



Adverse effects of shift work at a biscuits manufacturer

This work is submitted in fulfilment of the requirements

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Master of Health Science: Environmental Health
in the Faculty of Health Sciences at
Durban University of Technology

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DECLARATION

I, Philisiwe Kenlly Mhlongo declare that this research report is my own original work. It is being submitted for the degree of Masters of Health Sciences in Environmental Health of the Durban University of Technology.

It has not been submitted before in part or in full for any degree or examination at this or any other University

Signature : _____

Date : _____

ABSTRACT

Shift work is a necessity for many organizations. Reasons for shift work are mainly to ensure continuous and optimized operations. Many studies on shift workers have concluded that it can lead to adverse physiological, social and psychological health effects. This study examines challenges associated with working shifts at a biscuits manufacturing factory. Results should be able to assist the employer in implementing effective interventions directed at limiting the negative effects of shift work on employees.

This is a convergent parallel design multi method study among 152 shift workers in a biscuits manufacturer located in Durban, KwaZulu Natal. An abbreviated and modified form of the validated SSI questionnaire was used (Barton *et al.* 1995). The questionnaire contained a battery of items designed to examine the relationship of health and personal adjustment to shift work. Owing to the exploratory nature of the study, a focus group methodology was also used and this allowed for in-depth qualitative research which catered for a more comprehensive understanding of the current shift work issues. A retrospective review of injury records of employees who sustained occupational injuries between 2012 and 2013 was also conducted.

The sample comprised of 85 (56%) males and 63 (42%) females. Logistic regression was used to estimate the association between shift work and the likelihood of sleep disturbance, poor health outcomes and limited time for social and domestic activities, adjusting for age, sex, partner working, years working night shift, marital status, job class and years employed. Odds ratio (OR) for reported sleep disturbance was slightly higher among women (OR=1.65; 95% CI = 0.25; 10.84; $p < 0.05$) compared to males, but this was not statistically significant.

Longer shift work experience (i.e. 11-20 years) was significantly associated with better health status (OR=0.18; 95%CI = 0.06; 0.46; $p < 0.05$). Shift work experience (11 to 20 years) was also found to be significantly associated with limited time for both social (OR = 0.10; 95%CI = 0.03; 0.30) and domestic activities (OR= 0.25; 95% CI = 0.11; 0.57; $p < 0.05$) (Table 4). Age had no effect on social and domestic activities, but those 40 years and above were more likely to have limited time for social and domestic activities (OR =

3.06; 95%CI =0.60; 15.60 and OR= 2.5; 95%CI=0.47; 13.06). Those with more shift work experience seemed to have more time for social and domestic activities compared to those with less than 10 years experience.

Findings from the FGD's revealed that most participants (91%) did not get sufficient sleep time after night shift; this was mainly because of the chores they had to do after getting home from night shift and disturbances from the household and neighbours. The average time spent sleeping by majority of participants after night shift was 5 hours. Swollen feet, gastric, sleep disorders, indigestion and headaches were some common complaints experienced by shift workers in this study. About 27% of participants reported to have been injured at work before. These incidents were reported to be related to drowsiness and fatigue.

The company's incident records showed a total of 160 injuries between 2012 and 2013, of which 38 occurred during night shift. In 2012, the company recorded 65 injuries which included 51 first aid (FA) injuries, 6 minor injuries (MI) and 8 lost time (LT) injuries, as categorized by the company. 2013 had the highest number of incidents, with 95 total injuries, averaging to 7.9 injuries annually. There were 84 first aid incidents recorded for year 2013, 9 minor injuries and only 2 lost time injuries. Twenty three percent (15, n=65) incidents occurred during night shift in year 2012, of which 11% (7, n=65) were females. The number of night shift incidents slightly increased to 24% (23, n=95) in 2013 and females accounted for 9.40%. The records showed that majority of injuries happened between 17h00 and 21h00 at night.

Results of this study provides evidence that shift work impacts negatively on the lives of the employees and can lead to adverse health outcomes such as poor dietary intake, headaches and swollen feet to mention but a few.

Key words: Shift work, continuous, physiological, psychological, convergent

DEDICATION

This dissertation is dedicated to all shift workers.

*“Shift work, hard work, tired body
In a blue-collar shirt and a baseball cap
union made
He's hot, sweat drops, 'round the clock
Door never locks
And noise never stops
Not all day
Working seven to three
Three to eleven
Eleven to seven”*

Kenny Chesney featuring George Strait

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Last but not least, I would like to thank my family for their patience and understanding throughout the period of this study.....it has been a long, long journey!!!

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DEFINITIONS

- Circadian rhythms - also referred to as the “body clock”, the circadian rhythm is a cycle that tells our bodies when to sleep, rise and eat. This clock regulates many physiological processes.
- Diurnal - of or belonging to or active during the day
- Fatigue - fatigue is generally defined as a feeling of lack of energy and motivation that can be physical, mental or both
- Physiological - consistent with the normal functioning of an organism
- Psychological - pertaining to the mind or to mental phenomena as the matter of psychology
- Shift work - shift work is defined as “a method of organization of working time in which workers succeed one another at the workplace so that the establishment can operate longer than the hours of work of individual workers” (International Labour Organization, 1990a)

LIST OF ABBREVIATIONS

FGD	- Focus Group Discussions
SA	- South Africa
BCEA	- Basic Conditions of Employment Act
OHS Act	- Occupational Health and Safety Act
ILO	- International Labour Organization
CVD	- Cardio Vascular Disorder
SWD	- Shift Work Disorder
ES	- Excessive Sleepiness
OR	- Odds Ratio

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CHAPTER 1

INTRODUCTON

1.1 Introduction to the study

Shift work is associated with a range of problems, e.g. physical and psychological health, disruption of social and domestic life and an increase in occupational injuries. It is estimated that at least 15-20% of the working population in developed countries is engaged in shift work (Hossain and Shapiro 1999). Shift work is a reality for an estimated 15-26% of Americans, according to the Bureau of Labor Statistics (2004). The General Survey conducted in 2005 by Statistics Canada found that approximately 28% of those who are actively employed work shifts. More than one in five employees are affected by shift work in Europe (Le Bihan and Martin 2004). There are limited shift work studies in the South African context. Adler (1991) reported that approximately 21% of the South African workforce worked shifts. It was estimated that at least 30% of employees in the mining, health, petrochemical and manufacturing industries worked shifts (Visser 1999). A few shiftwork studies were previously conducted in South Africa:

- A descriptive statistical report commissioned by the tyre and rubber industry (Adler 1991).
- The wellbeing sequelae of shiftworkers (Goldman 1992).
- Shiftwork and its effects on family structure (Brophy 1993).
- Hardiness and tenure in shiftwork as predictive variables for coping with shiftwork (Potgieter 1996).

Shift work was introduced by industries in order to secure continuous operations and optimisation of equipment. Whilst work outside daytime hours is unavoidable in many industries such as essential services, schedules which include shift work and extended hours are unsuitable for some workers. Studies show that an estimated 20% of workers cannot tolerate shift work (LaDou 1982). High levels of unemployment in South Africa (SA) have led people to seek out types of employment which may not be desirable for

their well-being (Statistics South Africa 2012). It is therefore important to evaluate the adverse effects of working shifts.

Daily physiologic variations, termed circadian rhythms, are interactive and require a high degree of phase relationship to produce subjective feelings of well-being (LaDou 1982). Disturbances in circadian rhythms may cause various physiological and psychological problems amongst shift workers, especially where night shift is involved (Shu-Fen *et al.* 2011). The present study was aimed at evaluating adverse effects of shift work. The association between exposure to shift work and the prevalence of reported work-related injuries and illnesses were also analysed.

1.2 Operational definition of shift work

Shift work is defined as “a method of organization of working time in which workers succeed one another at the workplace so that the establishment can operate longer than the hours of work of individual workers” (International Labour Organisation 1990). In South Africa, the Basic Conditions of Employment Act, No.75 of 1997 regulates working times and defines shift/night workers as those employees who are required to work before 06:00 or after 23:00 at least five times per month, or 50 times per annum. For the purpose of this research, the latter definition is accepted.

1.3 Statement of the problem

There is little evidence of detailed research on the prevalence of shift work and extended working hours in South Africa (SA). This study will assist in identifying the effects of shift work and some of the interventions that can be implemented to improve the quality of the work life of employees. Legislation such as the Basic Conditions of Employment Act and Occupational Health and Safety Act require that the employer provides a workplace that is free from risks and hazards. Fatigued and/or tired employees are potential hazards and may cost the company thousands of rands. Most studies (Korompeli *et al.* 2014; Harma and Keckland 2010; Knutsson 2003) have shown that shift work and working extended hours has a major impact on the risk of injury. All

these studies estimate that work involving nights has about a 30% increased risk of injury than day shifts. Working twelve-hour shifts has also been shown to have 25-30% higher risk of injury compared with eight-hour shifts (Folkard and Tucker 2003). Little is known of the direct impact of shift work (both long- and short-term) on productivity and health of workers in the manufacturing sector.

In view of the above, it was necessary for this research to be conducted to evaluate the impact and effects of shift work on employees. The results of this study may prompt management to take some necessary actions directed at eliminating the adverse effects associated with undesirable shifts.

1.4 Purpose of the study

The main aim of the study is to examine the effects associated with working shifts and to evaluate the impact these have on the overall health of an employee, with the aim of making feasible recommendations.

1.5 Study Objectives

The objectives of the study are:

- To evaluate the adverse health effects associated with shift work.
- To determine the social and domestic impact of working shifts on the lives of employees.
- To determine the shift workers incident profile over a two-year period (2012 and 2013), and risk factors associated with shift work related occupational incidents.
- To make recommendations to mitigate the effects of shift work.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Globally, customers enjoy the benefits of a 24-hour, seven-days-a-week service at the expense of workers exposed to shift work. Fast food outlets and shopping malls are often open until very late at night; some, such as selected McDonald's restaurants, do not close at all. This provides consumers with an opportunity to shop at any time of the day and any day of the week. Transportation workers, petrol attendants, police, firefighters and health care workers are some of those employees who offer their services around the clock. Shift work is defined as "a method of organization of working time in which workers succeed one another at the workplace so that the establishment can operate longer than the hours of work of individual workers" (International Labour Organization 1990). The various types of shift work include permanent night shift, rotating shift work and unscheduled work hours. The factors that may interfere with a shift worker's sleep could be daylight, for example, as night is usually quieter compared with day, and household and family responsibilities.

Shift work is associated with a range of problems, which include physical and psychological health, disruption of social and domestic life and an increase in occupational injuries. It is estimated that at least 15-20% of the working population in developed countries is engaged in shift work (Hossain and Shapiro 1999). Shift work was introduced by industries in order to secure continuous operations and the optimisation of productivity, profit and equipment. Whilst work outside daytime hours is unavoidable in many industries such as essential services, schedules which include shift work and extended hours are unsuitable for some workers. Studies show that most workers cannot tolerate shift work and long hours (Caruso 2014). High levels of unemployment in South Africa (SA), lead people to seek out types of employment which may not be desirable to their well-being (Statistics South Africa 2012). It is therefore important to evaluate the adverse effects of working shifts and to develop mitigating strategies.

Disturbances in circadian rhythms may cause various physiological and psychological problems amongst shift workers, especially where night shift is involved (Shu-Fen *et al.* 2011). The present study seeks to evaluate any adverse effects of shift work. The association between exposure to shift work and the prevalence rate of reported work related injuries and illnesses will also be analysed. American country music singer Kenny Chesney describes challenges faced by shift workers in his song titled “Shiftwork” from the album titled Just Who I AM, Poets and Pirates (Appendix 1), which provides a description of the challenges of shift work.

2.2 Definition of Shift work

2.2.1 Definition

The International Labour Office (International Labour Organization 1990) defines working shifts as “a method of organization of working time in which workers succeed one another at the workplace so that the establishment can operate longer than the hours of work of individual workers.” Whilst the European Council Directive 93/104 (1993) defines it as that “concerning certain aspects of the organization of working time, shift work shall mean any method of organizing work stations according to a certain pattern. Shift worker shall mean any worker whose work schedule is part of shift work.”

According to Dembe *et al.* (2006) shift work is any work activity scheduled outside what is accepted as standard daytime hours, where there may be a handover of duty from one individual to another or a pattern of work where one employee replaces another on the same job within a 24-hour period. The term ‘shift work’ includes both long-term night shift and work schedules in which employees change or rotate shifts. Moreover, the definition of ‘period of night work’ differs from country to country. For example, in some countries it ranges from 20:00, 21:00 or 22:00 to 05:00, 06:00 or 07:00, and in other countries from 21:00 or 00:00 to 05:00 or 06:00. Table 1 below shows definitions of night work and night workers in some European countries. The term shift work is synonymous with variable, flexible, odd, irregular and non-standard working hours. In South Africa the Basic Condition of Employment Act, No.75 of 1997 regulates working

times, and defines shift/night workers as those employees who are required to work before 06:00 or after 23:00 at least five times per month or 50 times per annum.

Table 2.1 Definitions of night work and night workers in different European countries (International Agency for Research on Cancer 2010).

Country	Night Time/Night Work	Night Worker
AUSTRIA	Night work: period between 22:00 and 05:00	The worker who works at least 3 hours between 22:00 and 05:00 on at least 48 hours nights per year
BELGIUM	Night Work: a period generally of 8 hours between 20:00 and 06:00	Loi du 17/02/1997 et Loi du 04/12/2998: Act of 17 February 1997
FINLAND	Work carried out between 23:00 and 06:00	Night shift refers to a work shift with at least 3 hours of duty between 23:00 nad 06:00
FRANCE	Night time: A period between 22:00 and 05:00 Night work: whichever work period between midnight and 05:00	Any employee working usually at least 2 times per week for at least 3 hours over the period defined as night work
GERMANY	Night time: the time between 23:00 and 06:00 (in case of bakers between 22:00 and 05:00). Night work: all work which occupies more than 2 hours of night time	“Night workers” means workers who usually work nights on rotating shift schedules, or work at night for not less than 48 days in a calendar year
IRELAND	Night time: period between midnight and 07:00	a) An employee who normally works at least 3 hours of his/her daily working time during the night b) An employee whose

		working hours during night time, in each year equals or exceeds 50% of the total number of hours worked during the year.
GREECE	Night time: a period of 8 hours which includes the period between 22:00 and 06:00	A worker who during night time works at least 3 hours of his/her daily working time or a worker who has to perform night work for at least 726 hours of his/her annual working time.
UNITED KINGDOM	Night time: a period lasting not less than 7 hours, and which includes the period between midnight and 05:00	A worker who, as a normal course works at least 3 hours of his/her daily working time during night time, or who is likely during night time, to work at least such proportion of his annual working time as may be specified for the purposes of these Regulations in a collective agreement.

2.2.2 Types of shift work

Shift work may be organised in a variety of ways. Different countries have different classifications of 'shift work schedules'. Researchers have found it useful to discuss shift schedules according to certain features used in the design of the shift schedules. The four main features used to classify shift schedules are: 1) whether or not night hours are involved; 2) whether a person's scheduled work hours are changed or rotated (e.g. daily, weekly or monthly); 3) whether or not the work covers a full day (24 hours); and 4) whether or not the schedule includes weekends (Kogi 1998).

According to Costa (2003), the shift system can also differ in relation to organisational factors such as:

- a) Duration of shift - generally, the length of a shift is eight hours, but can range from six to twelve hours.
- b) Length of shift cycle - a cycle includes all shifts and rest days lasting as long as the series of shifts restart from the same point, there can be short (six to nine days), intermediate (twenty to thirty days), or long (up to six months or more) cycles.
- c) Number of workers/crews who alternate during the working day.
- d) Start and finish time of the duty periods.
- e) Speed of shift rotation - this depends on the number of consecutive days worked before changing shift. It can be fast (that is every 1, 2 or 3 days), intermediate (i.e. every week), or slow (that is every 15, 20 or 30 days).
- f) Direction of shift rotation - it can be clockwise (i.e. morning/afternoon/night) or counter-clockwise (that is, afternoon/morning/night). Clockwise rotation can also be referred to as 'phase delay' or 'forward rotation', and counter-clockwise rotation as 'phase advance' or 'backward rotation'.
- g) Regularity/irregularity of the shift schedules.
- h) Number and position of rest days between shifts.

2.2.3 Shift work statistics

Reliable data on the number of workers employed in shift work is not easy to collect due to the lack of reliable and updated statistics in many countries, and/or differences in methods of data collection (Kogi 1998). As indicated by data from the National Health Interview Survey Occupational Health Survey (2010), 29% of all workers in the United States of America worked alternative shifts (not a regular day shift) in 2010. One in five employees in the United States of America works non-standard times – during the evening, night shift or rotating shifts. One in three employees works during the weekend (Gornick, Presser and Batzdorf 2009). Shift work was more common for workers aged 18-29 compared with other ages. Those with a Bachelor's degree or higher had a decreased tendency to work shifts compared with workers who were less educated.

Williams (2008), using data from Statistics Canada's General Social Survey, found that 25.5% of full-time workers aged 19-64 years worked shifts in Canada in 2005. About 45% of health care workers and 66% of those working in protective services (e.g. police, security guards etc.) were shift workers, with 42% from the agricultural industry. The most common forms of shift work were rotating schedules (36.3% of shift work in 2005) and irregular shifts (31.4%). Percentages for regular evening and night shifts were 11.5 and 8.1 respectively (Williams 2008). In Canada about 23% of 8.5 million full-time workers were involved in shift work in (Pati, Chandrawanski and Reinberg 2001).

2.3 Trends/Perspective

2.3.1 Global Perspective

Reliable data on the accurate numbers of shift workers is not easy to collect; one of the reasons being lack of robust statistics in many countries and/or differences in data collection methods. Shift work is prevalent among both full and part-time workers in countries worldwide. Shift work has been reported in more than 15% of European countries, North and South American countries and in Australia (Costa *et al.* 2004; European Working Conditions Observatory 2009). It is common amongst many professions. Figure 1 shows the different types of professions involved in shift work. Research shows that approximately half of protective services (police, security and fire fighters) and food service employees work outside conventional hours and nearly one-quarter of the transportation industry (train and bus drivers, truck drivers, pilots etc.) and healthcare (nurses, doctors, support staff) employees work shifts (McMenamin 2007).

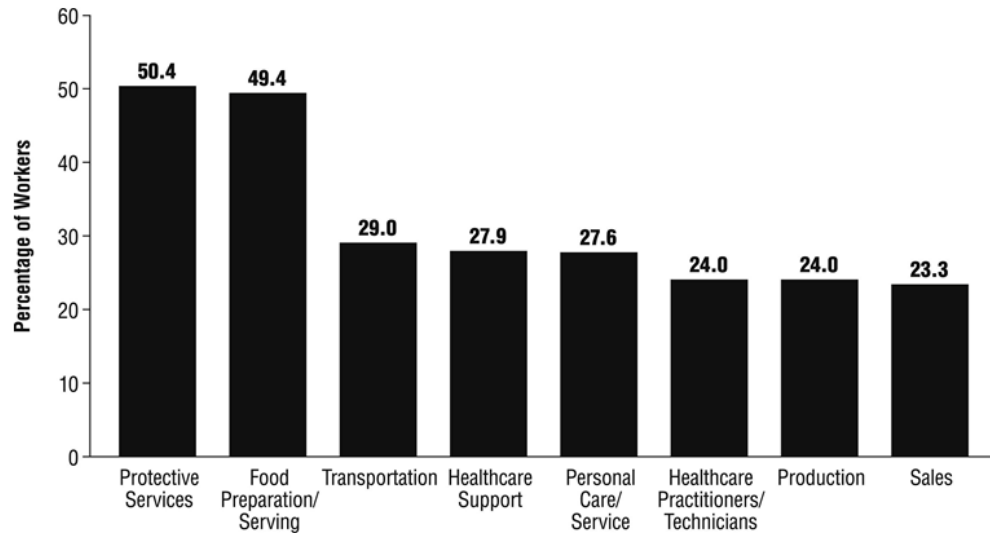


Figure 2.1 Occupations with a large proportion of shift workers (McMenamin 2007).

2.3.2 South African perspective

It is difficult to describe the shift work scenario in SA. The Department of Labour (DOL) conducted two surveys on shift work, one at the end of 1981 and the other at the end of 1983. The survey covered a total workforce of 701,799 in 8,706 companies in the manufacturing sector throughout South Africa. A total number of 31 104046 hours were worked in the factories covered by the survey. Of these, 22% were worked on shifts. Of these hours worked on shift, 57% were worked by employees on a two-shift system, while 43% were those working a three-shift system. Overall, 23% of the establishments surveyed were worked on shifts (Statistics South Africa 2012).

2.4 Effects of shift work

2.4.1 Physiological

Different shift work systems have potentially different impacts on the health of the workers, disturbing the circadian rhythm in different ways. In addition to shift work schedules, there are other factors that can affect tolerance to shift work such as

individual characteristics, working conditions, the family situation and social conditions as denoted in Figure 2 (Costa 2003).

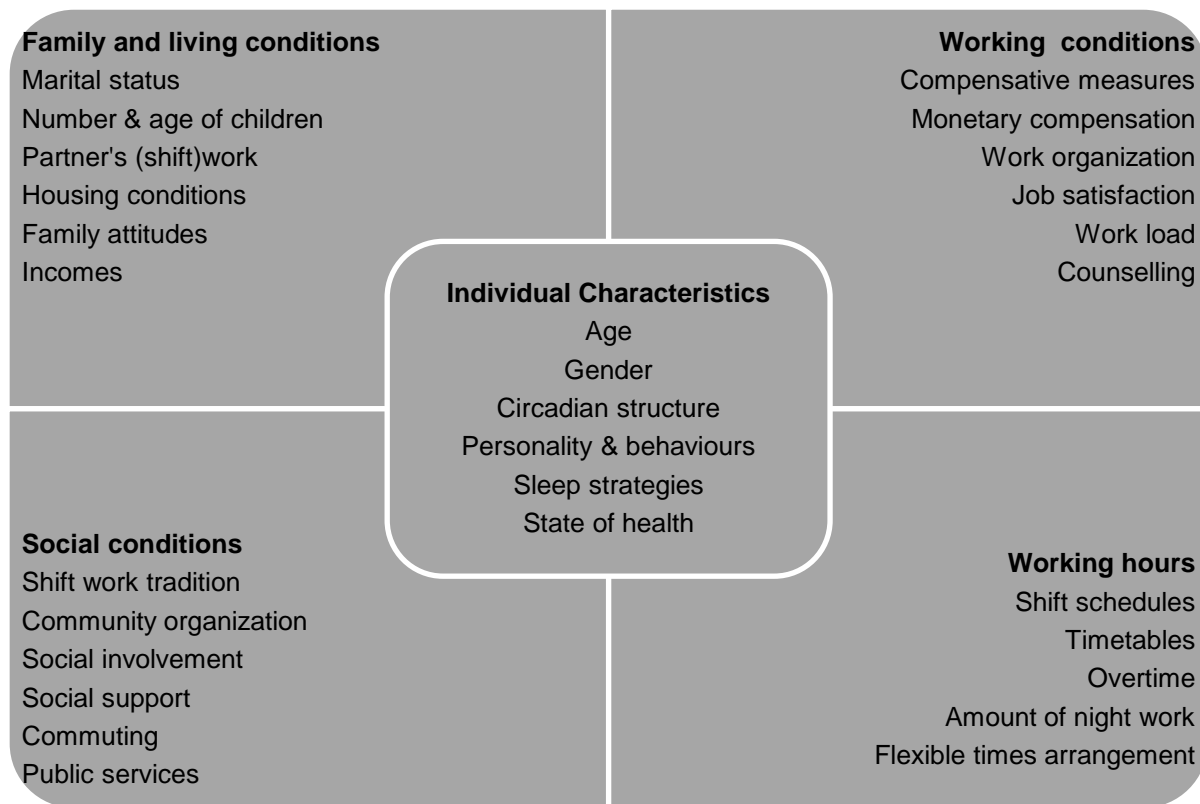


Figure 2.2 Factors that may affect tolerance to shift work and night shift (Costa 2003).

Some of the health effects of shift work that was researched include a reduction in the quality and quantity of sleep; complaints about fatigue; anxiety; depression; heart related problems; gastrointestinal disorders; increased risk of spontaneous abortion; low birth weight and prematurity (Wong 2001). Circadian disturbances affecting the intake, digestion, and absorption of food are thought to play a major aetiological role, although sleep loss, fatigue and the social stress of shift work may also be implicated (Costa 1996). Shift work has also been found to aggravate coronary heart disease. Kiviamki, Ferrie and Hagberg (2001) stated that habits such as the use of alcohol and cigarettes, reduced physical activity, and increased weight gain were common amongst shift workers. When these factors are combined with sleep deprivation and stress the immune system is weakened, causing increased susceptibility to many illnesses and diseases. Shift work has also been hypothesised to contribute to the development of

cardio vascular diseases (CVD) and other metabolic disorders though a number of pathways including circadian rhythm disruption, lifestyle changes, job strain and stress and social insufficiency (Frost, Kolstand and Bonde 2009; Green, Takahashi and Bass 2008; Knutsson 1998). About 20% of all workers have to stop shiftwork altogether after a very brief period because of serious health problems. Ten percent do not complain about shiftwork during their whole working life, while the remaining 70% withstand shiftwork with different intensity in terms of discomfort, troubles or diseases (Waterhouse, Folkard and Minors 1992). Figure 3.1 below summarises possible mechanisms of disease amongst shift workers.

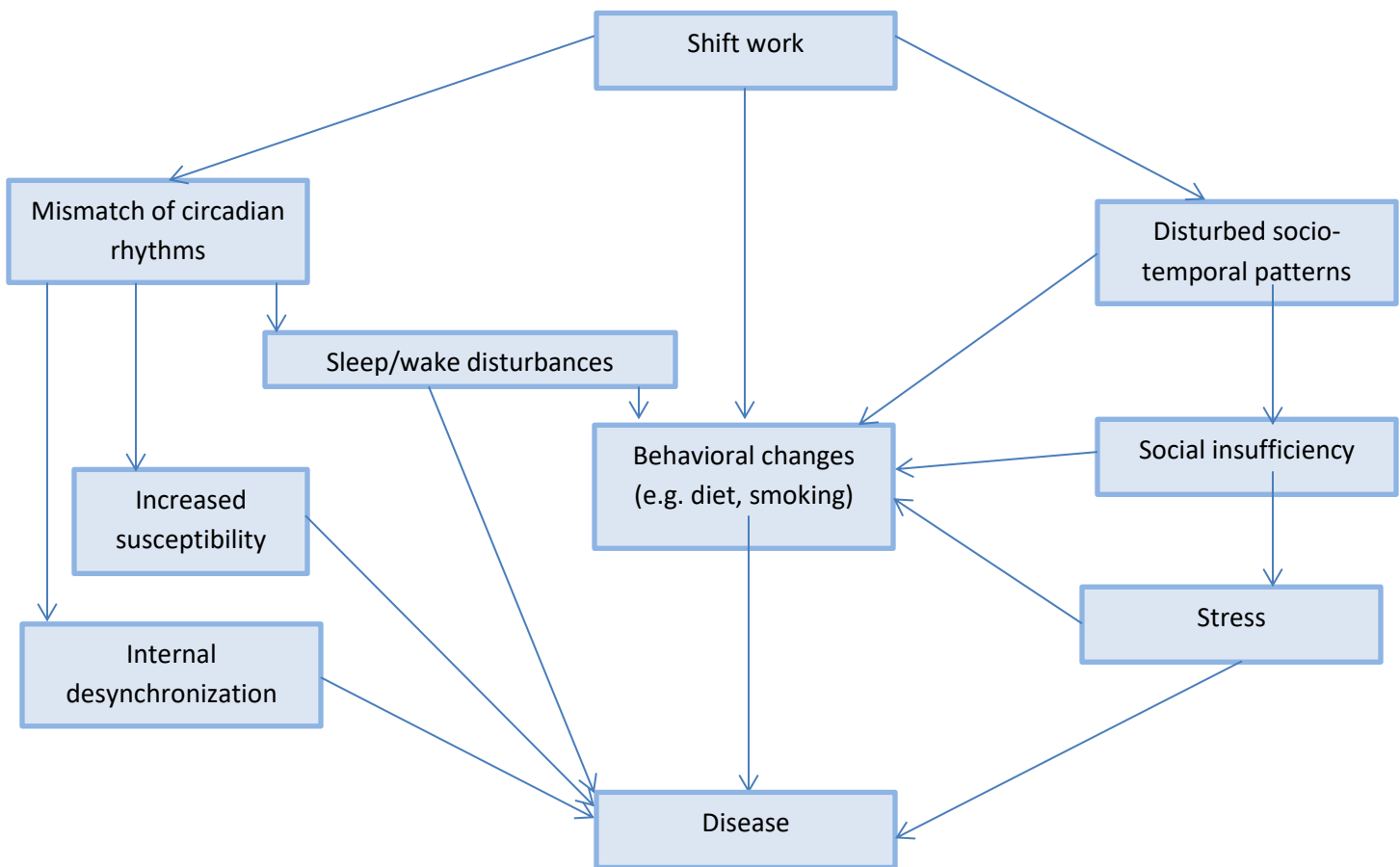


Figure 3.1 Disease mechanisms in shift workers (Knutsson 1989)

2.4.1.1 Circadian rhythm

The human body functions according to a natural sleep-wake/day-night 24-hour cycle referred to as a circadian rhythm (Akerstedt *et al.* 2002a). This rhythm helps to maintain most internal functions ranging from body temperature and hormone levels to blood pressure and sleep/wake patterns. It is guided by environmental cues such as darkness and light and day and night. Shift work, particularly night shift, disrupts the circadian rhythm. This disruption has been linked with many health-related problems and social impacts on workers (Akerstedt *et al.* 2002a).

