Gulf Region: unintentional injuries

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Gulf region overview

We have taken the Gulf region to refer to the six countries of the Gulf Cooperation Council,[1] as recognised by, among others, the UK and the EU, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). We have not included Iraq, since its recent history and current political and economic situation make comparisons with other countries on the Persian Gulf difficult. Different data sources – the World Health Organization, the Global Burden of Disease study, the World Bank, etc – provide different figures, creating discrepancies. Collection methods vary, classifications are different in different countries, and many figures are estimates, often with wide uncertainty intervals. We do not attempt to reconcile these differences, and report different figures depending on the context, for instance, Global Burden of Disease or World Health Organization road traffic assessments.

The total estimated population for the region in 2020 is 58.7 million. The United Nations population estimates for the six countries in 2015-2020 are shown in table 1. Some differences are immediately apparent. For instance, Saudi Arabia's population is larger than the other countries combined, and over 20 times bigger than that of the smallest, Bahrain.

A few other indicators show something of the diversity of the region (table 2). Bahrain is perhaps the world's sixth most densely populated country or territory, in effect a city-state, at 2,182 people per square kilometre, whereas Oman and Saudi Arabia, with 15 people per square kilometre, are perhaps 197th and 198th.[2] In 2015, international migrant stock as a percentage of the population was 88% in the UAE, 76% in Qatar, and 74% in Kuwait, but (only) 32% in Saudi Arabia. Population growth also varied greatly over the five years 2015-2020, with 24% in Bahrain and 19.7% in Oman, but just 6.8% in UAE. And the age distribution of the countries' populations varied greatly, with the proportion of the population aged 0-14 years ranging from 13.6% (Qatar) to 24.7% (Saudi Arabia), and that 65 years and over ranging from 1.3% (UAE) to 3.5% (Saudi Arabia). Two further indicators - the proportion of the female population in employment ranges from 24.4% in Oman to 57.1% in Qatar, and gross national income (GNI) varies enormously – Qatar has the highest GNI (purchasing power parity) in the world, the UAE the eighth, and Oman the 48th. These are far from equally wealthy countries. We do not attempt to explain these differences, but merely draw attention to them to bear in mind when considering injuries data.

For instance, table 2, taken from World Bank data,[3] shows one widely gathered injury statistic, that of deaths in road traffic. Bahrain at 5.2 deaths per 100,000 people lies between France and Canada in the World Bank data, whereas Saudi Arabia, an outlier in the Gulf with 35.9 deaths per 100,000, is between Burundi and South Sudan.

Injuries in the Gulf region

Global Burden of Diseases, Injuries, and Risk Factors study

The Global Burden of Disease (GBD) project, was established in 1990 and is coordinated by the Institute of Health Metrics and Evaluation, with funding from the Bill and Melinda Gates Foundation and, since 2018, in collaboration with the World Health Organization (WHO). It analyses causes of death, diseases and injuries, and risk factors around the world, and attempts to establish their relative harms, including years of life lost due to premature mortality, years lived with disability, and disability-adjusted life years.[4] [5] The most recent global data are from 2019 and include 30 categories of injuries under three main headings, transport injuries, unintentional injuries, and self-harm and interpersonal violence.[6] Most data are estimates, derived through sophisticated modelling, and often have wide uncertainty intervals. For clarity these margins are not used, but all data should be understood to have a margin of error.

The global picture is shown in table 3, and for the Gulf countries in tables 4 and 5. Unintentional injuries, at 3.0 million account for 5.4% of all deaths globally, and the largest proportion of those (1.2 million, 39.8%) are from road injuries, which account for about 94% of all transport-related deaths. Falls, at 721,000, are another major cause of deaths, and like road traffic injuries, are the focus of an ongoing safety campaign by the WHO.

All the Gulf states fall above the global rate for the main categories of injuries, except that Oman is below for interpersonal violence. The global rate of death per million population from falls is 13.1. In Saudi Arabia it is nearly 10 times that amount at 129, and the UAE are over four times higher, at 58. Deaths from fire, heat, and hot substances show a similarly stark picture, with Saudi Arabia (20.8) and the UAE (19.3) being many times above the global rate (2.0). Likewise for deaths from exposure to mechanical forces, 2.2 deaths per million population globally, but 40.1 in Saudi Arabia, 30.4 in the UAE, and 26.8 in Qatar. In small populations, particular instances and circumstances in any given year can distort the statistics, but the pattern seems common across the different injuries and the Gulf states.

