

Table 1: Summary of research on occupational injury among migrant workers in China

Authors	Year	Title	Study design	Study population	Findings	Risk of Bias and Limitations
Griggers-Smith E	2003	Chinese workers pay personal price for employer noncompliance with labor safety rules	Key informant interviews	Injured migrants seeking legal redress	Interviewees reported 1) beatings from supervisors, 2) pressure to ignore safety precautions because workloads require them to work prohibitively fast, and 3) injuries such as amputations from operating machinery without adequate training.	High risk of selection bias. All interviewed workers are suing employers. No empiric data to support anecdotal evidence.
Nielsen I, Nyland C, Smyth R, Zhang M, Zhu CJ	2005	Which Rural Migrants Receive Social Insurance in Chinese Cities?	Key informant interviews	Unspecified number of migrant workers in Shanghai	Companies dealing in the most hazardous chemicals specifically hire migrants on short term contracts to handle chemicals. The 20.8% of migrant workers reported an injury during the one year period studied. The highest annual rates of injury by mechanism are: falls (5.5%), being struck by an object (5.5%), and penetrating trauma (4.0%). Laborers and machine operators were most likely to be injured. 20.4% of men (n=571) and 23.3% of women (n=73) reported injuries (p>0.5).	High risk of bias from incomplete outcome data reporting. Data is from previously unpublished, unanalyzed surveys that are only partially presented.
Huang ZH, Huang Y, Wang XB, Zhang XT, Yang LS, Hao JH, Huang F	2007	Epidemiological investigation on injuries of peasant workers at construction sites in Hefei City	Cross-sectional survey	658 migrant workers randomly selected from seven railroad construction sites in Hefei City using cluster sampling		High risk of selection bias. Cross-sectional survey of previous on-the-job injury. Injured workers who have not returned to work are not sampled.

Huang F, Yang LS, Wang XB, Wang JF, Ye DQ, Zhang ZH	2008	Epidemic Characteristics of Accident Injury among Migrant Rural Workers at Building Site and Preventive Countermeasures	Cross- sectional survey	881 active migrant rural workers at 12 building sites in Hefei region during 2006	The 17.18% of migrant workers experienced an injury in the previous year, and the incidence rate, counting multiple injuries to one individual as unique, was 28.96 injuries per 100 man- years worked. The proportion of injuries by mechanism are the following: falls (21.61%), struck by an object (19.42%), machinery and equipment- related (17.37%), and transportation-related (10.59%).	High risk of selection bias. Cross-sectional survey of previous on- the-job injury.
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Xia QH, Jiang Y, Yin N, Hu J, Niu CJ	2011	Injury among migrant workers in Changning district, Shanghai, China	Cross- sectional survey	1256 migrant workers, ages 18- 55 (male) and 18-60 (female) years old, in Shanghai's Changning District with the following employment: service attendants 19.6%, retail 13.4%, factory worker 9%, cleaner 9%	The annual injury incidence among the study population was 38.3 injuries per 100 workers. The incidence rates by most common mechanism were: penetrating trauma (9.5%), falls (7.2%), traffic injuries (6.3%) and burns (5.5%). Only 39.3% of these injuries occurred at the workplace. Males had a higher injury risk (44.6 v. 31.6%, $p < 0.01$). The highest incidence was among electricians (75%), lifeguards (66.7%) and construction workers (58.8%). 19.6% of workers reported more than one injury. 417 workers needed sick leave, 424 needed treatment, and 27 hospitalized. 79.8% thought injury prevention services would be helpful. Some interviewed workers said that seriously injured workers often return to their home villages for treatment.	High risks of selection bias. Cross-sectional survey of previous on- the-job injury. Female participants had different age criteria than men. Limitations: the analyses of the causes of migrant injuries mix workplace injuries and injuries occurring outside of work.
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Hesketh T, Ye XJ, Li L, Wang HM	2008	Health status and access to health care of migrant workers in China	Cross-sectional survey	1,958 urban workers, 1,909 rural workers, and 4,452 migrant workers in Hangzhou city in Zhejiang province	While 23% of currently employed migrant workers reported a history an injury at work, compared to 16% of urban workers in the same work units and 10% of the workers still in rural Zhejiang (p<0.0001).	High risk of selection bias. Cross-sectional survey of previous on-the-job injury. Limitations: Allocation concealment not possible. Injury was not the focus of the research. The sample was not a representative picture of migrant workers in Zhejiang.
Zheng S, Wang Z, Wang H, Song S	2010	Do nutrition and health affect migrant workers' incomes? Some evidence from Beijing, China	Cross-sectional survey	Interviews of 383 migrant workers in Beijing	Of the workers interviewed, 40.7% reported a history work place injury, of which only half had been compensated. 34.5% of workers found their excessive workload to be the cause of their own ill health.	High risk of selection bias. Cross-sectional survey of previous on-the-job injury. Limitation: study does not describe the availability of occupational health resources, training or equipment for migrant workers in study. There is no control for comparison.
Wu CA, Yang WK, Liu KQ, Liu SX	2008	Investigation on awareness of migrant workers to occupational hazard protection in Bao'an District, Shenzhen City.	Cross-sectional Survey	8014 migrant workers in Bao'an Shenzhen	33% aware of basic occupational health services. 7.5% aware of occupational health services law. 48% using provided protective equipment. 35% had occupational Safety training.	High risk of selection bias. Cross-sectional survey of previous on-the-job injury. Limitation: study does not describe the availability of occupational health resources, training or equipment for migrant workers in study. There is no control for comparison.

