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The epidemiology of neck and low back pain in Iran: a national and sub-national analysis from 1990 to 2019

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Background: Neck pain (NP) is a condition influenced by multiple factors. It places a significant burden on individuals suffering from NP and on social and economic systems. On a global scale, low back pain (LBP) stands out as a significant contributor to years lost to disability, and this burden is on the rise due to population growth and aging.

Methods: The Global Burden of Disease database was used to collect data on the prevalence, incidence, and years lived with disability (YLD) of NP and LBP between 1990 and 2019. Various factors, including age group, gender, Iran, and its 31 provinces, were used to classify the data.

Results: Iran accounted for 0.86 million incident cases of NP in 2019, with age-standardized incident rate per 100 000 population of 934.1. Tehran has the maximum age-standardized prevalence, incidence, and YLD. Iran accounted for the age-standardized incidence rate for LBP per 100 000 population of 3492.9, and it reduced to −8.35% from 1990. Mazandaran exhibits the highest levels of prevalence, incidence, and YLD for LBP in 2019. In Iran, the point prevalence of NP in 2019 was higher in females and increased with age up to 50–54 years for females and 70–74 years for males. However, there is only a slight difference between females and males in Iran regarding LBP prevalence.

Conclusions: In this study, the authors report the prevalence, incidence, YLD, and age-standardized rates for NP and LBP in the world's general population and Iran's population based on its sub-nations in 1990 and 2019.

Keywords: epidemiology, Global Burden of Disease, Iran, low back pain, neck pain

Introduction

Low back pain (LBP) is a prominent global contributor to years lost to disability, with its burden increasing with the expanding and aging population[1]. The global prevalence of LBP has increased in recent years[2]. Neck pain (NP) is a multifactorial disease[3] with an annual prevalence rate exceeding 30%[4]. NP may not be the most common musculoskeletal disorder, but it is still very important in modern society[5]. This condition is a burden for the patients with NP as well as the social and economic systems[6].

Among the 154 conditions, LBP and NP had the highest healthcare spending in the United States with an estimated $134.5 billion[7]. Similar to numerous countries, Iran faces the significant challenge of addressing the substantial impact of LBP and NP on the overall health of its population[8]. These conditions not only result in pain and disability but also present considerable challenges to healthcare systems, the economy, and overall well-being[9–11]. It is reported that physical and mental dimensions of health-related quality of life were significantly negatively correlated to NP and LBP in both genders; additionally, life satisfaction was poorly correlated with these conditions[12]. Numerous factors contribute to the prevalence of LBP and NP. Lifestyle changes

HIGHLIGHTS

- In 2019, Iran had a higher age-standardized prevalence, incidence, and years lived with disability (YLD) rate than global for both neck pain (NP) and low back pain (LBP).
- In Iran, as globally, NP exhibits a higher prevalence, incidence, and YLD in females compared to males. The burden of LBP was slightly higher in Iranian males than females.
- Tehran province bears the highest burden of LBP, and Mazandaran has the highest burden of NP.
- The prevalence of LBP in Iran generally increases with age.

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such as a lack of physical activities and daily computer usage, the duration of occupational demands, being overweight or underweight, a low socioeconomic background, and an aging population are among the factors influencing the epidemiology of these conditions[13–16]. As we are facing these factors globally, understanding the epidemiology of NP and LBP is crucial for public health planning and intervention strategies. There is a disparity in prevalence of NP and LBP between genders. Females have significantly higher NP prevalence[17,18]. For LBP, while some studies suggest a higher prevalence among males[19], others indicate a greater occurrence in females[2].

The present study aimed to investigate the burden of NP and LBP, including prevalence, incidence, and years lived with disability (YLD), between 1990 and 2019 in Iran and its provinces, according to age and gender, using the Global Burden of Disease (GBD) data provided by the Institute of Health Metrics and Evaluation (IHME).

Methods

Overview and data source

The study was conducted in line with the STROCSS criteria[20] (Supplemental Digital Content 1, http://links.lww.com/MS9/A378), focusing on evaluating the prevalence, incidence, and YLD associated with NP and LBP in Iran between the years 1990 and 2019. As no evidence for mortality from LBP and NP was found in the GBD Study, the YLDs and disability-adjusted life years (DALYs) values were the same. In this study, the term YLDs was used. The data utilized for this study were obtained from the GBD dataset, which encompasses both national and sub-national levels. The GBD Study is an extensive program to assess the effects of injuries, communicable diseases, and non-communicable diseases on the health of populations. The GBD Study 2019 provides a thorough and organized assessment of the rates of incidence, prevalence, mortality, years of life lost (YLL), YLD, and DALYs for 369 injuries and diseases, along with 87 risk factors. This evaluation encompasses 204 countries and territories. The dataset encompassed the time frame ranging from 1990 to 2019[21].

The Global Health Data Exchange (GHDx) query tool was utilized to gather data on the prevalence, incidence, and YLD of NP and LBP cases between 1990 and 2019. These data were categorized based on various factors, including age group, sex, and Iran and its 31 provinces. The GBD Study follows the guidelines for accurate and transparent health estimates reporting (GATHER) statement[22]. As the Institute for Health Metrics and Evaluation (IHME), responsible for overseeing the GBD Study, exclusively utilizes deidentified and aggregated data, obtaining informed permission is not deemed necessary.

Definition

In the GBD Study, LBP is characterized as persistent pain lasting a minimum of 1 day. This pain may or may not radiate into one or both lower limbs. It is localized to the posterior region of the body, specifically spanning from the lower margin of the 12th ribs to the lower gluteal folds[23]. The GBD research defined NP as pain in the cervical spine region with or without pain referred to the arms that last at least 24 h; additionally, pain in the shoulder is a surrogate measure for NP[23,24]. The ICD-10 codes employed for the identification of cases of LBP were M54.3 (sciatica), M54.4 (lumbago with sciatica), and M54.5 (LBP). The ICD-9 code for low back discomfort was 724. In the case of NP, the ICD-10 code is M54.2 and the ICD-9 code is 723.1.

Statistical analysis

Age-standardized rates (ASRs) were computed for prevalence and YLD for the period spanning from 1990 to 2019. Additionally, estimated percentage changes were determined for these rates. The ASRs have been reported using a per 100 000 population metrics. The ASR was calculated by aggregating the product of the age-specific rate (βi, where i represents the ith age group) and the corresponding number of cases (or weight; ωi) within the same age subgroup i of the chosen reference standard population. This sum was then divided by the total sum of the weights of the standard population. The 95% uncertainty interval (95% UI) has also been provided for each point estimate. The UIs were established by identifying the 25th and 975th values from the ordered draws. Detailed information about data processing and disease model can be found elsewhere[23]. We used Python coding to draw maps and figures based on GBD data.

