Balkan Med J 2025;42:138-49

Burden of Substance Use Disorders in the Middle East and North Africa from 1990 to 2019

Seyed Reza Darijani[1], Homa Seyedmirzaei[2], Amin Nakhostin-Ansari[3], Iman Menbari-Oskouie[4], Amirhossein Ghaseminejad-Raeini[1], Hadis Nasoori[5], Amir Hossein Memari[6], Shahin Akhondzadeh[7,8]

[1]School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
[2]Occupational Sleep Research Center, Baharloo Hospital, Tehran University of Medical Sciences, Tehran, Iran
[3]Neuromusculoskeletal Research Center, Iran University of Medical Sciences, Tehran, Iran
[4]Urology Research Center, Tehran University of Medical Sciences, Tehran, Iran
[5]Faculty of Pharmacy, Tehran University of Medical Sciences, Islamic Azad University, Tehran, Iran
[6]Sport Medicine Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran
[7]Research Center for War-affected People, Tehran University of Medical Sciences, Tehran, Iran
[8]Psychiatric Research Center, Roozbeh Psychiatric Hospital, Tehran University of Medical Sciences, Tehran, Iran

Background: Studies on the burden and epidemiological aspects of substance-use disorders in the Middle East and North Africa (MENA) are limited.

Aims: To evaluate the burden and epidemiology of substance-use disorders in MENA countries during 1990-2019.

Study Design: Ecological study.

Methods: Data from the global burden of disease study were used in the current study. The incidence, prevalence, mortality, years of life lost from mortality, years of healthy life lost due to disability, and disability-adjusted life years (DALY) rates attributable to each group of disorders across age groups, genders, years, and countries were retrieved along with their corresponding age-standardized values. Age-standardized DALYs rates of alcohol-use disorders, drug-use disorders, and substance-use disorders associated with sociodemographic index across MENA countries and over 30 years were examined.

Results: The age-standardized DALY rate of substance-use disorders in MENA had risen from 190.1 in 1990 to 234.93 per 100,000 in 2019, indicating a 23.57% increase. In both genders, the DALY rate was highest in the 25-29-years age group in 2019 (440.81 per 100,000 in females and 645.97 per 100,000 in males). In addition, in 2019, age-standardized DALY rates of alcohol-use disorder were the highest in the United Arab Emirates (77.08 per 100,000), Afghanistan (67.77 per 100,000), and Bahrain (60.35 per 100,000). In almost all these countries, opioid-use disorder had the highest age-standardized DALY rate in 2019.

Conclusion: The burden of substance-use disorders has increased from 1990 to 2019 in the MENA region in contrast to the global trend. This study findings highlight that the current interventions and laws implemented in this region to address drug trafficking and substance-use disorders may be insufficient and ineffective, warranting further international collaboration and implementation of more effective strategies to reduce the overall burden of substance-use disorders.

INTRODUCTION

Substance-use disorder can be defined as illegal or legal drug- and alcohol-use in a manner that can cause health problems.[1] Substance-use disorder is the seventh leading cause of years lived with disability (YLD) globally, suggesting substance-use disorder is a major public health issue.[2,3] In 2017, more than 7 million people were estimated to suffer from drug-use disorder.[2] However, in recent years, substance-use disorder has not received much attention from policymakers relative to the focus on communicable and non-communicable diseases.[1,2]

The Middle East and North Africa (MENA) region includes 21 countries in west Asia and North of Africa.[4] Among these countries, some have

Corresponding author: Shahin Akhondzadeh, Psychiatric Research Center, Roozbeh Psychiatric Hospital, Tehran University of Medical Sciences, Tehran, Iran

e-mail: s.akhond@neda.net

Received: November 18, 2024 **Accepted:** February 06, 2025 **Available Online Date:** March 03, 2025 • **DOI:** 10.4274/balkanmedj.galenos.2025.2024-11-61

Available at www.balkanmedicaljournal.org

ORCID iDs of the authors: S.R.D. 0000-0002-9956-9787; H.S. 0000-0001-7799-9332; A.N.A. 0000-0002-1113-9257; I.M.O. 0000-0002-5511-1512; A.G.R. 0000-0002-4322-0236; H.N. 0000-0003-0348-3768; A.H.M. 0000-0002-8302-1821; S.A. 0000-0002-2277-5101.

Cite this article as: Darijani SR, Seyedmirzaei H, Nakhostin-Ansari A, Menbari-Oskouie I, Ghaseminejad-Raeini A, Nasoori H, Memari AH, Akhondzadeh S. Burden of Substance Use Disorders in the Middle East and North Africa from 1990 to 2019. Balkan Med J.; 2025; 42(2):138-49.

the highest production of opium- and cannabis-based drugs in the world and are globally known as the golden crescent.[5] Several of the MENA countries have experienced some sort of social unrest, such as wars and riots, in recent years. Based on the evidence, this kind of social unrest can lead to higher substance abuse in the affected societies.[6,7] Therefore, policymakers and healthcare providers need to have an insight into the epidemiology and burden of substance-use disorder in this region. Despite its importance, very limited studies have been conducted on the burden and epidemiology of substance-use disorder in the MENA region. In a study in Iran, Sangestani et al.[8] found that opioid is the most commonly used substance among a sample population of Iranians referred to methadone-maintenance treatment centers. In another study, Nafeh et al.[9] found that the prevalence of drug-use was higher in Afghanistan relative to its global prevalence. They also found that opioids were the leading cause of disability in Afghanistan among other drugs.[9] In another study, Safiri et al.[10] found that alcohol consumption was responsible for the death of more than 1 million people in MENA in 2019 alone. Despite these data, no comprehensive and comparative study has been conducted on all MENA countries and multiple substances.

In summary, despite the importance of substance abuse in the MENA region, there are only limited studies available on the burden and epidemiological aspects of substance-use disorder in this region. Accordingly, we aimed to evaluate the burden and epidemiology of substance-use disorders in MENA from 1990 to 2019. We compared the burden of substance-use among the countries as well as the burden imposed by different substances in the region. We also aimed to describe the epidemiology of substance-use disorder across age groups and genders.

MATERIALS AND METHODS

Source

Data from the global burden of disease (GBD) study were used in the current study. The Institute of Health Metrics and Evaluation conducted the GBD study to estimate the burden of 369 diseases and 87 risk factors at the national, international, and global levels from 1990 to 2019.[4,11] We retrieved relevant data on the burden of substance-use disorders from 1990 to 2019 across genders and all MENA countries, including Afghanistan, Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, Türkiye, United Arab Emirates, and Yemen.

Disorders

Substance-use disorders constitute two major groups of disorders: alcohol-use disorders and drug-use disorders. Drug-use disorders also include opioid-use disorders, cocaine-use disorders, amphetamine-use disorders, cannabis-use disorders, and other drug-use disorders.

Indexes

Incidence, prevalence, mortality, years of life lost from mortality (YLL), years of healthy life lost due to disability (YLD), and disability-adjusted life years (DALY) rates attributable to each group of disorders across age groups, genders, years, and countries, as well as their corresponding 95% confidence intervals [95% (CIs)] were retrieved along with their corresponding age-standardized values. All rates were reported per 100,000 people. YLL measures premature mortality based on the calculation of the difference between the age at death and the expected life expectancy. YLD quantifies the YLD or disease, considering both the duration and severity of the condition. DALY represents the combined burden of a disease, as it is the sum of YLL and YLD.[12,13]

Sociodemographic index (SDI) values were also extracted for each country across the years. SDI was calculated based on three factors: income per capita, the fertility rate in people aged < 25 years, and the number of years of education for people of age > 15 years. The resulting SDI values ranged from 0 to 1, with higher values indicating higher levels of development.

Statistical analysis

Age-standardized DALYs rates of alcohol-use disorders, drug-use disorders, and substance-use disorders associations with the SDI across MENA countries and over 30 years were examined in this study using locally estimated scatterplot smoothing (LOESS) regression. For this purpose, we employed the bootstrapping method and performed LOESS regression 100 times, each time with a randomly selected 50% data subset. The resulting average curve represented the expected value line, while the upper and lower limits were defined as $\pm$ 1.96 standard deviations from this expected line.

