. While recognizing the wide range of pain conditions that could be included, we have focused on areas that are common and contemporary in clinical and research practice: pain in children and adolescents, spinal pain, neuropathic pain, musculoskeletal pain, and fibromyalgia/chronic widespread pain. Factors that are associated with the prevalence of pain are also considered, as well as the individual, economic, and societal burden of pain conditions.

In order to provide the most recent and highest-quality evidence on the epidemiology of pain, we performed an electronic search of the MEDLINE and EMBASE databases for articles published from January 1, 2000, through December 31, 2005, using the keywords *pain*, *epidemiology*, *burden*, *prevalence*, and *incidence*. Because there are a substantial number of large, well-conducted systematic reviews published on this topic, identifying these articles was the focus of the search, and their findings form the basis of the information presented in this review. The findings of systematic reviews also provide an insight into the methodological issues faced when performing studies on the epidemiology and economic consequences of pain. These issues are summarized briefly at the end of this article, and considerations for future studies are proposed.

DEFINING THE INCIDENCE AND PREVALENCE OF PAIN

Describing the epidemiology of pain is challenging because of the subjective nature of the symptoms and a lack of consensus regarding specific diagnoses and definitions of conditions. Identifying true “incident” (or first-ever) episodes of pain, especially musculoskeletal pain, is problematic because of recall over a lifetime. Many pain conditions are episodic, with a large proportion of patients reporting symptoms that resolve and then recur with varying time periods in between. The true incidence for most pain conditions may thus remain unknown; however, from clinical and research perspectives, it is valuable to know the number of newly developing (or recurring) episodes within a given time frame. In light of this, the focus of this review was on incidence proportions over a period of 1 year. These proportions are calculated in longitudinal studies of pain-

free (at baseline) populations, identifying the number of new or recurring episodes of pain that occur over 1 year.

Similarly, the identification of prevalent cases of pain varies across studies because of differences in the definition of an “episode” or specific diagnosis. Case definitions may vary on the basis of duration, intensity, or burden on the patient, whereas diagnoses may be based to a greater or lesser extent on subjective patient experience, clinical tests, or results of imaging and pathologic studies. Comparability among studies is also hampered by the reporting of different prevalence periods (eg, point, weekly, monthly, lifetime). For the purpose of this review, we focus on the 1-month prevalence of pain. This parameter represents the proportion of a population who report having an episode of pain during the past month. Where a range of monthly prevalence estimates were reported in multiple studies, the median was calculated and reported.

INCIDENCE AND PREVALENCE OF PAIN

Pain in Children and Adolescents

Pain conditions in children and adolescents have become the focus of an increasing amount of scientific literature in recent years.^{3,4} The occurrence of pain in children takes on added importance in light of the growing evidence that implicates pain in childhood or adolescence as a predictive factor for pain in adulthood.⁵⁻⁷ Children experiencing pain may miss school and withdraw from social activities and are at risk for the development of negative health behaviors such as physical inactivity.^{8,9} The most commonly reported pains in children and adolescents are low back pain, headache, and abdominal pain.^{4,10}

In children and adolescents, the reported 1-year incidence of low back pain ranges from 11.8% to 33.0% (median, 22.4%), with the 1-month prevalence ranging from 9.8% to 36.0% (median, 22.9%) (Table 1).¹¹ Because there are fewer studies on the prevalence of neck pain (49.0%) and upper back pain (30.0%), there is some doubt as to the precision of these estimates.¹¹ A systematic review on the epidemiology of chronic pain (ie, pain lasting longer than 3 months) in children and adolescents reported that the 1-month prevalence of chronic back pain ranges from 18.0% to 24.0%

TABLE 1. Characteristics of Selected Systematic Reviews of Pain Epidemiology in Children and Adolescents

Reference, year	No. of studies included	Pain type	1-Month prevalence (%)	1-Year incidence (%)
Jeffries et al, ¹¹ 2007	56	Low back pain	9.8-36.0	11.8-33.0
		Neck pain	49.0	28.4
		Upper back pain	30.0	Not available
Calvo-Muñoz et al, ⁴ 2013	14	Low back pain	18.3	Not available
King et al, ³ 2011	32	Headache	26.0-69.0	Not available
		Recurrent abdominal pain	3.8-41.2	Not available
		Back pain	18.0-24.0	Not available
		Musculoskeletal/limb pain	38.9	Not available
		Multiple pains	16.0	Not available
		Other/general pain	60.0	Not available
Abu-Arafah et al, ¹² 2010	50	Headache	58.0	Not available
Chitkara et al, ¹³ 2005	14	Recurrent abdominal pain	0.3-19.0	Not available

