Injury, Int. J. Care Injured 50 (2019) 1288–1292

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

The role of sociodemographics in the occurrence of orthopaedic trauma

Elizabeth Sheridan[a], Jessica M. Wiseman[a], Azeem Tariq Malik[a], Xueliang Pan[b], Carmen E. Quatman[a,d,*], Heena P. Santry[c,d], Laura S. Phieffer[a]

[a] Department of Orthopaedics, The Ohio State University Wexner Medical Center, United States
[b] Department of Biomedical Informatics, The Ohio State University, United States
[c] Department of Surgery, The Ohio State University Wexner Medical Center, United States
[d] Center for Surgical Health Assessment, Research and Policy (SHARP), The Ohio State University Wexner Medical Center, United States

ARTICLE INFO

Article history:
Accepted 18 May 2019

Keywords:
Fracture
Race
Sex
Age
Socioeconomic status
Blunt trauma
Penetrating trauma

ABSTRACT

Introduction: We sought to determine the effects of sociodemographic factors on the occurrence of orthopaedic injuries in an adult population presenting to a level 1 trauma center.
Materials and methods: We conducted a retrospective chart review of patients who received orthopaedic trauma care at a level 1 academic trauma center.
Results: 20,919 orthopaedic trauma injury cases were treated at an academic level 1 trauma center between 01 January 1993 and 27 August 2017. Following application of inclusion/exclusion criteria, a total of 14,654 patients were retrieved for analysis. Out of 14,654 patients, 4602 (31.4%) belonged to low socioeconomic status (SES), 4961 (32.0%) to middle SES and 5361 (36.6%) to high SES. Following adjustment for age, sex, race, insurance status and injury severity score (ISS), patients belonging to middle SES vs. low SES (OR 0.77 [95% CI 0.63-0.94]; p = 0.009) or high SES vs. low SES (OR 0.77 [95% CI 0.62-0.95]; p = 0.016) had lower odds of receiving a penetrating injury as compared to a blunt injury.
Conclusion: The results from this study indicate that a link exists between sociodemographic factors and the occurrence of orthopaedic injuries presenting to a level 1 trauma center. The most common cause of injury varied within age groups, by sex, and within the different socioeconomic groups.

Introduction

Traumatic injury is the leading cause of death in Americans ages 1–44 in the United States and accounts for nearly 10% of global mortality [1,2]. Trauma care requires extensive health care resource utilization including hospital visits, surgeries, rehabilitation and psychological care. In addition, the health system-level financial losses associated with traumatic injury exceed those of cancer and heart disease combined with annual costs exceeding $670 billion [2,3]. Meanwhile, the patient-level productivity losses due to acute and sometimes life-long physical, psychological, and emotional pain or disability result in financial hardship for individuals and their families. Unlike many congenital or acquired diseases, traumatic injuries have high potential for reduced incidence through prevention measures [1,2].

Sociodemographic factors, which include age, race, sex, and socioeconomic status, have a complex effect on health, including injury incidence, treatment patterns, and outcomes [4–20]. Unequal outcomes after trauma also exist, again affected by lack of health insurance, violence, socioeconomic status, and race [9,10,15,21–23]. These data have led to a discussion of whether patient performance measures for bundled payments should be adjusted with consideration of sociodemographic factors [24,25]. However, the role of sociodemographic factors among fracture patients is not well studied. Although the interaction of sociodemographic factors is complex, addressing these risk factors may lead to improved outcomes and reduced health inequalities.

The primary aim of this study was to determine the effects of selected sociodemographic factors on the occurrence of orthopaedic injuries in an adult population presenting to a level 1 trauma center.