To evaluate the trends in the age-standardized DALY rates of substance-use disorders over the years, we utilized linear regression models, with age-standardized values for substance-use disorders as the dependent variable and years as the independent variable. The analyses were performed using Python version 3.8 and SPSS version 26.

RESULTS

The age-standardized DALY rate of substance-use disorders in MENA had risen from 190.11 (95% CI: 147.46-236.44) in 1990 to 234.93 (95% CI: 182.47-289.59) per 100,000 in 2019, indicating a 23.58% (95% CI: 18.04-30.18) increase (Table 1). The age-standardized DALY rate of alcohol-use disorder decreased from 58.86 (95% CI: 43.35-78.05) in 1990 to 51.76 (95% CI: 36.83-69.92) per 100,000 in 2019. However, the age-standardized DALY rates of all other individual disorders increased during this period (Figure 1). These results were compatible with our regression models evaluating the trends in the age-standardized DALY rates of substance-use disorders in MENA (Table 2).

In 2019, the age-standardized DALY rate of substance-use disorders in MENA was higher in males (288.4 per 100,000, 95% CI: 230.88-349.01) than in females (176.04 per 100,000, 95% CI: 130.44-225.98). Similarly, the age-standardized DALY rates of all individual substance-use disorders were higher in males than in females (Table 1).

TABLE 1. Burden of Substance Use Disorders Across Genders and Years in MENA.

	Gender				Year					
	Male		Female		Rate (95% UI)			Age-standardized rate (95% UI)		
Disorder	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	1990	2019	Percentage change	1990	2019	Percentage change
Substance use disorders										
Incidence	489.7 (414.33-579.89)	453.21 (386.72-531.24)	312.04 (264.42-369.11)	293.09 (248.85-344.43)	327.62 (277.93-388.41)	404.33 (344.5-478.26)	23.42 (19.26-27.66)	371.3 (318.58-434.58)	376.83 (322.72-444.21)	1.49 (–0.76-3.55)
Prevalence	1124.58 (974.29-1294.38)	1047.62 (911.98-1207.08)	658.44 (564.7-771.4)	620.57 (534.79-726.16)	696.48 (600.06-806.08)	900.59 (78zz 2.77-1032.66)	29.31 (25.15-34.09)	782.5 (681.61-896.7)	843.62 (736.34-965.85)	7.81 (4.98-10.8)
Death	2.27 (2-2.55)	2.32 (2.05-2.58)	0.71 (0.62-0.8)	0.77 (0.68-0.87)	0.86 (0.75-0.97)	1.52 (1.36-1.69)	77.55 (55.36-104.34)	1.2 (1.04-1.37)	1.58 (1.42-1.75)	30.93 (15.26-50.15)
YLL	107.28 (93.95-120.74)	101.15 (88.81-113.41)	32.22 (27.9-37.09)	31.6 (27.48-36.21)	41.18 (36.28-46.49)	71.21 (63.07-79.46)	72.94 (50.05-99.58)	50.91 (44.6-57.77)	68.06 (60.39-75.88)	33.68 (16.7-54.56)
YLD	201.69 (140.49-265.05)	187.25 (130.28-245.89)	153.42 (104.98-207.49)	144.44 (99.05-194.54)	124.03 (84.95-167.15)	178.49 (123.64-236.07)	43.91 (37.12-51.3)	139.2 (96.56-185.86)	166.87 (116.01-219.95)	19.88 (15.11-25.35)
DALYs	308.96 (246.29-374.66)	288.4 (230.88-349.01)	185.64 (135.85-240.06)	176.04 (130.44-225.98)	165.21 (126.36-208.6)	249.7 (192.95-308.91)	51.15 (42.98-59.71)	190.11 (147.46-236.44)	234.93 (182.47-289.59)	23.58 (18.04-30.18)
Alcohol use disorders										
Incidence	299.79 (232.61-376.31)	278.5 (218.13-348.07)	146.8 (111.17-188.82)	138.69 (106.82-177.37)	196.1 (152.83-247.85)	226.28 (174.02-286.33)	15.39 (9.67-20.99)	225.56 (180.29-279.61)	211.89 (165.35-265.98)	–6.06 (–9.28-–3.15)
Prevalence	567.84 (449.09-700.03)	533.64 (428.94-649.65)	281.84 (218.67-355.22)	268.88 (212.19-335.73)	368.98 (293.86-457.56)	430.41 (340.1-532.84)	16.65 (11.46-21.56)	436.5 (353.83-529.51)	407.44 (326.42-497.5)	–6.66 (–9.81-–3.87)
Death	0.44 (0.35-0.52)	0.48 (0.4-0.56)	0.08 (0.07-0.09)	0.09 (0.08-0.1)	0.26 (0.2-0.31)	0.27 (0.22-0.31)	2.92 (–13.88-34.11)	0.4 (0.31-0.47)	0.29 (0.24-0.34)	–26.35 (–37.96-–3.77)
YLL	18.05 (14.32-21.25)	18.08 (14.43-21.24)	3.34 (2.86-3.93)	3.37 (2.9-3.94)	11.03 (8.44-13.07)	10.98 (8.93-12.84)	–0.49 (–17.44-29.88)	15.23 (11.65-18.19)	11.06 (9.06-12.89)	–27.36 (–39.49-–4.96)
YLD	57.2 (36.64-83.27)	53.56 (34.38-78.27)	27.88 (17.54-40.49)	26.58 (16.7-38.35)	37.02 (23.81-53.46)	43.11 (27.42-62.55)	16.46 (10.54-22.64)	43.63 (28.48-63)	40.7 (25.93-59.11)	–6.71 (–10.74-–2.77)
DALYs	75.25 (54.05-101.66)	71.64 (52.03-96.3)	31.22 (20.77-43.97)	29.94 (20.21-41.83)	48.05 (34.31-64.69)	54.09 (38.16-73.7)	12.57 (4.9-21.43)	58.86 (43.35-78.05)	51.76 (36.83-69.92)	–12.05 (–18.36-–4.94)