University of California San Francisco neurologist Louis Ptacek, who studies circadian rhythms, genes and sleep behaviours, has been quoted as stating that: "It's not surprising; we have evolved on a planet that is rotating every 24 hours. Our internal clock is more than just when we sleep and wake. It's related to cell division and it regulates our immune systems. When we battle our internal clock that has complications" (Ptacek, Jones and Fu 2007).

2.4.1.2 Shift work disorder

Shift work disorder (SWD) is experienced by individuals whose work schedule overlaps with the normal sleep period, causing misalignment between the body's endogenous circadian clock and the time at which the worker is able to rest (Schwartz 2010). The International Classification of Sleep Disorders (ICSD-2) defines SWD as the presence of excessive sleepiness (ES) and/or insomnia for at least one month, in association with a shift work schedule. The classification of results in the shift work population is separated into three groups: 1) those that have no impairment; 2) those that have the impairment but do not meet the ICSD-2 criteria for the diagnosis of SWD; and 3) those that have SWD. Individuals in the last two groups are less likely to be able to meet the demands of shift work, and therefore often return to non-shift work schedules or retire from work (Marquie and Foret 1999). Insomnia and ES (drowsiness and a propensity to sleep) are the defining symptoms of SWD and can result in fatigue, difficulty concentrating, headaches, reduced work performance, irritability, depressed mood and

feeling un-refreshed after sleeping (Schwartz and Roth 2006). The consequences of insomnia and ES may be useful warning signs for SWD.

Night shift workers are reported to be the most susceptible to SWD, with an estimated 32.1% of this group experiencing symptoms that meet the minimum diagnostic criteria for SWD compared with 26.1% of rotating shift workers (Drake, Roehrs and Richardson 2004). In a study conducted by Waage, Moen and Pallesen (2009) it was found that 23.3% of oil rig swing shift workers (two weeks working 12 hour day/ night shifts followed by four weeks off) met the ICSD-2 criteria for SWD. The high prevalence rate of SWD among night shift workers is thought to be due to light exposure during rest periods and dark during the hours when the workers are trying to be most productive (Drake, Roehrs and Richardson 2004). Those working morning shift are more susceptible to SWD than evening shift workers, as delaying sleep appears to be more easily achieved than trying to advance the rest period (Ohayon, Lemoine and Arnaud-Briant 2002).

Older workers between the ages 53-59 years appeared to adapt better to acute sleep deprivation compared with their younger counterparts of ages 19 to 29 years, however older individuals show a reduced capacity for circadian adaptation when exposed to consecutive night shifts (Harma *et al.* 1994). Although younger workers are initially sleepier in response to a new shift pattern, they are capable of rapidly adapting to changes. After three consecutive night shifts younger workers are less sleepy than older workers (Harma, Hakola and Akerstadt 1994), therefore older workers are more likely to experience adverse effects while working night shifts even if they do not meet all the ICSD-2 criteria for a diagnosis of SWD.

Shift work may affect women differently than men (Drake, Roehrs and Richardson 2004). In an American study of crane operators, women employed on afternoon or night shifts slept approximately 30 minutes less than their male counterparts (Oginska, Pokorski and Oginska 1993). Less sleep in female workers may reflect differences in the familial and/or social obligations of the male and female members of this worker population. The tendency of female shift workers to sleep less also emphasises factors such as childcare requirements, which may have an impact on sleep during a shift work

schedule even in the absence of circadian issues (Oginska, Pokorski and Oginska 1993).

2.4.1.3 Gastrointestinal diseases

Meal times are important synchronisers of the human life, with both physiological and social effects (Costa 2010a). Shift workers do not significantly change their total energy intake, but they change the timing and frequency of eating (i.e. nibbling) and sometimes the content of meals (i.e. more carbohydrates and fats in many cases), and meals often being taken cold and during short breaks (Costa 2010a). Shift workers are more prone to upset stomachs, ulcers, indigestion and constipation. According to research, gastrointestinal disorders are high in shift workers and this can be attributed to alcohol and caffeine intake, as well as smoking. Some workers tend to eat too little while they work and others tend to over-consume during the day, consuming snacks as well as regular meals. They also tend to eat less nutritious foods. Gastrointestinal troubles and diseases that are most common in shift workers can vary from alterations in bowel habits (mainly constipation); difficulties in digestion; flatulence and pyrosis to more severe disorders such as peptic ulcer, gastroduodenitis and irritable bowel syndrome (Costa 2010a).

Gastrointestinal complaints are among the most frequently reported health problems of shift workers; these problems are estimated to be two to five times more common among night shift workers compared with those not working night shifts (Costa 2003). A sample of US workers reported that night shift workers (odds ratio [OR] 3.13, 95% confidence interval [CI], 1.62-1.05), rotating shift workers (OR 2.34, 95% CI, 1.32-4.06) and subjects diagnosed with symptoms of shift work disorder (OR 4.55, 95% CI, 2.47-8.37) experienced increased rates of peptic ulcers compared with day workers for all comparisons, ($p < 0,001$) (Drake, Roehrs and Richardson 2004). In a review of various health disorders and shift work, Knutsson (1989) concluded that the strongest evidence was for an association between shiftwork and gastrointestinal disease, coronary heart disease and pregnancy complications. He cites several studies reporting more gastrointestinal disorders than day workers. A Japanese study conducted by Segawa, Nakazawa and Tsukumoto (1987) of 11 657 employees of various institutions such as

factories, banks and schools who had undergone a mass x-ray examination of the upper gastrointestinal tract, found that gastric ulcers were twice as common amongst shift workers than in day workers. With present shift workers (n=2 269), the prevalence of gastric ulcers was 2.38% (n=54) and that of duodenal ulcers, 1.37% (N=31). With the past shift workers (N=2111), the prevalence of gastric ulcers was 1.52% (n=32) and that of duodenal ulcers, 0.62 (n=13). In comparison, the daytime workers (n=6 525) showed that the prevalence of gastric ulcer was 1.03% (n=67) and that of duodenal ulcer, 0.69% (n=45).

2.4.1.4 Sleep and fatigue

'Fatigue' and 'sleepiness' are often used interchangeably, however they are actually distinct phenomena (Shen, Barbera and Shapiro 2006). Fatigue refers to an overwhelming sense of tiredness, lack of energy and feeling of exhaustion associated with impaired physical and/or cognitive functioning, whereas sleepiness refers to a tendency to fall asleep (Shen, Barbera and Shapiro 2006). To maintain alertness and performance, each individual requires a certain amount of sleep (Caskardon and Roth 1991). Reducing sleep by one hour per night is sufficient to cause sleepiness, which becomes progressively more severe with each night of restricted sleep (Caskardon and Roth 1991). Reduced sleep is common during shiftwork, particularly during work at night (Schutte 2005). It is estimated that 75% of night workers experience sleepiness on every shift, and for an estimated 20% it is severe enough to cause them to sleep (Mine Health and Safety Council 2003). The disruption of the normal circadian rhythm and its associated affects has also been reported to apply to truck haulage operators in the South African mining industry (Mine Health and Safety Council 2003). Poor quality and quantity of sleep have been identified as major risk factors in the reduced alertness of haulage drivers during mining operations (Mine Health and Safety Council 2003).

Studies have shown that shift workers sleep less than non-shift workers every day. When you do not get enough sleep then you build up a sleep debt. Over time sleep debt can lead to serious problems such as insomnia, excessive sleepiness during the day and chronic fatigue. Daytime sleep is not as deep and restful as night sleep. Sleep

deprivation can lead to poor co-ordination, irritability, anxiety or depression, and even short-term memory loss. The immune system is also vulnerable, which can leave shift workers more susceptible to viruses and infections (Aura and Nicholson 1999).

Fatigue is a term applied to a wide diversity of conditions and results from most occupational tasks due to subtler psycho-physiological processes (Pheasant 1991). Fatigue is the feeling of abnormal tiredness, lethargy, loss of drive and merges into number of others, which are equally hard to define such as stress and depression (Pheasant 1991). Alertness, vigilance, concentration, judgement, mood and performance are all significantly affected by fatigue (Dawson and Zee 2005), with memory impairment, problem-solving and decision-making leading to a decrease in work productivity and performance (Jansen, Van Amelsvoort and Kristensen 2003). In a 2002 study of health and stress in the Ambulance Services of Victoria, Australia, results showed fatigue had increased since 1993 from 20% to 29% (Kuhn 2001).

2.4.1.5 Weight gain

The World Health Organisation (WHO) and the Centers for Disease Control and Prevention (CDC), define obesity as a body mass index (BMI) of greater than 30 kg/m². Studies have revealed that the incidence of obesity is higher amongst shift workers, especially night workers, thus increasing their risk of diabetes (Di Lorenzo, Pergola and Zocchetti 2003; Biggi, Consonni and Galluzzo 2008; Geliebter *et al.* 2000). This is largely due to unhealthy eating habits and unusual sleeping patterns, which disrupt normal digestive functions. Sleep deprivation has also been implicated in the pathogenesis of weight gain (Knutson, Spiegel and Penev 2007). A retrospective longitudinal study of 500 male municipal workers conducted in Italy revealed that three of the five diagnostic symptoms of metabolic syndrome – obesity $p < 0.001$, elevated cholesterol $p < 0.01$, and raised triglycerine levels, were significantly more frequent amongst night shift workers than in day workers $p < 0.001$, indicating that shift work is associated with significant metabolic disturbances (Biggi, Consonni and Galluzzo 2008). This study compared workers who were either on permanent night shift or day shift, or who switched from day to night shift between 1976 and 2007. A qualitative study conducted by Phiri *et al.* (2014) among nurses in the Western Cape Metropole also

linked weight gain to shift work. The study found that night nurses (57/103) identified weight gain and high blood pressure as their main health concern; they further indicated that being overweight had a negative impact on overall performance and made it difficult to cope with job demands (Phiri *et al.* 2014).

Di Lorenzo, Pergola and Zocchetti (2003) conducted a study at a chemical plant in Italy on 319 men aged between 25 and 60 years. Out of the total (319), shift workers accounted for 185 employees and the remaining 134 worked only on day shift. Findings revealed that shift workers comprised 74% of the total obese population ($p < 0.05$). The range of BMI for the daytime workers was 19.8 – 35.4 kg/m², whereas the range for those working night shift was 20.2 – 40.7 kg/m² ($p < 0.01$). The association between shift work and BMI was independent of age and work duration beyond five years (Di Lorenzo, Pergola and Zocchetti 2003). Geliebter *et al.* (2000) conducted a study among 85 workers in a New York City hospital. The sample included nurses, nurse's aides and security personnel. The purpose of the study was to determine whether workers on late shifts gain more weight than those on regular day shifts (Geliebter *et al.* 2000). Results were adjusted for age, gender, smoking habits and duration on shifts. Results showed that late shift workers (those working evening and night shifts) experienced more weight gain than did day workers since beginning their respective shifts. The adjusted average weight gain for night shift workers was 4.4 kg versus 0.7 kg for those working during the day ($p = 0.008$). Those working night shifts also reported an increase in food intake, a later last daily meal and less exercise. All of these may have contributed to their greater weight gain (Geliebter *et al.* 2000).

Suwazono *et al.* (2008) conducted a study comparing the effect of alternating shift work and day work on weight gain among 7 294 Japanese male workers. The cohort study consisted of 4 328 day shift workers and 2 926 alternating shift workers of a steel company, who received annual health checkups over a 14-year period between 1991 and 2005. The endpoints in the study were either a 5%, 7.5% or 10% increase in BMI during the period of observation, compared with the BMI at entry. The type of job schedule was significantly associated with all three BMI endpoints (5% increase in BMI; OR for comparison between alternating shift workers and regular day workers, 1.14;

95% CI, 1.06 – 1.23): (7.5% increase in BMI; OR, 1.13; 95% CI, 1.03 – 1.24:10% increase in MBI during the study). Age and drinking were negatively associated with 5%, 7.5% and 10% increases in BMI. All-in-all, the study revealed that alternating shift work was an independent risk factor for weight gain in male Japanese workers (Suwazono *et al.* 2008).

2.4.1.6 Cardiovascular diseases

According to the WHO about 17.3 million deaths world-wide per year are due to cardiovascular diseases (World Health Organisation 2008). Several studies have shown that there is an association between shift work and cardiovascular disease (Tenkanen *et al.* 1997; Kawachi *et al.* 1995; Scott and LaDou 1998). It is not completely understood what mechanisms link shift work to CDV's but it is thought that the contributing factors may include disturbed circadian rhythms and factors such as bad nutritional habits, stress and smoking which are found to be common among shift workers (Knutsson and Boggild 2000). In a Brazilian study carried out with 211 University workers, the risk of CVD among night shift workers was found to be 67% higher than that of day shift workers (PR = 1.67, 95% CI = 1.10-2.54) (Pimenta *et al.* 2011).

The risk of dying from ischemic heart disease increases according with age as well as the number of years spent doing shift work. A study in the United Kingdom (UK) found that while shift work did not increase a man's risk of dying of heart disease, social class might modify the finding. Most studies (Hublin *et al.* 2010; Vyas *et al.* 2012; Tenkanen *et al.* 1997) have found that social class was strongly related to lifestyle factors that may increase the risk of heart disease, and that shift workers are more likely to be from the working class. In a six-year prospective study of Cardiovascular (CHD) risk, 1 806 industrial workers were followed to assess life-style factors, serum lipid levels, blood pressure and identifying CHD cases from official health records (Tenkanen *et al.* 1997). Overall, the relative risk of CHD among shift workers was 1.5 (CI 1.1-2.1) compared to day workers. Among blue-collar workers, day workers, 2-shift workers and 3-shift workers had a relative risk of 1.3 (CI 0.8-2.0), 1.9 (CI 1.1-3.4) and 1.7 (CI 1.1-2.7) respectively. Furthermore, shift work was also found to interact with smoking and obesity to increase CHD risk (Tenkanen *et al.* 1997).

A prospective cohort study of shift work and the risk of ischemic heart disease was conducted among 17 649 Japanese male workers between 1988 and 1990. The cause of death was identified from death certificates. The Cox proportional hazards model was used to estimate the risks of shift work for ischemic heart disease. During the 233, 869 person-years of follow up, a total of 1,363 deaths were recorded, 86 of which were due to ischemic disease. Rotating shift workers had a higher risk of death due to ischemic heart disease compared with day time workers (RR=2.32, 95% confidence interval: 1.37, 3.95, p=0.002), whereas fixed night work was not associated with ischemic heart disease (RR=1.23, 95% confidence interval:0.49 to 3.10, p=0.658). The same study also revealed that subjects with coronary risk factors such as alcohol consumption, hypertension, smoking and overweight were highly susceptible to the effect of rotating shift work with the risk of death due to ischemic heart disease (Yoshihisa *et al.* 2006).

A cohort study of 79 109 US female nurses was conducted from 1988 to 1992 by Kawachi *et al.* (1995). The study included females aged 42 to 67 years of age who were free of diagnosed coronary heart disease (CHD) and stroke. Incident CHD was defined as non-fatal myocardial infarction and fatal CHD. During the four years of follow-up, 292 cases of incident CHD (248 non-fatal myocardial infarction and 44 fatal CHD) occurred. The age-adjusted relative risk of CHD was 1.38 (95% CI, 1.08 to 1.76) in women who reported ever doing shift work, compared with those who had never done so. Compared with women who had never been on shifts, the multivariate adjusted relative risks of CHD were 1.21 (95% CI, 0.92 to 1.59) among women reporting less than six years and 1.51 (95% CI, 1.12 to 2.03) among those reporting six or more years of rotating night shifts (Kawachi *et al.* 1995). The above-mentioned studies prove that there is profound evidence that link shift work as risk for cardiovascular disease, however limited data exists in South Africa that connects shift work to ill health.

2.4.1.7 Reproductive health

Shift work also has an effect on the reproductive health of women. Studies have linked poorly designed shift rotas to riskier pregnancy, resulting in spontaneous abortion, premature birth and low birth weight for women who work after the twenty-third week of their pregnancy. Irregular menstruation is also common among shift workers. Women

working shifts may also take longer than their daytime colleagues to fall pregnant. Although there is not a large body of work on the subject, researchers have reached consensus that shift work may be considered a possible risk factor for adverse reproductive health. Bonzini, Coggon and Palmer (2007) reviewed literature on the association between several possible pregnancy complications (including low birth weight, pre-term delivery and pre-eclampsia) and various working conditions, including shift work or night work which was grouped together. There were only two studies in each case on the relationship between shift/night work and low birth weight or pre-eclampsia, pointing to “no more than a moderate effect”. The authors concluded that the balance of evidence suggested a small effect of shift work on pre-term delivery (Bonzini, Coggon and Palmer 2007).

2.4.1.8 Hypertension and diabetes

Evidence from epidemiological studies has been limited to investigating the association between shift work and an increased incidence rate of diabetes, however many studies have alluded to this association (Karlsson *et al.* 2005; Kawakami *et al.* 1999; Nagaya *et al.* 2002). In a study in Japan in 1999, Nagaya and colleagues reported that shift workers were more likely to have high fasting serum glucose than day workers or be under treatment for diabetes in subjects aged 30-39 years (OR= 6.75, 95%CI 1.31 – 56.1), but not for those aged 40-49 years (OR=1.22, 95% CI 0.53-1.55). Rotating night shift was found to be positively associated with the risk of Type 2 diabetes in a Nurses’ Health Study conducted between 1988 and 2008 (Kroente *et al.* 2007). The authors studied 69 269 women aged 42-67 in Nurses’ Health Study I (NHS I, 1988-2008) and 107 915 women aged 25-42 in NHI II (1989-2007) without diabetes, cardiovascular disease and cancer. Self-reported Type 2 diabetes was confirmed by using a validated supplementary questionnaire. They documented 6,165 (NHS I) and 3,961 (NHS II) incident Type 2 diabetes cases during the 18-20 years of follow-up. Compared with women who reported no shift work, the risk ratio for participants with 1-2,3-9, 10-19 and ≥ 20 years of shift work were 1.05 (1.00-1.11), 1.20 (1.14-1.26), 1.40 (1.30-1.51), and 1.58 (1.43-1.74, p-value for trend <0.001), respectively. The results of the study suggested that an extended period of rotating night shift work is associated with an

increased risk of type 2 diabetes in women, which also appears to be partly mediated by body weight (Kroente *et al.* 2007).

Circadian disruption as encountered by many rotating shift workers has been associated with an increased risk of hypertension (Schernhammer *et al.* 2006). A Nurses' Health Study to determine the association between rotating night shift and the risk of hypertension was conducted in 1 510 black and 94 142 White female American participants. As blood pressure responds differently to sleep alteration in Black compared with White groups, the authors hypothesised that rotating night shift work may be a stronger risk for hypertension amongst the Black population (Schernhammer *et al.* 2006). During the sixteen years of follow-up (1991-2007), they identified 580 incident cases of hypertension in Blacks and 23 360 cases in Whites. In Blacks, the risk ratio for incident hypertension among women who worked rotating night shift for more than twelve months in the previous two years was 1.81(95% CI 1.14-2.87), compared with those who do not work shifts. In Whites the authors observed no increase in risk (RR 0.99, 95% CI 0.93-1.06). The association between shift work and hypertension varied significantly by race ($p=0.01$). The multivariate risk ratio for incident hypertension in Black women who worked rotating night shift work was 1.46 (95% CI 1.07-1.99), compared with those who have never worked rotating night shift. Among Whites, there was no increase in risk (RR 0.97, 95% CI 0.93-1.01 $p<0.01$). The authors concluded that rotating night work is independently associated with an increased risk of hypertension in Blacks but not among Whites (Schernhammer *et al.* 2006).

2.4.1.9 Cancer

There is published evidence from both human and animal studies that shift work poses an increased risk of cancer (World Health Organisation 2007). In 2007 a sub-committee of the WHO stated that shift work is "probably carcinogenic". Several studies have further reported an association between increased risk of breast cancer and shift work (Hansen 2001; Schernhammer *et al.* 2006; Pukkala, Auvinen and Wahlberg 1995). Two mechanisms have been suggested that might explain this association: 1) a reduction in circulating levels of melatonin (the hormone with direct oncostatic properties); and/or 2) increased levels of reproductive hormones important in the development of cancer, both

as a result of light-at-night exposure resulting from shift work (Scott, Monk and Brink 1997). Lifestyle factors such as sleep disruption and occupational exposures to particular agents that also disrupt circadian rhythms may alter endocrine function, and possibly the regulation of reproductive hormones which are relevant to the etiology of hormone-related diseases such as breast cancer (Czeisler and Klerman 1999).

Travis *et al.* (2004) cast some doubt on the possible link between melatonin levels and breast cancer. The authors examined melatonin levels in women on the island of Guernsey who were cancer-free when recruited into the study between 1977 and 1985, but who had developed cancer by 2001. The analysis involved matching the case patients with control participants who had not developed breast cancer at the time the case patient was diagnosed. The case and control subjects were also matched on criteria such as age and menopausal status. The results showed no significant relationship between melatonin and the risk of breast cancer for either pre- or post-menopausal women. The authors noted, however, that their sample size was small (127 case patients and 3 control subjects for each case patient) and they could therefore not rule out a moderate association between melatonin levels and breast cancer.

In a Danish study, 18 551 female military workers born between 1929 and 1968 were followed to investigate the risk for breast cancer after being involved in shift work. The results showed 218 cases of breast cancer. They observed an adjusted OR of 1.4 (95% CI 0.9 to 2.1) among women with ever worked night shifts compared with never night shifts. The RR for breast cancer tended to increase with increasing number of years of night shift work ($p=0.03$) and cumulative number of shifts ($p=0.02$), with a no risk for fewer than three night shifts per week. These results meant workers on rotating shifts had a significantly higher risk of prostate cancer than day workers (Kubo, Ozasa and Mikami 2006).

2.4.2 Social effects

Shift work has become a lifestyle for most people. Because of their irregular working hours, shift workers spend less time with their families on their off days when they are often too tired to enjoy recreational and social activities. Lack of sleep makes people

irritable and simple everyday issues can lead to arguments. This puts strain on personal relationships and family life. Workers can also often feel isolated (Woolfenden 1998). Several studies have shown evidence that shift work can indirectly contribute to a negative social life (Costa 2003; Ahasan, Khaleque and Mohiddin 1999; Wedderburn 1981). Shift work can lead to family problems, reduced social support and stress (Begani *et al.* 2013). A study conducted in Bangladesh and Dhaka in a shoe manufacturing factory revealed that employees' competition to find work was very high, mainly because of a high unemployment rate and over population (Ahasan, Khaleque and Mohiddin 1999). Negotiating working hours, and particularly the number of hours to be worked in a day, and the likely adverse effects was least important. Almost 22% responded that they liked the shift system, while about 73% of respondents said they disliked shift work. Three percent reported extreme negative attitudes and complained about shift work causing potential risks in their working lives (Ahasan, Khaleque and Mohiddin 1999).

Shift work has been reported to also interfere with the co-ordination of family timetables, depending on the family composition (i.e. number and age of children), personal duties (i.e. housework, school) and the availability of community services (i.e. transportation, shop hours). Time pressure has been stated as a constant problem for those shift workers who have high family burdens, parental roles and the children's education (Costa 2003). In general, workers who are more socially and economically disadvantaged tend to work non-standard hours, although many of the advantaged do as well. Single mothers and younger workers are more likely than married mothers and older workers to do shift work (Kogi 1998).

A study on social co-ordination of occupation revealed that most Western industrialised countries encountered an increase in social and family problems, which brings disharmony and other related problems such as divorce (Larson and Zemke 2003). Disharmony within couples who had conflicts because of one partner spending more time with family members and friends than the other has been documented. The above authors also reported that the daily and weekly organisation of individual and family activities were mostly governed by work schedules (Lasen and Zemke 2003). A South

African study by Phiri *et al.* (2014) also found that night nurses work demands due to shift work had a negative impact on family responsibilities. Nurses mentioned that they had limited time to spend with their families due to their schedule (twelve hours). They felt the long hours contributed to the moody and irritable feeling, which often created family conflict.

As was demonstrated by Baer *et al.* (1981), Baer *et al.* (1985) and Wedderburn (1981), there is a distinct pattern in the value of free time depending on its chronological position in the day and in the week. A “Wednesday is not Saturday”, noted one of Sergean’s (1971) shift workers. During the working days, evening hours have the highest utility (because of various social activities during the evening), whilst during the weekend, both morning and afternoon hours have a high utility and value (Baer *et al.* 1981; 1985). Shift work may thus interfere through the working time with the rhythms of social life (Baer *et al.* 1981).

Shift workers complain more frequently of sex-related problems and disturbed relationships with friends. Shift work can, however, have some positive psycho-social effects. A shift worker has more leisure time during the day to spend with family or friends if the latter are not working during the daytime hours. Yet it should be noted that this free time accrues not only from the shift system, but also from the reduced amount of sleep experienced by shift workers. Many shift workers, however, resent the fact that they cannot attend theater or sports events or even watch their favourite television programmes. Some suggested as far back as 1977 that the timing of union meetings, religious services, television programmes, shops and libraries should be adapted to their working needs (Rutenfranz, Colquhoun and Knauth 1977).

2.4.3 Psychological effects

Haines, Marchand and Rousseau (2008) cited several studies that showed an association between shift work and psychological distress, depression, anxiety and burnout. The authors proposed that shift work may get in the way of participating in family life because of fatigue and scheduling, which may increase the risk of depression. They conducted a study that included 2 931 Canadians with spouses and at

least one child living at home. The main aim of the study was to elucidate the social pathway by which shift work may lead to mental illness. It also examined the mediating influence of work-to-family conflict in the association between shift work and depression. They found that shift work was significantly linked to work-to-family conflict and that work-to-family conflict was found to significantly raise the likelihood of depression. The authors estimated that about 70% of this effect was direct and 30% through work-to-family conflict. Bara and Arber (2009) used data from the British Household Panel Survey to determine the effects of shift work on mental health. The survey participants reported on the number of years between 1995 and 2005 in which they worked night shift or a schedule with varied shift patterns. Mental health was assessed in two ways: through responses to the General Health Questionnaire and through a question about the presence of problems with anxiety or 'depression of bad nerves' or 'psychiatric problems'. The results revealed that men who had worked nights for four or more years were more than twice as likely as men who had never worked nights to report mental health problems. For women, the results were almost the inverse of those of men: those working varied shifts for four or more years were more than twice as likely to report mental health problems compared with women who did not work varied shifts (Bara and Arber 2009)

2.5 Safety and productivity

Workers employed on night shifts are believed to have a much higher risk of accidents at work (Pease and Raether 2003). Many international studies have correlated high injury rates with working night shift. Fortson (2004) concluded that the human biological clock (circadian rhythms) does not function effectively in the early hours of the morning, and, as a result, short-term memory, reaction time and visual vigilance may be compromised. According to population-attributable risk calculations, 6-7% of workplace injuries may be attributed to shift work. These risks are generally understood to arise from two primary factors: 1) worker fatigue due to sleep disturbance, long work hours and their effect on the circadian rhythm; and 2) typically lower levels of supervision and co-worker support during non-daytime work schedules (Fortson 2004).

Folkard and Tucker (2003) reviewed the literature on the relationship between safety and shift work. They emphasised that such studies of this relationship have to take account of two possibilities: 1) different exposures on different shifts; and 2) different incident reporting patterns or trends for night shift workers than others. When the mentioned influences have been controlled for, the following trends emerged:

- The risk of incidents (defined as 'accidents and injuries') increases about 20% from the first to second hour of the night shift.
- The risk of incidents is higher for afternoon shift work than for morning shifts, and higher for night shifts.
- The incident rates increase on successive night shifts. On average, the incident rate on the fourth night is 36% higher than on the first night.
- The risk of an incident increases markedly after more than eight hours on duty.
- The risk in the twelfth hour is almost double that in the eighth hour.

One of the main problems facing shift workers is to remain awake and alert at night; they may fall asleep on the job. Working the night shift may affect performance levels, especially if the work is mentally and physically demanding. There is also an increased risk of accidents and injuries. Some types of shift work may involve working alone at night, increasing a worker's chances of becoming a victim of crime (Ganza 2006). Using data from the National Longitudinal Survey of Youth to evaluate the effects of different types of shift work on the combined incidence of work injury and illnesses, Dembe *et al.* (2003) found that night, evening, rotating and irregular shifts all were associated with an increased risk of occupational injury or illness compared with regular day time shifts. According to their study, there was a 43% increased risk for evening shift workers, 36% for those working rotating shifts, and 30% increased risk for those involved in shift work that includes nights.