Motor vehicles & road trauma

Comparing road traffic mortality in countries with similar incomes (table 6) illustrates the situation more clearly. Taking the top 45 countries by GNI purchasing power parity (Oman is the 45th) shows that all except Bahrain significantly underperform in regards to peers. Bahrain is the 25th richest country and 27 in road traffic mortality ranking. But Qatar, which is the country with the highest GNI is 37th, the UAE, fourth highest GNI, is 54th, Oman is 62nd, and Kuwait, 12th richest, is 95th. Saudi Arabia is 178th in the world in terms of road traffic mortality ranking.

World Health Organization: Global status report on road safety 2018

The WHO Global Status Report on Road Safety 2018 estimates of road-related fatalities are 1.35 million in an estimated global population of 7.63 billion people or 17.69 road traffic deaths per 100,000 people.[7]

Overall, all Gulf states do not conform to the United Nations Economic Commission For Europe (UNECE) working programme 29.[8] This is a set of regulations pertaining to vehicles, their design, safety features, and add fixtures. For example, the regulations cover seatbelts, protective helmets, engines, steering systems, and lighting standards. As the Gulf states do not conform to these standards vehicles are not compared to these arrangements and regulations. As a result, the vehicle stock could be considered less safe.

The WHO report compares data from national organisations and governments with estimates of deaths relating to road traffic collisions. The larger the gap between the figures the less reliable reported levels of road traffic related fatalities are.

Bahrain is not included in the WHO report.

Kuwait does not have a full data set but is included within the report. WHO's report estimates that road related fatalities are 715 in 2016, 291 greater than 424 reported (p175). This gives an estimated rate of 17.6 deaths per 100,000 people, in line with the global average. Nonetheless the proportion of deaths is higher than the average and clear improvements could be made. Safety standards are not applied to the UNCE WP.29 regulation. Helmets, although mandated, do not need to be fastened. Alcohol is prohibited but is not routinely tested for or after a fatal crash. Seat belts are compulsory, yet not for the rear occupants, and there is an absent of child restraint law.

Oman has funded a national approach to reducing road related deaths. All fatal crashes include testing of fatalities for alcohol. Both front and rear occupants of a vehicle have an obligation to have a restraining belt. There is a requirement for child restraints up to four years of age. However, there is no compliance with the UNECE WP.29 regulations and despite helmets being required for all riders of motorcycles they do not have to be fastened or comply to a specification. The difference in estimated deaths and report is only 21 deaths with an estimated 713 deaths compared to 692 in 2016. Giving a slightly lower than the global average of 16.1 deaths on the road per 100,000 people.

Qatar has a fully funded strategy for road safety. The WHO estimates 239 deaths.. Helmets are required for all riders of motorcycles, yet fastening requirements are absent. Similarly, seat restraints are required, but rear seat occupants are not required to have restraints and there is no child restraints law. Nevertheless, 72% of drivers are using seat belts for children. Although routine alcohol breathalysing is absent, all drivers in fatal crashes are tested with prohibition enforced.

Saudi Arabia has an incomplete dataset, with less infrastructure supports for road design compared to Oman, yet better than Kuwait and Iraq. The WHO estimate of deaths in 2016 was 9,031 compared to government figures of 9,311, giving a higher than average, 28.8 deaths per 100,000 people. Seat restraints, as in Oman, are required for front and rear occupants with child restraints requirements. There is a requirement for helmets to be fastened and no under 16-year-olds allowed on motorcycles. However, they do not have a specific safety standard for helmets. Drivers are not routinely tested for alcohol after fatal collisions or randomly.

The UAE has a partially funded strategy for road deaths. Reported fatalities (n=725) was 953 fewer than the estimated (n=1,678) or 18.1 deaths per 100,000. Alcohol is prohibited in the UAE, and all drivers in a fatal accident are tested for alcohol. Seat belts are required for front and rear passengers and clear child restraints requirements. All riders on motorcycles must have helmets yet are not required to be fastened.

