

The health of Canada's shift workers

by Margot Shields

This article is adapted from "Shift work and health," in the July 2002 issue of *Health Reports*, vol. 13, no. 4 (Statistics Canada Catalogue no. 82-003). Please see *Health Reports* for a full bibliography.

At any given time, approximately 30% of employed Canadians work shift; that is, non-standard hours. For most of them, shift work is not a choice, but a job requirement. Our society, which has long needed around-the-clock provision of medical, transportation and protection services, now also demands more flexible access to many commercial, industrial and financial services.

While shift work may be critical to the economy, evidence indicates that it can take a physical and emotional toll on workers. The most common health complaint of shift workers is lack of sleep, but shift work has also been associated with cardiovascular disease, hypertension and gastrointestinal disorders, and, for women, with reproductive health problems and breast cancer. Shift work may exacerbate conditions such as asthma, diabetes and epilepsy. Mental health disorders such as anxiety

and depression have also been linked to shift work.¹

Researchers have proposed three potentially interrelated pathways that may explain the association between shift work and health problems: disruption of circadian rhythms, adoption or worsening of unhealthy behaviour, and stress. Biological functions such as body temperature, cognitive performance and hormonal secretions follow a 24-hour cycle. Shift workers, however, must prepare for sleep when their natural body rhythms are telling them to be active, and they must be alert and ready to work when their bodies are preparing them for sleep. Most find that their circadian system never fully adapts and this disruption has been related to a variety of physical and mental symptoms.²

The association between shift work and health may also be mediated by unhealthy behaviour, most often

smoking. Some studies have also found shift workers to be more likely than regular daytime workers to drink heavily, eat poorly and have weight problems.³ At the same time, although the exact mechanisms are not fully understood, high stress levels have

1. Colligan, M.J. and R.R. Rosa. 1990. "Shiftwork effects on social and family life." *Occupational Medicine: State of the Art Reviews* 5, 2: 315-22. For a full listing of references that pertain to this section, please see the original article in *Health Reports*.
2. Harma, M., L. Tenkanen, T. Sjoblom et al. 1998. "Combined effects of shift work and lifestyle on the prevalence of insomnia, sleep deprivation and daytime sleepiness." *Scandinavian Journal of Work, Environment and Health* 24, 4: 300-307.
3. Boggild, H. and A. Knutsson. 1999. "Shift work, risk factors and cardiovascular disease." *Scandinavian Journal of Work, Environment and Health* 25, 2: 85-99.

This article draws on data from the 2000–01 Canadian Community Health Survey (CCHS) to provide a brief profile of shift workers. It also uses data from the 1994–95 cross-sectional and the 1994–95, 1996–97 and 1998–99 longitudinal files of the National Population Health Survey (NPHS) to study the relationships between shift work and work stress, psychosocial problems, health behaviours, chronic conditions and psychological distress. Shift workers are compared with workers who had a regular daytime schedule. The analysis is based on full-year workers — those employed throughout the year before the survey — and examines each sex separately.

Work schedule was based on the question, “Which of the following best describes the hours you usually work at this job?” There were eight possible responses: regular daytime schedule or shift; regular evening shift; regular night shift; rotating shift; split shift; on call; irregular schedule; or other. Shift work was defined as anything but a regular daytime schedule. Four categories of shift workers were used in this analysis: evening shift, night shift, rotating shift and irregular shift. An irregular shift was defined to include split shift, on call, irregular schedule and other. For analysis based on NPHS data, night shift workers were excluded because of small sample sizes.

repeatedly been shown to be linked with poorer physical health. Recently, researchers have suggested that shift work is a stressor that should be included in studies examining both occupational and personal stress.⁴

This article provides an up-to-date profile of shift workers and studies their physical and mental health both at one point in time and over a longer period. The analysis is based on full-year workers — those employed throughout the year — and thus focuses on workers with more than a marginal attachment to the labour force. Because job profiles differ for men and women, analyses are conducted separately for each sex.

More than one-quarter of Canadian adults work shift

According to the 2000–01 Canadian Community Health Survey, 30% of men and 26% of women aged 18 to 54 who were employed throughout the year — nearly 3 million individuals — had non-standard schedules. About one-quarter of them worked evening or night shifts. Rotating and irregular shifts were reported more frequently,

each accounting for around four in 10 of these workers.

Not all workers were equally likely to work shift. Shift work was more common among people in blue-collar or sales and service occupations than in white-collar or clerical jobs; among men and women working less than 30 hours a week and men working more than 40 hours a week; and among people who worked on weekends.⁵

The likelihood of working shift decreased with advancing age and with marriage; for men, the likelihood also declined if they lived in a household with children. There was no difference between women workers with and without children, which may be because women were more likely than men to cite caring for family as their main reason for shift work.

