

This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike License](#). Your use of this material constitutes acceptance of that license and the conditions of use of materials on this site.



Copyright 2011, The Johns Hopkins University and Adnan Hyder. All rights reserved. Use of these materials permitted only in accordance with license rights granted. Materials provided "AS IS"; no representations or warranties provided. User assumes all responsibility for use, and all liability related thereto, and must independently review all materials for accuracy and efficacy. May contain materials owned by others. User is responsible for obtaining permissions for use from third parties as needed.



JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Section D: Case Study on Exposure, Events, and Risk Factors

Adnan Hyder, MD, PhD

Occupational Injuries

- Account for nearly one-fifth of the total global burden of injuries
- Estimates of the burden of occupational injury are often imprecise because of under-reporting and classification problems

Occupational Injuries in Brazil

- The cohort comprised 21,752 male workers at a steel plant in Minas Gerais, Brazil, who were employed between 1 January 1977 and 31 August 1990

Occupational Injuries in Brazil

- The study monitored injuries to these workers in two categories
 - Workplace injuries that occurred inside the plant during the work shift (see risk factors in tables I to III)
 - Injuries that occurred during travel to and from work (see risk factors in tables IV–VI)

Tables I–III

- Risk factors for injuries in the workplace

Table 1—Age Group

	Injuries (n)	Person Years	Rate/100 Person Years	Adjusted Rate Ratio (95% CI)
<20	891	7084	12.6	1.00
20–24	3240	35003	9.3	0.76 (0.70–0.83)
25–29	2799	44958	6.2	0.61 (0.56–0.66)
30–34	1780	42197	4.2	0.51 (0.46–0.55)
35–39	1043	30358	3.4	0.42 (0.38–0.47)
40–44	628	18438	3.4	0.40 (0.36–0.45)
≥45	510	16183	3.2	0.35 (0.3–0.40)

Table II—Duration of Employment (DOE)

DOE (y)	Injuries (n)	Person Years	Rate/100 Person Years	Adjusted Rate Ratio (95% CI)
<1	1547	11281	13.7	1.00
1–1.9	1400	11947	11.7	0.89 (0.82–0.95)
2–4.9	3278	37394	8.8	0.72 (0.67–0.76)
5–9.9	2346	52528	4.5	0.47 (0.44–0.51)
10–14.9	1293	42853	3.0	0.39 (0.36–0.42)
≥15	1027	38218	2.7	0.30 (0.27–0.33)

Table III—Calendar Year

Years	Injuries (n)	Person Years	Rate/100 Person Years	Adjust ed Rate Ratio (95% CI)
1977–80	5636	49174	11.5	1.00
1981–84	2538	51965	4.9	0.53 (0.50–0.56)
1985–88	1671	50526	3.3	0.40 (0.38–0.43)
1989–92	1046	42557	2.5	0.33 (0.30–0.35)

Table IV–VI

- Risk factors for injuries during travel to and from work

Table IV—Age Group

	Injuries (n)	Person Years	Rate/100 Person Years	Adjusted Rate Ratio (95% CI)
<20	305	7084	4.3	1.00
20–24	1206	35003	3.5	0.84 (0.74–0.95)
25–29	1046	44958	2.3	0.65 (0.57–0.74)
30–34	686	42197	1.6	0.53 (0.46–0.62)
35–39	395	30358	1.3	0.44 (0.38–0.52)
40–44	223	18438	1.2	0.40 (0.33–0.48)
45	220	16183	1.4	0.43 (0.35–0.51)

Table V—Duration of Employment

DOE (y)	Injuries (n)	Person Years	Rate/100 Person Years	Adjusted Rate Ratio (95% CI)
<1	463	11281	4.1	1.00
1–1.9	474	11947	4.0	1.00 (0.88–1.14)
2–4.9	1203	37394	3.2	0.89 (0.80–0.99)
5–9.9	964	52528	1.8	0.62 (0.55–0.70)
10–14.9	522	42853	1.2	0.48 (0.42–0.56)
15	455	38218	1.2	0.43 (0.38–0.50)

Table VI—Calendar Period

Calendar Period	Injuries (n)	Person Years	Rate/100 Person Years	Adjusted Rate Ratio (95% CI)
1977–80	1948	49174	4.0	1.00
1981–84	947	51965	1.8	0.54 (0.49-0.59)
1985–88	775	50526	1.5	0.51 (0.46-0.56)
1989–92	411	42557	1.0	0.35 (0.31-0.39)

Rate of Injury

- Rate of injury relative to the number of previous injuries experienced for workers recruited 1 January 1977 or later (n=10,963)

Table VII—Injury in the Workplace

n	Injuries (n)	Person Years	Rate/100 Person Years	Adjusted Rate Ratio (95% CI)
0	3074	57406	5.4	1.00
1	1168	16431	7.1	1.89 (1.76–2.03)
2	443	5617	7.9	2.63 (2.36–2.93)
3	191	1764	10.8	4.03 (3.44–4.72)
4	82	761	10.8	4.13 (3.27–5.22)
5	35	330	10.6	4.27 (3.09–5.89)
6	39	212	18.4	8.13 (5.92–11.19)

Table VIII—Injury During Travel to Work

n	Injuries (n)	Person Years	Rate/100 Person Years	Adjusted Rate Ratio^a (95% CI)
0	1457	71567	2.0	1.00
1	274	9127	3.0	2.15 (1.81–2.56)
2	40	1543	2.6	2.37 (1.58–3.56)
>3	11	285	3.9	3.24 (1.59–6.59)

Table IX—Job Category

	Workplac e	Workplac e	Trav el to work	Trav el to work
	Rate/100 Person Years	Adjusted Rate Ratio	Rate/100 Person Years	Adjusted Rate Ratio
Professionals	1.0	1.00	0.7	1.00
Technicians	2.3	2.34	1.5	1.26
Support Workers	2.9	2.70	2.8	3.86
Group Leaders	4.2	3.99	1.6	2.14
Laborers	7.5	7.35	2.2	3.13

Table X—Place of Work

	Workp lace	Workp lace	Trav el to Work	Trav el to Work
	Rate/100 Person Years	Adjusted Rate Ratio	Rate/100 Person Years	Adjusted Rate Ratio
General Support Services	2.7	1.00	2.2	1.00
Research and Production	4.5	1.67	2.5	1.15
Energy Supply	4.4	1.63	2.0	0.91
Maintenance	6.5	2.41	1.9	0.88

Table X—Place of Work

	Workp lace	Workp lace	Trav el to Work	Trav el to Work
	Rate/100 Person Years	Adjusted Rate Ratio	Rate/100 Person Years	Adjusted Rate Ratio
Cranes/Rail and Trucks	5.9	2.36	1.7	0.83
Steel Mill and Foundry	11.2	4.07	2.4	1.05
Plate Mill	5.9	2.25	2.2	1.05
Coke Oven and Blast Furnace	6.5	2.49	1.8	0.85

Main Results

- Injury rates are highest for workers less than 20 years of age, and the rates progressively decline with increasing age
- Recently employed workers met with more injuries than those who had been employed for longer periods

Main Results

- Decreasing trend in injury rate with calendar year
- Significant increase in both workplace and travel injuries was found to be related to the number of injuries of that type previously experienced (tables VII and VIII)
- Laborers and group leaders were at highest risk for workplace injuries (table IX)

Main Results

- Highest rate of injury was among those working in a foundry
- The smallest number of injuries was among those in general support services (table X)