

INVOLUNTARY LONG HOURS IN MINING

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Long hours worked in the mining industry might reflect employee preferences. We analyse quantitative and qualitative data from the mining industry, and relevant literature, and find that employee preferences are for substantially shorter hours than are actually worked. This links to ‘interference’ of work in life, including through lost family time, fatigue, interference with community and sporting activities and, it appears, high labour turnover. Involuntary long hours in mining are related to 24-hour operations and twelve hour shifts and worsened where employees lack input into the design of rosters. The findings suggest that, in order to promote ‘good job’ in the mining industry, there is both a need to revisit protections for employees against being forced to work ‘unreasonable’ hours above the ostensible national standard of 38 hours per week and strong support even amongst mineworkers for a ceiling on hours worked per week.

Introduction

Full-time Australian employees work long hours (Campbell 2002). However, the circumstances in which those hours are worked have been subject to debate. For example, it has been argued that ‘for many people, long hours of work are not imposed on them by uncaring employers but are the result of workers exercising their preferences’ (Wooden 2007). The mining industry was the first industry to achieve a 35 hour week but it has, in recent years, become characterised by long hours – indeed, the second longest of any industry, next to road transport (Australian Bureau of Statistics 6306.0b). Heiler et al (2000) show that long working hours are more common in sites with twelve hour shifts. The reason is ‘that mandatory overtime is a common feature where twelve hour shifts exist’. Nowadays most mines work twelve hour shifts or longer. One might expect a high incidence of mandatory overtime to be associated with many employees working involuntary long hours – that is, working long hours (above the national standard 38 hour week) while preferring fewer hours. On the other hand, it could be argued that these long hours simply reflect workers’ preferences to work as many hours as they can to maximise earnings, and that there is no ‘long hours problem’ in the mining industry. Conventional economic theory would tell us that workers will be attracted to jobs that match their preferences for work and leisure, so workers who are dissatisfied with their hours will leave and find jobs elsewhere. Thus any dissatisfaction with working hours should be only transitory.

This issue is significant as the mining industry has been the setting for considerable debate about working hours, including a recent case in which an employee sought to prevent his employer from requiring him to work ‘unreasonable’ additional hours (FMCA [2009] 881). Higher wages are normally associated with lower labour turnover (eg Freeman and Medoff 1984), and so we would expect labour turnover to be low in the industry that has the highest hourly earnings (Australian Bureau of Statistics 6306.0a). Some labour turnover is necessary to enable workers to move to jobs that better match their preferences. However, relatively low or high labour turnover could be symptomatic of satisfaction or dissatisfaction with working conditions. If involuntary long hours persist it would suggest a need to think about the labour market in mining in different ways and to reconsider regulation of working hours.

Our interest focuses on whether workers in the mining sector work hours that align with their preferences, and the causes and consequences of this consonance or dissonance. Our threefold method analyses: statistical data relevant to the industry, qualitative interviews undertaken in the Queensland coal mining industry, and the relevant literature.

The quantitative data come from the Australian Work and Life Index (AWALI) survey, undertaken annually by the Centre for Work + Life at the University of South Australia since 2007 (Skinner and Pocock 2008; Pocock, Skinner and Ichii 2009). AWALI surveys a representative, national, stratified random sample of the Australian workforce. Sample sizes were 1435 in 2007, 2831 in 2008 and 2691 in 2009. Telephone interviews were conducted by Newspoll and household selected through random digit dialling, with individuals within households randomly selected through 'last birthday' screening (Skinner and Pocock 2008, pp.15-16). A request was made to the AWALI project team for unpublished data on hours preferences in the mining industry. In order to achieve a reasonable sample size, data from the three years of AWALI (2007 to 2009) were aggregated to produce a total N for mining of 188 for the question on hours worked and 176 for hours preferences. Unfortunately the sample is not large enough for authoritative disaggregation by gender or age. The qualitative data come from 135 interviews we undertook with miners and their spouses almost entirely from nine coal mining communities in Queensland between 2006 and 2009.¹

