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EXTENDED REPORT

Burden of musculoskeletal disorders in the Eastern Mediterranean Region, 1990–2013: findings from the Global Burden of Disease Study 2013

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ABSTRACT

Objectives We used findings from the Global Burden of Disease Study 2013 to report the burden of musculoskeletal disorders in the Eastern Mediterranean Region (EMR).

Methods The burden of musculoskeletal disorders was calculated for the EMR's 22 countries between 1990 and 2013. A systematic analysis was performed on mortality and morbidity data to estimate prevalence, death, years of life lost, years lived with disability and disability-adjusted life years (DALYs).

Results For musculoskeletal disorders, the crude DALYs rate per 100 000 increased from 1297.1 (95% uncertainty interval (UI) 924.3–1703.4) in 1990 to 1606.0 (95% UI 1141.2–2130.4) in 2013. During 1990–2013, the total DALYs of musculoskeletal disorders increased by 105.2% in the EMR compared with a 58.0% increase in the rest of the world. The burden of musculoskeletal disorders as a

proportion of total DALYs increased from 2.4% (95% UI 1.7–3.0) in 1990 to 4.7% (95% UI 3.6–5.8) in 2013. The range of point prevalence (per 1000) among the EMR countries was 28.2–136.0 for low back pain, 27.3–49.7 for neck pain, 9.7–37.3 for osteoarthritis (OA), 0.6–2.2 for rheumatoid arthritis and 0.1–0.8 for gout. Low back pain and neck pain had the highest burden in EMR countries.

Conclusions This study shows a high burden of musculoskeletal disorders, with a faster increase in EMR compared with the rest of the world. The reasons for this faster increase need to be explored. Our findings call for incorporating prevention and control programmes that should include improving health data, addressing risk factors, providing evidence-based care and community programmes to increase awareness.

INTRODUCTION

Musculoskeletal disorders have been underestimated and even ignored for a long time, mainly due to their low fatality rate and being viewed as irreversible conditions or simply part of the ageing process.¹ The considerable contribution of musculoskeletal disorders is now more clear and several studies have quantified causes of absence from work and death.² High frequency, chronicity and musculoskeletal disorders impose a consideration on the communities. Population ageing increases the burden of musculoskeletal disorders over decades.³ Despite these facts, they have not been a focus of public health in low-income and middle-income

the Eastern Mediterranean Region (EMR), epidemiological disorders are sparse and not easily compared to baseline data in this region (from the Community Oriented Program for Control of PCORD). The programme, designed by the International League of Associations for Rheumatology in the 1980s, is presumably the most eminent effort to tackle the burden of musculoskeletal disorders in middle-income countries.⁵ Some countries in the EMR, such as Egypt, Iran, Kuwait, Lebanon, Pakistan and Saudi Arabia, have conducted COPCORD projects in the past two decades. Baseline surveys have shown a high prevalence of musculoskeletal conditions in the region; for example, 45% of people in Iran, based on four different areas. The most common anatomical sites affected were the knees (27%), dorsolumbar spine (24%), cervical spine (14%).⁷ Lifetime prevalence of musculoskeletal disorders was reported by around 33% of individuals in Kuwait, with the most common sites of pain were the knees.⁹ In the northern part of Pakistan, individuals had rheumatic diseases with higher prevalence (16.5%) compared with poor urban areas (10.7%).¹⁰ Musculoskeletal disorders were generally more common in females compared with males.⁸⁻¹² The overall prevalence of musculoskeletal conditions was higher in rural

areas compared with urban.¹⁰⁻¹³ Original data from other countries of the region are usually limited to specific diseases.¹⁴⁻¹⁷ In the demographic and health survey of Palestine, 2% of the population reported a diagnosis of musculoskeletal diseases, with an increasing prevalence with age.¹⁸ Some of the countries in the region have no accessible original data on the magnitude and intensity of musculoskeletal disorders.

There is not a comprehensive summary or comparable data on the burden of musculoskeletal disorders in the countries of this region. In this report, which is part of the Global Burden of Diseases, Injuries, and Risk Factors Study 2013 (GBD 2013), we present the prevalence and burden of musculoskeletal disorders (low back pain, neck pain, osteoarthritis, rheumatoid arthritis, gout and other musculoskeletal disorders) at the regional and national levels in the EMR from 1990 to 2013, as well as the attributable burden from the known risk factors of musculoskeletal disorders.