Beyond the WHO status report

According to Alawad and colleagues, motor vehicle accidents account for 66.8% (n=462) of traumatic spinal injuries in the Riyadh region of Saudi Arabia (n=692) demonstrating a significant burden.[13] Out of 171 head injuries 105 (61.4%) were from motor vehicle accidents.[9] In a scoping review of childhood injuries in Saudi Arabia, motor vehicle accidents were the second most common injury (21.5%). Motor vehicle accidents represented the most common cause of spinal cord injuries in Southern Saudi Arabia, with 79.5% (n=89) of 112 injuries.[10] The mean age was 32.1 years.

Falls

Falls represent a large proportion of unintended accidents and injuries. Falls may occur within the home, workplaces, and during pleasure time. In the home falls are also associated with comorbidity disease, increasing frailty and disorientation.

Juhani and colleagues analysed data from a single level 1 trauma centre in Saudi Arabia, for musculoskeletal injuries during the covid-19 pandemic lockdowns.[11] During the three months of analysis, 92 patients were included in the study and falls represented 47.0% of the injuries. Proximal femur injuries were the most frequent fracture from injury (22.8%). The most common comorbidity was hypertension (30.7%). In the Saudi Arabian city of Unaizah, the risk of falls in the over 60-year-olds was greater in females and occurred mostly indoors.[12] Over the age of 80, polypharmacy and the environment are the greatest risk factors for falls.[13] In the UAE, there is an increase in falls between 2003 and 2006 compared to 2014 and 2017 for geriatric patients.[14 15]

A cross-sectional study in Saudi Arabia, Razik et al. (2020) highlights how falls impact younger populations also.[16] Out of 262 patients, 25.7% were under ten (n=67) and 18.2% between 21 and 30 (n=48). The authors concluded that in a tertiary hospital falls were associated with significant injury and appropriate care and management was needed.

Another retrospective study about spinal injuries in Saudi Arabia, Alawad et al. (2020) has established that 31.6% (n=219) of cases were associated with falls.[17] 37.4% (n=89 of non-Saudi patients (n=238) fell from height, possibly suggesting that the incidents may have been work related. In a study of head injuries in Saudi Arabia, falling from height was the second most common injury with 19.9% (n=34) of 171 patients.[9] In a scoping review of childhood injuries, the leading cause of injury in children in Saudi Arabia was fractures from falls (37.9%). Falls represented the only other cause of spinal cord injuries in Southern Saudi Arabia, with 20.5% (n=33) of 112 injuries.[10]

In Kuwait, 2.9% of hospitalisations are because of accidental falls, with being female and over the age of 65 years of age increasing the likelihood of falls.[18] Non-Kuwaiti nationals are more likely to have a fall from height than other working age males. The author concludes intervention is required for older females and working aged non-Kuwaitis. The need for interventions for the working population is also discussed by Abbas and colleagues, who highlighted this because more preventative measures are required due to Saudi Arabian occupational injuries and insurance claims.[19] Most injuries occurred, however, on a Friday which is generally not a working day in the Gulf.

Trauma registries

We present data from trauma registries on injuries and hospitalisations generated from a literature search of academic sources identified through academic database search engines' PUBMED and WEB OF SCIENCE. Scoping searchers were conducted with the country's names and types of injuries.

Bahrain

In 2018, data were collected over a three-month trial period for paediatric trauma in three referral paediatric emergency departments.[20] In the three-month period, 92.3% of 1,328 (n=1,226) trauma cases resulted from motor vehicle accidents, and 12% involved an ejection from the vehicle which would suggest that a restraint or seat belt was not worn during the crash.

Kuwait

At the time of reporting there is no obvious trauma registry. However, some retrospective work has been undertaken within specific orthopaedic databases in a level two trauma centre.[21 22] These data relate only to musculoskeletal injuries of 564 patients, with a mean age of 33 years accounting for 788 injuries. The most common mechanism of injury was road traffic accidents (37.9%) with the second and third relating to falls from tripping and from height, 29.3% and 16.8%, respectively. Of the study population, 308 were non-Kuwaiti nationals were (57.0%). Within the trend of injuries, ankle injuries were more likely to be associated with falls from height, and non-Kuwaitis had more injuries for ankle fractures. Also, of interest spinal injuries were more common for Kuwaiti nationals and in car crashes.