Patients and methods

A retrospective chart review of prospectively collected data was conducted at a single level 1 academic trauma center. All patients age 18 and older who resided in the Combined Statistical Area (CSA; defined as the 17 surrounding counties around the trauma center location) that received treatment for an orthopaedic injury between the dates of 01 January 1993 and 27 August 2017 were screened for inclusion. All traumas that involved a broken bone were included

* Corresponding author at: The Ohio State University Wexner Medical Center, 725 Prior Hall, Columbus, OH, 43210, United States.
E-mail address: Carmen.Quatman@osumc.edu (C.E. Quatman).

https://doi.org/10.1016/j.injury.2019.05.018
0020-1383/

regardless of location of bone or whether they were seen for an orthopaedic consult. Excluded from the study population were individuals incarcerated at the time of injury and those who lived outside of the CSA were excluded from the study. ge, sex, race, insurance type, date of injury, ZIP code (numerical system used by the postal service in the United States to denote geographic residential area), diagnosis, location of injury, and cause of injury were reviewed. For the purpose of this study, the diagnosis of a polytrauma patient was limited to the primary orthopaedic injury designated by the provider. The patient's socioeconomic status was determined by identification of the billing ZIP code in which the individual lived at the time of their injury. To make the socioeconomic status assessment, the median income, education level, and unemployment information for each ZIP code was collected from the United States census [26]. A socioeconomic status index number for each ZIP code was calculated using Mustard and Frohlich's method [27–29]. The socioeconomic status index number was then placed into one of three groups; low, middle or high. Using Mustard and Frohlich's method z-scores were calculated for all ZIP codes within the CSA. They ranged from -0.93958 to 2.428891. The z-scores were then used to rank the ZIP codes from lowest to highest and divided into tertiles (low, middle, high).

Statistical analysis

Pearson's Chi-Square tests were used to assess for unadjusted significant associations present between baseline demographic/clinical characteristics (age, sex, race, insurance status, type of injury and injury severity score) and socio-economic status (low, middle and high). Multi-variate analysis, using a binomial logistic regression model, was then utilized to analyze the independent impact of increasing socio-economic status on the odds of receiving a penetrating trauma vs. a blunt injury while controlling for other clinical and demographic characteristics. Results from multi-variate regression have been reported as adjusted odds ratio (OR) and 95% confidence intervals (CI) and p-values. For all statistical purposes, a p-value of less than 0.05 was considered significant. All statistical analyses were carried out using SPSSv24 (IBM, Armonk, NY).

Results

A total of 14,684 of the 20,919 orthopaedic trauma injury cases met inclusion criteria for study. The racial distribution was primarily white (79.6%) and black (16.4%) (Table 1). Males accounted for the majority of total trauma injuries (66%) as well as the majority of blunt and penetrating trauma incidents (65% and 89%, respectively). The most prevalent type of trauma was blunt force trauma (94.6%) followed by penetrating trauma (5%) (Table 2). Causes of blunt force trauma included falls (37.6%), motor vehicle accidents (37.5%), and assault (12.3%). Falls most frequently occurred among adults ages 65–89 (41.6%). In the oldest age group (65–89), the highest incidence of falls was among white adults (88%) and were evenly distributed by sex among all races (53% male). The most common cause of penetrating trauma was assault (91%) and the majority of these incidents occurred in individuals ages 18–29 (52.5%). Black males represented more than half of all penetrating trauma. Patients with low socioeconomic status had more than twice the number of penetrating trauma than patients from middle or high socioeconomic statuses (Figs. 1 and 2). Socioeconomic distribution was associated with race ($p < 0.0001$), with the lowest socioeconomic group comprised mainly of black individuals (66%) and the highest socioeconomic group mainly of white individuals (41.3%). Following adjustment for age, sex, race, insurance status and injury severity score (ISS), patients belonging to middle SES vs. low SES (OR 0.77 [95% CI 0.63–0.94]; $p = 0.009$) or high SES vs. low SES (OR 0.77 [95% CI 0.62–0.95]; $p = 0.016$) had lower odds of receiving a penetrating injury as compared to a blunt injury.

Table 1
Baseline demographic and clinical characteristics of the study population.