METHODS

GBD 2013 covers 188 countries, 7 super-regions and 21 regions from 1990 to 2013. In total, 306 causes of diseases and injuries, 240 causes of death and 79 risk factors were systematically analysed. Details on the methodology of GBD studies and the main changes to the methods for GBD 2013 have been explained in previous publications.^{2, 19-21}

There are 22 countries in the EMR by WHO designation with different levels of Gross National Income per capita. The low-income countries are Afghanistan, Djibouti, Somalia and Yemen; middle-income countries: Egypt, Iraq, Iran, Jordan, Lebanon, Libya, Morocco, Pakistan, Palestine, Sudan, Syria and Tunisia; and high-income countries: Bahrain, Saudi Arabia, Kuwait, Oman, Qatar and the United Arab Emirates.

In GBD 2013, the burden from six main categories of musculoskeletal disorders was calculated: rheumatoid arthritis, osteoarthritis, low back pain, neck pain, gout and other musculoskeletal disorders. We used the International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10) codes or their equivalent codes in the earlier versions of ICD and assumed different sequelae for each disorder (table 1). Each musculoskeletal disorder had a list of sequelae with potentially different levels of disability; for instance, low back pain had eight sequelae classified as mild, moderate, severe and most severe low back pain with or without leg pain. Range of disability weight for these sequelae was different from 0.02 (95% uncertainty interval (UI) 0.011–

disorders, equivalent ICD-10 codes and list of sequelae for each disorder in the Global Burden of Disease Study

ICD codes	Sequelae (number of sequelae)
M06.9, M08.0-M08.89	Mild, moderate and severe rheumatoid arthritis (3)
M13.9, M15-M19.079	Mild, moderate, and severe osteoarthritis of the hip; mild, moderate and severe osteoarthritis of the knee (6)
M54.3, G54.4, G57.0-G57.12, M43.2-M43.5, M43.8, M43.9, M45-M49, -M49.89, M51-M51.9, M53, M53.2-M54, M54.1-M54.18, M54.3-M54.9, M99.1-M99.9	Mild, moderate, severe and most severe low back pain without leg pain; mild, moderate, severe and most severe low back pain with leg pain (8)
M50-M50.93, M53.0, M53.1, M54.0-M54.09, M54.2	Mild, moderate, severe and most severe neck pain (4)
M10.19, M10.3-M10.9	Asymptomatic gout, symptomatic episodes of gout and polyarticular gout (3)
L93-L93.2, M00-M03.0, M03.2, M03.6, M07-M08, M08.9-M09.0, M09.8, M11-M12, M12.2-M12.49, M12.8-M12.9, M14-M14.89, M25.879, M30-M32.9, M34-M36.8, M40-M43.19, M65-M68.8, M73, M73.8, M75-M77.9, M80-M83.4, M83.8-M87.09, M87.3-M89.59, -M95.9, M99.0-M99.09.	Asymptomatic other musculoskeletal disorders and other musculoskeletal disorders severity levels 1–6 (7)

Classification of Diseases and Related Health Problems, tenth revision.

0.035) for mild low back pain without leg pain to 0.384 (95% UI 0.256–0.518) for most severe low back pain with leg pain. A complete list of health state descriptions and equivalent disability weights is available in the web appendix of a previous GBD publication.²¹

In this study, the burden is described as prevalence, deaths, due to premature mortality, years lived with disability-adjusted life-years (DALYs), age-standardised rates to be able to dis-

in population structure from the differ-sex-specific rates. musculoskeletal disorder categories (except the category of ‘other musculoskeletal’ to be non-fatal with no mortality and premature mortality. To estimate the cause-mortality envelopes (total number of deaths) were estimated for each country during 1990–2013. All accessible data from vital registration surveys, sample registration data and deaths were considered for preparing the life tables. Death data was extracted from the sample registration data and any available verbal autopsies.¹⁹ We used ensemble modelling²² to estimate the burden of rheumatoid arthritis and ‘other musculoskeletal’ disorders, by sex, country and year.

For this study, we updated the GBD 2010 systematic review methods and measures for each musculoskeletal disorder to avoid missing sources of data. We used the same strategies to avoid missing sources of data as in the previous systematic reviews of GBD collaborators.²¹ A list of the data sources is available on the Global Health Data Exchange (<http://ghdx.healthdata.org/gbd-2013-data-sources>). Bayesian meta-regression analyses through ensemble modelling. We used fixed effects and country-level covariates to adjust for study-level covariates, we included osteoarthritis (OA) disease definition as the reference category. Data from other studies that reported having had a diagnosis of OA, ‘of OA regardless of symptoms’ or ‘OA radiographic confirmation’. More details are available in the online appendix of a previous publication.²⁰ Standardised epidemiological estimates in common weights were used to calculate cause-specific mortality rates through summation of YLLs and YLDs.