Qatar

Prior to the Qatar National Trauma Registry being setup in 2017, the Hamad Trauma Centre was the only level one trauma centre in Qatar and held its own records. Between 2011 and 2017 Consunji and colleagues utilised the Hamad Trauma Centre and analysed work-related injuries, including 3,757 cases.[23] Falls were the cause in 1,792 (47.7%) injuries. Of the injuries 714 (19%) were a motor vehicle collision in occupational use. Of these 408, and 57.1% of the motor vehicle related to work, injured parties were not wearing seat belts. There was median increase of US$13,219 in associated costs of an injured party as a result of a motor vehicle accident not wearing a seat belt compared to wearing a seat belt. Falling objects represented 16.9% of injuries (n=636), 4.2% machine-related (n=159), 4.2% pedestrians (n=157), and 8.0% other injuries (n=299). Helmets, when applicable, were used 68% of the time. The greatest levels of cost for workplace injuries were those involving pedestrians, with a median cost of US$25,308. Workplace deaths over this period represent 4.8% of injuries (n=180), with US$7,465 higher median costs associated.

Saudi Arabia

Saudi Trauma Registry (STAR)

STAR is a collaboration between Monash University and the Alfred Hospital Melbourne and King Saudi Medical City's trauma centre, which has been recording injuries since 2016. Alsenani and colleagues analysed a cohort or patients and compared it with the Australian Trauma registry at the King Alfred Hospital, Melbourne.[14] In the breakdown of injuries STAR had 52.1% resulting from road traffic compared to 42.4% in Australia. Males were disproportionally impacted by injuries in both registries, but more so in STAR, 86.3% compared to 68.6%. The mean age for STAR was 36.2 years compared to 49.8 years in Australia. Compared to the care in STAR, the Australian cohort spent 4 days less in hospital and had a quarter of the mortality.

STAR is a successor of the electronic database major trauma registry in Riyadh, Saudi Arabia, the same region as the King Saudi Medical City.[17] The previous major trauma registry, between 2001 and 2010, reported 52.0% of injuries related to motor vehicles or roads. The rate of injuries relating to roads has remained similar. From 2016 to 2018 in the STAR cohort road traffic collisions were responsible for 51.0% of injuries.[10] Importantly, of those injuries involving road traffic, information was absent about a seat belt being worn in 70.2% of records. There is a national requirement for restraints.

In Riyadh, between 2016 and 2018, Alawad and colleagues studied traumatic spinal injuries.[24] Of 692 patients with spinal injuries, 462 (66.8%) of injuries resulted from motor vehicle accidents. This is higher than the global average of 39.5%, demonstrating that the burden from motor accidents is greater in Saudi Arabia for spinal injuries.

Reporting 2018 data from the Saudi Red Crescent [ambulance] Authority, road traffic accidents resulted in 68,141 cases; 7,060 involved altercations or intra-personal violence; 20,783 were from

falls; 528 were burns, 292 were drownings, and 15,338 other accidents. Of the 308,754 ambulance cases 112,142 (36.32%) involved an accident.[25]

UAE

In the UAE since the early 2000s, Al-Ain City has surveyed traumatic injuries.[26] Over a ten-year period, the trauma centres saw a decrease in trauma incidence and trauma mortality with reductions in trauma from height-related falls and road traffic collisions. However, there was an increase in geriatric and female trauma cases. In a further in-depth analysis, Alao and colleagues explored the increase in geriatric trauma.[27] Incidence and severity were consistent with mortality decreasing. Falls in the home caused the majority of injuries, leading the authors to conclude that there is a need to increase interventions to prevent falls. During the covid-19 pandemic, Alao and colleagues continued their surveillance of traumatic injuries and found there were fewer road traffic accidents and falls from height, yet work-related injuries continued to be high during the pandemic, particularly because of falling object and machinery injuries.[28]

Conclusion

It is clear that there is enormous scope for improvement in the Gulf. Indeed, there was widespread improvement across the major injury categories between 2015 and 2019 (tables 4 & 5). Bahrain and Oman saw improvements in all six areas (transport; falls; drownings; fire, heat, and hot substances; exposure to mechanical forces; and interpersonal violence), with declines in figures of over 10% across in Bahrain all but fire and heat. Saudi Arabia improved in four areas, including a big decrease in exposure to mechanical forces, but increases of over 10% in transport- and falls-related deaths. Qatar and the UAE had more mixed developments, and Kuwait struggled, improving in only two areas, drownings and exposure to mechanical forces.

