

## **Impact of shift work amongst security guards in Madang**

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### **Abstract**

This cross sectional study identified the common impacts of shift work on the health and social lives of security guards in the town of Madang. The study used face to face interviews and questionnaires to collect data from the managers and security guards. Both male and female security guards of three different security firms were involved in the study. Results showed that the most common health effects associated with shift work was sleeping disorder (52%), followed by fatigue (22%), stress (15%) and eating disorder (11%). The most common action taken by individual guards in managing the mentioned health conditions was a visit to the hospital. This study further discovered that social activities of security guards working on shifts were disturbed whereby 46% had less or limited time for other activities, 35% experienced behavioural changes, 11% encountered disharmony and 7% suffered broken marriages. In light of the findings of this study, recommendations are made for the National Department of Health (NDoH) and the Labour Department to review policies and legislations in the area of Occupational Health and Safety specifically dealing with shift work.

**Keywords:** shift work, health effects, social effects, security guards, occupational health and safety

### **Introduction**

Shift work is practiced in industrialized activities in the world today. In Papua New Guinea, the Madang Province is one of the few provinces that have many industries and businesses that are operating both day and night with the system of shift work. Although the system of shift work has been in the country for decades, no studies have been done to ascertain the effects on employees. Therefore, this study is an initial effort to document shift work and its associated effects involving security guards from selected security firms in the town of Madang.

The town of Madang is the capital of the Madang Province and is located on the north coast of mainland, Papua New Guinea. It lies 5° 13'S 145° 48'E/ 5.217° S 145.8° E of the equator. The administrative capital of Madang Province shares a border with East Sepik Province and Morobe Province. The

province itself is a large region approximately 300 kilometres long and 160km wide with four large offshore islands. It has a climate that is usually tropical with an average annual rainfall of 3440 mm, with the wettest times being between the months of November and June (National Research Institute, 2010).

Madang Province is the third leading producer of cocoa and copra and second producer of cattle in the country. In addition, Madang Province also supports Papua New Guinea economically through its agricultural activities, mining industries, food industries and forest logging. Notable business corporations in Madang Province include the Ramu Sugar, Coconut Oil Production, Madang Ltd, Ramu Nickel Mining and RD Tuna Cannery (Nationwide Business Directories, 2009).

Due to the growth of the Madang township, there are increased employment opportunities for people with no or limited formal education. Jobs are available as security workers, gardeners, road workers, factory workers or cleaners to name a few. Because uneducated people are eager to find employment, they are often more willing than an educated person to do shift-work, manual work and to work long hours.

### **Review of the related literature**

Shift work is an employment practice for organizations to provide services or maintain production outputs across all 24 hours of a day. The practice typically sees a work day divided into "shifts" which are set periods of time during the day or night when different groups of workers do the tasks required of them (Parkes, 1999). The shifts can either be organized as a stable/permanent time slot, rotating shift or an on-call shift. With stable shift work, a person is consistently on either a morning, afternoon or evening period of work. In rotating shift work, employees are required to work more than one shift, rotating from one period of time to another period of time. On-call shift occurs when a particular group of workers are called for their duties. It is special in the case of emergencies particularly in a hospital where it is common. The most widespread type of shift work is organized in an eight hours stretch but depends on the employers' scheduled time, called the morning; evening and night shift (Pati *et al.*, 2001).

Working at night has been prevalent since the Roman times, extending to the industrial revolution and beyond. Modern technology and economic development has increased the need for increased production rates to satisfy the needs of the modern society (Barton, 1994).

Shift work is performed within the employment range where employees rotate; making sure that work is continued for the delivery of essential services. Many industrial and commercial activities that operate outside common day-time working hours have become widespread in recent years. Services such as police, fire station, military forces, hospital and security guards, all have this system in place because of the need for these essential services to continue round the clock. Similarly modern technology has altered the system of

producing goods and services by producing many activities in a particular day or night (Parkes, 1999) thus requiring continuous work in order to meet demands.

In the past few decades there has been a tremendous growth in the population of shift workers, especially in highly industrialized countries. In 1968 Great Britain recorded an increase in the percentage of employees doing shift work from 12.5 percent to 16 percent as a result of their booming industrial activities. According to Parkes (1999), a USA survey conducted in 1997 on shift work showed that 27.6% of the workforce had flexible working schedules; 16.8% were full-time employees that had alternative schedules, including work outside day-time 6am to 6pm hours; while 6.4% worked on rotating night shifts. Moreover, a high number of the shift workers in the USA were males (27%) compared to females (16%) (Pati *et al.* (2001).

In Netherlands and France, the shift workers were estimated to be around 19 percent and 21 percent in the early 1970's (Davis *et al.*, 2001). Records by the Bureau of Labour Statistics (2004) indicated that there was a great increase of 26.1 percent of shift work in Netherlands and France with 15.1 percent accounting for males and 11.0 percent for females. Asian countries such as Japan also had an increase in shift work of 27.4 percent because of the high number of industries in the country (Bureau of Labour Statistics, 2004). In Canada, currently there are about two million people who make up 23 percent of the 8.5 million full time workers; who work in shifts (Pati *et al.*, 2001).

Although shift work is a normal system applied in various industries globally and nationally it is not without any negative effects. This paper argues that shift work can have negative effects on a person's physical, social and mental health regardless of the type of job or the exposure duration.

Shift work has been associated with a number of diseases apart from accidents that occur in organisations where the system is practiced. Conditions such as sleep disturbances, fatigue, poor mental health and gastrointestinal disorders, apart from diseases of the cardio vascular system, accidents and injuries (Parkes, 1999) have been shown to be associated with shift work although others may argue that the evidence is inconclusive.

### **Health effects of shift work in other countries**

Working during the night disturbs sleeping patterns that leads to the disruption to normal circadian rhythms. Circadian rhythms are physiological activities that occur approximately every twenty-four hours. The usual pattern is for people to be awake during the day and to sleep at night. A problem arises for shift-workers due to the difference between the need for wakefulness and work activity during night hours when the circadian rhythms are conditioned to sleep and for sleep during daylight hours which is normally the time of wakefulness and activity thus a disruption to the sleeping pattern is encountered consequently impacting negatively on shift workers (Pati *et al.*, 2001).

