

Voices of Indonesian Manufacturing Workers in Rotating Shift Systems

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Abstract

The factors associated with changes in work patterns and working hours due to rotating shifts have an effect on the increased risk of health problems in workers. Manufacturing industry workers, specifically those on rotating shift schedules, are at a high risk of various health problems, such as cardiovascular diseases, circadian rhythm problems, social life problems, and stress. These health problems may be worsened by poor lifestyle habits, such as smoking, unhealthy diet, and infrequent physical activity. This research aimed to explore the experience of 12 manufacturing workers on rotating shift schedules in Greater Jakarta, Indonesia. Through a phenomenological approach, this qualitative study employed 12 participants selected from manufacturing industry shift workers. The participants were selected through purposive sampling whom met the inclusion criteria, namely working in three rotating shift patterns (morning, afternoon, and night shift), aged 20–50 years old, having at least three years of experience in shift work, and able to communicate well. Selection was done with the assistance of the supervisors of the participants working in the manufacturing industry. Thematic analysis yielded three themes: the reasons for working shifts, the effects of shift work, and efforts made to maintain health during working shifts. The findings of this study imply the need for occupational health nursing services as the main intervention at the primary and secondary prevention levels. Occupational health nurses provide occupational health nursing services in the workplace in accordance with the nursing intervention model of fatigue management.

Keywords: shift work, manufacture worker, rotation system, occupational health nursing

Abstrak

Suara Pekerja Manufaktur Indonesia dalam Sistem Shift Berputar. Dalam sistem kerja shift, faktor-faktor seperti perubahan pola kerja dan jam kerja dapat berdampak pada masalah kesehatan para pekerjanya. Pekerja shift manufaktur berisiko memiliki berbagai masalah kesehatan, seperti penyakit kardiovaskuler, gangguan irama sirkadian, gangguan pola kehidupan sosial, stres, didukung oleh perilaku pekerja seperti merokok, diet yang buruk serta aktivitas olah raga yang jarang dilakukan. Penelitian ini bertujuan untuk mengeksplorasi pengalaman para 12 pekerja di sektor manufaktur di Indonesia, khususnya di daerah Jakarta dan sekitarnya. Peneliti menggunakan metode penelitian kualitatif dengan pendekatan fenomenologi. Partisipan berjumlah 12 didapatkan melalui teknik purposive sampling yang memenuhi kriteria inklusi: menggunakan sistem kerja rotasi tiga shift (pagi, sore, dan malam), berusia 20–50 tahun, memiliki pengalaman bekerja sistem rotasi shift minimal tiga tahun, dan mampu berkomunikasi dengan baik. Proses pemilihan partisipan dilakukan peneliti bersama key person, yaitu supervisor/leader dari beberapa pabrik manufaktur. Analisis tematik yang dilakukan menghasilkan tiga tema: alasan bekerja shift, dampak dari kerja shift, dan upaya para pekerja dalam menjaga status kesehatan. Temuan dari penelitian ini dapat menjadi implikasi bagi kesadaran terhadap perlunya tenaga kesehatan atau perawat di area kerja atau sektor industri sebagai upaya intervensi utama dan sekunder dalam pencegahan kecelakaan kerja untuk para pekerja dan keluarga pekerja melalui model keperawatan manajemen kelelahan kerja (MARIKERJA).

Kata Kunci: kerja shift, pekerja manufaktur, perawat kesehatan kerja, sistem berputar

Introduction

Being a worker is one of the tasks of adult human development (Kaakinen, 2018). Work is a

demand for social roles in human life and must be carried out by everyone when entering early adulthood and middle adulthood; all individuals must perform their roles as workers (Rogers,

2012; Stanhope & Lancaster, 2019). Worker groups are one of the groups at high risk (at-risk population) of experiencing health problems (Stanhope & Lancaster, 2019).