Results

Burden of NP in Iran

In Iran, the prevalence number of NP was 3.88 million (95% UI 3.04–5.01 million) in 2019 and 1.55 million (95% UI 1.22–2 million) in 1990. Iran accounted for 0.86 million (95% UI 0.66–1.14 million) incident cases in 2019 with age-standardized incident rate per 100 000 population of 934.1 (95% UI 732.8–1189.9), but there are no significant changes compared to 1990 (0.55% and 95% UI 0.26–0.93%). In Iran in 2019, due to NP, there are a total of 0.38 million (95% UI 0.25% to 0.55 million) YLDs. The age-standardized YLD was 423.5 (95% UI 280.2–609.8) per 100 000 people in 2019, and it did not significantly change compared to 1990 [1.12% (95% UI 0.44–1.78%)].

Regarding Iran provinces, Tehran has the maximum prevalence, incidence, and YLD with an ASR of 5139.93 (95% CI 4038.41–6485.4), 506.73 (95% UI 335.4–723.53), and 506.73 (95% UI 335.4–723.53) of NP in 100 000 people, respectively. However, Bushehr Province has the minimum prevalence, incidence, and YLD with an ASR of 4059.72 (95% UI 3218.54–5169.3), 896.6 (95% CI 703.79–1147.75), and 401.78 (95% UI 265.35–580.03) of NP in 100 000 people in 2019, respectively. (Table 1) (Fig. 1).

Burden of LBP in Iran

Iran accounted for 7.41 million (95% UI 6.52–8.39 million) prevalent cases in 2019 and 3.7 million (95% UI 3.23–4.18 million) in 1990. The incidence number of NP in Iran was 3.05 million (95% UI 2.68–3.48 million) in 2019, with age-standardized incident rate per 100 000 population of 3492.9 (95% UI 2092.5–2949.5), and it reduced – 8.35% (95% UI – 9.17% to – 7.47%) from 1990. A total of 0.83 million (95% UI 0.58–1.12) YLD was reported in Iran in 2019. The age-standardized YLD was 951.1 (95% UI 668.9–1275.1) per 100 000 people in 2019, and it reduced compared to 1990 [– 9.46% (95% UI – 10.67% to – 8.23%)].

Table 1

Age-standardized rates (per 100 000) of prevalence, incidence, and years lived with disability (YLD) of neck pain in Iran and its provinces in 1990 and 2019 and their changes during this period

	Prevalence			Incidence				YLDs			
	Age-standardized rate estimates (1990)	Age-standardized rate estimates (2019)	Percentage change in age-standardized rates between 1990 and 2019	Age-standardized rate estimates (1990)	Age-standardized rate estimates (2019)	Percentage change in age-standardized rates between 1990 and 2019	Beta for age-standardized rates trends through 1990–2019	Age-standardized rate estimates (1990)	Age-standardized rate estimates (2019)	Percentage change in age-standardized rates between 1990 and 2019	Beta for age-standardized rates trends through 1990–2019
Global	2709.42	2696.52	−0.48	581.7364	579.0853	−0.46	−0.34	268.26	267.35	−0.34	−0.25
Iran	4246.34	4288.71	0.99	929.0002	934.1391	0.55	0.57	418.8452	423.5369	1.12	0.43
Alborz	4046.27	4086.96	1.01	896.5595	903.9155	0.82	0.78	400.59	404.07	0.87	0.49
Ardebil	4075.71	4096.18	0.50	904.1782	903.9106	−0.03	0.37	402.2325	404.9163	0.67	0.38
Bushehr	4086.36	4059.72	−0.65	904.332	896.6025	−0.85	−0.19	403.77	401.78	−0.49	0.04
Chahar Mahaal and Bakhtiari	4071.87	4095.26	0.57	902.1967	904.2547	0.23	0.50	402.7685	406.4431	0.91	0.43
East Azerbaijan	4077.71	4096.35	0.46	903.4073	904.676	0.14	0.50	403.8189	405.7369	0.47	0.38
Fars	4082.46	4095.22	0.31	903.2473	904.719	0.16	0.56	402.1746	404.3606	0.54	0.41
Gil	4107.04	4107.82	0.02	906.9161	906.9705	0.01	0.48	405.5847	405.5359	-0.01	0.36
Golestan	4088.46	4114.84	0.65	905.4601	908.111	0.29	0.50	404.03	406.95	0.72	0.38
Hamadan	4083.99	4100.44	0.40	904.0688	905.5186	0.16	0.50	403.40	406.35	0.73	0.41
Hormozgan	4053.64	4090.14	0.90	898.8596	903.0463	0.47	0.70	400.3522	404.817	1.12	0.51
Ilam	4033.674	4099.871	1.64	897.8058	905.6553	0.87	0.75	399.3001	406.0456	1.69	0.55
Isfahan	4075.65	4091.35	0.39	900.5571	904.6191	0.45	0.61	403.11	404.98	0.46	0.37
Kerman	4080.87	4084.46	0.09	903.326	902.174	−0.13	0.51	401.85	401.84	0.00	0.33
Kermanshah	4060.93	4110.34	1.22	901.6334	907.2074	0.62	0.73	401.30	406.75	1.36	0.55
Khorasan-e-Razavi	4083.53	4105.06	0.53	904.4669	906.3217	0.21	0.53	402.3028	404.6996	0.60	0.40
Khuzestan	4080.62	4097.16	0.41	902.8508	905.198	0.26	0.61	401.63	403.89	0.56	0.41
Kohgiluyeh and Boyer-Ahmad	4048.90	4084.45	0.88	898.4832	903.7202	0.58	0.70	399.00	404.81	1.46	0.54
Kurdistan	4063.409	4097.676	0.84	902.0786	904.7267	0.29	0.59	401.7202	406.2053	1.12	0.49
Lorestan	4061.30	4108.21	1.16	901.7161	906.6425	0.55	0.69	401.24	407.29	1.51	0.57
Markazi	4109.23	4097.21	−0.29	908.8007	904.8681	−0.43	0.27	404.93	405.29	0.09	0.30
Mazandaran	4100.563	4104.879	0.11	906.5494	906.3049	−0.03	0.41	402.4865	403.5977	0.28	0.33
North Khorasan	4086.92	4111.64	0.60	905.975	907.838	0.21	0.50	402.56	405.87	0.82	0.45
Qazvin	4085.75	4091.09	0.13	904.0053	903.2262	−0.09	0.46	403.7144	405.2809	0.39	0.38
Qom	4069.47	4080.00	0.26	900.0482	902.8475	0.31	0.58	400.1408	403.3977	0.81	0.43
Semnan	4099.419	4094.848	−0.11	904.9507	904.2953	−0.07	0.49	404.32	405.31	0.25	0.36
Sistan and Baluchestan	4034.29	4102.63	1.69	896.8181	906.4603	1.08	0.93	398.28	405.91	1.92	0.65
South Khorasan	4081.20	4116.33	0.86	904.5333	907.547	0.33	0.54	402.23	405.57	0.83	0.43
Tehran	5094.239	5139.925	0.90	1058.705	1067.667	0.85	0.44	501.64	506.73	1.02	0.28
West Azerbaijan	4079.38	4101.14	0.53	903.6851	905.2589	0.17	0.54	402.66	405.29	0.65	0.43
Yazd	4086.13	4070.68	−0.38	901.0427	900.4538	−0.07	0.44	402.99	402.68	−0.08	0.28
Zanjan	4093.13	4104.19	0.27	906.5259	905.5809	−0.10	0.42	403.25	405.69	0.61	0.44