Background

In 1970, coal miners won a 35 hour week, with the working day reduced from eight to seven hours (Thomas 1983). Few other industries achieved this, with most settling for a 38 hour week in the early 1980s. Through this period to the 1980s, the industry operated in an environment of high coal prices and highly regulated industrial relations (Di Mila and Bowden 2004). There was a permanent workforce with limited shiftwork restricted to eight hours. In 1988, as part of a national 'award restructuring' process, the specialist tribunal granted increased flexibility to employers including an extension of shift lengths from seven to eight hours, with longer shifts by agreement, and continuous production including six-day-a-week coal production. Under pressure from the tribunal, the unions negotiated with employers for new work models with enhanced numerical and functional flexibility. In 1995, roughly one third of mining workplaces had at least some employees on twelve hour shifts, but this was mainly concentrated in metals mining. Coal mines were less likely to have long runs of consecutive shifts. This reflected the differing strength of the unions to resist this development (Heiler et al. 2000). Institutional factors began to move against the unions, including, from 1996, the coming to office of a conservative (Liberal-National Party) coalition government that introduced legislation that delivered flexibility in work scheduling and employment sought by employers. Companies were able to use individual contracts to undermine collective organisation; seniority, which protected union activists against targeting for dismissal, was abolished as a criterion for determining order of redundancy; and perhaps most importantly, mining companies were able to make unrestricted use of contractor labour, often non-union, and able to be used to maintain production during disputes. Most coal mines also moved onto 24 hour operations, first of all through rotating eight hour shifts, then on rotating twelve hour shifts.

The move to longer hours in mining is inextricably linked to the introduction of 24 hour operations and twelve hour shifts. With four crews, a minimum of 42 hours (one quarter of the hours in a week) per week per worker is necessary to ensure that machinery is being operated 24 hours a day, seven days a week, though usually this would be averaged over a roster cycle that lasted anything from 16 to 28 days. By 2006, coal mining employees worked an average of 43.8 hours per week and metals mining employees averaged 46.2 hours per week (Australian Bureau of Statistics 6306.0b).

Labour turnover in mining

In 1996, labour turnover in mining was 20.2 per cent, slightly below the national average of 21.2 per cent. By 2006, turnover in mining had risen to 23.5 per cent, whereas in every other

industry it had fallen, to a national average of 18.4 per cent. There is a strong relationship between industry-level turnover and hourly earnings, but mining has a much higher rate of turnover than would be predicted by its hourly earnings. A simple regression equation on 16 industries in 2006 indicates that for each \$1 increase in hourly earnings, industry level labour turnover falls by an average of 1.1 percentage points, with an industry dummy for mining indicating that turnover in mining was well over 10 percentage points above the rate predicted by its earnings level.² Although we would expect some variation from year to year, these data suggest that there is a real issue with labour turnover in mining. This in turn raises questions about working arrangements in the industry, in particular working hours.

Hours worked and preferred in the mining industry

In AWALI, respondents were asked 'How many hours per week do you usually spend in paid work, including any paid or unpaid overtime?' They were also asked 'If you could choose the number of hours you work each week, and taking into account how that would affect your income, how many hours would you choose to work?'

The distribution of hour's preferences in mining is shown in Figure 1. This shows that the majority of miners like to work less than forty-one hours per week. The modal band is 38-41 hours, preferred by 35 per cent of respondents. Only 13 per cent prefer 46-50 hours per week. The median of preferred hours – that is, the 'mid point' – was 40 hours per week. These data show that 64 per cent of mining employees prefer to work *less* than 44 hours per week and only 36 per cent prefer to work 44 hours or more per week.