Xia F	2010	Analysis of influencing factors on occupational injuries in off-farm workers	Case control study	217 injured migrant workers and 220 uninjured workers in 31 companies in Shanghai	Multiple variable logistic regression model showed an association of occupational injuries among migrant workers with lower education level (OR=16.67), longer weekly working time (OR=2.12) and less job experience and training (OR=2.12) (P<0.05).	Unclear risk of detection bias and unclear risk of bias in case-control design.
Xie Y, Tan Y, Tang S	2004	Epidemiology of 377 patients with chemical burns in Guangdong province	Hospital-based injury surveillance	377 people admitted for chemical burns to Guangdong Red Cross Hospital from 1987 to 2001 from all across the province	Of 244 patients with occupational burn injuries, 95% were "peasant workers" (nongmingong). 46% of burns occurred in autumn and 35% in Winter. 30% of injuries of Shanghai natives occurred at work (697/2321) compared with 59.5% of injuries in non-native Shanghai residents (509/855). The crude prevalence ratio of work-related injury for migrants is 2.0. This ratio is adjusted to 1.6 when controlled for gender and salary. Males have a 1.5 adjusted prevalence ratio for on the job injury compared to females.	Limitations: 1) no data to document the causes of workers' injuries, and 2) no data comparing Guangdong workforce demographics to burn injury demographics.
Perry MJ, Sun BX, Zhang HX, Wang X, Christiani D	2005	Emergency Department Surveillance of Occupational Injuries in Shanghai's Putuo District, People's Republic of China	Hospital-based injury surveillance	All injury cases of working age adults presenting to the emergency department from 11/1/1998 to 11/31/1999 at the Putuo District Hospital.		Limitations: The prevalence ratios are not adjusted for age. Unclear what proportion of workers in district are local or migrants. Unclear what proportion of those that live in the district are migrants or locals.

Disease Prevention and Control Bureau of the Ministry of Public Health	2007	Report on Injury Prevention in China	Hospital-based injury surveillance	All traumatic hand injury patients at Tianjin Hospital in 2004	For all of 2004, the Tianjin Hospital emergency room saw 8,742 patients, 83.7% of traumatic hand injury patients were rural migrants to the area, of which 90.9% of the injuries happened at work. The urban hospital's traumatic hand injuries show seasonal fluctuations, with peaks during the agricultural off-season.	High risk of bias from incomplete outcome reporting. This is a small excerpt of large government report with no independent evaluation or analysis. Limitation: neither the proportion of migrants in the local workforce nor the proportion of migrants who are patients of other services in the hospital are presented. Note: ' <i>nongmingong</i> ' translated as 'farm workers.'
Xia F	2010	Analysis on causes of farm workers accidents and its prevention countermeasures	Hospital-based surveillance	All workers presenting with "accidental injuries" to Affiliated Xiehe Hospital of Tongji Medical College from 6/1/2008-6/1/2009	There were 597 patients with "accidental injuries," including 563 men and 34 women. Migrant workers made up 87.6% of these patients.	

