



**CIRCADIAN**<sup>®</sup>  
24/7 WORKFORCE SOLUTIONS



CIRCADIAN<sup>®</sup> Report

# Shiftwork Practices 2017

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## **CIRCADIAN®**

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### **About CIRCADIAN®**

The CIRCADIAN® international family of companies is the global leader in providing 24/7 workforce performance and safety solutions for businesses that operate around the clock. Through a unique combination of consulting expertise, research and technology, CIRCADIAN Light products, software tools and informative publications, CIRCADIAN helps organizations in the 24-hour economy optimize employee performance and reduce the inherent risks and costs of their extended hours operations.

With offices in North America, South America, Europe, Asia, and Australia, CIRCADIAN experts ensure that over half the Fortune 500, and other leading international companies, improve their competitiveness in the global 24/7 economy. CIRCADIAN's core expertise is the staffing, scheduling, training, workplace lighting and risk management of their most vital asset – the 24/7 workforce.

Founded in 1983 by Dr. Martin Moore-Ede, a former professor at Harvard Medical School and author of the best-selling book *“The Twenty-Four Hour Society”*, CIRCADIAN has led the development of innovative new technologies and tools to enable employees to successfully adapt to today's high performance 24/7 workplace.

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## ABOUT THE SHIFTWORK PRACTICES SURVEY

The U.S. Bureau of Labor Statistics reports that nearly one in five American workers (about 24 million people) regularly work full- or part-time night or weekend shifts, and similar trends are occurring throughout the industrialized world. 24/7 operations encompass virtually all types of work from health care to semiconductor manufacture, from trucking to call centers.

To better understand this vital workforce, CIRCADIAN has been administering the *Shiftwork Practices Survey* for over 18 years to managers and supervisors in the 24/7 workplace. To date, more than 3,000 industrial companies employing more than 500,000 shiftworkers have been surveyed in North America. From this data, CIRCADIAN has published periodic Shiftwork Practices Reports that have revealed important trends and best practices that are defining successful shiftwork management practices in the 24/7 economy.

Each Shiftwork Practices Report includes an analysis on shift scheduling practices, payroll and benefit packages, and key performance indicators (KPI), such as safety, absenteeism, and turnover rates. The data is presented for both the specific target industry and benchmarked against all shiftwork operations in North America (U.S. and Canada). In addition, the report analyzes the factors that affect KPIs and the consequences of excessive fatigue and other issues on KPIs.



## EXECUTIVE SUMMARY

Many businesses have increasingly come to rely on the competitive advantage of 24/7 shiftwork operations. Running 24/7 maximizes the utilization of capital assets, boosts industrial productivity, enables optimal customer service and provides around-the-clock security. However, if not properly staffed and managed, 24/7 operations are critically vulnerable to human errors and accidents, absenteeism, employee health issues and low morale and increased turnover. These excessive risks, costs and liabilities of 24/7 operations arise when employees become stressed and fatigued due to night work and rotating shifts. These demands have been exacerbated in the recent past by tougher economic times. Managing a 24/7 workforce is a significantly more challenging task in the current economic environment.

CIRCADIAN's *SHIFTWORK PRACTICES 2017* reports on the shift work operation practices and key performance data of 225 shiftwork operations in the U.S. and Canada. These data are valuable for benchmarking individual operations, providing insights into the effectiveness of safety and health improvements implemented by other shiftwork operations, assessing Fatigue Risk Management Systems, and for identifying potential areas for cost saving in a company's bottom line.

*Shiftwork Practices* data are important because shiftwork operations cost significantly more to run than non-shiftwork operations due to increased turnover, absenteeism, health problems, and safety issues. However, all of these areas can be addressed with programs specific to extended hours operations.

### Summary of Results

#### STAFFING LEVELS

The Issue: The staffing level, and not the shift schedule, is the primary determinant of overtime levels, average time off-duty, and other key factors related to employee fatigue.

Key Questions: Are there enough people for the job? How are overtime and absenteeism handled? Does the workload (and staffing level) fluctuate?

Results: Only 30% of shiftwork companies reported having sufficient employees to cover both permanent positions and scheduled absenteeism. Staffing levels were inadequate to manage fatigue and stress risk, and reduced staffing levels were correlated with an increased risk of employee fatigue. Most shiftwork companies did not vary the number of employees to compensate for workload fluctuations.

#### SHIFT SCHEDULING PRACTICES

The Issue: Even in appropriately staffed operations, poorly designed shift schedules (e.g. schedules that do not account for speed of rotation, consecutive workdays, employee's commute time, overtime assignments, etc.) may lead to excessive employee fatigue.

Key Questions: What shift schedule is used? What are the practices regarding consecutive work hours and work days?

Results: In shiftwork operations, 12-h shifts were the most frequent (56% of companies). The most common shift patterns were the 2-3-2 and the long break 12-hour "DuPont" schedule. About two-thirds of companies had limits on maximum consecutive



work days. The majority of companies (96%) had limits on consecutive work hours, and in most companies the limit was set at 16 hours.

### **OVERTIME**

The Issue: Overtime is common in 24/7 operations.

Key Questions: What are the overtime rates? How is overtime managed?

Results: In shiftwork companies, the average overtime rate was 11%. However, 23% of companies operated with average overtime rates in excess of 20%. In most companies, overtime was first voluntary and then mandatory if not enough volunteers were found. Higher overtime levels were correlated with higher absenteeism and turnover rates.

### **FATIGUE AND SAFETY**

The Issue: Excessive fatigue is common in 24/7 operations and has a negative impact on operations.

Key Questions: What are the fatigue levels? How is fatigue prevented and managed? Have Fatigue Risk Management Systems (FRMS) been implemented?

Results: Almost half of shiftwork companies reported moderate/severe fatigue levels. Inadequate staffing and excessive overtime resulted in higher fatigue levels. Excessive fatigue was associated with increased absenteeism and turnover. Companies with implemented FRMS (Fatigue Risk Management System) had lower fatigue levels than companies without FRMS.

### **ABSENTEEISM**

The Issue: Absenteeism is a major problem for employers and is higher in 24/7 operations.

Key Questions: What are the absenteeism rates? How is absenteeism prevented and managed?

Results: Sixty-nine percent of companies reported absenteeism rates higher than 5%, representing a higher absenteeism rate than the rate for overall US

companies. Excessive fatigue, stress and poor employee morale as well as inadequate staffing levels were related to higher absenteeism rates.

Most companies had programs to prevent and manage absenteeism.

### **TURNOVER**

The Issue: Turnover is a major problem for employers and is higher in 24/7 operations.

Key Questions: What are the turnover rates? How is turnover prevented and managed?

Results: Forty-eight percent of companies reported turnover rates higher than 4%, representing a higher absenteeism rate than the rate for overall US companies. Excessive fatigue, stress and poor employee morale as well as inadequate staffing levels were related to higher rates. Most companies had programs to prevent and manage turnover.

### **PAYROLL AND BENEFITS**

The Issue: Wages and benefits are a major factor in recruiting and retaining employees, especially in 24/7 operations.

Key Questions: What are the wages and benefits offered?

Results: The average hourly earnings in 24/7 operations were \$29.27 (median \$29.75), higher than the average for full time and salary workers across all U.S. employees. Shift differentials were more common for night and evening shifts than for Sunday and Saturday work. Most companies offered benefits. The most frequent benefit was health insurance.



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## METHODOLOGY

This report relies on data collected by CIRCADIAN from employers in the 24/7 workplace. CIRCADIAN surveys managers and supervisors to solicit data concerning their operations. The survey incorporates questions about shift schedules, employee demographics, payroll, safety, benefits, and key performance indicators such as absenteeism, turnover, and productivity. Managers are asked to fill out the survey at the CIRCADIAN website. Media positioning, as well as promotional mailings via e-mail help attract responders, and incentives for completing the survey, such as an executive summary of the previous year's report, are offered. More than 3,000 industrial companies employing more than 500,000 shiftworkers have been surveyed over the 18 year history of the Shiftwork Practices Survey.

This year's survey is based on the responses from the managers of 225 industrial companies in the U.S. and Canada, collected from January to September 2016. Survey responses were received from a broad range of sizes of 24-h companies, from companies with less than 50 employees to companies with more than 5,000 employees.

Respondents to Shiftwork Practices 2014 represent the whole spectrum of 24/7 operations (Table 1).

### THIRD PARTY DATA

CIRCADIAN uses a number of third-party sources for U.S. industry data to confirm trends in CIRCADIAN data and to provide data that CIRCADIAN does not collect (i.e., daytime only operation and U.S. work population). Third-party sources include surveys and reports by other experts in the human capital field, peer-reviewed scientific papers, and government data.

**TABLE 1.** Spectrum of Respondents

Electric Power Generation	29	Manufacturing	50
Mining	5	Natural Gas Distribution	16
Petrochemical	25	Pipelines Transportation	19
Emergency Services	31	Other	50





# 1. SHIFTWORK DEMOGRAPHICS

- MAIN POINTS** →
- 94% of the companies surveyed operated 24 hours a day, and 88% 7 days a week.
  - Shift work operations had an experienced, highly skilled workforce.
  - Thirty-five percent of companies were fully unionized.

## 1.1 DAYS AND HOURS OF OPERATION

Eighty-eight percent of respondents noted that their companies operated 7 days a week and 94% operated 24 hours a day.

## 1.2 WORKFORCE DEMOGRAPHICS

The shift work operations surveyed had a majority of male shiftworkers, with females representing less than 20% of the workforce in 71% of the companies. This percentage is much lower than in the overall working population, where 43% of employees are women (BLS 2016).<sup>1</sup>

Sixty-three percent of companies reported that over 80% of their employees were hourly workers.

Shift work operations had an experienced, highly skilled workforce. Twenty-two percent of companies reported that employees aged 55-64 years represented more than 40% of the workforce. In addition, employees aged 65 years or older represented up to 20% of the workforce in 36% of companies. This contrasts with the overall working population, where, according to BLS data,<sup>2</sup> employees 55 years and older represent 22% of the population.

<sup>1</sup> Bureau of Labor Statistics, 2016. <http://www.bls.gov/cps/lfcharacteristics.htm#laborforce>

<sup>2</sup> Bureau of Labor Statistics, 2016. <http://www.bls.gov/cps/lfcharacteristics.htm#laborforce>

Eighty-five percent of companies reported that all employees were proficient in English. Twenty-three percent of companies reported having some employees with limited reading ability.

## 1.3 UNION REPRESENTATION

According to BLS data,<sup>3</sup> in 2015, considering all workers, 11.1% of employees were members of a union and 12.3% were represented by a union. Overall, union representation is higher in 24/7 operations than in the overall U.S. workforce. The Shiftwork Practice Survey found that 35% of companies reported being more than three-quarters or fully unionized, and 55% reported no union representation. These percentages have remained relatively stable over the past few years. In the 2014 Shiftwork Practices report, 32% of companies reported being more than three-quarters or fully unionized and 57% no union representation.

Forty-four percent of companies that were more than three-quarters or fully unionized reported having a “Good relationship with unions,” 44% reported having an “OK relationship” and 12% a “Poor relationship.”

<sup>3</sup> Bureau of Labor Statistics, 2016. <http://www.bls.gov/cps/lfcharacteristics.htm#laborforce>





## 2. WORK HOURS, SCHEDULING AND STAFFING LEVELS

- MAIN POINTS** →
- Only thirty percent of companies had sufficient employees to cover permanent positions and scheduled absenteeism. Inadequate staffing levels were correlated with excessive fatigue levels and increased absenteeism.
  - The majority of companies used rotating 12-h shifts. The most common 12-h schedules were the 2-3-2 and the long break (DuPont).
  - Sixty-seven percent of companies limited consecutive work days and 94% limited consecutive work hours.
  - The average overtime rate was 11%. However, 23% of companies had average overtime rates of over 20%. In most cases, overtime was first voluntary, then mandatory.

### 2.1 Work Hours

The majority of companies (82%) reported that scheduled work hours did not change over the past year. Twelve percent reported an increase in work hours and 4% a decrease.

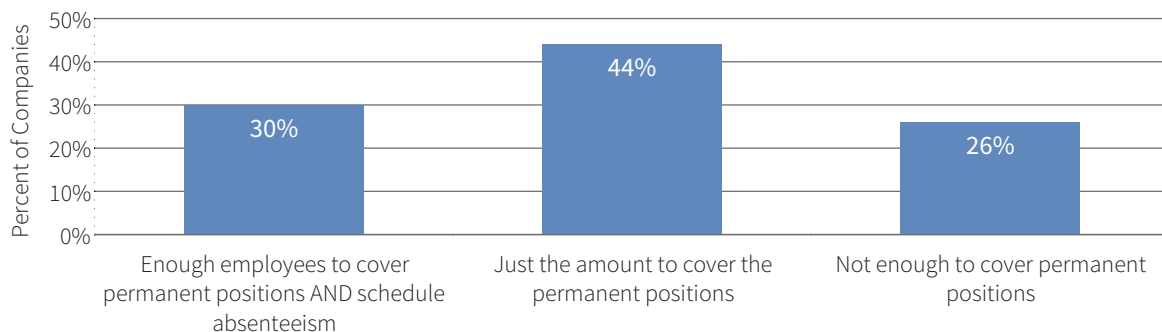
Despite the fact that most companies did not have an increase in work hours, 17% of companies reported an increase of permanent shiftworkers over the past year. In addition, 12% of the companies reported a change on the number of temporary shiftworkers. In comparison, in the 2014 Shiftwork Prac-

tices report, 21% of companies reported an increase of permanent shiftworkers, and 14% an increase of temporary shiftworkers.