This viewpoint is supported by Askerstedt (2003) whereby the characteristics of sleep disturbances were linked to delayed onset of sleep and reduction in sleep duration and sleepiness, resulting in fatigue during working hours. This further confounds the fact that rotating schedules and adaptation to one shift may not be completed before a further shift change occurs thereby resulting in severe sleep disturbances and chronic fatigue continuing for the rest of the days. In a research study by Askerstedt (2003), it was that 70% of workers had to leave their jobs after a relatively short period of time due to chronic fatigue; 20% of the workers had become tolerant to the effects of shift work and continued working despite experienced adverse effects; while the remaining 10% had not encountered any problems with shift work.

Cardiovascular diseases have been associated with shift work as shown by past studies. A review by Knutsson (2003) indicated that there is strong evidence in favour of an association between shift work and coronary heart disease. Another meta-analysis of 17 studies of cardiovascular disease in relation to shift work supported this positive association. It was further revealed that 40% of day shift workers had a high risk for cardiovascular diseases and others were at risk of developing cardiovascular heart diseases which were attributed to the introduction to a new lifestyle such as taking up smoking which in fact can also be a confounder. From a study of shift workers employed in a treatment plant in Italy, Knutsson (2003) found that employees who had worked for over four years were more susceptible to getting cancer compared with new recruits.

Gastrointestinal disorders are among the most frequently reported health problems of shift workers which are estimated to be two or five times more common among night shift workers than day shift workers (Costa, 1996). The disturbance to the circadian rhythm consequently affects the intake, digestion, and absorption of food resulting in gastric system disorders such as indigestion, heart burn, constipation, loss of appetite and nausea. According to Knauth & Hornberger (2003) shift work can also be linked to peptic ulcers. Based on the authors' endoscopic examination of suspected cases among Japanese workers, 2.38% of current shift workers, 1.52% of past shift workers, and 1.03% of day workers developed peptic ulcers. This could be explained in terms of their irregular eating times or lack of food consumption for prolonged hours due to time factors and job demands.

Accidents and injuries occur indirectly due to sleep deprivation and chronic fatigue which are associated with circadian disturbances. This can have a negative effect on cognitive performance and reasoning particularly for tasks that require concentration and decision making. Should a worker lose concentration due to fatigue or tiredness, this potentially increases the risk of accidents. It has also been found by a USA study (Folkard & Tucker, 2003) of morning, afternoon and evening shifts that the risk of accidents and injuries increased almost linearly across the three shifts. Interestingly, 80% of the accidents and injuries were from night shift workers, compared to 20% from day and afternoon shift workers indicating that night shift workers were more vulnerable to accidents and injuries compared to day shift workers.

### **Social effects of shift work in other countries**

Shift work can indirectly contribute to negative social life such as family problems, reduced social support and stress. A study on social coordination of occupation, indicated that most Western industrialized countries encountered an increase in social relationship and family problems, bringing disharmony and other related problems such as divorce out of hand (Lasen & Zemke, 2003). For example, disharmony within the couples who had conflicts because of one partner spending more time with the family members and friends than the other has been documented. The authors also stated that the weekly and daily organizations of individual and family activities were frequently governed by work schedules where family members and individuals find most of their time being alone.

Similarly, in developing countries there has been documentation of shift work and their social effects. A study by Ahasan *et al.* (1999) in Bangladesh and Dhaka in a shoe making factory found that workers competition for securing a job was very high. Two contributing factors to this were over population and high unemployment rate. Working conditions and particularly the number of hours required for shift work in a day were non negotiable hence there existed a tendency not to care about shift work and the likely effects. Out of the total number of employees interviewed about 73% of them responded that they disliked shift work while 22% liked shift systems. Only 3% reported extreme negative attitudes, and complained regarding the rotating shift work, that is causing potential risk in their working lives (Ahasan *et al.*, 1999). Most workers indicated the effects of shift work to include problems in their personal, family, health and social lives. The authors further documented that 75% of those affected created disturbances in their family lives, 65% in social lives and 72% in married lives. In addition, it was noted that 70% of all the workers created problems for their own family members, 71% had no time for their family and friends while 80% complained of limited leisure time to spend with their relatives and friends due to insufficient off days. Similarly, 83% of subjects suffered from health problems, 85% had sleep disturbances, and 78% mealtime irregularities.

### **Shift work problem in Pacific Island countries**

A couple of studies on the direct and indirect impacts of shift work have been conducted in other Pacific Island countries such as New Zealand, Samoa, Cook Island, and Tonga. A study (Tahana, 2010) into Pacific Islands' children obesity has documented that shift work of parents was one of the underlying issues that indirectly lead to children's obesity. From a survey among 2495 Pacific Islands children it was found that parental shift work and the costs of food were contributing factors to Pacific children's obesity. The study indicated that 23.3% of young Pacific people significantly have higher level of obesity compared to the general population at only 8.3%. There were 33 adolescents and 35 parents from 30 Pacific households interviewed regarding the socio-cultural factors that promote or prevent obesity.

The study found out that the key difference between obese and healthy weight adolescents was in parental presence in home. Parents of healthy adolescents were more likely to be home to provide healthy food and monitor eating practices (New Zealand Medical Journal, 2010) compared to obese adolescents' parents who were involved in shift work and unavailable during meal times. This is indicative of the fact that shift work not only directly affects those engaged in it but also indirectly affects the families of those concerned.

Sleeping disorder in workers who were engaged in night shift has been documented among Maori and non-Maori persons aged 20 to 59 years old (NOHSAC, 2004). The response rate indicated that 73% of night shift workers experienced some form of sleeping disorder compared to employed persons who did not work on night shifts. Interestingly 15.8% of those who were engaged in night shift work were indigenous New Zealanders. It was also documented that 10.5% of Maoris experienced greater effects of shift work compared to non-Maoris. Unlike the Pacific Island nations mentioned, shift work is a neglected topic for research in Papua New Guinea.

