Original Article

Global low back pain prevalence and years lived with disability from 1990 to 2017: estimates from the Global Burden of Disease Study 2017

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Background: Low back pain (LBP) is a common musculoskeletal problem globally. Updating the prevalence and burden of LBP is important for researchers and policy makers. This paper presents, compares and contextualizes the global prevalence and years lived with disability (YLDs) of LBP by age, sex and region, from 1990 to 2017.

Methods: Data were extracted from the GBD (the Global Burden of Disease, Injuries, and Risk Factors Study) 2017 Study. Age, sex and region-specific analyses were conducted to estimate the global prevalence and YLDs of LBP, with the uncertainty intervals (UIs).

Results: The age-standardized point prevalence of LBP was 8.20% (95% UI: 7.31–9.10%) in 1990 and decreased slightly to 7.50% (95% UI: 6.75–8.27%) in 2017. The prevalent numbers of people with LBP at any one point in time in 1990 was 377.5 million, and this increased to 577.0 million in 2017. Age-standardized prevalence of LBP was higher in females than males. LBP prevalence increased with age, and peaked around the ages of 80 to 89 years, and then decreased slightly. Global YLDs were 42.5 million (95% UI: 30.2 million–57.2 million) in 1990 and increased by 52.7% to 64.9 million (95% UI: 46.5 million–87.4 million) in 2017. YLDs were also higher in females than males and increased initially with age; they peaked at 35–39 years of age in 1990, before decreasing, whereas in 2017, they peaked at 45–49 years of age, before decreasing. Western Europe had the highest number of LBP YLDs.

Conclusions: Globally, LBP is the leading global cause of YLDs. Greater attention is urgently needed to mitigate this increasing burden and the impact it is having on health and social systems.

Keywords: Low back pain (LBP); prevalence; years lived with disability (YLDs); Global Burden of Disease Study

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Introduction

Low back pain (LBP) is the most common musculoskeletal problem globally (1-4). It is the leading cause of activity limitation and absenteeism from work (5-7), and results in a huge medical burden and economic cost (2,8). It is consequently one of the major global public health problems (9-11).

The Global Burden of Disease (GBD) Study is updated every one to two years (6,12-15). LBP is included as one of the musculoskeletal conditions in GBD study—the last article describing the global burden of LBP in detail was based upon the GBD 2010 (10) analysis. However, since then, there have been a number of methodological changes made and updated data (6). These include: an updated DisMod-MR tool; construction of a Socio-Demographic Index (SDI); further research to establish disability weights (DWs); and adjustment for comorbidity (6). Therefore, it is important to present these changes and highlight the resulting update on the prevalence and global burden of LBP.

Methods

All of the data analysed and presented in this article were obtained from the updated GBD 2017 (the Global Burden of Disease, Injuries, and Risk Factors Study) (http://www.healthdata.org/gbd/data). The GBD 2017 data were derived from the GBD repository of population health data, including World Health Surveys and National Health Surveys, literature reviews, and claims data. Literature review for LBP was conducted in October 2017. The electronic databases of Ovid Medline, EMBase, and CINAHL were searched and eight studies were included. In addition, USA claims data for 2000, 2010, 2012, and 2014 by state, and Taiwan claims data from 2016 were included.

In brief, Bayesian meta-regressions by DisMod-MR 2.1 were used to synthesize sparse and heterogeneous, epidemiological data to estimate the point prevalence and YLD outcomes. In GBD 2010, DisMod-MR 1.0 was used to pool all data by world region. This was updated to DisMod-MR 2.0 in GBD 2013, which increased the computational speed allowing consistent computations between all disease parameters at the country level. DisMod-MR 2.1 was used in GBD 2016 and 2017, and enables estimates down to the sub-national level. Results were stratified by five-year age groups from birth up to 95+. The detailed methods of the systematic analysis for GBD 2017 by the IHME (Institute for Health Metrics and Evaluation) have been published elsewhere (6).

LBP was defined as pain that lasts for at least one day (with/without pain referred into one or both lower limbs) in the area on the posterior aspect of the body from the lower margin of the 12th ribs to the lower gluteal folds (10,16,17).

DWs represent the magnitude of health loss associated with BP. DWs were measured on a scale from zero to one, with zero representing a state of full health, and one representing a state equivalent to death. The DWs used in GBD 2010 were based on face to face surveys conducted in five countries as well as an internet survey (10). The DWs used in GBD 2017 have been described previously (18), and also included data from the European Disability Weights Measurement Study that took place in Hungary, Italy, the Netherlands and Sweden.

A total of six sequelae were used to represent the different levels of LBP severity: (I) most severe BP with leg pain (DW: 0.384, 95% CI: 0.256–0.518); (II) most severe BP without leg pain (DW: 0.372, 95% CI: 0.250–0.506); (III) severe BP with leg pain (DW: 0.325, 95% CI: 0.219–0.446); (IV) severe BP without leg pain (DW: 0.272, 95% CI: 0.182–0.373); (V) moderate BP with/without leg pain (DW: 0.054, 95% CI: 0.035–0.079); and (VI) mild BP with/without leg pain (DW: 0.020, 95% CI: 0.011–0.035).

There is no mortality from LBP, therefore, the YLDs and DALYs (Disability-adjusted life years) values are the same. In this paper, we have only used the term YLDs. The unadjusted YLDs of each sequela were calculated using the formula:

$YLD_{sequela} = Prevalence_{sequela} \times DW_{sequela}$ (17).

The SDI was originally constructed in GBD 2015; it is a composite indicator of development status correlated with health outcomes. Briefly, it is the geometric mean of 0 to 1 indices of total fertility rate under the age of 25 (TFU25), mean education for those aged 15 and older (EDU15+), and lag-distributed income (LDI) per capita.