(median, 21.0%).³ In addition to these estimates from systematic reviews, a recently published survey of over 400,000 children and adolescents aged 11 to 15 years reported the 1-month prevalence of low back pain to be 37.0%.¹⁰

The estimated 1-month prevalence of headache in children and adolescents ranges from 26.0% to 69.0% (median, 47.5%) in systematic reviews^{3,12} and was reported to be 54.1% in a large school-based survey.¹⁰ The estimated monthly prevalence of stomachache was 49.8% in the study by Swain et al.¹⁰ Most studies in children and adolescents focus on recurrent abdominal pain, which is defined as 3 or more episodes of abdominal pain, severe enough to limit the child's functioning, over 3 months or more.¹⁴ The prevalence of recurrent abdominal pain ranged from 0.3% to 19.0% (median, 8.4%) in one review¹³ and from 3.8% to 41.2% (median, 12.0%) in a more recent article.³ The monthly prevalence of multiple pains (ie, pain in more than one body location) in children and adolescents ranges from 12.1% to 35.7% (median, 23.9%).^{3,10}

Although the amount of research on pain epidemiology in children and adolescents is increasing, there is a need for future studies to consider the effect of age on pain prevalence. It is currently unclear which pains increase with age in childhood and adolescence and what the effect of the transition through puberty has on the incidence and prevalence of pain conditions.

Spinal Pain

Spinal pain, in particular low back pain, is a common problem that most people experience at some point in their lifetime. The lifetime

prevalence of low back pain is reported to be in the range of 51.0% to 84.0%.^{1,15} In comparison with other pain conditions, there is a large amount of research on the epidemiology of low back pain. This work, however, frequently suffers from a lack of clarity regarding the definition of episodes and heterogeneity with regard to sample populations and reporting time periods of incidence and prevalence.

Estimates of the 1-year incidence of a first-ever episode of low back pain ranged from 6.3% to 15.4% (median, 10.9%) in one review¹⁶ and from 13.5% to 26.2% (median, 19.9%) in another (Table 2).¹⁷ Estimates of the 1-year incidence of any low back pain (including patients who have had a previous episode) range between 1.5% and 38.9% (median, 20.2%).^{16,17} Many people who experience activity-limiting low back pain recover quickly,²⁹ but some have recurrent episodes.³⁰ Estimates of recurrence at 1 year range from 24.0% to 80.0% (median, 52.0%).¹⁶

There is considerable information on low back pain prevalence, and estimates of the 1-month prevalence range from 24.0% to 49.5% (median, 36.8%).¹⁶ Thoracic spine pain prevalence ranges from 1.4% to 34.8% (median, 18.1%),¹⁸ while the 1-month prevalence of neck pain ranges from 15.4% to 45.3% (median, 30.4%).¹⁹

Chronic low back pain (CLBP) is commonly defined as low back pain that lasts longer than 12 weeks.³¹ Two reviews reported some variation in the prevalence estimates of CLBP in the general population in Europe, with a range between 5.9% and 11.1% (median, 8.5%).^{20,21} A third review found that the median prevalence of CLBP was 18.1%.¹⁶

TABLE 2. Characteristics of Selected Systematic Reviews of Pain Epidemiology in Adults