### 2.2 Staffing Levels

Staffing levels are crucial in shiftwork operations, since they are the primary determinant of schedule risk factors and the actual shift schedule worked, as well as Key Performance Indicators (KPI), such as overtime and absenteeism management.

**FIGURE 1.** Staffing Levels





Adequate staffing levels are defined as staffing that allows companies to have a sufficient number of employees to cover permanent positions and scheduled absenteeism. The survey shows that in most companies staffing levels were not adequate. Only thirty percent of companies had a sufficient number of employees to cover permanent positions and scheduled absenteeism (Figure 1).

Inadequate staffing levels have a clear impact on operations, since they are related to increased employee fatigue and absenteeism. Sixty-six percent of companies with “not enough staffing to cover permanent positions” reported moderate/severe fatigue levels, compared to 34% of companies that have

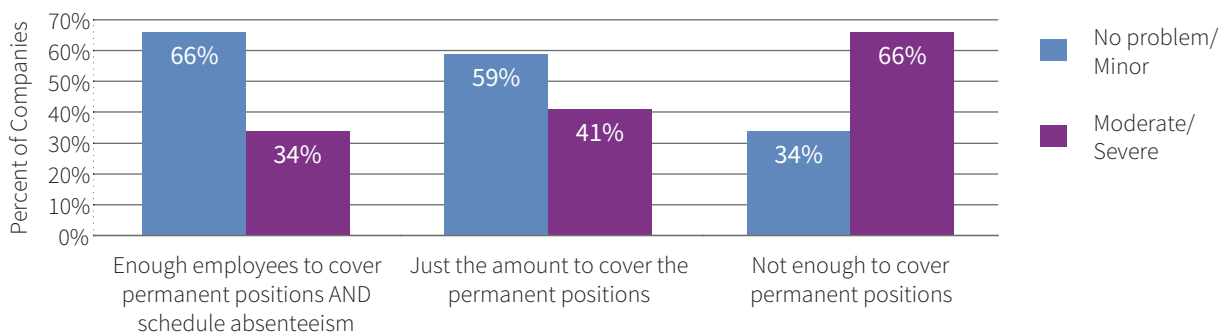
enough employees to cover permanent positions and scheduled absenteeism (Figure 2).

It is important to recognize that prolonged periods of understaffing lead to increased levels of absenteeism as workers become fatigued and may decide to be absent for medical reasons or because of family/social/psychological stress. Eighty-three percent of companies without enough employees to cover permanent positions had absenteeism rates greater than 5% (Figure 3).

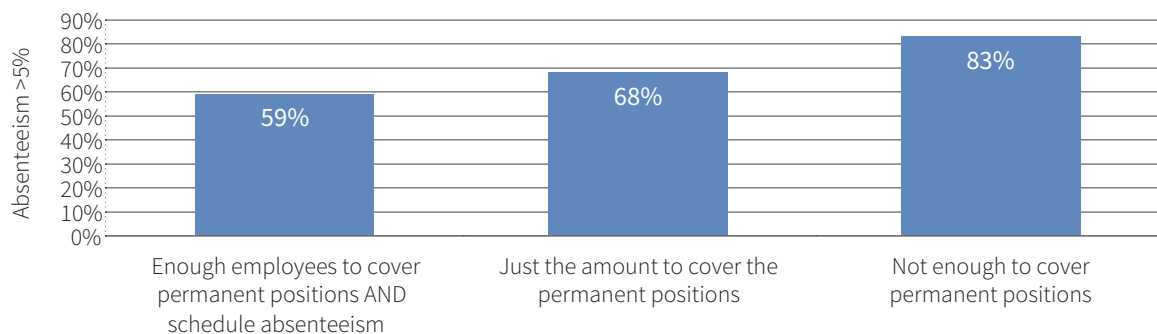
### WORKLOAD FLUCTUATIONS

By its nature, workload may vary over time, and hence the staffing levels should be reassessed by

**FIGURE 2.** Staffing Levels and Fatigue

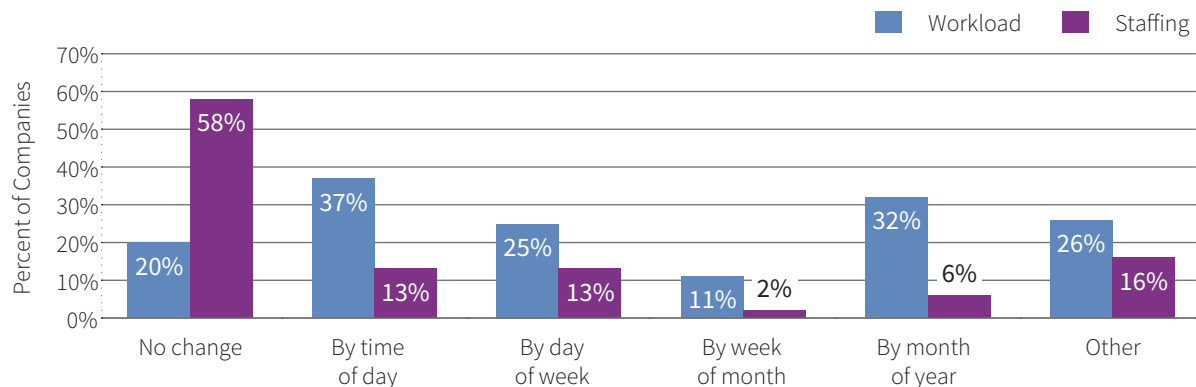


**FIGURE 3.** Staffing Levels and Absenteeism, >5%.





**FIGURE 4.** Percentage of Companies Reporting Variation in Workload Compared to Those Reporting a Variation in Number of Employees



each facility on a periodic basis to cope with workload fluctuations. In these evaluations, it is important to deal with actual daily staffing levels (people available to do the work tasks that day) and not just planned or paper staffing levels, which may fail to address vacations, sick leave, long term disability or other issues.

In 24/7 operations, customer or economic demand and equipment and raw material availability often show fluctuations across time. Therefore, production rates and workload levels may vary significantly. Fluctuations can occur by hour of day, day of week, week of month, month of year, or a combination of these, or may be related to other reasons, such as changes in the economy.

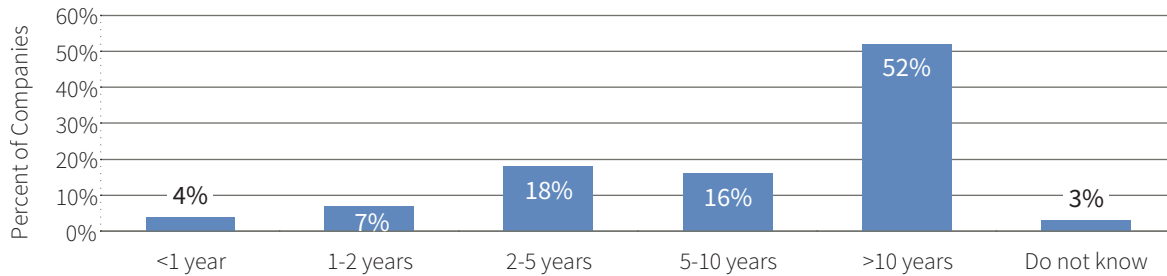
If a facility maintains the same number of employees working at all times despite fluctuations in workload, there will be some times when staff members are underutilized and other times when they must work excessive levels of overtime to meet demand. In such situations, the traditional shift scheduling used in many operations, with its balanced crews and equalized staffing, is no longer appropriate.

The majority of companies reported fluctuations in workload by time period, mainly related to time of day, day of week and month of year.

It is noteworthy that although most companies acknowledged fluctuations in workload, the majority did not vary number of employees accordingly (Figure 4). If a facility maintains the same number of employees working at all times, despite workload fluctuations, there would be times where staff members are underutilized and other times when overtime must be worked to catch up.

### 2.3 Scheduling Practices Length of Schedule Use

The most efficient work schedules are site-specific and determined by operational requirements, the health and safety impact of given schedules, and the family and social needs of the employees. All these factors change over the years, and thus work schedules should be periodically revised to make sure that they still match all the requirements. It is advisable to assess schedules every two to five years, depending on production needs and changes in employee


**FIGURE 5.** Length of schedule use


demographics. However, 53% of companies have had the current schedule for more than 10 years (Figure 5).

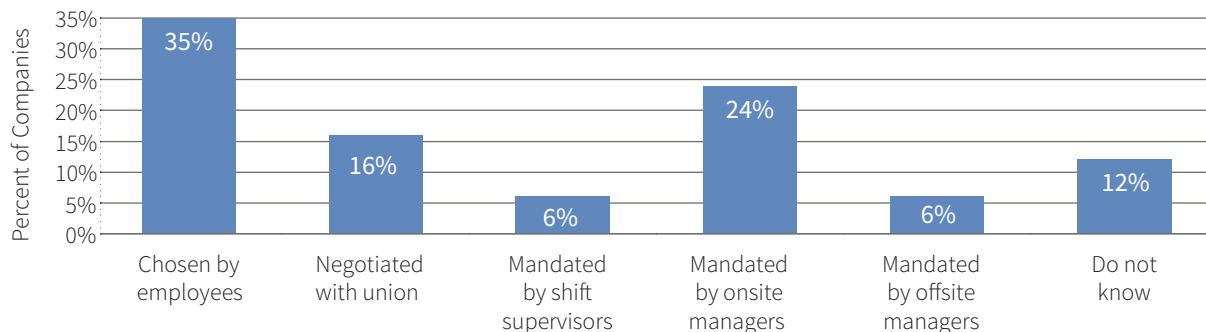
### SCHEDULE SELECTION METHOD

There are thousands of different shift schedules in use in 24/7 companies, but no single one can be called the “best” schedule. The optimal schedule for a particular 24/7 facility properly balances the operational needs of the facility, the preferences and lifestyle issues of its workforce, and the human factors that influence employee health, safety and performance.

Schedules are usually selected in one of three ways: mandated by management, negotiated with a union, or selected by employees. It has been proven that involving employees in the selection process results in better employee morale and satisfaction with the new schedule, lower absenteeism and turnover, and increased operational efficiency.<sup>1</sup>

Employee involvement in schedule selection has changed over the years. The 2002 Shiftwork Practices Survey found that in 58% of 24/7 companies the schedule was chosen by employees or negotiated with unions. In the 2007 Shiftwork Practices Survey,

<sup>1</sup> Davis W, Aguirre A. “Shift Scheduling and Employee Involvement: The Key to Successful Schedules” Circadian Information LP, 2009

**FIGURE 6.** Method of choosing current schedule






this percentage decreased to 41% of 24/7 companies. The 2014 Shiftwork Practices Survey found that the trend to reduced employee involvement was reversing, with 49% of 24/7 companies reporting that the current schedule was chosen by employees or negotiated with the unions. The trend to increased employee involvement was still present in the 2017 Shiftwork Practices Survey, where in 51% of companies the schedule was chosen by employees or negotiated with unions (Figure 6).

### SCHEDULE MANAGEMENT AND SCHEDULING SOFTWARE

Forty-seven percent of the companies used Excel, or similar generic spreadsheet software for the day-to-day schedule management. Currently, 20% of companies reported using scheduling software (Figure 7).

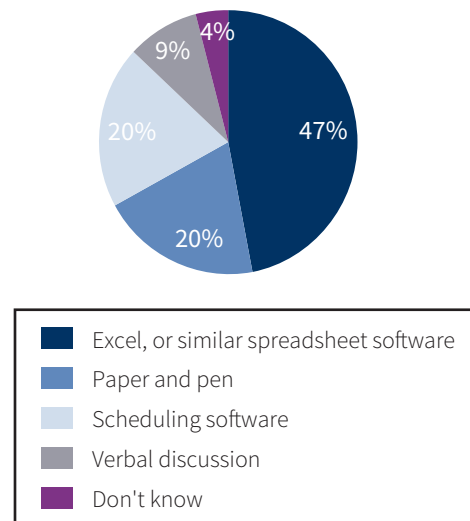
Professional scheduling software provides a benefit over scheduling by hand, since factors that minimize fatigue can be automatically incorporated into the schedule. For example, fatigue mitigation rules can be built into the software and highlight areas in which an operation is at risk for noncompliance. Furthermore, fatigue risk models can be integrated with scheduling software to identify employees at risk for fatigue and measure (benchmark) the ongoing fatigue risk of the work. In addition to the 20% of companies currently using scheduling software, 7% of companies have decided to implement scheduling software next year, and 22% are considering it.