A comorbidity correction involving a micro-simulation performed for each age-sex-location-year, was used to calculate the comorbidity-adjusted YLDs at the final stage. The co-occurrence of different diseases was estimated by simulating 40,000 individuals in each age-sex-location-year combination based on disease prevalence. A flow chart describing the process for estimating the YLDs is shown in *Figure 1*.

Uncertainty intervals (UIs) were calculated using a propagating technique also described elsewhere (15,19,20). Briefly, the distribution of every computed step was stored

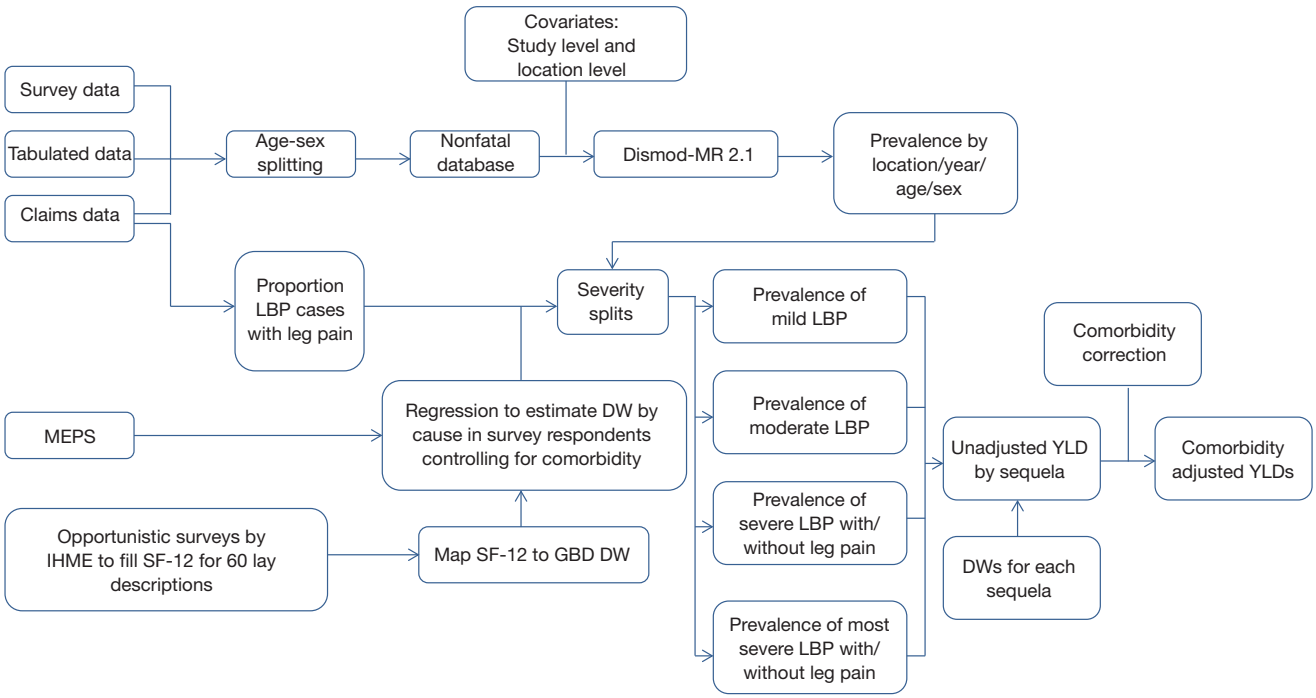

Figure 1 The flow chart of the YLDs estimation. Map SF-12 to GBD DW: the data were first collected from the short form-12 (SF-12), then, the individual SF-12 summary scores were mapped to an equivalent disability weight (DW); Nonfatal database: low back pain is one type of nonfatal disease, therefore, the data are input into the GBD nonfatal database; The "year" under the prevalence by location/year/ age/sex represents the years 1990–2017.

in 1,000 draws; the final estimate is the mean estimate across all 1,000 draws, and the 95% UI is the 25th and 975th ranked values.

Results

Prevalence

The age-standardized point prevalence of LBP in the 21 world regions by gender at 1990 and 2017 is summarized in *Table 1*.

Globally, the age-standardized point prevalence of LBP was 8.20% (95% UI: 7.31–9.10%) in 1990, and this decreased to 7.50% (95% UI: 6.75–8.27%) in 2017. Prevalence was higher in females than males. For females, this was 8.86% (95% UI: 7.90–9.82%) in 1990 and 8.01% (95% UI: 7.22–8.84%) in 2017, whereas for males, prevalence was 7.47% (95% UI: 6.67–8.31%) in 1990 and 6.94% (95% UI: 6.24–7.67%) in 2017 (*Figure 2A*). The estimated prevalent numbers of people with LBP was 377.5 million in 1990, and this increased to 577.0 million in 2017, due to the considerable increased population globally from 1990 to 2017 (*Figure 2B*).

LBP prevalence increased with age, peaking around the ages 80 to 89 years old, and then slightly decreased. This pattern was observed in both females and males, in 1990 and 2017 (*Figure 3A,B*).

In 2017, the highest LBP prevalence was Southern Latin America (13.47%), followed by high-income Asia Pacific (13.16%), while the lowest was East Asia (3.92%), followed by Central Latin America (5.62%). The highest prevalent number of people with LBP was South Asia (96.3 million), followed by East Asia (67.7 million), while the lowest prevalent number of people with LBP was Oceania (0.7 million), followed by Caribbean (2.7 million).

Years lived with disability (YLDs)

LBP was the leading cause of YLDs for both 1990 and 2017 out of the all conditions studied in GBD 2017. In both time points, LBP was the leading cause of YLDs in 13 out of the 21 world regions (*Table 2*).