Studies on impacts of shift work in terms of health and social issues have been conducted in most industrialized nations especially in the USA, South America and Asian countries using observational studies into the impacts of shift work among security workers engaging in both day and night shifts (Harrington, 2005). Although there is a limited research into the impact of shift work on health and social life of individuals and families in developing countries the effects could be assumed to be similar to research in industrialized nations.

In Papua New Guinea the effects of shift work on people's lives may not be clearly understood by those affected. Therefore the interest of this research project was to gain insight to, and create knowledge about the issue, with due concern for the health of the shift workers in industries and services. It is anticipated recommendations will be provided concerning occupational health and safety in work places employing shift workers.

### **Relevance of this study**

This research study aimed to generate some baseline information about social and health issues associated with people doing shift work in occupations providing 24-hour services or having 24 hour operations. In particular, the study focused on security guards and security firms which are necessary throughout Papua New Guinea due to its poor law and order situation. The findings can be a medium for awareness to both the employees and employers of security firms for development of practical measures to minimise adverse effects of shift work.

The general objective was to identify the impacts of shift work amongst security guards in Madang Town. Specifically, (a) to document the common health effects associated with shift work among security guards, (b) to identify the employers' management approach on the effects of shift work; and (c) to consider differences in responses of male and female security guards.

### **Research questions**

The following research questions were formulated to guide the research study.

1. What are the common health effects associated with shift work?
2. What is the management approach to shift work?
3. What are the health and social effects of shift work for male security guards compared to female security guards?

### **Research design**

This was a descriptive study conducted using a researcher-constructed questionnaire and face to face interviews. The questionnaire consisted of both open ended and closed items relating to the security guards' knowledge about the health effects associated with shift work, the management approaches towards shift work, and gender difference in health effects associated with shift work.

### **Sample and participants**

The sample size consisted of 110 security guards from four different security firms in Madang. The participants of the study involved both female and male security guards and the managers of each of the selected security firms. However, from the total of 110 questionnaires distributed, only three firms responded, with the response rate of 51.8% (46 males and 11 females).

### **Instruments**

Two different structured questionnaires were used: (i) for employees (security guards) and (ii) for employers (managers). The security guards' questionnaire consisted of questions regarding the security guards' knowledge about the health effects associated with shift work, whereas, the employers' questionnaire consisted of questions regarding the management approaches towards shift work and associated health effects.

### **Procedure**

First, letters were written to seven selected security firms, asking for permission to conduct the research. A pilot test of 10 questionnaires was then carried out in one of the selected firms. The questionnaires were then modified based on this pilot test. Subsequently, upon the approval of four firms, questionnaires were provided to them.

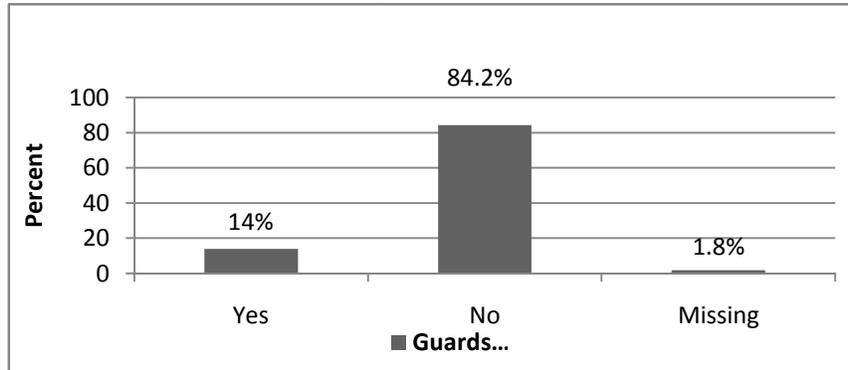
### **Data analysis**

Data gathered were analyzed using Microsoft excel and presented as graphs.

### **Results from security guards' responses**

#### ***Prior health problems of security guards***

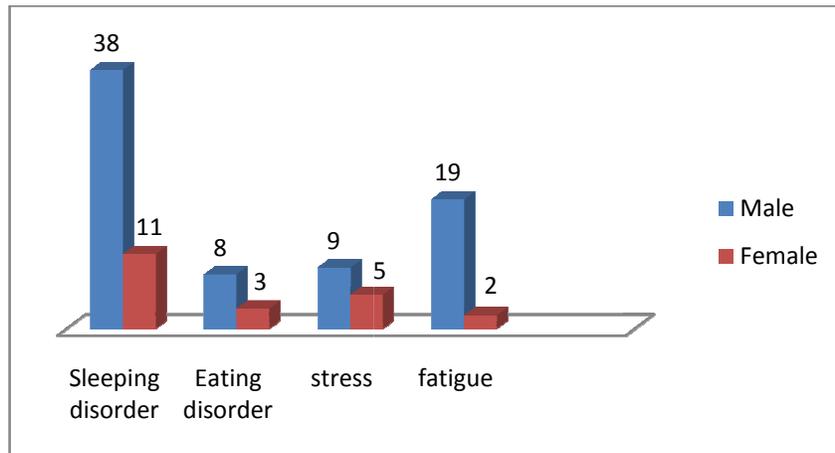
Security guards were asked if they had experienced health problems prior to becoming a security guard. As illustrated in Figure 1, the clear majority of respondents had not experienced health problems prior to becoming a security guard.