Again, with small actual numbers for some types of injury in some states – for instance, just 13 deaths from drowning in Bahrain, 18 from exposure to mechanical forces in Kuwait, and 23 from fire and heat in Oman, small variations may create a false impression of change. And indeed in the numerically larger areas of transport and falls, there was little improvement, with statistics unchanged for transport in Kuwait and for falls in Qatar and the UAE, and worsening for transport in Qatar, Saudi Arabia, and the UAE, and for falls in Kuwait and Saudi Arabia.

Table 1 Total county population annually in thousands, 2015-2020[29]

Country	Total population, as of 01 July (thousands)						Population growth
	2015	2016	2017	2018	2019	2020	2015-2020, %
Bahrain	1,372	1,426	1,494	1,569	1,641	1,702	24.0
Kuwait	3,836	3,957	4,056	4,137	4,207	4,271	11.3
Oman	4,267	4,479	4,666	4,829	4,975	5,107	19.7
Qatar	2,566	2,654	2,725	2,782	2,832	2,881	12.3
Saudi Arabia	31,718	32,443	33,101	33,703	34,269	34,814	9.8
United Arab Emirates	9,263	9,361	9,487	9,631	9,771	9,890	6.8

Table 2 Population growth, population density, migrant stock, road traffic mortality, population ages, Gulf states[30]

Country	Population density (people per sq km of land area) 2020	International migrant stock, % of population 2015	Mortality caused by road traffic injury per 100,000 population 2019	Population ages 0-14, % of total population, 2020	Population ages 15-64 (% of total population) 2020	Population ages 65 and above (% of total population) 2020	Employment to population ratio, 15+, female (%) modelled ILO estimate 2019	GNI per capita, PPP (current international $) 2019
Bahrain	2,182	51.1	5.2	18.3	79.1	2.7	39.9	44,470
Kuwait	240	73.6	15.4	21.5	75.5	3	42.2	58,930
Oman	16	41.1	10.6	22.5	75	2.5	24.4	30,330
Qatar	251	75.5	7.3	13.6	84.7	1.7	57.1	91,430
Saudi Arabia	16	32.3	35.9	24.7	71.8	3.5	25.4	49,440
United Arab Emirates	139	88.4	8.9	14.8	83.9	1.3	42.3	71,500

Table 3 Global deaths by all causes and selected injuries, 2019[31]

Cause	Deaths (000s)	Rates of death per 1 million population
All causes	55,161	-
Unintentional injuries	3,005	54.5
Road injuries	1,196	21.7
Falls	721	13.1
Drowning	237	4.3
Fire, heat, and hot substances	110	2.0
Exposure to mechanical forces	122	2.2
Self-harm	758	13.7
Interpersonal violence	415	7.5

Table 4 Gulf states, total numbers of deaths from selected injuries, 2015 and 2019[29 31]

Country	Total population, as of 01 July (000s)		Transport		Falls		Drownings		Fire, heat, and hot substances		Exposure to mechanical forces		Interpersonal violence	
	2015	2019	2015	2019	2015	2019	2015	2019	2015	2019	2015	2019	2015	2019
Bahrain	1,372	1,641	186	181	27	26	13	13	15	15	13	10	31	25
Kuwait	3,836	4,207	552	607	102	118	22	22	31	35	18	18	34	40
Oman	4,267	4,975	2,087	2,061	155	154	122	118	22	23	89	91	30	29
Qatar	2,566	2,832	699	782	92	101	37	25	31	35	75	76	25	25
Saudi Arabia	31,718	34,269	19,946	21,775	3,902	4,405	719	724	702	713	3,680	1,374	407	403
United Arab Emirates	9,263	9,771	3,689	3,937	540	562	166	171	179	189	320	297	109	85