The burden of the following risk factors for musculoskeletal disorders: occupational factors, high body mass index and low glomeral filtration rate. Details on definitions of these risk factors for musculoskeletal disorders are available in the online appendix of a previous publication.²⁰

95% UIs for each quantity in this analysis. We used 1000 samples of posterior distribution and 975th values of the distribution.²¹

The burden of musculoskeletal disorders in EMR increased from 5084 (95% UI 1380–2090) in 1990 to 5084 (95% UI 1380–2090) in 2013, a 198% increase. The DALY rate was 0.89 per 100 000 (95% UI 0.62–1.18) in 1990 and 1.39 per 100 000 (95% UI 1.07–1.58) in 2013. The rate of deaths in 2013 was equal to 0.83 (95% UI 0.62–0.95) and constitutes

0.14% (95% UI 0.10–0.16) of all deaths. YLLs of musculoskeletal disorders increased from 68 211 (95% UI 52 961–86 586) in 1990 to 183 659 (95% UI 131 166–219 907) in 2013, a 169% increase.

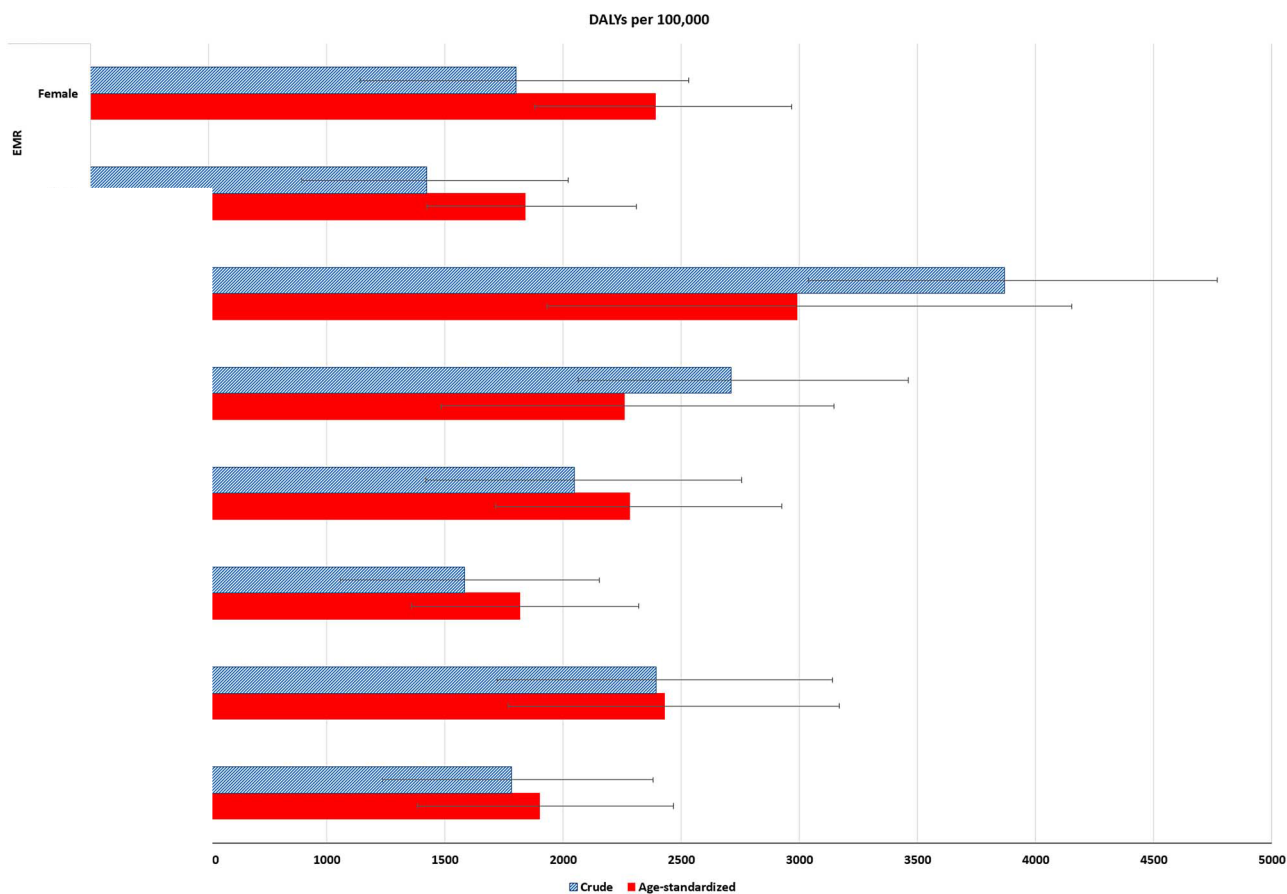
Web appendix table S1 shows point prevalence of musculoskeletal disorders in the EMR countries. Low back pain was the most common condition in all countries in 2013, except Kuwait and Lebanon where neck pain was more prevalent: the range of point prevalence of low back pain was between 32.45 per 1000 in Kuwait and 159.23 in Egypt. The range of point prevalence of neck pain was between 34.31 per 1000 in Pakistan and >55 per 1000 in Somalia and Djibouti. Osteoarthritis ranged from 29.67 per 1000 in Pakistan to >46 per 1000 in Somalia and Djibouti. Point prevalence of gout had a range of 0.15 per 1000 in Pakistan to 1.00 per 1000 in Iran and Qatar. Point prevalence of rheumatoid arthritis was between 0.88 per 1000 in Saudi Arabia and >3 per 1000 in Somalia and Djibouti (web appendix table 1). YLDs of musculoskeletal disorders increased from 1279 per 100 000 (95% UI 907–1686) in 1990 to 1576 (95% UI 1111–2100) in 2013. Musculoskeletal disorders were the second leading cause of YLDs after ‘mental and substance use disorders’ and accounted for 15.7% of all YLDs (95% UI 13.8–17.7%) in 2013. Low back pain and neck pain had the highest YLDs among the disorders (web appendix 1).