**Figure1: Were health problems experienced before joining a security firm?**

*Health effects of security guard work by gender*

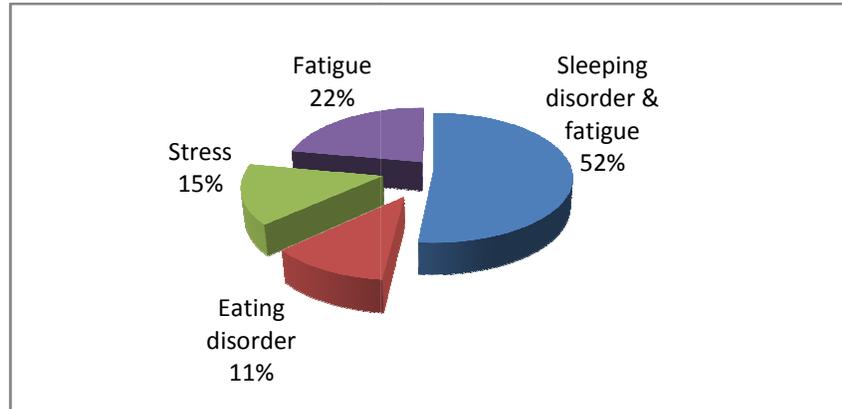
Data were gained to identify male and female differences in health effects suffered through security guard work. Sleeping disorders, fatigue, stress and eating disorders were identified as health issues associated with being a security guard. In interpreting Figure 2, of the 46 male respondents and 11 female respondents, all the females (100%) and most of the males (83%) suffered from sleeping disorders caused by security guard work. Stress was a greater concern for females (45%) than for males (20%). Fatigue was more of an issue for males (41%) than for females (18%), and eating disorders were more of concern for females (27%) than for males (17%)



**Figure 2: Health effects experienced by male and female security guards**

***Impact of shift work on security guards***

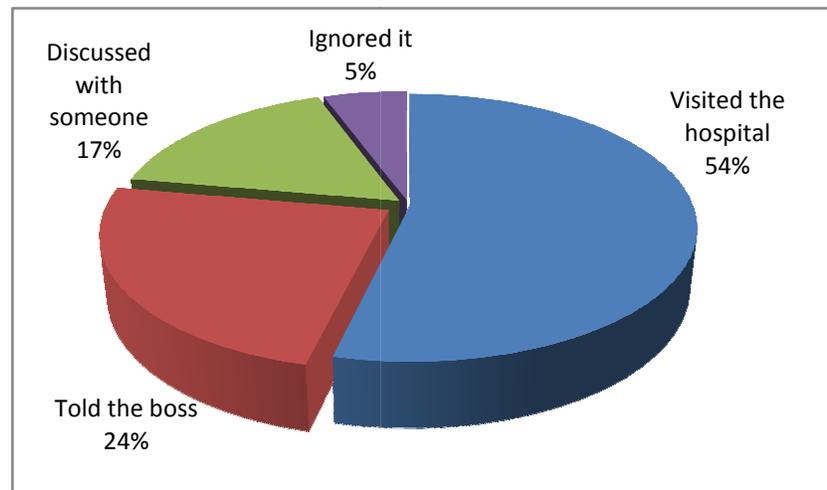
As illustrated in Figure 3, the study found that sleeping disorder and fatigue were the most common effect on health caused by shift work, followed by stress and eating disorders.



**Figure 3: Health impacts of shift work amongst security guards**

***Actions by security guards to manage health issues***

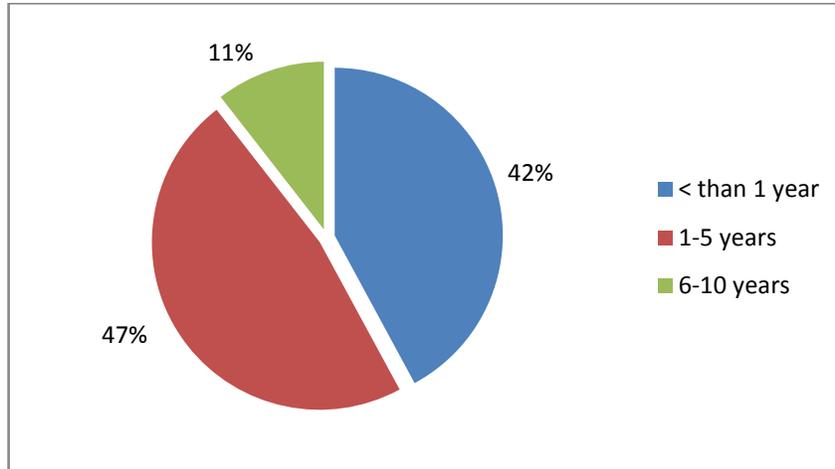
Respondents were asked to indicate what actions they took to manage the impact on their health of the nature of security guard work. Figure 4 shows that more than half (54%) of the respondents sought medical attention; 24% made the problem known to their supervisors, 17% discussed their problem with someone significant and the remaining 5% ignored the problem.



**Figure 4: Actions taken by security guards upon health concerns**

***Duration of health effects while working as a security guard***

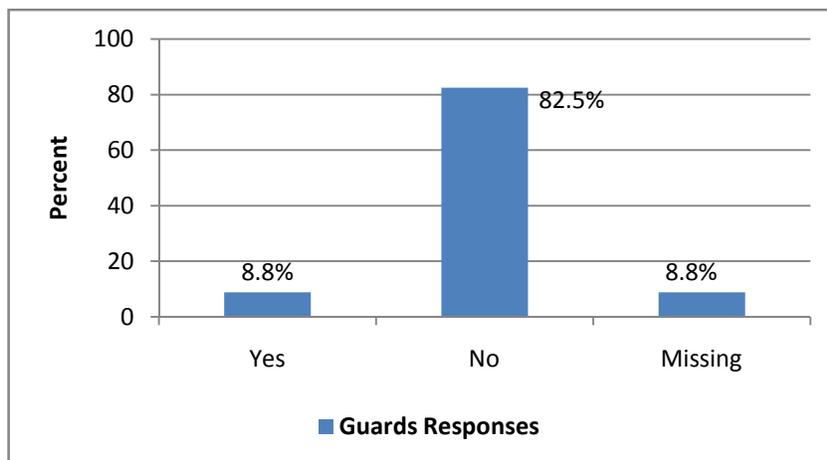
From the responses of the 57 respondents, some (47%) had experienced health problems for one to five years, some (42%) had experienced health problems for less than a year, and the remainder (11%) had experienced health problems for six to ten years (Figure 5).