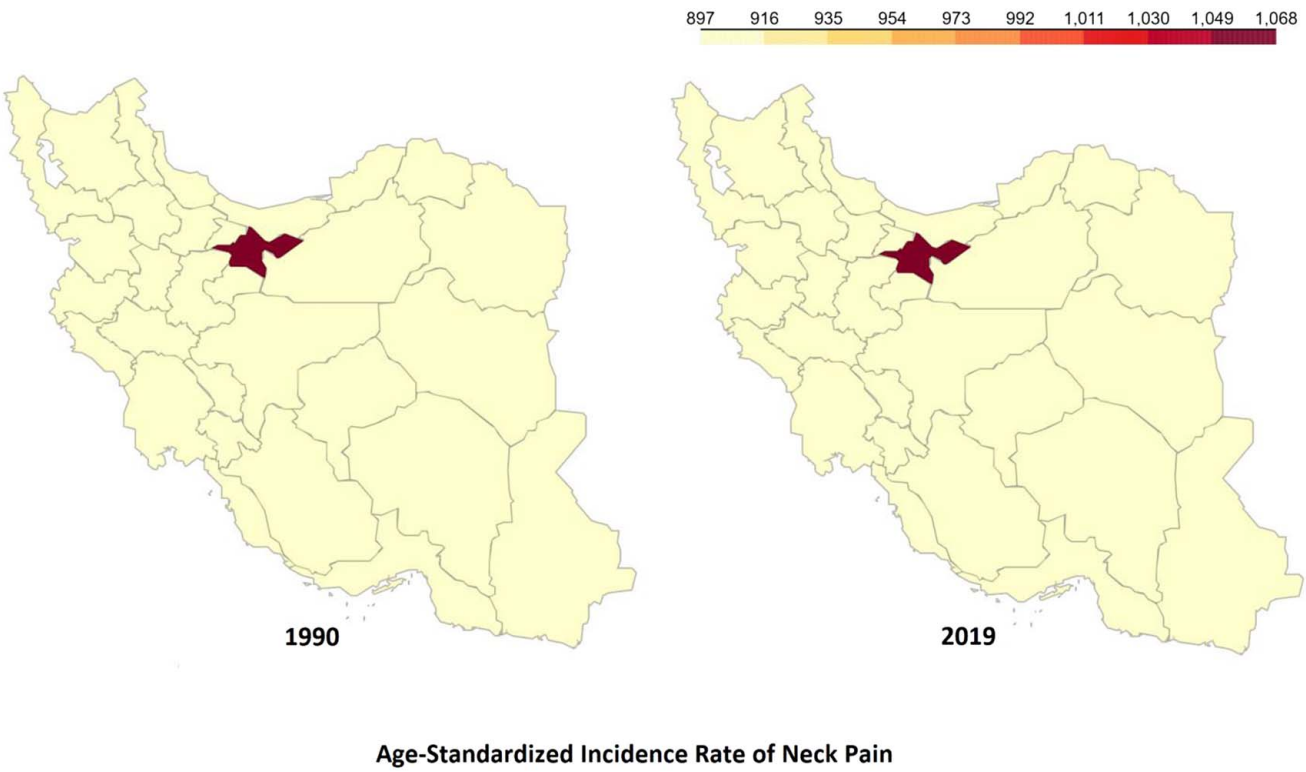

Figure 1. Age-standardized incidence rate map of Iran for neck pain in both sexes in 1990 and 2019.

Concerning the provinces of Iran, it is observed that Mazandaran exhibits the highest levels of prevalence, incidence, and YLD for LBP in 2019. The ASR for Mazandaran is calculated to be 13 259.62 (95% UI 11812–14841.5) per 100 000 individuals for prevalence, 4349.5 (95% UI 3861.68–4869.3) for incidence, and 1476.81 (95% UI 1042.55–1972.19) for YLD. In 2019, East Azerbaijan Province exhibited the lowest rates of prevalence, incidence, and YLD for LBP. In this province, the ASR for prevalence was documented at 6877.5 (95% UI 5921.06–7910.22) per 100 000 individuals. The incidence rate was 3007.6 (95% UI 2622.33–3442.15) per 100 000 individuals, and the YLD rate was 773.08 (95% UI 543.31–1045.1) (Table 2) (Fig. 2).

Gender and age disparity

In Iran, during 2019, the prevalence of NP was higher in females and rose with age until reaching its peak in the 50–54 age group for females and the 70–74 age group for males. Subsequently, there was a decline in prevalence among older age groups. Furthermore, in 2019, NP incidence in Iran was higher among females and exhibited an upward pattern with age, reaching its highest point in the 45–49 age group for both genders, followed by a decline in older age groups (Fig. 3). Additionally, in 2019, the YLD due to NP in Iran was more prominent in females. It followed an ascending pattern up to the 45–49 age group for females and the 65–69 age group for males, after which they decreased with advancing age. (Fig. 4).

In Iran, the prevalence of LBP in 2019 generally increased with age for both genders. However, there is only a slight difference between females and males in Iran regarding LBP prevalence. The incidence and YLD rates for LBP were slightly higher in males than females in Iran in 2019, but these epidemiological parameters also increased with age for both genders (Figs. 5, 6). For more information about the pattern of age-standardized incidence and YLD rate of NP and LBP from 1990 to 2019, see Supplementary Figure 1 (Supplemental Digital Content 2, http://links.lww.com/MS9/A379) and Supplementary Figure 2 (Supplemental Digital Content 3, http://links.lww.com/MS9/A380).