	Low SES (N = 4602)	Middle SES (N = 4691)	Upper SES (N = 5361)	P-Value
Age (years)				<0.001
18-29	1,302 (28.3%)	1460 (31.1%)	1310 (24.4%)	
30-45	1,401 (30.4%)	1187 (25.3%)	1275 (23.8%)	
46-64	1,192 (25.9%)	1197 (25.5%)	1390 (25.9%)	
≥65	707 (15.4%)	847 (18.1%)	1386 (25.9%)	
Sex				<0.001
Female	1,441 (31.3%)	1557 (33.2%)	1969 (36.7%)	
Male	3,161 (68.7%)	3134 (66.8%)	3392 (63.3%)	
Race				<0.001
White	2,854 (62.0%)	3994 (85.1%)	4821 (89.9%)	
Black	1,590 (34.6%)	498 (10.6%)	318 (5.9%)	
Other	158 (3.4%)	199 (4.2%)	222 (4.1%)	
Insurance Status				<0.001
Private	1,583 (34.4%)	2194 (46.8%)	2859 (53.3%)	
Self	1,475 (32.1%)	1223 (26.1%)	1105 (20.6%)	
Medicare	476 (10.3%)	499 (10.6%)	692 (12.9%)	
Medicaid	1,068 (23.2%)	775 (16.5%)	705 (13.2%)	
Type of Injury				<0.001
Blunt	4,209 (91.5%)	4506 (96.1%)	5202 (97.0%)	
Penetrating	393 (8.5%)	185 (3.9%)	159 (3.0%)	
Injury Severity Score (ISS)				0.208
≤15	3,727 (81.0%)	3797 (80.9%)	4276 (79.8%)	
>15	875 (19.0%)	894 (19.1%)	1085 (20.2%)	

Discussion

Black patients in the population studied were represented in trauma (79.6% white, 16.4% black) in a ratio consistent with the demographics of all patients treated at the medical center (76% white, 16% black). However, county demographics of the location of the academic medical center, where the majority of patients presented from, are 67% white and 22% black, would suggest black patients presented for treatment at a lower number than their white counterparts. Males were disproportionately affected by trauma at 66% of all trauma incidents, although they represent only 41% of the patient population for any cause at the medical center. Blunt force trauma was by far the most common cause of injury. Again, males comprised the majority of this group. In the U.S., falls and motor vehicle accidents are the most common causes of blunt trauma. Falls occurred primarily among older adults, while motor vehicle accidents and assaults occurred mostly in young adults. Falls were more predominant among males and white individuals. Penetrating trauma was a comparatively small portion of the traumas treated at the medical center but overwhelmingly the result of assaults and occurred mostly in young adults. Black males had the highest number of penetrating trauma, and low socioeconomic patients were twice as likely to suffer penetrating trauma as individuals from either middle or high socioeconomic groups. Similar to the data in this study, blunt trauma is the leading cause of traumatic death, followed by penetrating trauma, in the United States [1]. White patients had higher overall socioeconomic status than black patients, but within each race, association with socioeconomic status differed by sex. Black males had higher socioeconomic status than black females, but white females had higher socioeconomic status than white males.

Table 2
Impact of socioeconomic status on odds of receiving a penetrating orthopaedic injury vs. a blunt trauma. Adjustment carried out for age, sex, race, insurance status and injury severity score.

Characteristic	Adjusted Odds Ratio [95% CI]	P-Value
Age (years)		
18–29	Ref.	–
30–45	0.60 [0.50–0.72]	<0.001
46–64	0.46 [0.37–0.58]	<0.001
≥65	0.21 [0.13–0.33]	<0.001
Sex		
Male	3.14 [2.46-3.99]	<0.001
Female	Ref.	
Race		
White	Ref.	–
Black	6.26 [5.22–7.50]	<0.001
Other	1.94 [1.35–2.80]	<0.001
Socioeconomic Status		
Low	Ref.	–
Middle	0.77 [0.63–0.94]	0.009
Upper	0.77 [0.62–0.95]	0.016
Insurance Status		
Private	Ref.	–
Self	1.92 [1.57–2.35]	<0.001
Medicare	1.47 [0.93–2.33]	0.103
Medicaid	1.52 [1.20–1.93]	0.001
Injury Severity Score (ISS)		
≤15	Ref.	–
>15	2.19 [1.84–2.62]	<0.001

