Burden of fatal and nonfatal injury in Hong Kong: abridged secondary publication

CB Chow *, P Ip, SM McGhee, SHM Tsui, CW Kam, HFP Ho, EWY Chan, HSW Wong, IWS Chiu

KEY MESSAGES

1. This study aimed to quantify injury burden in Hong Kong in terms of disability weights and disability-adjusted life-years (DALYs).
2. Disability weights in Hong Kong were lower than those in foreign countries, especially those of lifelong effects.
3. Between 2001 and 2012 in Hong Kong, a mean of 85 151 DALYs were lost due to injury annually, equivalent to 1192 DALYs per 100 000 population.
4. The study design could only capture injury mortality and injury-related inpatient cases. Owing to a lack of routine injury data at accident and emergency departments, the injury burden may be underestimated.
5. Healthcare professionals and policymakers can reference the results of this study to make informed decisions on local and territory-wide injury prevention strategies.

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[1] CB Chow, [1] P Ip, [2] SM McGhee, [3] SHM Tsui, [4] CW Kam, [5] HFP Ho, [6] EWY Chan, [1] HSW Wong, [1] IWS Chiu

[1] *Department of Paediatrics and Adolescent Medicine, Li Ka Shing Faculty of Medicine, The University of Hong Kong*
[2] *Department of Community Medicine, The University of Hong Kong*
[3] *Accident & Emergency Department, Queen Mary Hospital*
[4] *Clinical Skills Training Centre, New Territories (West Cluster)*
[5] *Department of Accident & Emergency, Queen Elizabeth Hospital*
[6] *Department of Pharmacology and Pharmacy, The University of Hong Kong*

* Principal applicant and corresponding author: chowcb@hku.hk

Introduction

Injury is one of the leading causes of mortality and morbidity, and is also a common health problem in Hong Kong, especially unintentional injury.[1] It is the leading cause of adolescent death and disability in Hong Kong,[2] accounting for 3.1 deaths per 100 000 person-years among those aged 0 to 4 years and 3.7 deaths per 100 000 person-years among those aged 15 to 24 years.[3] Quantifying injury burden is essential for priority setting and allocation of limited resources.

Disability-adjusted life-years (DALYs), devised from the Global Burden of Disease Study,[4] is used to quantify burden of disease and injuries in a standardised manner to enable valid comparison between diseases and countries. It summarises mortality, morbidity, and disability of a disease into one single score. By generating DALYs from injuries, healthcare professionals and policymakers can objectively assess the injury burden in Hong Kong and make informed decisions on injury prevention strategies.

Methods

DALYs was calculated using disability weights (DW), years lost due to premature mortality (YLL), and years lived with disability (YLD). DW was estimated in patients who were injured and admitted to the accident and emergency departments of three trauma centres (Queen Elizabeth Hospital, Queen Mary Hospital, and Tuen Mun Hospital).

Health-related quality of life was assessed using the Short Form-12 version 2. Pre-injury health-related quality of life was assessed retrospectively by asking subjects to recall their health state 1 week prior to injury. Follow-up telephone interviews were made at 1 and 4 months after injury or until the patient resumed normal health status, whichever earlier. All subjects were contacted at 12 months after injury. Scores from Short Form-12 version 2 were used to derive the Short Form-6D single utility index. The index from those who were recovered by 12 months was used to compute the population mean score. The annualised DW was estimated by averaging the DWs at all post-injury follow-ups. Acute and lifelong DWs were calculated.

In the event of insufficient case recruitment in particular injury types, a linear regression analysis was used to impute the DWs of these injuries using age, sex, and length of hospital stay from the results of recruited subjects.

YLL was calculated using age- and sex-specific injury mortality from 2001 to 2012 from Centre for Health Protection, with ICD-10 causes of death. Life expectancies for each age group and sex were extracted from the 2011 life table by the Census and Statistics Department.

Short- and long-term YLDs were mapped into EUROCOST injury categories. The short-term YLDs was computed by multiplying the annualised DW with the corresponding number of the injuries.

The long-term YLDs was computed by multiplying the lifelong DW with the corresponding number of injuries, the proportion of lifelong consequences, and the remaining life expectancy of the patient.

Results

Of 1728 (90%) subjects contacted, 775 (45%) were still affected by the injury at 1 month after injury. Of whom, 337 (47%) were still affected by the injury at 4 months after injury. At 12 months after injury, the response rate was 81%, with 201 (13%) subjects still affected by the injury, which was considered as having lifelong consequences. The Short Form-6D single utility index troughed at 1 month after injury and increased steadily from 4 to 12 months, with men reporting higher scores than women at all time points.

Acute and lifelong DWs and the proportion of lifelong consequences of each EUROCOST injury type are shown in Table 1. Lifelong DW was lower than acute DW, as not all injury cases have lifelong effects on patient's quality of life.

From 2001 to 2012, injury accounted for 1 021 815 DALYs, which was equivalent to 85 151 DALYs annually or 1192 DALYs per 100 000 population (Table 2). Men contributed more DALYs

TABLE 1. Acute and lifelong disability weights and proportion of lifelong consequences of EUROCOST injury types.