Discussion

In this study, from 1990 to 2019, we report the prevalence, incidence, YLD, and ASRs for NP and LBP in the general population of Iran. In 2019, Iran had a higher age-standardized prevalence rate, incidence, and YLD than global for both NP and LBP. NP in Iran accounts for 4288.71 age-standardized prevalence rate, 934.13 age-standardized incidence rate, and 432.5 age-standardized YLD, while globally, these epidemiological parameters for NP were 2696.52, 579.08, and 267.3, respectively[25]. Regarding LBP, in 2019, Iran accounted for 8486.5 age-standardized prevalence, 3492.9 age-standardized incidences, and a 951.9 age-standardized YLD rate, which illustrates a higher value compared to global age-standardized prevalence (6972.5), incidence (2748.9), and YLD (780.15)[26]. The gender disparity of NP in Iran follows the same pattern as the global pattern, which shows a higher prevalence, incidence, and YLD for females than males[25,27]. Conversely, when it comes to LBP, the incidence and YLD were slightly higher in Iranian males than females. This contrasts with the global trend, where females generally tend to have higher incidence and YLD rates[26,28]. Iran,

Table 2

Age-standardized rates (per 100 000) of prevalence, incidence, and YLD of low back pain in Iran and its provinces in 1990 and 2019 and their changes during this period

	Prevalence			Incidence					YLDs		
	Age-standardized rate estimates (1990)	Age-standardized rate estimates (2019)	Percentage change in age-standardized rates between 1990 and 2019	Age-standardized rate estimates (1990)	Age-standardized rate estimates (2019)	Percentage change in age-standardized rates between 1990 and 2019	Beta for age-standardized rates trends through 1990–2019	Age-standardized rate estimates (1990)	Age-standardized rate estimates (2019)	Percentage change in age-standardized rates between 1990 and 2019	Beta for age-standardized rates trends through 1990–2019
Global	8341.19	6972.55	−16.41	3168.933	2748.9	−13.25	−11.98	932.5195	780.1537	−16.34	−4.30
Iran	9377.05	8486.51	−9.50	3811.258	3492.982	−8.35	−12.38	1051.423	951.9215	−9.46	−3.93
Alborz	9010.19	8080.66	−10.32	3744.918	3407.312	−9.02	−13.18	1013.783	907.9024	−10.44	−4.19
Ardabil	9220.38	8292.47	−10.06	3793.994	3469.633	−8.55	−12.61	1034.25	931.35	−9.95	−4.07
Bushehr	8914.14	8016.719	−10.07	3710.183	3391.95	−8.58	−12.24	1001.73	901.06	−10.05	−3.90
Chahar Mahaal and Bakhtiari	9050.89	8113.11	−10.36	3749.498	3417.497	−8.85	−12.70	1017.78	915.08	−10.09	−4.00
East Azerbaijan	8045.10	6877.59	−14.51	3432.192	3007.681	−12.37	−16.39	905.685	773.0761	−14.64	−5.17
Fars	9003.19	8074.33	−10.32	3733.897	3405.443	−8.80	−13.02	1007.492	905.7568	−10.10	−4.10
Gilan	9131.18	8190.24	−10.30	3774.357	3435.104	−8.99	−12.89	1024.607	918.7175	−10.33	−4.10
Golestan	9146.72	8228.64	−10.04	3776.068	3450.546	−8.62	−12.67	1028.03	924.25	−10.10	−4.11
Hamadan	9121.62	8199.21	−10.11	3770.561	3445.995	−8.61	−12.82	1024.18	922.92	−9.89	−4.01
Hormozgan	9054.65	8142.24	−10.08	3756.176	3421.232	−8.92	−12.99	1015.96	915.58	−9.88	−3.98
Ilam	9153.26	8171.14	−10.73	3778.471	3433.069	−9.14	−13.66	1030.582	918.9658	−10.83	−4.40
Isfahan	8914.64	8028.15	−9.94	3708.914	3391.413	−8.56	−12.60	1003.12	902.29	−10.05	−3.99
Kerman	9127.45	8195.22	−10.21	3772.976	3438.609	−8.86	−12.83	1021.04	915.46	−10.34	−4.19
Kermanshah	9125.23	8167.87	−10.49	3772.495	3424.863	−9.21	−13.47	1025.014	917.335	−10.51	−4.20
Khorasan-e-Razavi	9079.13	8128.94	−10.47	3754.532	3422.507	−8.84	−12.79	1017.068	909.2034	−10.61	−4.14
Khuzestan	9001.29	8077.74	−10.26	3735.36	3406.964	−8.79	−12.91	1006.575	904.6047	−10.13	−4.09
Kohgiluyeh and Boyer-Ahmad	9067.08	8090.52	−10.77	3757.374	3406.197	−9.35	−13.53	1015.97	910.97	−10.33	−4.10
Kurdistan	9165.51	8224.69	−10.26	3787.254	3447.094	−8.98	−13.06	1029.443	926.0245	−10.05	−4.09
Lorestan	9152.84	8214.91	−10.25	3781.011	3442.116	−8.96	−13.09	1027.47	925.28	−9.95	−4.13
Markazi	9042.62	8116.18	−10.25	3744.885	3415.903	−8.78	−12.85	1012.136	911.8332	−9.91	−3.95
Mazandaran	14416.98	13259.62	−8.03	4673.237	4349.581	−6.93	12.54	1602.64	1476.82	−7.85	−5.04
North Khorasan	9201.62	8243.96	−10.41	3792.818	3453.51	−8.95	−13.01	1030.156	924.0423	−10.30	−4.06
Qazvin	9081.414	8121.222	−10.57	3760.053	3418.979	−9.07	−13.09	1020.08	913.7035	−10.43	−4.19
Qom	8818.00	7941.94	−9.93	3683.539	3366.819	−8.60	−12.16	984.7719	891.9708	−9.42	−3.57
Semnan	8953.116	8047.825	−10.11	3723.027	3399.017	−8.70	−12.73	1002.02	904.34	−9.75	−3.88
Sistan and Baluchestan	8968.97	8070.101	−10.02	3729.735	3401.739	−8.79	−12.74	1005.87	906.73	−9.86	−3.90
South Khorasan	9137.27	8216.29	−10.08	3773.957	3443.826	−8.75	−12.68	1023.51	919.69	−10.14	−4.00
Tehran	9850.31	9174.19	−6.86	3972.125	3718.645	−6.38	−9.56	1105.85	1029.38	−6.91	−2.95
West Azerbaijan	9144.17	8237.42	−9.92	3775.477	3448.863	−8.65	−12.81	1026.10	925.12	−9.84	−4.02
Yazd	8982.99	8055.01	−10.33	3728.912	3402.935	−8.74	−12.61	1006.583	904.3174	−10.16	−3.95
Zanjan	9149.48	8241.60	−9.92	3777.368	3456.184	−8.50	−12.68	1024.20	925.37	−9.65	−3.89