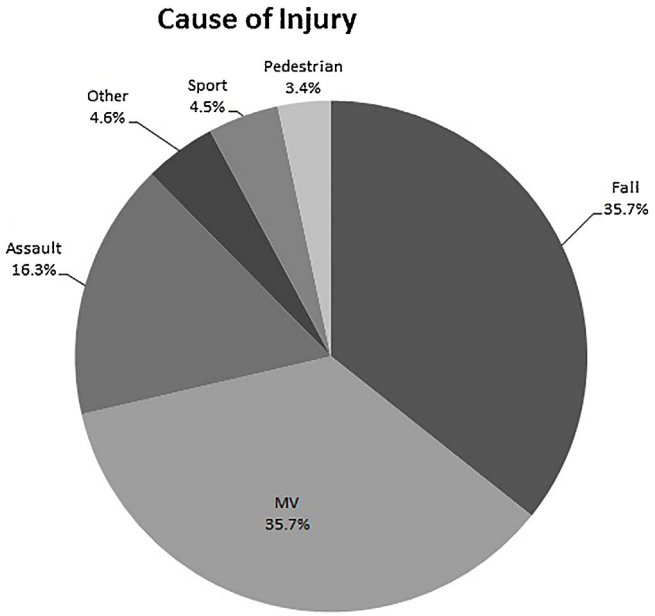

Fig. 1. Causes of blunt trauma.

In a report by the Robert Wood Johnson Foundation, National Public Radio, and the T.H. Chan School of Public Health at Harvard, 42%–60% of black Americans reported discrimination in a variety of sectors in daily life as well as racial slurs and violence [30]. In addition, nearly a quarter of black individuals reported not seeking medical care for fear of discrimination and more than half of black individuals in the U.S. have avoided medical care due to concern over the potential cost regardless of insurance status or income level [30]. It is possible that fear of discrimination or financial concerns are active or perceived barriers for black individuals in the area serviced by the medical center. This might account for the fact that the proportion of black patients treated is less than the community demographics. Delayed healthcare use results in decreased health and mental health status which may exacerbate the already vulnerable health disposition of patients [31].

Males were disproportionately affected by trauma in this population. Sixty-six percent of trauma incidents at this medical center involved males, although males comprised only 41% of the entire medical center's patient population. It is reported that men are less likely to visit a doctor and more likely to ignore diagnostic test results, with perceptions of masculinity and peer-approval among men contributing to delays or refusals to seek healthcare [32–37]. The higher incidence of severe traumatic injuries that prohibit neglecting professional healthcare for males in this patient population may be explained by well-documented increased risk behavior, aggression, violence, alcohol and substance abuse in males [38–47]. To our knowledge, there are no published studies that specifically state male sex as a risk factor for orthopaedic trauma, although many have demonstrated males are disproportionately affected by orthopaedic injuries [48].

Among the study population, blunt force trauma represented nearly 95% of injuries and the primary cause was falls. Consistently over the past decade, falls have been a leading cause of nonfatal injuries in Americans, and with the exception of the 15–24 age group, they are the number one cause of nonfatal injury in males and females [49]. Falls are common in older adults, who are particularly vulnerable to morbidity and mortality due to musculoskeletal changes associated with aging [50,51]. This was reflected by the data in which more than 70% of falls were in adults older than 46 and 40% of falls were in adults older than 65. One in four older adults (≥65 years old) falls each year with associated medical costs reaching $50 billion annually [52]. Falls can cause significant morbidity and mortality and lead to a loss of independence and decrease in quality of life [53]. Fall rates were highest among white older adults, which is consistent with other findings [54].

Penetrating trauma represented 5% of traumatic injuries in the study, and women were only 11% of this population. Males are more likely to be victims and perpetrators of penetrating violence than women [21,55]. More than half of the victims of penetrating trauma were young adults (18–29 years old) and the risk of penetrating trauma decreased with age. The group with the highest number of penetrating trauma was black males 18–29 years old in the low socioeconomic group. Black individuals were more than half of the patients treated for penetrating trauma although only 16.4% of the study population, consistent with the extant literature that there exists a higher risk of penetrating trauma for populations of color, particularly associated with interpersonal violence [21]. Although exposure to violence occurs regardless of sociodemographic factors, youth from lower socioeconomic backgrounds are more likely to have exposure to violence [4]. In this study, assault was the cause of 91% of penetrating trauma, and individuals from low socioeconomic areas had more than twice the number of penetrating trauma experienced by middle or high socioeconomic areas. Higher levels of unemployment, poverty, and transiency in combination with lower levels of economic opportunity, community participation, neighborhood development, and gang activity are community-level risk factors for violence [56–58]. Patients with penetrating injuries have an increased risk of mortality and of returning with the same injury pattern [59]. The incidence of penetrating trauma may be considered an indicator of elevated risk for excessive violence exposure and not a random event. As such, interventions should be made to counteract the increased risk [60].