As expected, YLDs were the main component of DALYs for musculoskeletal disorders (>98%, both in 1990 and 2013), and DALY estimates were very close to YLD estimates. The total burden of musculoskeletal disorders was 4 842 603 DALYs (95% UI 3 450 654–6 359 159) in 1990 and increased to 9 946 874 DALYs (95% UI 7 068 174–13 194 791) in 2013, a 105.4% increase in total DALYs of musculoskeletal disorders, compared with a 58.0% increase in the rest of the world. The crude DALYs rate per 100 000 increased from 1297.1 (95% UI 924.3–1703.4) in 1990 to 1606.0 (95% UI 1141.2–2130.4) in 2013, which shows a 23.8% increase. Age-standardised DALY rates were 2055.6 (95% UI 1478.3–2704.1) in 1990 and increased by 2.9% to 2115.9 (95% UI 1517.2–2799.7) in 2013. The burden of musculoskeletal disorders as a proportion of total DALYs has constantly increased since 1990; the proportion that was 2.4% (95% UI 1.7–3.0) in 1990 increased to 3.2% (95% UI 2.8–4.6) in 2000 and 4.7% (95% UI 3.6–5.8) in 2013. **Figure 1** compares the burden of musculoskeletal disorders in the EMR to data for the world, low/middle-income countries and high-income countries. **Table 2** summarises DALY rates for each musculoskeletal disorder. As shown, DALY rates have been increased during 1990–2013 for all musculoskeletal disorders, both in men and women.

Egypt had the highest and Lebanon had the lowest age-standardised musculoskeletal disorders DALY rates both for males and females. Ranges of age-standardised DALY rates had a considerable overlap between the low-income, middle-income and high-income countries of EMR (**table 3**).

DALY rates had a clear increasing pattern with age; however, those of middle age had the highest number of DALYs (**figure 2**). Among different musculoskeletal disorders, low back pain had the highest proportion of DALYs in all age groups. The proportion of osteoarthritis DALYs out of total DALYs of musculoskeletal disorders increased with age. In individuals aged ≥65 years, osteoarthritis was the second important cause of DALYs after low back pain.

The burden of musculoskeletal disorders was higher in females compared with males, except for low back pain and gout. The total burden was 5 415 756 DALYs (95% UI 3 877 474–7 150 503) in females and 4 531 118 DALYs (95% UI 3



musculoskeletal disorders in the Eastern Mediterranean Region compared with the world, high-income countries and low-income countries. DALYs, disability-adjusted life-years.