The global YLDs for LBP were 42.5 million (95% UI:

Table 1 The age-standardized point prevalence of low back pain in 1990 and 2017, by region and gender

Region	Gender	1990 (%)				2017 (%)				Difference** (%)
		Mean	LUI	UUI	Rank*	Mean	LUI	UUI	Rank*	
Andean Latin America	Male	7.65	6.89	8.44		8.31	7.45	9.19		0.66
	Female	7.36	6.61	8.22		7.87	7.08	8.77		0.50
	Both	7.50	6.76	8.33	13	8.08	7.26	8.94	13	0.58
Australasia	Male	11.60	10.52	12.79		11.99	10.73	13.38		0.39
	Female	13.11	11.86	14.54		13.84	12.41	15.31		0.73
	Both	12.38	11.22	13.63	3	12.94	11.63	14.32	4	0.56
Caribbean	Male	5.32	4.79	5.89		5.28	4.77	5.85		–0.04
	Female	6.15	5.49	6.81		6.03	5.51	6.65		–0.12
	Both	5.75	5.15	6.36	19	5.67	5.16	6.26	19	–0.08
Central Asia	Male	9.21	8.27	10.23		9.14	8.22	10.17		–0.07
	Female	9.11	8.16	10.18		9.11	8.11	10.18		0.01
	Both	9.17	8.24	10.21	10	9.13	8.16	10.20	10	–0.04
Central Europe	Male	12.40	11.16	13.79		12.51	11.34	13.77		0.11
	Female	12.47	11.15	13.89		12.57	11.37	13.86		0.10
	Both	12.46	11.18	13.86	2	12.57	11.38	13.85	5	0.11
Central Latin America	Male	4.68	4.15	5.24		4.88	4.37	5.41		0.20
	Female	6.43	5.73	7.17		6.28	5.61	6.95		–0.15
	Both	5.59	4.97	6.20	20	5.62	5.02	6.23	20	0.03
Central Sub-Saharan Africa	Male	8.78	7.78	9.82		8.94	7.95	9.99		0.16
	Female	7.75	6.90	8.69		7.87	6.99	8.82		0.12
	Both	8.24	7.30	9.23	11	8.40	7.48	9.39	12	0.16
East Asia	Male	4.16	3.61	4.72		3.44	3.02	3.85		–0.72
	Female	5.70	4.91	6.56		4.38	3.87	4.89		–1.32
	Both	4.94	4.27	5.63	21	3.92	3.46	4.37	21	–1.02
Eastern Europe	Male	11.56	10.26	12.95		10.52	9.37	11.78		–1.04
	Female	11.40	10.10	12.74		10.59	9.47	11.79		–0.81
	Both	11.48	10.20	12.77	6	10.57	9.40	11.79	8	–0.91
Eastern Sub-Saharan Africa	Male	8.10	7.23	8.99		8.52	7.60	9.49		0.43
	Female	6.43	5.74	7.20		6.65	5.90	7.42		0.22
	Both	7.25	6.46	8.09	15	7.56	6.73	8.42	15	0.31
High-income Asia Pacific	Male	10.25	9.12	11.51		11.45	10.19	12.83		1.20
	Female	14.42	12.80	16.18		14.90	13.27	16.80		0.48
	Both	12.36	11.02	13.84	4	13.16	11.74	14.73	2	0.80

Table 1 (*continued*)

Table 1 (*continued*)

Region	Gender	1990 (%)				2017 (%)				Difference** (%)
		Mean	LUI	UUI	Rank*	Mean	LUI	UUI	Rank*	
High-income North America	Male	10.39	9.37	11.49		9.80	9.20	10.42		–0.59
	Female	12.21	11.03	13.44		11.55	10.85	12.28		–0.66
	Both	11.36	10.24	12.54	7	10.71	10.06	11.39	7	–0.65
North Africa and Middle East	Male	8.96	8.06	9.90		9.09	8.14	10.01		0.13
	Female	10.75	9.62	11.94		10.74	9.61	11.97		–0.01
	Both	9.85	8.84	10.90	9	9.90	8.86	10.98	9	0.06
Oceania	Male	5.89	5.21	6.57		6.20	5.50	6.98		0.31
	Female	6.89	6.10	7.75		7.23	6.41	8.11		0.34
	Both	6.37	5.67	7.11	18	6.70	5.95	7.53	16	0.33
South Asia	Male	5.72	5.06	6.43		5.05	4.50	5.65		–0.67
	Female	7.44	6.62	8.33		7.07	6.31	7.89		–0.37
	Both	6.54	5.81	7.32	17	6.06	5.40	6.75	18	–0.48
Southeast Asia	Male	7.33	6.61	8.10		7.72	7.05	8.42		0.39
	Female	7.52	6.79	8.29		7.78	7.07	8.52		0.25
	Both	7.43	6.71	8.21	14	7.76	7.08	8.49	14	0.32
Southern Latin America	Male	11.98	10.59	13.54		13.25	11.86	14.64		1.27
	Female	12.64	11.22	14.11		13.66	12.26	15.18		1.02
	Both	12.33	10.97	13.85	5	13.47	12.09	14.89	1	1.13
Southern Sub-Saharan Africa	Male	8.11	7.25	9.03		7.40	6.62	8.25		–0.70
	Female	5.97	5.32	6.65		5.53	4.95	6.11		–0.44
	Both	6.99	6.25	7.75	16	6.42	5.75	7.12	17	–0.57
Tropical Latin America	Male	10.55	9.42	11.80		11.37	10.14	12.69		0.82
	Female	12.02	10.71	13.43		11.51	10.29	12.78		–0.52
	Both	11.32	10.11	12.60	8	11.45	10.22	12.74	6	0.13
Western Europe	Male	12.29	11.08	13.63		12.02	10.82	13.31		–0.27
	Female	14.05	12.69	15.49		14.13	12.74	15.62		0.08
	Both	13.24	11.95	14.63	1	13.12	11.81	14.50	3	–0.13
Western Sub-Saharan Africa	Male	8.79	7.86	9.78		9.31	8.36	10.32		0.52
	Female	7.65	6.86	8.50		8.27	7.42	9.12		0.62
	Both	8.23	7.40	9.18	12	8.76	7.89	9.70	11	0.53
Globally	Male	7.47	6.67	8.31		6.94	6.24	7.67		–0.53
	Female	8.86	7.90	9.82		8.01	7.22	8.84		–0.85
	Both	8.20	7.31	9.10	–	7.50	6.75	8.27	–	–0.70