Reference, year	No. of studies included	Pain type	1-Month prevalence (%)	1-Year incidence (%)
Hoy et al, ¹⁶ 2010	12	Low back pain (first ever)	Not available	6.3-15.4
		Low back pain (from pain-free state)	Not available	1.5-36.0
		Not stated	24.0-49.5	Not available
Taylor et al, ¹⁷ 2014	41	Low back pain (first ever)	Not available	13.5-26.2
		Low back pain (from pain-free state)	Not available	5.0-38.9
Briggs et al, ¹⁸ 2009	33	Thoracic spine pain	1.4-34.8	3.8-35.3
Hogg-Johnson et al, ¹⁹ 2008	101	Neck pain	15.4-45.3	Not available
		Cervicogenic headache	2.5	Not available
Juniper et al, ²⁰ 2009	23	Chronic low back pain	5.9-11.1	Not available
Reid et al, ²¹ 2011	45	Chronic low back pain	9.0 (lifetime prevalence)	Not available
		Chronic neck pain	5.0 (lifetime prevalence)	Not available
		Chronic upper back pain	6.0 (lifetime prevalence)	Not available
		Moderate to severe chronic pain	19.0	Not available
		Chronic widespread pain	13.0 (point prevalence)	Not available
		Fibromyalgia	2.9 (point prevalence)	Not available
van Hecke et al, ²² 2014	21	Neuropathic pain	0.9-17.9	Not available
Bennett et al, ²³ 2012	22	Neuropathic pain in cancer patients	19.0-39.1	Not available
Cook et al, ²⁴ 2014	8	Sciatica	Not available	9.3
Konstantinou & Dunn, ²⁵ 2008	23	Sciatica	0.4-16.4	Not available
Luime et al, ²⁶ 2004	19	Shoulder pain	18.6-31.0	Not available
Peat et al, ²⁷ 2001	5	Knee pain in older adults	13.0-28.0	Not available
Thomas et al, ²⁸ 2011	31	Foot pain	28.0 (pooled prevalence)	Not available
		Ankle pain	15.0 (pooled prevalence)	Not available
		Big toe pain	14.0 (pooled prevalence)	Not available

Neuropathic Pain and Sciatica

Neuropathic pain is defined by the International Association for the Study of Pain as “pain caused by a lesion or disease of the somatosensory nervous system.”² It is distinguished from other pain conditions by its characteristic signs and symptoms, such as “burning” or “freezing” pain, as well as numbness, tingling, or “pins and needles” sensations.² There are few high-quality studies that describe the incidence and prevalence of neuropathic pain in the population, as most studies focus on the presence of neuropathic pain within defined patient groups.

Chronic pain with neuropathic characteristics has a reported prevalence ranging from 0.9% to 17.9% (median, 9.4%).²² The prevalence of neuropathic pain in patients with cancer varies from 19.0% to 39.1% (median, 29.1%).²³ The incidence of neuropathic pain associated with postherpetic neuralgia ranges from 3.9 to 42.0 per 100,000 person-years (PY). The incidence range is 12.6 to 28.9 per 100,000 PY for trigeminal neuralgia, 15.3 to 72.3 per 100,000 PY for painful diabetic peripheral neuropathy, and 0.2 to

0.4 per 100,000 PY for glossopharyngeal neuralgia.²²

Sciatica is described by a range of terms in the literature, such as *lumbosacral radicular syndrome*, *radiculopathy*, *nerve root pain*, and *nerve root entrapment or irritation*.²⁴ The condition includes pain that is felt in the buttock or leg but is thought to originate in the lumbar spine. The incidence of sciatica over 1 year is reported to be 9.3%.²⁴ The 1-month prevalence of sciatica ranges from 0.4% to 16.4% (median, 8.4%).²⁵

Other Musculoskeletal Pain

Musculoskeletal disorders are one of the most common causes of disability and work incapacity, especially in older people.³² Apart from spinal pain, upper limb pain is one of the most common musculoskeletal symptoms—approximately 18.6% to 31.0% (median, 24.8%) of adults report shoulder pain every month.²⁶ The prevalence of knee pain occurring at least monthly is reported to range from 13.0% to 28.0% (median, 20.5%) in older adults.²⁷ A systematic review of foot and ankle pain in adults reported pooled prevalence

results incorporating a variety of case definitions.²⁸ The pooled prevalence was 28.0% for foot pain, 15.0% for ankle pain, and 14.0% for big toe pain.²⁸