Disability-adjusted life-years (per 100 000) for musculoskeletal disorders in the Eastern Mediterranean Region, 1990 and 2013

Year	Both		Male		Female	
	Rate	95% UI	Rate	95% UI	Rate	95% UI
1990	733.6	497.0–1001.2	770.7	519.2–1059.0	694.6	475.0–959.1
2013	870.6	583.9–1197.9	911.5	612.8–1268.1	827.3	561.2–1148.7
1990	280.5	194.4–386.6	226.0	156.5–310.0	337.8	235.6–467.5
2013	351.8	244.5–483.2	274.2	190.2–376.6	434.0	302.8–592.4
1990	103.8	72.8–140.0	74.9	52.5–101.7	134.2	94.4–181.0
2013	131.7	92.2–179.0	93.9	65.4–127.1	171.8	120.3–233.9
1990	33.7	25.4–43.1	25.7	19.3–32.5	42.0	31.1–54.3
2013	37.6	28.4–48.2	30.3	22.8–38.8	45.2	33.8–58.4
1990	0.9	0.6–1.2	1.3	0.9–1.8	0.5	0.3–0.6
2013	1.2	0.8–1.6	1.7	1.2–2.3	0.6	0.4–0.8
1990	144.7	99.5–200.0	76.6	54.9–104.3	216.3	145.3–303.9
2013	213.2	151.3–292.2	110.6	80.2–152.8	322.1	224.1–445.2
1990	1297.2	924.3–1703.4	1175.3	821.4–1558.4	1425.4	1024.4–1879.6
2013	1606.0	1141.2–2130.4	1422.2	1004.5–1891.6	1800.9	1289.4–2377.7

males in 2013. DALY rates were 1800.9 (95% UI 1004.5–1891.6) and 1422.2 (95% UI 1004.5–1891.6) respectively. Figure 3 shows the burden of musculoskeletal disorders by sex in 2013. Gout had a small burden of DALYs per 100 000 in women and men, and its burden has not been shown in the figure.

The ratio of age-standardised female to male musculoskeletal DALY rates ranged between 1.02 in Morocco and 2.01 in Iran (table 3). The ratio of age-standardised female to male DALY rates was <1 for gout disease in all countries of the region. For low back pain, the ratio was <1 except for Sudan (1.02), Egypt (1.03), Saudi Arabia (1.15), Lebanon (1.43) and Iran

Table 3 Age-standardised disability-adjusted life year rates (per 100 000) of musculoskeletal disorders by country and sex in the Eastern Mediterranean Region, 2013

Countries	Both		Male		Female		F/M ratio
	Rate	95% UI	Rate	95% UI	Rate	95% UI	
Low-income countries	2125	1507–2800	1864	1293–2500	2362	1630–3189	1.27
	2075	1497–2743	1819	1280–2456	2312	1638–3130	1.27
	2020	1463–2621	1880	1350–2473	2151	1522–2835	1.14
	1998	1429–2643	1856	1307–2448	2122	1527–2826	1.14
	2848	1989–3863	2459	1692–3335	3201	2256–4309	1.3
	2370	1708–3153	2034	1442–2715	2683	1936–3529	1.32
	2352	1683–3108	2318	1650–3123	2370	1692–3114	1.02
	2322	1664–3056	1539	1084–2026	3095	2216–4090	2.01
	2274	1605–3003	2028	1418–2718	2507	1770–3348	1.24
	2195	1555–2972	1943	1318–2692	2450	1713–3340	1.26
	2177	1533–2925	1862	1209–2593	2480	1745–3285	1.33
	2040	1438–2728	1880	1289–2590	2165	1531–2905	1.15
	2007	1389–2732	1849	1240–2579	2161	1479–2990	1.17
	1992	1413–2654	1842	1307–2450	2125	1511–2803	1.15
	1636	1186–2158	1603	1156–2140	1670	1205–2197	1.04
	1287	937–1715	1093	792–1450	1500	1077–2004	1.37
	2205	1598–2914	1994	1404–2686	2505	1765–3376	1.26
	2161	1528–2852	1806	1247–2404	2650	1837–3558	1.47
	2080	1470–2782	1825	1222–2538	2436	1718–3259	1.33
	2078	1485–2764	1914	1318–2587	2499	1788–3323	1.31
	2040	1463–2688	1985	1400–2651	2151	1535–2840	1.08
	1361	983–1794	1126	809–1469	1741	1254–2298	1.55

ve-mentioned cases, for each country ge-standardised female to male DALY

mic factors and high body mass index t risk factors for musculoskeletal disorder (95% UI 1 023 600–2 148 137) DALYs were attributable to occupational ergo-66 DALYs (95% UI 283 614–626 896) tributable to high body mass index. ALYs (95% UI 313 110–642 108) of re attributable to high body mass index. c factors were the most important risk h body mass index was a more importhe attributable burden to occupational 3.2 times of the attributable burden to n men and 0.8 for women. This ratio 3 in the low-income countries of the iddle-income countries and 0.8–1.5 in es of the region.