Smith, Folkard and Poole (1994) found that relative to the morning shift, the overall risk of an injury incident during the night shift was 1.23 (CI 1.14-1.31), with a higher risk for self-paced work at night (RR=1.82, CI 1.30-2.34). Folkard and Tucker (2003) found that risk increased approximately linearly across three shifts. Relative to the morning shift, the increase was 18.3% for afternoon shifts, and 30.4% for the night shifts. The cause

of industrial accidents is exceedingly complex, but the link between increased fatigue with lowered performance and subsequent high rates of accidents would seem logical (Harrington 2001). Published data does not support this very well, largely because many of the studies have inadequate analytical procedures or failed to allow for the many confounding factors that can influence accident statistics (Harrington 2001). A few of the world's catastrophic industrial disasters happened in the early hours of the morning. The 1986 Chernobyl Disaster occurred at 01:23 and the 1979 Three Mile Island accident took place around 04:00; both accidents are believed to have happened following mistakes made by night shift workers. On 3 December 1984 at around 23:00, more than 40 tons of methyl isocyanate gas leaked from a pesticide plant in Bhopal, India. More than 3 800 people were instantly killed (Broughton 2005).

According to a report published by Circadian Technologies Inc., sleep deprivation and poor work-life conditions can also result in ergonomics injuries and lost workdays, especially among workers who are involved in extended hours (regularly working outside hours of 07:00 to 19:00). The report also details the link between work practices and ergonomics injuries such as musculoskeletal disorder (MSD). In a study of over 12 500 extended hours' workers, 30% of male workers and 41% of female workers reported 'chronic or frequent' back pain, while 16% of male workers and 27% of female workers reported 'chronic or frequent' wrist pain. The researchers attributed this to sleep deprivation, which could possibly be damaging in terms of muscle, ligament or tendon injury (Ganza 2006).

In the USA, a paramedic died in a motor vehicle accident after he fell asleep whilst driving after a night shift. In another example, a Washington ambulance crew, dispatched to a chest pain patient, failed to attend and were found asleep in the front seats of the ambulance 25 minutes later (Ganza 2006). These accounts show that fatigue resulted in the loss of life and posed a threat to the paramedics and the public. A study by Phiri *et al.* (2014) conducted among Western Cape nurses found that needle stick injuries were reportedly prevalent during night shift, and mostly occurred during the early hours of the morning when nurses were often fatigued.

2.6 Prevention of shift work disorder

2.6.1 Occupational Health services for shift workers

The Occupational Health and Safety Act No.85 of 1993 and the Basic Conditions of Employment Act No.75 of 1997 are the main employment related legislation that addresses the link between health and safety in the workplace and the arrangement of working time in South Africa. The employer is obliged to provide for employees a workplace that is free from hazards. The Act also provides for night workers to undergo medical examinations prior to commencing night work and at appropriate intervals (periodic screening) as may be required. The medical examination should include:

- Health problems that may be aggravated by shift work (e.g. sleeping conditions such insomnia, uncontrolled diabetes etc.).
- Any challenges the employee may have adjusting to night work.
- Any social, psychological and occupational stress.

Medical counselling is also necessary in the first months of shifts and night work exposure and after long exposure to shift work. The International Labour Organisation (ILO) Night Work Convention (1990a) recommends that: 1) appropriate occupational health services are provided for night and shift workers, including counselling; 2) first aid during all shift hours; 3) the option of transfer to day work when certified unfit for night work for reasons of health; and 4) measures for women on night shifts, especially maternity protection (transfer to day work, extension of maternity leave etc.).

2.6.2 Design of work schedules

There are several routes the business can take to assist reduce the negative effects of shift work. Optimising the design of the shift schedule is the most effective way. Night shift has been shown to cause a disproportionate amount of the problems of shift work, so it should be reduced as much as possible (Harrington 2001). If this means increasing the number of crews involved, so be it. If rotating shifts are an absolute necessity, then rapid rotation of shifts (scheduling rotations every two or three days) are preferable to slow rotation, as this schedule creates less interference with the circadian rhythm (Monk and Folkard 1985). Clockwise rotation (from mornings to afternoons to nights) is

preferable to counter clockwise rotation, as quick changeovers are avoided and this type of rotation also allows longer rest periods. Start and finish times also need to be considered. The duration of the shift should not be extended to ten or twelve hours. Early morning shifts are associated with shorter sleep and lots of fatigue complaints (Harrington 2001). It is advisable to avoid shift start times as early as 05:00 or 06:00. The availability of transport may also be an issue when the shift starts too early in the morning.

The literature reviewed above suggests that the majority of workers working on shifts experience various health problems, poor quality of sleep, negative social psychological issues and an increased risk for errors and accidents at work compared with workers on daytime shift schedules. Shift work is a reality for many South Africans. Research has not been very successful in demonstrating the direct impact of shift work on physical and mental health (Vogel *et al.* 2012). There is no unequivocal evidence to suggest that shift work is related to a higher incidence of psychiatric disorders as the reported correlations between certain work schedules and health outcomes do not point to any causality. Further research examining large groups with a precise survey of the working conditions, the family conditions as well as the individual characteristics of shift workers is needed, in order to further analyse the relationship between shift work and adverse health and social effects

CHAPTER 3

RESEARCH METHODS

3.1 Introduction

The main purpose of this chapter is to describe the research methodology used in this study, which was aimed at gaining a better understanding of the effects of shift work on workers. The research methods section includes the research design, study site, sampling, data collection methods, data preparation and cleaning, data analysis and ethical considerations.

3.2 Study site



Figure 3.1 Map of the study site, situated in Westmead Pinetown KwaZulu Natal (source: Google Map)

The study site is situated in the Westmead Industrial area of Pinetown, KwaZulu-Natal, South Africa. The company is owned by Anglo Vaal Industries (AVI). It produces

different types of biscuits and confectioneries. With a turnover of R9.2 billion in the 2013 financial year, the company's products are a household name in South Africa and growing every day. It has a total of 463 permanent employees, comprising of 137 salaried workers, 326 bargaining unit workers and 10 fixed-term workers. There is an estimate of 968 temporal workers who are managed by Capacity Labour Brokers. The company has a two shift pattern with three crews, working twelve hours per shift. One shift works during the day (05:30 to 17:30), another on night shift (17:30 to 05:30) whilst the third crew is off. Dayshift starts on Friday and ends on Thursday; no weekends are worked. Night shift begins on Wednesdays and ends on Tuesday night. A month schedule is as follows:

OONNNNNNOODDDDDDDOOOOOONNNNNNN

(O = Off work; N = Night shift; D = Day shift).

3.3 Research design

This is a convergent parallel design multi method study, conducted using both questionnaires and focus groups as a primary research approach. Many definitions of mixed methods are available in the literature (Johnson *et al.* 2007; Greene 2006). As highlighted by Creswell and Plano Clark (2011), a convergent research design is used when the intent is to merge concurrent quantitative and qualitative research. For example, an investigator might collect both quantitative correlational data and qualitative individual or group interview data and combine the two to best understand participants' experiences (Creswell and Plano Clark 2011).

3.4 Sampling

Barbie and Mouton (2001) explained that the main purpose of sampling is to achieve representativeness. To achieve representativeness in this current study, convenient sampling was used. All available permanent shift workers were eligible to be part of the study. The sample included production operators and supervisors, engineering personnel (including fitters and artisans) and logistics employees (stores controller, forklift drivers etc.). At the time of the study, the organisation had a total headcount of

1 231 employees, with permanent employees accounting for 430 (35%). Only shift workers (n=200) were recruited to complete the questionnaire. Participants were recruited in two ways. Individuals were eligible to participate in the study if they were more than eighteen years of age; they were employed on a permanent basis; work had to be scheduled during the habitual hours of sleep, including night shifts, early morning shifts and rotating shifts. They were also required to meet the following criteria: a) begin work at 05:30 and finish at 17:30; and b) have frequently rotating shifts. Workers fixed at day shift such as executives and administrative staff, were excluded from the study. Contract workers and those who refused to give informed consent were also excluded.

3.5 Recruitment of participants

The briefing consisted of a discussion of procedures to be followed when collecting data, evaluation of injury records, confidentiality and the possible benefits of the study. An e-mail was first sent to all employees informing them of the study and also requesting their participation. Those who were willing to participate were requested to reply via e-mail and the researcher handed them questionnaires to complete. Information flyers, in both English (Appendix 5a) and iSiZulu (Appendix 5b) were posted on all communication boards requesting shift workers who were interested in participating in the research study to meet with the researcher. The researcher conducted floor meetings with supervisors informing them of the study and ensuring that information about the study was received by all shifts.

3.6 Data collection

Primary data collection included questionnaires (Appendix 6: Shift Work Questionnaire), focus group discussions (Appendix 7: Interviewer's Guide) and evaluation of injury records (Appendix 8: Retrospective Data Review Tool). Barton *et al.* (1995) recommended that researchers use some or all of the Standard Shift work Index (SSI) scales depending on their specific requirements. The researcher thus included some of the questions from the SSI scales in the questionnaire used in the present study. The SSI scale was developed by Barton *et al.* (1995) due to lack of uniformity in surveys conducted for shift work research. It is a battery of self-reported questionnaires which

focus on the health and psychological well-being of shift workers. A pilot test of seven questionnaires was conducted which led to questions 1.13, 1.14, 1.36, 1.37, 1.38 and 1.39 being simplified to ensure that there was no confusion. Questionnaires consisted of both open-ended and closed-ended items relating to the employees' knowledge about the health effects associated with shift work and gender differences in health effects associated with shift work. Focus group discussions complemented the questionnaires, in which data is enriched through the process of group interaction (Hodge and Tellier 1975). Envelopes with questionnaires were given to supervisors to distribute to all those willing to participate. This took place between September 2014 and February 2015. The sealed envelopes with questionnaires were placed into a container designated for this purpose by the supervisors.

Two focus group discussions were conducted; one consisting of seven female participants and the other of five male participants. With permission from the participants the discussions were audio taped and transcribed verbatim for further analysis. Focus groups were very informal and carried out in a conversational style. Discussions lasted about 45 minutes for each group. Both focus group discussions were conducted during a night shift, starting at 18h00 to minimise disruption to production.

Occupational injury data for a period of two years (2013 to 2014) was scrutinised to check the trend of injuries. The records contained an account of shift type, injury information (time and cause of injury) area where the injury took place and type of incident. Permission to access records was sought from the operations executive (Appendix 2: Permission Letter).

3.6.1 Questionnaires

An abbreviated and modified form of the validated SSI questionnaire was used (Barton *et al.* 1995). The questionnaire contained a battery of items designed to examine the relationship of health and personal adjustment to shift work. It included the following components: 1) general biographical information; 2) domestic circumstances: marital status, partner's work pattern and the present shift pattern of the participant; 3) shift details; 4) sleep patterns: quality and quantity of sleep, sleep medication usage, fatigue;

5) health aspects; 6) work performance; 7) psychological aspects; and 8) social aspects. The questions included in the health aspect category measured cardiovascular and gastrointestinal disorders, both known to have a high incidence among shift workers. A Likert scale option was included. Participants were requested to rate how frequently they experienced symptoms such as digestive difficulties. The response options were 'quite seldom', 'quite often' and 'almost always'. Two more questions were included concerning conditions suffered and medication usage since starting shifts. Participants were asked to tick whether or not they had experienced any of the listed conditions (nineteen in total) or regularly taken any of the listed medication (thirteen in total) since commencing with shift work.

The social aspect category consisted of items covering social and domestic activities. To better evaluate the amount of time spent on specific activities, the question was phrased "are you satisfied with the amount of time....." A five- point response option was provided for 1.48, 1.49 and 1.50, ranging from 'not at all' to 'very much'. The questionnaire consisted of a total of 50 items to be answered by the participants.

3.6.2 Focus Group Discussions

3.6.2.1 Research setting and establishing researcher roles

Owing to the exploratory nature of the study, a focus group methodology was also used. This allowed for in-depth qualitative research which catered for a more comprehensive understanding of the current shift work issues. Powell, Single and Lloyd (1996) defined focus group as a group of individuals selected and assembled by researchers to discuss and comment on a particular set of questions. Two focus groups were conducted, one with five participants (males) and the other one with seven participants (females). De Vos *et al.* (2005) posited that maintaining proper relationships with the participants is of great importance and will largely determine the accuracy and reliability of the information gathered. Since some of the participants may view the researcher as an intruder or being on the management side, it was important to identify a person from the factory who would assist the researcher and act as a mediator in the research process. The role of the mediator was to identify employees willing to participate in the study.

Focus group discussions were scheduled on dates that suited each of the participants. Participants consented in writing after they were informed of the objectives and procedures of the study.

The focus group discussions were held in a boardroom within the factory. Special attention was given to the climate/atmosphere of the room and to establishing a relaxed environment. A 'Do Not Disturb' sign was put up outside the door to ensure privacy and to minimise disruptions during the interviews. The participants were reassured by the friendly and warm manner in which the researcher introduced herself, after which the researcher explained that she was doing the study solely for educational purposes and they should view her as a student and not as a Safety Health and Environmental Co-ordinator. Participants were informed that they could withdraw from the study at any time.

3.6.2.2 Focus group discussions (FGD)

Prior to discussions taking place, a guideline was developed and evaluated where only open-ended questions were included. The researcher also used communication techniques such as paraphrasing, clarifying and summarising to encourage elaboration, as suggested by Okun (1992). Focus group discussions were conducted in isiZulu, which was the preferred language of the participants. In addition to the verbal information that was obtained during the discussions, observation notes of the participant's behaviour were taken throughout the discussions. The notes included the manner in which the participants answered the questions and also how they reacted when answering the questions. Their behaviour was also observed during the discussions. Observation notes contain a comprehensive account of the participants, the events taking place, the actual discussions and communication. They also enable the researcher to maintain maximum control over the situation (De Vos *et al.* 2005).

With permission from the participants the discussions were audio taped and transcribed verbatim for further analysis. In order to ensure confidentiality the transcriptions were labelled using specific coding according to occupation (position) and gender (for

example QCF1- Quality Controller Female Participant 1; MCF2- Material Controller Female Participant 2; and so forth). Only the researcher had access to the coding scheme, which ensured privacy for the participants. The coding was also used in the referencing of the quotes in the report. Participants were given assurances that the audio recordings would be kept in a safe place after completion of the study and that their identity would remain anonymous.

Transcripts were analysed by means of content analysis. Content analysis is a procedure for the categorisation of verbal or behavioural data for the purposes of classification, summarisation and tabulation (Mayring 2003). White and Marsh (2006) indicated that content analysis is a research method used to make replicable and valid inferences from text to meaningful themes and ideas. The participants' responses were read thoroughly, after which the text was condensed into paragraphs that emerged from the responses regarding their opinions on shift work.

3.6.3 Retrospective injury records

Accessing injury records is usually a sensitive issue with most companies, due to concerns of employee privacy and company liability. Even though these records were readily available to the researcher due to the nature of her position within the business, consent was obtained from the Human Resources department. The retrospective occupational injury profile for a two-year period (2012 and 2013) was also reviewed (Appendix 8: Retrospective Data Review Tool). This was limited to incidents involving shift work and extracted from the company injury database.

3.7 Data preparation and cleaning

Data preparation included: 1) data editing; 2) coding; and 3) statistical adjustment of data (Aaker and Day 1995). Upon receipt of all questionnaires, each was checked to identify any omissions. All responses were then captured on Microsoft Excel 2007.

3.8 Data analysis

Data was analysed using both descriptive and inferential statistics. Lind and Mason (2004) mooted that descriptive statistics describes the organising and summarising of data within a study. Data was analysed using STATA (version 12). Frequency distributions of categorical variables, means, standard deviation and ranges of continuous variables were calculated. Frequency tables and graphs were used to represent univariate and bivariate variables. Bivariate correlations were investigated using the Spearman's correlation. The exposure variables for the study were age, gender, work demand and shift pattern. The outcome variables were injuries, social and domestic disruptions, sleep disturbance and psychological impact. Multivariate testing was conducted via multinomial logistic regressions to determine whether more than one factor is responsible for the outcome. Chi-squared tests were used to determine differences between men and women working shifts. Odds ratios and confidence intervals of 95% were calculated and p values < 0.05 were considered statistically significant. A statistician was used for the analysis of data.

3.9 Ethical considerations

Permission to conduct the study was obtained from factory management (Appendix 2: Permission Letter) and assurance was given that the study was solely for academic purposes. Informed consent was sought from all participants, who were also informed that there were no monetary benefits associated with participation. Participants were assured that their responses would be treated as strictly confidential and that they could not be identified in person based on their responses. The study documentation, including the questionnaire, went through the clearance and approval process of the Durban University of Technology's Institutional Research Ethics Committee as shown in the IREC letter of approval, REC 16/14 (Appendix 9).

CHAPTER 4

RESULTS

4.1 Introduction

This chapter presents the findings obtained from the study. Questionnaires and A retrospective review of incident records over a period of two years (2012-2013) were analysed. Focus group discussions were conducted to obtain information on participants' perceptions on shift work. The analysis of quantitative data was conducted using STATA (version 12).

4.2 Questionnaire Analysis

An abbreviated and modified form of the SSI questionnaire was used to explore the employees' perceptions about shift work and the effects on their health and social lives. The results of the study are presented below. Descriptive statistics and graphs were used to illustrate participant responses in the study.

4.2.1 Demographics characteristics

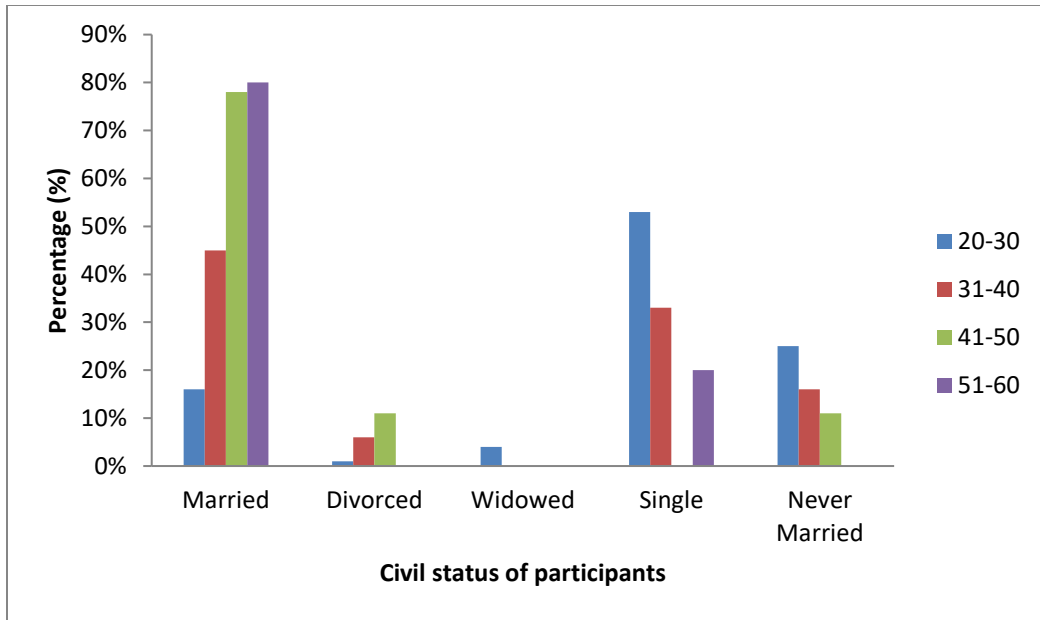
Table 4.1 summarises demographic characteristics for the 152 participants. The sample was comprised of 85 (56%) males and 63 (42%) females. The younger population in the age range 20-30 years formed a larger proportion of the sample, (51%). Very few employees over the age of 41 worked shifts (n=14). The largest number of participants were single, with 40 (46%) males and 23 (37%) females. The majority of participants working shifts were operators, with only three participants in managerial positions.

Table 4.1 Demographic characteristics of study population (n=152).

Variable	n%	Male (%)	Female (%)
Age Group			
20-30	78 (51)	42 (53)	36 (46)
31-40	49 (32)	29 (57)	20 (39)
41-50	9 (5.9)	5 (56)	4 (44)
51-60	5 (3.2)	5 (100)	0(0)
Civil Status			
Married/Living with partner	49 (32)	31 (35.63)	18 (29.03)
Separated/Divorced	5 (3.2)	2 (2.30)	3 (4.84)
Widowed	3 (1.9)	2 (2.30)	1 (1.61)
Single	63 (41)	40 (46)	23 (37)
Never been married	29 (19)	12 (14)	17 (27)
Job Class*			
Operator	72 (47)	46 (53)	26 (41)
General Worker	56 (34)	25 (29)	31 (49)
Supervisor	10 (6.7)	9 (10)	1 (2)
Manager	3 (1.9)	2 (2)	1 (2)
Other	8 (5)	4 (5)	4 (6)

*p-value of < 0.05 was considered as statistically significant.

It was important to look at the civil status of the participants in this study in order to determine the relationship between age, status and effects of shift schedules. Figure 4.1 illustrates the marital status of the participants in relation to their age groups. The highest number of married participants was between 51 and 60 (80%), while the highest number of divorced participants (11%) was in the age group from 41 to 50. More than half of the participants in the age group 20 to 30 years were single.



p-value of < 0.05 was considered as statistically significant

Figure 4.1 Civil status of different age groups (p = 0.90)

4.2.2. Shift Details

Shift work was described by asking participants to report the number, type and length of shift. They were also requested to state the number of years doing shifts and reasons for shift work. The company currently has a two-shift rotational pattern with three crews, working twelve hours per shift. One shift works during the day (05:30 to 17:30), another on night shift (17:30 to 05:30), whilst the third crew is off. Dayshift starts on Friday and ends Thursday, and night shift begins on Wednesdays and ends on Tuesday night. A month schedule is as follows:

OONNNNNNOODDDDDDDOOOOOONNNNNNNN

(O = Off work, N = Night shift and D = Day shift.)

Among the total sample, the number of workers on rotational with nights was found to be the highest (109, 71%), followed closely by those working on rotational shift work

without night shifts (24, 16%) and (20, 13%) reported to be on straight day shift (Figure 4.2).

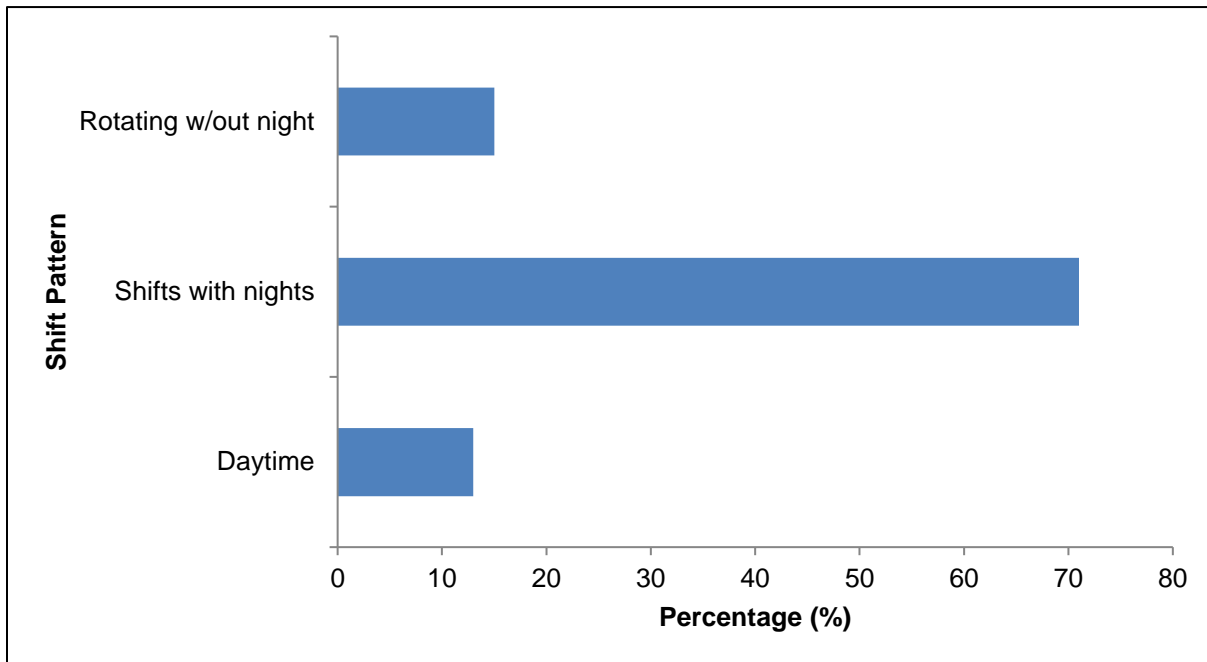
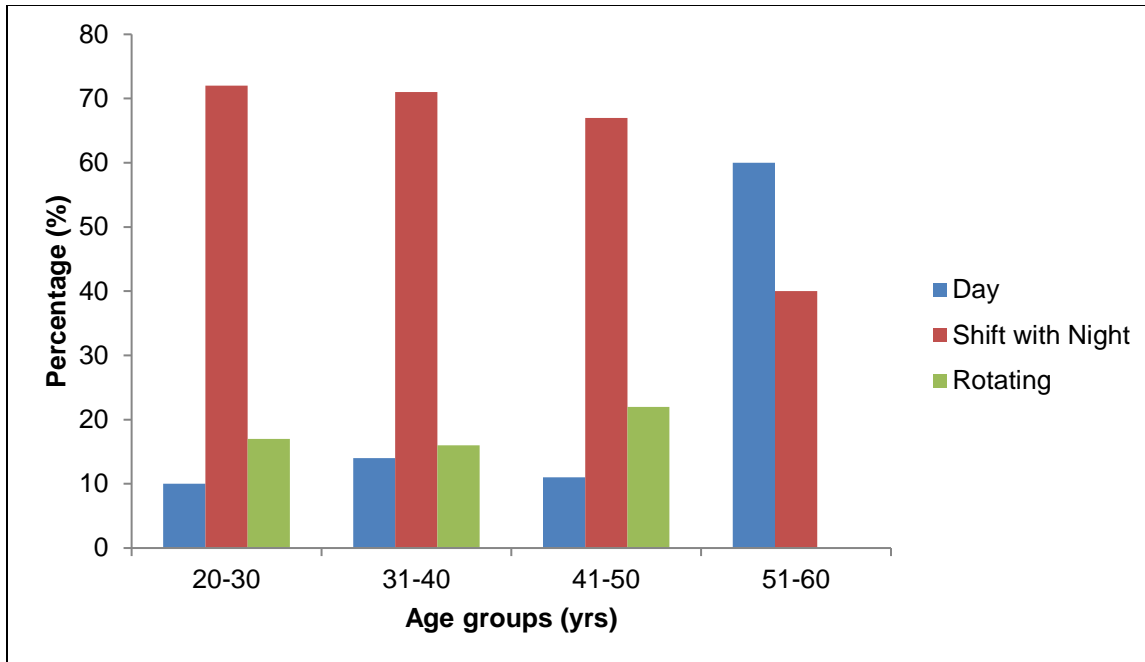


Figure 4.2 Participant's shift patterns (n=152)

Figure 4.3 shows the allocation of participants to different shifts in relation to their age groups. Older participants (51-60 years old) were more likely to work day shift whilst the majority of participants who worked shifts with nights were between 20 and 50 years. Many participants within the age group of 41 to 50 years were on rotating shifts (22%). There was no significant association between age group and type of shift ($p=0.21$).



p-value of < 0.05 was considered as statistically significant.

Figure 4.3 Shift patterns of different age groups (n=152)

Figure 4.4 depicts the number of years the participants had been working shifts. Most participants (34%) had been working shifts for one to five years, followed closely by those who had been working shifts for six to ten years (33%).