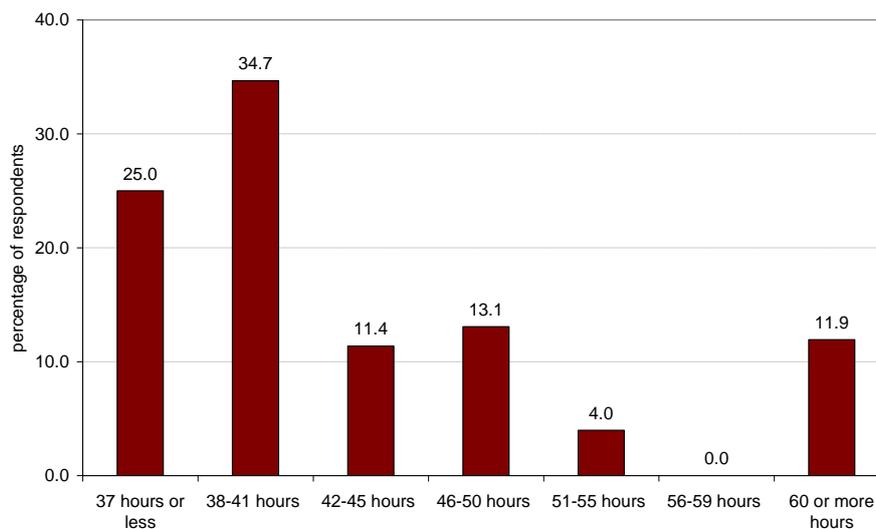


Figure (1) Preferred work hours per week, Mining employees, AWALI survey

Source: unpublished AWALI data, 2007 to 2009.

The full AWALI data on hours preferences, expressed unbanded (ie in single hour ranges), are contained in Figure 2. This shows that by far the *most common* (modal) hours preference in mining was for a 40 hour working week. As it is a skewed distribution, *average* preferred hours in mining were higher at 42.0, slightly above the 39.4 hours average amongst full-time workers across all industries in 2009 (Pocock et al. 2009).

The data for the mining industry as a whole include Long Distance Commuting (LDC) mineworkers, who travel from their home, often on the coast or in capital cities, to the mine site and live on-site for the duration of their 'on' period. We would expect that LDC workers would have longer hours preferences than other mining industry workers because of the need to factor in blocks of time for travel. Accordingly, hours preferences of workers in

residential mine sites are likely, on average, to be shorter than those described here.

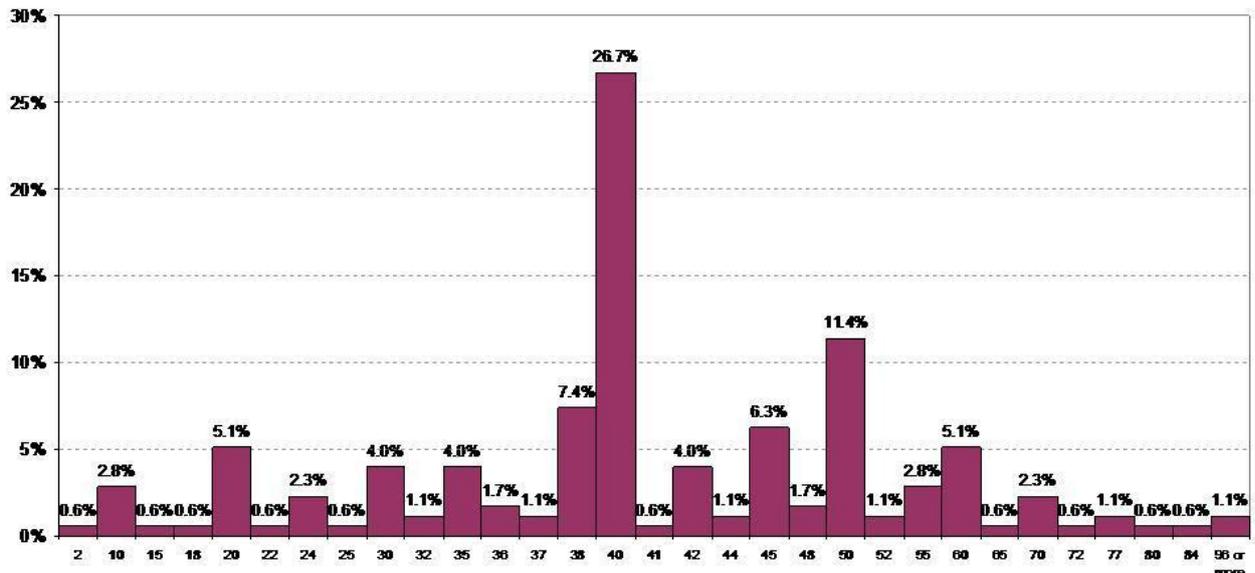


Figure (2) Preferred hours per week (unbanded), mining employees, AWALI

Source: unpublished AWALI data, 2007 to 2009.