At present, the number of workers in shift work systems is very high in countries worldwide, including Indonesia. In 2018, the number of workers in Indonesia was approximately 127.1 million (Statistics Indonesia, 2018). Manufacturing workers in shift work systems carry out work activities by using technology, such as electrical machinery and material equipment, for 24 hours (McMenamim, 2007). In this study, manufacturing division includes mechanical transformation production, wherein machines are used to transform chemical substances through mechanical processes into new material products that can be consumed or used by people. Manufacturing processes can also include the assembly of manufacturing components and the mixing of materials, such as lubricants, resins, or alcoholic beverages (Occupational Safety and Health Administration [OSHA], 2015). Manufacturing goods are categorized into two classes, namely, usable or consumable goods and semifinished goods. Manufacturing workers are required to be adept in the use of machinery tools to reach production targets and are thus required to work in shifts.

The shift work system harms workers' physical, psychological, and social health and poses the risk of workplace accidents. One of the causes of health problems is fatigue. Fatigue can exert a detrimental effect on workplace safety by reducing alertness. This issue can result in errors and increase the risk of accidents (Fang, 2014; Nordlöf et al., 2015). Jie (2014) found that the shift work system can interfere with heart rates and activities. This interference worsens the fatigue experienced by workers. Shift work affects other body systems, such as the digestive system. For example, night shift workers complain of abdominal pain, dyspepsia, and flatulence (Rogers et al., 2021).

The data from the Social Security Organizing

Agency show that relative to that in 2017, the number of workplace accidents in 2018 increased to 17,105 cases, with the number of work accident claims amounting to IDR 1.2 trillion (Widianto, 2019). The supporting data on morbidity, accident, and mortality rates show that 15.4 million, or 13%, of the workers in the manufacturing sector in Indonesia are in shift work systems. On the basis of these data, morbidity and health insurance costs can be concluded to account for the high amount of funds spent to deal with accidents among shift workers.

The occupational health and safety personnel have provided a lot of effort to prevent fatigue workers that caused by work shift. For example, Dawson et al. (2021) developed the Fatigue Risk Management System (FRMS). However, FRMS has not shown any optimum effects. Other intervention models, such as the shift management model developed by IPIECA, had attempted to formulate shift work advice sheets in consideration of efficiency, performance, and safety enhancement (Chan, 2014; Chompu et al., 2010; Darwent et al., 2015). Nurses in the occupational health sector improve the quality of health of workers, including shift workers, by providing nursing care and health service management aimed at individuals, families, worker groups, and company management. Occupational health nurses have four main key roles: as health-care providers, as policy makers for improved health, safety, and productivity policies; as health promoters; and as case managers (Guzik, 2013; Rogers, 2012; Stanhope & Lancaster, 2019). The purpose of this study was to explore the shift workers' experiences and possible health problems through in-depth interviews.

Methods

This study employed phenomenology hermeneutic approach that is appropriate for exploring meaning. Hermeneutic phenomenology, as outlined by van Manen (1990), was used to describe and to interpret the experiences of the shift workers of manufacturing sector companies in Jakarta, Bogor, Depok, and Bekasi (Greater Ja-

karta), in Indonesia. Through this research, the researchers attempted to uncover the meaning of life experiences as shift workers, in other words, their daily experiences as workers in the shift system.

The participants in this study were selected from eligible workers in manufacturing sector companies in Jakarta, Bogor, Depok, and Bekasi areas. The participants must meet the following inclusion criteria: (a) working in a rotating shift system (morning, evening, and night), (b) aged 20–50 years old, (c) has a minimum of three years of experience in the rotating shift system, and (d) able to talk about their experience as workers. The age criterion was chosen in accordance with the general age requirement for the manufacturing industry, which is 20 years old with the minimum educational attainment of a high school degree. Meanwhile, the age of 50 was considered for workers who are motivated and able to maintain their health status (Rogers, 2012; Thornbory et al., 2018).