**Figure 5: Duration of security guards' health concerns**

***Social problems prior to employment as a security guard***

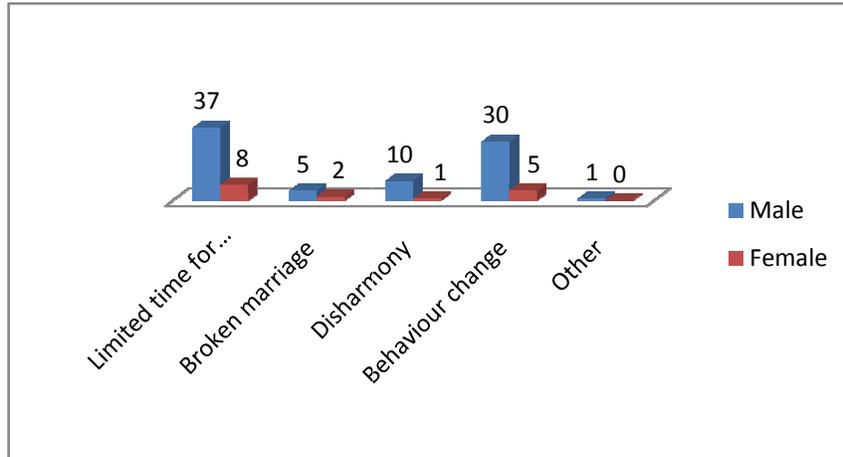
Security guards were asked if they had experienced any social problems prior to becoming a security guard. As illustrated in Figure 6, the clear majority of respondents (82.5%) claimed not to have experienced social problems prior to becoming a security guard.



**Figure 6: Were social problems experienced before joining a security firm?**

***Social effects of security guard work by gender***

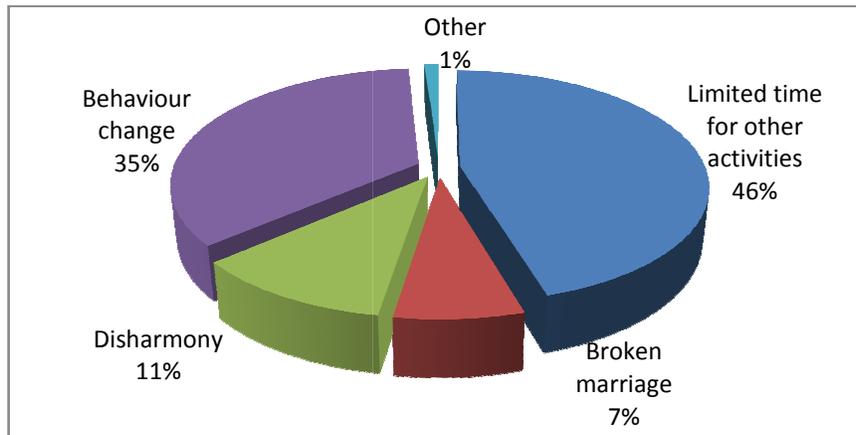
Data were analyzed to identify male and female differences in social effects suffered through security guard work. Figure 7 shows that more males (80%) than females (73%) had limited time for other activities; while more females (18%) than males (11%) experienced broken marriages; more males (22%) than females (9%) faced disharmony; and interestingly, more (65%) males than females (45%) stated behavioural modification as a result of shift work.



**Figure 7: Social impact of shift work amongst male and female security guards**

***Social impacts as reported by security guards***

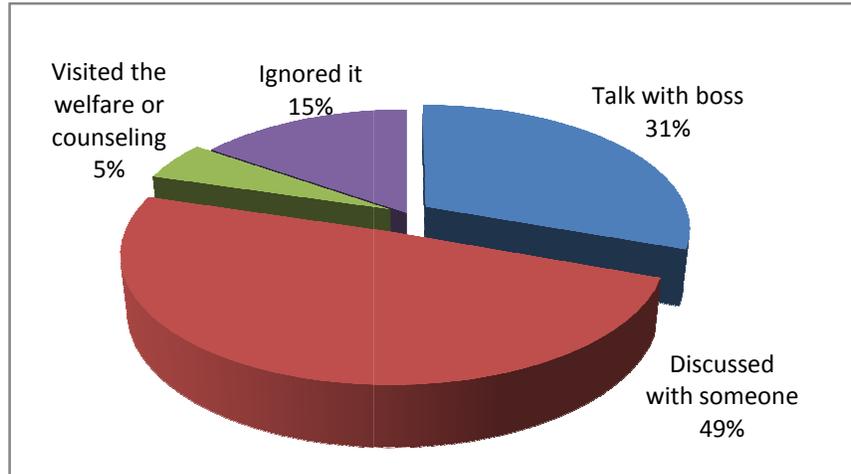
Respondents identified social impacts of security guard work as limited time for other activities (46%), behavioural changes (35%), disharmony within their families (11%) and broken marriages (7%).



**Figure 8: Social effects of shift work amongst security guards interviewed**

***Actions by security guards to manage adverse social effects their work***

Respondents were asked to indicate what actions they took to manage the impact of adverse social effects caused by the nature of security guard work. As illustrated in Figure 9, some respondents (49%) discussed their social problems with someone significant; some respondents (31%) talked with their bosses; some respondents (15%) sought help from welfare or counselling officers; while other respondents (15%) kept their problems to themselves.



**Figure 9: Actions of security guards to deal with adverse social effects**

**Discussion**

The study found that there are more than ten security firms in Madang Town. Seven security firms were randomly selected. However; only three firms responded positively for our research to be conducted on their premises. The findings of this research are discussed in the following order: health effects and the measures undertaken to address them; social effects found and the measures undertaken to deal with them; employers' approach to the effects of shift work; and the comparison of health and social effects in male and female security guards.