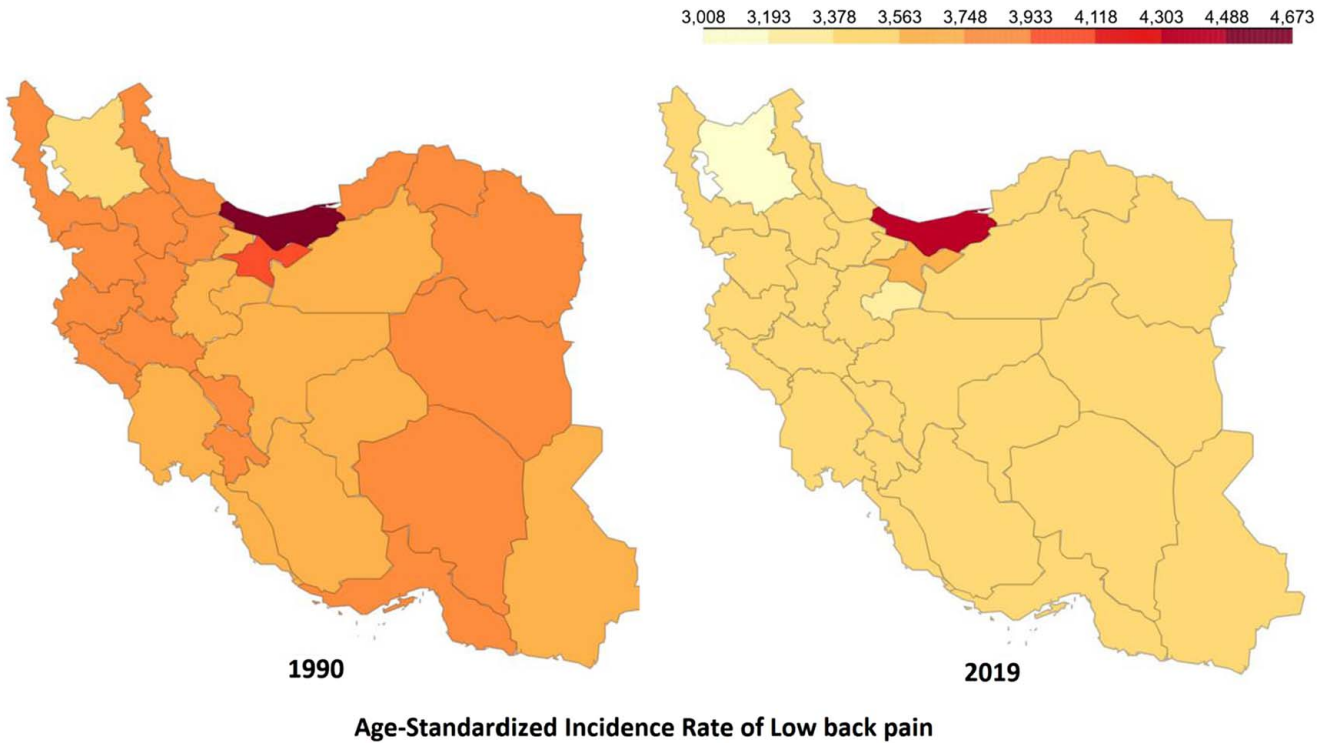

Figure 2. Age-standardized incidence rate map of Iran for low back pain in both sexes in 1990 and 2019.

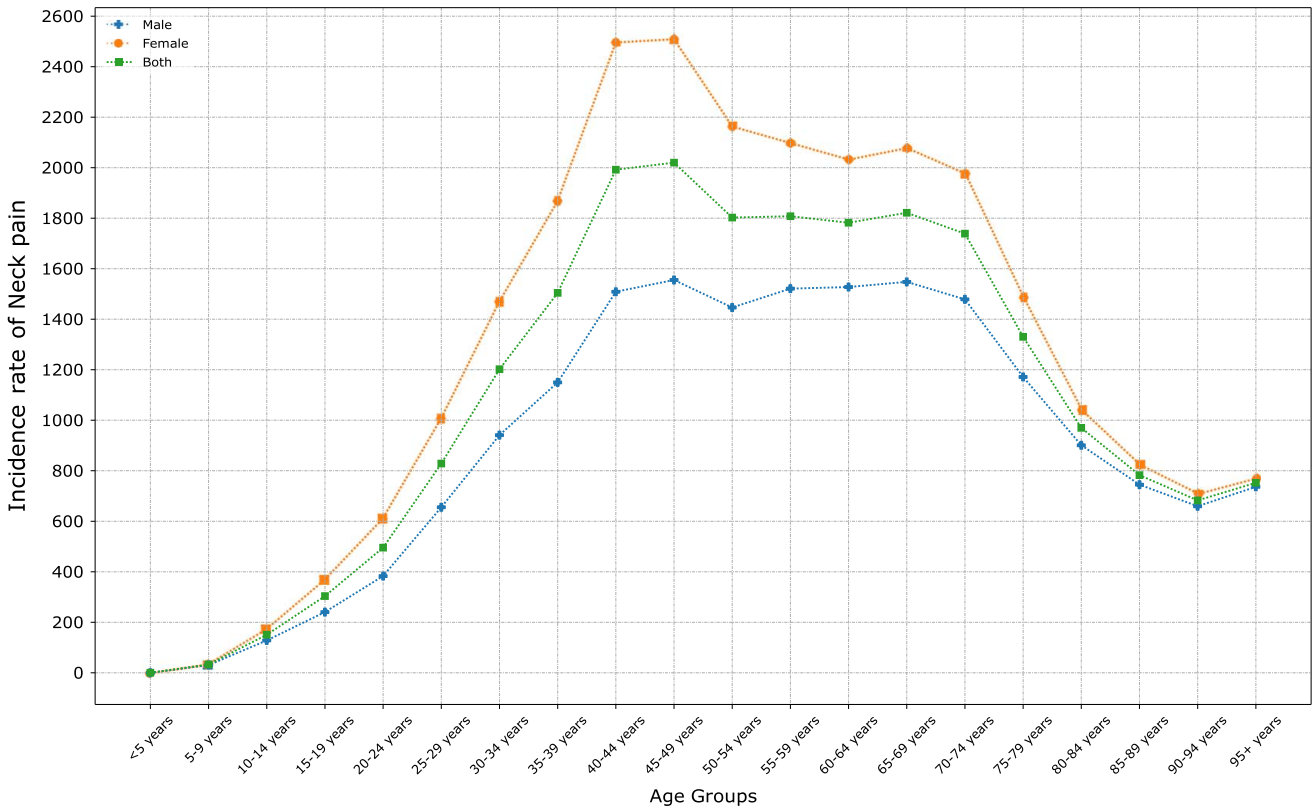

Figure 3. Incidence rate of neck pain by age groups in Iran in 2019.