The data were collected through semistructured conversational interviews. This interview approach would be applicable for eliciting the workers' thoughts and feelings, as well as detailed descriptions of their life and work in relation to their experiences as shift workers. The conversational approach of the interview allowed the workers to describe with great comfort how shift work affected their experiences in completing their tasks and allowed for a good flow of information. During the interviews, the researchers attempted to keep what they knew and felt about shift workers to themselves to allow the participants to describe their experiences and to encourage the participants to talk about themselves. After the interviews, several techniques, including reflexivity, clarification, and summarization, were used to ensure the credibility of the data. The research team made field notes immediately following an interview. Two interviews were conducted with each participant in the study. These interviews were phone-recorded with consent and lasted from 60–90 min.

In this study, each interview was subjected to thematic analysis through the selective or highlighting approach as outlined by van Manen (1990). Through this approach, the team read the transcribed texts with the following question in mind: “What statement(s) or phrase(s) seem particularly essential or revealing about the experience described by these participants in this study?” The researchers then encircled, underlined, or highlighted these statements. The themes found appeared to describe well the experiences of shift workers in Indonesia. One of the challenges in determining the themes within this study was that it undeniably wholly captured the broad meaning of each experience and thus represented a poor summary of the shift workers' experiences (van Manen, 1990).

The permission to conduct the study was requested and received from the Research Ethics Committees of Faculty of Nursing, Universitas Indonesia (No.86/UN2.F12.D/HKP.02.04/2017). Autonomy, beneficence, and maleficence principles were applied in this study. All respondents provided signed informed consent after receiving an explanation regarding the study objectives and methods.

Results

12 participants were involved in this study, nine of whom were men and three were women. These participants were all shift workers in the manufacturing sector. The participants' age were ranged between 20–40 years old and have had minimum three years of experience as shift workers. Their educational backgrounds varied from junior high school to diploma three (associate degree diploma). All participants resided in Greater Jakarta, specifically, in the Bogor and Depok areas. The researchers identified three themes as the findings of this qualitative research: (1) the reasons for working shifts; (2) the effects of shift work; (3) and efforts to maintain health.

Theme 1: The Reasons for Working Shifts
Shift Work as an Obligation. Seven participants

stated that obligation was the main reason that they worked in the rotating shift system. Two other participants stated that shift work was a task that they carried out with a sense of responsibility as shown by the following statements:

... *“but it's responsibility, it's called work, we have to be responsible...”* (P5)

... *“because it's one of our work responsibilities...”* (P2)

Having Leisure Time Outside the Shift Work Schedule. One participant with a dual role as a housewife with school-age children stated that shift work was flexible because it provided her with some spare time to take care of her family before or after shift work:

“...the positive side of having afternoon shift means being at home in the morning so that I can spruce up the house, right? Like doing my morning chores, washing the clothes, and doing everything else...” (P8)

“...more time with kids of course, my working time is more flexible compared to those with non-shift system...” (P4)

“I think I have more free time, to rest, to play with kids or with my wife for stress relieve, or just watching some TV, even I can go to sleep after that...” (P1)

Financial Needs. Three participants stated that they were earning a good income through the rotating shift system because it provided special allowances. Four other participants stated that the benefits of shift work were high overtime pay. As one participant stated:

“...the income is good, because I get a special shift allowance...” (P9)

“Thank God, the shift allowance here is really good...” (P4)

“They compensate me (for overtime) well

here, and I decide whether to take the off time depending on the money...” (P2)

Theme 2: The Effects of Shift Work

Effects of Working Morning Shift. All participants recognized the effects of each shift system. Two unmarried female participants stated that if they worked the morning shift, they would feel like “normal people” (working in the morning until noon/evening, then resting in the afternoon/evening):

“...if I may choose, the morning shift is far better, like any normal worker out there so I can rest at night...” (P7, P8)