### SCHEDULES USED

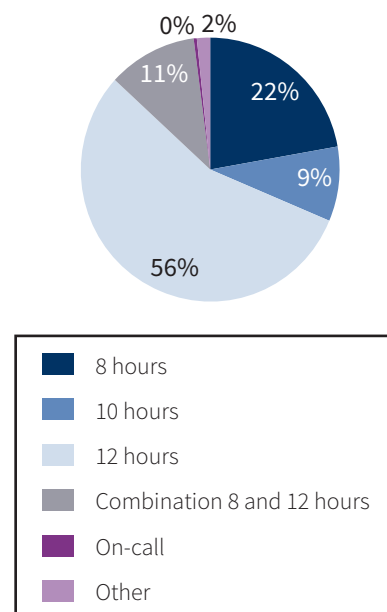
**Shift length.** Overall, the most common shift length used across all 24/7 industries was 12-h shifts (56% of companies). Twenty-two percent of companies used 8-h shifts, and combinations of 8 and 12-h shifts were used by 11% of 24/7 companies (Figure 8).

The increased prevalence of 12-h shifts may be related to employee involvement in schedule

**FIGURE 7.** Schedule management methods



**FIGURE 8.** Shift lengths in the companies surveyed





selection, since very often 12-h shifts are preferred by employees. Compared to 8-h shifts, 12-h shifts can allow double the number of days off, as well as weekend days off. They also reduce the number of consecutive work days and total number of days worked, reducing the time and expenses associated to commute.

**Fixed versus Rotating.** One of the most challenging questions in shiftwork scheduling is whether to rotate crews or keep them fixed. Rotation provides the advantages of balancing skills and experience across all shifts, and providing all employees with equal exposure to daytime management. However, constantly shifting work and sleep times may increase employee fatigue, especially if the schedule is not properly designed. Fixed shifts provide stable work hours, making it easier for employees to organize their lives. On the other hand, fixed shifts unevenly spread the risk and burdens of shiftwork among employees, both from a physiological and a social perspective.

The 2017 Shiftwork Practices Survey found that the majority of surveyed 24/7 companies (71%) used rotating shifts.

**Backward versus Forward rotation.** When using rotating 8-h shifts, the rotation can be forward (clockwise) or backward (counterclockwise). Often employees prefer backward rotations, since they feel that they are getting more time off between shifts. However, scientific research has shown that backward rotations are more fatiguing, and have a negative impact on employee health and performance. Educating employees on how different schedules affect health and safety could help implementing schedules that minimize fatigue. It is thus encouraging to see that among companies using rotating 8-h shifts, the majority (68%) used forward rotations.

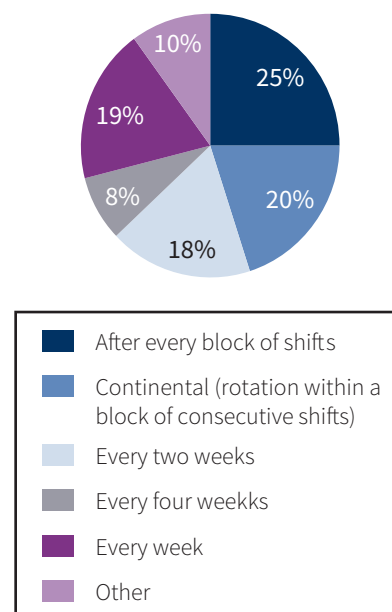
**Speed of rotation.** Most facilities rotated after every block of shifts (25%) or used a Continental rotation (20%) (Figure 9).

**Schedule pattern.** There is a broad range of 12-h shift schedules, but some schedule patterns are considerably more common than others.

In companies working 12-h shifts, the most common schedule patterns were the 2-3-2 (Every Other WeekEnd Off, EOWEO) pattern (42%) and the DuPont (long break) (24%).

The 2-3-2 schedule has become quite popular, since employees have every other weekend off. It should be noted that there are large differences in the risks of these schedules depending on the rate of rotation, and rapidly rotating schedules may be associated with higher fatigue levels. The DuPont long break schedule is popular with employees due to the built in 7 or 8-day break each month. However,

**FIGURE 9.** Speed of rotation in shiftwork companies





some managers are concerned that the long break may create communications problems as workers get out of touch with changes in business during the long break. However, there are large differences in the risks of these schedules depending on the rate of rotation, and rapidly rotating schedules may be associated with higher fatigue levels.

### WORK HOURS LIMITS

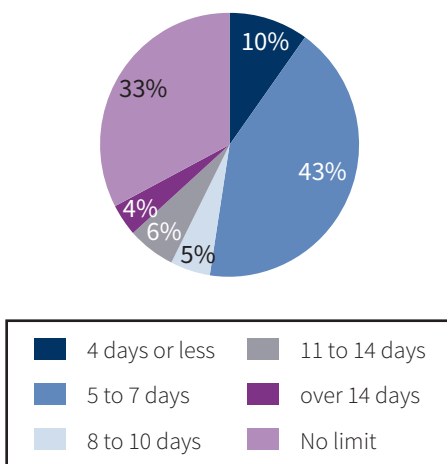
Limiting the number of consecutive work days and consecutive work hours has been the traditional approach to mitigate fatigue. However, only some industries have regulations or guidelines regarding work hours. Limiting the number of consecutive work hours is more common than limiting the number of consecutive work days.

**Consecutive work days.** Thirty-three percent of the sample of 24/7 companies reported having no limit in permitted consecutive work days. For those that had a limit, the most frequent (43%) was a maximum of 5-7 consecutive shifts (Figure 10). A small percentage (4%) reported that they allowed

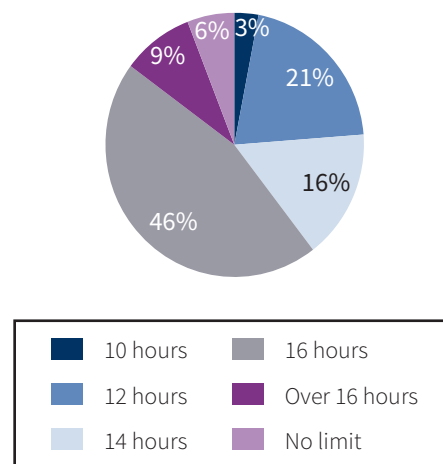
more than 14 consecutive work days. It is interesting to note that companies working 12-h shifts were more likely to have limits than companies working 8-h shifts (70% compared to 63%). However, this difference is slightly smaller than the values from 2014 Shiftwork Practices (74% vs. 57%).

**Consecutive work hours.** The majority of 24/7 companies reported limits on the maximum of consecutive work hours (including overtime shifts). Only a small percentage (6%) reported having no limits. For those that had a limit, the most frequent (46%) allowed a maximum of 16 consecutive hours, and 9% reported that they allowed more than 16 consecutive work hours (Figure 11). It is interesting to note that there were some differences between companies working 8-h and 12-h shifts. For companies working 8-h shifts, 43% allowed a maximum of 16 hours and 31% a maximum of 12 hours. For companies working 12-h shifts, 22% allowed a maximum of 14 hours, 53% a maximum of 16 hours, and 10% allowed more than 16 consecutive hours. The limits on number of consecutive hours have changed since

**FIGURE 10.** Maximum amount of consecutive work days



**FIGURE 11.** Maximum amount of consecutive work hours allowed on a shift





the 2014 Shiftwork Practices report, with a trend to a lower number of consecutive hours. In 2014, 57% of companies working 8-h shifts allowed a maximum of 16 hours, and 14% of companies working 12-h shifts allowed more than 16 consecutive hours.

*Note: For information on the relationship between scheduling factors and fatigue risk, please refer to Section 3.2*

## 2.4 OVERTIME

### OVERTIME LEVELS

Overtime is common in 24/7 operations, in part because small amounts of overtime are often built into the shift schedule (e.g., an employee working four consecutive 12-hour shifts would typically work 48 hours in a single workweek, of which 8 hours are overtime).

Additionally, overtime can occur when there are too few employees to meet demand. For example, if an operation is understaffed and productivity cannot be improved, there is either a shortfall in meeting demand or overtime is required.

The appropriate level of overtime for a facility depends on a number of factors, including whether the employees must be paid an overtime premium, training and recruitment costs, safety and quality issues, and the cost of the benefits package.

It is sometimes difficult to decide whether to hire additional employees or permit high overtime levels. Employee health and safety should be considered in the analysis of the appropriate overtime rates. If all employees were working the same amount of overtime, taking into account all the health and safety factors related to work hours, CIRCADIAN estimates that up to about 12% overtime is an acceptable rate.

However, it is very common to find that while some employees work very few overtime hours, there is a group of employees who consistently work most of the overtime hours. Working excessive

**TABLE 2.** Actual vs scheduled work hours and average overtime rates

	2014	2017
Average scheduled hours/week	41.5 h	41.9 h
Average actual hours worked/week	46.3 h	45.5 h
Calculated average overtime rate	13%	11%

overtime may pose a risk to employees' health and safety and may also affect the company because of increased health care costs, absenteeism, safety issues, and legal liability.

Table 2 shows the average scheduled work hours and the average amount of hours actually worked by employees. The table also shows the average overtime rate in 24/7 companies, calculated using the above numbers. It should be noted that while the average scheduled hours remained quite stable, the actual hours worked, as well as the overtime rate, were lower in the 2017 SWP report than in the 2014 SWP report.

It is important to note that while the average overtime rate was at an acceptable level, the rates vary greatly among different companies. Thus, while 39% of companies had overtime rates of less than 5%, 12% had overtime rates of 15-20%, and in 23% of companies overtime rates were greater than 20%.

### REASONS FOR OVERTIME

Overtime primarily provides flexibility within an operation, which is needed in the following situations:

- Demand for product or service increases (temporarily or permanently) so employees are asked to work more hours



- Too few appropriately skilled staff exist to meet current demand, so they must work additional hours
- Unexpected absences or maintenance require extra employees to work

A study by Cornell University reveals that the vast majority (82%) of the employees surveyed (hourly unionized workers across most industries) are either satisfied with their current level of overtime, or would like to work more overtime than they currently do.<sup>2</sup> The study further concluded that most employees (75%) experienced little or no pressure from their managers to work overtime.

These study findings reflect that overtime is largely voluntary, and not mandatory. Indeed, in the extended hours workplace, among employees who work more than 400 hours of overtime per year (approximately 20% of total hours worked per year) most of these employees did not express the wish to work fewer hours.<sup>3</sup> Of extended hours employees who worked 200 hours or less overtime, 50% wanted to work more. Therefore, not allowing employees to work overtime or limiting amounts could cause employee dissatisfaction.

The Cornell study indicates that employees want to work overtime for the following reasons:

- **More income.** Simply put, working extra hours at a premium pay rate is just too enticing for a large minority of workers to pass up. Furthermore, the number of dependent children an employee has appears to be directly proportional to the number of overtime hours the employee would like to work.
- **Job security.** Employees feel that if they refuse to work overtime or are not putting in as many over-

time hours as co-workers are, then they are more likely to be fired.

### OVERTIME MANAGEMENT

The number of positions to fill on each shift is fixed in most 24/7 operations. If the staffing level is lower than optimal then the employees in that operation have to work additional hours to keep the positions filled. These hours may be added by:

- Holding employees over for additional hours at the end of their shift
- Calling in employees

Hold-overs may give employees limited advance notice, leading to conflicts with their family/social life. In addition, they increase shift length, and in the case of 8-h shifts they often result on employees working a double shift without being sufficiently prepared or rested. Moreover, if not properly managed, they may reduce the amount of off-duty rest hours after the shift.

Call-ins sometimes involve bringing in employees early for additional hours at the beginning of their shift. This increases average shift length and reduces off-duty rest hours before the shift. Another method is to bring employees into work on their days off for additional shifts, which increases the number of consecutive workdays and/or reduces the number of consecutive days off.

The 2017 Shiftwork Practices Survey found that the majority of companies used either “call-in and hold over” or “call-in” (Figure 12 on the following page).

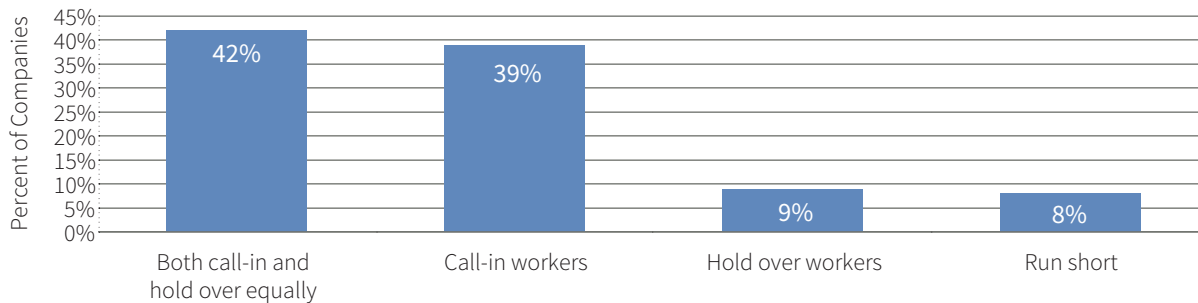
To assign overtime, the majority of companies (72%) first asked for volunteers, and then used mandatory overtime if needed because of a lack of volunteers. Twenty-one percent of companies reported relying exclusively on voluntary overtime and 6% exclusively on mandatory overtime.