EUROCOST injury types	Acute disability weight	Lifelong disability weight	Proportion of lifelong consequences
Concussion	0.044	0.005	6.7%
Other skull-brain injury	0.079	0.001	6.3%
Open wound head	0.010	0.000	0.0%
Eye injury	0.025	0.004	2.5%
Fracture of facial bones	0.151	0.026	21.1%
Open wound face	0.043	0.000	8.4%
Fracture/dislocation/strain/sprain of vertebrae/spine	0.056	0.002	11.0%
Whiplash, neck sprain, distortion of cervical spine	0.136	0.016	32.0%
Spinal cord injury	0.654	0.394	100.0%
Internal organ injury	0.216	0.055	59.1%
Fracture of rib/sternum	0.092	0.000	6.1%
Fracture of clavicle/scapula	0.141	0.021	12.6%
Fracture of upper arm	0.183	0.002	25.1%
Fracture of elbow/forearm	0.174	0.016	12.5%
Fracture of wrist	0.138	0.002	10.5%
Fracture hand/fingers	0.115	0.032	22.4%
Dislocation/strain/sprain of shoulder/elbow	0.075	0.014	13.6%
Dislocation/strain/sprain of wrist/hand/fingers	0.083	0.013	14.5%
Injury of upper extremity nerves	0.142	0.022	34.6%
Complex soft tissue injury of upper extremity	0.123	0.003	17.5%
Fracture of pelvis	0.041	0.001	8.9%
Fracture of hip	0.150	0.077	57.4%
Fracture of femur shaft	0.286	0.080	72.8%
Fracture of knee/lower leg	0.222	0.029	31.6%
Fracture of ankle	0.168	0.028	18.1%
Fracture of foot/toes	0.141	0.020	12.7%
Dislocation/strain/sprain of knee	0.069	0.006	13.1%
Dislocation/strain/sprain of ankle/foot	0.065	0.000	10.0%
Dislocation/strain/sprain of hip	0.060	0.018	21.1%
Injury of lower extremity nerves	0.230	0.060	100.0%
Complex soft tissue injury of lower extremities	0.198	0.001	0.0%
Superficial injury, including contusions	0.037	0.005	8.3%
Open wounds	0.030	0.002	5.2%
Burns	0.030	0.016	4.9%
Poisoning	0.025	0.000	21.1%
Foreign body	0.000	0.000	0.0%
Other injury	0.047	0.008	11.9%

TABLE 2. Disability-adjusted life-years (DALYs), years lost due to premature mortality (YLL), years lived with disability (YLD) [acute and lifelong], and YLL:YLD ratio stratified by sex, age, and year

	DALYs	YLL	YLD (acute)	YLD (lifelong)	YLL:YLD ratio
Sex					
Female	396 971	253 390	64 009	79 573	1.76
Male	624 844	459 626	64 663	100 555	2.78
Age, y					
0-14	40 957	23 967	6 994	9 995	1.41
15-59	734 971	579 912	54 945	100 114	3.74
≥60	245 887	109 136	66 732	70 019	0.80
Year					
2001	91 562	65 080	10 745	15 737	2.46
2002	93 451	67 891	10 452	15 108	2.66
2003	89 874	66 469	9 440	13 966	2.84
2004	95 215	71 127	9 771	14 316	2.95
2005	91 617	68 438	9 495	13 684	2.95
2006	83 991	60 714	9 524	13 753	2.61
2007	78 471	55 874	9 560	13 037	2.47
2008	77 016	53 347	10 186	13 483	2.25
2009	84 216	57 504	11 309	15 403	2.15
2010	85 802	56 069	12 441	17 292	1.89
2011	74 592	44 772	12 712	17 108	1.50
2012	76 008	45 731	13 037	17 240	1.51

TABLE 3. Total disability-adjusted life-years (DALYs) and DALYs per 100 000 population by district between 2001-2012*

District	Population in 2006	Total DALYs	DALYs per 100 000
Hong Kong Island	1 268 112	173 229	1138
Central & Western	250 064	32 654	1088
Wan Chai	155 196	20 250	1087
Eastern	587 690	79 947	1134
Southern	275 162	40 379	1223
Kowloon	2 019 533	319 874	1320
Yau Tsim Mong	280 548	49 687	1476
Sham Shui Po	365 540	61 159	1394
Kowloon City	362 501	46 893	1078
Wong Tai Sin	423 521	73 914	1454
Kwun Tong	587 423	88 222	1252
New Territories	3 573 635	488 529	1139
Kwai Tsing	523 300	77 932	1241
Tsuen Wan	288 728	33 530	968
Tuen Mun	502 035	77 028	1279
Yuen Long	534 192	78 354	1222
North	280 730	42 932	1274
Tai Po	293 542	42 006	1192
Sha Tin	607 544	76 525	1050
Sai Kung	406 442	44 752	918
Islands	137 122	15 470	940
Total	**6 861 280**	**981 633**	**1192**

* Cases contributing to 40 182 DALYs did not specify residential district

than women (61.2% vs 38.8%). Generally, the YLL:YLD ratio was >1, which indicated that injury morbidity contributed less DALYs than mortality. DALYs by residential district are shown in Table 3, with Yau Tsim Mong ranking highest in terms of DALYs per 100 000 population.

Discussion

The DWs for most injury types were significantly lower in our study than in foreign studies, in particular annualised DWs. The DWs, especially lifelong DWs, in our study were generally lower than the confidence intervals reported in a meta-analysis of six developed countries injury cohort studies.[5] Although the linear regression analysis showed that it was statistically reliable to compute DWs of under-represented injury types from length of hospital stay data collected from recruited cases, lower DWs may indicate that the relationship between computed values in the prediction may not be linear.

Our study has limitations in estimating injury burden in Hong Kong holistically, owing to a lack of routine injury data from accident and emergency departments. Thus, our study reflects injury burden only from injury mortality and injury-related inpatient cases. DALYs in our study was only 34% to 41% of that in overseas studies (UK 2005: 2924 DALYs per 100 000 population; global 2013: 3459 DALYs per 100 000 population). This may indicate that the injury burden may be severely underestimated using only inpatient and mortality injury data. To accurately estimate the injury burden in Hong Kong, a comprehensive injury surveillance system inside and outside healthcare system should be implemented to collect routine injury data.

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