**Health effects experienced by security guards**

In this study, it is shown that shift work does have an impact on security guards in terms of their health. As illustrated in Figure 3, the most common health effects associated with shift work duties of security guards, as identified by the respondents, were sleeping disorder and fatigue, stress and eating disorders. Research studies (Harrington, 2005; Knutsson, 2003; Pati, Chandrawanshi & Reinberg, 2001) reveal that these are common occupational health problems associated with shift work. Eating disorder was rated less common (Costa, 1996) as food habits can be influenced by other factors such as workers'

salaries. For instance, senior shift-workers on higher salaries tend to buy better quality food compared with junior shift-workers on lower salaries. Nevertheless, well-paid shift-workers workers can still experience other poor health conditions such as obesity (International Journal of Obesity, 2003).

Most of the security guards (84.2%) who participated in this study claimed that they had experienced adverse health effects only after becoming security guards. The data in Figure 5 revealed that a high percentage (42%) of the respondents had experienced some health effects less than one year while the highest proportion (47%) of respondents experienced the health effects between 1 to 5 years of employment. However, some respondents (11%) had sustained adverse health effects for six to ten years. Interestingly for workers who worked for more than five years, their bodies tend to tolerate the effects of varying hours of work and staying awake throughout the night.

The study found that respondents dealt with health issues in a variety of ways, Figure 4 indicated that a high percentage (54%) of the guards decided to visit the hospital, 24% discussed their problems with their bosses, 17% discussed with someone else, while 5% ignored their health problems. Most respondents sought help from the hospital in their own free time without consulting their bosses, followed by some who took the step to see the boss and then went for a medical check-up. Others decided to discuss their issues with their friends while others ignored the problem.

There is little information available that allows objective prediction of benefits and disadvantages of shift work in developing countries, however, the research of Ahasan *et al.*, (1999) in Bangladesh found negative aspects of shift work included disturbed family, conjugal and social lives; curtailed leisure activities; created difficulties in meeting with friends; caused irregularity of mealtimes; affected sleep and caused health problems. These findings from Bangladesh were similar to those found in this PNG study.

Many industrial and commercial activities involve shift work hours for employees where 24 hour services need to be provided to the public or to meet production targets. These include services from police, hospitals, fire station, security guards, factories, mines and transport industries. Modern technology has altered the system of producing goods and services and people can buy via the internet or access funds at bank automatic teller machines day and night. (Parkes, 1999).

These conditions exist in the Madang where urbanisation and economic development have resulted in increased numbers of businesses and industries and, in some cases, the demand for 24 hour services or production routines. Madang has a meat canning factory, a fish canning factory, a sugar processing factory and a nickel mine which operate on a 24-hour basis. Madang has a busy port where customs and shipping agents can be called out at night, if ships arrive at that time. All businesses have 24-hour security services protecting property. Even educational institutions, such as secondary schools, colleges and university campuses, have 24-hour security guards protecting lives and

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property. ATM facilities are available at banks and hospitals and police stations are staffed day and night.

Because of the poor law and order situation in PNG, there is a constant need for people to apply for jobs as security guards and applicants accept the need to work shifts, if they want employment.

Of the different systems of shift known (stable or permanent, rotating and on-call) the most commonly applied is the rotating shift (Parkes, 1999). The rotating shift has been linked to negative health and social effects as people work a variety of morning, afternoon or night shifts and their circadian rhythms are constantly being disrupted. This study has confirmed that rotating shift work is common in Madang and had negatively impacted on the health and social lives of the participants' interviewed. This supports findings by (Akerstedt, 2003) that shift work was impacting negatively on rotating shift workers in terms of sleeping disorder and fatigue (75%), cardiovascular diseases (40%), stomach ulcer (2.4%), gastrointestinal disorders (2.0%) and heart burn (less than 2%). Although rotating shift work was singled out as the common for security firms in Madang, it may not be conclusive to state that the health and social effects arise from this type of shift work as the data did not distinguish between this and other types of shift work. Furthermore, shift work is not the only contributing factor to the health effects of shift work as other factors can contribute. For instance, working in a humid tropical environment where ventilation systems are very poor could lead to stress or fatigue. This study primarily focused on security guards in the town of Madang, therefore findings on the findings are limited to this context.

#### **Social effects and its measures**

This study revealed that not only does shift work affect the health of security guards but also their social lives. The study found that the security guards reported that their employment routines gave them limited time for other activities, led to behaviour change, influenced disharmony in relationships, sometimes leading to broken marriages. Industrialized countries are not immune to similar effects of shift work on social aspects of shift workers' lives (Ahasan *et al.*, 1999).

Changing from a lifestyle that did not involve shift work to one that did involve shift work, had an effect on the social lives of security guards in this study. As illustrated in Figure 6, the majority (82.5%) of respondents claimed that social related problems were experienced after joining a security firm and working shifts. According to a report (Lake & McBride, 1998) on a research study involving Los Angeles police officers it was found that 75% of the state's officers experienced adverse social effects on their lifestyles after joining the police force and being required to do shift work. This further supports the argument that shift work does impact negatively on the social lives of those involved with this system.

Measures in solving the social issues in security guards' lifestyles were also carried out by the employees themselves or with the help of the management. The findings of this study as presented in Figure 9 shows that 49% of the security guards sought help through discussing the problem with others, 31% discussed their problem with their boss, 5% visited the welfare and counseling while 15% ignored the problems they were facing, meaning they did not get help from anyone. Security guards, when interviewed, confirmed that discussing the issue with others was easy due to the fact that others had been in a similar situation and successfully found solutions. Therefore, it is possible for them to hear what they say and follow as well. About a third of the respondents chose to talk over their social problems with their boss who could perhaps offer solutions that would retain their services rather than see the person resign. A few respondents decided to see the welfare or counseling officer who are trained and employed to help workers. Some (15%) decided not to talk about the adverse social effects that shift work had on their lives, preferring to accept them as changes that accompanied being a shift-worker. When interviewed, they reported that it was personal choices about work and social activities that became a norm to their daily routines.