However, unlike afternoon or evening shifts, the morning shift had the negative impact of being fully supervised by supervisors as shown by the following participant's statement:

“...the morning shift should be busy, sometimes our bosses are watching...there are always lots of bosses...” (P9)

“...there was a feeling of being watched by the supervisor during the morning shift...” (P2)

The morning shift, especially shifts on Saturdays or Sundays, had negative effects in addition to feeling supervised:

“...I can't go to marriage celebration if I get morning shift on Saturday or Sunday, and probably never will... if it's really important, I'll ask for permission, but I rarely do it...” (P12)

Effects of Working Afternoon Shift. Most participants stated that the afternoon shift was more comfortable for them than other shifts given the absence of pressure from supervisors. The relevant participant statements can be seen below:

“...I am more comfortable with shifts 2 and 3; there are less pressure, as the supervisor

is mostly not present.” (P2)

Effects of Working Night Shift. Participants in this study had different views of night shifts. Some reported that the night shift had a positive effect, such as providing spare time in the morning until noon to relax or perform other activities. Some other participants stated that the night shift was challenging due to fatigue and health problems. One participant felt distressed on night shifts. As stated by the participants:

“...on the positive side, night shift gives more morning free time at home...” (P2)

“...shift 3 is the worst, I often feel sleep... and after Fajr prayer at 5... I'll be dull...” (P4)

“...damaging the body... if it's long term (night shift)...” (P1)

All participants in this study stated that night shift work affected their fitness:

“... I feel not good or something... because of working all night...” (P2)

“...Shift work is quite tiring... if you get the night shift you need extra energy because you are required to be focused...” (P3)

Effects on Individuals' Health. Most of the participants stated that they developed health issues, including visual impairment; respiratory, digestive, and musculoskeletal problems; and sleep disorders. The participants' statements regarding these issues are given below:

“...I think I get nearsighted vision...” (P1)

“...It's easy to get a sore throat during the night shift since my sleeping time gets disturbed...” (P2)

“...sometimes, if it gets busy, aches will occur all over my body... Sometimes it turns to be gastritis...” (P8)

Moreover, most workers felt at risk of workplace accidents during the night shift. As stated by the participants:

“...But if (I get) the night shift, I'll be dull, I can't focus at all...” (P2)

“...if we get drowsy, the risk of an accident will be bigger...” (P6)

In addition to health and safety effects, many workers on afternoon and evening shifts felt role interference.

“How come, I feel like I have not tried my best to be a good father, I haven't been able to give meaningful impact to my kids...because I often do evening and night assignments...” (P3)

Most participants also stated reduced enthusiasm, irritation, distress, and anxiety after numerous shifts as a psychological effect. The issues can be seen as follow:

“...Well, yes, it's really boring... and also stressful, most people can go to sleep at night while I (go to) work ...” (P6)

Some participants also felt social life disruptions, such as family conflicts, lack of interaction with their families (i.e., children and wife), and loss of special moments with their families:

“...sometimes (when I get home) my wife's already sleeping...I often come home at 9, then we (immediately) go to bed, my wife isn't happy about it...(she's) just frowning...” (P1)

Another participant provided the following statement on social disruption as the effect of shift work:

“I can still keep up with that (religious meeting), but it is hard to make an appointment because of my shift rotation schedule...” (P2)

A similar statement was voiced by one participant:

“I would rather not participate at all, mostly because I am swamped already.” (P7)

Participants were also concerned that their spiritual routine was affected by shift work. One participant stated that his prayer routines have been completely disrupted.