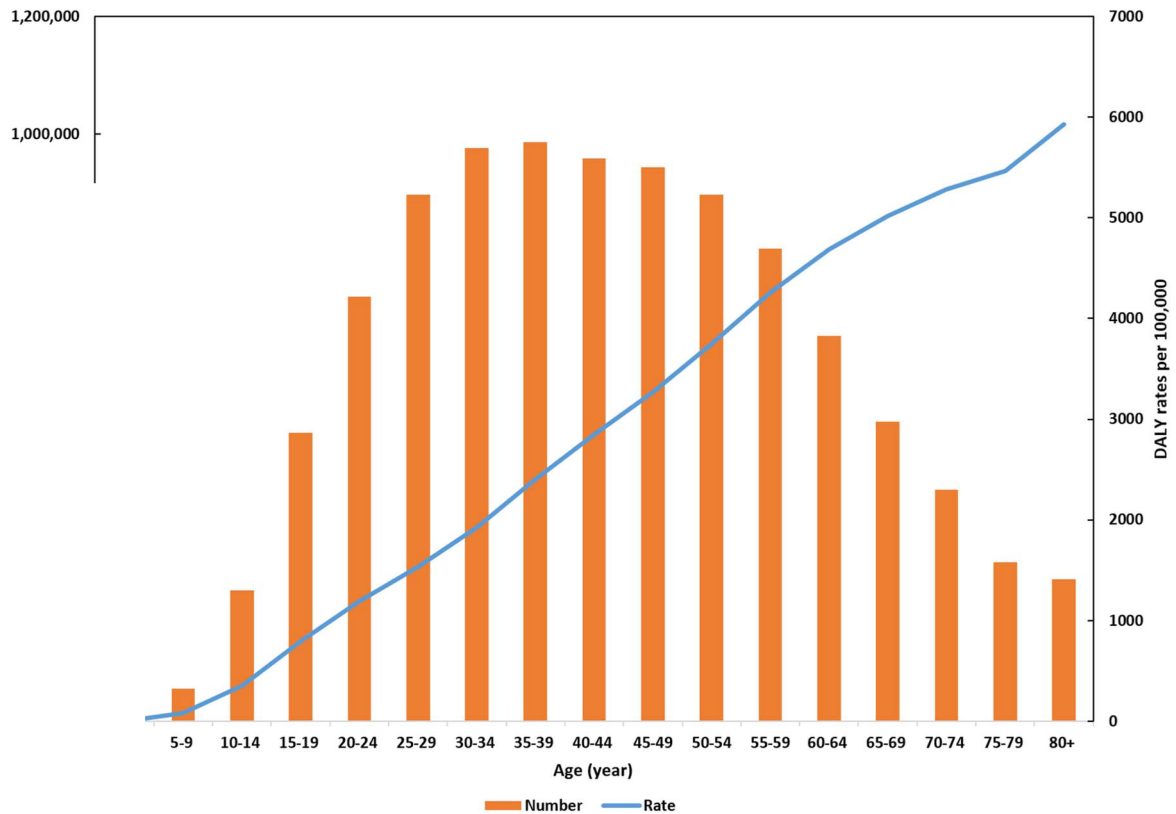
evidence and burden of musculoskeletal low back pain, neck pain and osteoarth-burden of these disorders has increased he rest of the world during 1990–2013.

burden is mainly related to increase in ing, despite most of the other diseases, n the age-standardised rates of burden.

The proportion of musculoskeletal disorders' burden over total burden of disease has even increased. Musculoskeletal disorders are the second leading cause of disability in the EMR. Although population ageing is a main reason for increasing burden of musculoskeletal disorders, a large proportion of the burden is imposed on people in their most active and productive years of life. We did not find a specific association between income level of the country and burden of musculoskeletal disorders; however, the relative importance of risk factors (occupational ergonomic factors compared with high body mass index) was different based on the income level of countries.