TABLE 1. Continued

	Gender				Year					
	Male		Female		Rate (95% UI)			Age-standardized rate (95% UI)		
Disorder	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	1990	2019	Percentage change	1990	2019	Percentage change
Drug use disorders										
Incidence	189.9 (158.83-223.79)	174.71 (147.22-205.02)	165.24 (135.31-199.96)	154.4 (126.76-186.08)	131.52 (108.96-155.84)	178.05 (147.68-211.56)	35.38 (29.78-41.01)	145.74 (119.98-173.6)	164.95 (137.37-195.29)	13.18 (10.96-15.39)
Prevalence	570.66 (478.43-677.38)	527.41 (444.27-626.11)	389.55 (319.9-475.14)	365.2 (302.59-441.56)	340.43 (279.02-415.5)	483.63 (405.47-573.54)	42.07 (34.97-50.01)	359.53 (299.68-427.97)	449.7 (379.6-532.2)	25.08 (20.83-29.81)
Death	1.84 (1.6-2.07)	1.84 (1.61-2.06)	0.63 (0.55-0.71)	0.68 (0.6-0.76)	0.6 (0.55-0.68)	1.25 (1.12-1.41)	109.74 (83.94-136.28)	0.81 (0.74-0.92)	1.28 (1.15-1.43)	59.19 (40.09-78.19)
YLL	89.23 (77.51-101.28)	83.07 (72.33-93.83)	28.88 (24.98-33.27)	28.23 (24.6-32.39)	30.14 (27.43-33.76)	60.23 (53.18-67.56)	99.81 (74.49-126.64)	35.68 (32.56-40.23)	57 (50.45-63.81)	59.73 (39.75-80.99)
YLD	144.49 (101.59-193.6)	133.7 (94.24-178.19)	125.54 (85.18-173.13)	117.86 (80.4-162.14)	87.01 (58.85-119.3)	135.38 (93.46-181.01)	55.59 (46.5-65.45)	95.57 (65.39-129.44)	126.17 (87.49-168.34)	32.02 (25.83-38.77)
DALYs	233.72 (187.47-283.08)	216.77 (173.79-262.06)	154.42 (113.85-204.44)	146.09 (108.37-191.18)	117.16 (88.57-150.02)	195.62 (151.29-242.66)	66.97 (56.09-78.46)	131.25 (100.54-166.02)	183.17 (142.53-225.99)	39.56 (32.17-47.83)
Opioid use disorders										
Incidence	44.39 (35.37-55.1)	42 (33.85-51.6)	45.57 (34.76-60.17)	43.08 (33-56.66)	32.5 (24.43-43.24)	44.96 (35.55-57.56)	38.32 (29.34-48.22)	32.99 (25.8-42.65)	42.53 (33.79-54.22)	28.9 (23.41-35.15)
Prevalence	280.88 (232.66-343.02)	261.49 (217.97-318.22)	273.45 (211.7-357.96)	258.02 (201.52-333.77)	167.73 (129.95-222.17)	277.31 (223.71-349.4)	65.33 (53.52-78.22)	188.48 (149.31-243.7)	259.95 (210.92-325.12)	37.92 (30.84-46.18)
Death	1.27 (1.09-1.46)	1.24 (1.08-1.42)	0.4 (0.35-0.46)	0.42 (0.36-0.48)	0.44 (0.37-0.52)	0.85 (0.74-0.96)	91.96 (61.87-128.99)	0.58 (0.49-0.69)	0.85 (0.74-0.96)	45.76 (22.99-74.08)
YLL	62.69 (53.75-72.42)	58.03 (49.88-66.82)	19.14 (16.38-22.5)	18.44 (15.9-21.65)	22.62 (19.32-26.05)	41.76 (36.36-47.7)	84.61 (53.21-122.33)	26.49 (22.41-30.76)	39.2 (34.26-44.58)	47.99 (24.19-76.56)
YLD	118.36 (80.62-161.14)	109.76 (75.09-147.83)	112.25 (74.58-158.63)	105.57 (70.84-148.08)	69.96 (46.08-100.61)	115.43 (77.81-158.36)	64.99 (53.19-78.17)	78.06 (51.7-110.29)	107.81 (73.14-147.08)	38.12 (30.37-46.83)
DALYs	181.06 (141.69-225.24)	167.79 (131.66-208.13)	131.39 (92.86-178.41)	124.02 (88.49-167.86)	92.58 (67.9-122.83)	157.19 (118.99-201.19)	69.79 (57.3-83.5)	104.55 (78.22-135.99)	147.01 (111.76-187.72)	40.62 (31.93-50.69)

TABLE 1. Continued

	Gender				Year					
	Male		Female		Rate (95% UI)			Age-standardized rate (95% UI)		
Disorder	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	1990	2019	Percentage change	1990	2019	Percentage change
Cocaine use disorders										
Incidence	3.37 (2.45-4.57)	3.14 (2.29-4.26)	1.9 (1.35-2.73)	1.77 (1.27-2.55)	2.85 (1.99-4)	2.66 (1.94-3.64)	–6.66 (–13.79-2.42)	2.55 (1.83-3.52)	2.48 (1.8-3.41)	–2.64 (–5.3-0.17)
Prevalence	27.35 (20.36-36.61)	25.46 (19.08-33.98)	13.34 (9.51-18.87)	12.45 (8.94-17.67)	18.38 (13.26-25.76)	20.62 (15.19-28.18)	12.19 (4.25-20.52)	19.16 (14.18-26.52)	19.24 (14.33-26.19)	0.42 (–2.28-3.31)
Death	0.16 (0.13-0.21)	0.15 (0.12-0.2)	0.03 (0.02-0.03)	0.03 (0.02-0.03)	0.03 (0.02-0.06)	0.09 (0.08-0.12)	197.61 (55.08-353.29)	0.04 (0.03-0.08)	0.09 (0.08-0.12)	117.38 (13.26-232.3)
YLL	7.63 (6.09-10.17)	7.03 (5.66-9.36)	1.31 (0.98-1.56)	1.24 (0.92-1.47)	1.58 (1.2-2.93)	4.59 (3.74-6)	191.06 (52.15-344.87)	1.92 (1.45-3.61)	4.28 (3.51-5.54)	122.58 (16.36-239.58)
YLD	3.86 (2.25-5.98)	3.59 (2.11-5.48)	1.93 (1.09-3.06)	1.8 (1.02-2.83)	2.61 (1.46-4.18)	2.93 (1.7-4.59)	12.35 (1.75-23.51)	2.72 (1.57-4.23)	2.74 (1.61-4.25)	0.56 (–5.82-6.78)
DALYs	11.49 (9.04-14.87)	10.62 (8.39-13.58)	3.24 (2.32-4.41)	3.03 (2.18-4.12)	4.19 (2.9-6.39)	7.52 (5.92-9.53)	79.74 (32.9-141.34)	4.64 (3.29-7.06)	7.01 (5.54-8.84)	51.08 (9.13-99.24)
Amphetamine use disorders										
Incidence	8.82 (6.11-12.07)	8.17 (5.64-11.09)	5.11 (3.48-6.92)	4.72 (3.26-6.39)	6.77 (4.47-9.3)	7.04 (4.88-9.57)	3.92 (–1.68-11.38)	6.42 (4.42-8.7)	6.51 (4.49-8.79)	1.42 (–0.73-3.98)
Prevalence	53.87 (34.67-77.14)	48.59 (31.38-69.3)	28.13 (17.98-40.65)	25.6 (16.41-36.91)	36.71 (22.86-52.9)	41.5 (26.57-59.54)	13.07 (7.8-19.37)	36.81 (23.66-52.25)	37.58 (24.13-53.85)	2.1 (–0.36-4.6)
Death	0.08 (0.06-0.11)	0.08 (0.06-0.11)	0.02 (0.01-0.02)	0.02 (0.01-0.02)	0.02 (0.01-0.04)	0.05 (0.04-0.07)	157.84 (32.75-356.91)	0.03 (0.02-0.05)	0.05 (0.04-0.06)	96.31 (3.72-246.74)
YLL	4.04 (2.76-5.68)	3.73 (2.58-5.19)	0.88 (0.58-1.18)	0.83 (0.55-1.11)	1.03 (0.73-2.05)	2.52 (1.84-3.35)	144.18 (24.67-332.85)	1.21 (0.85-2.35)	2.36 (1.74-3.1)	94.35 (1.67-244.97)
YLD	7.16 (3.84-12.03)	6.47 (3.49-10.76)	3.7 (1.97-6.25)	3.37 (1.8-5.69)	4.87 (2.59-8.14)	5.5 (2.97-9.18)	12.92 (2.15-24.64)	4.89 (2.65-8.16)	4.98 (2.7-8.27)	1.98 (–7.25-10.75)
DALYs	11.2 (7.42-16.23)	10.19 (6.83-14.73)	4.57 (2.89-7.19)	4.2 (2.68-6.58)	5.9 (3.61-9.35)	8.01 (5.39-11.93)	35.87 (14.68-72.31)	6.1 (3.81-9.47)	7.34 (4.94-10.78)	20.34 (0.82-50.13)

