EXTENDED REPORT

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

Maziar Moradi-Lakeh,[1,2] Mohammad H Forouzanfar,[1] Stein Emil Vollset,[1,3,4] Charbel El Bcheraoui,[1] Farah Daoud,[1] Ashkan Afshin,[1] Raghid Charara,[1] Ibrahim Khalil,[1] Hideki Higashi,[5] Mohamed Magdy Abd El Razek,[6] Aliasghar Ahmad Kiadaliri,[7] Khurshid Alam,[8,9,10] Nadia Akseer,[11,12] Nawal Al-Hamad,[13] Raghib Ali,[14] Mohammad AbdulAziz AlMazroa,[15] Mahmoud A Alomari,[16] Abdullah A Al-Rabeeah,[15] Ubai Alsharif,[17] Khalid A Altirkawi,[18] Suleman Atique,[19] Alaa Badawi,[20] Lope H Barrero,[21] Mohammed Basulaiman,[15] Shahrzad Bazargan-Hejazi,[22,23] Neeraj Bedi,[24] Isabela M Bensenor,[25] Rachelle Buchbinder,[26,27] Hadi Danawi,[28] Samath D Dharmaratne,[29] Faiez Zannad,[30] Maryam S Farvid,[31,32] Seyed-Mohammad Fereshtehnejad,[33] Farshad Farzadfar,[34] Florian Fischer,[35] Rahul Gupta,[36] Randah Ribhi Hamadeh,[37] Samer Hamidi,[38] Masako Horino,[39,40] Damian G Hoy,[41] Mohamed Hsairi,[42] Abdullatif Husseini,[43] Mehdi Javanbakht,[44] Jost B Jonas,[45] Amir Kasaeian,[46,47] Ejaz Ahmad Khan,[48] Jagdish Khubchandani,[49] Ann Kristin Knudsen,[50] Jacek A Kopec,[51] Raimundas Lunevicius,[52,53] Hassan Magdy Abd El Razek,[54] Azeem Majeed,[55] Reza Malekzadeh,[56] Kedar Mate,[57] Alem Mehari,[58] Michele Meltzer,[59] Ziad A Memish,[15,60] Mojde Mirarefin,[61] Shafiu Mohammed,[62,63] Aliya Naheed,[64] Carla Makhlouf Obermeyer,[65] In-Hwan Oh,[66] Eun-Kee Park,[67] Emmanuel Kwame Peprah,[68] Farshad Pourmalek,[51] Mostafa Qorbani,[69] Anwar Rafay,[70,71] Vafa Rahimi-Movaghar,[72] Rahman Shiri,[73] Sajjad Ur Rahman,[74] Rajesh Kumar Rai,[75] Saleem M Rana,[70,71] Sadaf G Sepanlou,[76] Masood Ali Shaikh,[77] Ivy Shiue,[78,79] Abla Mehio Sibai,[80] Diego Augusto Santos Silva,[81] Jasvinder A Singh,[82] Jens Christoffer Skogen,[3,83] Abdullah Sulieman Terkawi,[84,85,86] Kingsley N Ukwaja,[87] Ronny Westerman,[88,89] Naohiro Yonemoto,[90] Seok-Jun Yoon,[91] Mustafa Z Younis,[92] Zoubida Zaidi,[93] Maysaa El Sayed Zaki,[54] Stephen S Lim,[1] Haidong Wang,[1] Theo Vos,[1] Mohsen Naghavi,[1] Alan D Lopez,[1,94] Christopher J L Murray,[1] Ali H Mokdad[1]

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For numbered affiliations see end of article.

Correspondence to
Professor Ali Mokdad, Institute for Health Metrics and Evaluation, University of Washington, 2301 5th Avenue, Suite 600, Seattle, WA 98121, USA; mokdaa@uw.edu