*, rank: the rank of LBP prevalence among the above 21 regions. **, difference: calculated by subtracting the 1990 prevalence (%) from the 2017 prevalence (%). LUI, lower uncertainty interval; UUI, upper uncertainty interval.

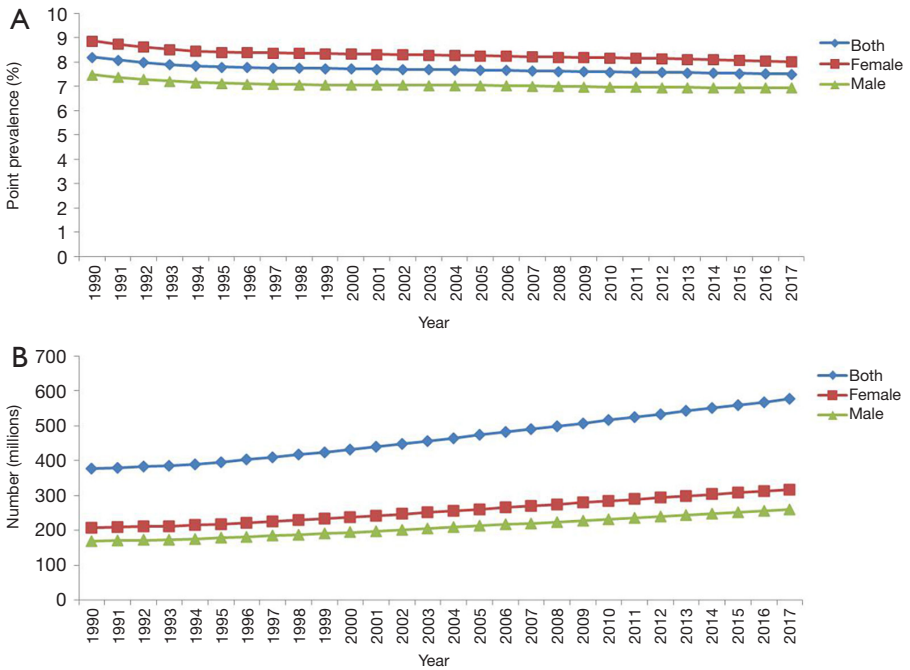

Figure 2 The prevalence trend of low back pain. (A) The age-standardized point prevalence of low back pain from 1990 to 2017, by gender. (B) The estimated prevalent number of people with low back pain from 1990 to 2017, by gender.

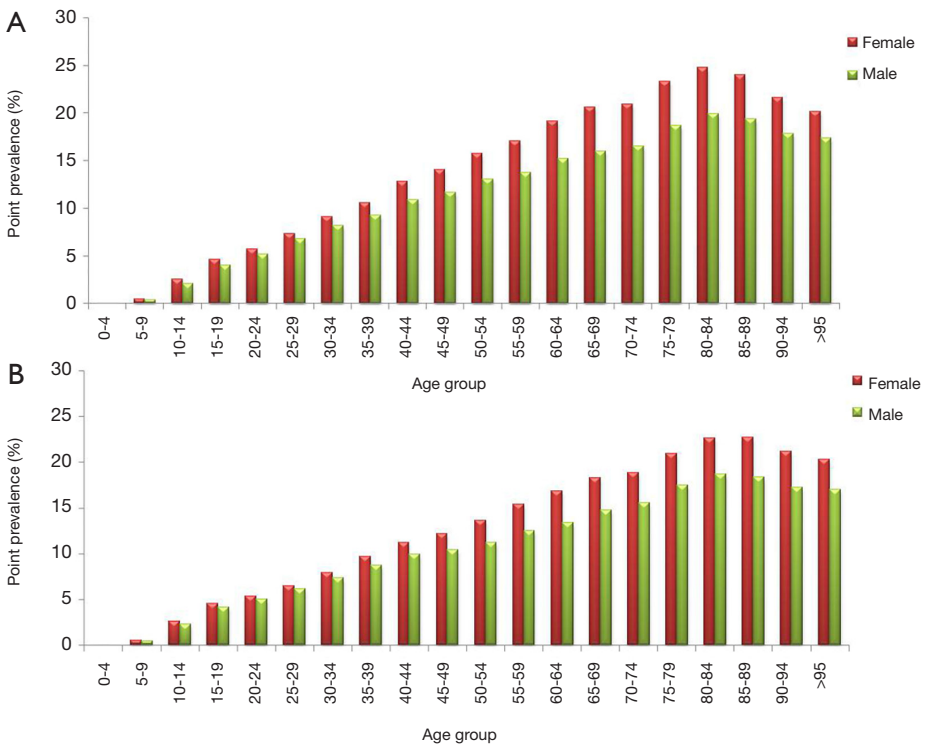

Figure 3 The age-specific prevalence of low back pain. (A) The age-specific point prevalence of low back pain in 1990, by gender. (B) The age-specific point prevalence of low back pain in 2017, by gender.