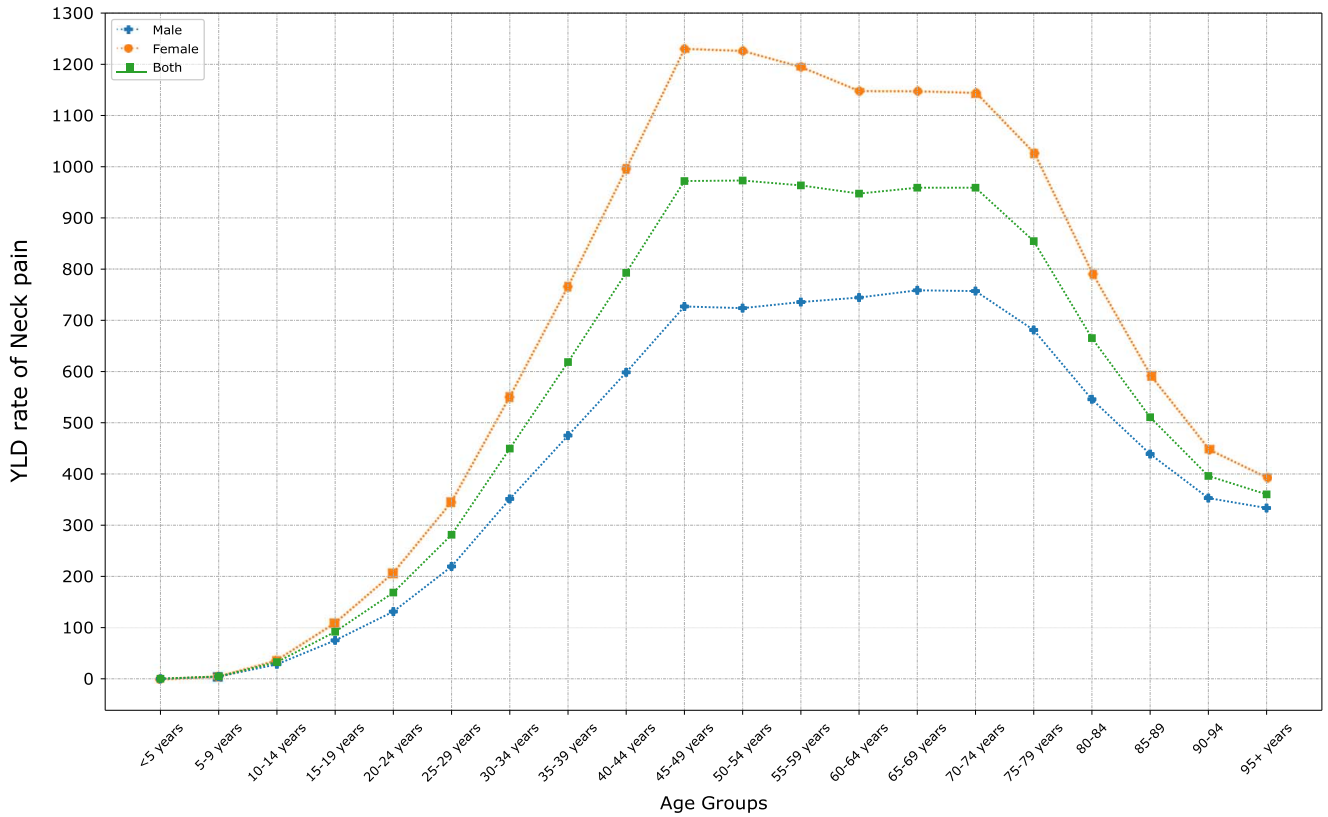

Figure 4. YLD rate of neck pain by age groups in Iran in 2019. YLD, years lived with disability.

as a middle-high sociodemographic index (SDI) country in the Middle East, has demonstrated a higher prevalence, incidence, and YLDs associated with NP and LBP when compared to other countries in the Middle East and North Africa (MENA) region[25,26,29,30]. When compared to 20 neighboring countries spanning from Afghanistan to Qatar and Lebanon, Iran exhibits a YLD rate in LBP that surpasses the median value[31]. Given that we are already aware of the possible risk factors for NP and LBP[15,32,] we need a more in-depth investigation of these risk factors to determine why Iran has a higher burden of NP and LBP than the MENA region and global.

Evidence has demonstrated that among the Iranian population, there is a notable increase in the occurrence of LBP in individuals with a higher BMI. The most pronounced correlation is observed in the overweight and obese groups[33]. A potential explanation for the increased prevalence of LBP in Iran compared to the global average could be attributed to the larger proportion of obese and overweight individuals in Iran[34–36]. Several possible explanations can clarify this association. The primary factor may be the reduction of muscle mass in the trunk and lower extremities[37]. Obesity can elevate the mechanical strain on the spine by applying increased compressive pressure to the structures of the lumbar spine during various movements[38]. Disparities in the allocation of adipose tissue or the ratio of muscular body tissue could also account for this phenomenon[39]. However, there was no significant correlation observed between BMI and NP[15].

The elevated occurrence of LBP and NP in Iran might be attributed to a heightened prevalence of additional risk factors, including occupational exposures, smoking, and lower levels of physical activity, surpassing the global average[32]. Since 1990, Iran has experienced a rise in tobacco smoking among both genders, in contrast to the global trend showing a decrease in smoking prevalence[40]. This shift could potentially impact the prevalence of NP and LBP[41–43].

In this study, we demonstrated that Tehran province bears the highest burden of NP, while Mazandaran has the highest burden of LBP. The disparities in the prevalence of LBP and NP across Iranian provinces may be influenced by various factors, including socioeconomic status (SES) and occupational exposures. This is particularly notable as different provinces in Iran display regional inequality and occupational preferences[33,44,45]. Several studies have indicated that higher income, improved SES, increased wealth, and enhanced education have a beneficial effect on musculoskeletal disorders[46]. The higher occurrence of LBP in certain groups can be attributed to factors such as heightened pain sensitivity, less healthcare access, and a lack of knowledge of how to seek proper help in time[47]. Furthermore, there is evidence suggesting a potential correlation between SES and the medical care received by those suffering from LBP or NP[48]. SES also plays a role in the reporting of musculoskeletal pain[49].