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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 live 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 musculoskel- etal disorders is now more clear and several studies have quanti- en of musculoskeletal disorders.[2] They valent causes of absence from work and de.[2] High frequency, chronicity and sculoskeletal disorders impose a consid- on the communities. Population ageing lly increase the burden of musculoskel- coming decades.[3] Despite these facts, s have not been a focus of public health in low-income and middle-income

rranean Region (EMR), epidemiological disorders are sparse and not easily com- ata in this region come from baseline nity Oriented Program for Control of PCORD). The programme, designed by ernational League of Associations for 980s, is presumably the most eminent e to tackle the burden of musculoskel- ddle-income countries.[5] Some countries Egypt, Iran, Kuwait, Lebanon, Pakistan ed COPCORD projects in the past two D baseline surveys have shown a high keletal conditions in the region; for l complaints during the past seven days d 45% of people in Iran, based on four an areas. The most common anatomical knees (27%), dorsolumbar spine (24%), vical spine (14%).[7] Lifetime prevalence lems was reported by around 33% of a current point prevalence of approxi- 7% of individuals in Kuwait reported d the most common sites of pain were rs.[9] In the northern part of Pakistan in e had rheumatic diseases with higher s (16.5%) compared with poor urban rban areas (10.7%).[10] Musculoskeletal or disorders) were generally more ompared with males.[8–12] The overall keletal 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

0 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)
, G54.3, 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 d disability-adjusted life-years (DALYs). age-standardised rates to be able to dis- n population structure from the differ- sex-specific rates.

loskeletal disorder categories (except the category of 'other musculoskeletal d to be non-fatal with no mortality and ture mortality. To estimate the cause- mortality envelopes (total number of were estimated for each country during 3. All accessible data from vital registra- story surveys, sample registration data deaths were considered for preparing of death data was extracted from the s any available verbal autopsies.[19] We nsemble modelling [22] to estimate the heumatoid arthritis and 'other musculo- , sex, country and year.

, we updated the GBD 2010 systematic ical measures for each musculoskeletal ent strategies to avoid missing sources of ring of the results of systematic reviews ork of GBD collaborators.[21] A list of ns is available on the Global Health tp://ghdx.healthdata.org/gbd-2013-data- yesian meta-regression analyses through sed for disease modelling. We used fixed and country-level covariates to adjust le of study-level covariates, we included OA disease definition as the reference extracted data from other studies that porting having had a diagnosis of OA', of OA regardless of symptoms' or 'OA adiographic confirmation'. More details le in the online appendix of a previous sed epidemiological estimates in com- weights were used to calculate cause- age, sex, location and calendar year.[21] hrough summation of YLLs and YLDs.

able burden of the following risk factors of musculoskeletal disorders: occupa- , high body mass index and low glom- tails on definitions of these risk factors r musculoskeletal disorders are available previous publication.[20]

% UIs for each quantity in this analysis. king 1000 samples of posterior distribu- and 975th values of the distribution.[21]

ue to musculoskeletal disorders in EMR 5% UI 1380–2090) in 1990 to 5084 9) in 2013, a 198% increase. rate was 0.89 per 100 000 (95% UI 1.39 per 100 000 (95% UI 1.07–1.58) of deaths in 2013 was equal to 0.83 0 (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.