Our findings call for incorporating prevention and control programmes for musculoskeletal disorders in national health programmes. COPCORD could be used as a stepwise approach to address the high burden of musculoskeletal disorders; however, previous COPCORD programmes in EMR usually have not progressed beyond the early stages (such as baseline surveys) towards a focus on prevention and control activities.^{6 23} Considering the important risk factors of musculoskeletal disorders, public education, occupational health and safety and ergonomics are among the most important components of any prevention and control programme. Medical interventions and rehabilitation to preserve functional status are essential to provide control of the situation.

Advocacy is required to raise the attention of policy and decision makers to the disease burden caused by musculoskeletal disorders.³ As a reflection on the previous round of the ongoing GBD study, some experts recommended extensive involvement



es and numbers of disability-adjusted life-years (DALYs) of musculoskeletal disorders in the Eastern Mediterranean

to initiate any intervention for control and integrating services with existers.³ Mody and Brooks suggested new egies to train community health workers providers to detect and initiate the man- rlier stages.²⁴

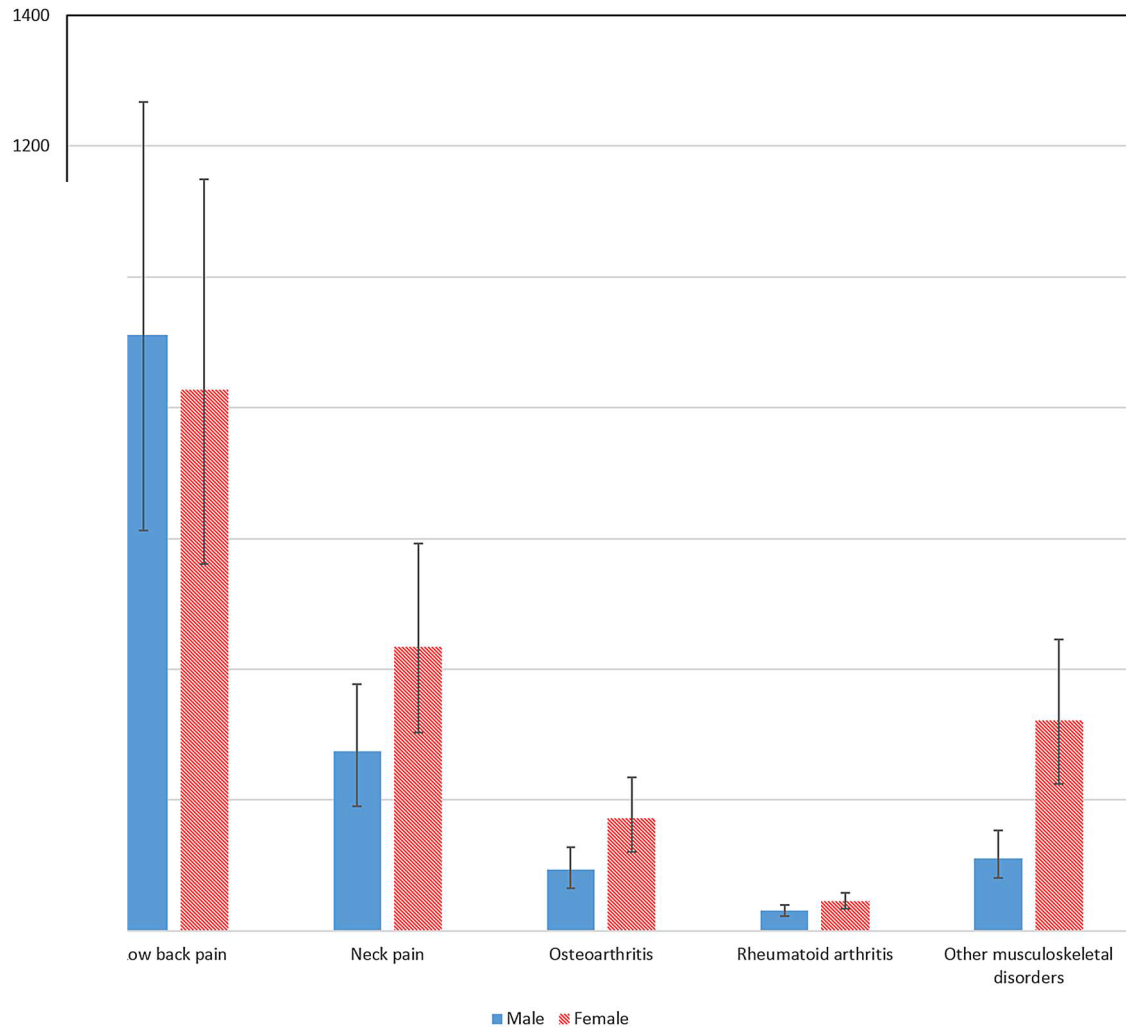
ients and the entire population, treat- interventions, prevention through iden- of environmental and genetic risks are f interventions after primary epidemio- People with musculoskeletal conditions m of services including traditional, come- ve therapies of which efficacies may not nt biological medications and surgical the long-term outcomes of some mus- uch as rheumatoid arthritis or severe they can be too expensive to be afford- imely access to healthcare providers is f the musculoskeletal disorders. For with inflammatory disorders such as rly assessment by a specialist improves ver, previous studies show that many oskeletal disorders do not receive treat- in Lebanon, around a quarter of these ind of treatment.²⁶ On the other hand, using unnecessary diagnostic or thera- eople with musculoskeletal symptoms, er countries. This needs to be avoided for quaternary prevention.