<sup>2</sup> Cornell University. *Industrial and Labor Relations, Institute for Workplace Studies. Overtime and the American Worker. 1999.*

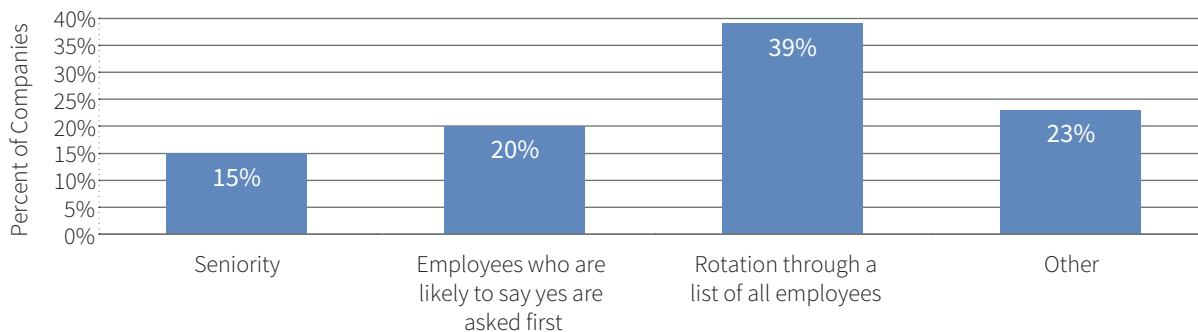
<sup>3</sup> CIRCADIAN extended hours employee database.



**FIGURE 12.** Management of unscheduled overtime



**FIGURE 13.** Method of assigning voluntary overtime



The use of mandatory overtime can create employee dissatisfaction, and result in poor morale, and increased stress and fatigue, affecting thus absenteeism and productivity. Although in non-regulated industries in most states there are no rules against mandatory overtime, in some cases, such as in the healthcare industry, there is a growing movement against it, and in several states mandatory overtime is restricted.

When using voluntary overtime, most companies rotated through a list of employees (Figure 13).



## 3. FATIGUE AND SAFETY

- MAIN POINTS** →
- *Fatigue was reported as a moderate/severe problem in almost half of shiftwork companies.*
  - *Inadequate staffing and excessive overtime were related to greater fatigue levels.*
  - *Excessive fatigue was associated with increased absenteeism and turnover.*
  - *Companies with implemented FRMS (Fatigue Risk Management System) had lower fatigue levels than companies without FRMS.*

Minimizing employee fatigue is one of the constant challenges in 24/7 operations. If fatigue is not adequately prevented and managed, 24/7 operations are more vulnerable to human errors and accidents, increased absenteeism and turnover and lower productivity.

### 3.1 FATIGUE LEVELS

Human fatigue is an impairment of mental and physical function manifested by a cluster of debilitating symptoms, usually including excessive sleepiness, reduced physical and mental performance, depressed mood and loss of motivation. A person experiencing fatigue may be more likely to make

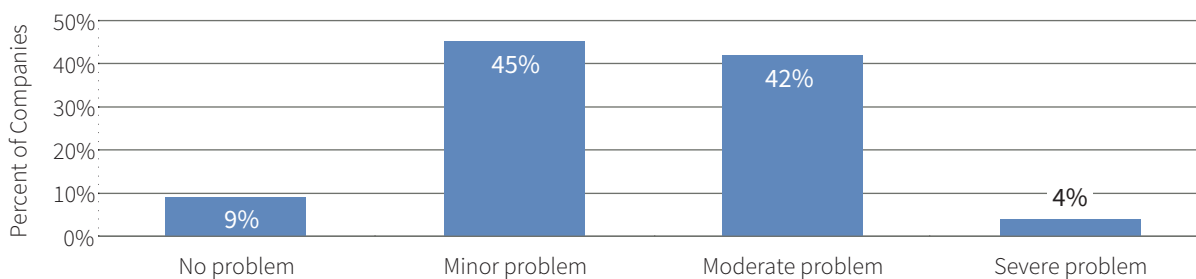
mistakes and take risks, and may be less able to respond to unusual or emergency events.

There are many different causes of fatigue, including prolonged periods without sleep (i.e., sleep deprivation), sleep disorders, illness or disease, medication side-effects (e.g., some cold medicines), and heavy stressful physical or mental exertion.<sup>1</sup>

Fatigue is also associated with long hours of work, the conditions of the work environment, and the requirement to work when people would normally be resting (e.g. night shift). Even under ideal conditions, night time alertness will generally be less than daytime alertness. Long working hours

<sup>1</sup> Moore-Ede M. "Definition of Human Fatigue" Circadian Information LP, 2009

**FIGURE 14.** Fatigue levels in 24/7 operations.





and long commutes to and from work can lead to fatigue.

It is important to recognize that fatigue is a result of physiological factors and is not a ‘state of mind’. Simply put, fatigue has biological causes. The effects of not getting enough sleep build up (this is known as sleep debt and for the average adult generally starts building up if they receive less than seven or eight hours sleep a night) and result in reduced alertness and increased sleep pressure (i.e. the feeling of having to sleep).

Almost half of companies (46%) reported that fatigue was a moderate/severe problem (Figure 14). In addition, 49% of companies reported that stress was a moderate/severe problem. The majority of companies (76%) reported that fatigue levels stayed the same over the past year, and 75% that human errors, incidents and accidents stayed at the same rate.

### 3.2 CAUSES OF EXCESSIVE FATIGUE

#### INADEQUATE STAFFING LEVELS

As discussed in the previous section, staffing levels have a clear impact on fatigue: 66% of surveyed 24/7 companies that do not have enough employees to cover permanent positions report moderate/severe

fatigue levels, compared to 34% of companies with adequate staffing levels.

#### EXCESSIVE OVERTIME

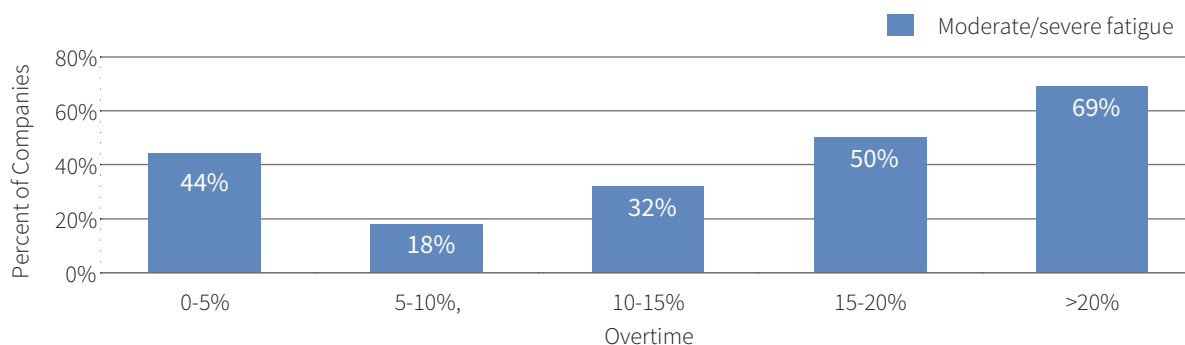
Research has shown that excessive long hours (which may result from excessive overtime) affect employee health, and may result in cardiovascular disease, including high blood pressure, increased risk of injuries and repetitive strain injuries due to poor ergonomics. The relationship between excessive overtime and increased employee fatigue is shown clearly in Figure 15, with the exception of a surprisingly high percentage of moderate/severe fatigue in companies with very low overtime

#### SCHEDULING FACTORS

Work schedules can significantly impact the level of fatigue in the workplace. Factors such as shift length and pattern, and the number of consecutive work days and work hours all influence general fatigue. Reducing worker fatigue might therefore be improved by finding the right combination of days and hours worked.

**Shift Duration.** The percentage of companies reporting moderate/severe fatigue levels was highest among companies using 8-h shifts (59%), followed by companies using a combination of 8-and 12-h

**FIGURE 15.** Overtime levels and percentage of companies with moderate/severe fatigue levels.







shifts (50%), and lowest in companies using 12-h shifts (36%).

**Consecutive work days.** Fatigue levels were lowest when companies limited work days to 4 days in a row or less. The percentage of companies reporting fatigue was highest for companies working 11-14 days and companies with no limits on consecutive work days (Figure 16).

**Consecutive work hours.** Fatigue levels were substantially higher in companies that had no limits for consecutive work hours than in companies that limited the number of consecutive work hours (Figure 17).

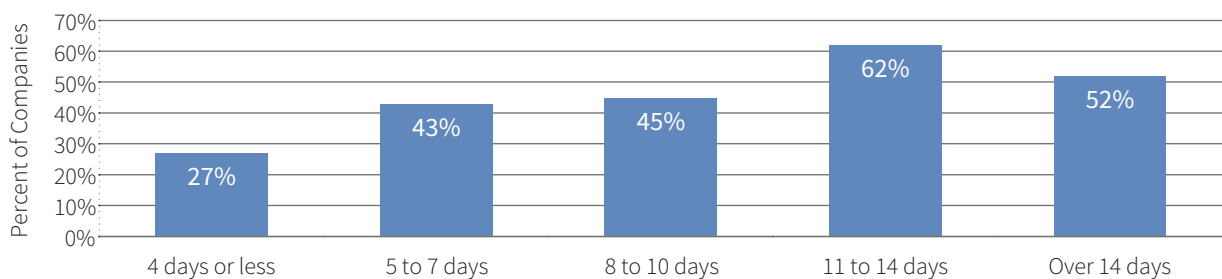
### 3.3 CONSEQUENCES OF EXCESSIVE FATIGUE

When an individual is fatigued, the probability of poor, inefficient, and variable performance increases. Performance deficits include increased periods of delayed response or no-response (lapses) during attention-based tasks, slowed information processing, increase in reaction times, reduced accuracy of short-term memory, and accelerated decrements in performance with time on task.<sup>2</sup>

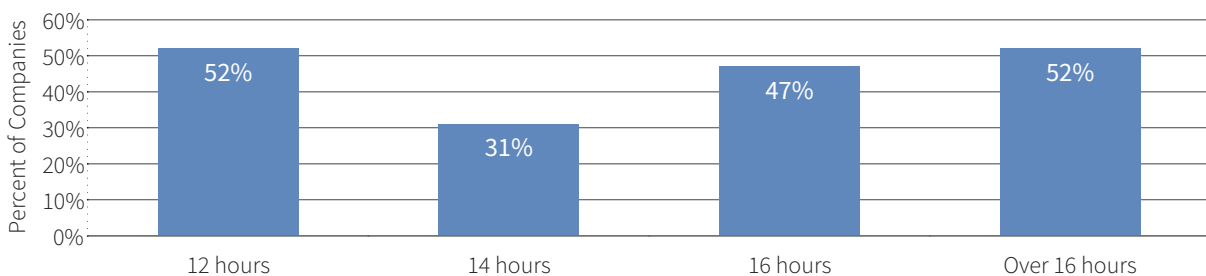
Fatigue is also associated with a loss of environmental (“situational”) awareness, impairment of cognitive/logical reasoning skills, poor judgment, and diminished ability to communicate and/or

<sup>2</sup> Dinges DF. 1995. An overview of sleepiness and accidents. *J. Sleep Res.* 4 Suppl. 2, 4-14.

**FIGURE 16.** Consecutive work days and moderate/severe fatigue levels.



**FIGURE 17.** Consecutive work hours and moderate/severe fatigue levels.





process communications and information. Fatigue impairs judgment and cognitive reasoning. Divided attention tasks requiring anticipation and pro-active planning are typically the first to degrade. As fatigue impairment progresses, the likelihood of automatic behavior (performance of tasks without cognitive awareness) and “microsleep” lapses of attention significantly increases.

The inevitable result of the reduced or impaired alertness caused by fatigue includes increased human error and a reduced ability to work safely. There is considerable investigative evidence that fatigue has contributed to serious incidents and accidents in industrial operations, nuclear power plants, and in all modes of transportation.<sup>3</sup> For example, human fatigue has been identified by the U.S. Department of Transportation as the “number one” safety problem in transportation operations.<sup>4</sup>

Besides affecting performance, fatigue also affects mood.<sup>5</sup> The National Sleep Foundation found that people who do not get enough sleep are more likely to get impatient or aggravated and have difficulty getting along with others. Increased irritability and stress negatively influence relationships. In the workplace, that translates into reduced morale and poorer labor relations. Fatigue also impacts a company’s operating efficiency and costs. Fatigue results in reduced productivity and customer service quality, reduced operating reliability and decreased operating profit, increased health and wellness costs, and higher overall costs, risks, and liabilities.