Improvement > 20%
Improvement 11%-20%
Improvement 2%-10%
No improvement -1%-1%
Decline -2%- -10%
Decline -11%- -20%

Population increase, >10%
Population increase, 0-10%

Table 5 Gulf states, rates of death per 1 million population, from selected injuries, 2015 and 2019[29 31]

Country	Transport		Falls		Drownings		Fire, heat, and hot substances		Exposure to mechanical forces		Interpersonal violence	
	2015	2019	2015	2019	2015	2019	2015	2019	2015	2019	2015	2019
Bahrain	136	110	20	16	9.5	7.9	10.9	9.1	9.5	6.1	22.6	15.2
Kuwait	144	144	27	28	5.7	5.2	8.1	8.3	4.7	4.3	8.9	9.5
Oman	489	414	36	31	28.6	23.7	5.2	4.6	20.9	18.3	7.0	5.8
Qatar	272	276	36	36	14.4	8.8	12.1	12.4	29.2	26.8	9.7	8.8
Saudi Arabia	629	635	123	129	22.7	21.1	22.1	20.8	116.0	40.1	12.8	11.8
United Arab Emirates	398	403	58	58	17.9	17.5	19.3	19.3	34.5	30.4	11.8	8.7

Improvement > 20%
Improvement 11%-20%
Improvement 2%-10%
No improvement -1%-1%
Decline -2%- -10%
Decline -11%- -20%

Table 6 Comparison of GNI per capita and road traffic mortality, 2019, 45 countries with highest GNI[30 31]

	GNI per capita, PPP (current international $)	GNI ranking	Mortality caused by road traffic injury (per 100,000 population)	Road traffic mortality ranking
Qatar	91,430	1	7.3	37
Singapore	90,320	2	2.1	7
Luxembourg	77,680	3	4.1	19
United Arab Emirates	71,500	4	8.9	**54**
Switzerland	69,440	5	2.2	8
Norway	68,830	6	2.1	6
Ireland	67,820	7	3.1	9
Brunei Darussalam	66,460	8	7.5	39
United States	66,120	9	12.7	76
Denmark	60,400	10	3.7	13
Netherlands	59,250	11	4.0	18
Kuwait	58,930	12	15.4	**95**
Austria	57,870	13	4.9	23
Iceland	57,770	14	2.0	5
Germany	57,460	15	3.8	14
Sweden	56,190	16	3.1	10
Belgium	54,790	17	5.8	30
Finland	50,630	18	3.9	15
France	50,130	19	5.1	24
Australia	50,090	20	4.9	22
Saudi Arabia	49,440	21	35.9	**178**
United Kingdom	48,760	22	3.2	11
Canada	48,680	23	5.3	28
Italy	44,720	24	5.3	29
Bahrain	44,470	25	5.2	27
New Zealand	44,300	26	9.6	58
Japan	44,260	27	3.6	12
Korea, Rep.	43,420	28	8.6	52
Malta	42,480	29	4.1	20
Spain	41,790	30	3.9	17
Cyprus	40,390	31	5.8	31
Czech Republic	40,260	32	5.9	32
Slovenia	40,060	33	5.1	26
Israel	39,780	34	3.9	16
Estonia	37,500	35	4.5	21
Lithuania	37,200	36	8.1	48
Bahamas, The	36,180	37	7.7	43
Portugal	35,230	38	8.2	50
Hungary	32,630	39	7.7	44
Poland	32,410	40	9.4	57
Romania	31,450	41	10.3	61
Latvia	31,410	42	8.1	47
Slovak Republic	31,410	43	6.1	33
Panama	30,570	44	13.9	84
Oman	30,330	45	10.6	**62**

[1] Secretariat General of the Gulf Cooperation Council. https://www.gcc-sg.org/en-us/Pages/default.aspx
[2] World Bank data includes non-independent territories like Macau, Hong Kong, and Gibraltar; perhaps Bahrain is second only to Singapore in population density.
[3] The World Bank. Mortality caused by road traffic injury per 100,000 population. DataBank https://databank.worldbank.org/home.aspx
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