le factors (such as maintaining physical , having a balanced diet, avoidance of lcohol consumption, and preventing

injuries) is not only beneficial for musculoskeletal health but also for other non-communicable diseases that contribute to increasing mortality and morbidity.²⁴

Low back pain and neck pain have the highest burden of musculoskeletal disorders in most of the EMR countries. In previous studies, the seven-day period prevalence of pain for dorsolumbar and cervical spine in Iran were 23.7% and 14.2%, respectively.⁷ The estimates were higher in rural areas compared with urban areas, and also in people with specific jobs and pregnant women.²⁹ In Kuwait, the point prevalence of low back pain in schoolchildren aged 10–18 years old was 20.6% in males and 39.3% in females.³⁰ A cumulative prevalence of around 28% for low back pain was reported by children aged 11–19 years old in Tunisia.³¹ Some of these estimates cannot be directly compared with our estimates due to different definitions and the time interval used for assessment. However, the available evidence collectively reflects the importance of the problem. There are several evidence-based public health and clinical guidelines for low back pain^{32–34} and neck pain,^{35 36} usually from high-income countries. Development of suitable guidelines for use in resource-poor settings is challenging. Most research evidence originates from high-income countries and may not be relevant or applicable to the needs of low-income countries. Moreover, the development of valid clinical guidelines needs resources and certain expertise that sometimes is not available. In the paucity of nationally developed guidelines, EMR countries can use the available guidelines through adaptation processes.³⁷

Osteoarthritis is an important cause of disability, especially in elderly people. It is expected to be influenced by the population ageing process more than other musculoskeletal disorders. Some evidence suggests that intensive physical activity might increase



musculoskeletal disorders in the Eastern Mediterranean Region by sex, 2013. DALYs, disability-adjusted life-years.

large joints; however, this is not a finding especially confusing in the elderly; while at walking and physical exercise has a coarthritis, there are some reviews that in elder individuals can help to reduce arthritis.³⁹ Light or moderate physical activity known to increase risk or complications of physical activity can also decrease risk of osteoarthritis.^{38 39} The burden of musculoskeletal disorders' was around threefold in men. Conditions such as fibromyalgia and systemic connective tissue disorders are more prevalent among

mitations. Although we estimated a burden of musculoskeletal disorders in this study, we did not separately assess the burden of hand osteoarthritis and systemic connective tissue disorders. The classification of musculoskeletal disorders into 10 codes clarify the components of each disorder; instead, osteoporosis was classified as a risk factor for fracture; its burden has not been shown in this study. We provide separate estimates for diseases

such as the Behçet disease, which have regional importance in EMR or individual (but not collective) high burden.

There were issues with availability and quality of data in some EMR countries; however, we used GBD modelling approaches to reduce this issue. Indeed, the lack of high-quality data in the region, especially from the 1990s, might have an influence on the estimated trend of musculoskeletal diseases. Although this issue exists for many of the causes of diseases, it might have an imbalanced effect on musculoskeletal diseases (the importance of which has been highlighted in the recent decades) compared with the other diseases. This factor might affect different regions of the world in different ways. However, we do not believe that it can purely explain the faster increase in burden of musculoskeletal disorders in EMR compared with the rest of the world.

CONCLUSION

Findings from this study show a high burden of musculoskeletal disorders, especially low back pain, neck pain and osteoarthritis in the region. The reasons for faster increase of musculoskeletal disorders' burden in EMR during 1990–2013 compared with the rest of the world need to be explored. Our findings call for integrating prevention and control programmes for musculoskeletal disorders with health system programmes. Plans should include improving health data to monitor trends, addressing known risk factors especially through health education and awareness, ergonomics and occupational health and safety, and

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