Fatigue has been associated with an increase in Lost Productive Time (LPT).<sup>6</sup> Among workers reporting fatigue, 65.7% reported health-related LPT compared to 26.4% of those without fatigue. Workers with fatigue cost employers \$136.4 billion annually in health-related LPT, an excess of \$101.1 billion com-

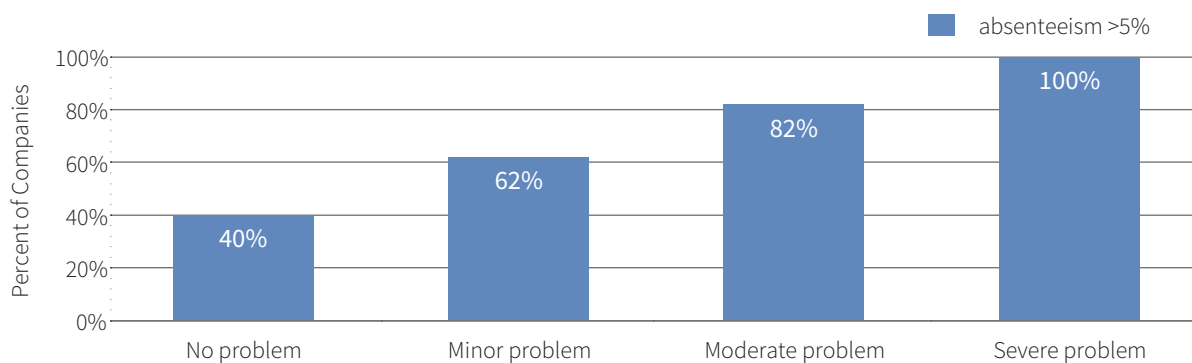
3 Mitler MM, Dinges DF, Dement WC. 1994. Sleep medicine, public policy and public health. In: MH Kryger, T Roth, WC Dement (Eds) Principles and practice of sleep medicine (2nd ed). WB Saunders & Co. Philadelphia.

4 Downey ML. U.S. Deputy Secretary of Transportation speech. U.S. DOT Conference, Tyson’s Corner, VA, Aug. 29, 2000.

5 The National Sleep Foundation. 2002 Sleep in America Poll. [www.sleepfoundation.org](http://www.sleepfoundation.org)

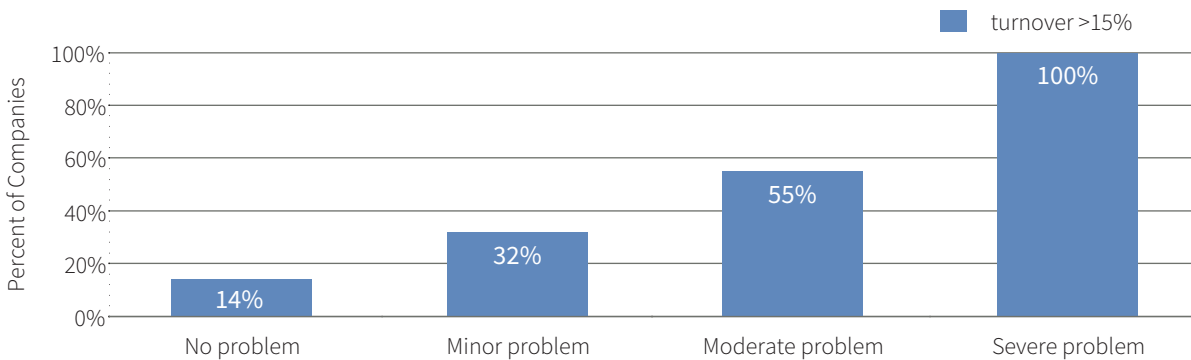
6 Ricci JA, Chee E, Lorandean AL, Berger J. 2007. Fatigue in the US Workforce: Prevalence and implications for lost productive work time. JOEM 49, 1-10.

**FIGURE 18.** Absenteeism rates and fatigue levels.





**FIGURE 19.** Turnover rates and fatigue levels.



pared to workers without fatigue. Fatigue impaired work ability primarily by increasing workers' time to accomplish tasks and impairing their concentration. In addition, fatigued workers reported more physical health and social functioning problems than workers without fatigue.

SHIFTWORK PRACTICES 2017 data demonstrate the negative impact of fatigue on some KPIs, such as absenteeism and turnover. Absenteeism rates increased linearly with increased fatigue levels: 100% of 24/7 companies with severe fatigue problems had absenteeism rates of 6% or greater, compared to 40% of companies that reported that fatigue was not a problem (Figure 18).

Excessive fatigue also had a clear impact on employee turnover rates. Turnover rates increased linearly with increased fatigue levels: 100% of 24/7 companies with severe fatigue problems had turnover rates of 15% or greater, compared to 14% of companies that reported that fatigue was not a problem (Figure 19).

### 3.4 SAFETY PROGRAMS

The first step to evaluate the impact of fatigue and human error is to analyze to what extent incidents and accidents are caused by fatigue and human error. It is noteworthy that 52% of companies have procedures to determine whether fatigue and human error were causal factors. However, 21% had procedures to investigate human error, but did not investigate fatigue (Figure 20 on the following page).

The majority of companies had some program to prevent human error. Although these programs may be helpful, they do not represent a comprehensive approach. Overall, the most frequent programs were drug and alcohol testing, followed by work hours limits (Figure 21 on the following page).

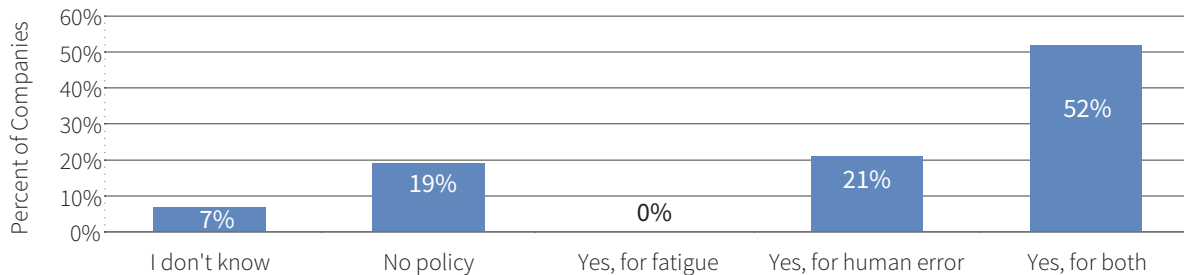
#### FATIGUE RISK MANAGEMENT SYSTEMS (FRMS)

Over the past 10 years, a broad international consensus has emerged across many 24/7 industries that the optimal way to manage and reduce employee fatigue risk is through a systematic process called a Fatigue Risk Management System (FRMS).

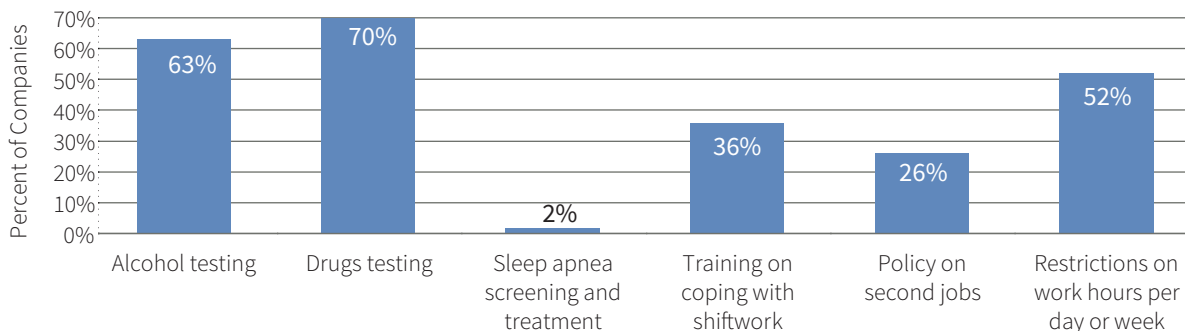
With improvements in fatigue management tools, data collection methodologies, and scientific



**FIGURE 20.** Procedures to determine whether an accident was caused by human error.



**FIGURE 21.** Programs to prevent human error.



research and analysis, more emphasis can now be placed on a proactive approach rather than a prescriptive regulatory approach to managing fatigue.

The flexible nature of FRMS is illustrated in the American College of Occupational and Environmental Medicine (ACOEM) definition of FRMS as:

*“A scientifically based, data-driven addition or alternative to prescriptive hours of work limitations which manages employee fatigue in a flexible manner appropriate to the level of risk exposure and the nature of the operation.”<sup>7</sup>*

<sup>7</sup> Lerman SE, et al. “Fatigue Risk Management in the Workplace.” JOEM, Vol. 54, No.2: 231-258, February 2012.

To accomplish this switch, organizations that implement an FRMS must ensure that the system is firmly embedded in the health and safety management systems of the company and that it is rigorously maintained, carefully monitored and continuously improved upon (Figure 22).<sup>8</sup> This process should be part of the continuous cycle of managing the risk profile of any organization’s management system. Provided it is properly designed, implemented and managed, an FRMS offers a major step change in addressing the health and safety risks in 24/7 operations.

<sup>8</sup> Moore-Ede M. “Evolution of Fatigue Risk Management Systems: The ‘Tipping Point’ of employee fatigue mitigation” Circadian Information LP, 2010.



As described in Professor James Reason’s 1990 book “Human Error,” most major industrial and transportation accidents are the result of multiple latent points of system failure and not just the immediately obvious active error of the human at the controls.<sup>9</sup> Reason introduced the imagery of a series of Swiss cheese slices (Figure 23) to explain that every level of organizational defense against potential hazards has holes in it. It is when the holes line

up that a pathway for accidents to occur emerges. These slices of cheese, which Reason calls “defenses in depth,” operate at different levels of control.

One of the key features of FRMS is that the process seeks to identify the holes in the “Swiss cheese slices” from a fatigue perspective and should also identify the mitigation required to either close the holes or at least reduce their size.

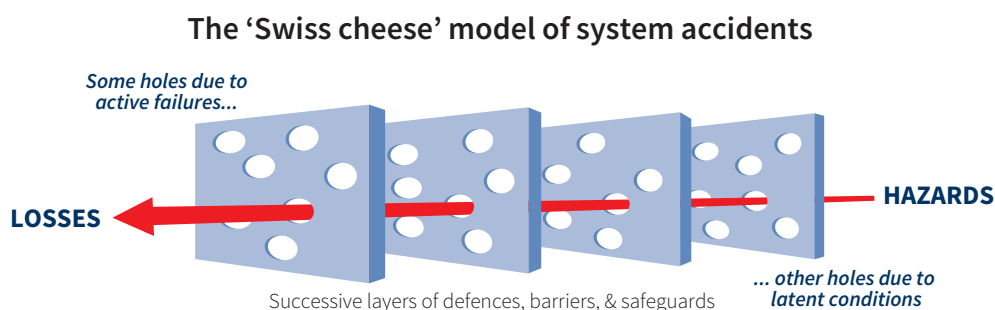
CIRCADIAN®’s experience in designing and implementing FRMS over the past twenty years has led to the appreciation of the critical path for assessing

<sup>9</sup> Reason, J. 1990. *Human Error*, Cambridge, UK: Cambridge University Press.

**FIGURE 22.** Key characteristics of a successful Fatigue Risk Management System.

<b>Science based</b>	Supported by established peer-reviewed science
<b>Data driven</b>	Decisions based on collection and objective analysis of data
<b>Cooperative</b>	Designed together by all stakeholders
<b>Fully Implemented</b>	System-wide use of tools, systems, policies, procedures
<b>Integrated</b>	Built into the corporate safety & health management systems
<b>Continuously improved</b>	Progressively reduces risk using feedback, evaluation & modification
<b>Budgeted</b>	Justified by an accurate ROI business case
<b>Owned</b>	Responsibility accepted by senior corporate leadership

**FIGURE 23.** The successive layers of defense in depth in a safety (and fatigue risk) management system and the strategy of addressing risk © 2009 James Reason.





and managing fatigue risk. As illustrated in Figure 24, there are five key “defenses in depth” (similar to Reason’s ‘cheese slices’) and a feedback loop which analyses fatigue-related errors and incidents and strengthens defenses that must be managed by FRMS. The first three of these defenses impact sleep management, and the last two provide alertness management.<sup>10</sup>

The pace of adoption of FRMS has accelerated in many 24/7 industries. In the last 10 years:

- The European Aviation Safety Agency (EASA) has made having an FRMS a requirement for airlines operating in Europe.
- The American Petroleum Institute has published

an ANSI Standard (API RP 755) for all U.S. refining and petrochemical operations to implement a comprehensive FRMS.