#### **Employers approach to the health and social effects of shift work on security guards**

Interviews were conducted with the managers of three security firms. It was found that they were more concerned with the work performance of their staff than with the impact shift work had on the physical or social aspects of employees' lives. Two of the managers indicated that they were aware of health and social issues of security guard employees associated with shift work. The other firm affirmed that there were no complaints from security guards regarding their health and social issues. In Firm 1, its employees had laid complains about their health and social problems in regards to their work. The firm responded by covering the employees' health expenses in terms of hospital fees and depending on the severity of the problems, the guards were given days off accordingly to medical advice. In this study, it was also discovered that, the manager of Firm 2 stated that there were no complaints by the employees regarding their health and social problems. However, this is a contradiction to the employees' responses, where 75% of them said they told their manager about their problems. According to the manager of Firm 3, complaints were received from his employees regarding their health and social lives and giving them days off from work was the only approach he took to address these issues.

#### **Comparison of health and social effects between male and female security guards**

There were more males (80.7%, n=46) than females (19.3%, n=11) employed as security guards than females by the firms involved in this research study. Pati, Chandrawanshi and Reinberg (2007) claim that industrialized countries have more males than females involved in shift work occupations. Their study of shift workers in the USA indicated a comparison of 27 percent males and 16

percent females. Another report by the Bureau of Labour Statistics (2004) concerning shift workers in the Netherlands and France reported 15% males and 11% females with males dominating shift work occupations.

From the interviews with managers of Madang security firms, it was revealed that limited accommodation availability and safety concerns for females led to fewer females than males being employed as security guards. For these reasons also, female security guards were given preference for day-time shifts and not required to do night shifts at the same level as their male colleagues. This may explain why females suffered less impact of shift work on their lives in comparison to males.

Figure 2 indicates that 45% (n=38) males and 13% (n=11) females experienced sleeping disorder and fatigue, 11% (n=9) males and 6% (n=5) females experienced stress, 22% (n=19) males and 8% (n=2) females suffered from fatigue, 9% (n= 8) males while 4% (n= 3) females had eating disorders. In terms of social effects in shift work, Figure 7 shows that 38% males and 8% females had limited time for other activities, 5% males and 2% females suffered broken marriages, 10% males and 1% females had the problem of disharmony, 30% males and 5% females experienced behaviour changed while 1% males had other unspecified social issues. However, care must be taken when interpreting these data due to unequal numbers of female and male participants in this study and unequal distribution of duties during the more dangerous and stressful night shifts.

### Summary

This town-based explorative study involved various procedures which included writing letters of consent and gaining permission to conduct the study, constructing, delivering and pilot-testing questionnaires, interviewing participants, analysing data and reporting results. The participants of the study involved managers and security guards of three different security firms in the town of Madang. The security guards involved were both males and females but with a higher number of male participants.

The study revealed that sleeping disorder and fatigue (52%) are the common health effects of shift work amongst security guards, followed by fatigue (22%), stress (15%) and the less common eating disorder (11%). The most common measures that were taken by the security guards to address physical effects of shift work were visiting the hospital (54%), telling the boss (24%), discussing problems with someone (17%) or ignoring the problem (5%).

The study also found that not only does shift work have impacts on the security guards' health but also on their social lives. Many respondents (46%) admitted having less or limited time for social or recreational activities, some (35%) experienced behaviour changes, some (11%) confessed to having disharmony with their partners/spouses and a few (7%) admitted to having broken marriages, influenced by their work occupation. When asked for the approach that is normally taken when faced with these adverse social effects, the security

guards responses were; 49% discussed the issue with someone, 31% talked it over with their bosses, 15% ignored the problems and 5% consulted the welfare or counselling officers.

### **Limitations**

The authors are not aware of any other study in PNG concerning the impact of shift work on employees. Despite this study being unprecedented in PNG, limitations are acknowledged. The sample size of this study was small. Of the eight selected security firms, only four approved the research to be carried out, and, out of the four, only three firms completed and submitted their questionnaires within the given timeframe. As the numbers of female security guard participants were fewer than male participants, the findings are biased towards health and social impacts of shift work on male security guards.

### **Recommendations**

In light of the findings in this study, we recommend the following;

- That a follow up study be conducted using a bigger sample size and conducted in different industries and organizations where shift work is applied.
- That the Labour Department and Department of Health ensure that appropriate policies and regulations are in place to protect the safety, health and welfare of shift workers and that implementation processes are monitored and reported on
- That the Labour Department and Department of Health work with managers of security firms to raise awareness of health and social issues associated with shift work and the nature of security guard work to minimise adverse effects on employees' safety, health and welfare
- That hospital database records indicate workplace accidents or health issues related to shift work and security guard work that would be useful for future research in this field.

### **Conclusion**

Shift work is a concern if it has adverse effects on the safety, health and welfare of employees. The research was able to identify the common health and social impacts of shift work on security guards in Madang. The study identified actions that were taken by the security guards subsequently realizing the impacts shift work had on them. The study showed that sleeping disorder and fatigue are the most common health impact of shift work amongst security guards in Madang while having less or limited time for other activities is the widespread social impact the security guards are facing today. The other effects of shift work included fatigue, stress, eating disorder, broken marriages, relationship disharmony and changes in behaviour. Although shift work is an advantage for the delivery of essential services and of the very high demand for these services, the adverse effects of shift work for employees need to be recognized and minimized.