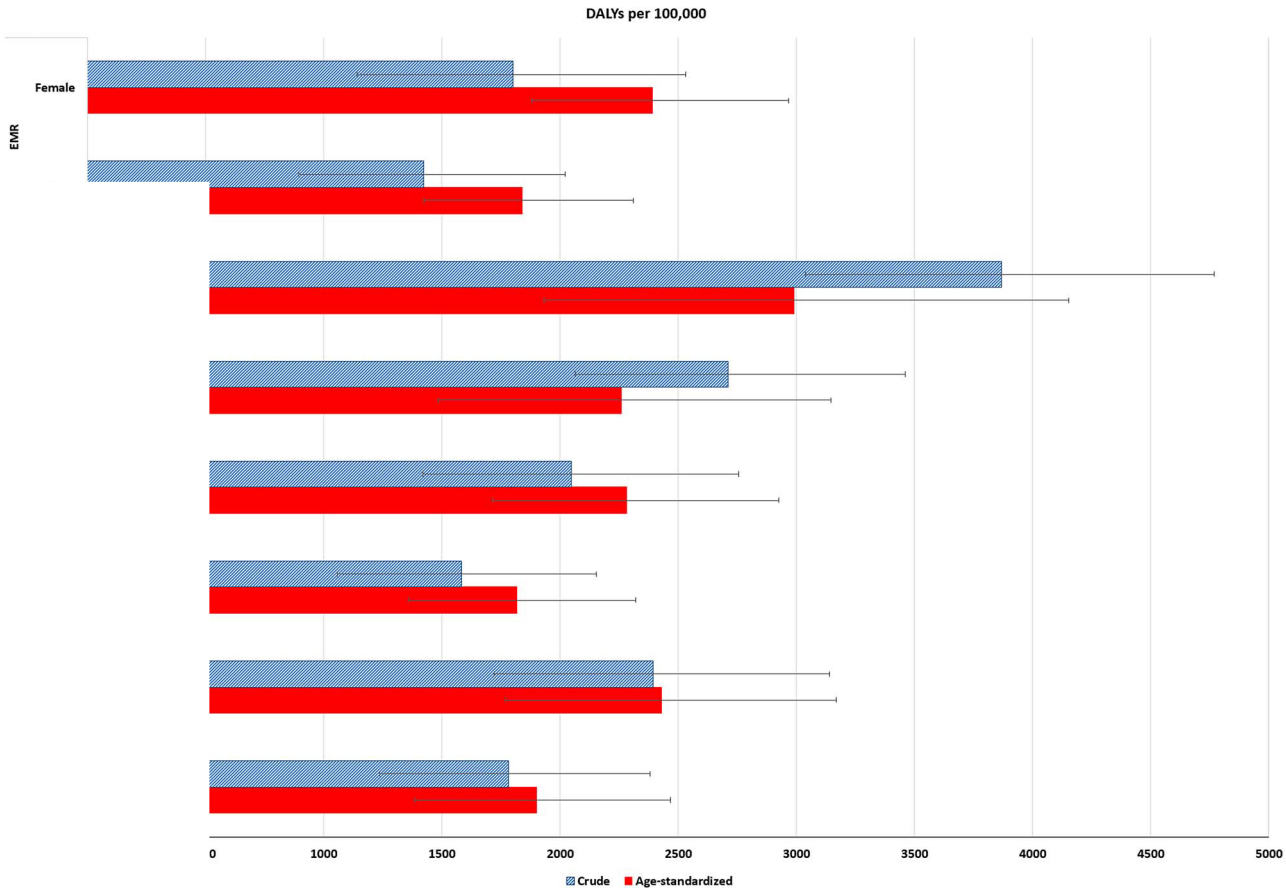
Web appendix table S1 shows point prevalence of musculoskeletal disorders in the EMR countries. Low back pain was the most common condition in all countries in 2013, except Kuwait and Lebanon where neck pain was more prevalent: the range of point prevalence of low back pain was between 32.45 per 1000 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



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

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

	Both		Male		Female	
Year	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	1024.4–1.879.6
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
) and 1422.2 (95% UI 1004.5–1891.6)
spectively. Figure 3 shows the burden of
order by sex in 2013. Gout had a small
LYs per 100 000 in women and men,
en 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

	Both		Male		Female		
Countries	Rate	95% UI	Rate	95% UI	Rate	95% UI	F/M ratio
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