AWALI also asked employees the number of hours that they worked. It was thus possible to estimate the extent to which hours worked matched hours preferences of employees. The results are shown in Table 1. This table shows that 47 per cent of employees in the mining industry are working more hours than they would prefer, even after taking into account how that would affect their income, while 44 per cent are working the number of hours they would prefer and 9 per cent would prefer to be working more hours. Amongst those who would prefer to be working more hours, the average gap between what they would prefer and what they are working is 7.8 hours. But amongst the 47 per cent of mining employees who would rather be working fewer hours, the average gap between the hours they are working and the hours they would prefer to work is almost 16 hours. Overall, across the mining industry as a whole, employees are working on average for nearly 7 more hours per week than they would prefer. The idea that current working hours arrangements in the mining industry are driven primarily by changes in employee preferences is thus shown to be incorrect.

Hours preference	Percentage of mining employees	Average gap between hours worked and hours preferred
want more hours	9.1	-7.8
want same hours	44.0	0
want fewer hours	46.9	15.9
Total	100.0	6.7

Table (1) Gap between hours worked and hours preferred, mining industry, AWALI, 2007-2009.

Source: unpublished AWALI data, 2007 to 2009. A negative sign indicates hours worked are less than hours preferred, a positive sign indicates hours worked are greater than hours preferred.

The impact of involuntary long hours on family and community life

In light of the above it is no surprise that when all industries are ranked on an index measuring the degree of interference between work and family life, the mining industry is

ranked the second worst (Skinner and Pocock 2008, p.7). This AWALI index is constructed from responses to five questions concerning whether: work interferes with activities outside work; work interferes with enough time with family or friends; work interferes with community connections; respondents feel rushed or pressed for time; and respondents feel satisfied with their work life balance.

One reason for mining's poor ranking on work-life interference is the divergence between hours preferred and hours worked. The AWALI index is scored from zero (best possible fit between work and life) to 100 (worst possible fit). Male workers who are working more hours than they would prefer have an index score 35 per cent higher (ie 35 per cent worse) than male workers who are working at or near their preferred hours. For female workers, the impact is 46 per cent. According to the AWALI researchers, this finding has important implications, as 'measures which help workers find a better fit between actual and preferred hours will result in lower work-life conflict' (Skinner and Pocock 2008).

To understand the story behind these numbers, we turn to the literature and data from our interviews of men and women in the mining communities of central Queensland. Again, the interaction between long hours and twelve hour shifts comes out strongly, particularly in terms of the impact on families and community. One of the women we spoke to, Winona, told us that her husband:

does two or three day shifts then he has a pyjama day then he does two or three night shifts. And 'cause you only get a couple of hours to do that transition, it completely stuffs him; he gets just bugged from it. And then the nightshifts – he's still trying to get his body into nightshift mode and then it's over. And then he's back to days off which is like a dayshift mode.

Brooke, a mineworker, told us

The roster and the long shifts make you very old, very quick. Anybody that wants to get into it I recommend they do it early in their life, get in, be diligent, make your little fortune and get out because you get really old, really quick.

The linking of work-life interference to long hours in AWALI is consistent with evidence from other researchers; Alexander and Baxter suggest that 'the literature surrounding work-family balance recognises that the interplay between the work and home environment is crucial to the understanding of individual and family well being'. They suggest that long hours in the workplace are associated with 'less favourable outcomes' for parenting and they also 'recognise that events that affect the feelings, attitudes and experiences of a parent in either the family or work environment can 'spill over' to other spheres of a parent's life' (Alexander and Baxter 2005). Another study using longitudinal data from the Household, Income and Labour Dynamics in Australia survey, found 'overall father's satisfaction with their work hours decreases with the number of hours worked that increases beyond the standard working week' (Gray et al. 2004).

Gibson, in her study of four Queensland mining towns, found a negative response to long hours working arrangements. She report that wives in mining communities had begged their partners to leave the mines to save their marriages and that they had forced their partners to make choices 'between them and their families and the family versus mining and the money' (Gibson 1994).