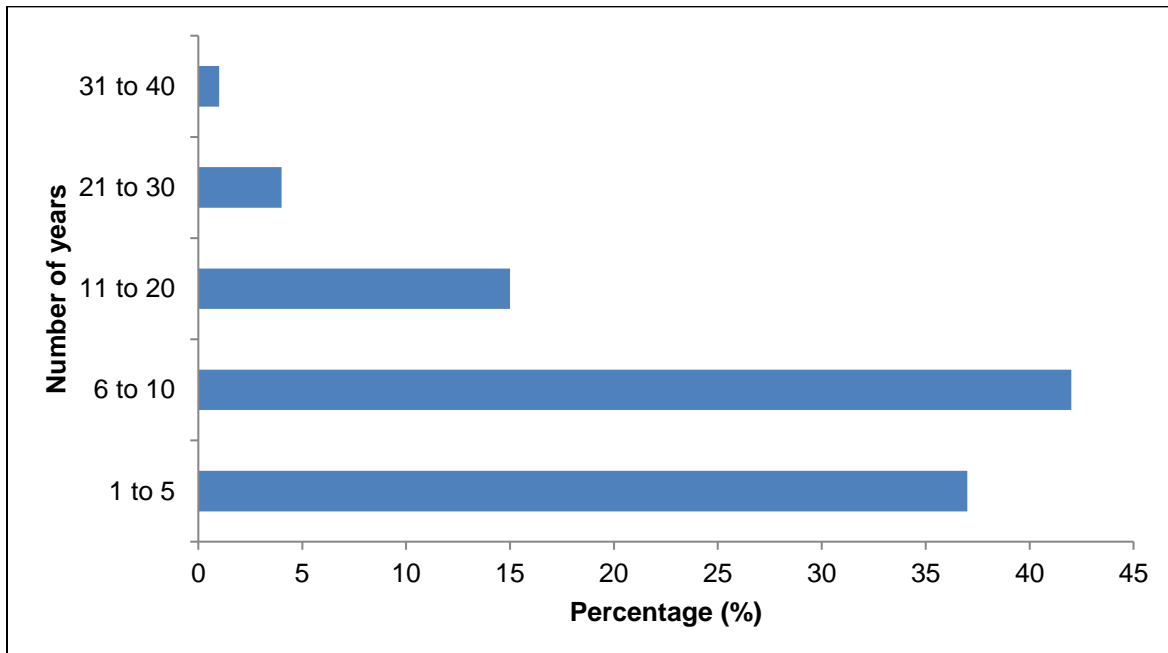


Figure 4.4 Participants' number of years working shifts (n=152).

The results, as shown in Figure 4.5, revealed that a substantial number of employees worked long hours and worked overtime. About 50% of participants worked one to five hours of paid overtime per week, and they all worked a twelve-hour shift. An estimated 4% of the participants in the study worked an additional 20-plus hours per week. In addition, 93% reported one to five hours of unpaid overtime per week. Almost half (47%) of the participants worked from 31 to 60 nights per year (Figure 4.7).

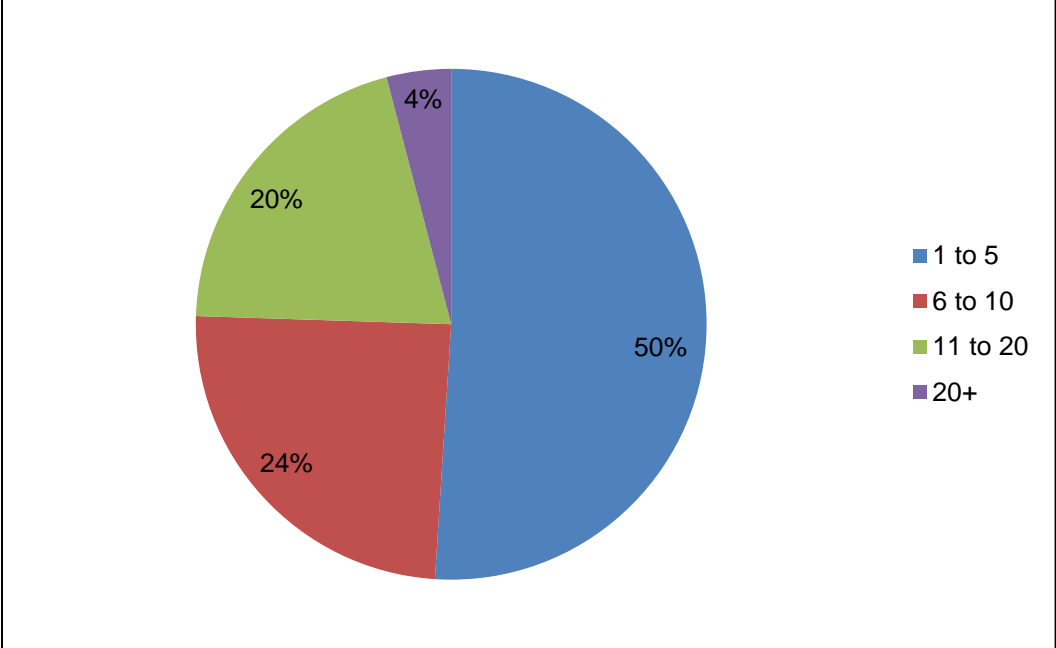


Figure 4.5 Participants' hours of paid overtime per week (n=152).

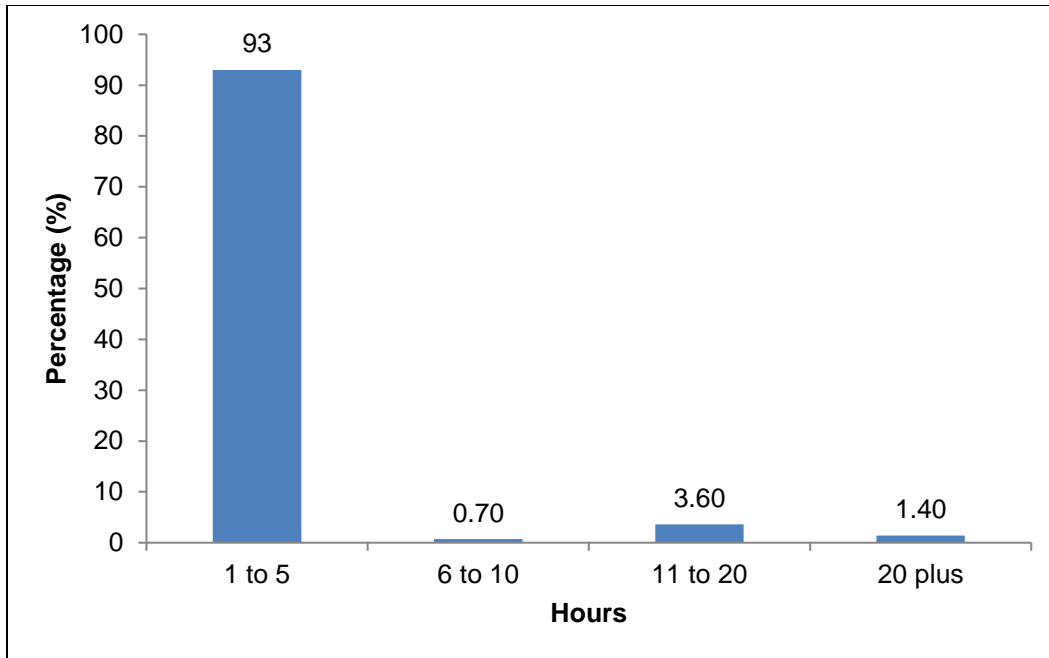


Figure 4.6 Participants hours of unpaid overtime per week (n=152).

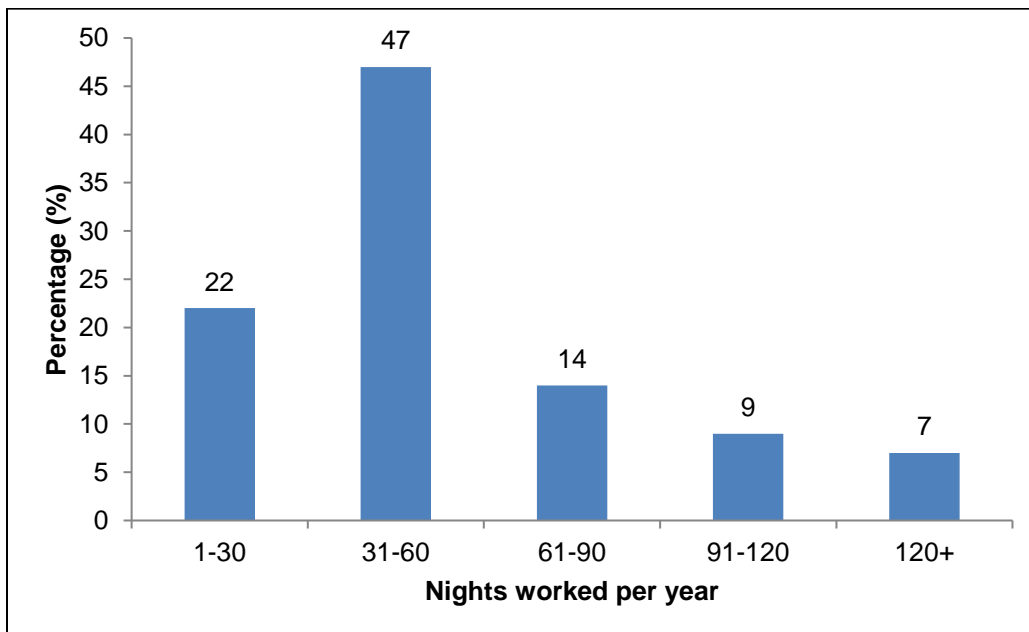
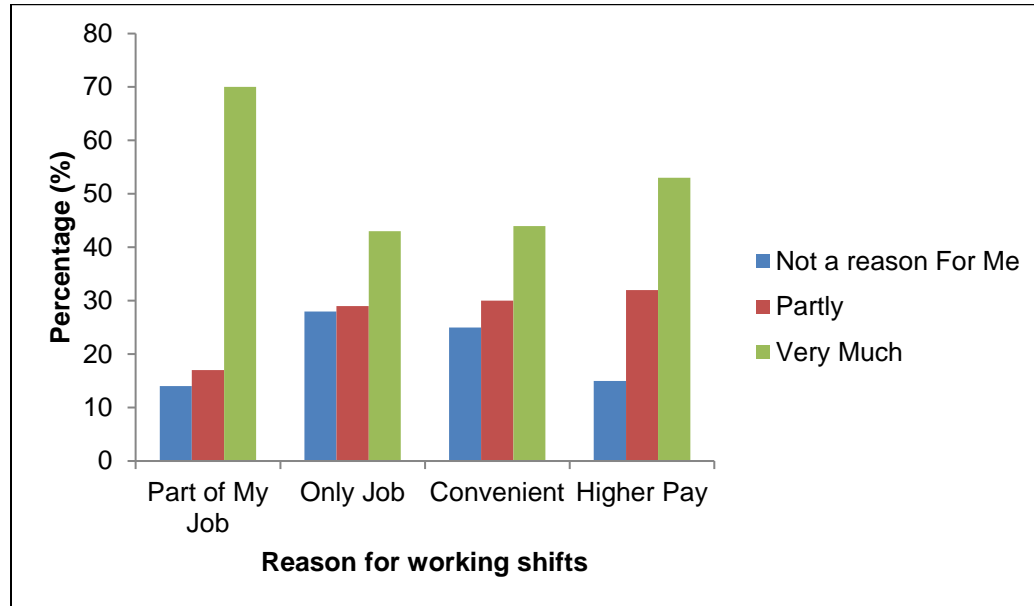


Figure 4.7 Average nights worked in a year (n=152).

Reasons for working shifts in this present study varied. The most common reason, cited by a majority of shift workers was that it was 'part of my job' (70%) (Figure 4.8). For some, however, shift work was preferred because of its 'convenience' (44%). With respect to the rates of pay, 53% of the participants said shift work was preferable

because of higher pay. For the rest, it was the only job available (43%). Chi-square analysis of data showed no statistical significant difference between the age groups and reasons for working shifts (Table 4.2).



p-value of < 0.05 was considered as statistically significant.

Figure 4.8 Reasons for working shifts (n=152).

Table 4.2 Reasons for working shifts stratified by age (n=152)

Variable	20-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs
Reasons for working shifts				
Part of my job				
Not a reason for me	11(64)	5 (29.41)	0 (0.00)	1 (5.88)
Partly a reason for me	9 (45.00)	9 (45.00)	1 (5.88)	0 (0.00)
Very much a reason for me	54 (56.84)	2 (10.00)	5 (5.26)	4 (4.21)
Higher rates of pay				
Not a reason for me	12 (66.67)	5 (27.78)	1(5.56)	0 (0.00)
Partly a reason for me	26 (65.00)	10 (25.00)	2 (5.00)	2 (5.00)
Very much a reason for me	33 (49.25)	28 (41.79)	4 (5.97)	2 (2.99)

p-value of < 0.05 was considered as statistically significant.

When participants were asked if they would prefer working daytime shift only instead of their current shift, 31% of the sample group said 'probably not' and only 9% said 'definitely yes' (Figure 4.9).

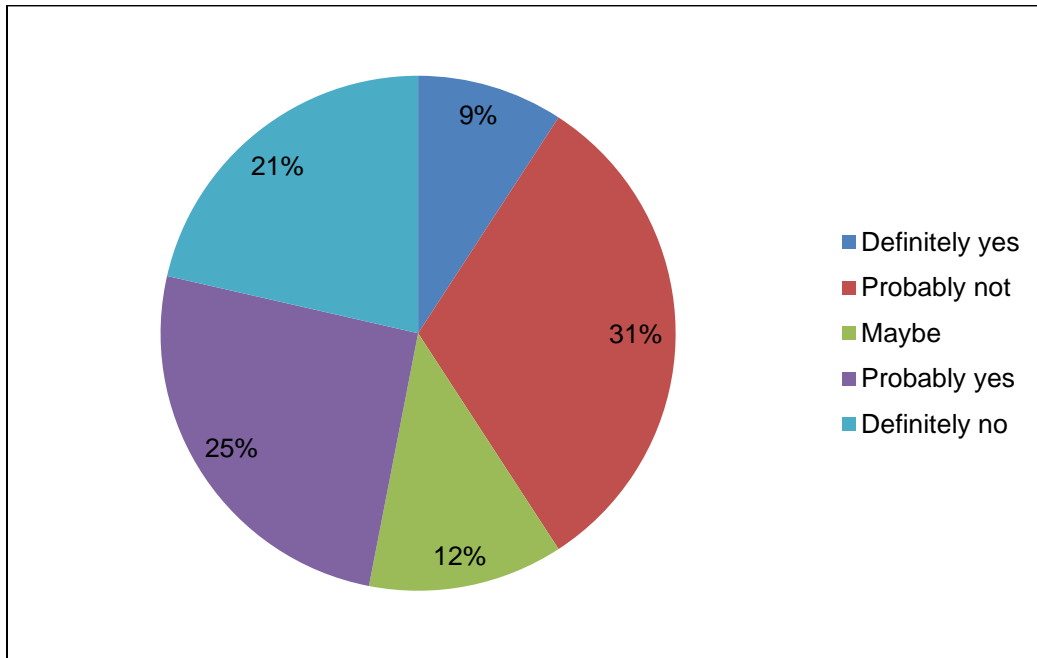


Figure 4.9 Number of participants who would prefer daytime shifts to nights (n=152).

4.2.3 Sleep and Fatigue

For a total sleep disturbance score, all responses from the participant sleep-related scales in the questionnaire were added together as suggested by the SSI validated analysis strategy; a higher score indicated high sleep disturbance. Results showed that more than half of the participants (52%) were not satisfied with their amount of sleep after night shift (Figure 4.10).

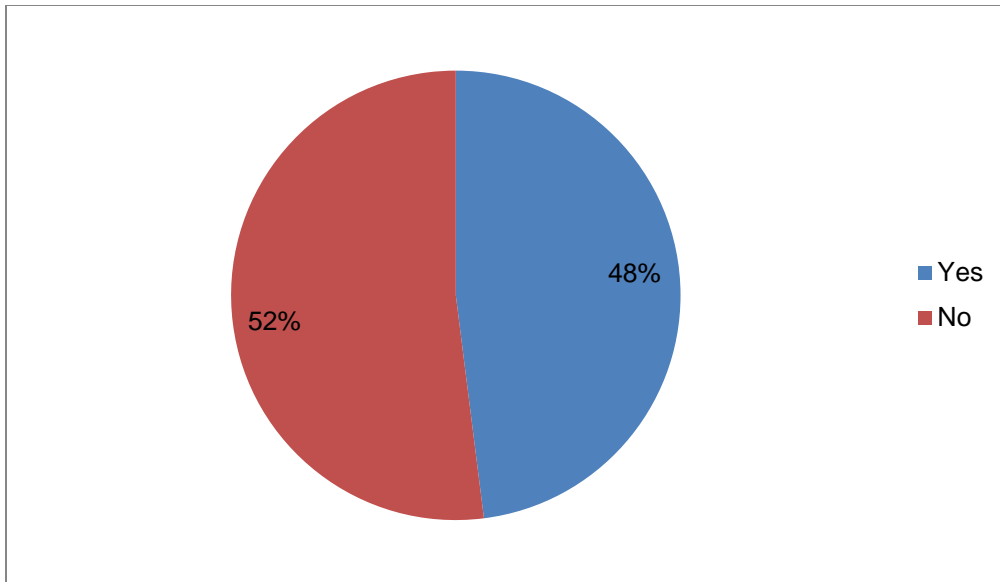


Figure 4.10 Number of people satisfied with hours of sleep (n=152).

The majority of participants (62%) reported that they slept for six to eight hours after night shift; 36% slept for less than five hours; and only 3% had more than eight hours of sleep.

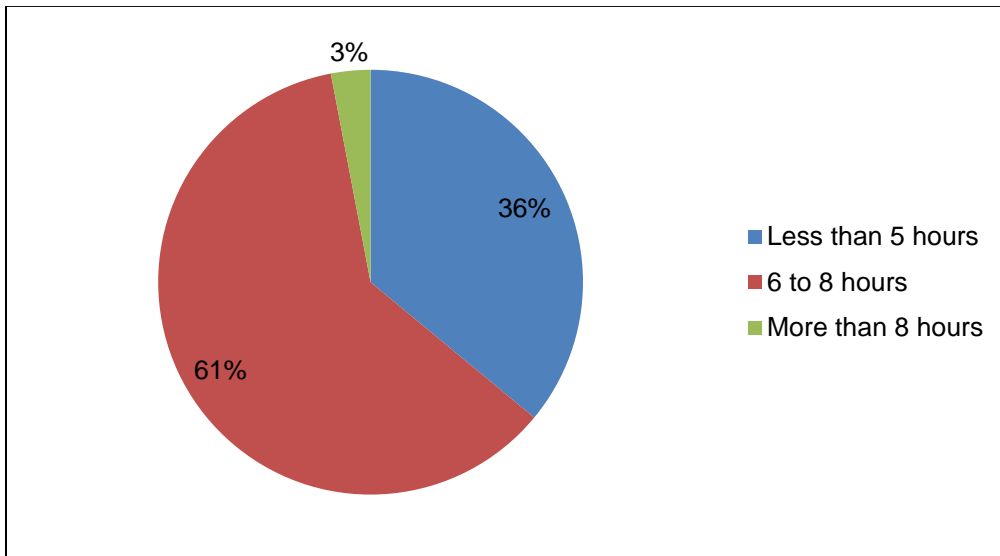


Figure 4.11 Estimated hours of sleep after night shift (n=152).

About 53% of participants struggled to fall asleep after working night shift; 43% indicated not have any problems at all in falling asleep.

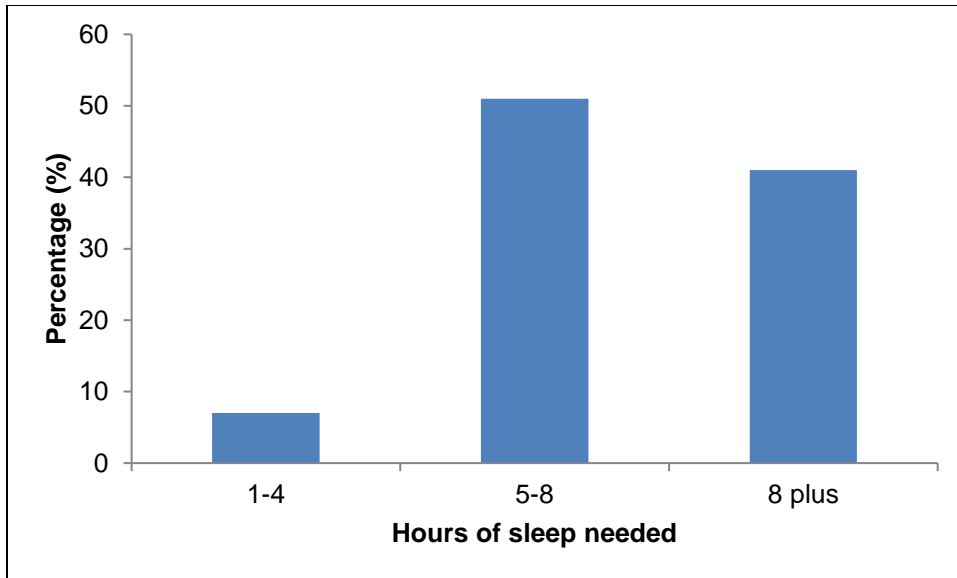


Figure 4.12 Hours of sleep participants felt they needed (n=152).

Irrespective of the type of shift, just over half of the participants (51%) reported needing five to eight hours of sleep; 41% said they needed more than eight hours of sleep; and a minority (7%) reported needing only one to four hours of sleep. Almost half (49%) of the participants reported that they were moderately disturbed while trying to sleep. No significant difference was noted between sleep disturbance and gender ($p = 0.41$) (Table 4.3).

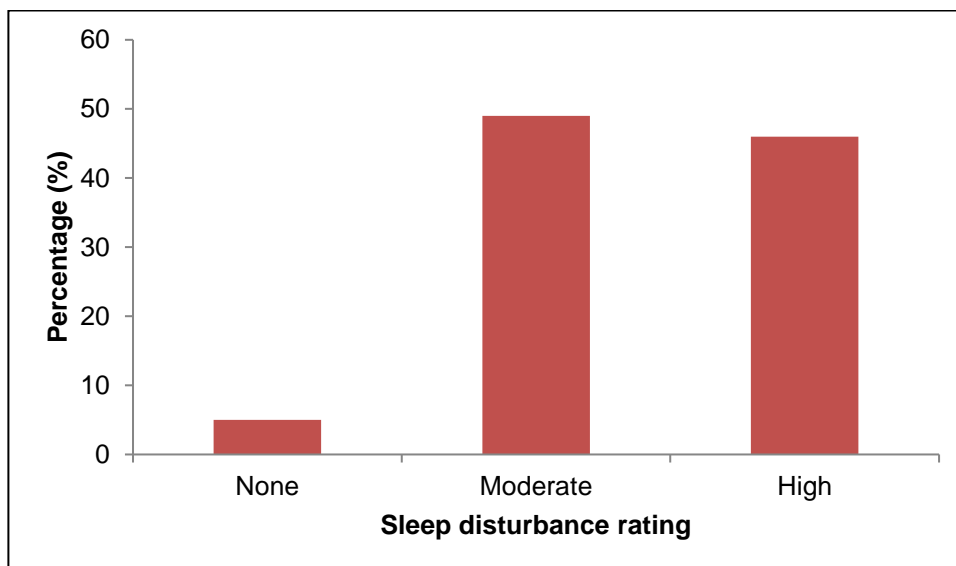
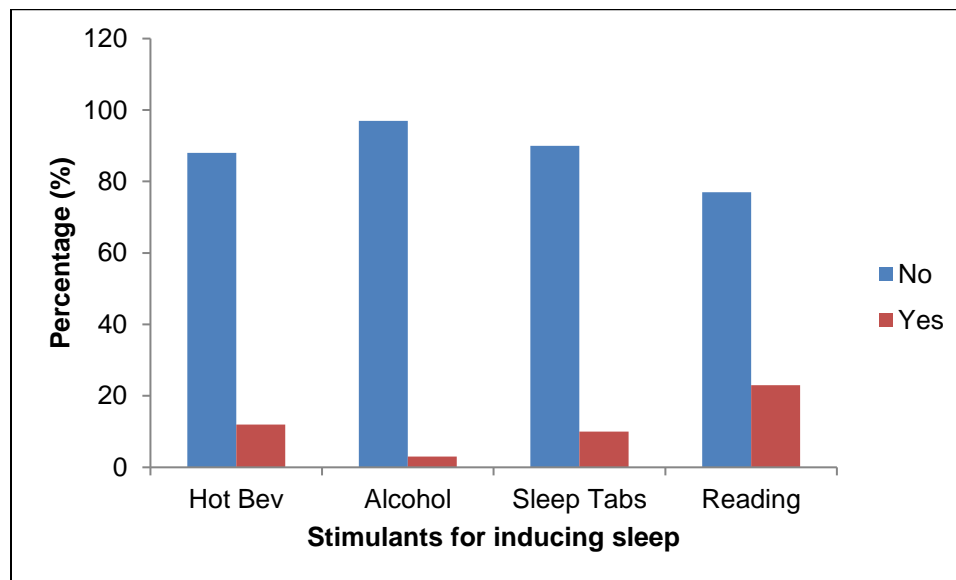


Figure 4.13 Percentage of people who experienced sleep disturbance (n=152).

Table 4.3 Sleep disturbance stratified by gender (p=0.40)

Variable	Male	Female
Sleep disturbance		
Sleep disturbance	5 (71.43)	2 (28.57)
No sleep disturbance	73 (58.87)	51 (41.13)
Moderate sleep disturbance	6 (42.86)	8 (57.14)

Data depicting various ways in which participants induced sleep is shown in Figure 4.14. About 23% of participants indicated that they read in order to induce sleep; 12% drank hot beverages; and 10% used sleeping tablets. Only 3% drank alcoholic beverages to encourage sleep.



p-value of < 0.05 was considered as statistically significant.

Figure 4.14 Strategies used for inducing sleep (n=152).

When participants were asked which shift made them more tired, about 42% of the participants reported that a morning shift made them tired; while 42% of the participants responded that night shift was more tiring. The rest (16%) indicated that there was no difference between morning and night in terms of feeling tired.

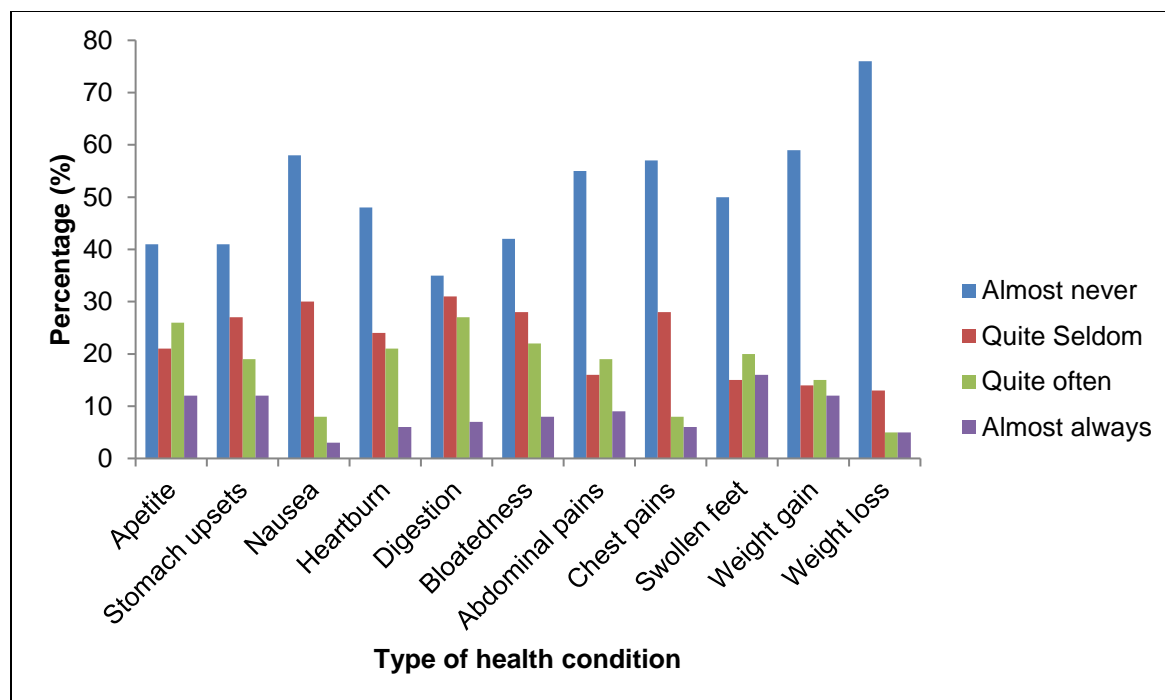
4.2.4 Health Effects of Shift Work

To determine the general health condition of the participants, they were requested to note how frequently they experienced various health related symptoms. The response options were: almost never, quite seldom, quite often and almost always. Two general screening questions were also included concerning medical conditions and medication use since starting shift work. Individual scores were added together and a higher score was associated with poorer physical health (Table 4.4).

Table 4.4 Physical health stratified by age (n=143).

Variable	20-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs
Physical health				
Healthy	38 (57.58)	23 (34.85)	5 (7.58)	0 (0.00)
Satisfactory	20 (51.28)	13 (33.33)	3 (7.69)	3 (7.69)
Poorer health	17 (54.84)	11 (35.48)	1 (3.23)	2 (6.45)

In terms of health outcomes, swollen feet (15%), weight gain (12%), loss of appetite (12%) and stomach upsets (12%) were amongst the common health complaints experienced by participants in this study. There was no statistically significant difference between age and the occurrence of health conditions ($p= 0.37$) (Figure 4.15).



p-value of < 0.05 was considered as statistically significant.