TABLE 1. Continued

	Gender				Year					
	Male		Female		Rate (95% UI)			Age-standardized rate (95% UI)		
Disorder	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	Rate in 2019 (95% UI)	Age-standardized rate in 2019 (95% UI)	1990	2019	Percentage change	1990	2019	Percentage change
Cannabis use disorders										
Incidence	34.35 (24.79-49.76)	32.37 (23.27-47.2)	13.58 (9.97-19)	12.73 (9.37-17.85)	23.05 (16.34-34.14)	24.37 (17.79-34.87)	5.73 (–1.15-14.03)	20.64 (15.09-29.49)	22.91 (16.73-32.9)	11 (5.62-15.65)
Prevalence	210.79 (144.75-303.44)	195.7 (134.82-281.21)	77.74 (55.19-107.74)	72.59 (52.26-99.96)	122.75 (82.86-180.4)	146.86 (103.08-207.85)	19.64 (11.54-28.86)	120.11 (84.31-169.11)	136.55 (96.42-193.26)	13.69 (9.03-18.27)
DALYs	6.17 (3.41-10.31)	5.73 (3.18-9.58)	2.28 (1.3-3.69)	2.13 (1.22-3.43)	3.6 (1.94-6.2)	4.3 (2.41-7.16)	19.51 (9.36-32.68)	3.52 (1.96-5.84)	4 (2.25-6.61)	13.6 (5.73-22.18)
Other drug use disorders										
Incidence	98.97 (72.28-129.83)	89.04 (65.58-116.63)	99.08 (71.05-132.33)	92.09 (66.5-122.49)	66.34 (47.95-88.02)	99.02 (71.8-130.64)	49.26 (42.37-56.24)	83.14 (60.43-109.86)	90.51 (66.08-119.2)	8.87 (5.92-11.52)
Prevalence	16.1 (12.19-21.2)	14.65 (11.19-19.01)	16.12 (11.91-21.52)	15.22 (11.35-20.1)	10.37 (7.77-13.75)	16.11 (12.07-21.23)	55.33 (47.99-63.04)	13.31 (9.95-17.44)	14.93 (11.29-19.45)	12.18 (9.32-15.33)
Death	0.33 (0.26-0.39)	0.36 (0.3-0.42)	0.19 (0.16-0.22)	0.22 (0.19-0.26)	0.1 (0.09-0.12)	0.26 (0.22-0.3)	149.25 (89.97-198.04)	0.16 (0.13-0.18)	0.3 (0.26-0.33)	87.39 (47.8-122.83)
YLL	14.87 (11.54-18.19)	14.28 (11.31-17.26)	7.55 (6.33-9.05)	7.72 (6.55-9.16)	4.91 (4.25-5.79)	11.35 (9.41-13.26)	131.17 (72.7-181.45)	6.06 (5.26-7.07)	11.16 (9.39-12.92)	84.18 (39.38-122.19)
YLD	8.93 (5.69-12.99)	8.15 (5.21-11.79)	5.39 (3.49-7.77)	5 (3.25-7.18)	5.98 (3.78-8.78)	7.23 (4.67-10.46)	20.89 (10.95-31.71)	6.38 (4.11-9.14)	6.64 (4.28-9.58)	4.03 (–3.16-11.01)
DALYs	23.8 (18.87-29.12)	22.43 (17.98-27.17)	12.95 (10.62-15.59)	12.71 (10.53-15.15)	10.89 (8.6-13.72)	18.58 (15.25-22.4)	70.61 (46.53-97.41)	12.45 (9.93-15.54)	17.81 (14.73-21.32)	43.06 (22.6-63.93)

MENA, Middle East and North Africa; UI, uncertainty interval YLL, years of life lost; YLD, years lived with disability; DALYs, disability-adjusted life years.

The DALY rates of substance-use disorders across age groups in both males and females in the MENA region in 2019 are shown in Figure 2. In both the genders, the DALY rate was highest in the 25-29-year age group [440.81 per 100,000 in females (95% CI: 300-617.72) and 645.97 (95% CI: 494.4-822.32) per 100,000 in males]. In addition, in all the age groups, the DALY rate was higher in males than in females.

The DALY rates of substance-use disorders across age groups in MENA in 2019 are shown in Figure 3. For alcohol-use disorder (101.01 per 100,000, 95% CI: 60.37-157.5) and cocaine-use disorder (16.82 per 100,000, 95% CI: 12.52-22.78), the highest DALY rates were in the 30-34-age group. The highest DALY rates of opioid-use disorder (372.33 per 100,000, 95% CI: 259.65-519.61) and amphetamine-use disorder (23.13 per 100,000, 95% CI: 13.1-37.23) were recorded in the 25-29-age group. The highest DALY rate of cannabis-use disorder was recorded in the 15-19-age group (12.47 per 100,000, 95% CI: 5.5-24.52). In adults aged ≥ 15 years, opioid-use disorder had the highest DALY rate compared with other substance-use disorders.

The age-standardized DALY rates of alcohol-use disorders, drug-use disorders, and substance-use disorders across MENA countries in 2019 are shown in Figure 4. In 2019, the age-standardized DALY rates of alcohol-use disorder were the highest in the UAE (77.08 per 100,000, 95% CI: 55.88-102.23), Afghanistan (67.77 per 100,000, 95% CI: 47.84-89.37), and Bahrain (60.35 per 100,000, 95% CI: 43.39-82.9). These rates were the lowest in Iran (41.81 per 100,000, 95% CI: 31.37-54.89), Palestine (46.44 per 100,000, 95% CI: 32.02-64.3), and Iraq (46.51 per 100,000, 95% CI: 31.49-65.08). The age-standardized DALY rates of drug-use disorders were the highest in the UAE (506.22

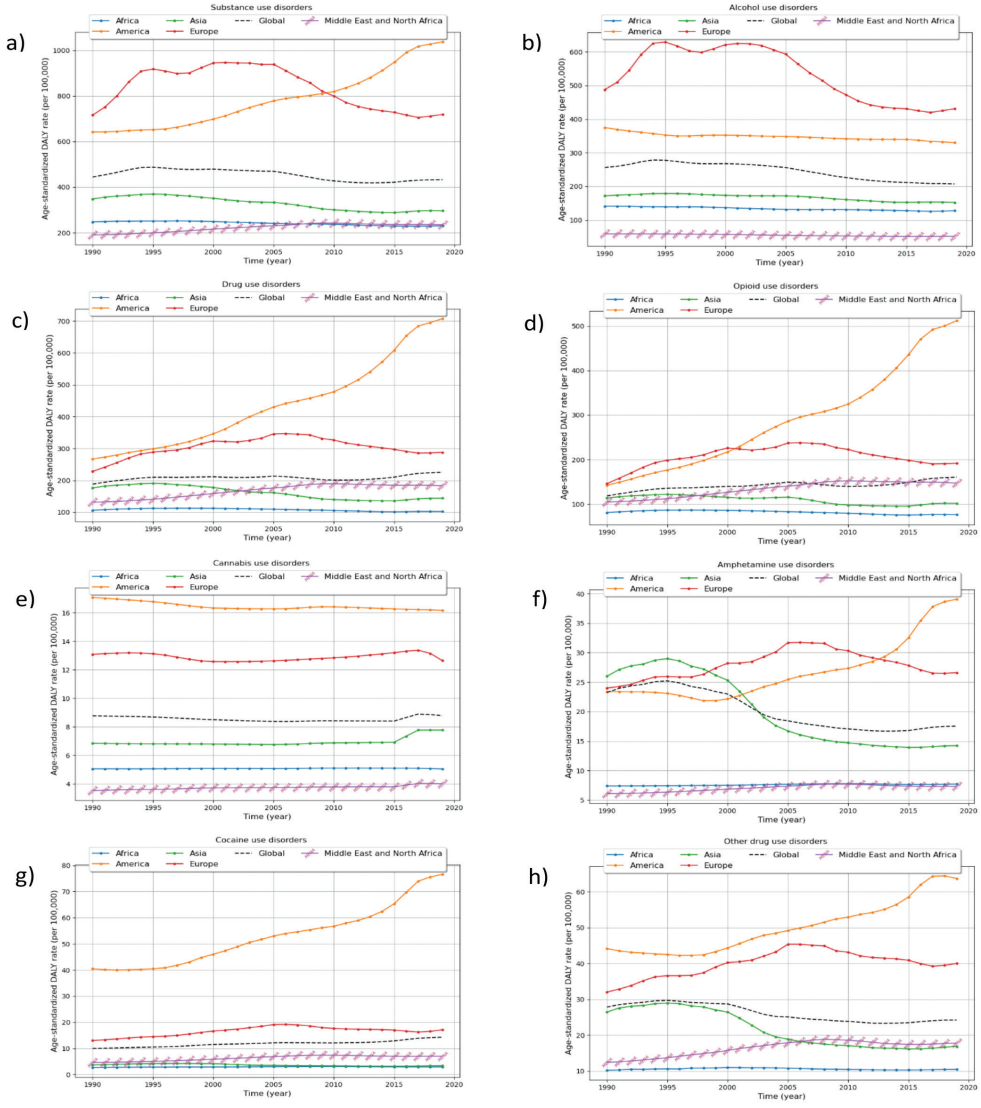

FIG. 1. Trends of age-standardized DALY rates for substance use disorders (a), alcohol use disorders (b), drug use disorders (c), opioid use disorders (d), cannabis use disorders (e), amphetamine use disorders (f), cocaine use disorders (g), and other drug use disorders (h) in MENA during 1990-2019.
DALY, disability-adjusted life years.; MENA, Middle East and North Africa.