Table 2 Years lived with disability (YLDs), age-standardized YLD rate (per 100,000 persons) and rank (in all causes) of low back pain in 1990 and 2017, by region and sex

Regions	Gender	YLDs (1,000s)							Age-standardized YLD rate (per 100,000 persons)							Rank**	
		1,990			2,017			Difference*	1,990			2,017			Difference*	1,990	2,017
		Mean	LUI	UUI	Mean	LUI	UUI		Mean	LUI	UUI	Mean	LUI	UUI			
Andean Latin America	Male	123	88	165	262	186	165	140	844	607	1,140	904	644	1,215	60	1	1
	Female	125	89	169	259	184	169	135	815	584	1,100	865	615	1,163	50	2	1
	Both	247	176	337	522	371	337	274	829	595	1,113	884	630	1,183	55	1	1
Australasia	Male	127	90	172	202	145	172	75	1,170	830	1,580	1,198	863	1,628	29	1	1
	Female	153	109	206	250	179	206	97	1,345	957	1,810	1,406	1,006	1,889	61	1	1
	Both	280	200	377	453	324	377	173	1,259	898	1,702	1,304	937	1,759	45	1	1
Caribbean	Male	90	64	123	138	99	123	48	584	415	793	576	414	776	−8	1	2
	Female	108	78	146	166	120	146	58	672	484	904	657	475	872	−15	3	2
	Both	198	142	269	304	219	269	105	629	452	851	618	446	830	−11	3	3
Central Asia	Male	259	187	349	400	286	349	140	993	716	1,332	973	698	1,307	−20	1	1
	Female	301	216	407	450	321	407	149	990	705	1,324	985	706	1,327	−5	2	1
	Both	560	404	752	850	607	752	290	993	712	1,330	979	704	1,314	−13	1	1
Central Europe	Male	864	616	1,170	966	694	1,170	101	1,311	939	1,762	1,306	934	1,755	−5	2	1
	Female	997	708	1,343	1,139	825	1,343	142	1,341	959	1,805	1,343	963	1,801	2	1	1
	Both	1,861	1,319	2,505	2,104	1,530	2,505	243	1,329	949	1,787	1,328	949	1,772	−1	1	1
Central Latin America	Male	317	225	432	633	453	432	316	511	368	695	521	374	707	9	2	2
	Female	471	334	637	902	643	637	431	705	503	952	681	485	928	−24	2	2
	Both	788	559	1,066	1,535	1,096	1,066	747	611	437	828	604	430	818	−7	2	2
Central Sub-Saharan Africa	Male	165	118	227	391	279	227	226	961	691	1,293	977	696	1,310	16	3	1
	Female	151	108	204	354	251	204	203	840	608	1,125	857	620	1,150	17	5	3
	Both	317	226	434	746	532	434	429	898	648	1,201	917	658	1,230	19	4	1
East Asia	Male	2,719	1,936	3,735	3,316	2,342	3,735	597	456	324	620	366	259	494	−90	1	4
	Female	3,478	2,445	4,696	4,394	3,134	4,696	916	623	437	837	471	336	633	−152	2	3
	Both	6,197	4,397	8,384	7,709	5,453	8,384	1,513	539	381	730	419	300	565	−120	1	3

Table 2 (*continued*)

Table 2 (*continued*)

Regions	Gender	YLDs (1,000s)							Age-standardized YLD rate (per 100,000 persons)							Rank**	
		1,990			2,017			Difference*	1,990			2,017			Difference*	1,990	2,017
		Mean	LUI	UUI	Mean	LUI	UUI		Mean	LUI	UUI	Mean	LUI	UUI			
Eastern Europe	Male	1,356	971	1,840	1,321	950	1,840	−35	1,212	873	1,639	1,095	783	1,482	−117	1	1
	Female	1,814	1,318	2,432	1,767	1,288	2,432	−47	1,206	864	1,615	1,115	804	1,498	−91	1	1
	Both	3,170	2,305	4,274	3,089	2,236	4,274	−82	1,208	868	1,622	1,106	793	1,497	−102	1	1
Eastern Sub-Saharan Africa	Male	499	356	678	1,125	801	678	626	894	645	1,202	934	674	1,265	40	3	1
	Female	396	284	535	892	635	535	496	707	511	946	731	526	988	23	5	4
	Both	895	642	1,215	2,017	1,437	1,215	1,122	799	577	1,070	830	599	1,120	31	3	2
High-income Asia Pacific	Male	1,007	717	1,368	1,489	1,067	1,368	481	1,060	754	1,444	1,166	829	1,600	106	1	1
	Female	1,535	1,091	2,090	1,930	1,378	2,090	395	1,530	1,091	2,091	1,567	1,117	2,126	37	1	1
	Both	2,543	1,811	3,441	3,419	2,423	3,441	876	1,294	923	1,758	1,361	970	1,863	67	1	1
High-income North America	Male	1,581	1,131	2,124	2,171	1,554	2,124	589	1,054	756	1,424	988	709	1,313	−66	1	1
	Female	2,105	1,510	2,820	2,801	2,027	2,820	695	1,270	910	1,707	1,191	858	1,572	−79	1	1
	Both	3,687	2,635	4,931	4,972	3,590	4,931	1,285	1,167	837	1,575	1,091	786	1,445	−75	1	1
North Africa and Middle East	Male	1,281	916	1,734	2,822	2,014	1,734	1,541	971	698	1,308	972	699	1,308	2	1	2
	Female	1,442	1,030	1,934	3,062	2,197	1,934	1,620	1,162	833	1,546	1,155	825	1,555	−6	2	2
	Both	2,723	1,953	3,685	5,884	4,211	3,685	3,161	1,064	763	1,430	1,062	761	1,429	−3	1	1
Oceania	Male	16	11	22	35	25	22	19	649	461	883	678	488	910	29	2	2
	Female	17	12	23	38	27	23	21	754	541	1,023	785	563	1,045	32	3	3
	Both	33	23	45	74	53	45	41	700	500	952	730	524	980	30	3	3
South Asia	Male	2,774	1,987	3,769	4,547	3,239	3,769	1,773	633	457	848	553	397	746	−79	2	2
	Female	3,236	2,315	4,363	6,248	4,454	4,363	3,012	812	581	1,085	771	553	1,028	−41	3	3
	Both	6,010	4,291	8,156	10,795	7,689	8,156	4,785	718	514	961	661	476	889	−56	3	3
Southeast Asia	Male	1,448	1,033	1,964	2,758	1,983	1,964	1,310	816	588	1,101	843	605	1,125	27	1	1
	Female	1,554	1,112	2,102	2,911	2,096	2,102	1,357	832	592	1,116	849	611	1,131	17	2	1
	Both	3,002	2,146	4,061	5,669	4,078	4,061	2,668	825	589	1,109	847	610	1,128	22	1	1