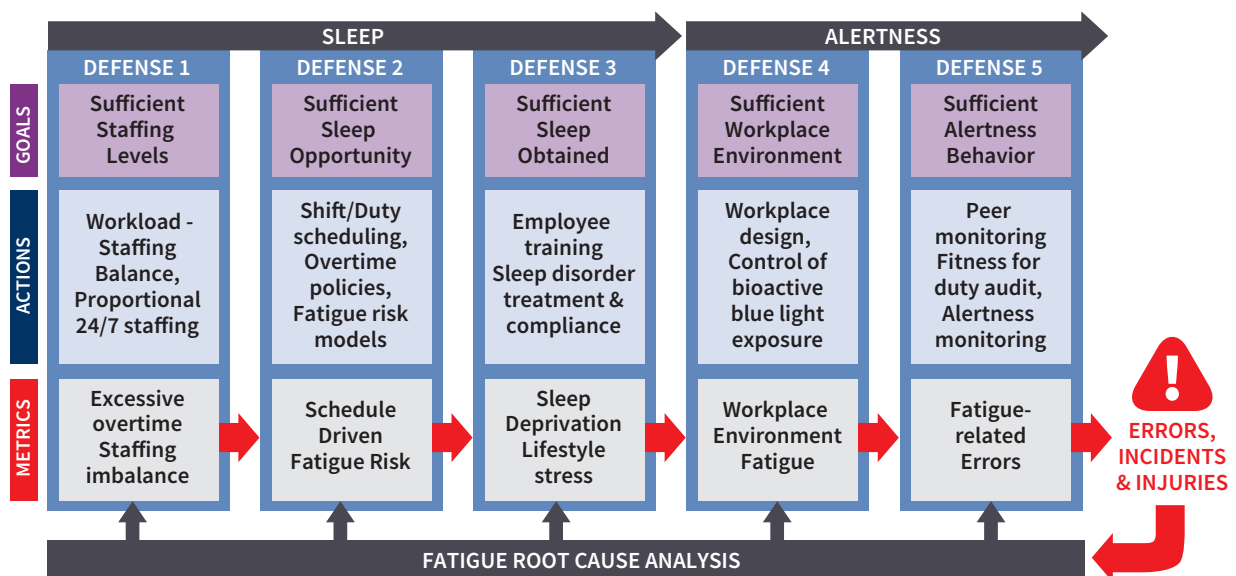
- The Federal Rail Safety Act has mandated that U.S. railroads have fatigue risk management plans.
- The U.S. pipeline safety agency PHMSA has enacted rule changes for natural gas pipeline control rooms that include fatigue risk management programs.

### FRMS IN 24/7 OPERATIONS

FRMS are still not common practice in many industries. Fourteen percent of companies reported having a fully implemented FRMS and 8% reported having a partially implemented FRMS.

<sup>10</sup> Moore-Ede M. “Evolution of Fatigue Risk Management Systems: The ‘Tipping Point’ of employee fatigue mitigation” Circadian Information LP, 2010.

**FIGURE 24.** The five major lines of defense used in designing and implementing a Fatigue Risk Management System and the feedback loop which analyses fatigue-related errors & incidents and strengthens defenses to ensure the FRMS is risk-informed, performance-based, and continuously improved.



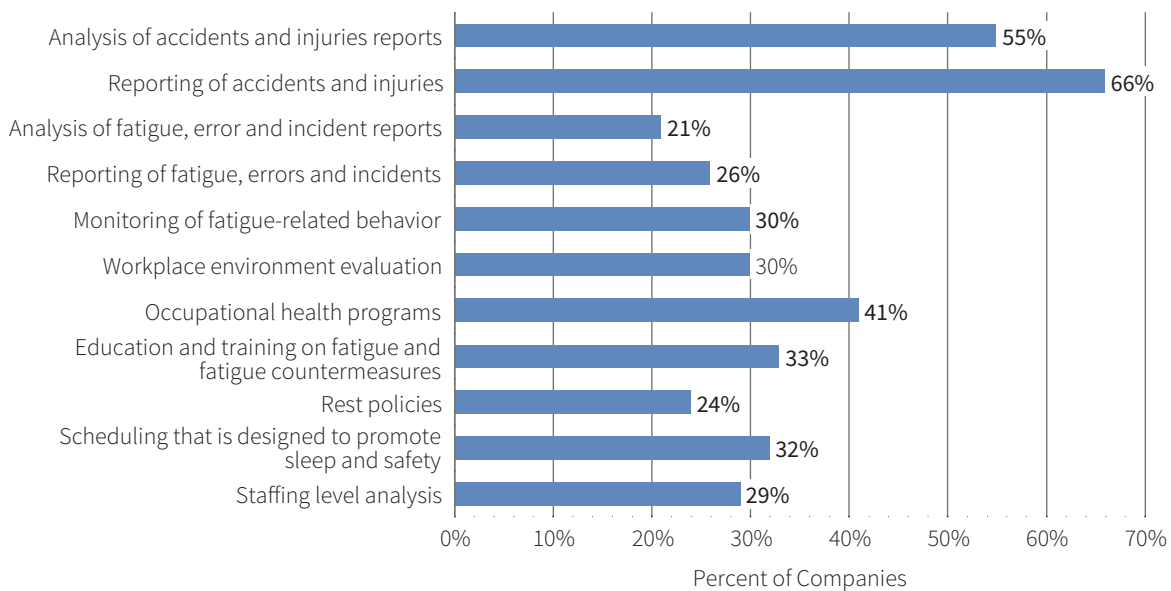
© 2017 Circadian International, Inc.



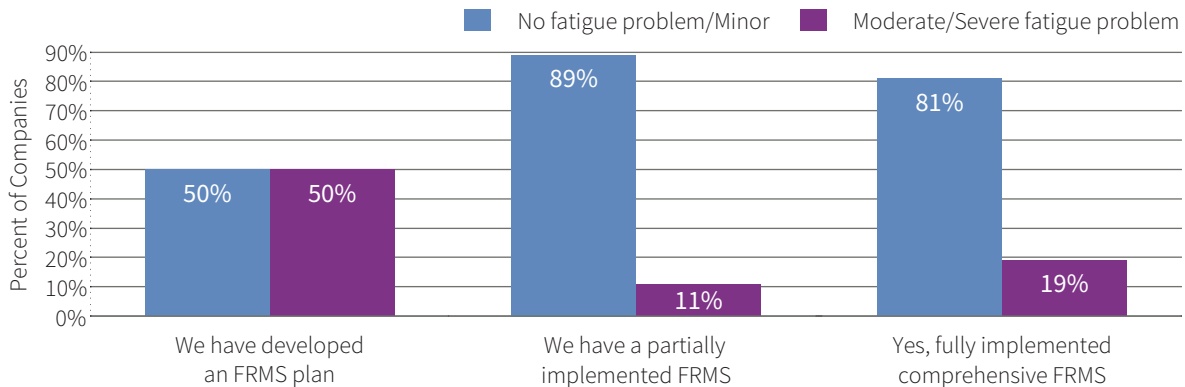
Figure 25 shows the percentage of companies having any of the different key FRMS components. The only programs reported by more than half of companies were reporting and analysis of accidents and injuries.

Figure 26 on the following page shows the effect of having an FRMS on fatigue. It is evident the effectiveness of an FRMS for minimizing fatigue levels.

**FIGURE 25.** Prevalence of FRMS components.



**FIGURE 26.** Effect of FRMS on fatigue.









## 4. ABSENTEEISM

- MAIN POINTS** →
- Absenteeism was higher in 24/7 operations than the average in all U.S. industries.
  - Excessive fatigue and stress, poor employee morale, and inadequate staffing levels were associated with higher absenteeism rates.
  - Most companies had programs to control absenteeism, but not the fatigue-related causes of absenteeism.

Absenteeism is a major problem area for employers.<sup>1</sup> Work-life balance has been gaining relevance, as employees desire more time for family and social activities, and increasingly reject long work hours. The economic pressures of the recent years have compounded the problem, with a reduced workforce struggling to maintain productivity, resulting in long hours and increased stress. A survey of U.S. companies<sup>2</sup> highlighted the relationship between absenteeism and personal issues. According to this survey, only 34% of unscheduled absences were related to personal illness. About two thirds of absences were due to other reasons, including family issues (22%),

<sup>1</sup> CCH INCORPORATED, CCH Unscheduled Absence Survey 2006. <http://hr.cch.com>

<sup>2</sup> CCH INCORPORATED, CCH Unscheduled Absence Survey 2007. <http://hr.cch.com>

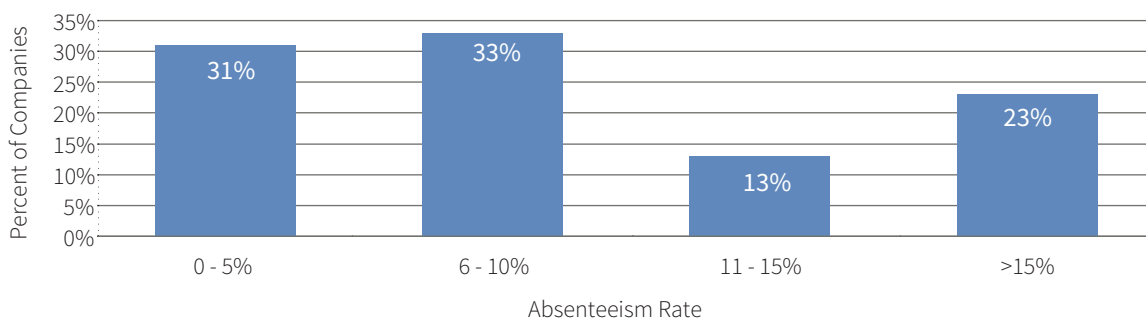
personal needs (18%), stress (13%), and entitlement mentality (13%).

The demands of shiftwork on family and social life, combined with its impact on health and sleep, cause absenteeism to be higher in shiftwork than in traditional daytime operations.

The Bureau of Labor Statistics (BLS) reported that in 2015 the absenteeism rate for full time and salary employees in U.S. industries was 2.9%.<sup>3</sup> It should be noted that BLS data showed that absenteeism due to illness or injury represents about two-thirds of all absenteeism (1.9%), which contradicts the data from the CCH survey. This discrepancy could be due to the fact that the CCH surveys correspond to a different time period.

<sup>3</sup> Bureau of Labor Statistics: <http://www.bls.gov/cps/cpsaat46.pdf>

**FIGURE 27.** Absenteeism rate.





The 2017 Shiftwork Practices Survey found that absenteeism was higher in 24/7 operations than the average in all U.S. industries: 69% of respondents reported absenteeism rates greater than 5% (Figure 27).

### CAUSES OF ABSENTEEISM

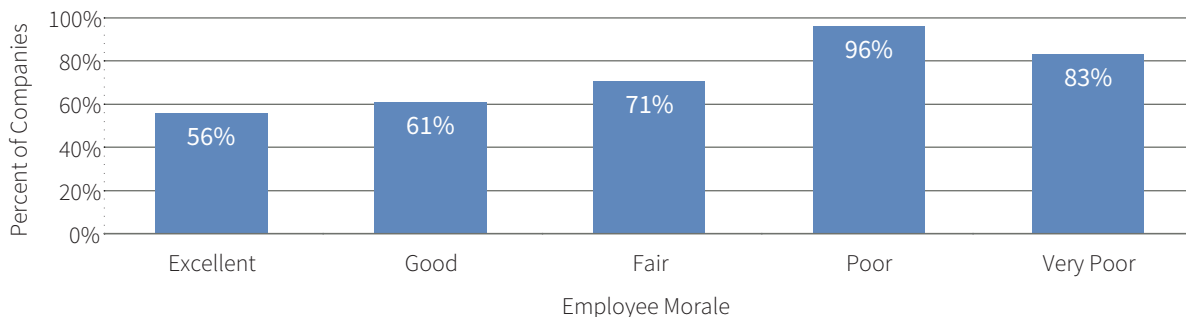
Absenteeism is related to a number of factors, including work schedule and hours worked as well as employee fatigue, stress and morale. The CCH survey noted that morale has a significant impact on absenteeism, with companies reporting good/very good morale experiencing a 2.2% absenteeism rate, compared to a 2.9% rate in companies with poor/fair morale. Unfortunately, when employees take

unscheduled time off work, other employees must work overtime to cover their absence, creating a self-perpetuating problem.

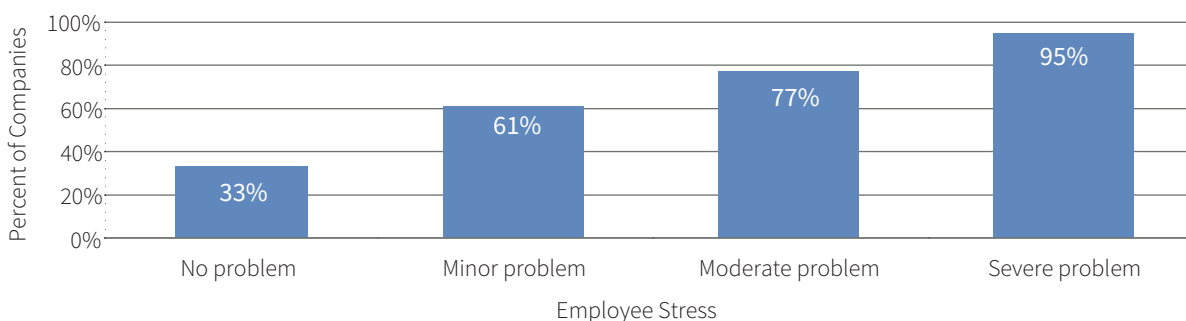
**Employee morale, stress and fatigue.** The 2017 Shiftwork Practices data confirms the relationship between employee morale and absenteeism. A high absenteeism rate (>5%) was reported by 56% of companies with “Excellent morale,” compared to 96% of companies with “Poor morale” and 83% of companies with “Very poor morale” (Figure 28).