Pocock and her team in the *Fifty families* project found that, of the five families that were miners, all of the men felt that the roster with twelve hour shifts had meant they worked unreasonable hours and that meant 'they missed out on 'full fathering' in the sense that they had missed important events for their children...in each household the women parented and

worked around their partner's hours, adopting a residual model of partnership, where the fulltime, shift working pattern of the male breadwinner dominated household life. The impact of the unreasonable hours upon the whole community was very clear in this town' (Pocock et al. 2001). They summarised the situation amongst families working long hours as 'overwhelmingly when asked about the impact of their hours on their families, most named negative affects'. These included less time for home which affected intimate relationships and their relationships with children. The impact on children varied by age but 'absences in relation to children in age groups from 0 to 18' were remarked upon. These absences resulted in a sense of loss amongst many workers who felt that they could never pick up that time again – and in some cases their relationships with their children were compromised- perhaps irreparably' Pocock et al. 2001. Melissa spoke of her husband's twelve-hour-shift and his relationship with his children:

...when they are on day shift they are gone before the children get out of bed. The kids are usually ready for bed by the time they get home and my husband didn't get home till about half past seven and you are not eating your meal – by the time he has his shower and you are eating between eight and half past eight and they have got to go to bed because you have got to get up again early the next morning... And then when they are on night shift, the fellows would come home by about 7:30 and might see the children for half an hour before they go to school and then they are asleep most of the day and they might get up at about 5:00 and then they are gone again. They do have their days off....But if the kids are at school, they don't see them during that time. And the twelve hour shift involved weekend work, so sporting – I have got to take the children which is a lot of travel here. You know, we go to ... Emerald, Rocky, wherever.

Mandy, a wife, focused on implications for emotional connection and time use:

They're not doing many shifts, but they're long shifts and you don't get any communication from your husband really. He comes home at eight o'clock at night, you feed them, they have a shower and basically you don't have much communication with them while they're working. But the four days you have them at home you try and cram it all in, because you know the next four or five days you're not going to get too much involvement. And it's hard on the kids, you know "where's Dad", "oh he's at work". And that's hard, you know you can't go anywhere, you can't do anything... You try and keep the kids quiet when they're on night shift, Friday night, Saturday night, Sunday night, you've got to try, 'cause the houses aren't that big.

Several respondents pointed to the importance of voluntary overtime in the days before 24 hour operations. For example, Vern, a miner from Mt Isa, told us that

I worked eight hour shifts, from eight in the morning to four in the afternoon and four to twelve and twelve to eight in the morning on a weekly - but I only ever worked Monday to Friday and I never worked overtime for the whole time I was there. The Industrial Court [said] at one stage that if you work underground and it's a critical job then you may be required to work overtime, that was in the Award. They told me after that I'd have to work overtime; otherwise they'd be breaching the law. I took that to Industrial Court on the grounds that it's their responsibility to hire enough people to do the work, it's their responsibility to project what work has to be done and when. I won.

Victor, another mineworker, described how:

When I came here there were two thousand people. Everybody used to work eight

hour shifts Monday to Friday. They would do overtime on Saturday or Sunday if they wanted to, but rarely anybody did that because sport was played, junior sport was played Saturday, senior sport was played Sunday... Yeah it was a good town to live.

The move to longer hours and rotating twelve hour shifts has led a number of workers' families to move away from the mining towns, while other families have stayed in coastal towns while the mineworkers in the family became a 'long distance commuter', travelling to or from the mine sites every few days for blocks of time. Meredith, a spouse, said

They are just not family-friendly shifts. That is why a lot of our people have moved out of town. If you are not going to see your kids for four days, and I can live at the beach for four days and you are going to see them on your four days off whether you live here or whether you live in there, of course it is a much better lifestyle than that.

Not all people were opposed to the working patterns. As we saw in AWALI data, nearly half of coal employees were content with how many hours they worked. But even some enthusiasts for twelve hour shifts could see disadvantages. Wynne, a mineworker, said

You're there for a longer period per day but you're there less days in the month. Before you were doing seven eight hour shifts now we only do four twelve hours so you get more time away from work which is better... Twelve hour shifts are the go – time away. But it ruins the town, because everyone is gone. It's ruined the sporting clubs like football, these guys used to play touch, I used to just go and sit and watch and drink but it ruined all them because different shifts and guys couldn't ... like the eight hour shifts you could go after work but by the time you get home the game is over. Yeah it's not very good for family. Kids are in bed asleep. But I like it.

The situation nowadays could not be more different. Todd, a union official told us

We have had blokes at mines doing twenty-six hour shifts. And we found out [and] stopped the shifts! The company let him drive to town. They are neglecting their obligation under the Act but they let him work the twenty-six hours. They were just hoping no one found out about it.