Figure 4.15 Frequency of health conditions reported by participants (n=152).

Table 4.5 below shows different doctor-diagnosed health conditions reported by participants since starting shifts. About 8% of the participants have suffered headaches since starting shifts; an estimated 5% reported backaches; gastritis (4%); ulcers (3%); gallstones (3%); asthma (3%) and depression (3%) were also reported.

Table 4.5 Top 10 doctor diagnosed health conditions related to shift work (n=152).

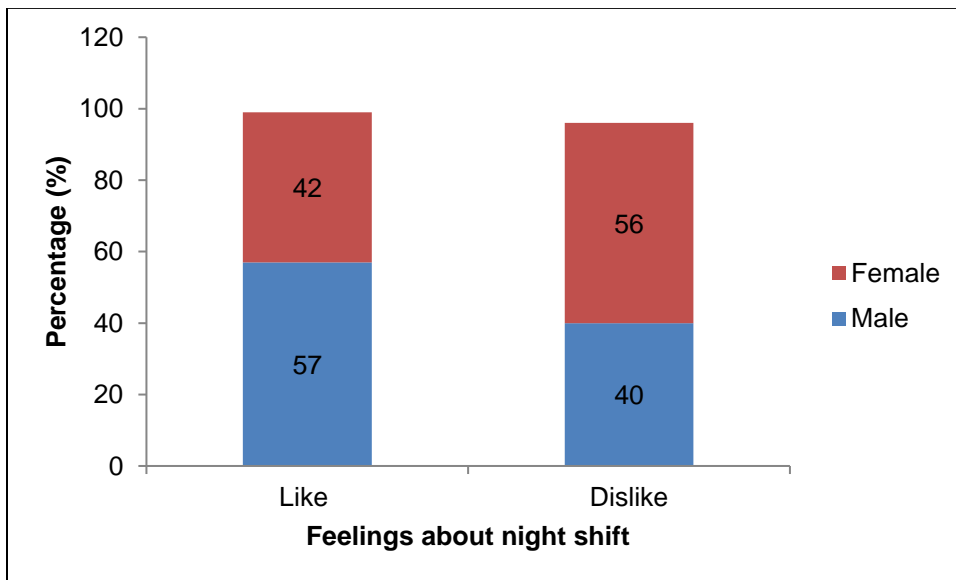
Condition	Never	Before Shift Work	Since Shift Work
Headaches	128 (87)	7 (5)	12 (8)
Backache	123 (83)	17 (11)	7 (5)
Gastritis	132 (90)	9 (6)	6 (4)
Ulcers	134 (91)	8 (5)	5 (3)
Gallstones	136 (93)	6 (4)	5 (3)
Sinutitis/Tonsilitis	137 (94)	5 (3)	4 (3)
Asthma	137 (93)	6 (4)	5 (3)
Depression	135 (92)	7 (5)	5 (3)
Diabetes	145 (95)	3 (2)	4 (3)
Hypertension	138 (93)	6 (4)	3 (2)

4.2.5 Occupational Injuries

Five participants reported having been injured at work over the past two years. No further analysis or stratification was done with respect to participant-reported occupational injuries.

4.2.6 Psychological Effects of Shift Work

The psychological effect of shift work was measured based on three questions, namely: 1) how the participants felt about working during nights; 2) their level of concentration when on night shift; and 3) their attitudes towards night shift. Participants' feelings about night shift are illustrated in Figure 4.16. About 57% of males reported to like working night shifts compared with women (42%).



p-value of < 0.05 was considered as statistically significant.

Figure 4.16 Participants feelings about night shift stratified by gender (n=152).

It is evident from Figure 4.17 that the concentration level of participants during night shift was somewhat compromised. About 31% of the participants reported low concentration levels during night shift.

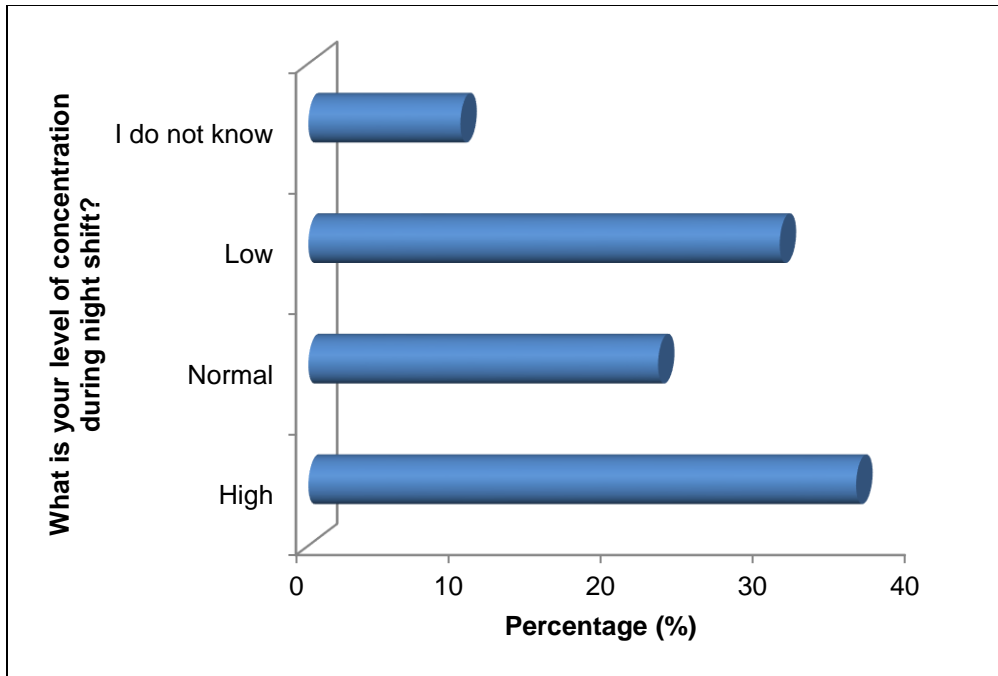


Figure 4.17 Effect of night shift on participants' concentration (n=152).

Figure 4.18 illustrates the impact of night shift workload on participants. Only 11% of participants who participated in the study agreed that the night shift workload was heavier than the day shift.

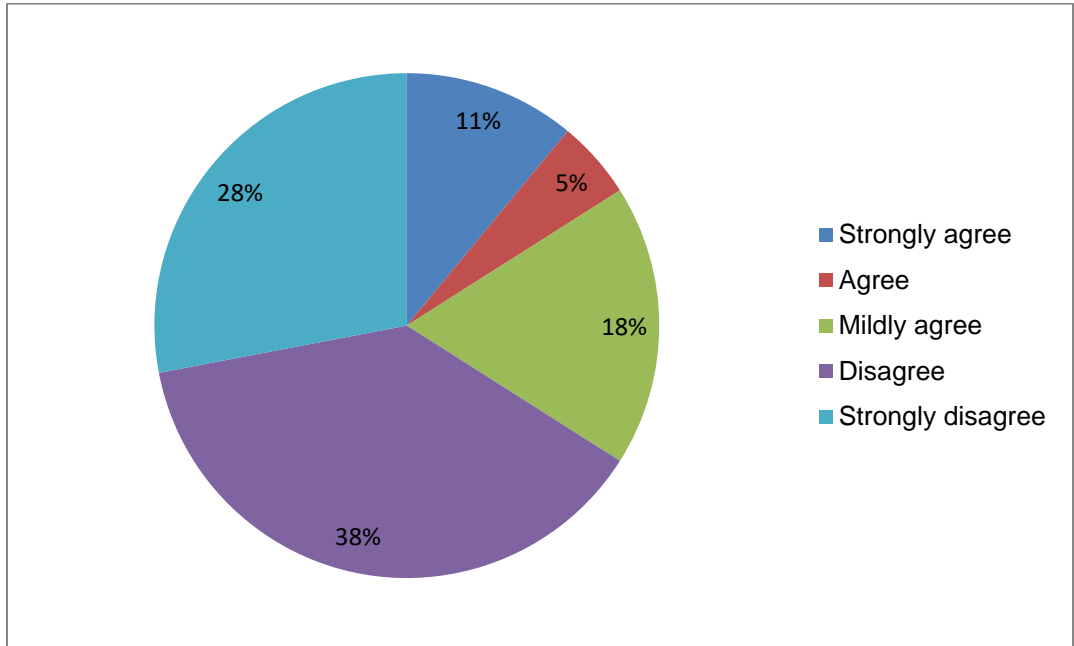


Figure 4.18 Is night shift load heavier than day shift load?

When asked if they had more energy to perform their work during night shift when compared with other shifts, more than half of all participants (52%), who worked night shifts reported feeling active whilst on night shift.

4.2.7 Social and Domestic Impact of Shift

Participants were asked if working shifts interfered with their domestic activities (Figure 4.19). The questionnaire consisted of nine items covering social and domestic activities (hobbies, sports etc.). Participants were asked if they had sufficient time for these activities. A five-point response option was provided ranging from 'not at all' to 'very much'. Item scores were added together to get the total score of general satisfaction. The higher the score, the more satisfied. The responses indicated that more than half of the participants (62%) were very disrupted; about 28% stated that they were somewhat affected and 9% reported that their domestic activities were not disrupted at all. Bivariate testing using the chi-squared test showed that there was no significant association between the gender of participants and domestic and social effects, (Table 4.6).

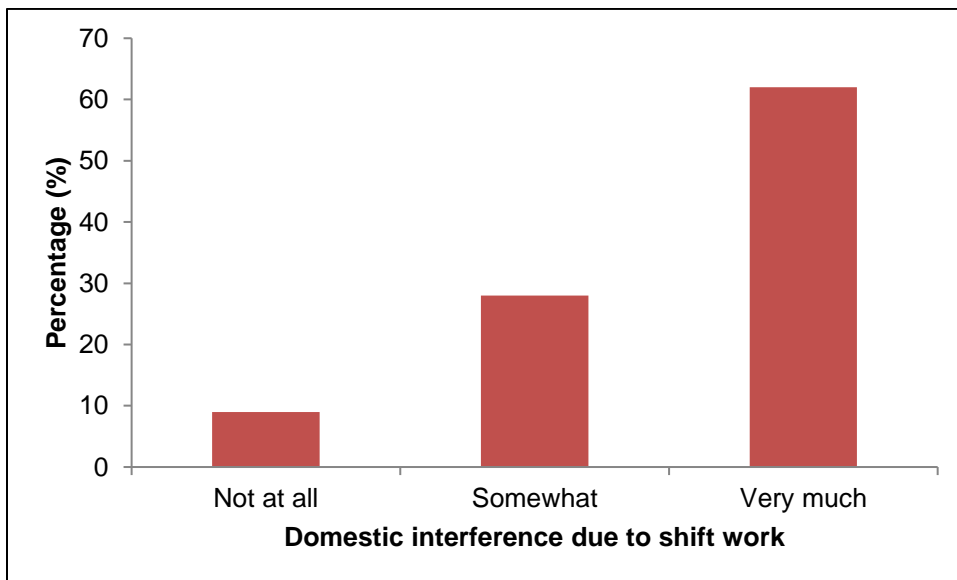


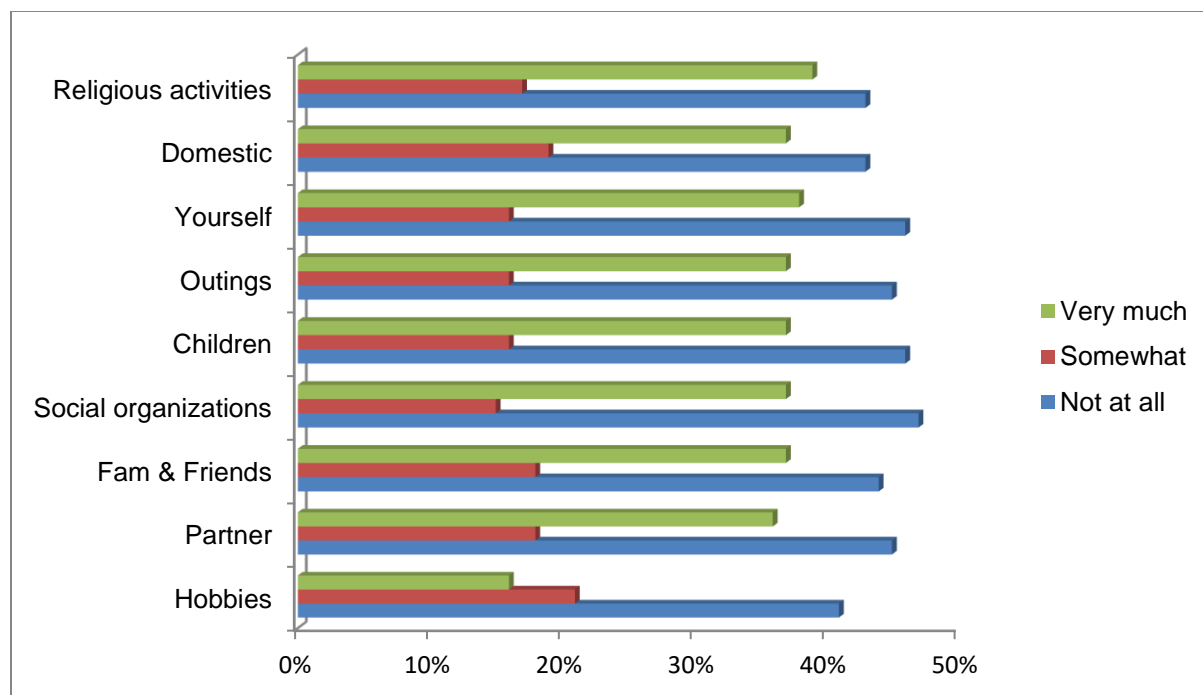
Figure 4.19 Domestic interference due to shift work (n=152).

Table 4.6 Social and Domestic interference due to shift work stratified by gender (n=138).

Variable	n%	Male (%)	Female (%)
Social Effects			
Not at all	51 (36.95)	32 (39.51)	21 (37.50)
Somewhat	21 (15.21)	16 (19.75)	5 (8.93)
Very much	63 (45.65)	33 (40.74)	30 (53.57)
Domestic Effects			
Not at all	46 (33.33)	30 (36.59)	16 (29.63)
Somewhat	62 (44.92)	37 (45.12)	25 (46.30)
Very much	28 (20.28)	15 (18.29)	13 (24.07)

p-value of < 0.05 was considered as statistically significant.

The majority of participants were not happy with time left for several activities, including time left for social organisation (47%); their children (46%); time left for themselves (46%); and time left for family and friends (45%), amongst others (Figure 4.20). Surprisingly, there was no statistically significant difference between males and females for social and domestic impact ($p > 0.05$) (Table 4.6).



p-value of < 0.05 was considered as statistically significant.

Figure 4.20 Participants time left for activities as direct results of working shifts.

Table 4.7 Advantages and disadvantages of working shifts (n=132).

Advantages	n (%)	Disadvantages	n %
5 days off	81 (61)	Working on weekends	41 (31)
Monetary compensation	77 (58)	Disturbed sleeping patterns	31 (24)
Time for domestic chores	33 (25)	Health issues including bad poor nutrition	28 (21)
Time for studies	30 (27)	Less time for social activities and family	53 (40)
		Long hours of work	69 (52)
		Difficulty in studying further	11 (8)
		Night shift	4 (3)

Working on weekends and disturbed sleeping patterns (31% and 24% respectively) were the most cited disadvantages for working shifts. About 21% felt that their health was adversely affected since starting shifts. Amongst health issues raised were stomach ulcers, swollen feet, poor nutrition which led to weight gain and digestion problems. The current shift pattern allows employees to have five days off after working

night shift; this was reported by 61% of the participants as one of the benefits of working shifts. Monetary compensation (58%) in the form of a night shift allowance and overtime were also among the top three advantages.

Table 4.8 Adjusted multiple logistic regression models of reported sleep disturbance using sex and general health status as exposure variables (n=152).

	Reported Sleep Disturbance	
	OR	CI
Sex		
Male	1.00	
Female	1.65	0.25; 10.84
General Health Status		
Healthy	1.00	
Poor Health Status	4.72	0.51; 4.37

*p < 0.05 is statistically significant.

(Adjusted for partner working and years working night shift.)

Table 4.9 Adjusted logistic regression models of health status using age and number of years working shifts as independent variables (n=152).

	Poor Health Status	
	OR	CI
Age		
Less than 40 years	1.00	
Equal or greater than 40 years	1.1	0.53 - 2.26
Number of years working shifts		
1-10 years	1.00	
11 -20 years	0.18*	0.06 - 0.46
More than 20 years	0.17	0.02 - 1.79

*p < 0.05 is statistically significant.

(Adjusted for gender.)

4.10 Adjusted logistic regression models of time left for domestic and social activities using age, sex and work experience as independent variables (n=152).

	Limited Time for Social Activities		Limited Time for Domestic Activities	
	OR	CI	OR	CI
Age				
Less than 40 years	1		1	
Equal or greater than 40 years	3.06	0.60 - 15.60	2.5	0.47 - 13.06
Sex				
Male	1		1	
Female	1.13	1.49 - 2.58	1.46	0.61 - 3.37
Shift work Experience				
1 - 10 years	1		1	
11 - 20 years	0.10*	0.03 - 0.30	0.25*	0.11 - 0.57
more than 20 years	0.12	0.09 - 1.64	0.33	0.04 - 2.51

*p < 0.05 is statistically significant.

(Adjusted for marital status, job class and years employed)

Logistic regression was used to estimate the association between shift work and the likelihood of sleep disturbance, poor health outcomes and limited time for social and domestic activities, adjusting for age; sex; partner working; years working night shift; marital status; job class and years employed. Table 4.8 shows the relationship between measured variables and reported sleep disturbance. Odds ratio (OR) for reported sleep disturbance was slightly higher among women (OR=1.65; 95% CI = 0.25; 10.84; p < 0.05) compared with males, but this was not statistically significant.

Longer shift work experience (i.e.11-20 years) was significantly associated with better health status (OR=0.18; 95%CI = 0.06; 0.46; p < 0.05) (Table 4.8). Shift work experience (11 to 20 years) was also found to be significantly associated with limited time for both social (OR = 0.10; 95%CI = 0.03; 0.30) and domestic activities (OR= 0.25; 95% CI = 0.11; 0.57; p < 0.05) (Table 4.9). Age had no effect on social and domestic

activities, although those aged 40 years and above were more likely to have limited time for social and domestic activities (OR = 3.06; 95%CI =0.60; 15.60 and OR= 2.5; 95%CI=0.47; 13.06). Those with more shift work experience seemed to have more time for social and domestic activities compared with those with less than ten years experience.

4.3 Retrospective Injury Review

The aim of the retrospective record review was to identify any demographic factors that may affect the likelihood of shift workers incurring an injury. Between 2012 and 2013 there were a total of 160 injuries recorded by the company under study. In 2012, the company recorded 65 injuries which included 51 first aid (FA) injuries, six minor injuries (MI) and eight lost time (LT) injuries, as categorised by the company. Near-miss incidents were excluded from the statistics. As seen in Figure 4.21 below, 2013 had the highest number of incidents with 95 total injuries, averaging to 7.9 injuries annually. There were 84 first aid incidents recorded for 2013, nine minor injuries and only two lost time injuries.

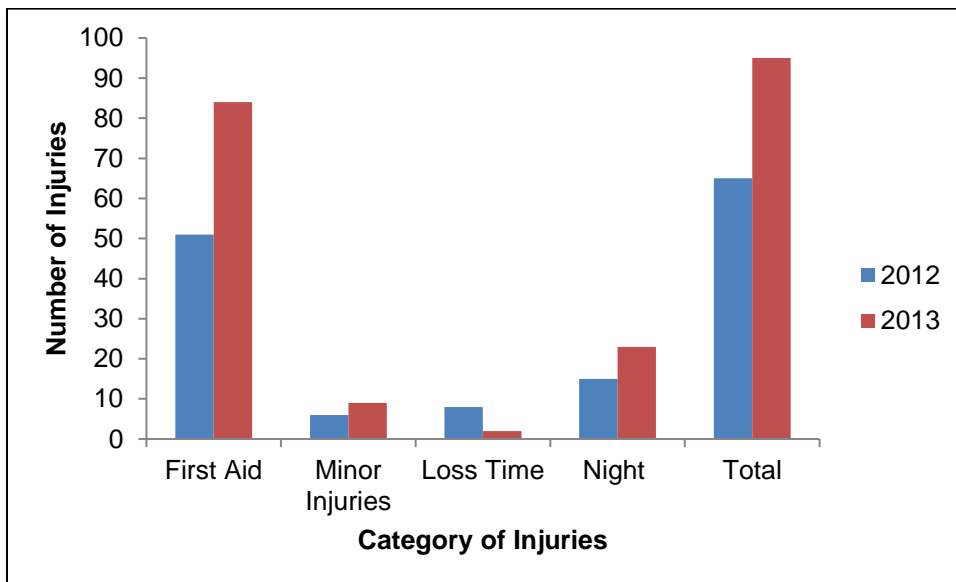


Figure 4.21 Distribution of injuries per category between year 2012 and year 2013.

Twenty-three percent (15, n=65) of the incidents occurred during night shift in 2012, of which 11% (7, n=65) were females. The number of night shift incidents slightly increased to 24% (23, n=95) in 2013, and females accounted for 9.40% (Figure 4.22).

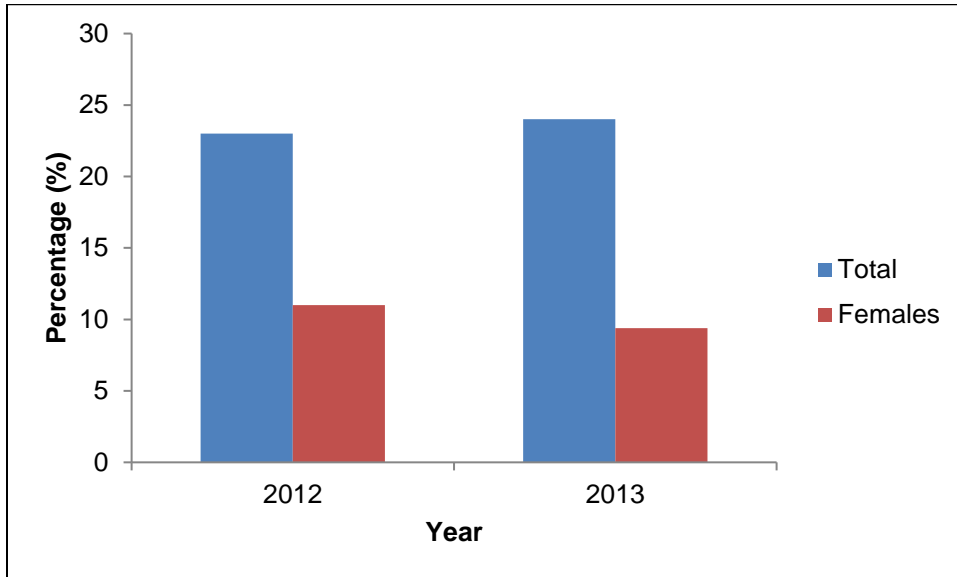


Figure 4.22 Night shift injuries (%) and number of females who were injured during night shift in 2012/2013.

A total of 38 injuries occurred during night shift between 2012 and 2013. The highest number of injuries 16 (42%) occurred during the first segment of night shift, 17:00 to 21:00, and the least number of incidents happened in the last segment of the shift between 01:01 and 05:00 (8, 21%) (Figure 4.23).

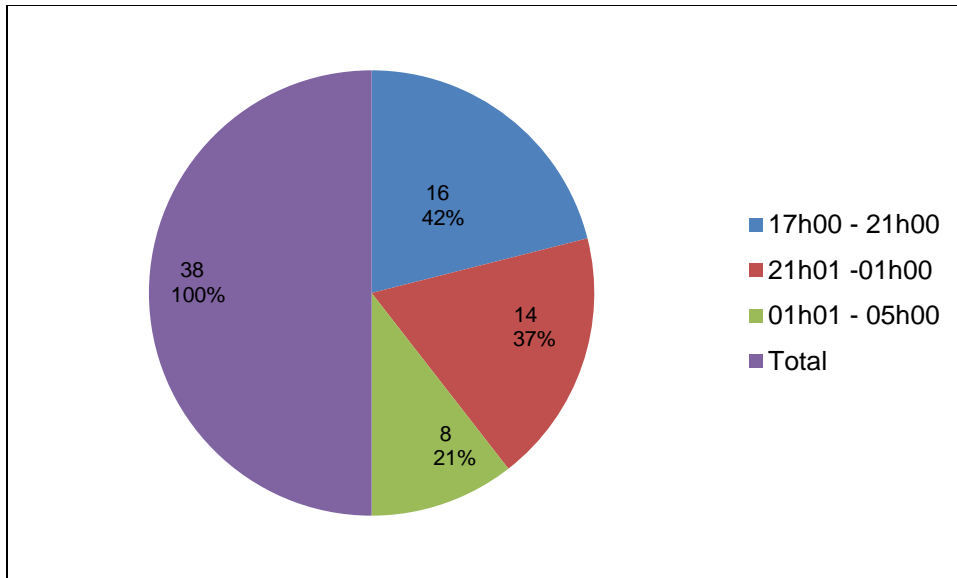


Figure 4.23 Frequency of injuries stratified by year (2012-2013).

4.4 Focus Group Discussion (FGD) Analysis

This section presents the data of results from focus group discussions. The purpose of these interviews was to identify the workers' perceptions of effects associated with working shifts without any restrictions. The following seven questions were asked, together with suitable probing questions:

1. Tell me about your sleeping habits. What is the usual amount of sleep that you get each night?
2. Tell me briefly if your lack of sleep may have affected you personally and your job? Your performance in other things throughout your day?
3. Statistics suggest that night shift employees' average about four hours of sleep per night, compared with day shift workers (eight hours). How do you personally relate to this statement? Do you think that would affect the quality of work especially during night shift?

4. More employees get injured at night and in the early hours of the morning due to fatigue. In what way do you agree with this statement? What types of injuries have you sustained whilst on night shift?
5. Social and family life can be disrupted by shift work Please explain how your current shift takes up time reserved for you and your family.
6. Shift work can cause ill health and can aggravate existing chronic illnesses. What illnesses/conditions do you have that you think are, or may be, caused by working shifts?
7. It is a generally known fact that shift workers sometimes become dependent on working overtime/late shifts to maintain their current lifestyle. Does that happen where you work? How much of a problem do you think this is?

4.4.1 Demographic Profile of Participants

Two focus groups were conducted, one male only and one female only. Homogeneous focus groups create an environment where everyone is more likely to express themselves freely. The mean age for the female group was 41.1 years, and 38.2 years for males. The mean age range was 26 to 62 years. The mean interview duration was 42 minutes. The mean work experience for the female focus group was 11.1 years and 12.6 years for males. Table 4.11 below presents the demographic characteristics of both focus groups.

Table 4.11 Age and experience (in years) of participants (n=11)

	Age	Experience (years)
Female, FG1		
Participant 1	46	15
Participant 2	48	15
Participant 3	33	4
Participant 4	42	15
Participant 5	45	15
Participant 6	33	3
Male, FG2		
Participant 1	26	2
Participant 2	62	40
Participant 3	34	5
Participant 4	39	8
Participant 5	30	8

Five inter-related themes were identified, namely: sleep quality and quantity; shift work and ill-health; accidents and injuries; domestic and social aspects; and overtime.

4.4.2 Sleep Quality and Quantity

This theme focused mainly on the duration of sleep (hours spent sleeping on an average night). Participants were also requested to describe how a lack of sleep impacted on their lives personally as well as on their jobs. Lastly, they were asked if they thought the quality of work was compromised at night. Most participants (10/11, 91%) reported not getting sufficient sleep, especially after night shift.

(Participant 1: FG 1, Female): "I sleep an average of five hours, but I wake up feeling tired, stressed and I cannot work effectively with my colleagues. I regard sleeping as important in a person's life as one cannot work if feeling stressed and irritable. Focusing on your work becomes difficult."

Participants discussed the difficulty in falling and staying asleep after night shift, "*falling asleep is really difficult during the day, takes forever.*" Descriptions included things/tasks

they needed to do once home from night shift, the time it took falling asleep, being woken up every now and then because of the noise and difficulty getting back to sleep once disturbed and awake.

(Participant 4: FG 2, Male) "It depends on weather conditions, if it is hot I cannot fall asleep when I am from night shift, I just relax on the bed and wait for the time to wake up for the next shift. But when I am working during the day I have more sleeping time".

4.4.3 Shift Work and Ill-Health

Most employees perceived their health after starting shift work as a 'bad state of health'. All female participants reported some kind of health condition caused by working shifts and standing for extended periods of time. Swollen feet, gastric and sleep disorders, indigestion and headaches were common complaints. The same symptoms were noted in a descriptive study of 39 day shift versus 60 night shift nurses conducted in Kentucky, USA (Martin 2011). Another study of 476 nurses conducted in Spain found that there was a high incidence of appetite disturbance, sleep disorders, poor health and less leisure time for night nurses compared with those who work day shift (Bonet-Porqueras, Moline-Pallares and Olana-Cabases 2009). These results are almost similar to the current study.