Our study determined that the prevalence of NP among females was higher than that among males in all age groups globally and in Iran, supporting previous research findings[27,50]. We demonstrated a statistically non-significant slight distinction in the prevalence of LBP between females and males in Iran. However, certain studies on LBP have reported a higher prevalence among females[51–53]. In the study of Ghafouri *et al.*[33] on

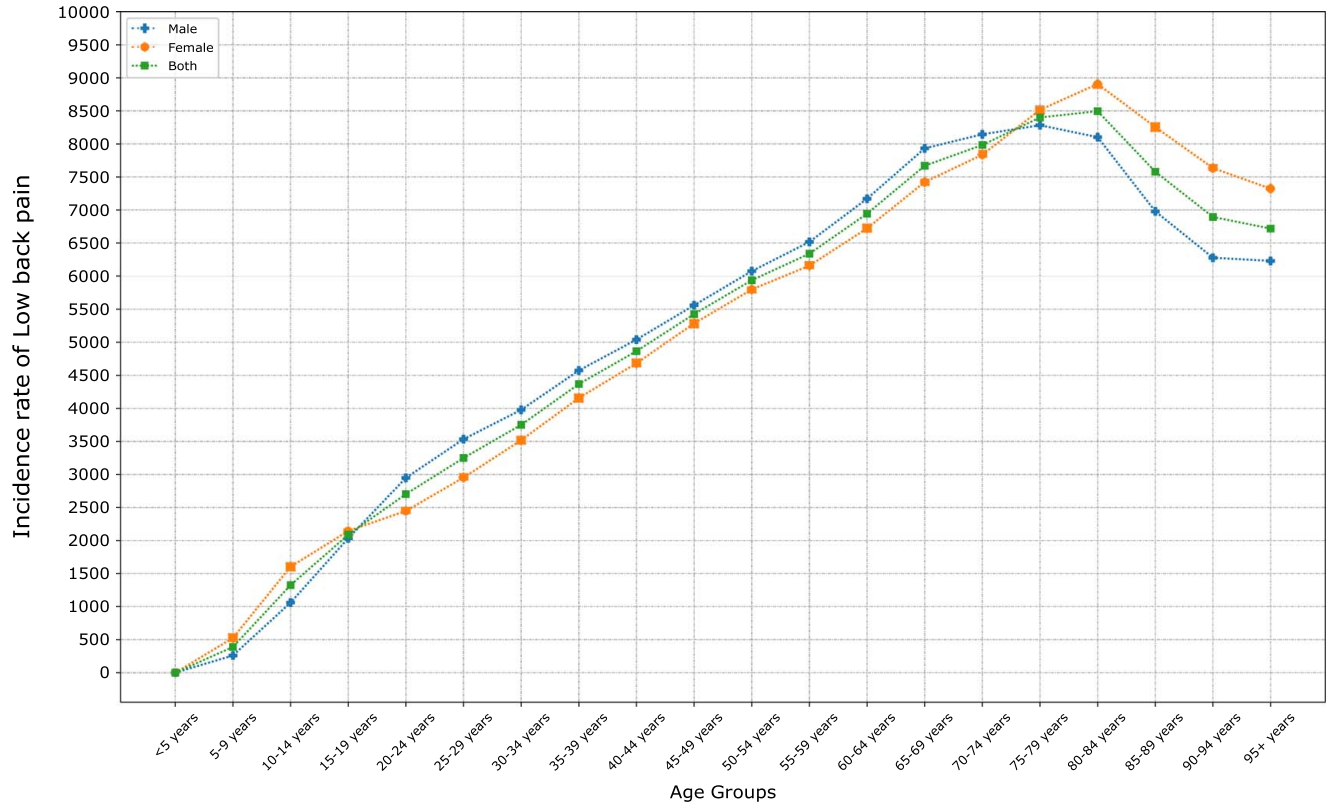

Figure 5. Incidence rate of low back pain by age groups in Iran in 2019.

the Iranian population, it has been shown that females have a higher LBP prevalence than males. However, there is some study that reports no significant difference between genders regarding to LBP prevalence[54,55]. In the study of Ehsani *et al.*[56] on Iranian teachers, there was a significant disparity regarding gender; females had a higher NP prevalence. Possible explanations for these disparities are likely to be complicated. Women are inherently prone to experiencing LBP due to biological variables such as pregnancy, contraceptive use, and estrogen use during menopause[57]. Furthermore, it could be linked to hormonal effects on the regulation of pain in females[52,58]. Gender disparities have been seen in the context of pain perception; women exhibit heightened pain sensitivity and a greater susceptibility to chronic pain disorders compared to men[59,60]. Women have a higher tendency to seek medical consultations, utilize urgent care services, and resort to emergency treatment[61]. According to reports, female patients in Iran had a greater rate of healthcare utilization for LBP[62].

In our study, we found that the prevalence of LBP generally increases with age; previous GBD study and other studies support this finding[26,63]. A number of factors may influence the age pattern of LBP burden. Intervertebral disc degeneration is a primary factor contributing to LBP. As individuals grow older, the extent of this degeneration intensifies, which helps to account for the observed correlation with age[64,65]. Advancing age is correlated with an increased probability of experiencing facetogenic or sacroiliac-mediated LBP[66]. The aging process is linked to the experience of pain, which can manifest in various body regions, potentially limiting both physical and social functioning. Additionally, it may contribute to the accelerated decline of the musculoskeletal system, leading to further pain[67]. Given the robust association between NP and work-related factors such as workload, prolonged computer use, and extended study time involving significant flexion of the neck, as well as the prevalent use of smartphones and handheld devices, it becomes plausible to explain the higher prevalence of NP in the middle-age population, as indicated by the findings of our study[68].

In a study involving 163 770 Iranians, the prevalence of LBP was reported at 25.2% among participants[33]. Another investigation, conducted as part of the Iranian National Health Survey with 25 307 participants, found a slightly higher LBP prevalence of 29.3%[8]. A review by Mousavi *et al.*[69] encompassing various demographics, including the general population, working individuals, school children, and pregnant women, revealed a wide range in LBP's point, period, and lifetime prevalence, spanning from 14.4% to 84.1%. Additionally, in a study focusing on 7889 Iranians aged between 30 and 70, the prevalence rates for NP and LBP were 15.34% and 27.18%, respectively[70]. These collective findings from our study and prior research on the Iranian population underscore the importance of recognizing these conditions and understanding their contributing factors to prevent and alleviate their burden proactively.