Workers who were not postsecondary graduates were more likely to

have non-standard work schedules, as were workers in lower-income households. However, rotating shifts were relatively common among men from more affluent households, partly because men in health professions and protection services (whose incomes were quite high) tend to work rotating shifts.

Shift workers report high levels of work stress

Shift workers have relatively high levels of work stress, which in turn has been linked to a variety of health problems such as depression, anxiety, migraine headaches, high blood pressure and coronary heart disease. In 1994–95, men and women working evening or rotating shifts were more likely than their counterparts with regular daytime schedules to report that their jobs entailed high job

4. Taylor, E., R.B. Briner and S. Folkard. 1997. “Models of shiftwork and health: an examination of the influence of stress on shiftwork theory.” *Human Factors* 39, 1: 67-82.

5. Relatively few self-employed individuals worked the evening, night or rotating shift, but a considerable number had irregular hours.

Work stress	Men				Women			
	Regular daytime	Evening shift	Rotating shift	Irregular shift	Regular daytime	Evening shift	Rotating shift	Irregular shift
High job strain ²	17	30*	29*	19	29	40*	45*	34
High physical demands	47	56	59*	50	34	54*	68*	52*
Low supervisor support	19	31	17	16	17	17 ¹	17	17
Low co-worker support	32	37	36	29	34	37	52*	34
High job insecurity	17	27 ¹	24*	23*	18	19	26*	31*
Psychosocial problems								
High personal stress	33	44	36	32	43	41	45	54*
Married — problems with partner	16	36* ¹	22	19	21	29	24	25
Single — difficulty finding partner	33	55*	35	35	34	30	39	19*
Low mastery ³	20	32*	23	15*	23	24	31*	24
Health behaviours								
Daily smoker	27	45*	33	28	23	28	30	26
Inactive	59	47	54	54	66	62	63	62
Heavy drinker	21	27	26	18	6		5 ¹	7
Obese	13	9 ¹	15	10	11	10 ¹	12	12

-- Sample too small to provide reliable estimate.

* Significantly different from regular daytime schedule (p<0.05).

1. High sampling variability.

2. "Job strain" was measured as a ratio of psychological demands to decision-making latitude.

3. "Mastery" measures respondents' perceptions of control over things that happen, ability to solve problems and feelings of helplessness.

Note: Evening shift excludes night shift workers.

Source: Statistics Canada, National Population Health Survey, 1994–95, cross-sectional sample.

strain, that is, high psychological demands coupled with low decision-making latitude. Job insecurity was common among both men and women with a rotating or irregular schedule and female workers on a rotating shift were more likely than those with a daytime schedule to perceive low support from their co-workers. High physical demands were reported by women working an evening, rotating or irregular shift, and by men on a rotating shift.

Psychosocial problems more common among shift workers

Since non-standard hours can limit a worker's participation in leisure-time

and family activities, the strain of shift work on family life can lead to social support problems and stress. While data from the 1994–95 National Population Health Survey (NPHS) support a link between shift work and psychosocial problems, this varied with the type of shift and whether the workers were men or women.

For men, the evening shift was particularly associated with psychosocial difficulties. Married men working an evening shift were more likely than those with regular daytime hours to report relationship problems, while single men were more likely to report difficulty finding someone with whom they were compatible. The

evening shift was also associated with low levels of mastery, meaning that evening workers were more likely than daytime workers to perceive a lack of control in their lives.

On the other hand, women working the evening shift did not report similar psychosocial problems, possibly because they had often chosen such a schedule. However, women who worked an irregular shift were more likely than those with a daytime schedule to report high personal stress — taking on too much, feeling pressured and unappreciated. And women working a rotating schedule were more likely than regular daytime workers to have low mastery.

	Regular daytime	Evening shift	Rotating shift %	Irregular shift
Men				
Trouble falling/staying asleep most of the time or sometimes	38	45*	44*	41*
Less than 6 hours sleep	10	13	15*	16*
Sleep not always refreshing	30	40*	36*	33
Women				
Trouble falling/staying asleep most of the time or sometimes	48	49	51*	54*
Less than 6 hours sleep	9	13*	13*	11*
Sleep not always refreshing	36	45*	43*	41*

* Significantly different from regular daytime schedule (p<0.05).
Source: Statistics Canada, Canadian Community Health Survey, 2000–01.

Smoking common among male evening shift workers

Shift workers may pick up unhealthy habits in their attempts to cope with sleep/wake disturbances, family upset, and other stresses brought about by their work schedules. However, in 1994–95, the only difference in health behaviour between shift and daytime workers was among men working the evening shift, a high percentage of whom were daily smokers. Differences in the prevalence of inactivity during leisure time, heavy drinking, and obesity were not statistically significant between the two groups.