(Participant 1: FG 1, Female) "My problem is that as a supervisor I need to move up and down, ensuring everything is okay. Since starting shifts, I now have a problem with swollen feet. When I was hired I used to wear size 3 but lately because of my feet I now wear size 4 and even 5!! I observe a lot of employees feeling drowsy and sleeping whilst on the job but it is difficult disciplining them because I myself know what they are going through. Night time was meant for sleeping".

(Participant 2: FG 1, Female) "Before I was hired here I used to have normal legs and feet but now because my job requires that I stand for long hours, my legs and feet are always swollen. I can't even wear sandals now because my feet are

ugly with blisters – I don't want people to see them. I also have indigestion problems because I eat at awkward times.”

Most participants attributed their digestive problems to the bad canteen food and eating at awkward times. One participant reported that: *“The food they cook for day shift workers is not the same as the one we get on night shift. The standard is below average and they don't care because they know you will have no choice but buy and eat the food because most food establishments nearby are closed at nights”*. This is consistent with findings from a study conducted among 378 night shift nurses in Hong Kong, where a restricted number of food choices and exhaustion led to intake of food with low nutritional value (Soeres *et al.* 2012).

4.4.4 Accidents and Injuries

Participants discussed how fatigue may lead to human errors, which in turn may lead to injuries during night shift. Fatigue-induced human errors can have major consequences for workers. About 27% of participants reported to have been injured at work before. All these incidents were direct results of drowsiness and fatigue as all of them happened in the early hours of the morning.

(Participant 1: FG 1, Female) “I was once injured at night, I got pinched by a machine at about 3 am in the morning. It is very difficult to remain alert between 12am and 2am.”

(Participant 2: FG 2, Male) “I have seen incidents happen right in front of me but I have never been injured. There are people who sleep-walk and that makes it easy for them to slip, trip or fall”.

The results of this study are similar with those of Akerstedt *et al.* (2002b), who after controlling for physical work load, stress and other factors found that fatal occupational accidents were higher among shift workers. There is also evidence that the nuclear plant meltdown at Chernobyl was due to human error and was related to work scheduling (Mitler *et al.* 1988). The same observations were made for the Three Mile Island reactor incident. When this incident happened in 1979, it was described as America's most serious nuclear accident. According to the investigation, shift workers

failed to recognise the loss of core coolant water between 04:00 and 06:00, resulting in the reactor overheating. This incident was attributed to human error due to sleep deprivation (Walker 2004).

4.4.5 Domestic and Social Effects

Working shifts had a significant disruptive effect on participants' family life, their relationships, and on their children or dependents. In this study, participants experienced difficulty maintaining a balance between shift work and their home life/ social commitments. All participants (n=11, 100%) reported that their social and domestic tasks and/or needs were often pushed aside in favour of work. These results are in contradiction to research done previously. A study conducted by Golla and Vernon (2006) found that working at night is associated with spending more time with children. The study revealed that night shift workers spent 4.4 hours per day with their children, about 30 minutes more than day shift workers. The study also found that evening shift workers spent an estimated 4.2 hours per day with their children, about eighteen minutes more than day workers.

Some of the social and domestic challenges expressed were:

(Participant 3: FG 1, Female) "As a woman, I do not get enough time to spend with my children and husband. We do not give our husbands the love they deserve because we are always tired – the twelve-hour shift is just too long. We cannot even watch television without falling asleep, we give irrelevant responses when children ask questions when watching programmes because we feel tired and sleepy."

Even though all participants elaborated on how their social and domestic lives are adversely affected by working shifts, women clearly defined how their work lives and private lives influenced each other in different ways. Women further discussed how the work/life balance was adversely changed at different transition stages in life. For example when you become pregnant whilst rostered on shifts, having children and having to continue working shifts and overtime whilst all the domestic duties remained the same, and this was challenging. This finding is supported by an Iranian study where

four nurses identified great concerns with fulfilment of priorities as wives and mothers (Nasrabadi *et al.* 2009).

Participants also revealed that they sometimes felt isolated from relatives and old friends due to working nights. One male participant said, *“I cannot attend funerals or other social functions on weekends because I am always working, and when I give my reasons, relatives and friends always think I am giving excuses. This in turn creates some animosity because they think you do not want to attend their functions”*. A study conducted in India supported these findings. The participants, 60 nurses, reported difficulties in meeting family obligations and attending social functions (Soares *et al.* 2012). The results of this study found that there was little or no communication between shift workers and their partners regarding their shift work schedules; this may result in bad feelings, confusion and unnecessary misunderstandings. Improved communication and education may ensure that partners are more positive and understanding towards their partners who are involved in shift work.

4.4.6 Overtime

Overtime enables companies to manage their workloads without having to hire more workers. The main benefit of overtime for workers is that it provides them with a supplemented income without having to look for a second job. Prolonged overtime levels may, however, result in workers becoming dependent on extra money to make ends meet. This may cause a dependency on overtime money to survive. In the current study, employees reported that they were not given an option to choose where overtime was concerned. There was no consultation between management and workers. All the women felt that overtime was not worth it. They wanted it to be taken away as they felt it took them away from their families and the money did not provide any satisfaction.

(Participant 5: FG 1, Female) “Overtime money does not have any good impact in my life, the money is taxed and is not enough. I can’t even pay 10% of my debts. When there was no overtime in place, I could survive. If it can be taken away from me, I would be happier”

(Participant 3: FG 2, Male) "It would be better if one was given a choice. You arrange for your normal twelve hour shift and then you are just told on the day that you will be working overtime. That is not fair on us."

It may be impossible for the company to do away with overtime, especially during the peak season (October to December) when products are in demand. It is therefore vital that an effective overtime policy be developed after proper consultations with employees and union representatives. The findings of this study have shown that the current shift pattern is not preferred by employees. Making overtime compulsory whenever the employer sees a need, and a failure in informing employees in advance when they need to work extended hours, may lead to compromised productivity, health and safety.

CHAPTER 5

DISCUSSION

Many South Africans are involved in night or shift work operations. It is estimated that at least 30% of employees in the mining, health, petrochemical and manufacturing industries work shifts (Visser 1999). In spite of this, shift work research in South Africa has not been given sufficient attention. This study was aimed at investigating employees' perceptions and attitudes about shift work, the balance between work and home, and lastly health effects associated with working shifts. Longer shift work experience, i.e. eleven to 20 years, was significantly associated with better health status (OR=0.18; 95%CI = 0.06; 0.46; $p < 0.05$) (Table 4.8). It would seem that health status tended to be better among those 40 years of age and above, compared with those less than 40 years of age, although this finding was not statistically significant (OR=1.1; 95%CI = 0.53; 2.26). Shift work experience of eleven to 20 years was also significantly associated with limited time for both social (OR = 0.10; 95%CI = 0.03; 0.30, $p < 0.05$) and domestic activities (OR= 0.25; 95% CI = 0.11; 0.57; $p < 0.05$). The odds ratio (OR) of reported sleep disturbance was slightly higher among women (OR=1.65; 95% CI = 0.25; 10.84; $p < 0.05$) compared with males in this study. Qualitative findings revealed that most participants (91%) did not get sufficient sleep time after a night shift; this was mainly because of the chores they had to do after getting home from night shift and disturbances from the household and neighbours. The average time spent sleeping by the majority of participants after a night shift was five hours. Swollen feet, gastric and sleep disorders, indigestion and headaches were some common complaints experienced by shift workers in this study. About 27% of participants reported to have been previously injured at work. These incidents were reported to be related to drowsiness and fatigue. The company's incident records showed a total of 160 injuries between 2012 and 2013, of which 38 occurred during night shift. The records also showed that the majority of injuries happened between 17:00 and 21:00.

The demographic profile of the shift worker has changed over the years. Previously, men were mainly employed in the manufacturing sector where there were continuous

processes to maintain (Health and Safety Executive 2011). Recently, however, females are now involved in this industry as seen in this current study. Employees who are involved in healthcare services, security, the food industry, transport and communication industries are most likely to work night shifts. In sectors such as social and health care, the number of women on night shifts is considerably more than the number of men, while the reverse is true for the manufacturing sector (Health and Safety Executive 2011). In this study there were also more men (56%) than women (41%) employed in shift work in this manufacturing sector.

The age profile for shift workers has also changed. Research conducted by the Health and Safety Executive (HSE) found that young people under the age of 24 years were more likely to work shifts than older workers, and are now twice as likely to work shifts compared with young people twenty years ago (Health and Safety Executive 2011). Data from this study is consistent with previous studies; the largest participating age group fell between 20 and 30 years of age, with only one respondent over 61 years (Figure 1). This study also showed that single workers were more likely to work shifts, with males accounting for 46% (n=40) and females 37% (23). Williams (2008) supported these findings as he concluded that three out of ten shift workers were likely to be single compared with about two out of ten workers employed on day shift. She found that the reason for this discrepancy was that shift workers were generally younger than day schedule workers.

Almost half of the participants surveyed in this study were operators (47%, n=152), about 34% were general workers and supervisors accounted for 6.7%. The patterns of shift schedules worked at this factory are similar to the schedules described in the literature review. Workers are employed on a twelve-hour shift on both day and night shift. It is a three crew system: Shift A, B and C which requires two teams to cover the 24/7 operations whilst the other team is off. Teams have the same days on, days off and rotation pattern. Most participants (71%) were employed on rotational shifts without nights. This number was followed closely by those on rotational shifts without number, and surprisingly there was a small percentage (13%) that reported to be on straight day shift (Figure 4.2). Most shift workers in this study (34%) had been working shifts for one

to five years, followed closely by those who have been working shifts for six to ten years (33%). About 27% of the participants had been on shifts for eleven to 20 years and only 2% have been employed on shifts for 31 to 40 years. Longer shift work experience (eleven to 20 years) was significantly associated with better health status (OR=0.18; 95%CI = 0.06; 0.46; $p < 0.05$) (Table 4.8). It would seem that health status tended to be better among those 40 years of age and above, compared with those less than 40 years of age, however this finding was not statistically significant (OR=1.1; 95%CI = 0.53; 2.26).

In a study conducted amongst nurses by De Castro *et al.* (2010), non-day shift schedules and working compulsory overtime were associated with work-related injuries and illnesses. The study found that 65% of nurses worked more than 40 hours per week, and 23% worked shifts lasting more than eight hours per day. Eighty-three percent of participants worked mandatory or unplanned overtime at least once a month. About 42% of the nurses reported working 1 to sixteen hours overtime a month (De Castro *et al.* 2010). The findings of this study are consistent with the one conducted by De Castro *et al.* (2010), as about 89% of respondents worked 41 to 50 hours per week, with 5% working more than 52 hours (Figure 4.6). Additionally, 93% of the respondents worked between one and five hours of unpaid overtime per week. A considerable amount of research has been conducted on the impact of overtime, long hours and shift work in the health care sector, although very limited data is available in other sectors and particularly for the manufacturing sector. This is despite the fact that most manufacturing companies run 24/7 continuous operations to meet targets. The reason for this special attention may be attributed to the fact that in most countries, including South Africa, the health care sector is the largest employer. For instance, the United States Census Bureau estimates that from 2007 to 2012 approximately 1.8 million new workers were employed by the health care sector in America. The report further indicates that in 2012, the health care sector had a total of 18.6 million workers which made it the nation's largest employer.

Reasons for working shift were assessed. The most common reason, cited by 71% of the shift workers, was 'part of my job'. Some preferred working shifts because of its

convenience. One male worker, single and 26 years of age working as a Stores Controller, reported that although he does not like working shifts he gets sufficient time to study. About 53% of participants reported that shift work was the only available option, while 32% shift workers chose to work shifts for better pay. McMenemy (2007) reported that 55% of full-time shift workers worked shifts simply because it was the nature of the job. The research further stated that only 7% reported choosing shifts because of 'better pay'. The Canadian Bureau of Labour Statistics also supports the two above-mentioned studies. In a study conducted in 1997, it was revealed that 51% of the most cited reason for working shifts was the nature of the job, while better pay was cited by only 6% of shift workers.

Sleep disruption, which includes reduced sleep duration and/or sleep quality, was the most reported health-related challenge in this study. More than half of the respondents (53%) reported having difficulties falling asleep after night work (Figure 4.11). Disturbances from their homes and noise by neighbours caused most of the participants to be disrupted whilst trying to sleep, which led to reduced sleep duration. After night shift the body is generally not adjusted for sleep and daytime sleep is generally not as deep and refreshing as night sleep. One respondent from the focus group commented that even noise from traffic was a problem. A study by Akerstedt (2003) concluded that people working shifts experienced more sleep disturbances than those on fixed day shift. He further observed that shift workers were more likely than day shift workers to experience sleepiness during their work shift (Akerstedt 2003). A Norwegian study by Ursin, Bjorvatn and Holsten (2005) found that shift workers experienced shorter sleep duration than day workers. The odds ratio (OR) of reporting sleep disturbance was slightly higher among women (OR=1.65; 95% CI = 0.25; 10.84; $p \geq 0.05$) compared with males in this study. Having good quality sleep is difficult after working night shift because it is the rising time of biological rhythms which promotes and sustains wakefulness. Environmental conditions such as noise disturbances and light can further exacerbate this. Sleep disturbance may lead to a sleep deficit, which in turn can result to increased fatigue which increases employee risk of errors and incidents.

Only 3% of respondents reported sleeping for more than eight hours; about 36% said they slept for less than five hours. Responses from the focus group discussions were also consistent with these quantitative findings. Most participants reported to have found themselves nodding off while on night shift or having noticed a colleague taking a nap while working during the night. These findings indicate that inadequate sleep is clearly a problem in this workplace. Management may need to consider investigating whether naps of fifteen to 30 minutes may be beneficial to the company, as proven by previous research (Naithon 1992; Edward *et al.* 2013; Geiger-Brown *et al.* 2016). The majority of the respondents (61%) reported sleeping for between six and eight hours (Figure 4.11). Many participants had to find strategies to induce sleep. Twenty-three percent of the respondents read in order to induce sleep, and close to 10% indicated that they used sleeping pills to sedate themselves. About 12% of the respondents drank hot caffeinated beverages such as coffee or tea. It was disturbing to find that a small percentage (3%) drank alcoholic beverages to encourage sleep (Figure 4.14). Alcohol should never be used as a sleep aid. According to Irshaad Ebrahim, Medical Director at The London Sleep Centre, alcohol is more disruptive to sleep as it causes more disturbances during the second half of nocturnal sleep period (Ebrahim *et al.* 2013). He further reported that alcohol may suppress breathing and precipitate sleep apnea, so clearly it is not a good solution in trying to solve sleep problems.

Swollen feet (15%), weight gain (12%), loss of appetite (12%), stomach upsets (12%) and ulcers (5%) were amongst the most common health complaints reported by participants in this study (Figure 4.15). These results are consistent with previous studies. Segawa, Nakazawa and Tsukamoto (1987) conducted a study on Japanese employees in factories, schools and banks. They found that gastric ulcers were more than twice more likely to occur among shift workers than among day workers. A review study by Knutsson and Boggild (2000) also found a positive association between gastrointestinal disorders and shift work. From the 20 studies reviewed, they found that the risk of having gastrointestinal disorders was 36% higher when you have been involved in night shift for 30 or more years. The most cited reason for swollen feet was the long hours of work (twelve hours) and overtime. One female supervisor in this study reported that her feet are always swollen, since starting shifts she has moved from a

three size shoe to a size five. The prevalence of these ailments indicates that there may be a health risk associated with working shifts and more especially night shifts. These health conditions may be further exacerbated by inadequate sleep.

It has been reported in the past that shift work may give rise to various neurophysiological disorders due to the disturbance of circadian rhythms (Saber, Lu and Chou 2005). In this study, shift workers in general experienced a sense of depression and fatigue. An alarming 31% of the participants felt that their concentration was low when on night shift. About 23% of the respondents indicated that they had normal concentration (Figure 4.17). The focus groups reported that their level of concentration got lower and lower as the night progressed, with early mornings being the most difficult time to concentrate on the task at hand. The reason for this could be tiredness due to working longer lengths of shifts and changes in sleeping patterns. Low levels of concentration could lead to impaired performance, which in turn may result in increased work-related injuries. Shift workers in this study also described themselves as being habitually more tired during night shift, especially during the early hours of the morning.

This survey also examined attitudes towards working at night as one of the psychological component of shift work. About 21% of the participants conveyed negative attitudes towards shift work, while 35% reported to sometimes being negatively affected. In most companies there is usually less supervision during night and fewer or no interruptions from management. For this reason, many shift workers feel 'relaxed' and there is less tension. People who function best during night or evening ('night owls'), usually welcome working night shifts. A Canadian cross-sectional study of 376 workers by Jamal (2004) yielded similar findings. The study concluded that shift workers reported significantly higher job stress, emotional exhaustion and psychosomatic health problems such as headaches and upset stomachs than employees on fixed day shifts. Heines *et al.* (2008) also noted an association between shift work and psychological distress, anxiety, depression and burnout. In a British study examining the effects of shift work on mental health, Bara and Arber (2009) concluded that men who worked nights for four years and more were more than twice as likely as men who had never worked nights to report mental health problems.

Most workers, from the focus group discussions regarded the current twelve-hour shift for both day and night shifts as too long. They felt it was even more strenuous when they were required to work overtime, which pushed their total working hours to thirteen or fourteen hours. One of the questions in the questionnaire was: “Do you think night shift workload is heavier than day shift”? A five-point response option was provided, ranging from ‘Strongly agree’ to ‘Strongly disagree’. Results revealed that participants generally believed that the night shift load was heavier than the day shift load (Figure 4.18). The workload is dependent on the production target set, however, and this target is usually the same for both night and day shift. The difference is that there is additional administrative support during a day shift. It should be noted that the biscuit manufacturing process involves many monotonous tasks and this may increase sleepiness and fatigue.

Shift work, and in particular working nights, could cause “considerable disruption of family and social activities as many of these rhythms of the general population are orientated around the day” (Harrington 2001). The researcher found similar results. Not having enough time for socialising (47%), time for children (46%) and for oneself (46%) was common among respondents. About 45% of participants reported not having time to socialise with friends and family. Shift work experience (eleven to 20 years) was also found to be significantly associated with limited time for both social (OR = 0.10; 95%CI = 0.03; 0.30, $p < 0.05$) and domestic activities (OR= 0.25; 95% CI = 0.11; 0.57; $p < 0.05$) (Table 4.9). With more experience, they may have developed coping strategies and better management skills over the years. These findings are backed up by literature. Several studies (Oginska, Pokorsi and Oginska 1993; Baker *et al.* 2004; Bohle and Tiley 1989) highlighted that more experienced workers were able to spend more time with their family and engage more in leisurely activities because the more time they spent doing shift work, the more they learnt to adapt and develop coping mechanisms. This was further explained by Kundi *et al.* (1979), who proffered that the most difficult period in the lives of shift workers is the first five years, where workers try to adapt and adjust to new schedules. In this time period they have to deal with family, social and domestic obligations. They further found that this first five years of shift work also had the strongest effect the physical health. Those who can tolerate shift work

continue and those who cannot cope normally leave (Kundi *et al.* 1979). Interestingly, this is contradicted by many researchers who are of the view that the older the shift worker, the more pronounced the difficulties and health issues compared with younger shift workers (Pati, Chandrawanshi and Reinberg 2001; Rouch *et al.* 2005; Furnham and Hughes 1999). In this study, age had no effect on social and domestic activities, but those aged 40 years and above were more likely to have limited time for social and domestic activities (OR = 3.06; 95%CI =0.60; 15.60 and OR= 2.5; 95%CI=0.47; 13.06).

Domestic chores, shopping, children's homework and not seeing the spouse because of shifts were reported to lead to family dysfunction in several studies (Harrington 2011; Wilson 2002; Rosa and Colligan 1997). This study showed that only 9% of participants believed that shift work did not interfere with their domestic lives. Over half (62%) of the respondents reported an adverse effect on their domestic lives, while 28% of the participants reported that they were somewhat affected (Figure 4.19). From the focus group discussion, female shift workers complained mainly of not being able to assist their children with homework and attending at school events/functions. One female worker said, *"When my shift starts at 05h30 in the afternoon, I cannot assist my child with his homework because as he only comes home at 4h30 after sports, I will be leaving the house for my shift. This is a problem"*. These findings are supported by research conducted by Mott *et al.* (1965) which concluded that regular contact between shift workers and their school-age children is severely reduced during a week of evening shifts. He further stated that this may even be a bigger problem for workers employed on permanent afternoon shifts. For households with children where both the mother and father are employed full-time, it is generally difficult to achieve a work/life balance; this becomes even more challenging when both the parents are working shifts.

Married female shift workers also reported spending less time with their spouses. In most instances the children's needs were put ahead of the spouse's needs, indicating that there was limited time available for proper communication and adult relationships. One female worker reported, *"Sometimes, when my partner wants us to be cuddly and all....I just feel like screaming and want to be left alone because I am always tired. I sometimes think in his mind he may think I am cheating when I am not."* This disinterest

to do joint leisure or recreational activities may be attributed to irritability due to fatigue, which may require several days for recovery (Golla and Vernon 2006). The findings of this study are consistent with the findings by Golla and Vernon (2006) which suggested that married night workers spend less time with their partners. This is contradicted by Skipper, Jung and Coffey (1990), however, who concluded that shift work did not to any significant degree influence family relationships. Domestic chores or responsibilities are generally not equally shared in most households, which could be a reason why most women working shifts have more problems. Excessive domestic chores can be very strenuous for women who work shifts. Women, especially those in the Black community, are generally expected by their partners to look after the children (e.g. bath, feed and assist with homework) and continue to run the household. In most cases there is just insufficient time to finish all these chores in a day. These women are therefore left with no choice but to steal some hours reserved for sleep. This often results in sleep debt and they will feel tired on their next shift and be prone to making mistakes. This is backed up by literature; one Turkish study of 243 female nurses found that overtime, work demands and rotating shifts lowered life satisfaction and caused family conflicts. The nurses reported that because of insufficient sleep, they found it difficult meeting family responsibilities and attending social events (Soares *et al.* 2012).

A retrospective review of injuries investigated the incidence rate and types of work-related injuries occurring during night shift. About 24% (38, n=160) happened during the night between 2012 and 2013. In 2012, the company recorded a total of 65 injuries with 23% (15, n=65) occurred during night shift. There was a slight increase in night shift injuries (24%, 23, n=95) in 2013; this could be attributed to the fact that prior to 2012 the company did not have an effective system for the reporting and recording of incidents (Figure 4.21). In this study, the highest number of night injuries (42%, n= 16) happened during the first segment of the shift (17:00 to 21:00) (Figure 4.23). The findings of the current study concur with the results of a cross-sectional observation study by Mustard *et al.* (2012), who estimated the rate of work injury over a 24 hour period among Ontario workers. They concluded that the incident rate for a work related injury was elevated between 17:00 to 24:00 and in the early hours of the morning (00:00 to 05:00). An early start to the shift (05:30), as in the current study, necessitates an early start to the

working day. Some employees indicated that they started their day as early as 03:30 because of limited transport available in the morning to get to work. This may cause employees to be fatigued in the morning when they start their shift, as well as towards the end of the shift because they had not had enough sleep. Delaying the start of the shift by at least an hour could improve their alertness.

The frequency of injuries was found to be less during night shift compared to day shift (38 vs. 122), however the rate of severe injuries was found to be higher at night. The most severe incident occurred around 21:00, necessitating the employee to be booked off for seventeen days. Severity was measured by the number of lost work days. This finding is supported by those of Ong *et al.* (1987), where it emerged that of a total of 921 injuries recorded over a five-year period in an iron and steel mill over 40% (383 injuries) occurred during the morning shift (07:00 – 15:00). About 210 injuries happened during the afternoon shift (15:00 – 23:00), and only 150 injuries were recorded for the night shift. The same study found that although less injuries were reported for the night shift compared with afternoon and morning shifts, injuries occurring at night were more severe and required more sick leave (Ong *et al.* 1987). The reason for this could be that the level of concentration is compromised during the night. On the contrary, some researchers have found that the accident rate significantly increases during night shift. Smith, Folkard and Poole (1994) found that in a car manufacturing industry there was a 30-50% increase in accident risk on night shift. Another study investigating the rate of accidents among shift workers concluded that the risk of having a fatal occupational accident was higher on the night shift (Akerstedt *et al.* 2002).

Several studies have found that women who work non-standard shifts have an increased risk of injury than men (Wong, 2001). This was said to be attributed to differences between women and men in terms of job tasks and domestic responsibilities such as chores and care giving. Women generally spend more time taking care of the household, which may result in fewer hours of sleep. This study did not yield the same results. Out of 23% (15, n=65) of the injuries that occurred during night shifts in 2012, only 11% (7, n=65) were females. In 2013 the number of night shift injuries increased to 24% (23, n=95) with females accounting for 9.40% (Figure 4.22).

From the focus group discussions, about 27% participants reported to have been injured at work during night shift. The most cited reason for these injuries at night was fatigue, which according to participants led to reduced concentration. Participants felt that the most difficult period to stay alert was the early hours of the morning (00:00 to 03:00). Performing monotonous tasks, for example putting a label on a box of biscuits, may also contribute to this challenge. The study also showed that women are more likely than men to be injured during a night shift. The 27% who reported having being injured during night shift were all women. These results are consistent with those of the Labour and Income Dynamics Survey that was conducted between 1996 and 2006. This survey was aimed at investigating the trends in work injury by shift type. After adjusting for potential confounders, it found that the rate of injury declined during the period under review (1996-2006) but did not decline for night shift workers. Night shift work was positively associated with work injury for women [OR=2.04, 95% CI 1.13-3.69] and men [1.91, 95% CI 1.21-3.03]. The survey concluded that the excess risk of work injury attributed to shift was 14.4% for women and 8.2% for men.

This study also evaluated the advantages and disadvantages of working shifts. The findings are consistent with those stated in wider literature, with benefits being monetary compensation, having long days off after changing shifts, time for studies and time to do chores such as shopping during the day while everybody else is at work. These results are consistent with the study by Finn (1981), which found that financial incentives provided by working shifts and extended free time during the day was reported as advantageous. Furthermore, he also reported that employees were able to spend some of their paid hours studying because of the quiet environment provided by night shift work (Finn 1981). The disadvantages include that parents may feel they get less time to spend with their family, relatives and friends; working on weekends; having to deal with compromised health; and long hours of work. The conclusion was that shift work, especially involving night shift, can negatively impact on the health of workers. Sleep disturbance and its impact on the lives of shift workers was confirmed in this study. Insights were provided on how family and social lives were disrupted.

5.1 Limitations

Some of the perceived limitations of this study were:

- The limitation of this study is that it investigated the effect of shift work for permanent employees who were actively involved in shift work. For these people the effects may be manageable enough for them to remain in their current employment. Had the study also included employees who had previously been employed on shifts but left because of the negative effects, the study might have found greater insight on the effects of shift work which may have caused the employees to leave shift work.
- The relationship between shift work and ill-health may be due to socio-economic status. Shift workers are normally employed in positions that represent a lower socio-economic status than those working on day shifts (Kiviamaki, Ferrie and Hagberg 2001). People with lower educational levels are more likely to live an unhealthy lifestyle than individuals of a higher socio-economic status.
- Some shift workers may have underestimated their health effects and regarded their health complaints as a 'natural' component of their work, and may be more accepting of discomfort and not report them.
- The study design did not use a control group. The use of fixed daytime employees as a reference group would have been beneficial in ascertaining group differences.
- Employees may not have been forthright with information if they were concerned that the results of this study would be presented to management. In addition, some may have felt uncomfortable with the fact that the researcher was a current employee of the company at the time of data collection.

CHAPTER 6

RECOMMENDATIONS AND CONCLUSIONS

Data collected in this study and the literature that was reviewed supports the contention that shift workers are at an increased risk of adverse health effects. Unfortunately shift work cannot be discontinued. Recommendations and conclusions based on the findings will be discussed in the following sections.

This research investigated the main effects of shift work and its impacts on the lives of employees in a biscuit manufacturer. It has utilised questionnaires as a primary means of data collection. Focus group discussions were also conducted to obtain in-depth perceptions without any restrictions of structured questions. Based on the study findings, there is sufficient evidence to conclude that shift work that includes nights and working extended hours may be detrimental to workers' health. Longer shift work experience, i.e. eleven to 20 years, was significantly associated with better health status and it tended to be better among those 40 years of age and above, compared with those less than 40 years of age, although this finding was not statistically significant. Shift work experience of eleven to 20 years was also significantly associated with limited time for both social and domestic activities. The odds ratio (OR) of reporting sleep disturbance was slightly higher among women compared with males in this study.