## References

- Ahasan, R. Khaleque, A. Mohiuddin, G. (1999). *Human aspects of shift work in developing countries*, 28:59-65. Retrieved 15 March 2011 from: [www.humanergology.com/old/Ahsan.pdf](http://www.humanergology.com/old/Ahsan.pdf)
- Akerstedt, T. (2003). Shift work and disturbed sleep/ wakefulness. *Occupational Medicine*, 53, 89-94. Retrieved 15 March 2011 from: [www.ncbi.nlm.nih.gov/pubmed/12637592](http://www.ncbi.nlm.nih.gov/pubmed/12637592)
- Barton, J. (1994). Choosing to work at night, a moderating influence on individual tolerance to shift work. *Journal of Applied Science*, Vol. 79, 3:449-454. Retrieved 15 March 2011 from: [www.ncbi.nlm.nih.gov/pubmed/15676307](http://www.ncbi.nlm.nih.gov/pubmed/15676307)
- Borden, W. & Ward, G. (2006). Country environmental profile of Papua New Guinea. *European Union Census 2000*. Retrieved 21 August 2011 from: <http://www.ec.europa.eu>
- Bureau of Labour and Statistics, (2004). *Workers on flexible and shift schedule*. Retrieved 23 April 2011 from: <http://www.bls.gov/cps/home.htm>
- Commonwealth Local Government forum and the good practice scheme, (1998). *Concept Note*. Retrieved 21 August 2011 from: <http://www.lgma.org.au>
- Costa, G. (1996). The impact of shift and night work on health. *Applied Ergonomics*, 27, 9-16. Retrieved 15 March 2011 from: [www.jnci.oxfordjournals.org/content/93/20/1557.full](http://www.jnci.oxfordjournals.org/content/93/20/1557.full)
- Davis, S., Mirick, D. K., & Stevens, R. G. (2001). *Night shift work, light at night, and risk of breast cancer*, 21:129-140. Retrieved 15 March 2011 from [www.occmed.oxfordjournals.org/content/53/2/95.short](http://www.occmed.oxfordjournals.org/content/53/2/95.short)
- Folkard, S. & Tucker, P. (2003). Shift work, safety and productivity. *Occupational Medicine*, 53,95-101. Retrieved 4 April 2011, from: [www.ncbi.nlm.nih.gov/pubmed/15676307](http://www.ncbi.nlm.nih.gov/pubmed/15676307)
- Harrington, J. M. (2005). Health effects of shift work and extended hours of work. *Occupational Health and Safety*, Vol 3, 3:26-49. Retrieved 4 April 2011 from [www.jnci.oxfordjournals.org/content/93/20/1513.full.pdf](http://www.jnci.oxfordjournals.org/content/93/20/1513.full.pdf)
- Hoppock, R. (1935). *Job satisfaction*. New York: Hyper Publications Inc .
- Institute for Work and Health (2010). *Research excellence advancing employee health*. Retrieved 2 May 2011 from <http://www.iwh.on.ca/systematic-reviews>
- International Journal of Obesity (2003). Effect of shift work on body mass index: results of a study performed in 319 glucose-tolerant men working in a Southern Italian industry. Retrieved 6 October 2011 from <http://www.nature.com/ijo/journal/v27/n11/full/0802419a.html>
- Knauth, P. & Hornberger, S. (2003). Preventive and compensatory measures for shift workers. *Occupational Medicine*, 53, 109-116. Retrieved 6 April 2011 from [www.occmed.oxfordjournals.org/content/53/2/95.short](http://www.occmed.oxfordjournals.org/content/53/2/95.short)
- Knutsson, A. (2003). Health disorders of shift work. Retrieved 6 October 2011 from <http://occmed.oxfordjournals.org/content/53/2/103.full.pdf>
- Kogi, K. Saito, Y. & Mitsuhashi, T. (1970). Validity of subjective fatigues feeling. *Science of Labor*, 46:251-270. Retrieved 7 April 2011 from [www.ncbi.nlm.nih.gov/pmc/articles/PMC1740027/pdf/v058p00068.pdf](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1740027/pdf/v058p00068.pdf)
- Lake, P. & McBride, W. (1998). *Shift work safety and performance: a manual for managers and trainers*. Library for Congress: Florida.
- Lazon, E. A. & Zemke, R. (2003). Shaping the temporal patterns of our lives. *The Social Coordination of Occupation*, Vol. 10, 2:80-89. Retrieved 7 April 2011 from [www.jos.edu.au/download.asp?file=Larson.pdf](http://www.jos.edu.au/download.asp?file=Larson.pdf)
- National Occupational Health and Safety Advisory Committee (2004). *The burden of occupational disease and injury in New Zealand*. Technical Report. Wellington, NewZealand

- National Research Institute,(2010). Papua New Guinea district and provincial profile. Retrieved 21 August 2011 from [http://www.nri.org.pg/research\\_divisions/cross\\_divisional\\_projects/Web%20Version%20Profiles\\_%20Report%20140410.pdf](http://www.nri.org.pg/research_divisions/cross_divisional_projects/Web%20Version%20Profiles_%20Report%20140410.pdf)
- Nationwide Business Directories (2009). *Papua New Guinea*. Retrieved 22 August 2011 from [natwide@bigpond.com](http://natwide@bigpond.com)
- New Zealand Medical Journal (2010). Parental shift work linked to obesity. Retrieved 6 October 2011 from [http://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=10690172](http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10690172)
- Parkes, K. R. (1999). Shift work and health. *Journal of Occupational Health Psychology*, 4:256-268. Retrieved 5 April 2011 from: [www.occmed.oxfordjournals.org/content/53/2/109.abstract](http://www.occmed.oxfordjournals.org/content/53/2/109.abstract)
- Pati, A. K. Chandrawanshi, A. & Reinberg, A. (2001). *Shift work: Consequences and management*, 1:32-47. Retrieved 7 April 2011 from: [www.ncbi.nlm.nih.gov/pubmed/11268624](http://www.ncbi.nlm.nih.gov/pubmed/11268624)
- Tahana.Y. (2010). *Parental shift work link to obesity in Pacific Island Countries*, Vol. 1, 2:57-68, Retrieved April 7<sup>th</sup> 2011 from: [www.psyweb.psy.ox.ac.uk/stressgroup/shiftchapter%25.pdf](http://www.psyweb.psy.ox.ac.uk/stressgroup/shiftchapter%25.pdf)
- Oshitake, H. (1971). *Relations between the symptoms and feelings of fatigue*. *Ergonomics*, 14:175-181. Retrieved 15 March 2011 from: [www.ias.ac.in/currensci/jul102001/32.pdf](http://www.ias.ac.in/currensci/jul102001/32.pdf)

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