TABLE 2. Results of Linear Regression Models on the Association Between Year (Independent Variable) and the Age-Standardized DALY Rate of Substance Use Disorders in the Middle East and North Africa.

Condition	Beta	95% CI	R^2	*p*
Substance use disorders	1,875	1,559; 2,191	0.840	< 0.001
Alcohol use disorders	-0.328	-0.354; -0.301	0.959	< 0.001
Drug use disorders	2,203	1,872; 2,533	0.869	< 0.001
Amphetamine use disorders	0.053	0.041; 0.065	0.749	< 0.001
Cannabis use disorders	0.014	0.012; 0.016	0.878	< 0.001
Cocaine use disorders	0.101	0.082; 0.119	0.816	< 0.001
Opioid use disorders	1,829	1,573; 2,086	0.884	< 0.001
Other drug use disorders	0.205	0.158; 0.253	0.738	< 0.001

DALYs, disability-adjusted life years; CI, confidence interval.

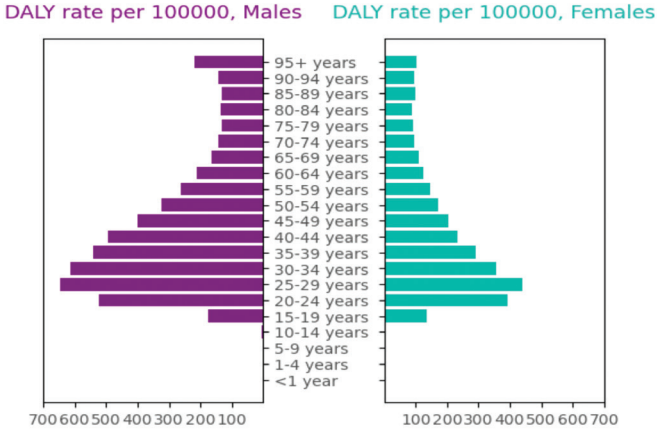

FIG. 2. DALY rates across age groups in males and females in MENA in 2019.
DALY, disability-adjusted life years.; MENA, Middle East and North Africa.

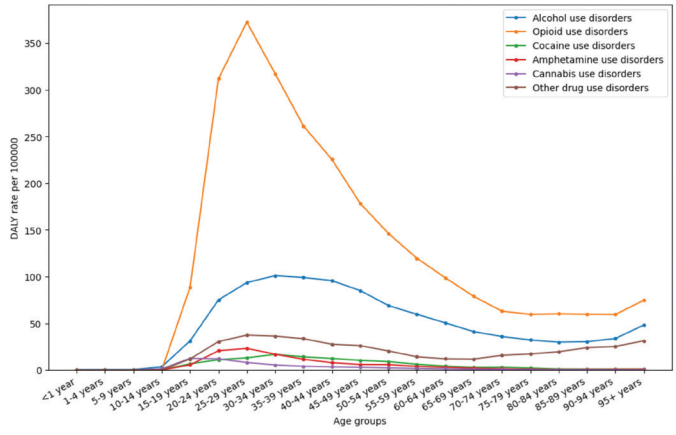

FIG. 3. DALY rates of substance use disorders across age groups in MENA in 2019.
DALY, disability-adjusted life years.; MENA, Middle East and North Africa.

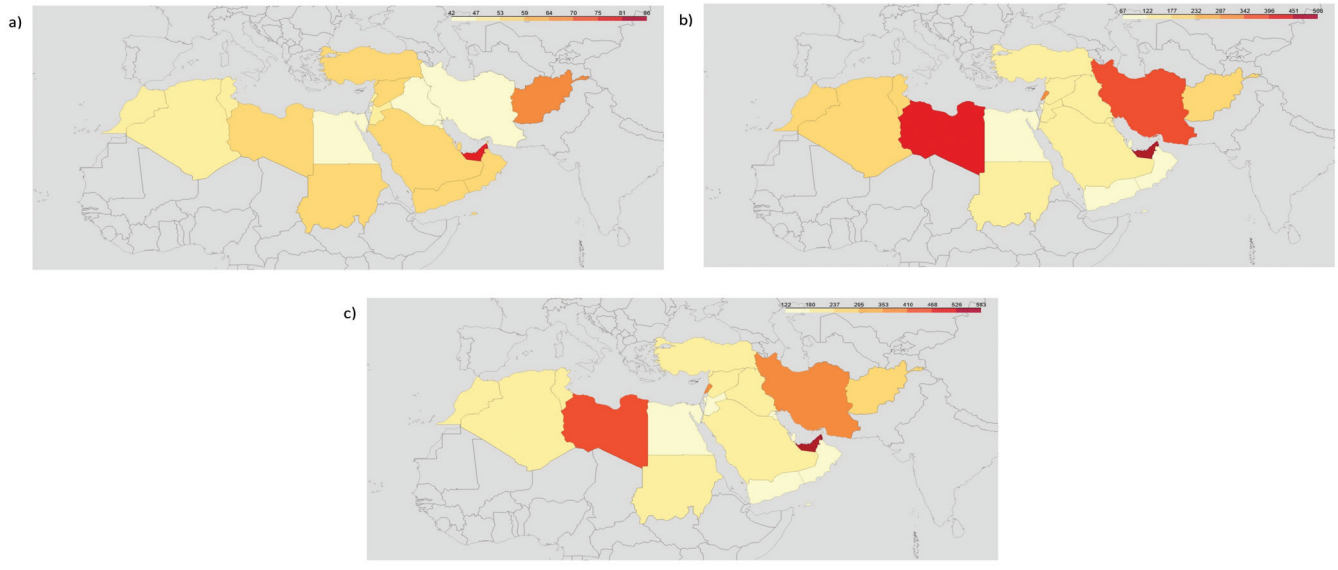

FIG. 4. Age-standardized DALY rates of alcohol use disorders (a), drug use disorders (b), and substance use disorders (c) across MENA countries in 2019.
DALY, disability-adjusted life years.; MENA, Middle East and North Africa.

per 100,000, 95% CI: 386.87-640.92), Libya (403.24 per 100,000, 95% CI: 306.74-502.22), and Iran (358.12 per 100,000, 95% CI: 291.52-431.83) in 2019. However, it was the lowest in Egypt (91.97 per 100,000, 95% CI: 61.95-126.81), Oman (104.39 per 100,000, 95% CI: 74.46-139.82), and Palestine (108.82 per 100,000, 95% CI: 76.48-147.48).

The age-standardized DALY rates of individual substance-use disorders in the MENA countries in 2019 are shown in Figure 5. In almost all countries, opioid-use disorder had the highest age-standardized DALY rate. The age-standardized DALY rate of substance-use disorders was the highest in the UAE (583.3 per 100,000, 95% CI: 450.51-730.39), Libya (458.61 per 100,000, 95% CI: 353.83-568.52), and Iran (399.94 per 100,000, 95% CI: 324.31-481.33) in 2019. Conversely, these rates were the lowest in Egypt (138.59 per 100,000, 95% CI: 95.38-184.9), Palestine (155.27 per 100,000, 95% CI: 111.87-202.47), and Oman (157.49 per 100,000, 95% CI: 114.45-204.04).

The association between the SDI and DALY rates of substance-use disorders, drug-use disorders, and alcohol-use disorders in the MENA countries across time is shown in Figure 6. For all three groups of disorders, the expected value line had an ascending slope at higher SDI values, indicating a positive association between SDI and the age-standardized DALY rate of substance-use disorders, drug-use disorders, and alcohol-use disorders. At lower SDI values, the expected value line had a descending slope, indicating a negative association between SDI and the age-standardized DALY rate of substance-use disorders, drug-use disorders, and alcohol-use disorders.