Table 2 (*continued*)

Table 2 (*continued*)

Regions	Gender	YLDs (1,000s)							Age-standardized YLD rate (per 100,000 persons)							Rank**	
		1,990			2,017			Difference*	1,990			2,017			Difference*	1,990	2,017
		Mean	LUI	UUI	Mean	LUI	UUI		Mean	LUI	UUI	Mean	LUI	UUI			
Southern Latin America	Male	292	209	402	473	336	402	181	1,263	904	1,736	1,367	972	1,847	104	1	1
	Female	340	243	465	543	392	465	203	1,351	962	1,848	1,438	1,027	1,949	87	1	1
	Both	632	453	866	1,016	724	866	384	1,309	941	1,786	1,404	1,002	1,896	95	1	1
Southern Sub-Saharan Africa	Male	158	113	214	256	183	214	98	885	635	1,197	791	565	1,060	−93	1	2
	Female	127	90	170	214	154	170	87	648	468	872	593	428	795	−56	5	5
	Both	285	204	385	470	336	385	186	762	549	1,026	688	498	919	−74	1	3
Tropical Latin America	Male	738	527	1,012	1,402	1,002	1,012	664	1,154	824	1,567	1,227	872	1,662	73	1	1
	Female	877	625	1,191	1,521	1,088	1,191	644	1,310	936	1,775	1,246	891	1,679	−65	1	1
	Both	1,615	1,149	2,215	2,924	2,085	2,215	1,308	1,235	885	1,675	1,237	884	1,670	2	1	1
Western Europe	Male	2,754	1,960	3,733	3,302	2,383	3,733	548	1,269	901	1,730	1,229	872	1,676	−39	1	1
	Female	3,555	2,533	4,801	4,273	3,085	4,801	718	1,478	1,051	2,000	1,479	1,051	2,011	0	1	1
	Both	6,309	4,513	8,491	7,575	5,476	8,491	1,266	1,379	983	1,870	1,356	964	1,851	−23	1	1
Western Sub-Saharan Africa	Male	642	464	867	1,459	1,039	867	817	971	704	1,307	1,024	733	1,384	53	2	2
	Female	530	379	709	1,363	972	709	834	838	605	1,120	906	641	1,210	68	4	3
	Both	1,172	839	1,575	2,822	2,015	1,575	1,650	906	653	1,207	962	684	1,292	57	3	2
Globally	Male	19,210	13,729	26,153	29,467	21,020	26,153	10,257	813	580	1,094	748	538	1,008	−65	1	1
	Female	23,313	16,598	31,184	35,479	25,357	31,184	12,167	966	687	1,293	869	624	1,165	−97	1	1
	Both	42,523	30,176	57,224	64,947	46,512	57,224	22,424	892	637	1,195	810	582	1,089	−82	1	1

*, difference: calculated by subtracting the 1990 YLDs/age-standardized YLD rate from the 2017 YLDs/age-standardized YLD rate. **, rank: the rank of the number of YLDs caused by LBP compared to all other conditions in GBD 2017. LUI, lower uncertainty interval; UUI, upper uncertainty interval.