Similarly, stress has a clear impact on absenteeism rates. A high absenteeism rate (>5%) was reported by 33% of companies that reported that stress was “No problem,” but by 95% of companies where stress was a “Severe problem” (Figure 29).

**FIGURE 28.** Absenteeism rate >5% and employee morale.

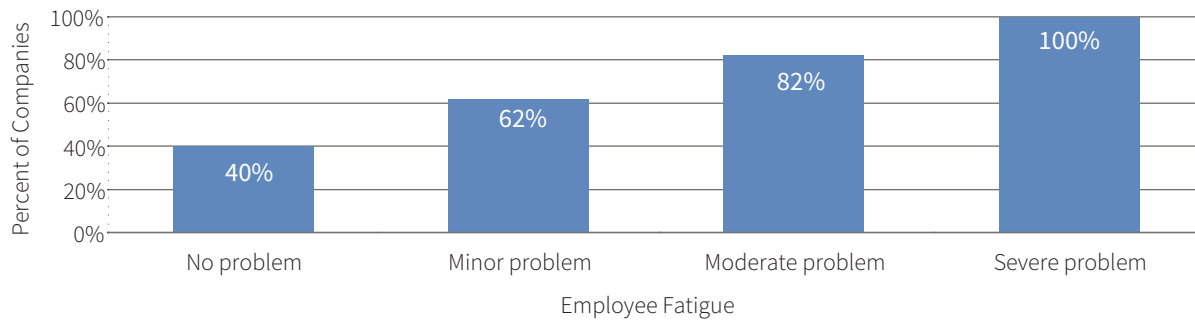


**FIGURE 29.** Stress and absenteeism rate >5%.





**FIGURE 30.** Fatigue and absenteeism rate >5%.



Excessive fatigue levels are also related to higher levels of absenteeism. A high absenteeism rate (>5%) was reported by 40% of companies that reported that fatigue was “No problem,” but by 100% of companies where fatigue was a “Severe problem” (Figure 30).

**Staffing levels.** As discussed in the Scheduling and Staffing section, companies inadequately staffed had higher levels of absenteeism.

### COST OF ABSENTEEISM

Absenteeism has a clear impact on a company’s bottom line. The 2006 CCH survey estimated that absenteeism cost was \$850,000 for some large employers, only in direct payroll costs. The total cost is likely to be much higher, considering the indirect costs associated with low morale and productivity, and temporary labor. The Centers for Disease Control and Prevention (CDC)<sup>4</sup> have reported that productivity losses linked to absenteeism cost employers \$225.8 billion annually in the United States, or \$1,685 per employee.

The costs of absenteeism to shiftwork operations are even higher than in daytime operations, due to higher absenteeism rate among shiftworkers and the

fact that shiftworkers usually earn higher wages than daytime workers.

### ABSENTEEISM PREVENTION

Employers concerns are reflected in the increased number of companies using different programs to reduce absenteeism. According to the 2006 CHH survey, most employers use absence control programs. Among them, disciplinary action is the most used (97%). Other programs include yearly review, verification of illness and paid leave banks.

Paid leave banks (or Paid time off) has become an increasingly popular program among employers during the past few years. It has also become the program that is viewed as the most effective. It should be noted that programs such as Paid leave banks provide employees more control over how they use their time. This is a key factor, since many absences are not due to sickness, but rather to family issues and personal needs.

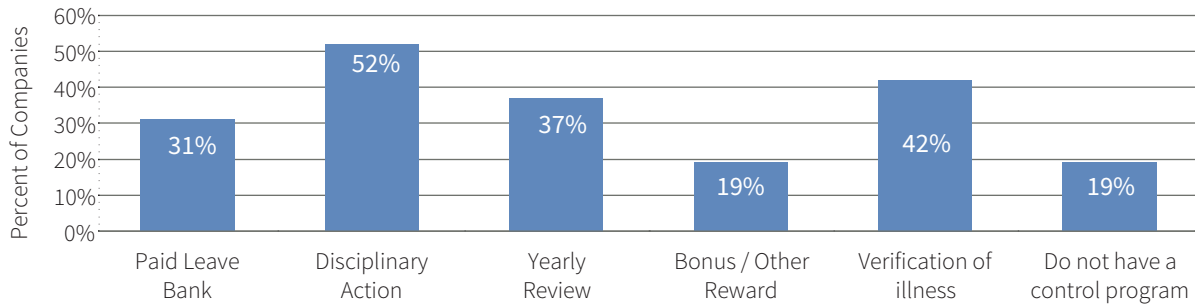
Eighty-one percent of shiftwork companies had at least one program to control absenteeism. The programs most used were disciplinary action and illness verification (Figure 31 on the following page).

The 2006 CHH Survey also noted that companies are offering an increased number of work-life

<sup>4</sup> *Business Pulse: Healthy Workforce*, CDC 2015



**FIGURE 31.** Programs to control absenteeism.



programs for their employees. The five most used programs are: Employee Assistance Plans, Wellness Programs, Leave for School Functions, Flu Shot Programs and Alternative Work Arrangements. However, the programs rated as most effective in reducing absenteeism were Alternative Work Arrangements, Leave for School Functions, Compressed Work Week, Telecommuting and Emergency Child Care.

In conclusion, to help control absenteeism rates employers are offering more flexibility to their employees, and accommodating their family responsibilities (child care and elder care), as well as helping employees maintain their well-being. It is important that companies analyze the specific needs of their workforce and implement those programs that would be most effective for them.



## 5. TURNOVER

- MAIN POINTS** →
- In 2015-16 the turnover rate in U.S. industries ranged between 3.4% and 3.6%. The 2017 Shiftwork Practices Survey found that 47% of companies had turnover rates greater than 4%.
  - Excessive fatigue and stress, poor employee morale and inadequate staffing levels were associated with higher turnover.
  - Most companies had programs to control turnover.

Just as with absenteeism, the stresses of shift-work increase the likelihood of turnover. It is unlikely that turnover in 24/7 operations could be reduced to the levels of daytime operations, but implementing a range of countermeasures, such as lifestyle training, scheduling, appropriate work policies and practices, can help shiftwork operations reduce their turnover rates.

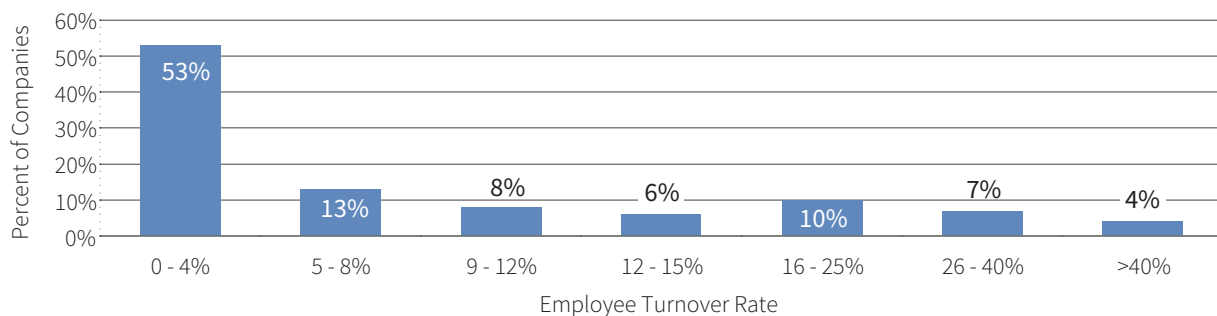
The Bureau of Labor Statistics (BLS) reported that in 2015-16 the turnover rate in U.S. industries ranged between 3.4% and 3.6%.<sup>1</sup> The 2017 Shiftwork Practices Survey found that 48% of 24/7 companies had turnover rates greater than 4% (Figure 32).

<sup>1</sup> BLS. Job openings and labor turnover. August 2016.

### CAUSES OF TURNOVER

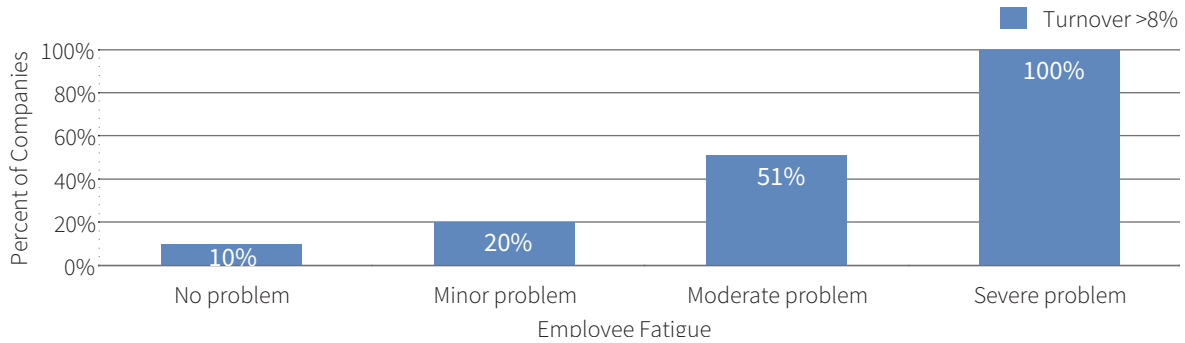
**Fatigue, stress and employee morale.** As it was the case with absenteeism, turnover rates are substantially higher with increased fatigue and stress and lower employee morale (Figures 33-35 on the following page).

**FIGURE 32.** Turnover rates.

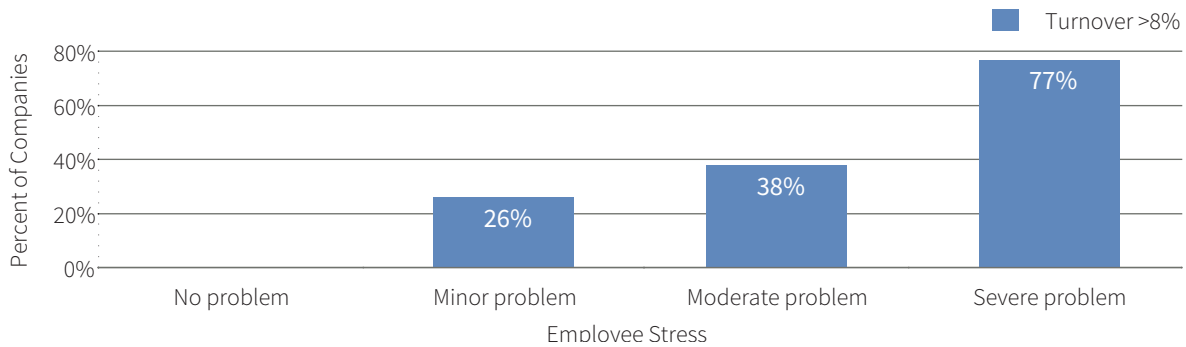




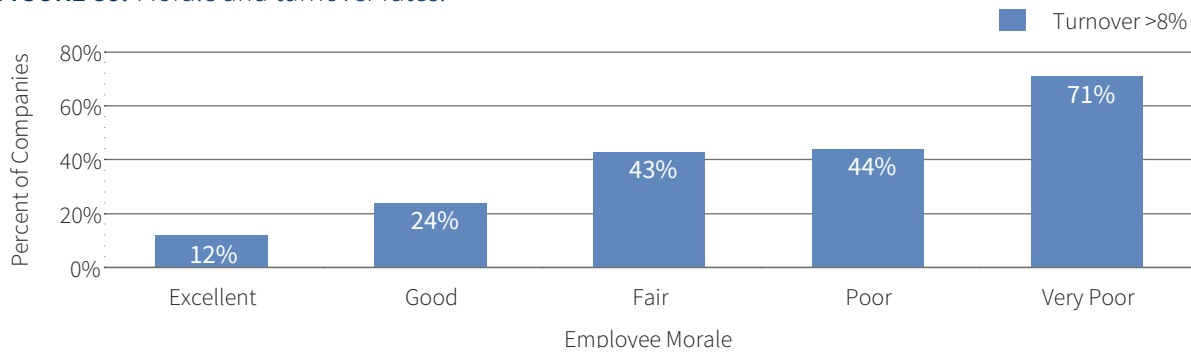
**FIGURE 33.** Fatigue levels and turnover rates.



**FIGURE 34.** Stress levels and turnover rates.



**FIGURE 35.** Morale and turnover rates.





**Staffing levels.** Staffing levels also have an impact on turnover rates, with higher turnover in companies with inadequate staffing levels (Figure 36).

### COSTS OF TURNOVER

Sixty-six percent of shiftwork companies reported that they sometimes/always had difficulties recruiting and hiring employees. Losing valued, well-trained, and productive shiftworkers is obviously costly for a wide variety of reasons, including the following:<sup>2</sup>

#### Separation Costs

- Separation pay
- Cost of exit interviewer's time
- Cost of terminating employee's time
- Cost of administrative functions related to termination
- Increase in unemployment tax

**Vacancy Costs** (affected by the length of time a position is open)

<sup>2</sup> Adapted from *How Much Does Your Employee Turnover Cost?* William H. Pinkovitz, et al. University of Wisconsin-Extension.