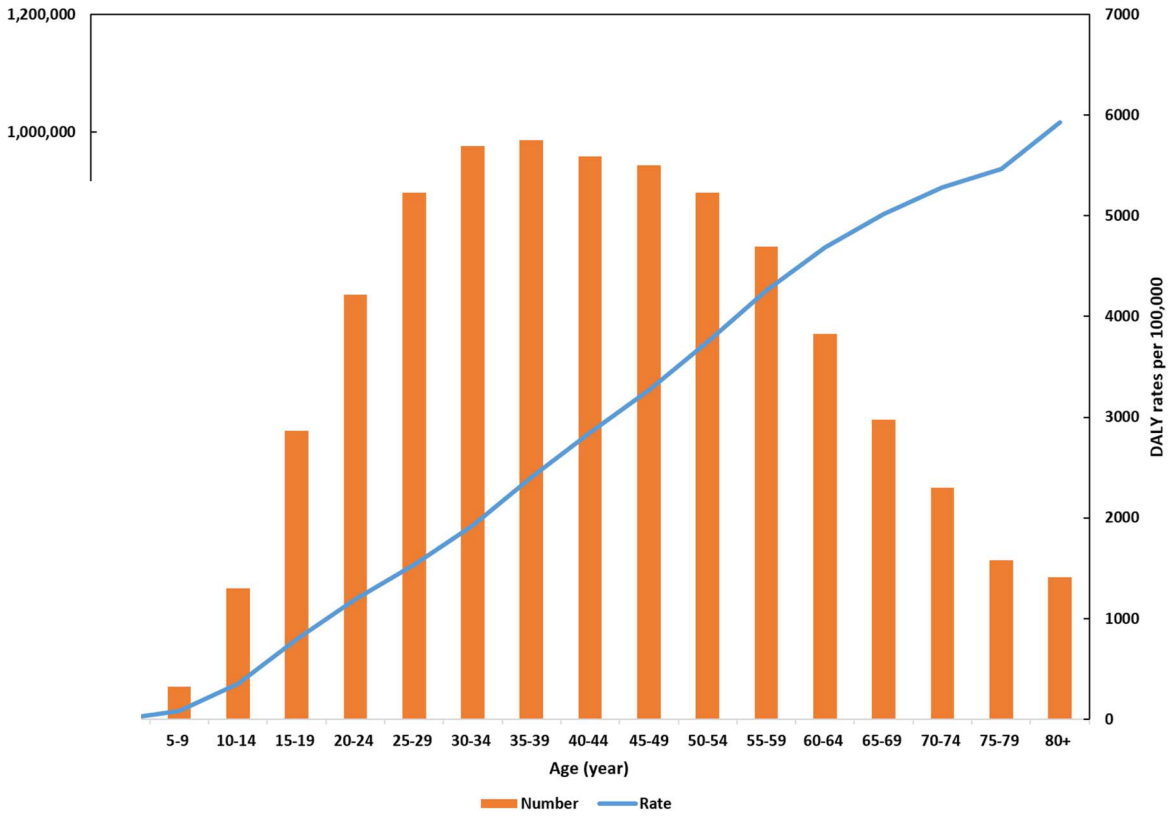
mic factors and high body mass index
t risk factors for musculoskeletal disor-
(95% UI 1 023 600–2 148 137) DALYs
were attributable to occupational ergo-
66 DALYs (95% UI 283 614–626 896)
tributable to high body mass index.
ALYs (95% UI 313 110–642 108) of
re attributable to high body mass index.
c factors were the most important risk
h body mass index was a more import-
he 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.