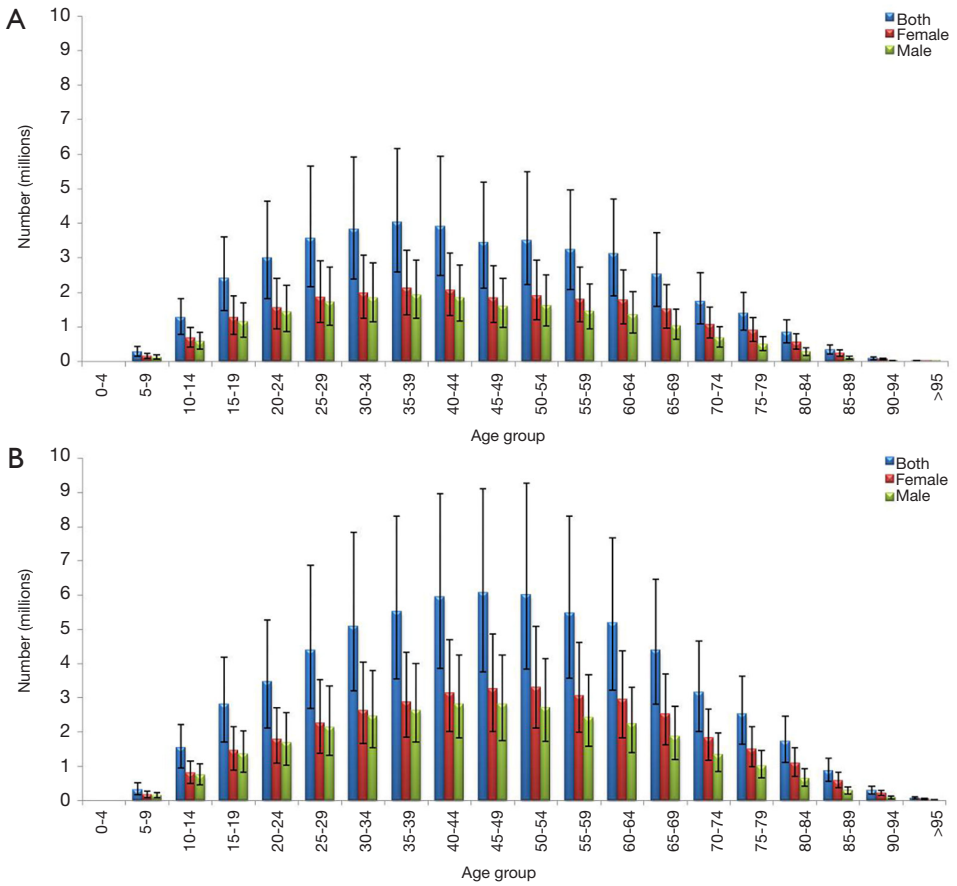

Figure 4 The age-specific number of years lived with disability. (A) The age-specific number of low back pain years lived with disability (with uncertainty intervals) in 1990, by age and gender. (B) The age-specific number of low back pain years lived with disability (with uncertainty intervals) in 2017, by age and gender.

30.2 million–57.2 million) in 1990, and increased 52.7% to 64.9 million (95% UI: 46.5 million–87.4 million) in 2017 (*Table 2*). YLDs were higher for females than males in both 1990 (23.3 million, 95% UI: 16.6 million–31.2 million, compared to 19.2 million, 95% UI: 13.7 million–26.2 million, respectively) and 2017 (35.5 million, 95% UI: 25.4 million–47.7 million, compared to 29.5 million, 95% UI: 21.0 million–40.0 million, respectively) (*Table 2*). The age-standardized YLD rate (per 100,000 population) decreased slightly from 892 (95% UI: 637–1,195) in 1990 to 810 (95% UI: 582–1,089) in 2017, although this was not statistically significant at the 0.05 level. The age-standardized YLD rate was also higher in females than males (*Table 2*).

Total YLDs for LBP also increased initially with age; they peaked at 35–39 years of age in 1990, before decreasing (*Figure 4A*), whereas in 2017, they peaked at 45–49 years of age, before decreasing (*Figure 4B*). Both females and males had similar trends.

In 2017, the region with the highest number of YLDs was South Asia (10.8 million, 95% UI: 7.7 million–14.7 million), followed by East Asia (7.7 million, 95% UI: 5.53 million–10.4 million). The region with the lowest number of YLDs was Oceania (73,589, 95% UI: 52,501–100,281), followed by the Caribbean (303,867, 95% UI: 219,393–408,488). The region with the highest age-standardized YLD rate (per 100,000 persons) was Southern Latin America [1,404], followed by high-income Asia Pacific [1,361]. The region with the lowest age-standardized YLDs rate was East Asia [419], followed by Central Latin America [604].

Discussion

In this article, data analysed in GBD 2017 are presented.

The prevalence (in %) of LBP had decreased between 1990 and 2017, whereas the prevalent number of people with LBP and the number of YLDs had increased substantially. LBP remains the leading global cause of YLDs in 2017. It should be noted that with each GBD study iteration, new data are being added to the models that derive the estimates over time. This consequently alters and strengthens the model outputs—as a result, and for example, prevalence estimates from GBD 2010 may differ from those from GBD 2017. Other factors that may influence prevalence changes between iterations are changes to the DWs, the DisMod-MR tool, construction of the SDI, and adjustments for comorbidity.

The gender disparity of LBP prevalence was different in GBD 2017 compared to GBD 2010 (10). In GBD 2010, prevalence was reportedly higher in males (10.1%) compared to females (8.1%); however, prevalence was higher in females in GBD 2017. This difference between GBD 2010 and GBD 2017 is mainly attributed to the improved data coverage and methods in GBD 2017 rather than any real changes over this period. Other studies have reported a similar gender trend (21-24). Possible explanations for this are likely to be complex and may include biological, psychological and sociocultural factors (22,25,26). However, another interesting finding is that males in Central, Eastern, Western and Southern Sub-Saharan Africa had a higher prevalence than females—further research is needed to better understand this.

The prevalence trends by age observed in GBD 2017 were similar to GBD 2010 (10). Prevalence was high in all age groups from 18 years onwards, and peaked at around 80–89 years old (*Figure 3*). There are many factors that may increase the prevalence of LBP with age. Aging is associated with pain, which may restrict social and physical function (27); consequently, this restriction may result in further deterioration of the musculoskeletal system and further pain. Degeneration of the lumbar spine as a potential contributor to LBP continues to be a subject of debate (28-32).

There was a slight decrease in the point prevalence (%) of LBP from 1990 to 2017, although this was not significant at the 0.05 level. The number of prevalent cases of LBP and number of YLDs has increased dramatically in this period, although, again, this was not significant at the 0.05 level. If these are real increases, they are likely to be mainly driven by aging and increasing population numbers (19)—having said this, the influence of this will vary from region to region, and there may also be other contributing factors such as obesity, increased motorization (1,4), and willingness to report pain. Of note, the point prevalence and age-standardized YLDs rate (per 100,000 persons) in Southern Latin America, high-income Asia Pacific, Andean Latin America, Australasia and Western Sub-Saharan Africa have all increased suggesting that factors beyond aging and population increase may be at play.