Qualitative findings revealed that most participants (91%) did not get sufficient sleep time after night shift; this was mainly because of the chores they had to do after getting home from night shift and noise from the household and neighbors. Five hours was the average time spent sleeping by the majority of participants in the FGD after night shift. Swollen feet, gastric and sleep disorders, indigestion and headaches were some common complaints experienced by shift workers in this study. About 27% of participants reported having previously been injured at work. All these incidents were reported to be direct results of drowsiness and fatigue. The company's incident records showed that there were more incidents during the day shift than the night shift, however the night

shift had more severe injuries. Records also showed that the majority of injuries happened between 17:00 and 21:00 at night, which is supported by the wider literature. It is suggested that some flexibility be considered when scheduling rosters and that all stakeholders must be involved when planning shift rosters. Shortening shift length, education and training in sleep hygiene and coping mechanisms, and encouraging rest during the night shift are some of recommendations based on the findings of this study.

The economic future of South Africa is dependent upon every worker who wakes up every morning to go and work. The South African government owes it to its people to ensure that proper legislation is put in place, and more research is done to ensure a healthy work/life balance. More research is needed to understand the effects of shift work on the health and safety on employees in the manufacturing sector since previous studies were mainly conducted in the health care sector. Optimal work schedules in industrial settings and countermeasures such as the ones mentioned above (sleep hygiene, napping etc.) should be tested to investigate their efficacy, since shift work and night work cannot be eliminated.

The following recommendations are made by the researcher to minimize the impact of shift work on employees:-

a) Flexible Work Schedules

Previous research has revealed that flexible work schedules can lead to greater work/life balances (Levin-Epstein 2006). Flexibility towards shift schedules was one of the weaknesses of the company in this study. Employees were not given the option to work overtime or have a say on the kind of shift pattern they would have preferred. Over and above that, they are not included when planning schedules. Whilst it can never be possible to meet the needs of different employees when doing rosters, it is important that management tries to consider the input of all those involved. When all stakeholders (employer, employees, labour union) contribute towards the planning of shift schedules, then employees will most likely accept and benefit from those shift schedules.

It is clear from the findings of this study that most employees were not happy with the current twelve-hour shift. Management needs to consider reverting to the eight-hour

rotational shift as pointed out by some employees. The current shift pattern requires employees to clock off work at 05:00. Most workers without their own vehicles complained about waiting too long for transportation, which exponentially decreases the time to get home to rest. If management cannot change the shift pattern, it is important that they consider providing transport for their workers.

b) Workplace Conditions

It is the employer's legal responsibility as set out in the Occupational Health and Safety Act, No. 85 of 1993, to provide a workplace that is free from hazards and without risks to employees. The Code of Good Practice on the Arrangement of Working Time further stipulates that employers must regularly assess whether the work environment, in particular lighting and heating are adequate for health, safety and physical comfort of employees, particularly night workers. Management is therefore encouraged to provide rest rooms separate from canteens and the work area, that will provide tranquillity for shift workers. An environment that is bright and cool will assist workers to be more alert on the job.

c) Napping

According to previous research, napping may be a powerful means of staying refreshed and also important for maintaining vigilance and alertness both before and while on duty (Dinges and Broughton 1981; Dinges *et al.* 1987). The management can then benefit from developing and implementing napping rosters for employees on night shift. Naps as short as 20 to 45 minutes have been shown to provide many benefits for shift workers (Naithon 1992). It is vital to first look at possible barriers (e.g. appropriate and adequate napping facilities, production demands etc.) to successful implementation of napping as a fatigue countermeasure to avoid failure and abuse by employees.

d) Education of workers

There is a significant impact of shift work on the employee's social and family lives. Employees need to obtain an appropriate balance between their work and personal lives. Education or awareness programmes need to be implemented by companies to assist employees to develop coping mechanisms to mitigate the impact of shift work on

the social and domestic fronts. Information should be made accessible to the families of shift workers and to encourage them to be informed about all aspects of shift work, since they are affected.

e) Sleep Hygiene

Sleep hygiene consists of basic habits and tips that will assist in developing a pattern of healthy sleep. Shift workers should be educated on how circadian rhythms can be influenced to maximise sleep quality. Employees should be encouraged to sleep in dark quiet rooms. What could be also helpful is to use dark curtains for bedrooms. It is important that they discuss their sleep needs with the whole family. Turning off the phone and putting up a 'Do Not Disturb' sign can also be useful.

f) Diet and Exercise

Digestive problems were found to be common in this study. Participants reported eating poorly and at odd times because of their shift patterns. Shift workers should understand that diet plays a vital role in good sleep. They must eat a balanced, high protein low fat diet with lots of fruits and vegetables. Management may assist in this regard by providing a canteen that serves nutritional and reasonably priced foods.

g) Use of wakefulness promoting drugs/stimulants

Drinking a cup or two of coffee at the beginning of night shift may help promote wakefulness. Several studies have indicated that drinking caffeinated beverages may reduce sleepiness and increase alertness during night shift (Freedman *et al.* 2012; Jarvis 1993; Lopez-Garcia *et al.* 2008). Furthermore, a couple of studies have concluded that prophylactic use of caffeine should be prior to the onset of sleepiness, as this is more effective than the use of caffeine to reverse sleepiness. It has also been advised that caffeine should be avoided within four hours of desired bedtime, as it can cause difficulties in falling asleep. As the use of caffeine has been associated with adverse effects such as increased blood pressure, dehydration and disrupted sleep, then this strategy is recommended with caution.

h) Sleep Aids

Some shift workers, as shown in the current study, struggle to fall asleep after night shift. This results in the use of hypnotics or sedatives. While these drugs may be useful in assisting them sleep better, they are not long term solutions as they can be addictive. Sleeping pills offer temporary relief but they do not address the root of the problem. Employees should be encouraged to see the company doctor should they feel that the use of sleep aides will assist them.

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Appendix 1: Shift Work Song by Kenny Chesney Duet featuring George Strait

SHIFT WORK

Shift work, hard work, tired body
In a blue-collar shirt and a baseball cap
union made

He's hot, sweat drops, 'round the clock

Door never locks

And noise never stops

Not all day

Working seven to three

Three to eleven

Eleven to seven

Shift work, tough work for the busy convenience store clerk

Two feet that hurt, going insane

She's mad at some lad

Drove off and didn't pay for his gas and he won't be the last 'round the clock pain

Working seven to three

Three to eleven

Eleven to seven

I'm talking about a bunch of shiftwork

A big ol' pile of shiftwork

Seven to three

Three to eleven

Eleven to seven

Well I worked, shiftwork,

Ten years man, I hated that work

Then I made a break with the money I saved

It took me to the beach to have a beer by the edge of the sea

And this 'round a clock place

I drank my money away

We partied

Seven to three

Three to eleven

Eleven to seven

Appendix 2: Permission Letter



LETTER GRANTING PERMISSION: SHIFT WORK STUDY

Dear Philisiwe Mthemba,

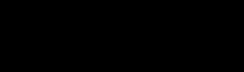
Following your request to conduct the above-mentioned study at Snackworks Biscuits, Westmead, I hereby give you permission.

The permission is granted on condition that you

- 1) do not disrupt production
- 2) that the information will be kept confidential, and
- 3) you forward dates when the study will be conducted.

Kind Regards

Clive Niela



Operations Executive

Date: 19 July 2012

A Division of National Brands Limited

Reg. no. 1948/02289/06

Registered address: 30 Sloane Street, Bryanston, Johannesburg, 2021, PO Box 5159, Roseville, Johannesburg, South Africa, 2106

Tel: +27 (0) 11 707 7280 Fax: +27 (0) 11 707 7899

National Brands Limited directors: S L Crutshley (Chairman)*, O P Cressey*, D Hood, D A MacDougall, K R Philips, *Non-Executive

Divisional Executives: G C Powell (Managing Director), J Leckram (Marketing Director), S Nkomo (Operations Director), P J Spinks (Finance Director)

E Van der Merwe (Sales Director)

Secretary: S Ndlovu

Member of the ABF United Group

Member of the ABF United Group

Appendix 3(a): LETTER OF INFORMATION – QUESTIONNAIRES



Introduction: Greetings, I hope you are well. I would like to invite you to participate in this research study. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information

Title of the Research: Adverse effects of shift work at a biscuits manufacturer.

Principal Investigator/s/researcher: Philisiwe Mthemba, B.Tech: Environmental Health, Postgraduate Diploma: Occupational Health

Co-Investigator/s/supervisor/s: Dr. Poovendhree Reddy (PhD) Tel. :(031) 373 2808
Mr. Sibusiso Derrick Gabela (MPH) Tel. :(031) 373 2809

Brief Introduction and Purpose of the Study: The main aim of the study is to evaluate the psychosocial, physiological and occupational effects of shift work.

Outline of the Procedures: This is a research study to investigate the negative effects caused by shiftwork amongst workers. The sample is a convenience sample of all 362 shift working employees at Snackworks, Westmead. Only permanent employees will be included in the study. Questionnaires, use of focus groups and analysis of injury monthly records will be utilised to

evaluate the impacts of shift work. The researcher will also conduct focus group discussions with 10 employees (Two groups, five participants per group).

Risks or Discomforts to the Participant: The only discomfort that may be encountered is discomfort when answering personal questions.

Benefits: There will be no direct benefit to you for your participation in this study. However, it is hoped that the information obtained from this study will help in identifying and reducing the problems experienced by individual shiftworkers.

Reason/s why the Participant May Be Withdrawn from the Study: Participation is voluntary. There will be no consequences for refusing to take part in the study, for withdrawing and for refusing to answer specific questions.

Remuneration: None

Costs of the Study: All costs will be covered by the researcher.

Confidentiality: Every effort will be made by the researcher to preserve your confidentiality including the following:

- Assigning code names/numbers for participants that will be used on all researcher notes and documents.
- Notes, interview transcriptions and any other identifying participant information will be kept in a locked file cabinet in the personal possession of the researcher. When no longer necessary for research, all materials will be destroyed.

Research-related Injury: No research related injury expected.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher, Philisiwe Mthemba (Tel no. 031 717 1642), my supervisor Poovendhree Reddy (Tel no. 031 373 2808) or the Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.



CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant Date Time Signature / Right Thumbprint

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Full Name of Researcher Date Signature

Full Name of Witness Date Signature

Full Name of Legal Guardian Date Signature

Appendix 3(b): ISITHASISELO 3: INCWADI YOLWAZI – IMIBUZO NGAMA SHIFT



Isingeniso: Sawubona, ngethemba uyaphila. Ngifisa ukukumema ukuba ubambe iqhaza kulolucwaningo Ungabamba iqhaza kuphela uma ufuna ukwenza njalo. Ukukhetha ukungabambi iqhaza ngeke kukulimaze nganoma iyiphi indlela. Ngaphambi kokuba unqume ukuthi uzolibamba iqhaza noma angeke ulibambe, kubalulekile ukuba uqonde ukuthi lolucwaningo lwenzelwani nangokuthi uzolibamba kanjani iqhaza. Zinike ithuba lokufunda ulwazi olulandelayo ngokucophelela. Usibuze uma kukhona into engacaci kahle noma ufuna ulwazi oluthe xaxa.

Isihloko Socwaningo: Imiphumela emibi yokusebenza ama-shift enkampanini eyenza amabhiskidi.

Umcwangingi omkhulu: Philisiwe Mthemba, B.Tech: Environmental Health, Postgraduate Diploma: Occupational Health

Acwanginga nabo/o-supervisor: Dr. Poovendhree Reddy (PhD) Tel. :(031) 373 2808
Mr. Sibusiso Derrick Gabela (MPH) Tel. :(031) 373 2809

Isingeniso esifushane nenhloso yocwangingo: Inhloso enkulu yocwangingo ukubheka imiphumela yangokwenhlalo, yangokwengqondo kanye neyasemsebenzini edalwa ukusebenza ama-shift.

Ukuchaza indlela ezolandelwa: Lolu ocwangingo lokuphenya kabanzi ngezimo ezingazinhle ezibandwakanyiswa nokusebenza ama-shift ngabasebenzi. Kuzosetshenziswa bonke abasebenzi abangama-362 abasebenza e-Snackworks, Westmead. Kuzosetshenziswa labo abaqashwe ngokuphelele kuphela. Imibuzo, ukusebenzisa izingxoxo zamaqembu abhekiwe nokucubungula ama-rekhodi okulimala anyangazonke kuzosetshenziswa ukuthola imithelela yokusebenza ama-shift. Umcwangingi uzobuye abe nezingxoxo namaqembu abhekiwe anabasebenzi abalishumi (Amaqembu amabili anabantu abahlanu ngeqembu).

Ubungozi nokungaphatheki kahle kobamba iqhaza: Ukungaphatheki kahle kungaba kuphela uma uphendula imibuzo eqondene nawe ngqo.

Izinzuzo: Ngeke kube khona izinzuzo ezizotholwa nguwe ngqo ngokubamba kwakho iqhaza ocwangingeni. Nakuba kunjalo, kwethenjwa ukuthi ulwazi oluzotholakala kulolucwangingo luzosiza ukuthola kanye nokunciphisa izinkinga ezibhekene nabasebenzi abasebenza ama-shift.

Isizathu/Izizathu zokuhoxa ekubambeni iqhaza ocwangingeni: Ukubamba iqhaza akuphoqelekile. Akukho okuyokwenzeka uma wenqaba ukubamba iqhaza ocwangingeni, noma uma uhoxa futhi wenqaba ukuphendula imibuzo ethile.

Umholo: Awukho

Izindleko zocwangingo: Zonke izindleko zizokhokhelwa umcwangingi.

Ubumfihlo: Umcwangingi uzokwenza yonke imizamo yokugcina ubumfihlo okuhlanganisa lokhu:

- Ukunikeza amagama/izinombolo zamakhodi kwababamba iqhaza ezizosetshenziswa kuwowonke amanothi nezincwadi zomcwangingi.
- Amanothi, okuqoshiwe ngesikhathi ubuzwa imibuzo nokunye okungaveza ukuthi obambe iqhaza ungubani kuzogcinwa ekhabethe elikhiywayo okungelomcwangingi. Uma lokhu kungasadingeki ocwangingeni kuyobhujiswa konke.

Ukulimala ngenxa yocwangingo: Akulindelekile ukuthi kungakhona olimalayo ngenxa yalolucwangingo.

Abantu ongabathinta uma unezinkinga nemibuzo:

Thinta umcwaningi u-Philisiwe Mthemba (Tel no. 031 717 1642), u-supervisor wami u Poovendhree Reddy (Tel no. 031 373 2808) noma i- Institutional Research Ethics administrator kwethi 031 373 2900. Izikhalo zingabikwa ku- DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.



UKUVUMA

Isitatimende Sokuvuma Ukubamba iqhaza Ocwaningeni:

- Nginyaqinisekisa ukuthi ngitsheliwe umcwaningi, _____ (igama lomcwaningi), ngesimo, indlela oluzoqhutshwa ngayo, imihlomulo kanye nobungozi balolucwaningo - Research Ethics Clearance Number: _____,
- Ngibuye ngaluthola, ngalufunda futhi ngalufunda ulwazi olubhalwe ngenhla (Incwadi Yolwazi Kobamba Iqhaza) mayelana nalolucwaningo.
- Ngiyazi ukuthi imiphumela yocwaningo, kuhlenganisa imininingwane yami yobulili, iminyaka, usuku lokuzalwa, ama-initials kanye nokutholakele ngeke kuvezwe embikweni wocwaningo.
- Ngokwezidingo zocwaningo, ngiyavuma ukuthi ulwazi oluqoqwe ngesikhathi ucwaningo luqhubeka lungacutshungulwa ngumcwaningi nge-computer.
- Ngingakuhoxisa ukuvuma kwami ukubamba iqhaza ocwaningeni nanoma ngabe yisiphi isikhathi futhi lokhu ngeke kungifake enkingeni
- Ngibe nethuba elanele lokubuza imibuzo futhi ngazivumela ngingaphoqiwe ukuthi ngizimisele ukubamba iqhaza ocwaningeni.
- Ngiyakuqonda ukuthi okusha okutholakela ngesikhathi lolucwaningo luqhubeka, okungathinta ukubamba kwami iqhaza ngiyonikezwa khona.

**Igama eligcwele
 lobamba iqhaza**

Usuku

Isikhathi

**Sayina/Isithupha
 sangakwesokudla**

Mina, _____ (igama lomcwaningi) ngiyaqinisekisa ukuthi lona obamba iqhaza ongenhla unikezwe lonke ulwazi ngesimo, indlela oluzoqhutshwa ngayo kanye nobungozi balolucwaningo olungenhla.

Igama eligcwele lomcwaningi **Usuku** **Sayina**

Igama eligcwele lofakazayo **Usuku** **Sayina**

Igama eligcwele lombheki osemthethweni **Usuku** **Sayina**

Appendix 4(a): LETTER OF INFORMATION – FOCUS GROUP



Introduction: Greetings, I hope you are well. I would like to invite you to participate in this research study. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information.

Title of the Research: Adverse effects of shift work at a biscuits manufacturer.

Principal Investigator/s/researcher: Philisiwe Mthemba, B.Tech: Environmental Health, Postgraduate Diploma: Occupational Health

Co-Investigator/s/supervisor/s: Dr. Poovendhree Reddy (PhD) Tel. :(031) 373 2808
Mr. Sibusiso Derrick Gabela (MPH) Tel. :(031) 373 2809

Brief Introduction and Purpose of the Study: The main aim of the study is to evaluate the psychosocial, physiological and occupational effects of shift work.

Outline of the Procedures: This is a research study to investigate the negative effects of shiftwork amongst workers. The sample is a convenience sample of all 362 shift working employees at Snackworks, Westmead. Only permanent employees will be included in the study. Questionnaires, use of focus groups discussions and analysis of injury monthly records will be utilised to evaluate the impacts of shift work. The researcher will also conduct focus group discussions with 10 employees (Two groups, five participants per group).

Risks or Discomforts to the Participant: The only discomfort that may be encountered is discomfort when answering personal questions.

Benefits: There will be no direct benefit to you for your participation in this study. However, it is hoped that the information obtained from this study will help in identifying and reducing the problems experienced by individual shiftworkers.

Reason/s why the Participant May Be Withdrawn from the Study: Participation is voluntary. There will be no consequences for refusing to take part in the study, for withdrawing and for refusing to answer specific questions.

Remuneration: None

Costs of the Study: All costs will be covered by the researcher.

Confidentiality: Every effort will be made by the researcher to preserve your confidentiality including the following:

- Assigning code names/numbers for participants that will be used on all researcher notes and documents.
- Notes, interview transcriptions and any other identifying participant information will be kept in a locked file cabinet in the personal possession of the researcher. When no longer necessary for research, all materials will be destroyed.

Research-related Injury: No research related injury expected.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher, Philisiwe Mthemba (Tel no. 031 717 1642), my supervisor Poovendhree Reddy (Tel no. 031 373 2808) or the Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.



CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant **Date** **Time** **Signature / Right Thumbprint**

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Full Name of Researcher **Date** **Signature**

Full Name of Witness **Date** **Signature**

Full Name of Legal Guardian **Date** **Signature**

Appendix 4(b): INCWADI YOLWAZI – IQEMBU ELIBHEKIWE



Isingeniso: Sawubona, ngethemba uyaphila. Ngifisa ukukumema ukuba ubambe iqhaza kulolucwaningo Ungabamba iqhaza kuphela uma ufuna ukwenza njalo. Ukukhetha ukungabambi iqhaza ngeke kukulimaze nganoma iyiphi indlela. Ngaphambi kokuba unqume ukuthi uzolibamba iqhaza noma angeke ulibambe, kubalulekile ukuba uqonde ukuthi lolucwaningo lwenzelwani nangokuthi uzolibamba kanjani iqhaza. Zinike ithuba lokufunda ulwazi olulandelayo ngokucophelela. Usibuze uma kukhona into engacaci kahle noma ufuna ulwazi oluthe xaxa.

Isihloko Socwaningo: Imiphumela emibi yokusebenza ama-shift enkampanini eyenza amabhiskidi.

Umcwangingi omkhulu: Philisiwe Mthemba, B.Tech: Environmental Health, Postgraduate Diploma: Occupational Health

Acwanginga nabo/o-supervisor: Dr. Poovendhree Reddy (PhD) Tel. :(031) 373 2808
Mr. Sibusiso Derrick Gabela (MPH) Tel. :(031) 373 2809

Isingeniso esifushane nenhloso yocwangingo: Inhloso enkulu yocwangingo ukubheka imiphumela yangokwenhlalo, yangokwengqondo kanye neyasemsebenzini edalwa ukusebenza ama-shift..

Ukuchaza indlela ezolandelwa: Lolu ocwaningo lokuphenya kabanzi ngezimo ezingazinhle ezibandwakanyiswa nokusebenza ama-shift ngabasebenzi. Kuzosetshenziswa bonke abasebenzi abangama-362 abasebenza e-Snackworks, Westmead. Kuzosetshenziswa labo abaqashwe ngokuphelele kuphela. Imibuzo, ukusebenzisa izingxoxo zamaqembu abhekiwe nokucubungula ama-rekhodi okulimala anyangazonke kuzosetshenziswa ukuthola imithelela yokusebenza ama-shift. Umcwaningi uzobuye abe nezingxoxo namaqembu abhekiwe anabasebenzi abalishumi (Amaqembu amabili anabantu abahlanu ngeqembu).

Ubungozi nokungaphatheki kahle kobamba iqhaza: Ukungaphatheki kahle kungaba kuphela uma uphendula imibuzo eqondene nawe ngqo.

Izinzuzo: Ngeke kube khona izinzuzo ezizotholwa nguwe ngqo ngokubamba kwakho iqhaza ocwaningeni . Nakuba kunjalo, kwethenjwa ukuthi ulwazi oluzotholakala kulolucwaningo luzosiza ukuthola kanye nokunciphisa izinkinga ezibhekene nabasebenzi abasebenza ama-shift.

Isizathu/izizathu zokuhoxa ekubambeni iqhaza ocwaningeni: Ukubamba iqhaza akuphoqelekile. Akukho okuyokwenzeka uma wenqaba ukubamba iqhaza ocwaningeni, noma uma uhoxa futhi wenqaba ukuphendula imibuzo ethile.

Umholo: Awukho

Izindleko zocwaningo: Zonke izindleko zizokhokhelwa umcwaningi.

Ubumfihlo: Umcwaningi uzokwenza yonke imizamo yokucina ubumfihlo okuhlanganisa lokhu:

- Ukunikeza amagama/izinombolo zamakhodi kwababamba iqhaza ezizosetshenziswa kuwovonke amanothi nezincwadi zomcwaningi.
- Amanothi, okuqoshiwe ngesikhathi ubuzwa imibuzo nokunye okungaveza ukuthi obambe iqhaza ungubani kuzogcinwa ekhabethe elikhwayo okungelomcwaningi. Uma lokhu kungasadingeki ocwaningeni kuyobhujiswa konke.

Ukulimala ngenxa yocwaningo: Akulindlekile ukuthi kungakhona olimalayo ngenxa yalolucwaningo.

Abantu ongabathinta uma unezinkinga nemibuzo:

Thinta umcwaningi u-Philisiwe Mthemba (Tel no. 031 717 1642), u-supervisor wami u Poovendhree Reddy (Tel no. 031 373 2808) noma i- Institutional Research Ethics administrator kwethi 031 373 2900. Izikhalo zingabikwa ku- DVC: TIP, Prof F. Otieno on 031 373 2382 or dvctip@dut.ac.za.

Appendix 5(a) – Information Flyer (English)

Volunteers Needed for Research Study!!!!

Title of the Research: Adverse effects of shift work at a biscuits manufacturer.

Principal Investigator/s/researcher: Philisiwe Mthemba

Brief Introduction and Purpose of the Study: The main aim of the study is to evaluate the psychosocial, physiological and occupational effects of shift work.

Outline of the Procedures: This is a mixed mode cross-sectional study. The sample is a convenience sample of all shift working employees. Only permanent employees will be included in the study. Questionnaires, use of focus groups and analysis of injury monthly records will be utilised to evaluate the impacts of shift work.

Reason/s why the Participant May Be Withdrawn from the Study: Participation is voluntary. There will be no consequences for refusing to take part in the study, for withdrawing and for refusing to answer specific questions.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher,

Philisiwe Mthemba (031 717 1642)

Human Resources

Ntsoaraleng Mnguni (031 717 1645)

Shop Stewards

Appendix 5(b): Information Flyer (IsiZulu)

Kudingeka ama Volontiya for i-Study!!!!

Isihloko socwaningo : Izingozi ngokwezempilo eziphathelele nokusebenza ama—shifts.

Principal Investigator/s/researcher: Philisiwe Mthemba

Buyacelwa uma unesikhathi ukuthi usize ngokungowalisa i-Questionnaire emayelana nokusebenza ama shifts.

Loluwaningo olwesikole kuphela futhi akekho umuntu ophoqelekile ukuthi abe ingxenye yalo.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher,

Philisiwe Mthemba (031 717 1642)

Human Resources

Ntsoraheng Mnguni (031 717 1645)

Shop Stewards

Complaints can be reported to the DVC: TIP, Prof F. Otieno on 031 373 2382 or dvc_tip@dut.ac.za.

Appendix 6(a): SHIFT WORK QUESTIONNAIRE



Please note that any information you provide in this questionnaire will be treated in the strictest confidence and will not be divulged to anyone EXCEPT DUT.

Please answer the following questions as accurately as possible.

1. GENERAL BIOGRAPHICAL INFORMATION

1.1 Date:

1.2 Age:

1.3 Sex: Male Female

DOMESTIC SITUATION

1.4 Civil status

- a) Married/Living with a partner
- b) Separated/Divorced
- c) Widowed
- d) Single
- e) Never been married

1.5 Occupational Rank

- a) Operator
- b) General worker
- c) Supervisor
- b) Manager
- c) Other.....

(Please specify)

1.6 What is your partner's work pattern?

- a) Daytime (no shifts)
- b) Rotating shifts with nights
- c) Rotating shifts without nights
- d) Permanent nights
- e) Other.....

(Please specify)

- 1.7 What is your present shift?
- a) Daytime (no shifts)
- b) Shifts with nights
- c) Rotating shifts without nights
- d) Permanent nights
- e) Other.....
(Please specify)

SHIFT DETAILS

- 1.8 How long have you worked altogether (period of employment)?
- 1.9 How long altogether have you worked shifts?
- 1.10 On average, how many hours do you work each week excluding overtime?
- 1.11 On average how many hours paid overtime do you work each week?
- 1.12 On average, how many hours unpaid overtime do you work each week (e.g. Over-run of shifts)?

- 1.13 How regular is the shift system you work?
(Please tick one)
- a) **REGULAR** i.e. a fixed roster which is prepared when the cycle of shifts finishes, even if occasional variations occur to meet special requests.
- b) **IRREGULAR** i.e. the duty roster does not cycle or repeat in any regular manner and individual preferences are not taken into account
- c) **FLEXIBLE** i.e. where the individuals concerned are consulted about their preferred duty hours before the duty roster is drawn up.

- 1.14 What are your main reasons for working shifts?
(Please circle one number for each)

		Not a reason for me	Partly a reason for me	Very much a reason for me		
a)	It is part of my job	1	2	3	4	5
b)	It was the only job available	1	2	3	4	5
c)	More convenient for me for my domestic responsibilities	1	2	3	4	5
d)	Higher rates of pay	1	2	3	4	5
e)	Other.....					

(Please give your reason)

1.15 Do you have a second paid job in addition to your main one? Yes No

1.16 How do you normally travel to work?

- a) By public transport
- b) By private transport
- c) By company transport
- d) By foot

1.17 On average, how long does it take you to travel to work?

	To Work		From Work	
a) Morning Shift	_____	mins	_____	mins
b) Night Shift	_____	mins	_____	mins
c) Other	_____	mins	_____	mins

1.18 What is the maximum number of shifts of any kind you have worked between days off in the past months? _____

1.19 On average, how many days off in succession do you normally have?

1.20 In general, when changing from one type of shift to another, what type of shift or day off followed by?

- a) Morning shifts are normally followed by:
- b) Afternoon shifts are normally followed by:
- c) Night shifts are normally followed by:
- d) Other are normally followed by:
- e) Days off are normally followed by:

1.21 On average, how many nights do you work per year?

1.22 On average, how many weekends do you off per 28 days?

1.23 How much advance notice of your roster are you normally given?

1.24 What are the 3 main advantages of your shift system?

- a).....
- b).....
- c).....

1.25 What are the 3 main disadvantages of your shift system?

- a).....
- b).....
- c).....