Limitations

The unavailability of some primary data utilized in the GBD Study 2019 is one of the study's major limitations. When data in

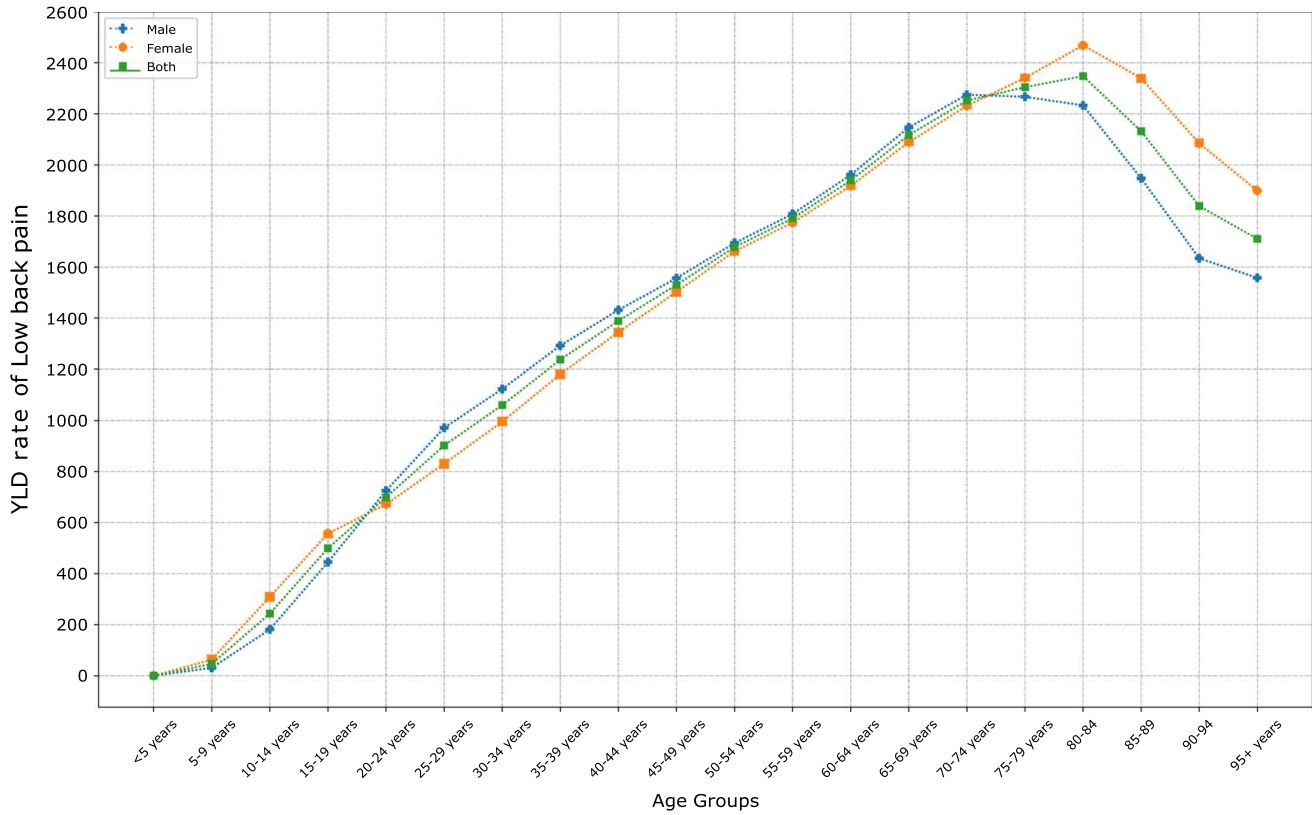

Figure 6. YLD rate of low back pain by age groups in Iran in 2019. YLD, years lived with disability.

some locations and nations are insufficient or unavailable, for example, when data have not been released, the results are based on modeled data from DisMod-MR 2.1 employing covariates and borrowing strength across geography or time. Another limitation of this study was the lack of a racial and ethnic disparity analysis. This was primarily because of the GBD study's lack of information on patients with NP and LBP. Furthermore, in low to middle-income nations, where prevention and care strategies for NP and LBP may be less effective than in high-income countries, health state experience and data accuracy may differ.

Conclusions

In this study, we report the prevalence, incidence, YLD, and ASRs for NP and LBP in Iran's population based on its sub-nations in 1990 and 2019. While investigating the age-standardized prevalence, incidence, and YLD of NP, despite no significant changes from 1990 to 2019, its burden is still high, with middle-aged men and women particularly vulnerable. In Iran, the point prevalence of NP in 2019 was higher in females and increased with age up to 50–54 years for females and 70–74 years for males, then decreased with older age. LBP showed a descending pattern in age-standardized prevalence, incidence, and YLD in Iran from 1990 to 2019. These epidemiological parameters generally increase with age for both genders. To reduce the future burden of these disorders, it is necessary to raise public knowledge about NP and LBP, their risk factors, and the need for early detection and care.

Ethical approval

No individual data were used in this paper, and the information is based on aggregated pre-existing online secondary data. Data reported in this study were aggregated epidemiologic data, and no individual data were reported.

Consent

No individual data were used in this paper, and the information is based on aggregated pre-existing online secondary data. Data reported in this study were aggregated epidemiologic data, and no individual data were reported.

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Author contribution

Conceptualization: M.M.K.; data collection, analysis, and visualization: M.S.K., M.A.K, and H.S.; writing – original draft: M.M.K., M.A.K., and N.M.; writing – review and editing: M.A., G.R., and M.B.C.; resources: G.R. and B.F.; supervision: B.F. and T.A. All authors have read and approved the manuscript prior to submission.

Conflicts of interest disclosure

The authors have no conflicts of interest to disclose.

Research registration unique identifying number (UIN)

We registered our project in the Iran University of Medical Sciences Research Bank (https://research.iums.ac.ir/), ID: 25352, Tracking Code: 1402-1-64-25352. We also Registered our study at: https://researchregistry.knack.com/. Registration number is: researchregistry9817.

Guarantor

Mohamad Mehdi Khadembashiri (M.mehdi.khademR@gmail.com); Mohamad Amin Khadembashiri (Amin.khadem75@gmail.com).

Data availability statement

This study used publicly available datasets. The data are available here: Global Burden of Disease (GBD) Compare Viz Hub, https:.. vizhub.healthdata.org.gbd-compare.

Provenance and peer review

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