Xia T	2006	Preliminary Exploration into Occupational Safety and Health of Migrant Workers in Jiangsu	Analysis of government data	252 deaths from occupational injury in mining and construction in Jiangsu province in first 8 months of 2006	<p>There were 206 fatal workplace incidents in Jiangsu reported during 8 months of survey causing 252 deaths. This includes 52 fatal incidents and 63 deaths in the construction industry. Migrant workers consisted of 80% of the deaths from occupational injuries in all industries, and 90% of the deaths in the construction industry. Migrants made up approximately one third of the Jiangsu workforce in 2005. Migrants workers consist of 32 million of the 38.9 million construction workers in China. According to limited government data, migrant workers suffer 85% of the occupational-injury related mortality among construction workers. Suggestions for improving the situation include improving national occupational injury surveillance and establishing a migrant labor union.</p>	High risk of bias from incomplete reporting of the data. The reported data are approximated.
Li SB	2006	Analysis of present situation of peasant workers safety production in construction industry	Analysis of government data	38.9 million Construction workers	<p>High risk of incomplete reporting of data. Government data is inadequately cited as from the "relevant government department."</p>	

Ministry of Health of China	2010	Ministry of Health Communiqué: The Situation of Occupational Disease Prevention Work in 2009.	Description of unevaluated intervention	Government report on Ministry of Health efforts targeting migrant workers	Pilot projects to increase availability of basic occupational health and safety services have been established in 65 counties, 20 of these designed particularly to address migrant workers.	Limitation: no reported data from interventions.
Chen Y, Chen J, Sun Y, Liu Y, Wu L, Wang Y, Yu S	2010	Basic Occupational Health Services in Baoan, China	Evaluated Intervention	30 workers and one manager in each of 150 randomly selected factories surveyed before and after intervention was implemented	Occupational health surveillance improved after a targeted intervention by local authorities, from covering only a little over 12% of migrant workers in 2001 to close to 80% in 2008.	High risk of observation bias. There is no control to compare with intervention. Unclear risk of selection bias.

Szudy, B.O'Rourke, D.Brown, G. D.	2003	Developing an action-based health and safety training project in Southern China	Evaluated Intervention	90 participants of the course including 15 workers and five supervisors from each of the three footwear factories, 22 representatives from four Hong Kong-based nongovernmental organizations, and eight labor practices staff members from Adidas, Nike, and Reebok	Workers reported improved safety knowledge (from 25- 75%). 90% of workers participated in the health and safety committees the intervention created, but fewer than 10% reported that a committee took any action to resolve a health or safety issue. They noted resistance from supervisors and inability to implement suggested safety improvements.	High risk of observation bias. There is no control to compare with intervention. Limitation: study did not evaluate as outcomes such as incidence of injury, or objective measures of workers' health and safety knowledge. High risk of selection bias. Paper is not a systematic review of literature. Limitation: Migration data of TVE workers presented in this review was not from the same studies or same workplaces as the research showing disproportionate occupational injury- related mortality in TVE mines.
Wang X, Wu S, Song Q, Tse LA, Yu IT, Wong TW, Griffiths S	2011	Occupational health and safety challenges in China-focusing on township- village enterprises	Literature Review	Businesses owned by local governments called Township Village Enterprises (TVE)	Surveys of two TVE in Shanxi found 50% of the workers were migrants. Nationwide surveys of TVE in 1990 and in 2000 found less than 2% of workplaces had preventive safety inspections, and less than 4% had any workplace hazard monitoring. TVE mines had a reported death rate between 7 and 8 times higher than that for larger state mines from 1992 to 2003	