“It’s hard now to go directly to mushola whenever azan comes. It’s a huge loss” (P3)

“Always late at asr and fajr prayers, while dhuhr is an exception, only if I get the morning shift, something like that.” (P3)

Theme 3: Efforts to Maintain Health. Some positive efforts made by shift workers included utilizing the healthcare facilities of their companies, undergoing simple health treatments or complementary healthcare, preventing possible traffic accidents and possible workplace accidents, and time management. Six participants reported that they used health facilities only if they felt unwell or had health problems:

“...So if I get sick, I just go to the clinic...” (P11)

Eight participants stated that they underwent simple treatments, took supplements, used simple medication, and received massage therapy to overcome their health problems:

“...sometimes, when I wake up early in the morning, I made a honeyed lemon drink or just lemonade with warm water...” (P10)

All participants sought to manage time well to maintain health and fitness. Time management may provide some spare time for rest, quality family time, and overtime or may help avoid overtime if possible. This subtheme is reflected by a participant’s statement below:

“...I have scheduled the overtime well, I guess,

so if this week I get overtime, I won't do the overtime in the next week, so I keep it even...” (P1)

Discussion

The Reasons for Working Shifts. The findings of this study indicated that workers who carry out shift work assume that the work system is part of their duties and responsibilities for meeting their financial needs. This finding is consistent with the results of previous research on shift workers in Yogyakarta, Indonesia, that identified overtime bonus as reasons for doing shift work (Satrio, 2015). The findings of the study by Setiono and Kwanda (2016) on shift workers in Surabaya, Indonesia, also support the results of this study. The previous study found that workers performed shift work because they expect a service charge reward or bonus every month. Thus, on the basis of the results of the above studies, obtaining income or rewards is the reason why workers performed shift work.

The Effect of Shift Work. The workers' activities in rotating shift systems have given them a good understanding of the effect of rotating shifts. On the basis of their experience, workers can adapt to changes from one shift to the next. The findings of this study showed that workers assume that in general, the morning shift has a “healthier” effect than the night shift because the morning shift allows workers to sleep at night, wake up in the morning, then work until the afternoon. Workers assume that compared with morning shifts, the night shift limits rest, social activities, and increases fatigue. These effects may cause family conflict.

The analysis of this finding implied that shift workers cannot yet understand that the tightened supervision and evaluation of morning shifts is one of the causes of fatigue. The Australian Workers'/Safe Work Australia Institution (2013) supports this analysis, stating that a significant association exists between fatigue and repetitive, monotonous work performed under pres-

sure or strict supervision. Thus, the findings of this study can strengthen the development of a nursing model intervention, i.e., fatigue management, in the workplace. These efforts are expected to prevent fatigue in certain groups of workers or workers on morning shifts.

All workers stated that the night shift has the most unpleasant impact due to limited rest, which results in the development fatigue and stress. This finding is consistent with the results of Yumang-Ross and Burns (2014), who found that shift workers are at risk of developing health problems due to irregular sleep patterns and poor sleep needs given that their sleep is reduced to two hours per day. Garde et al. (2020) stated that shift workers in rotating shift systems experience difficulty sleeping because they have to adjust their sleep patterns.

This research revealed that night shift workers experience sleep deprivation, wherein their sleep time is far less than the optimal sleep time of 7–8 h per day (Potter & Perry, 2010). Workers who experience sleep deprivation incur sleep debt, which can only be “paid” with a sufficient amount of sleep. Thus, if workers experience this situation every day, their sleep debt accumulates and causes fatigue. The analysis is consistent with the theory of the sleep needs of night shift workers proposed by international petroleum and environmental conservation organizations and IPIECA (2019). This theory explains that after a night shift, shift workers need 2–3 days off to fulfill their sleep needs optimally.

A few workers stated that shift work has positive effects, including spare time for activities other than work. The research conducted by Habibi et al. (2015) on rescue personnel in Iran found that overtime or work outside the usual working time is one of the factors that increase fatigue, especially mental fatigue. The cohort study by de Vries et al. (2015) on 3,583 factory workers in the Netherlands show a reciprocal relationship between physical activity outside and at work, with fatigue increasing and performance decreasing over time.