DISCUSSION

This study is the first to compare the trends in the burden of substance-use disorders in the MENA region. Our results indicated that the age-standardized DALY rate of substance-use disorders increased from 1990 to 2019 in the MENA region. The burden of these disorders is the highest among males and adults aged 25-29 years. Moreover, opium-use disorder was responsible for a higher burden in the region compared with other substances.

One of the main findings of our study is the decrease in the DALY rates for alcohol-use disorders in the MENA region. Our findings regarding the decrease in the burden of alcohol-use disorder are in line with those reported previously.[10] However, studies on some specific groups of people in this region indicate increased alcohol consumption. The countries in the MENA region are Muslim-majority countries, and Islamic laws prohibit alcohol consumption.[14] In addition, the trade and consumption of alcohol are against the governmental laws in some countries of this region, such as Iran and Saudi Arabia.[15] Therefore, MENA is one of the regions in the world where alcohol consumption per capita is the lowest and alcohol-use disorder has the lowest burden.[10,16] However, further studies are needed to better understand the underlying reasons for the decrease in the age-standardized DALY rate of alcohol-use disorders in MENA. An increase in the availability of treatments

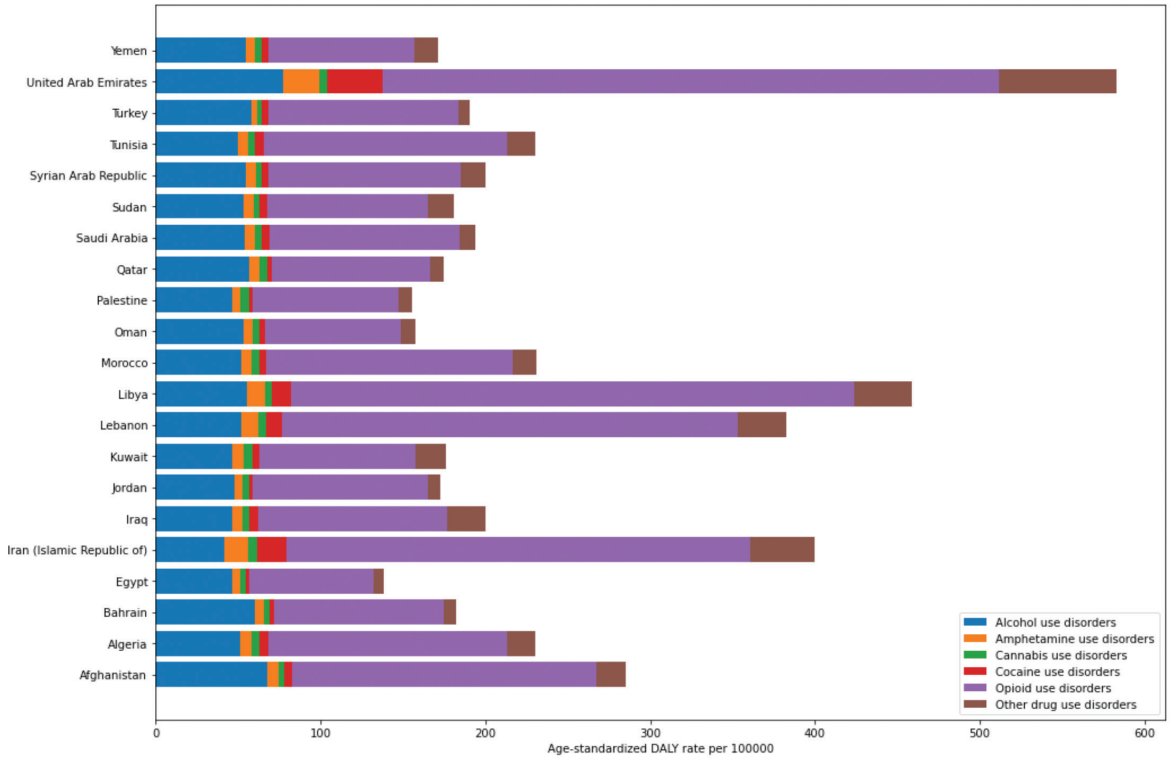

FIG. 5. Age-standardized DALY rates of substance use disorders across MENA countries in 2019.
DALY, disability-adjusted life years.; MENA, Middle East and North Africa.

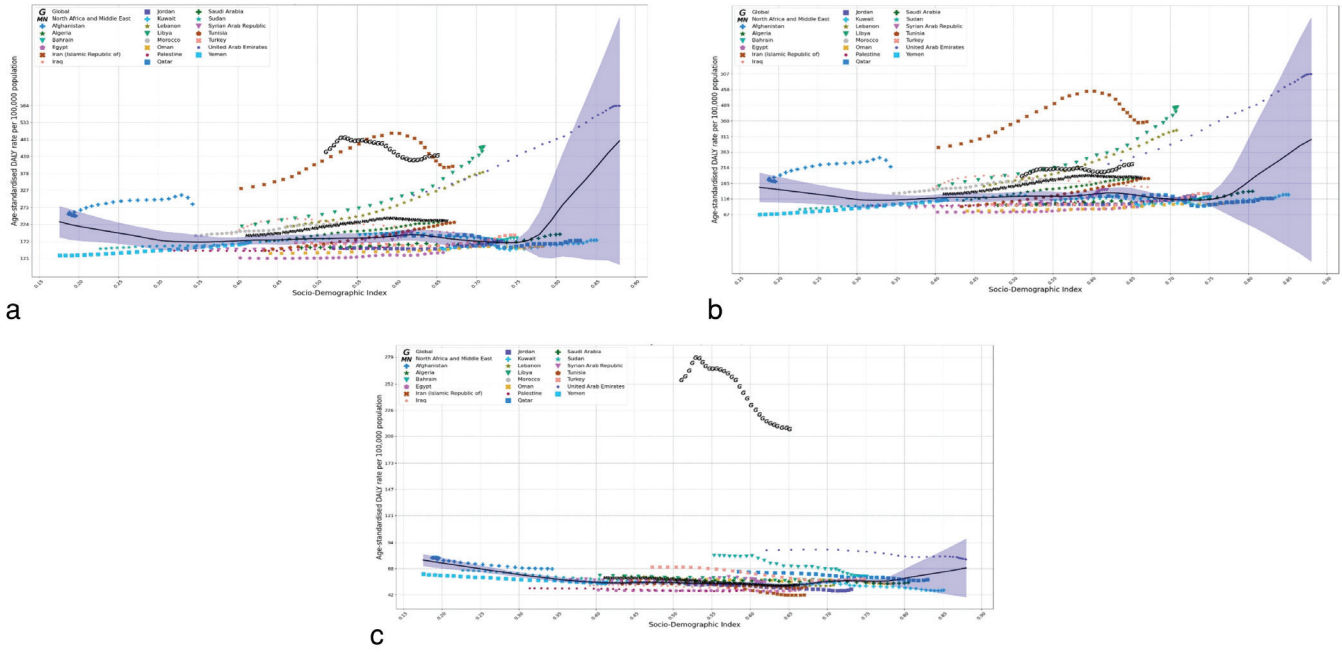

FIG. 6. Associations between SDI and age-standardized DALY rates of substance use disorders (a), drug use disorders (b), and alcohol use disorders (c) in MENA countries across time.