Physical and emotional health similar for shift and daytime workers

Previous research indicates a relationship between non-standard work schedules and specific chronic conditions such as cardiovascular disease, hypertension and gastrointestinal disorders. Yet, a statistical model using 1994–95 NPHS data showed that shift workers and daytime workers were equally likely to report chronic conditions when socio-economic status, work stress, psychosocial problems,

smoking habits and demographic and employment characteristics were taken into account.

The disruption in circadian rhythms and the social isolation brought about by shift work are believed to contribute to mental health problems. The fact that shift workers get less sleep than regular daytime workers could exacerbate the situation. Even so, a model considering the relationship between shift work and psychological distress showed that distress levels among men and women with non-standard schedules were similar to those of workers with regular daytime schedules, when other variables were controlled for. That is, shift workers were no more or less likely than daytime workers to report feeling sad, nervous, restless, hopeless, worthless, or that everything was an effort.

The lack of evidence of a relationship between shift work and chronic conditions or distress may be due to the fact that most workers who have trouble adjusting to non-standard hours transfer to a regular daytime schedule after a short period. For these workers, symptoms of illness such

as sleep disturbance, gastrointestinal complaints and mood disturbance are apparent from the outset, and because they tend not to work shift for long, their physical and psychological problems may not be captured in a cross-sectional analysis.

In the long run, shift workers more likely to develop chronic conditions

However, analysis of NPHS longitudinal data indicates that those who worked shift in 1994–95 were at some increased risk over the long run.

For men, a non-standard schedule in 1994–95 was predictive of developing chronic conditions in the next four years. Compared with men who had a regular daytime schedule, those working an evening, rotating or irregular shift in 1994–95 all had increased odds of having been diagnosed with at least one new chronic condition by 1998–99.

For women, a non-standard schedule in 1994–95 was not associated with a new diagnosis of chronic conditions. This may be because women more often worked shift to accommodate other needs such as caring for

Work schedule	Adjusted odds ratio	
	Men	Women
<i>Regular daytime</i>	1.0	1.0
Evening shift	2.0*	1.0
Rotating shift	1.7*	1.2
Irregular shift	1.7*	1.0

Italics denote reference group.
 *Significantly different from reference group (p<0.05).
 Note: The model also included occupation, work hours, weekend worker, self-employed, age, marital status, children, education, work stress, psychosocial factors, health behaviours, and chronic conditions in 1994–95.
 Source: Statistics Canada, National Population Health Survey, 1994–95, 1996–97 and 1998–99, longitudinal sample.

family or going to school. It has been suggested that commitment to shift work may be the most important individual factor related to the ability to tolerate it. Another possibility is that certain chronic conditions among women were associated with working shift, but the limited sample sizes could not reveal these relationships.

For both sexes, working the evening shift in 1994–95 was associated with an increase in psychological distress over the next two years. By 1998–99, however, the average predicted distress level of people who had worked the evening shift in 1994–95 did not differ from that of regular daytime workers. This suggests that people either ceased working shift or learned to cope with a non-standard schedule.

Majority of shift workers move to regular day schedule

Although the overall proportion of employed Canadians working shift has changed little over the past decade, transitions out of shift work are the rule, not the exception. In the majority of cases, the transition is to a regular daytime schedule rather than to a different type of shift, or it involves leaving the labour force entirely.

Of those who worked an evening, rotating or irregular shift in 1994–95, less than one in five maintained this schedule in both 1996–97 and 1998–99. In fact, the proportions who had an irregular shift in 1994–95 and continued with this schedule in the two subsequent time periods were just 12% for men and 11% for women. By contrast, about 75% of the men and women who worked regular daytime hours in 1994–95 did so as well in 1996–97 and 1998–99.

Summary

About three out of 10 Canadian workers are putting in non-standard hours. Most do so not because it is their choice, but because their jobs require it. With a few notable exceptions, shift workers tend to be younger, unmarried, less-educated and less affluent individuals. Working shift is associated with a number of potential psychosocial problems including high work and personal stress, low sense of mastery and relationship problems.

Even when work stress, personal stress, health behaviour, socio-economic status and other work-related factors were taken into account, men working an evening, rotating or irregular shift all had higher odds of developing

a chronic condition in the next four years than did men with regular daytime schedules. For both sexes, working the evening shift in 1994–95 was associated with an increase in psychological distress over the next two years. Thus, consistent with other research, analysis of NPHS data suggests a link between mental health and shift work.

Given the problems experienced by shift workers, it is not surprising that most do not maintain non-standard hours for prolonged periods.

Within two years, most shift workers either changed their hours or left the workforce. This supports earlier studies suggesting a “healthy survivor effect,” meaning that the people who continue are a more robust group who are willing and able to tolerate the stress of working shift.



Margot Shields is a senior analyst with Health Statistics Division, Statistics Canada.