1.26 Would you prefer working day shift as compared to working shifts?
(circle one)

Definitely not	Probably not	Maybe	Probably yes	Definitely yes
1	2	3	4	5

SLEEP AND FATIGUE

1.27 Do you get enough sleep after night shift?

a) Yes b) No

1.28 How many hours do you get sleep after night work?

a) Less than 5 hours
b) 6 hours to 8 hours
c) More than 8 hours

1.29 After night shift work do you experience any problems to fall asleep?

a) Yes b) No

1.30 Which one of these do you do to induce sleep after night shift?

a) Hot beverages
b) Alcoholic drinks
c) Sleeping tablets
d) Listen to music
e) Reading
f) None of the above

1.31 Which shift do you feel makes you more tired?

a) Morning shift
b) Night shift
c) None of the above

1.32 How many hours sleep do you feel you usually need per day, irrespective of which shift you are on?

HEALTH ASPECT

1.33 Please indicate how frequently you experience the following, by circling the appropriate number:

	Almost never	Quite seldom	Quite often	Almost always
a) How often is your appetite disturbed?	1	2	3	4
b) How often do you have to watch What you eat to avoid stomach upsets?	1	2	3	4
c) How often do you feel nauseous	1	2	3	4
d) How often do you suffer from heart-burn or stomach-ache?	1	2	3	4
e) How often do you complain of digestion difficulties?	1	2	3	4
f) How often to you suffer from bloated or flatulence?	1	2	3	4
g) How often do you suffer from pain in your abdomen?	1	2	3	4
h) How often do you suffer from constipation or diarrhoea?	1	2	3	4
i) How often do you suffer from aches and pains in your chest?	1	2	3	4
j) Do you suffer from swollen feet?	1	2	3	4
k) Do you feel you have put on too much weight since beginning shiftwork?	1	2	3	4
l) Do you feel you have lost too much weight since beginning shiftwork?	1	2	3	4

1.34 Have you suffered from any of the following (diagnosed by doctor)?

	Before starting shiftwork	Since starting shiftwork	Never
a) Chronic back pain
b) Gastritis, duodenitis
c) Gastric or duodenal ulcer
d) Gall stones
e) Sinusitis, tonsillitis
f) Bronchial asthma
g) Heart attack
h) High blood pressure
i) Hypercholesterolaemia
j) Diabetes
k) Kidney stones

- l) Cystitis
- m) Depression
- n) Eczema
- o) Arthritis
- p) Haemorrhoids
- q) Varicose veins
- r) Anaemia
- s) Headaches
- t) Other

1.35 Have you taken any of the following medications for prolonged periods (more than 3 months)?

- | | Before
starting
shiftwork | Since
starting
shiftwork | Never |
|---------------------------------|--|---|--------------|
| a) Tranquilizers | | | |
| b) Sleeping tablets | | | |
| c) Anti-depressants | | | |
| d) Antacids | | | |
| e) Antispasmodics | | | |
| f) Laxatives | | | |
| g) Drugs to control HBP | | | |
| h) Heart medicines | | | |
| i) Vitamins, tonics | | | |
| j) Pain killers | | | |
| k) Steroids | | | |
| l) Anti-inflammatory medicines | | | |
| m) Hormones(not contraceptives) | | | |
| n) Other | | | |

Before starting shiftwork	Since starting shiftwork
--	---

1.36 On average, how many cigarettes
Do you smoke per week?

1.37 How many glasses of alcohol
do you consume per week?

1.38 How many cups of caffeinated

coffee do you drink per day ?

1.39 On average, how many glasses of caffe-
inated cola do you drink per day?

1.40 Have you sustained any occupation injury in the past two years?

Yes.....

No.....

Please specify type of injury and shift

Type

Shift

1.41 How many days of work do you get off?

WORK PERFORMANCE

1.42 My night shift workload is heavier than day shift.
a) Strongly agree
b) Agree
c) Mildly agree
d) Disagree
e) Strongly disagree

1.43 I have more energy to perform during night shift. (please tick one one)
a) Agree b) Disagree

1.44 When working on night shifts which of the following do you experience?
a) More active
b) Active
c) Moderately active
d) Tired
e) Moderately tired
f) More tired

PSYCHOLOGICAL ASPECT

1.45 How do you feel about night shift?
a) Like b) Dislike

1.46 How do you find your level of concentration when working night shift?

- a) High
- b) Normal
- c) Low
- d) I do not know

1.47 Does night shift affect your attitude?

- a) Always
- b) Sometimes
- c) Never
- d) I do not know

SOCIAL ASPECT

1.48 Are you satisfied with the amount of time your shift system leaves you for:

- | | Not
at all | | Some-
what | | Very
much |
|---|-----------------------|---|-----------------------|---|----------------------|
| a) individual hobbies and/or sport activities | 1 | 2 | 3 | 4 | 5 |
| b) your partner | | | | | |
| c) your family, friends and close relations | | | | | |
| d) joining social organizations | | | | | |
| e) your children | | | | | |
| f) week-end outings | | | | | |
| g) yourself | | | | | |
| h) domestic tasks | | | | | |
| i) religious activities | | | | | |

1.49 In general how much does your shift system interfere with the domestic things you would like to do in your leisure time (e.g. sport activities, hobbies etc.)?

1 2 3 4 5

1.50 In general how much does your shift system interfere with domestic things you have to do in your time off work (e.g. domestic tasks, looking after children)?

1 2 3 4 5

THANK YOU FOR YOUR PARTICIPATION

Appendix 6(b): IMIBUZO NGAMA-SHIFT



Ulwazi olunikezayo ngemibuzo obuzwa yona luzogcinwa luyimfihlo futhi ngeke ludalulelwe omunye umuntu NGAPHANDLE.

Sicela uphendule lemibuzo elandelayo ngokweqiniso.

ULWAZI MAYELANA NOMUNTU

1.1 Usuku:

1.4 Iminyaka:

1.5 Ubulili:

Owesilisa

Owesifazane

ISIMO SASEKHAYA

1.4 Isimo sokushada

- a) Ushadile/Uhlala nophathina
- b) Nehlukene/Nehlukanisile
- c) Umfelwa/Umfelokazi
- f) Awushadile
- g) Awukaze ushade

1.5 Isikhundla emsebenzini

- a) U-Operator
- b) Umsebenzi o-General
- d) U-Supervisor
- e) Imenenja
- f) Okunye.....
(Chaza)

1.8 Usebenza nini?

- a) Emini (akunama-*shift*)
- f) Ama-*shift* aguqukayo anobusuku
- g) Ama-*shift* aguqukayo angenabusuku
- h) Ebusuku njalo
- i) Okunye.....
(Chaza)

1.9 Njengamanje iyiphi i-*shift* yakho?

- a) Emini (akunama-*shift*)
- f) Ama-*shift* anobusuku
- g) Ama-*shift* aguqukayo angenabusuku
- h) Ubusuku njalo
- i) Okunye.....
(Chaza)

IMINININGWANE YE-SHIFT

- 1.26 Ususebenze isikhathi esingakanani sekukonke (isikhathi sokusebenza)?
- 1.27 Sekukonke ususebenze ama-*shift* isikhathi esingakanani?
.....
- 1.28 Ngokulinganisa, usebenza amahora amangaki ngesonto kungafaki i-*overtime*?.....
- 1.29 Ngokulinganisa mangaki amahora e-*overtime* ekhokhelwayo owasebenzayo ngesonto?
.....
- 1.30 Ngokulinganisa, mangaki amahora e-*overtime* engakhokheli oyisebenzayo ngesonto (isib. Ukukapakela kwamanye ama-*shift*)?.....
- 1.31 Sinjani isimo sama-*shift* owasebenzayo?
(Khetha okukodwa)

- d) **SIQONDILE** i.e. uhla lokusebenza lwenziwa njalo uma kushintsha ama-*shift*, noma ngalesosikhathi uma kuba khona ushintsho olwenzekayo ukwenelisa izicelo eziyisipesheli
- e) **ASIQONDILE** i.e. uhla lokusebenza aluphindaphindeki futhi izifiso zabantu azinakwa
- f) **SIYAGUQULEKA** i.e. abasebenzi bayabuzwa ukuthi bathanda ukusebenza nini ngaphambi kokuba uhla ludwetshwe.

1.32 Yiziphi izizathu ezinqala zokuthi usebenze ama-*shift*?
(Kokelezela inombolo kulokho nalokho)

	Akusona sizathu		Kuyisizathu-ngxenywe Isizathu kakhulu		
	kimi		kimi		kimi
a) Yingxenywe yomsebenzi wami	1	2	3	4	5
b) Ukuphela komsebenzi okhona	1	2	3	4	5
c) Kuyangivumela mina ngenxa yemisebenzi yasekhaya	1	2	3	4	5
d) Umholo uphezulu	1	2	3	4	5
e) Okunye.....					

(Nikeza isizathu sakho)

1.33 Unawo omunye umsebenzi wesibili okhokhelayo ngaphandle kwalona owenzayo Yebo Cha

1.34 Ujwayele ukuhamba ngani uma uya emsebenzini?

- e) Ngezithuthi zomphakathi
- f) Ngesithuthi somuntu
- g) Ngesithuthi senkampani
- h) Ngezinyawo

1.35 Ngokulinganisa, kukuthatha isikhathi esingakanani ukuya emsebenzini?

	Ukuya emsebenzini		Ukubuya emsebenzini	
d) I- <i>shift</i> yasekuseni	_____	mins	_____	mins
e) Ukusebenza ebusuku	_____	mins	_____	mins

f) Okunye _____ mins _____ mins

1.36 Mangaki ama-*shift* anoma yiluphi uhlobo owasebenzile ngaphambi kokuba-*off* ezinyangeni ezedlule? _____

1.37 Ngokulinganisa, zingaki izinsuku ezilandelanayo ojwayele ukuba-*off* ngazo?

1.38 Ngokwejwayelekile, uma ushintsha i-*shift* uya kwenye , yiluphi uhlobo lwe-*shift* noma i-*off* elandelayo?

f) Ama-*shift* asekuseni avamise ukulandelwa

g) Ama-*shift* antambama avamise ukulandelwa:

h) Ama-*shift* asebusuku avamise ukulandelwa

i) Amanye avamise ukulandelwa

j) Izinsuku zokuba *off* zivamise ukulandelwa:

1.39 Ngokulinganisa, bungaki ubusuku obusebenza ngonyaka?

1.40 Ngokulinganisa, uba *off* izimpelasonto ezingaki ezinsukwini ezingama-28?

1.41 Unikezwa isikhathi esingakanani ukwaziswa ngohlelo lwakho lokusebenza?

1.42 Yiziphi izinto ezintathu ezinhle nge-*shift* yakho?

a).....

b).....

c).....

1.43 Yiziphi izinto ezintathu ezimbi nge-*shift* yakho?

a).....

b).....

c).....

1.26 Ungathanda ukusebenza i-*shift* yasemini uma kuqhathaniswa nokusebenza ama-*shift*?
(kokelezela okukodwa)

Cha nakanjani Cishe cha Mhlawumbe Cishe yebo Yebo nakanjani

1

2

3

4

5

UKULALA NOKUKHATHALA

1.38 Uthola ukulala okwanele uma kade usebenza i-*shift* yasebusuku?

- a) Yebo b) Cha

1.39 Ulala amahora amangaki uma kade usebenza ebusuku?

- d) Ngaphansi kwamahora amahlanu
e) Amahora ayisi-6 kuya kwayisi-8
f) Ngaphezulu kwamahora ayisi-8

1.40 Emva kwe-*shift* yasebusuku, kuyenzeka ube nenkinga yokufikelwa ubuthongo?

- b) Yebo b) Cha

1.41 Yikuphi okusebenzisayo ukukufikisela ubuthongo uma kade usebenza i-*shift* yasebusuku?

- g) Iziphuzo ezishisayo njengetiye
h) Iziphuzo ezidakayo
i) Amaphilisi okulala
j) Ukulalela umculo
k) Ukufunda
l) Akukho kulokhu okungenhla

1.42 Iyiphi i-*shift* ozwa ukuthi ikukhathaza kakhulu?

- d) I-*shift* yasekuseni
e) I-*shift* yasebusuku
f) Akukho kulokhu okungenhla

1.43 Mangaki amahora okulala ozwa ngathi uyawadinga ngosuku, kungakhathaleki ukuthi ukuyiphi i-*shift*?

ISIMO SEZEMPILO

1.44 Veza ukuthi kukangakanani uzwa lokhu okulandelayo ngokukokelezela inombolo okuyiyonayona:

	Cishe	Akuvamile	Kuvamile	Cishe sonke
	akwenzeki		impela	isikhathi
m) Kwenzeka kangaki ukuthi uthando	1	2	3	4

Iwakho lokudla luphazamiseke?

- | | | | | |
|---|---|---|---|---|
| n) Kwenzeka kangaki ukuthi ubheke ukudla okudlayo ukuze ugweme ukuphathwa yisisu? | 1 | 2 | 3 | 4 |
| o) Kwenzeka kangaki ukuthi uzizwe ucanuzelwa yinhliziyu? | 1 | 2 | 3 | 4 |
| p) Kukangaki uphathwa yisilungulela noma yisisu? | 1 | 2 | 3 | 4 |
| q) Kukangaki uba nobunzima bokugaya ukudla? | 1 | 2 | 3 | 4 |
| r) Kukangaki lapho uqunjelwa khona? | 1 | 2 | 3 | 4 |
| s) Kukangaki lapho uzwa khona kwisingezansi sakho? | 1 | 2 | 3 | 4 |
| t) Kukangaki lapho uqunjelwa khona noma uhanjiswe yisisu? | 1 | 2 | 3 | 4 |
| u) Kukangaki lapho uzwa khona Izinhlungu esifubeni sakho? | 1 | 2 | 3 | 4 |
| v) Ziyavuvukala izinyawo zakho? | 1 | 2 | 3 | 4 |
| w) Uzizwa sengathi usukhuluphele kakhulu selokhu waqala ama- <i>shift</i> ? | 1 | 2 | 3 | 4 |
| x) Uzizwa sengathi usuzace kakhulu selokhu waqala ama- <i>shift</i> | 1 | 2 | 3 | 4 |

1.45 Usuke waphathwa esinye salezizifo ezilandelayo (zitholwe udokotela)?

	Ngaphambi	Selokhu	Angikaze
	kokuqala	ngaqala	
	ama-<i>shift</i>	ama-<i>shift</i>	
u) Ubuhlungu beqolo obungapheli
v) I- <i>Gastritis, duodenitis</i>
w) I- <i>Gatric or duodenal ulcer</i>
x) <i>Ama-Gall stones</i>
y) I- <i>Sinusitis, amathansela</i>
z) I- <i>Bronchial asthma</i>
aa) Isifo senhliziyo
bb) Umfutho wegazi ophezulu

cc) I- <i>Hypercholesterolaemia</i>	.....	.....	.....
dd) Isifo sikashukela	.....	.....	.....
ee) Amatshe ezinsweni	.....	.....	.....
ff) I- <i>Cystitis</i>	.....	.....	.....
gg) Ingcindezi	.....	.....	.....
hh) Ukuluma kwesikhumba	.....	.....	.....
ii) Isifo samathambo	.....	.....	.....
jj) <i>Ama-Haemorrhoids</i>	.....	.....	.....
kk) <i>Ama-Varicose veins</i>	.....	.....	.....
ll) I- <i>Anaemia</i>	.....	.....	.....
mm) Ubuhlungu bekhandu	.....	.....	.....
nn) Okunye .....	.....	.....	.....

1.46 Usuke wasebenzisa lemithi elandelayo isikhathi eside (ngaphezulu kwezinyanga ezintathu)?

	Ngaphambi kokuqala ama-shift	Selokhu ngaqala ama-shift	Angikaze
o) Amaphilisi adakanayo
p) Amaphilisi okulala
q) <i>Ama-Anti-depressants</i>
r) <i>Ama-Antacids</i>
s) <i>Ama-Antispasmodics</i>
t) Owokukukhipha ngesisu
u) Imithi ye-HBP
v) Imithi yenhliziyo
w) <i>Ama-Vitamins</i> nama- <i>tonics</i>
x) Iziqeda zinhlungu
y) Izikhuthazi
z) Imithi ye- <i>Anti-inflammatory</i>
aa) <i>Owama-Hormones</i> (hhayi izivikela kukhulelwa)
bb) Okunye

Ngaphambi

Selokhu

kokusebenza

wasebenza

ama-shift

ama-shift

1.47 Ngokulinganisa, ubhema
osikilidi abangaki ngesonto?

1.48 Ngokulinganisa, uphuza izilinganiso
ezingaki zotshwala ngesonto?

1.38 Ngokulinganisa, uphuza izinkomishi
ezingaki zekhofi eline-*caffeine* ngosuku?

1.39 Ngokulinganisa, uphuza izingilazi ezingaki
ze-*drink* ene-*caffeine* ngosuku?

1.40 Sewake walimala emsebenzini kulesisikhathi esiyiminyaka emibli edlulileyo?

Yebo.....

Cha.....

Chaza uhlobo lokulimala kanye ne-*shift*

Uhlobo I-*shift*

1.41 Uthola i-*off* yezinsuku ezingaki zomsebenzi?

UKWENZA UMSEBENZI

- 1.42 Umsebenzi wasebusuku unzima kunowe-shift yasemini.
- f) Ngivuma kakhulu
 - g) Ngiyavuma
 - h) Ngivuma kancane
 - i) Ngiyaphikisa
 - j) Ngiphikisa kakhulu
- 1.51 Nginomfutho omkhulu wokusebenza uma ngisebenza ebusuku. (khetha okukodwa)
- b) Ngiyavuma b) Ngiyaphika
- 1.52 Uma usebenza ebusuku, yikuphi kulokhu okulandelayo okuzwayo?
- g) Ukuba nomfutho kakhulu
 - h) Ukuba nomfutho
 - i) Ukuba nomfutho kancane
 - j) Ukukhathala
 - k) Ukukhathala kancane
 - l) Ukukhathala kakhulu

IZIMO ZOKWENGQONDO

- 1.53 Uzizwa kanjani mayelana ne-*shift* yasebusuku?
- b) Ngiyayithanda b) Ngiyayizonda
- 1.54 Uyithola ikuliphi izinga indlela ogxila ngayo ezintweni uma usebenza i-*shift* yasebusuku?
- e) Liphezulu
 - f) Lejwayelekile
 - g) Liphansi
 - h) **Angazi**
- 1.55 Ngabe ukusebenza i-*shift* yasebusuku kuyayishintsha indlela oziphatha ngayo?
- e) Njalo
 - f) Kwesinye isikhathi

g) Akwenzeki

h) Angazi

IZIMO ZOKUHLALA

1.56 Wenelisekile ngesikhathi ukusebenza i-*shift* okukushiyela sona ukwenza lokhu okulandelayo:

	Angeneli- sekile	2	Kancane nje	4	Kakhulu impela	5
j) Ukwenza izinto ozithandayo noma imidlalo	1	2	3	4	5	
k) ukuba nophathina wakho						
l) ukuba nomndeni, abangani nezihlobo eziseduze						
m) ukuba yingxenye yezinhlango zomphakathi						
n) ukuba nabantwana bakho						
o) ukuvakasha ngezimpelasonto						
p) ukuba wedwa						
q) ukwenza imisebenzi yasekhaya						
r) ukwenza izinto zenkonzo						
1.57 Ngokwejwayelekile, Ukusebenza kwakho ama- <i>shift</i> ngabe zasekhaya ongabe sakho sokuphumula (isib. ozithandayo njll)	1	2	3	4	5	izinto ngesikhathi izinto
1.58 Ngokwejwayelekile, ngabe ukusebenza ama- <i>shift</i> 1 Kuziphazamisa kanjani izinto uzenze uma ungasebenzi yasekhaya, ukunakekela abantwana)?	1	2	3	4	5	okumele Imisebenzi

SIYABONGA NGOKUBAMBA KWAKHO IQHAZA.

APPENDIX 7(A): INTERVIEWER'S GUIDE



Interviewer's Guide

Adverse effects of shift work at a biscuits manufacturer

Philisiwe Mhlongo

Discussion Guide

In depth discussion of adverse effects and challenges of shift work

1. Introductions and Warm up: (10 minutes)

How the focus group will work:

I am interested in your viewpoints. This is a research project, I am not selling anything, just want your perceptions. Talk to each other, not just me.

No right or wrong answers, it is okay to differ. If your opinion is different I would like to hear it.

Please answer honestly

I am here as a student not Philisiwe Mthemba, the SHE Coordinator.

Ground Rules:

- No vague words
- No wandering
- One person will talk at a time

Self-introductions:

Tell us your name, age, what you do and the kind of hours you work.

What topics are going to be covered?

1. Shift patterns
2. Health effects of shiftwork
3. Sleep quality and quantity
4. Occupational Injuries
5. Psychological Aspects
6. Social Aspects

Discussion of various aspects (sleep quality and quantity, occupational injuries, psychological aspects and social aspects)

1. Tell me about your sleeping habits. What is the usual amount of sleep that you get each night?
2. How important is being well-rested to you? How important is it in relationship to other things in your life?
(Probe: In relation to having fun? Spending time with your family? Getting work done? Your health? Your safety?)
3. Tell me briefly how your lack of sleep may have affected you personally and your job? Your performance in other things throughout your day?
4. Are there any factors that prevent you from getting regular, quality sleep?
(Probe: how does your work, your family or your social activities factor into deciding how much sleep you need or get?)
5. Would you consider worker sleepiness or fatigue to be a problem in your workplace?
6. What conditions has your colleagues complained about to you regarding lack of sleep?
7. Have you ever found difficulty performing your job due to fatigue?

Statistics suggest that night shift employee's average about 4 hours of sleep per night, compared with day shift workers (8 hours).

8. How do you personally relate to this statement?
9. Do you think that would affect the quality of work especially during night shift?

More employees get injured at night and early hours of the morning due to fatigue

10. In what way do you agree with this statement?
11. What types of injuries have you sustained whilst on night shift?

Social and family life can be disrupted by shiftwork

12. Please explain how your current shift takes up time reserved for you and your family.

13. Working shifts interferes with social activities e.g. attending weddings, going to movies, shopping etc? How do you relate to this?

14. What is your view regarding shiftwork and women?

Shiftwork can cause ill health and aggravate existing chronic illnesses

15. What illnesses/conditions do you have that you think is or may be caused by working shifts?

16. How have your eating habits changed because of the type shift you are working?

Discussion of Interventions

Some studies suggest that allowing workers to be involved in setting work schedules helps workers acceptance of their schedule and allows them better control over their lifestyle and may help them to get more sleep.

17. Would worker involvement in developing work schedules be possible in this company you are working for? If no, why not?

It is a generally known fact that shift workers, sometimes become dependent on working overtime/late shifts to maintain their current lifestyle.

18. Does that happen where you work?

19. How much of a problem do you think is?

Questions & Answers

APPENDIX 7 (B): UMHLAHLANDLELA WOBUZAYO



Interviewer's Guide

Adverse effects of shift work at a biscuits manufacturer

Philisiwe Mhlongo

Umhlahlandlela wengxoxo

Ingxoxo ejulile ngobubi nezinselelo zokusebenza ama-shift

Ukwethulwa nokuzifudumeza: (10 imizuzu)

Iqembu Elibhekiwe lizosebenza kanjani:

Ngifisa ukuzwa ngemibono yakho. Lolu wucwaningo, angithengisi lutho, ngifuna nje ukuzwa umbono wakho. Asikhulumisane, kungabi yimi nje kuphela engikhulumayo.

Azikho izimpendulo eziyizo nezingesizona, kuhle uma iphambana imibono. Uma umbono wakho wehlukile ngifisa ukuwuzwa.

Ngicela uphendule ngokwethembeka

Ngilapha njengomfundi, hhayi njengo- Philisiwe Mthemba oyi-*SHE Coordinator*.

Imithetho:

Asiwasebenzisi amagama angacacile

Asishoni lena nalena

Kukhuluma umuntu oyedwa ngesikhathi

Ukuzethula:

Sitshele igama lakho, iminyaka, wenzani kanye nohlobo lwamahora olusebenzayo.

Yiziphi izihloko ezizothintwa?

1. Isimo sama-shift
2. Umphumela kwezempilo obangwa ukusebenza ama-shift
3. Isimo kanye nobude bobuthongo obulalayo
4. Ukulimala kwasemsebenzini
5. Izimo zangokomqondo
6. Izimo zenhlalo

Ingxoxo ngezimo ezahlukehlukene (isimo sobuthongo nobude babo, ukulimala emsebenzini, izimo zangokwengqondo kanye nezimo zenhlalo)

1. Ngitshele ngendlela olala ngayo. Uvamise ukuthola ubuthongo obungakanani ngobusuku ?

2. Kubaluleke kangakanani ukuphumula kahle kuwe? Kubaluleke kangakanani uma ukuqhathanisa nezinye izinto empilweni yakho?

(Buzisisa: Uma ukuqhathanisa nokuba sebumnandini? Ukuchitha isikhathi nomndeni? Ukuqedela umsebenzi? Impilo yakho? Ukuphepha kwakho?)

3. Ngitshele ngamafuphi ukuthi ukungalali kahle kwakho ngabe kukulimaza kanjani wena uqobo kanye nomsebenzi wakho? Indlela owenza ngayo ezinye izinto osukwini lwakho?

4. Zikhona yini ezinye izinto ezikuvimbela ukuba uthole ubuthongo obumnandi futhi ungabutholi njalo?

(Buzisisa: Ngabe umsebenzi wakho, umndeni wakho noma izimo zenhlalo ziba nawo yini umthelela ekutheni uzolala kangakanani noma uzodinga ukulala kangakanani?)

5. Ubona ukuthi lapho osebenza khona ikhona inkinga yabasebenzi abozelayo noma abakhathele?

6. Yiziphi izimo ozakwenu abake bakhononda ngazo kuwe ukuthi zibancisha ubuthongo?

7. Sewake waba nobunzima bokwenza umsebenzi wakho ngenxa yokukhathala?

Izibalo zithi abasebenzi abasebenza ebusuku balala cishe amahora amane ebusuku uma beqhathaniswa nabasebenzi abasebenza i-shift yasemini bona abalala amahora ayisi-8.

8. Ngabe sikuthinta kanjani lesisitatimende?

9. Ucabanga ukuthi lokhu kungawulimaza umsebenzi ikakhulu uma usebenza ebusuku?

Abasebenzi abaningi balimala ebusuku nasentathakusa ngenxa yokukhathala

10. Kungani uvumelana nalesisitatemende?

11. Iziphi izinhlobo zokulimala ezake zakwehlakalela ngesikhathi usebenza ebusuku?

Izimo zenhlalo nempilo yomndeni kuyaphazamiseka ngokusebenza ama-shift

12. Chaza ukuthi i-shift oyisebenzayo njengamanje isithatha kanjani isikhathi esibekelwe nokuba wedwa kanye nomndeni wakho?

13. Sikhona isikhathi esanele sezinto zokuzithokozisa isib. Ukuya emishadweni, ukuyobukela ama-movie, ukuyothenga njll?

14. Uthini umbono wakho ngabesifazane abasebenza ama-shift?

Ukusebenza ama-shift kungabanga ukugula futhi kwenze izifo ezivele zikuphethe ezingalapheki zibe zimbi kakhulu

15. Yiziphi izifo/izimo onazo ocabanga ukuthi zibangwa noma zingabangwa ukusebenza ama-shift?

16. Ngabe indlela odla ngayo ishintshile ngenxa yohlobo lwe-shift oyisebenzayo?

Ingxoxo nokungenelela

Olunye ucwaningo luphakamisa ukuthi ukuvumela abasebenzi ukuba babambe iqhaza ekudwetshweni kohla lokusebenza kwenza abasebenzi balwemukele uhlelo lokusebenza kwabo. Kwenza bakwazi ukulawula impilo yabo kangcono futhi kuyabasiza bathole ubuthongo obuthe xaxa.

17. Ngabe ukubandakanya abasebenzi uma kudwetshwa uhla lokusebenza kungenzeka kulenkampani oyisebenzelayo? Uma kungenzeke, ngoba?

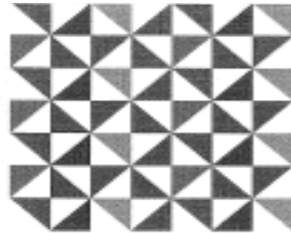
Yinto eyaziwayo ukuthi abasebenzi bama-shift kwesinye isikhathi bencika ekusebenzeni ama-overtime/ama-shift asebusuku ukwenelisa indlela abaphila ngayo.

18. Kuyenzeka lokho lapho usebenza khona?

19. Ucabanga ukuthi kuyinkinga engakanani?

Imibuzo neziMpendulo

Appendix 9: IREC LETTER OF APPROVAL



Institutional Research Ethics Committee
Faculty of Health Sciences
Room PB 49, Mansfield School Site
Gate 6, Ritson Campus
Durban University of Technology

P O Box 1336, Durban, South Africa, 4001

Tel: 031 373 2900

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http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

20 May 2014

IREC Reference Number: **REC 16/14**

Ms P K Mthemba
15 Lenhaven
39 Mariannahill Road
Ashley
Pinetown
3610

Dear Ms Mthemba

Adverse effects of shift work at a biscuits manufacturer

I am pleased to inform you that Full Approval has been granted to your proposal REC 16/14.

The Proposal has been allocated the following Ethical Clearance number IREC 032/14. Please use this number in all communication with this office.

Approval has been granted for a period of one year, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's. In addition, you will be responsible to ensure gatekeeper permission.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely



Prof J K Adam
Chairperson: IREC

