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Is **fatigue** mining-construction's hidden killer?

Is fatigue being overlooked as the underlying cause of accidents on major construction sites? One researcher believes it is, and she suspects the problem is worse for remote Australian construction workers

BY LIAM TUNG

In 2006, when University of Sydney researcher Margaret Chan first asked ex-patriot executives at a well-known China-based oil-processing joint venture what was the cause of accidents at its China-based facility, she was told that workers couldn't read safety signs, and therefore didn't follow safety procedures.

The conclusion was, in China's context, understandable. The workers predominantly came from rural China, which, given the country's ethnic and linguistic diversity, meant that few could understand the local languages of the two operations - Mandarin and Cantonese since its operations were based in Guangzhou (in China's south) and Shanghai.

"When I asked the expats what they thought were the main risks," says Chan, "they said these people are migrant workers: they cannot read safety signs, and they don't know about OHS.

Their belief was that if we train them - provide a carrot and stick approach - it will solve the problem."

Chan took note of their conclusions but also questioned the decisiveness of their answer. Her question to the expats was the precursor to a survey that, according to Chan, delivered surprising results.

What she didn't know was that after asking a sample of workers, safety managers, and executives in a survey to identify one risk out of a possible 290 that she had listed, the unanimous answer - across both operations - was fatigue.



Seventy-eight per cent had identified fatigue as the top risk. "I didn't think this was the issue that would come out on top," she says. "I concluded this is a big issue."

Chan's exploration of fatigue within large scale construction began in 2006 and has since canvassed four major sites within China as part of a PhD within the University of Sydney's Faculty of Engineering and Information Technologies.

Chan was granted over \$100,000 by the Federal Government to conduct the research, and the organisation that was the subject of the study agreed on the basis that it was at no cost to it, while her findings could provide insight into its operations. It was the first time a PhD student had been granted such access to a Chinese operation of this scale.

And while she openly concedes that China has lower safety standards than Australia, local operations, including a major Victorian project underway and local mining giants in Western Australia, are paying attention.



The alcohol effect

Chan is not the first to identify fatigue as a major risk factor in the use of heavy machinery. Indeed, when she discovered that respondents had, in contrast to the executives' assumptions, identified it as the leading risk factor, she turned to Australia's pre-eminent expert in the field, Professor Drew Dawson, director at the University of South Australia's Centre for Sleep Research.

"I asked him how would you interpret the results, what are the variables, and what are the consequences [of the findings]," says Chan. "He's the one that mentioned the relationship between fatigue and blood alcohol levels."

Dawson had been working on a method to calculate the effect of staying awake on a person's mental performance. His calculations indicated that staying awake for 17 hours is equivalent to having a blood alcohol level of 0.05, which doubles to .01 at 21 hours.

But while Chan could draw inferences from this on the use

of machinery at construction sites, her own research indicated fatigue's effects could have much wider consequences, in particular at remote construction sites, typical of Australian mining regions.

Respondents to Chan's survey - which covered near or actual accidents as well as the use of personal protective equipment - were asked to leave their mobile phone numbers on the response form (but not their names, which enabled an anonymous follow up call).

"Once I got the results, then I went out to identify the people who chose fatigue as the lead risk, and then (via a phone call) I found out who had a near miss or an accident," she says.

The second stage of the research involved data mining the results, which says Chan, revealed a strong link between fatigue and the failure to use personal protective equipment (PPE).

"The data mining analysis showed that fatigue is highly associated with improper use of PPE. It turned out that the probability of not wearing it is high when fatigued," she says, deducing that staff tended to either forget or skip basic safety procedures when stressed.

This could have a significant impact on the analysis of accidents that occur on the workplace, in particular, as it had on one of the sites she had been researching, where a worker had been killed when the crane he had been operating had toppled over. It was impossible to identify whether the operator had not followed the correct procedures, but nor was it possible to identify whether fatigue played any role.

One of the issues that Chan noticed in relation to safety during her research was that many organisations viewed safety as a purely procedural matter: if staff follow the correct procedures, accidents won't happen was the view she found.

"I say if you don't address fatigue, even if you send them to training, they might not follow the correct procedures," says Chan.

While her research to date has only covered fatigue at operations where heavy construction machinery is in frequent use, she intends to next look into fatigue's underlying causes, which is also why she believes her findings are so relevant to Australia.

"I say if you don't address fatigue, even if you send them to training, they might not follow the correct procedures"



Rural Chinese, remote Australians

Chan was surprised by the welcome she got by the workers she had interviewed at the two oil-processing operations in China. She suspects, because she was there temporarily and a woman, that she was able to talk to them openly, and found herself in a counsellor-like role.

The problem for the men working there was that many, including senior management, were separated from their families for long periods. The men, known as “transient husbands”,

The relationship between isolation and fatigue may seem tenuous on paper, but as Chan points out, when you put workers in a harsh, remote environment, it places greater stress on at least one of three fatigue categories - physical, mental and psychological - because workers don't get the time that normal nine-to-five workers get when they go home.

Add this to the type of work being asked of these people, and you get a potentially dangerous cocktail.

“Construction,” says Chan, “fits all three because it's monotonous, you have no control over your work - it's a menial task - and there's the psychological stress of social alienation because you're working in isolated places.”

Of the research she is currently working towards setting up, Chan says, “I'm not dealing with residential construction, but oil and gas projects, such as in Western Australia, where they're building in remote areas - where workers have to leave their families and live in camp-like situations.

“I've spoken with a few people in Western Australia that related to that. It's the mining projects that are out in

the wilderness, where the nearest town is six hours drive away.”

Most of the workers in her research in China were also shift-workers, compounding fatigue by working at odd hours. Chan found that removed from family for long periods, workers experienced insomnia after about three to four months on the job.

A problem she has encountered in Australia is that while fatigue is well-documented for the transportation industry, fatigue on construction sites is overlooked, particularly in the analysis of an incident.

Indeed, the Productivity Commission's recent OHS draft benchmarking report of Australian businesses, which drew figures from Safe Work Australia and state regulators, lacked any acknowledgement of fatigue in its assessment of causes behind injuries that lead to time off work. Fatigue as a causal category was also only linked to truck driving.

Chan has travelled to mines in Calgary and Alberta in Canada and reckons workers there are facing similar conditions. She argues isolation has a significant impact on the ability of workers to recover from fatigue, in turn impacting safety outcomes at work.

But one of the problems with fatigue, in terms of employer-employee relationships at remote sites, is that it is still viewed through the prism of the nine-to-five job.

“If a worker is employed at a residential construction site, you return to your family afterwards. You repay your sleep deficit,” says Chan. “But if it's a remote site, people leave their families behind.”

“One of the significant findings was that companies think that they don't have a moral responsibility for workers after they have finished work. The attitude is that at the end of shift, it's the end of the employer's responsibility.

“I'm trying to show them that the organisation has a moral responsibility - not of kindness of heart, but if you look after the welfare of workers, then your looking after your bottom line.”

“The data mining analysis showed that fatigue is highly associated with improper use of PPE.”

wiled away time at night playing cards, smoking, chatting and drinking.

The isolation of workers in Australia's mines is also a well-documented phenomenon, which appears now to be giving rise to an increase in HIV rates amongst mining workers. Though not strictly a workplace issue, it is a higher risk for those that work in remote regions.