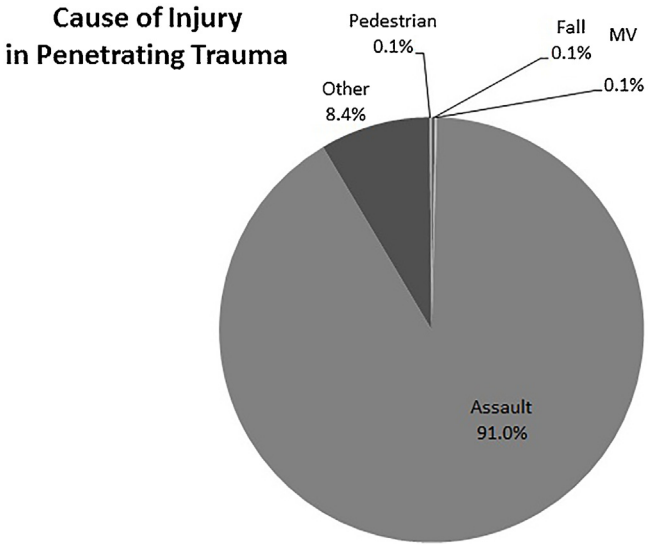

Fig. 2. Causes of penetrating trauma.

This study's findings on socioeconomic disparities by race are well known [61,62]. Political, economic, and societal structures have played a contributory role in this imbalance. Overall in the study socioeconomic status followed an established U.S. pattern of disparity by race with black patients having a lower socioeconomic status than whites [61,62]. However, the study also indicated a race-specific difference by sex. Black males who presented for orthopaedic traumatic injury had higher socioeconomic status than black females who also presented for treatment while white males had lower socioeconomic status than their white female counterparts. Even though black men earn less than white men, men consistently earn higher wages than women of any race [62]. In addition, women frequently have the financial responsibility for caring for children and disabled or older family members and these choices may require selection of a flexible over a well-paying job [63–65]. In the population studied, females had overall higher socioeconomic status than male trauma patients. This may reflect a difference in the cause for presentation to the trauma center as individuals of lower socioeconomic background have higher rates of traumatic injury [66].

The Health Care Leader Action Guide to Reduce Avoidable Readmissions suggests hospitals should focus on specific patient populations that are vulnerable to readmission and intentionally strategize to reduce recurrence [67]. Precautions may include enhanced discharge planning and transition of care and patient and family education before discharge in an effort to reduce racial disparities in health, improve patient outcomes, and reduce recidivism. Trauma providers should deliver enhanced care and particular attention to patients who have an increased risk of re-injury and mortality and not expect the patient to recover in the same manner as patients with a different level of risk. Specific to minority patients, providers must be aware that they may have a fear of discrimination even before seeking medical care and be intent on minimizing implicit bias and focus on providing quality healthcare.

Limitations

This is a retrospective, single-center study and the incidence, demographics, and injury patterns may not be generalizable across the United States. However, the study results may inform and guide the treatment of trauma patients regardless of where they live.

Conclusion

The results from this study indicate that a link exists between sociodemographic factors and the occurrence of orthopaedic injuries presenting to a level 1 trauma center. The most common cause of injury varied within age groups, by sex, and within the different socioeconomic groups. Therefore, trauma providers should be aware of higher health risks associated with black race, male sex, age, penetrating trauma, and low socioeconomic status.

Conflictof interest

Carmen E. Quatman, Heena P. Santry, and Laura S. Phieffer are consultants for the Hip Fracture Advisory Board of Johnson & Johnson, New Brunswick, New Jersey, United States.