Not all mines are the same. Hailey told us that one mine had

a really tight overtime policy, you're only allowed to do one overtime shift per round. They have a really strong belief out there. What they say is "one man's overtime is another man's job."

Overall, our interviews showed that working time arrangements were reasonable for some employees and their families but unreasonable for others. Company-imposed involuntary long hours had significant negative effects on their interpersonal interactions, relationship with the children, social lives, and community involvement. The biggest factors influencing these impacts appeared to be the objective circumstances of workers, in particular their family situation, their health, endurance and sleeping habits, and their personal preferences.

Participation in roster design

Can anything ease the problems of long hours in the mining industry? The close link between long hours and shift design may provide a clue. The literature says that giving employees a chance to input into 'deciding on working conditions during a roster change... was critical for the acceptance of a new roster' (Conrad-Betschart 1990; see also Latack 1986; Kogi 1995; Loudoun 2001). Others advocated creative solutions in roster design, including participants making inputs relating to their social, psychological and physiological needs, and referred to 'a growing body of research and practical organisational experience

which shows that employee, trade union and management...participation in roster design is highly effective in producing win-win-win outcomes for all stakeholders' (Smith et al. 1998).

To date the mining industry provides relatively little say for employees in choosing their hours of work or rosters. Some of our respondents told us how they had been able to swap shifts to meet their personal needs (for example, to enable a husband and wife to work the same shifts). But overall, employee input was minimal. Some told us how their social lives had been transformed because they were no longer on the same shift patterns as their friends and could not socialise or go away with them. A study of workers in 15 Queensland organisations across many industries found that workers in the mine included in the study were the most likely of any workers to say they had 'no say' in their start and finish times (81 per cent said this, compared to 31 per cent in other organisations), or in their workload (67 per cent compared to 32 per cent) or the number of hours they work in a week (74 per cent compared to 33 per cent). They were the second most likely to report 'no say' in the shifts they worked (67 per cent compared to 42 per cent) (unpublished data from Peetz et al. 2003). The lack of employee input into decisions on hours worked is part of the explanation for the high work-life interference amongst mining workers identified earlier in AWALI.

Policy aspects

One option for dealing with involuntary long hours would be setting an upper limit on hours worked each week. Such a policy would have widespread support among employees, at least in principle. The Griffith Work Time Project found 67 per cent of employees across the 15 organisations agreed that there should be an upper limit on how many hours someone can work each week (only 14 per cent disagreed). This included 78 per cent agreement in the mine, the highest proportion of any organisation in that survey (Peetz et al. 2003 and unpublished data). The data did not quantify how many hours employees would set as the limit. In another organisation in that survey, providing services to mines, a widely supported upper limit on hours had been put in place but it failed because of inadequate systems to enforce it, managers' and supervisors' desire to circumvent it to satisfy client requests and the willingness of a minority of employees to subvert the limit (Peetz et al. 2003). This reinforced the importance of collective (including external) regulation of working hours, rather than just leaving it to individual choice, as well as the need for enforcement to prevent minorities from subverting the will of the majority to regulate their own hours.

Another approach to dealing with involuntary long hours, seemingly already available to employees, may be making use of the protections in the Fair Work Act's National Employment Standards, which hold that 'an employer must not request or require an employee to work more than' 38 hours per week 'unless the additional hours are reasonable' (s62(1)) and that 'the employee may refuse to work additional hours...if they are unreasonable' (s62(2)). These provisions have yet to be tested, though the operation of their predecessor provision in the WorkChoices legislation provides little reassurance. Its Australian Fair Pay and Conditions Standard provided that 'an employee must not be required or requested by an employer to work more than' 38 hours per week plus 'reasonable additional hours' (s228(1)(b)). A fitter and turner in coalmining, Allan Macpherson, attempted to use these provisions to resist a demand by his employer, Coal and Allied (part of Rio Tinto), that he work 44 hours per week, in place of the 40 hour week previously worked. Mr Macpherson had three children between the ages of 15 and 21 and a working wife. He initially refused to work the new roster, arguing this was not what he had contracted to do and the new roster comprised unreasonable additional hours because of the impact on his family responsibilities, making him too tired to function properly with his family, unavailable or unsafe to drive his children to sporting venues where he was a soccer coach and too tired to

execute his job safely. He had to take his complaint to the Federal Magistrate's Court, which found that the benefit to the employer of the new roster outweighed the detriment to Mr Macpherson and rejected his claim (FMCA [2009] 881). The requirement that account be taken of 'the operational requirements of the workplace' gained precedence over that to take account of 'the employee's personal circumstances (including family responsibilities)'.