Fibromyalgia and Chronic Widespread Pain

The 3 cardinal features of chronic widespread pain are pain, chronicity, and widespread localization.³³ According to the American College of Rheumatology 1990 criteria, chronic widespread pain is defined as pain that is bilateral (above and below the waist) in the axial skeleton and lasts for at least 3 months.³⁴ This definition has also been used to develop the diagnostic criteria for fibromyalgia.³⁵ Estimates of the prevalence of fibromyalgia range from 0.7% in Denmark, 2.0% to 5.0% in the United States, and up to 10.5% in Norwegian women.^{1,21,36} Reports of chronic widespread pain are remarkably consistent among populations, with prevalence rates between 10.6% and 13.5%.¹

Similar to other chronic pain states, fibromyalgia is a clinical diagnosis, so the lack of a clear case definition restricts comparison of prevalence estimates. The American College of Rheumatology 2010 diagnostic criteria for fibromyalgia include an assessment of widespread pain in combination with other symptoms (such as fatigue and cognitive symptoms) to create a more specific case definition.³⁵ Future studies on the epidemiology of fibromyalgia using this definition are likely to improve the accuracy of current prevalence estimates.

Trends in Prevalence Over Time

Studies that have examined changes in the prevalence of pain conditions over time are limited in number, and most have focused on low back pain prevalence. Palmer et al³⁷ reported that over a 10-year period from 1987 to 1997, the 1-year prevalence of low back pain increased by 12.7%, and this increase was consistent across sex, age groups, social class, and area of residence. In contrast, another study reported that the 1-month prevalence had declined from 26.1% to 22.6% over a 7-year period.³⁸ In the United States, the prevalence of chronic, impairing low back pain appears to have increased significantly, from 3.9% in 1992 to 10.2% in 2006.³⁹

HEALTH IMPACTS OF PAIN

Pain conditions, especially chronic pain, place a substantial burden on patients and their families. In most patients, it negatively affects overall perceptions of general health, interferes considerably with everyday activities, is associated with depressive symptoms, and dramatically and negatively affects relationships and interactions with others.^{21,40} Interference with functioning and well-being appears to be significantly associated with increasing pain severity.^{21,41}

For the purposes of assessing nonmortality-related disease burden, the World Health Organization—sponsored Global Burden of Disease Study uses the construct of disability. They define disability as “any short term or long term health loss”⁴² and calculate time-based metrics called disability-adjusted life years (DALYs) and years lived with disability (YLD) to quantify and compare the worldwide burden of various diseases. Conditions characterized or defined by the presence of pain (low back pain, neck pain, other musculoskeletal disorders, migraine, and falls) accounted for 5 of the top 10 conditions responsible for the most YLD globally.⁴² Low back pain was responsible for 83 million DALYs and was the greatest contributor of YLD of all conditions, accounting for 10.7% of all YLD.⁴³ Neck pain and migraine/headache were each responsible for approximately 24 million DALYs, other musculoskeletal disorders for 28 million DALYs, and falls for 19 million DALYs. Other major contributors included osteoarthritis (17 million DALYs) and road injuries (13 million DALYs).⁴⁴

RISK FACTORS FOR PAIN

Identifying factors that are related to the onset of pain conditions in the population is difficult because differences in study methodology and reporting markedly impact the estimates of incidence. For this review, we focus on the main categories of risk factors: age, sex, social (group) factors, and individual factors. In general, there is a lack of available evidence on risk factors for pain. Future studies are required that consider all aspects of the pain experience from both an individual and population perspective.

Age and Sex

Studies of pain in children and adolescents have found that girls generally experience

more pain than boys.^{3,10} In adults, the relationship of pain with sex is clear—in most studies, women report more severe levels of pain, more frequent pain, and pain of longer duration than men.^{1,28,45,46} However, there is still debate as to whether this sex difference is due to the underlying biological mechanisms of pain or the contribution of psychological and social factors.⁴⁶

With regard to age, it appears that the prevalence of some pain conditions such as low back pain increases from childhood into adolescence to approach the prevalence in adults.^{3,10} The reported effect of age on pain prevalence in older people is inconsistent, with some studies reporting an increase in prevalence with age and others reporting a decrease in prevalence with age. The effect also varies by sex and site of pain.⁴⁷ It was widely believed that adults of working age are the most likely to experience musculoskeletal pain and hence that the prevalence of pain decreases from around the middle of the sixth decade of life.⁴⁸ However, recent studies have found that pain remains a prevalent and serious problem in older age. The prevalence of chronic pain in older people (>65 years) living in the community ranges from 25.0% to 76.0%, while the prevalence of chronic pain in older people living in residential care is much higher and ranges from 83.0% to 93.0%.⁴⁷