Acknowledgement

The project described was supported by Award Numbers UL1TR001070, KL2TR001068, and TL1TR001069 from the National Center for Advancing Translational Sciences. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Center for Advancing Translational Sciences or the National Institutes of Health.

From The Ohio State University, Department of Orthopaedics, Columbus, Ohio

References

[1] American Academy of Orthopaedic Surgeons. Emergency care and transportation of the sick and injured. 11th edition Jones & Bartlett Learning; 2016.
[2] Trauma statistics & facts. National Trauma Institute; 2015.
[3] Cost of injury data. Centers for Disease Control and Prevention; 2017.
[4] Violence & socioeconomic status. American Psychological Association; 2018.
[5] Ladha KS, Young JH, Ng DK, Efron DT, Haider AH. Factors affecting the likelihood of presentation to the emergency department of trauma patients after discharge. Ann Emerg Med 2011;58:431–7.
[6] Moore L, Stelfox HT, Turgeon AF, Nathens AB, Le Sage N, Émond M, et al. Rates, patterns, and determinants of unplanned readmission after traumatic injury: a multicenter cohort study. Ann Surg 2014;259:374–80.
[7] Morris DS, Rohrbach J, Sundaram LMT, Sonnad S, Sarani B, Pascual J, et al. Early hospital readmission in the trauma population: are the risk factors different? Injury 2014;45:56–60.
[8] Arthur M, Hedges JR, Newgard CD, Diggs BS, Mullins RJ. Racial disparities in mortality among adults hospitalized after injury. Med Care 2008;192–9.
[9] Haider AH, Weygandt PL, Bentley JM, Monn MF, Rehman KA, Zarzaur BL, et al. Disparities in trauma care and outcomes in the United States: a systematic review and meta-analysis. J Trauma 2013;74:1195.
[10] Schoenfeld AJ, Belmont Jr. PJ, See AA, Bader JO, Bono CM. Patient demographics, insurance status, race, and ethnicity as predictors of morbidity and mortality after spine trauma: a study using the National Trauma Data Bank. Spine J 2013;13:1766–73 e1.
[11] Harris AR, Fisher GA, Thomas SH. Homicide as a medical outcome: racial disparity in deaths from assault in US level I and II trauma centers. J Trauma 2012;72:773–82.
[12] Maybury RS, Bolorunduro OB, Villegas C, Haut ER, Stevens K, Cornwell IIIEE, et al. Pedestrians struck by motor vehicles further worsen race-and insurance-based disparities in trauma outcomes: the case for inner-city pedestrian injury prevention programs. Surgery 2010;148:202–8.
[13] Salim A, Ottochian M, DuBose J, Inaba K, Teixeira P, Chan LS, et al. Does insurance status matter at a public, level I trauma center? J Trauma 2010;68:211–6.
[14] Greene WR, Oyetunji TA, Bowers U, Haider AH, Mellman TA, Cornwell EE, et al. Insurance status is a potent predictor of outcomes in both blunt and penetrating trauma. Am J Surg 2010;199:554–7.
[15] Haider AH, Chang DC, Efron DT, Haut ER, Crandall M, Cornwell EE. Race and insurance status as risk factors for trauma mortality. Arch Surg 2008;143:945–9.
[16] Gannon CJ, Napolitano LM, Pasquale M, Tracy JK, McCarter RJ. A statewide population-based study of gender differences in trauma: validation of a prior single-institution study. J Am Coll Surg 2002;195:11–8.
[17] Hadley J. Sicker and poorer—the consequences of being uninsured: a review of the research on the relationship between health insurance, medical care use, health, work, and income. Med Care Res Rev 2003;60:3S–75S.
[18] House JS, Lantz PM, Herd P. Continuity and change in the social stratification of aging and health over the life course: evidence from a nationally