DALY, disability-adjusted life years.; MENA, Middle East and North Africa.

for alcohol-related harms and people's awareness about the possible consequences of excessive drinking may be a few of the contributing reasons for the decrease in the burden of alcohol-use disorder in MENA. Moreover, there may be some biases in reporting alcohol use in Muslim countries, as stigma and prohibitive laws may prevent people from reporting alcohol consumption. Consequently, the estimations regarding the burden of alcohol-related disorders may be inaccurate in these countries as a result of reporting bias.[17-19]

However, the burden of drug-use disorders has increased in MENA from 1990 to 2019. This increasing trend contrasts with the global trend wherein the burden of drug-use disorders has been stable or even decreased in the past years.[1,2] Wars and conflicts in the region are likely driving the rise in substance-use disorders because of worsening mental health conditions, which can trigger increased substance-use. In addition, drug trafficking often serves as a source of financial support for warring parties, thereby further perpetuating the problem.[20] Alternatively, several prohibitive laws have been enacted across the regions' countries to combat drug trafficking.[21] In some countries, even the death penalty has been considered for drug trafficking.[22] Most people in the MENA region are Muslims, and drug abuse is forbidden in Islam.[23] Other strategies, such as health communication and harm reduction, have been utilized to reduce the burden of substance abuse and its consequences.[24,25] However, these prohibitive laws and strategies seem to have been ineffective overall in the region, and despite the stable global trend, the burden of drug abuse has increased in the MENA region. This finding calls for a review of current policies and laws regarding substance abuse in the MENA countries and even international collaborations in the region to more effectively manage drug abuse and its consequences. In addition, there are limited studies on the risk factors and underlying reasons leading to drug abuse in MENA countries. Further studies on the potential factors, with a focus on cultural and regional factors that may differ from other regions in the world and lead to or prevent substance abuse among people living in MENA may be helpful in designing effective strategies for primary prevention.

The other important finding of our study was that opioid-use disorder had the highest DALY rate among substance-use disorders in MENA in 2019. In contrast, alcohol-use disorders have a higher global burden compared to other substance-use disorders.[1] It is not surprising as MENA is one of the main producers of opioid drugs across the world.[5] The high burden of opioid-use disorders necessitates appropriate policies and healthcare guidelines in MENA. Similar to other substances, the main policies implemented in MENA include preventive plans to reduce demand, activities to lower supply, and harm reduction programs.[26,27] Previous punishment-based policies to reduce substance demands and supplies, such as the so-called War on Drugs initiated in the United States, have relatively failed.[28] Indeed, the global War on Drugs has led to unintentional negative outcomes, such as the criminalization of drug-use, punitive sentencing practices (including the death penalty), and higher rates of imprisonment.[29] Therefore, other successful policies, such as Portugal's drug decriminalization policy, could serve as valuable models for policymakers aiming to reduce the burden of opioid-use disorder in MENA countries.[30]

Moreover, there has been an accelerating trend of age-standardized DALY rates for opioid-use disorder in MENA and other continents, such as the United States. The United States consumes

approximately 80% of the world's opioids while accounting for only 4.4% of the global population.[31] Meanwhile, 2007 estimates imply that Afghanistan, a country in MENA, produced 92% of the global illicit opium production.[32] There might be a bi-directional relationship between the markets and the subsequent burden; notably, a recent study showed that a decrease in the price of opium in Afghanistan significantly increased the per capita prescription opioid dispensation in the United States.[5] In the previous three decades, the United States has undergone waves of opioid-related overdose deaths, with prescription opioids in the late 1990s, followed by heroin around 2010, and non-pharmaceutical fentanyl in 2013.[33] The adjacent time point in Figure 1 depicts a slight peak of the opioid-use disorder burden around 2010, warranting more comprehensive studies to address the exact international dimensions of opioid-use disorders.

The highest DALY rates of alcohol-use disorders and opioid-use disorders, which are the disorders with the highest burden in the region, were recorded in the 25-29 and 30-34-year age groups. Although this pattern is similar to that of the global studies, there are subtle differences. For example, in another global study, the highest DALY rate of alcohol-use disorders was recorded in the 45-49-year age group, which is an older age group compared to that in MENA.[34] However, the burden of opioid-use disorder was the highest in the 25-29-year age group, similar to that in MENA.[35] This finding is worrying as the young age group is the main workforce of the population, and as substance-use disorders are chronic conditions needing chronic care, a high prevalence of these disorders among the young population can add pressure to the healthcare system and the high economic costs.[36-38] Therefore, teenagers can be appropriate targets for preventive and drug-education programs toward reduction of the incidence of substance abuse at younger ages.[39] It is imperative as studies have indicated adolescents do not have adequate knowledge about substance abuse, and increasing awareness may be an effective strategy to avoid future addiction and abuse.[40,41]

We demonstrated that countries with higher SDI had higher age-standardized DALY rates of alcohol-use and drug-use disorders. However, the association between socioeconomic status and substance-use disorders is debatable. Some studies have shown that worse socioeconomic status in childhood is associated with a higher chance of drug- and alcohol-use in the future.[42,43] Another study in the U.S. found that higher parental income was associated with a greater chance of the use of some substances.[44] Therefore, there may be some differences in the association between socioeconomic status and substance abuse across different regions. This difference may be partially due to reporting bias, as countries with better socioeconomic status have more efficient registries to document substance abuse cases. Moreover, although there is a need to further clarify the reasons behind the association between socioeconomic status and substance abuse in MENA, the parental socioeconomic status may be a reason for such an association, as children of parents with better socioeconomic status may have more or easier access to drugs and alcohol.[45] Therefore, this group of people can be an appropriate target for preventive and educational interventions.

This is the first study to investigate substance-use disorder epidemiology in the MENA region. Notwithstanding, it is associated with some limitations. For instance, the data used are based on estimates and are not perfectly accurate. There may also be differences regarding the quality of the available data in different regions, which affected the consequent estimations.[46] In addition, there might be some reporting bias as a considerable amount of drug or alcohol use possibly remains unrecorded.[47] Furthermore, the GBD study does not provide a comprehensive assessment of the variables, such as family history and genetic factors, which might potentially influence the burden of substance-use disorders.[48,49] As a result, we could not use adjusted regression models to evaluate the impact of factors other than SDI on the burden of these disorders. Finally, because the GBD study is primarily descriptive, we were unable to conduct detailed within-group or between-group analyses related to the burden of substance-use disorders.

In conclusion, we conducted the first GBD study to report the trend and associated factors of substance-use disorders in the MENA region. The burden of substance-use disorders has increased from 1990 to 2019 in the MENA region in contrast to the global trend. Surprisingly, we found that opioid-use disorder constitutes the majority of the burden on MENA countries as opposed to that in Western countries which face substantial alcohol- and cannabis-use. Our results imply that the current interventions and laws to address drug trafficking and substance-use disorders, especially opioids, might be insufficient, warranting the need for international collaboration and more effective strategies for reducing the burden of these disorders.

Acknowledgements: We would like to thank Prof. Josiah Rich for his feedback on the initial draft of the manuscript.

Ethics Committee Approval: Not applicable.

Informed Consent: Not applicable.

Data Sharing Statement: The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

Authorship Contributions: Concept- S.R.D., A.N.A., S.A.; Design- S.R.D., A.N.A., S.A.; Supervision- A.N.A., S.A.; Fundings- A.N.A., S.A.; Analysis or Interpretation- S.R.D., A.N.A.; Writing- S.R.D., H.S., A.N.A., I.M.O., A.G.R., H.N., A.H.M., S.A.; Critical Review- S.R.D., H.S., A.N.A., I.M.O., A.G.R., H.N., A.H.M., S.A.

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: This study was supported by Tehran University of Medical Sciences (grant number: 57749).