The age trend for YLDs was different to that of prevalence. YLDs peaked in the middle-aged population, and thus the working-age population is most greatly affected by the burden of LBP. *Figure 4* shows YLDs peaked around the ages 35 to 39 years old in 1990. However, consistent with the aging population and increasing global life expectancy, this peak was delayed to 45 to 49 years old in 2017 (19).

Strengths and limitations

The updated GBD 2017 has been improved compared to GBD 2010. More up-to-date data were included from World Health Surveys and National Health Surveys, the European Disability Weights Measurement Study, additional systematic reviews, and claims data from the USA Taiwan. Methodological changes included (I) updating the DisMod-MR tool, (II) having greater granularity in reporting of results for the oldest age groups (80–84, 85–89, 90–94 and 95+ years), (III) construction of a SDI, and (IV) adjustment for comorbidity. These changes increase confidence in the accuracy of results.

Despite some improvements since GBD 2010, sufficient population-based prevalence and burden estimates on LBP are still lacking from many regions and countries. Consequently, burden estimates were heavily reliant on models. While these models have been improved, it should be noted that they are models rather than original data. Further, of the studies that were included in the analysis, substantial heterogeneity remains between the case definitions used. This has made it difficult to compare the data across countries and over time. Additionally, it is difficult to determine with confidence the impact of changes to LBP policy and practice. Hence, this is the key limitation in estimating and understanding the global burden of LBP. Standardisation of data collection would be an important first step. The Global Alliance for Musculoskeletal (MSK) Health and the Global Burden of Disease 2010 Study MSK Expert Group have developed a standardized survey questionnaire for measuring the population prevalence of LBP and other MSK conditions (24). The tool can be found online at: http://

bjdonline.org/msk-survey-module/. The case definitions are aligned to those of the GBD. The intention for the questionnaire is for it to be integrated within pre-existing and planned surveys such as National Health Surveys, and not being used as a stand-alone tool. This will help to minimize the burden from having to conduct multiple surveys in the local communities, and, subsequently, will save the required resources. It also encourages LBP and other musculoskeletal disorders to be viewed as being integrated within broader health initiatives rather than being seen as a separate issue. It is hoped this publicly-available module will be widely adopted to increase the availability of comparable data on LBP and other MSKs (24).

The DWs used also have some limitations. The DWs were based on surveys that were conducted in a limited number of countries (Bangladesh, Indonesia, Peru, Tanzania, the USA, Hungary, Italy, The Netherlands and Sweden) prior to 2013 as well as a global web-based survey (18). The surveys rely on perceptions of respondents to often brief descriptions of a complex health problem. More recent surveys in a greater number of countries will increase the generalizability of the DWs.

Implications for policy and practice

From 1990 to 2017, LBP continued to be the leading cause of YLDs globally. Many countries and health-related organizations continue to prioritize communicate diseases over non-communicable diseases such as LBP. The Lancet Low Back Pain Series recently made a call for action on the management of LBP burden from governments, policy makers and the broader society (8,9,33). However, there continues to be a gap between evidence for effective management of LBP and current practice and policy, as outlined in the recent Lancet Series (8,9,33). Greater attention is needed to bridge this gap. A biopsychosocial framework could be used to guide the management including education, self-management, resumption of usual activities and exercise, and psychological measures for those with persistent symptoms. Management guidelines for different stages of BP and for different contexts should also be recommended. The recent Lancet Series documented high level of the inappropriate investigations and treatments that are contributing to the LBP burden for both individuals and society. Key recommended principles for LBP would be to reduce unnecessary imaging and treatment, support people to be active and stay at work, and to only use medication, imaging, and surgery prudently (33). For high-risk cases, prevention and early intervention could be considered. Linton *et al.* reported a stepped, stratified, and matched care approach might reduce wastage of clinical time and resources (34).

Hartvigsen *et al.* (8) concluded that the cost and disability from LBP vary substantially between countries, and would increase in the coming decades. Many of the risk factors (such as obesity, increased motorization and work-related issues) associated with LBP identified in those high-income countries are also present in developing countries (1,4,35,36). High-income countries are likely to have better developed health systems to manage this increasing burden. For these low-income and middle-income countries, health systems are most likely not as well developed, and, therefore, will face greater challenges in managing the impact of the growing LBP burden.

Given that many of the risk factors for LBP are shared by other non-communicable diseases, it is imperative that integrated, collaborative approaches are established and built upon to ensure affordable solutions to the growing burden of LBP (37), especially, in low- and middle-income countries (38). Greater efforts are urgently needed to expand the amount of comparable data on the prevalence of LBP at national and sub-national levels. Future investigation should also include the effectiveness, cost-effectiveness of preventive and therapeutic strategies.

Conclusions

The global prevalence and YLD rates from LBP decreased slightly from the 1990 to 2017, but the number of LBP sufferers and YLDs increased substantially. Prevalence and YLDs were higher in females than males. Prevalence increased with age, and YLDs peaked at around 35 to 49 years of age. Globally, LBP remains the leading global cause of YLDs, yet it continues to be inadequately recognized as a disease burden in the population with the major disparity continuing between the level of burden, and the policy, research and health services response. This will continue to be an urgent need for governments and other donors (33,38).

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. No identified patient information was included in this study, therefore, the ethical approval was not needed. To download the original full data used in these analyses, please visit the Global Health Data Exchange at http://ghdx.healthdata.org/gbd-2017.

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