representative longitudinal study from 1986 to 2001/2002 (Americans' changing Lives Study). J Gerontol B Psychol Sci Soc Sci 2005;60:S15–26.
[19] Hadley J. Insurance coverage, medical care use, and short-term health changes following an unintentional injury or the onset of a chronic condition. JAMA 2007;297:1073–84.
[20] Petrey LB, Weddle RJ, Richardson B, Gilder R, Reynolds M, Bennett M, et al. Trauma patient readmissions: why do they come back for more? J Trauma 2015;79:717–25.
[21] Scott VK, Hashmi ZG, Schneider EB, Hui X, Efron DT, Cornwell III EE, et al. Counting the lives lost: how many black trauma deaths are attributable to disparities? J Surg Res 2013;184:480–7.
[22] Haider AH, Ong'uti S, Efron DT, Oyetunji TA, Crandall ML, Scott VK, et al. Association between hospitals caring for a disproportionately high percentage of minority trauma patients and increased mortality: a nationwide analysis of 434 hospitals. Arch Surg 2012;147:63–70.
[23] Rosen H, Saleh F, Lipsitz S, Rogers SO, Gawande AA. Downwardly mobile: the accidental cost of being uninsured. Arch Surg 2009;144:1006–11.
[24] Lipstein SH, Dunagan WC. The risks of not adjusting performance measures for sociodemographic factors. Ann Intern Med 2014;161:594–6.
[25] Nagasako EM, Reidhead M, Waterman B, Claiborne Dunagan W. Adding socioeconomic data to hospital readmissions calculations may produce more useful results. Health Aff 2014;33:786–91.
[26] U.S. Census Bureau. American community survey 5-year estimates Tables DP02, DP03. 2017. 2010.
[27] Greer DM, Baumgardner DJ, Bridgewater FD, Frazer DA, Kessler CL, LeCounte ES, et al. Milwaukee health report 2013: health disparities in Milwaukee by socioeconomic status. 2014.
[28] Mustard CA, Frohlich N. Socioeconomic status and the health of the population. Med Care 1995;33:Ds43–54.
[29] Vila PM, Swain GR, Baumgardner DJ, Halsmer SE, Remington PL, Cisler RA. Health disparities in Milwaukee by socioeconomic status. WMJ 2007;106:366–72.
[30] NPR, Robert Wood Johnson Foundation, Harvard TH. Chan school of public health. Discrimination in America: experiences and views of african americans. 2017.
[31] Du Y, Xu Q. Health disparities and delayed health care among older adults in California: a perspective from race, ethnicity, and immigration. Public Health Nurs 2016;33:383–94.
[32] Healthy Men.. Agency for Healthcare Research and Quality; 2012.
[33] Mars vs. Venus: the gender gap in health. Harvard Health Publishing; 2010.
[34] Courtenay WH. Key determinants of the health and well-being of men and boys. Int J Mens Health 2003;2:.
[35] Himmelstein MS, Sanchez DT. Masculinity impediments: internalized masculinity contributes to healthcare avoidance in men and women. J Health Psychol 2016;21:1283–92.
[36] Mahalik JR, Lagan HD, Morrison JA. Health behaviors and masculinity in Kenyan and US male college students. Psychol Men Mascul 2006;7:191.
[37] Mahalik JR, Burns SM, Syzdek M. Masculinity and perceived normative health behaviors as predictors of men's health behaviors. Soc Sci Med 2007;64:2201–9.
[38] Lendrem BAD, Lendrem DW, Gray A, Isaacs JD. The Darwin Awards: sex differences in idiotic behaviour. BMJ 2014;349:g7094.
[39] Courtenay W. Dying to be men: psychosocial, environmental, and biobehavioral directions in promoting the health of men and boys. Routledge; 2011.
[40] Zuckerman M. Behavioral expressions and biosocial bases of sensation seeking. Cambridge University Press; 1994.
[41] Moffitt TE, Caspi A, Rutter M, Silva PA. Sex differences in antisocial behaviour: conduct disorder, delinquency, and violence in the Dunedin Longitudinal Study. Cambridge University Press; 2001.
[42] Dube S, Asman K, Malarcher A, Carabollo R. Cigarette smoking among adults and trends in smoking cessation-United States, 2008. MMWR Morb Mortal Wkly Rep 2009;58:1227–32.