Social (Group) Factors

There is increasing recognition of the role that social factors have on health throughout the life course.⁴⁹ Socioeconomic status is usually measured by determining education, income, occupation, or a composite of these dimensions. Few studies of pain in children and adolescents have examined the association with socioeconomic status. In those studies that have, there is conflicting evidence of a relationship.³ In adults, there is an inverse relationship between socioeconomic status and the prevalence of pain. Data suggest that lower levels of education, lower income, and being unemployed are all associated with an increased prevalence of pain.¹

More recently, studies of pain prevalence in populations of varying cultures, ethnicity, and socioeconomic status have been performed. A review of pain in American Indians, Alaska Natives, and Aboriginal Canadians revealed a higher pain prevalence in these groups than in the general population of the United States.⁵⁰

Studies conducted in Africa have found a mean 1-year prevalence of low back pain of 33.0% in adolescents and 50.0% in adults.⁵¹ This appears to be slightly higher than the 1-year prevalence for adults in studies conducted in mostly Western countries (mean 1-year prevalence of 38.1%).¹⁶ However, because of differences in methodology, this comparison should be interpreted with caution. Another review of the prevalence of chronic pain reported an estimate of 24.8% in less developed countries compared with 28.1% in more developed countries, based on the Human Development Index of the World Bank.⁵²

Individual Factors

An assortment of individual risk factors have been associated with the occurrence of pain conditions. Unfortunately, these risk factors are commonly explored in single studies, and most systematic reviews find synthesis difficult because of the lack of consistency across studies.^{1,17} The most consistent risk factor for the development of pain conditions is a previous episode of pain.

Various occupational factors have been associated with the onset of musculoskeletal pain, such as high job demands, job insecurity, sedentary work position, job dissatisfaction, low levels of social support in the workplace, and whole-body vibration.^{16,53} Individual lifestyle factors such as smoking, obesity, and poor health status may also play a role in the development of pain conditions.²⁷ Psychosocial variables thought to have impact on pain prevalence include stress, anxiety, depression, low self-esteem, and the presence of chronic health problems.^{3,16}

Genetic research on pain is becoming more common, with chronic pain increasingly conceptualized as a classic example of gene-environment interaction.⁵⁴ Inflammatory processes or nerve injuries are often suspected to be the initial trigger of chronic pain syndromes, but only a small minority of people actually have subsequent development of chronic pain. Once chronic pain has developed, pain severity and analgesic response are also highly variable among individuals. To date, however, there is a lack of evidence about the strength of genetic influence on the development of pain conditions as well as their interaction with psychosocial and environmental factors.

ECONOMIC IMPACTS OF PAIN

Individual Economic Burden

Chronic pain has an undeniable impact on a patient's quality of life; however, there are also financial consequences. Caring for those with chronic pain can also lead to financial costs, with the mean cost per adolescent experiencing chronic pain in the United Kingdom being approximately £8000 per year, including direct and indirect costs.⁵⁵ Patients may also find themselves needing to pay for activities that they can no longer perform, such as housekeeping.⁵⁶

It has been estimated that individuals with moderate to severe chronic pain lose an average of 8 days of work every 6 months, and 22% lose at least 10 workdays.²¹ Just over 50% of European patients undergoing rehabilitation for CLBP are working full- or part-time.⁵⁷ Indirect costs resulting from lost work productivity represent the majority of overall costs associated with low back pain; these costs may be borne by the individual, by employers, or both.⁵⁸

In Australia, arthritis and back pain are reported to triple the odds of people aged 45 to 64 years being out of the workforce. It is estimated that older Australians not working because of poor health reduces the gross domestic product (GDP) by \$14.7 billion per annum. Back pain and arthritis compose almost half of this burden. With an aging workforce in many countries, the social and economic impact of older workers having to retire because of painful health conditions is enormous and potentially increasing.⁵⁹

Health Care Utilization

Patients with pain conditions consume close to twice as much health care resources as the general population. The management of pain requires a range of services, for which the costs are substantial. In the United States, the largest proportion of direct medical costs for low back pain are spent on physical therapy (17.0%) and inpatient services (17.0%), followed by pharmacy (13.0%) and primary care (13.0%).⁵⁸