The union's industrial officer commented afterwards that it was 'hard to see how any worker in the mining industry would benefit from the guarantee of reasonable hours if this test is applied' (Endacott in Workplace Express 2009). This is yet to be properly tested, as many other mineworkers have even more onerous hours and clashes with family responsibilities than Mr McPherson who, unlike many, did not work rotating night shifts, did not work weekends and did not have young children. Our qualitative research suggests that the worst effects are felt in family households by partners with younger children and their miner spouses, and arise from the interaction of long hours with rotating twelve hour shifts. The Fair Work Act requires that, in deciding what is unreasonable, the Court must have regard to 'the usual patterns of work in the industry, or the part of an industry, in which the employee works'. This provision, which was only introduced in the Fair Work Act, ignores the way in which power relations shape the usual patterns of work in an industry. In particular, in this context, it ignores how the shifting power relations in the mining industry, brought about in no small part by the Workplace Relations Act and the WorkChoices amendments, have led to the high incidence of involuntary long hours. Corporations use their increase in bargaining power to increase working hours, then in a circular process they argue that the new level is perfectly reasonable because they are the hours that are now worked. The provision represents a loophole which policymakers should consider closing.

Conclusions

In mining, nearly half of employees are working more hours than they prefer, a result of long hours worked in rosters based around rotating twelve hour shifts. This has adverse implications for employees' personal lives, including their relations with family members and their ability to undertake their responsibilities in the family and community. Working hours arrangements which employees have not helped design are unlikely to reasonably serve their interests. High labour turnover, rather than enabling employees to match hours and preference, appears simply to be a result of extensive employee dissatisfaction, despite the high wages in the industry. Involuntary long hours in mining reflect the expression of preferences by employers, not employees.

Over a period of many decades, as national income grew and peoples expectations of what is 'reasonable' were raised, standard maximum working hours were gradually reduced, allowing more time for leisure and family life. Yet recently, the standard maximum hours of work have, in effect, increased – in the mining industry, they would appear in effect to have risen to 44 hours, at last for people working day shifts on week days. This deterioration in what is 'reasonable' does not reflect a drop in per capita income. Rather, it reflects a change in power relations. The frustration of one wife, Hilary, said it all:

All those strikes we had in the early days were for shorter working hours. All this sort of stuff now, it's almost like in the old days when they had twelve year olds working in the mines, isn't it?

While policy makers are effectively revising standard hours upwards, a large majority of employees are calling for a cap on hours worked.

The findings suggest that in order to promote 'good jobs' in the mining industry there is a need to revisit protections for employees against being forced to work 'unreasonable' hours

above the ostensible national standard of 38 hours per week. The 'reasonable additional hours' loophole created by WorkChoices, and expanded by the Fair Work Act, and which can only be enforced at considerable cost through employees taking complaints to courts, undermines the 'maximum weekly hours' standard. If it cannot be tightened, to give workers genuine say in the design of rosters and real choice, this loophole may be best abolished.

Endnotes

¹ The qualitative project was part of a broader project on the history of women in mining in Queensland and received financial support from the Queensland District of the CFMEU Mining and Energy Division, for which we express our thanks. We are also grateful to the AWALI team for their cooperation in providing data.

² A simple linear equation is $\text{turnover} = .466 - 0.11\text{earnings} + .192\text{mining}$. Adjusted $r^2 = .65$, $N=16$, with both coefficients significant at the 0.1% level. In quadratic form, it is $\text{turnover} = .779 - 0.37\text{earnings} + .001\text{earnings}^2 + .124\text{mining}$. Adjusted $r^2 = .71$, but with small N and an additional variable the first two coefficients are significant at the 10% level and the third was not significant, so the former, more parsimonious equation is preferred.

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ⁱ This paper has been peer reviewed by two anonymous referees.