evalence 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

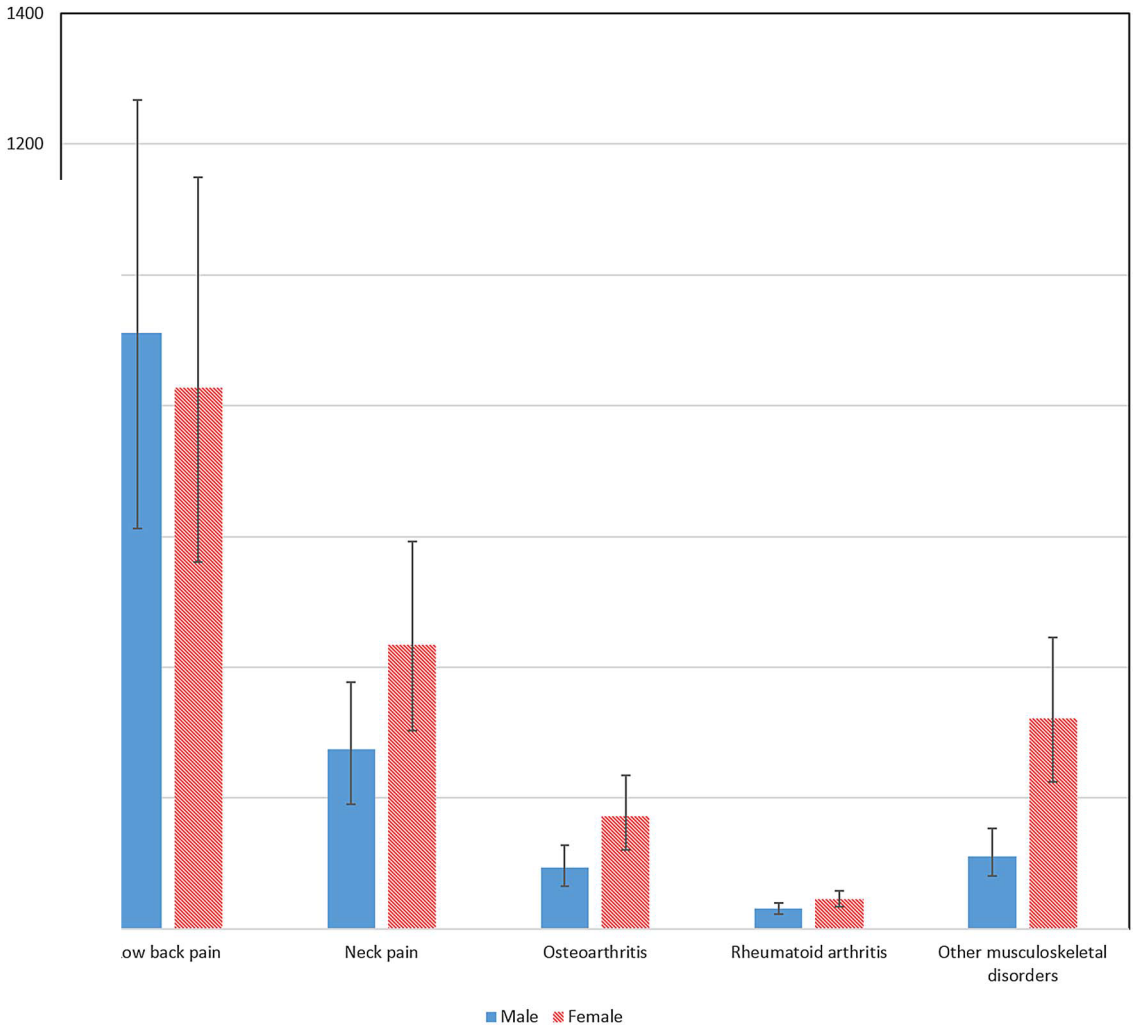


es and numbers of disability-adjusted life-years (DALYs) of musculoskeletal disorders in the Eastern Mediterranean

to initiate any intervention for control
ders and integrating services with exist-
res.[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, com-
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



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

large joints; however, this is not a dings on association of physical activity pecially confusing in the elderly; while at walking and physical exercise has a eoarthritis, there are some reviews that n elder individuals can help to reduce arthritis.[39] Light or moderate physical known to increase risk or complications l activity can also decrease risk of osteo- g body mass index.[38 39] The burden of disorders' was around threefold in men. Conditions such as fibromyalgia disorders are more prevalent among

mitations. Although we estimated a col- culoskeletal disorders in this study, we e estimations for some of the disorders and systemic connective tissue disor- not separately assess the burden of hand sification of musculoskeletal disorders ion between symptoms, complaints and 10 codes clarify the components of each clude osteoporosis as a disease; instead, y was classified as a risk factor for frac- e burden has not been shown in this t 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

providing evidence-based early diagnosis and treatment, rehabilitative care and community programmes to increase knowledge of risk and protective factors.

Author affiliations
[1]Institute for Health Metrics and Evaluation, University of Washington, Seattle,

icine, Preventive Medicine and Public Health
of Medical Sciences, Tehran, Iran
ealth, Bergen, Norway
alth and Primary Care, University of Bergen,

Agency, Lusaka, Zambia
an University Hospital, Aswan, Egypt
artment of Clinical Sciences Lund, Orthopedics,

stitute, Melbourne, Victoria, Australia
elbourne, Victoria, Australia
ey, New South Wales, Australia
onto, Ontario, Canada
Ontario, Canada
tion, Ministry of Health, Safat, Kuwait
K
h, Saudi Arabia
epartment of Rehabilitation Sciences, Faculty of
n University of Science and Technology, Irbid, Jordan
erlin, Germany
Saudi Arabia
al Informatics, Taipei Medical University, Taipei,

da, Toronto, Ontario, Canada
eering, School of Engineering, Pontificia Universidad

Medicine and Science, Los Angeles, California, USA
ne, University of California at Los Angeles (UCLA),

ropical Medicine, Jazan, Saudi Arabia
aulo, Brazil
l Epidemiology, Cabrini Institute, Melbourne,

nd Preventive Medicine, School of Public Health and
iversity, Melbourne, Victoria, Australia
s, Minnesota, USA
dicine, Faculty of Medicine, University of Peradeniya,

SERM (the National Institute for Health and Medical
, Vandoeuvre les Nancy, France
ard T.H. Chan School of Public Health, Boston,

mics, Vulnerable Populations, and Health Disparities,
cy, Massachusetts General Hospital, Boston,