Data from a European study of patients with chronic pain revealed that 93.0% visited their physician in the past 6 months. In contrast, 84.0% of the general European adult population visited their physician in the same period.²¹ The proportion of individuals with

chronic pain who sought care from a physician in the past year also appears to be increasing, with one study reporting an increase from 73.1% to 84.0% in the period from 1992 to 2006.³⁹ In an Australian study of 65,279 general practitioner encounters with children and adolescents, 4.9% were attributable to musculoskeletal problems.⁶⁰

The estimated cost to the health care system differs depending on the country and the condition. In Belgium, for instance, the cost to the health care system for low back pain ranges from €83.8 billion to €164.7 billion per year (2004 values).⁶¹ In the United Kingdom, the total cost of low back pain to the National Health Service was estimated at £1 billion (1998 values), and in Germany, the corresponding value was €5.11 billion.⁶¹

Total Cost

The cumulative burden of chronic pain, including the cost to patients, those who care for them, the health care system, and the economy, is considerable. In Australia, a country of 22.7 million people, the total annual cost of chronic pain was estimated in 2007 to be \$34.3 billion or \$10,847 per person with chronic pain.⁶² The total cost across Europe has been estimated to be in the region of 1.5% to 3.0% of the European GDP.⁶¹ In 2008, about 100 million adults in the United States were affected by chronic pain, including joint pain or arthritis.⁶² The total costs ranged from \$560 billion to \$635 billion in 2010. The annual cost of pain is greater than the annual costs of heart disease (\$309 billion), cancer (\$243 billion), and diabetes (\$188 billion).⁶³

THE CHALLENGES OF PAIN EPIDEMIOLOGY RESEARCH

Despite restricting the focus of this review to 1-year incidence and 1-month prevalence periods, the range of incidence and prevalence estimates for pain conditions reported in the literature is still large. These differences in estimates, often for the same condition, could be due to a variety of methodological issues inherent to pain epidemiology research. As discussed previously, the lack of a case definition or diagnosis makes identifying cases difficult, especially in population-based studies. Consensus documents for a number of conditions have been developed to define clinical

diagnoses of chronic pain conditions^{14,35} or episodes of pain for research purposes.⁶⁴ Capturing the multidimensional nature of pain conditions through assessment of subjective, functional, and psychological impacts is challenging.

Our understanding of the epidemiology of pain is also limited by the small number of studies providing general population prevalence estimates. These studies are often difficult to implement, are costly, and involve very large sample sizes. The manner in which data are collected and reported can also have an effect on estimates, with differences arising from studies using surveys, interviews, or clinical examinations.³³ Large-scale population-based studies can provide richer data on the age and sex distributions of pain, and when assessments are performed in a longitudinal manner, insights into incidence and risk factors should be possible. Performing epidemiological studies in a variety of cultural, social, and ethnic groups can further our understanding of the influence of and interactions between individual and societal risk factors.

CONCLUSION

Pain represents a major clinical, social, and economic problem across all ages, with estimates of the monthly prevalence ranging from 1.0% to over 60.0%. In addition, pain conditions appear to have the greatest negative impact on quality of life compared with other health problems, and they contribute the most to disability around the world. The impact of pain on economies is enormous, with the total cost of pain estimated to be up to 3.0% of the GDP. The annual cost of pain is greater than the cost of heart disease or cancer. Improvements in the methodology and conduct of epidemiological research are needed to fully understand this complex problem and develop effective strategies to manage it.

Abbreviations and Acronyms: CLBP = chronic low back pain; DALY = disability adjusted life year; GDP = gross domestic product; PY = person-years; YLD = years lived with disability

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Correspondence: Address to Nicholas Henschke, BAppSc (Physiotherapy)(Hons), PhD, Institute of Public Health,

University of Heidelberg, Im Neuenheimer Feld 324, Heidelberg 69120, Germany (henschke@uni-heidelberg.de). Individual reprints of this article and a bound reprint of the entire Symposium on Pain Medicine may be available for purchase from our website www.mayoclinicproceedings.org.

The Symposium on Pain Medicine will continue in an upcoming issue.

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