This study discovered that all workers felt the negative impact of changes and disruption on their health conditions. This finding is similar to the results of Kang et al. (2017), who identified the relationship between shift work and mental health in 1,414 electronic factory workers in South Korea. They found that compared with permanent day shift workers, shift workers are at higher risk of developing mental health problems and are 2.35 times more likely to experience insomnia. The findings of this study are also in line with the findings of Naghaspour et al. (2013), which show that shift workers are at risk of developing circadian rhythm disorders, resulting in the disruptions of hormone release due to irregular sleep patterns and the lack of sleep.

In addition to physical problems, workers experience psychological problems because of shift work systems. This finding is similar to the results of Caruso (2014), who found that shift workers experience anxiety, stress, and depression, which could pose a risk of family conflict. However, most workers stated that family conflict did not happen because their family members had accepted and understood their situation. Most of the workers stated that they had the support of their family to do shift work. Other findings indicated the disruption of the role experienced by workers, especially those with a dual role, such as housewives. This finding supported previous results showing that family–work conflicts affect the fatigue and performance of the employees of one of the universities in East Java (Widayanti et al., 2017)

On the basis of the explanation of the effect of shift work experienced by workers, the findings of this study were analyzed and found to be in accordance with various theories that explain the occurrence of physical and psychological problems, risk of workplace accidents, and disruptions in the family and social life of workers working in rotation shift systems (Caruso, 2014; Jie, 2014). These effects are caused by changes in work patterns, eating, and sleeping that in turn alter the body's natural patterns (circadian

rhythms). The shift system work pattern causes alterations in body rhythms that repeatedly occur and may sometimes be unpredictable, for example, when workers are on irregular shift work schedules.

Efforts to Maintain Health. The experience of shift workers in this study showed the existence of efforts to prevent, reduce, and overcome disturbances. Most workers have positive experiences, namely, utilizing health service facilities (workers' health clinics) available at the workplace if they experience health complaints. The experience of workers in utilizing health clinics shows that the existence of clinics as occupational health facilities is very important and useful for dealing with health complaints and problems (Kementerian Kesehatan RI, 2019). Most workers use clinics to obtain drugs that can eliminate complaints and diseases. None of the workers obtained health education in a structured and planned manner by using media (leaflets, booklets, or flipcharts) from doctors and nurses, whose duty is to prevent and overcome health problems.

On the basis of these experiences and explanations, we found that the health services implemented in workers' health clinics remain curative, wherein workers only obtain drugs to overcome their health problems. The management and health service managers of these clinics have not considered the importance of health promotion efforts and have not planned optimally for the workplace. Moreover, nurses and doctors lack the ability to design and implement health promotion efforts in the workplace. Workers lack a good understanding of the health promotion efforts that should be provided by nurses and doctors who are in charge of the clinic. Workers have limited time for health promotion in the workplace; the nurses in charge of clinics do have not the ability to carry out health promotion efforts; and the management support provided by companies for health promotion efforts in the workplace remains suboptimal (Handayani, 2014; Punchihewa, 2016).

Implications for Occupational Health Practice. This study revealed the importance of occupational health nursing services within the manufacturing workplace for preventing, overcoming, and improving the health status of workers, particularly those with various health problems as a result of shift work. Nursing services are given in the form of nursing care to individuals and groups of workers in accordance with the diagnosis given by the occupational health nurse on the basis of case study. Nursing care for individuals and groups of workers will be the central intervention at the primary and secondary levels. Such an intervention should be provided by researchers through the development of the nursing intervention model of fatigue management in the workplace.

Conclusion

The essence of the shift worker experiences identified through these three themes is that shift workers consider working in shift systems as an obligation that must be carried out responsibly. The workers recognize the positive and negative effects of each shift system (morning, evening, and night) and perceive that the flexible work shift system enables conducting other activities besides work. The workers feel the effect of shift work on their physical, psychological, social, and spiritual health status and thus make various efforts to maintain optimal health in accordance with their health knowledge and abilities.

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