Care Sciences and Society (NVS), Karolinska Institute,

Research Center, Endocrine and Metabolic Research
edical Sciences, Tehran, Iran
Germany
c Health, Charleston, West Virginia, USA
ma, Bahrain
rt University, Dubai, United Arab Emirates
nd Public Health, Carson City, Nevada, USA
h, University of California, Los Angeles, Los

riat of the Pacific Community, Noumea, New

nisia
blic Health, Birzeit University, Birzeit, Palestine
it, University of Aberdeen, Aberdeen, UK
, Medical Faculty Mannheim, Ruprecht-Karls-
, Germany
m Cell Transplantation Research Center, Tehran
ehran, Iran
Research Center, Endocrinology and Metabolism
hran University of Medical Sciences, Tehran, Iran
abad, Pakistan
Indiana, USA
s, Norwegian Institute of Public Health, Bergen,
Norway
[51]University of British Columbia, Vancouver, British Columbia, Canada
[52]Aintree University Hospital National Health Service Foundation Trust, Liverpool, UK
[53]School of Medicine, University of Liverpool, Liverpool, UK
[54]Mansoura Faculty of Medicine, Mansoura, Egypt
[55]Imperial College London, London, UK
[56]Digestive Disease Research Institute, Tehran Universities of Medical Sciences, Tehran, Iran
[57]McGill University, Montreal, Quebec, Canada
[58]College of Medicine, Howard University, Washington DC, USA
[59]Thomas Jefferson University, Philadelphia, Pennsylvania, USA
[60]College of Medicine, Alfaisal University, Riyadh, Saudi Arabia
[61]Hunger Action Los Angeles, Los Angeles, California, USA
[62]Health Systems and Policy Research Unit, Ahmadu Bello University, Zaria, Nigeria
[63]Institute of Public Health, Heidelberg University, Heidelberg, Germany
[64]International Centre for Diarrhoeal Disease Research, Dhaka, Bangladesh
[65]Faculty of Health Sciences, Center for Research on Population and Health, American University of Beirut, Beirut, Lebanon
[66]Department of Preventive Medicine, School of Medicine, Kyung Hee University, Seoul, South Korea
[67]Department of Medical Humanities and Social Medicine, College of Medicine, Kosin University, Busan, South Korea
[68]National Heart, Lung, and Blood Institute, Bethesda, Maryland, USA
[69]Noncommunicable Diseases Research Center, Alborz University of Medical Sciences, Karaj, Iran
[70]Contech International Health Consultants, Lahore, Pakistan
[71]Contech School of Public Health, Lahore, Pakistan
[72]Sina Trauma and Surgery Research Center, Tehran University of Medical Sciences, Tehran, Iran
[73]Finnish Institute of Occupational Health, Helsinki, Finland
[74]Sweidi Hospital, Riyadh, Saudi Arabia
[75]Society for Health and Demographic Surveillance, Suri, India
[76]Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran
[77]Independent Consultant, Karachi, Pakistan
[78]Faculty of Health and Life Sciences, Northumbria University, Newcastle upon Tyne, UK
[79]Alzheimer Scotland Dementia Research Centre, University of Edinburgh, Edinburgh, UK
[80]Department of Epidemiology & Population Health, Faculty of Health Sciences, American University of Beirut, Beirut, Lebanon
[81]Federal University of Santa Catarina, Florianópolis, Brazil
[82]University of Alabama at Birmingham, and Birmingham Veterans Affairs Medical Center, Birmingham, Alabama, USA
[83]Alcohol and Drug Research Western Norway, Stavanger University Hospital, Stavanger, Norway
[84]Department of Anesthesiology, University of Virginia, Charlottesville, Virginia, USA
[85]Outcomes Research Consortium, Cleveland Clinic, Cleveland, Ohio, USA
[86]Department of Anesthesiology, King Fahad Medical City, Riyadh, Saudi Arabia
[87]Department of Internal Medicine, Federal Teaching Hospital, Abakaliki, Nigeria
[88]Federal Institute for Population Research, Wiesbaden, Germany
[89]German National Cohort Consortium, Heidelberg, Germany
[90]Department of Biostatistics, School of Public Health, Kyoto University, Kyoto, Japan
[91]Department of Preventive Medicine, College of Medicine, Korea University, Seoul, South Korea
[92]Jackson State University, Jackson, Mississippi, USA
[93]University Hospital, Setif, Algeria
[94]Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Victoria, Australia

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