- Cost of additional overtime
- Cost of additional temporary help
- Subtract wages and benefits saved due to vacancy

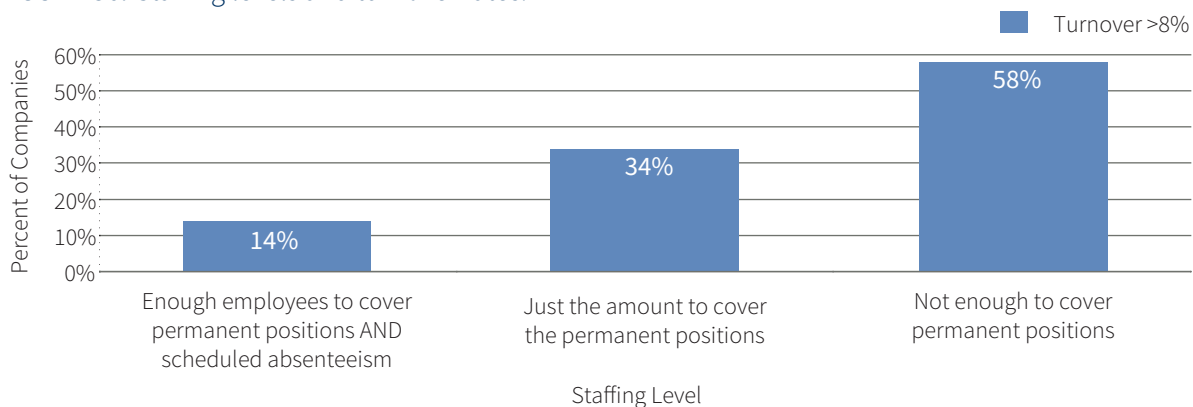
#### Replacement Costs

- Pre-employment administrative expenses
- Cost of attracting applicants
- Cost of entrance interviews
- Testing costs
- Staff costs
- Travel and moving expenses
- Post-employment information gathering and dissemination costs (payroll, benefits, policies and procedures, and employee records)
- Cost of post-employment medical exams

#### Training Costs

- Cost of informational literature (manuals, brochures, policies)
- Formal training costs
- Informal training costs (on-the-job training, mentoring, socializing)

**FIGURE 36.** Staffing levels and turnover rates.





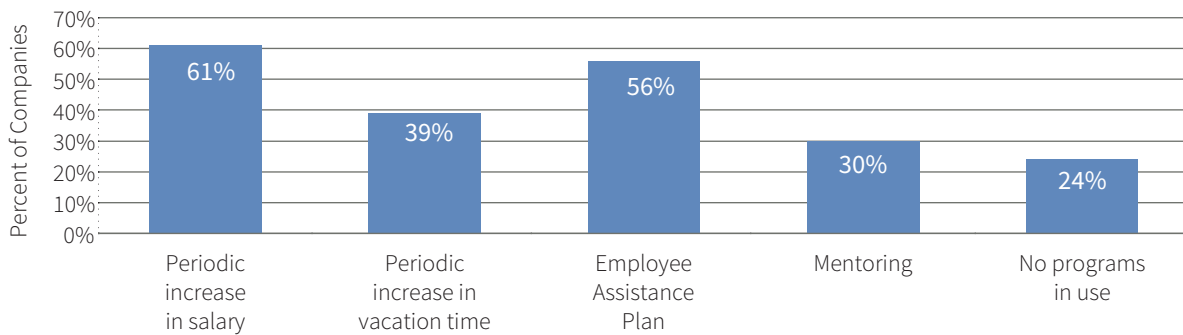
### Performance Differential

- Differential in performance costs during vacancy and training (lowered facility productivity and lowered productivity of new hire during initial months in the position)

### TURNOVER PREVENTION

Most companies had programs to reduce turnover rates. The most common programs were periodic salary increases and Employee Assistance Programs (EAP) (Figure 37).

**FIGURE 37.** Turnover prevention programs.







## 6. PAYROLL AND BENEFITS

- MAIN POINTS** →
- *The average hourly earnings in 24/7 operations were \$29.27 (median \$29.75), compared to a median of \$20.23 for full time and salary workers across all U.S. employees.*
  - *Shift differentials were more common for night and evening shifts than for Sunday and Saturday work.*
  - *Most companies offered benefits. The most frequent benefit was health insurance.*

The retention challenges of shiftwork, combined with a highly skilled workforce, result in higher-than-average hourly wages and benefits.

### 6.1 EARNINGS AND SHIFT DIFFERENTIALS

#### HOURLY WAGES

Overall, even without taking into account shift differentials, shiftwork pays better than the U.S. average hourly wage. In 2015, the average reported hourly earnings in 24/7 operations were \$29.27 (median \$29.75), compared to a median of \$20.23 for all full time and salary workers in U.S. industries<sup>1</sup> (calculated as \$809 weekly earnings/40 hours).

The higher salaries in shiftwork operations are related to the need to compensate employees for the challenges associated with a shiftwork lifestyle. 24/7 operations also have higher unionization rates compared to day-only operations. Companies with unions (which tend to also have more highly skilled, senior employees) have higher average salaries. The BLS data<sup>2</sup> show that in 2015, the median

weekly earnings for full time and salary workers was \$980 for union members and \$975 for workers represented by an union, compared to \$776 for non-union employees.

#### SHIFT DIFFERENTIALS

Shift differentials (pay incentives for people working night, evening or weekend shifts) are used to attract employees to positions that would otherwise be difficult to fill. While the majority of companies paid night differential, less than 30% paid weekend differentials. Due to the low number of shiftwork operations that reported paying evening and weekend differentials, the amount of the differential is not reported. Table 2 on the following page summarizes the percentage of companies paying a differential. For the night shift, the average amount was \$1.81, which represented 6% of the hourly rate.

<sup>1</sup> Bureau of Labor Statistics, Household data. Median weekly earnings of full time and salary workers by detailed occupation and sex. 2015.

<sup>2</sup> Bureau of Labor Statistics, Household data. Median weekly earnings of

full time and salary workers by detailed occupation and sex. 2015.


**TABLE 3.** Percentage of companies paying a shift differential and amount of differential

	Night	Evening	Saturday	Sunday
Percentage paying differential	75%	50%	21%	21%
Amount of differential (\$)	1.81	1.16	1.41	1.42
Amount of differential (% of hourly rate)	6%	3%	4%	7%

## 6.2 BENEFITS AND HEALTH CARE

The majority of companies offered benefits. Almost all companies offered health insurance, while less than half offered dependent subsidies and flex time (Figure 38).

In addition, most companies offered wellness programs. The most common program, offered by 72% of companies, was Employee Assistance Programs (EAPs). Health Risk Assessments, health promotion programs and periodical medical exams were offered by almost half of companies (Figure 39).

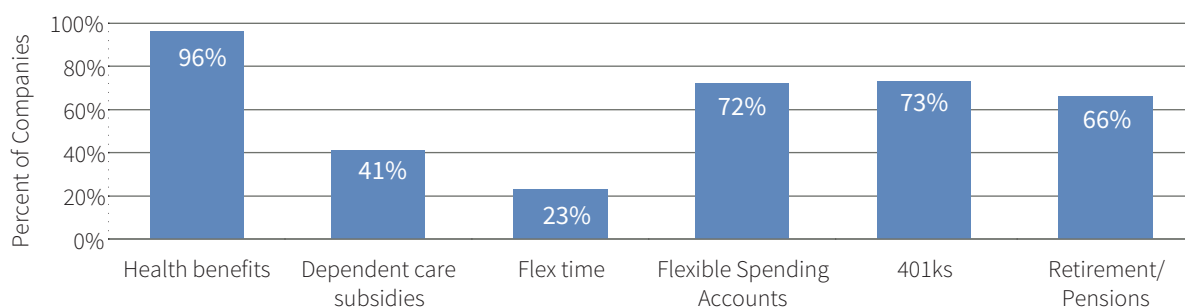
Additional benefits include policies regarding sick days and paid breaks. Eighty-six percent of shift work companies offered them. Eighty-two percent

of companies paid employees while on their main break during a shift.

### EMPLOYER-SPONSORED HEALTH INSURANCE

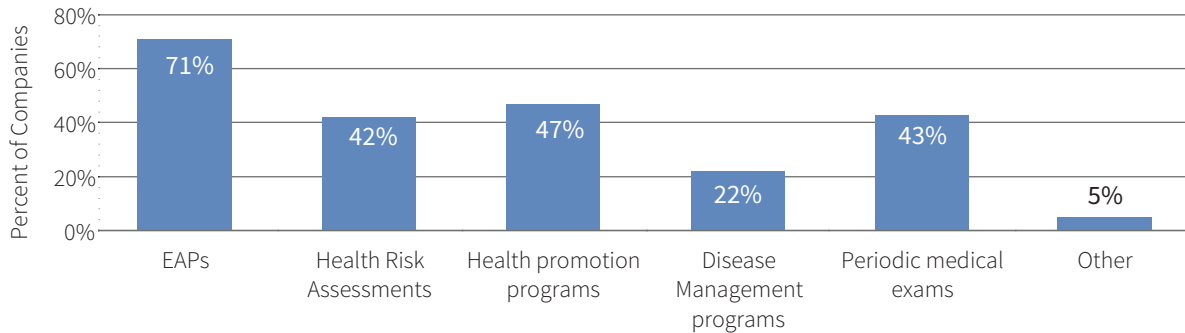
Employer-sponsored health insurance provides coverage for over 155 million non-elderly Americans. The high health care cost has resulted in employers reducing benefits, or outright eliminating health insurance. From the year 2000, when 68% of companies offered health insurance, the percentage of companies offering health insurance has decreased steadily. In 2016, the percentage of employees receiving coverage from their employer was 56%,<sup>3</sup>

<sup>3</sup> Kaiser Family Foundation and HRET. *Employer Health Benefits 2016*. <http://kff.org/private-insurance/report/2016-employer-health-benefits/>

**FIGURE 38.** Benefits offered.




**FIGURE 39.** Wellness programs offered.



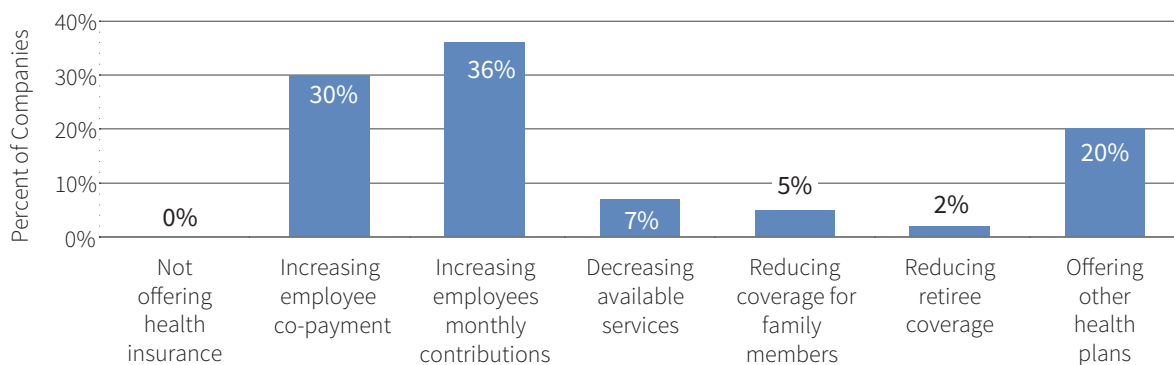
similar to the percentages in recent years. Small companies are less likely to offer health insurance than larger companies. While only 46% of employers with three to nine employees offer health insurance, virtually all employers with 1,000 or more employees offer coverage. The proportion of low-wage and part-time workers, and whether the company has union workers also determine the likelihood of the company offering health insurance to its employees.<sup>4</sup>

Overall, 24/7 operations are more likely to offer health insurance coverage to their employees. Ninety-two percent of companies offered health insurance to more than 75% of their employees.

Regarding the type of health plan offered, PPOs and HMOs continue to be the most common plans. However, this year Shiftwork Practice found an increase in the number of facilities offering high-deductible plans. PPOs were offered by 49% of facilities, HMOs by 23% and high-deductible plans by 15%. The data is in agreement with data from the 2016 Kaiser report, that found that PPOs enrolled

<sup>4</sup> Kaiser Family Foundation and HRET. *Employer Health Benefits 2016*. <http://kff.org/private-insurance/report/2016-employer-health-benefits/>

**FIGURE 40.** Measures to cope with increasing health care costs.





48% of employees covered, and HMOs 15% of employees covered.

The 2016 Kaiser report found that average premiums and worker contributions for family coverage have substantially increased over the last decade. Since 2006, annual premiums increased 58%, and worker's average contribution for family coverage increased 78%. The 2017 Shiftwork Practice report found that to cope with the increasing costs of health care, companies were considering a variety of measures. The most common measures were increasing employee monthly contribution and employee co-payment (Figure 40).



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