REFERENCES

1. Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V, Vos T. The global burden of mental, neurological and substance use disorders: an analysis from the Global Burden of Disease Study 2010. *PLoS One*. 2015;10:e0116820. [CrossRef]
2. Pan Z, Zhang J, Cheng H, et al. Trends of the incidence of drug use disorders from 1990 to 2017: an analysis based on the Global Burden of Disease 2017 data. *Epidemiol Psychiatr Sci*. 2020;29:e148. [CrossRef]
3. Chen A, Zou M, Fan M, et al. Time trends and associated factors of global burden due to drug use disorders in 204 countries and territories, 1990-2019. *Drug Alcohol Depend*. 2022;238:109542. [CrossRef]
4. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020;396:1204-1222. [CrossRef]

5. Sankar S. Heroin trafficking in the golden crescent. *Police Journal.* 1992;65:251-256. [CrossRef]
6. Rather YH, Bashir W, Sheikh AA, Amin M, Zahgeer YA. Socio-demographic and clinical profile of substance abusers attending a regional drug de-addiction centre in chronic conflict Area: Kashmir, India. *Malays J Med Sci.* 2013;20:31-38. [CrossRef]
7. Odejide AO. Status of drug use/abuse in Africa: a review. *International Journal of Mental Health and Addiction*. 2006;4:87-102. [CrossRef]
8. Sangestani M, Mohammadi Y, Hamidi Y, Babamiri M. Investigating and comparing disabilities caused by substance abuse using Disability Assessment Schedule 2.0 (WHODAS 2.0). *Journal of Substance Use.* 2023;28:989-994. [CrossRef]
9. Nafeh F, Fusigboye S, Sornpaisarn B. Understanding injecting drug use in Afghanistan: a scoping review. *Subst Abuse Treat Prev Policy.* 2022;17:65. [CrossRef]
10. Safiri S, Nejadghaderi SA, Noori M, et al. Burden of diseases and injuries attributable to alcohol consumption in the Middle East and North Africa region, 1990-2019. *Sci Rep.* 2022;12:19301. [CrossRef]
11. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020;396:1223-1249. [CrossRef]
12. Kim YE, Jung YS, Ock M, Yoon SJ. DALY estimation approaches: understanding and using the incidence-based approach and the prevalence-based approach. *J Prev Med Public Health*. 2022;55(1):10-18. [CrossRef]
13. Polinder S, Haagsma JA, Stein C, Havelaar AH. Systematic review of general burden of disease studies using disability-adjusted life years. *Popul Health Metr.* 2012;10:21. [CrossRef]
14. Matthee R. Alcohol in the Islamic Middle East: ambivalence and ambiguity. *Past & Present.* 2014;222(suppl_9):100-125. [CrossRef]
15. Al-Ansari B, Thow AM, Day CA, Conigrave KM. Extent of alcohol prohibition in civil policy in Muslim majority countries: the impact of globalization. *Addiction*. 2016;111:1703-1713. [CrossRef]
16. Mellinger JL. Epidemiology of alcohol use and alcoholic liver disease. *Clin Liver Dis (Hoboken).* 2019;13:136-139. [CrossRef]
17. Al Mousawi A. Alcohol use disorder identification test use in Muslim countries. *International Journal of Prevention and Treatment of Substance Use Disorders*. 2015;1:79. [CrossRef]
18. Nikfarjam A, Hajimaghsoudi S, Rastegari A, et al. The frequency of alcohol use in Iranian urban population: the results of a national network scale up survey. *Int J Health Policy Manag*. 2017;6:97-102. [CrossRef]
19. Baneshi MR, Zolala F, Zamanian M, Zarei N, Heydari MR. Estimating the visibility rate of alcohol consumption: a case study in Shiraz, Iran. *Addic Health*. 2020;12:18-24. [CrossRef]
20. Abazid H. Drug abuse in the Middle East. Handbook of Substance Misuse and Addictions: Springer International Publishing; 2022. p. 2629-2648. [CrossRef]
21. Al-Shazly F, Tinasti K. Incarceration or mandatory treatment: drug use and the law in the Middle East and North Africa. *Int J Drug Policy.* 2016;31:172-177. [CrossRef]
22. Barzoukas G. Drug trafficking in the MENA: JSTOR; 2017. [CrossRef]
23. Priyono A. Drug Abuse In The Perspective Of Islamic Law. International Journal of Humanities Education and Social Sciences (IJHESS). 2022;2:759-770. [CrossRef]
24. Aljaid B. Health Communication and Islam: A critique of Saudi Arabia's efforts to prevent substance abuse. University of Stirling Publisher; 2015. [CrossRef]
25. Aaraj E, Jreij Abou Chrouch M. Drug policy and harm reduction in the Middle East and North Africa: the role of civil society. *Int J Drug Policy*. 2016;31:168-171. [CrossRef]
26. Saberi Zafarghandi MB, Jadidi M, Khalili N. Iran's activities on prevention, treatment and harm reduction of drug abuse. *Int J High Risk Behav Addict.* 2015;4;e22863. [CrossRef]
27. Nafeh F, Werb D, Karamouzian M. The ups and downs of harm reduction in Afghanistan. *Lancet Reg Health Southeast Asia*. 2023;13;100186. [CrossRef]
28. Stone BM. The war on drugs has unduly biased substance use research. *Psychol Rep*. 2024;127:2087-2094. [CrossRef]
29. Penal Reform International. The unintended negative consequences of the 'war on drugs': mass criminalisation and punitive sentencing policies. 2013 [cited 2024 3/13/2024]. [CrossRef]
30. Cabral TS. The 15th anniversary of the Portuguese drug policy: its history, its success and its future. *Drug Science, Policy and Law*. 2017;3:205032451668364. [CrossRef]
31. Amèrica-Simms L. Global: commission on drug policy declares drug war a failure, urges reforms. *HIV AIDS Policy Law Review.* 2011;15:33. [CrossRef]
32. Deiana C, Giua L, Nisticò R. Opium price shocks and prescription opioids in the USA*. Oxford Bulletin of Economics and Statistics. 2020. [CrossRef]
33. Compton WM, Jones CM. Epidemiology of the U.S. opioid crisis: the importance of the vector. *Ann N Y Acad Sci*. 2019;1451:130-143. [CrossRef]
34. Whiteford HA, Degenhardt L, Rehm J, et al. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. *Lancet*. 2013;382:1575-1586. [CrossRef]
35. Degenhardt L, Charlson F, Mathers B, et al. The global epidemiology and burden of opioid dependence: results from the global burden of disease 2010 study. *Addiction*. 2014;109:1320-1333. [CrossRef]
36. Goodwin LR, Sias SM. Severe substance use disorder viewed as a chronic condition and disability. *Journal of Rehabilitation*. 2014;80:42-49. [CrossRef]
37. Rice DP. Economic costs of substance abuse, 1995. *Proc Assoc Am Physicians.* 1999;111:119-125. [CrossRef]
38. Young MM, Jesseman R. The impact of substance use disorders on hospital use. Ottawa, ON: Canadian Centre on Substance Abuse. 2014. [CrossRef]
39. Momtazi S, Rawson R. Substance abuse among Iranian high school students. *Curr Opin Psychiatry*. 2010;23:221-226. [CrossRef]
40. Haddad L, Shotar A, Umlauf M, Al-Zyoud S. Knowledge of substance abuse among high school students in Jordan. *J Transcult Nurs.* 2010;21:143-150. [CrossRef]
41. Nahvizadeh MM, Akhavan S, Arti S, et al. A Review study of substance abuse status in high school students, Isfahan, Iran. *Int J Prev Med*. 2014;5(Suppl 2):S77-S82. [CrossRef]
42. Daniel JZ, Hickman M, Macleod J, et al. Is socioeconomic status in early life associated with drug use? A systematic review of the evidence. *Drug Alcohol Rev.* 2009;28:142-153. [CrossRef]
43. Wiles NJ, Lingford-Hughes A, Daniel J, et al. Socio-economic status in childhood and later alcohol use: a systematic review. *Addiction*. 2007;102:1546-1563. [CrossRef]
44. Humensky JL. Are adolescents with high socioeconomic status more likely to engage in alcohol and illicit drug use in early adulthood?. *Subst Abuse Treat Prev Policy*. 2010;5:19. [CrossRef]
45. Patrick ME, Wightman P, Schoeni RF, Schulenberg JE. Socioeconomic status and substance use among young adults: a comparison across constructs and drugs. *J Stud Alcohol Drugs*. 2012;73:772-782. [CrossRef]
46. Baxter AJ, Charlson FJ, Cheng HG, Shidhaye R, Ferrari AJ, Whiteford HA. Prevalence of mental, neurological, and substance use disorders in China and India: a systematic analysis. *Lancet Psychiatry*. 2016;3:832-841. [CrossRef]
47. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet*. 2009;373:2223-2233. [CrossRef]
48. Hägele C, Friedel E, Kienast T, Kiefer F. How do we 'learn' addiction? Risk factors and mechanisms getting addicted to alcohol. *Neuropsychobiology*. 2014;70:67-76. [CrossRef]
49. Crist RC, Reiner BC, Berrettini WH. A review of opioid addiction genetics. *Curr Opin Psychol*. 2019;27:31-35. [CrossRef]