[43] Eaton DK, Kann L, Kinchen S, Shanklin S, Ross J, Hawkins J, et al. Youth risk behavior surveillance—United States, 2007. MMWR Morb Mortal Wkly Rep 2008;57:1–131 (Washington, DC: 2002).
[44] Bureau of Justice Statistics UDtoJ. Sourcebook of criminal justice statistics. Washington, DC: US Department of Justice, Bureau of Justice Statistics; 2003.
[45] Pinkhasov RM, Wong J, Kashanian J, Lee M, Samadi DB, Pinkhasov MM, et al. Are men shortchanged on health? Perspective on health care utilization and health risk behavior in men and women in the United States. Int J Clin Pract 2010;64:475–87.
[46] Mahalik JR, Levine Coley R, McPherran Lombardi C, Doyle Lynch A, Markowitz AJ, Jaffee SR. Changes in health risk behaviors for males and females from early adolescence through early adulthood. Health Psychol 2013;32:685.
[47] Croisant SAP, Laz TH, Rahman M, Berenson AB. Gender differences in risk behaviors among high school youth. Glov Adv Health Med 2013;2:16–22.
[48] Johnson JP, Kleiner J, Klinge SA, McClure PK, Hayda RA, Born CT. Increased incidence of vascular injury in obese patients with knee dislocations. J Orthop Trauma 2018;32:82–7.
[49] Centers for Disease Control and Prevention. 10 leading causes of nonfatal injury, United States. 2006-2016, all races, both sexes, disposition: all cases. 2016.
[50] Burns ER, Stevens JA, Lee R. The direct costs of fatal and non-fatal falls among older adults—united States. J Safe Res 2016;58:99–103.
[51] Quatman CE, Switzer JA. Geriatric orthopaedics: a new paradigm for management of older patients. Curr Geriatr Rep 2017;6:15–9.
[52] Older adult falls. Centers for Disease Control and Prevention; 2016.
[53] Alexander BH, Rivara FP, Wolf ME. The cost and frequency of hospitalization for fall-related injuries in older adults. Am J Pub Health 1992;82:1020–3.
[54] Bergen G. Falls and fall injuries among adults aged≥ 65 years—United States, 2014. MMWR Morb Mortal Wkly Rep 2016;65:.
[55] Jacovides CL, Bruns B, Holena DN, Sims CA, Wiebe DJ, Reilly PM, et al. Penetrating trauma in urban women: patterns of injury and violence. J Surg Res 2013;184:592–8.
[56] Chen P, Voisin DR, Jacobson KC. Community violence exposure and adolescent delinquency: examining a spectrum of promotive factors. Youth Soc 2016;48:33–57.
[57] McMahon SD, Todd NR, Martinez A, Coker C, Sheu C-F, Washburn J, et al. Aggressive and prosocial behavior: community violence, cognitive, and behavioral predictors among urban African American youth. Am J Community Psychol 2013;51:407–21.
[58] Voisin DR, Neilands TB. Community violence and health risk factors among adolescents on Chicago's southside: does gender matter? J Adolesc Health 2010;46:600–2.
[59] Koleszar JC, Childs BR, Vallier HA. Frequency of recidivism in patients with orthopedic trauma. Orthopedics 2016;39:300–6.
[60] Brooke BS, Efron DT, Chang DC, Haut ER, Cornwell III EE. Patterns and outcomes among penetrating trauma recidivists: it only gets worse. J Trauma 2006;61:16–20.
[61] Association AP. Ethnic and racial minorities and socio-economic status [fact sheet] 2016;vol. 15: Retrieved March. 2016.
[62] Williams DR, Mohammed SA, Leavell J, Collins C. Race, socioeconomic status, and health: complexities, ongoing challenges, and research opportunities. Ann NY Acad Sci. 2010;1186:69–101.
[63] NYC Consumer Affairs. From cradle to cane: the cost of being a female consumer. 2015.
[64] Miller CC. Children hurt women's earnings, but not men's (Even in Scandinavia). 2018.
[65] Family Caregiver Alliance. Women and caregiving: facts and figures. 2003.
[66] Brattström O, Eriksson M, Larsson E, Oldner A. Socio-economic status and co-morbidity as risk factors for trauma. Eur J Epidemiol 2015;30:151–7.
[67] Osei-Anto A, Joshi M, Audet A-M, Berman A, Jencks S. Health care leader action guide to reduce avoidable readmissions. Chicago, IL: Health Research & Educational Trust; 2010 January.