

Extent of Shift Work Impact on Library Staff Efficiency and Health

J. Chukwusa

Delta State University Library, Abraka, Nigeria
E-mail: chukwusajoseph@yahoo.com

Abstract - Shift workers in libraries just like their counterparts in service organizations are impacted upon negatively with respect to health and efficiency. This calls for investigation on the extent of impact on librarians' efficiency and health. The study empirically investigated the extent of shift work impact on library staff efficiency and health in academic libraries in Delta State, Nigeria. The study was a descriptive survey and the population includes 182 staff in the academic libraries. Questionnaire was used for data gathering. The questionnaire was validated and reliability established with Cronbach-Alpa reliability Co-efficient, 0.86. Data retrieved were analyzed using frequency count and simple percentage. The study found that, to a great extent, shift work disrupts shift workers' family life and has negative effects on efficiency and health. Also, the study found that service level is higher during morning shift, but the shift workers prefer afternoon shift. A shift worker whose pulse corresponds to diurnal activity by a light/dark cycle should go through phase modification when adjusting to a new light/dark cycle, especially the night/ afternoon shift workers). Adequate lighting could be used to reduce/mitigate circadian rhythms' disruption in shift workers.

Keywords: Academic Libraries, Librarians, Health Care, Shift Work, Health Impact, Nigeria

I. INTRODUCTION

Shift work is a work program that is prevailing in service organizations such as nursing and librarianship. Generally, shift work is a work schedule planned to make use of the 24 hours of the clock, rather than a standard working day (Treadwell, 2018; Dawn, 2018; Heathfield, 2018). Therefore, the concept shift work embraces both longstanding night shifts and work plans in which workers adjust or alternate shifts (Handy, 2010). The aim of the work schedule is to make organizations continue to be operational. In the library setting, shift work is usually in the morning and evening (8a.m-2p.m and 2p.m-10p.m).

According to Shegun Olagundoye as reported in the Nigerian Vanguard (2019) the human body has a normal reading that is regulated by sunlight. The scholar noted further that shift work destroys the regular cycle that is in the human body system. How? When the sun rises, some hormonal actions and activities in the body reach their highest point in the early hours of the morning to enable us to wake up, takes us through the day, then as the day darkens, the hormonal activities are disallowed from progressing to enable us prepare for the night sleep and relax. During afternoon or evening/night shift schedules, when the hormone of sleep and rest are supposed to be

functioning, the light is on (the person is awake) as a result of the fact that the shift worker is busy doing a variety of activities. Establishments have tested every conceivable form of shift work in their determinations to make the most of the potential of their work process. A lot of employers have considered how best to lessen the ill effects of shift work on their shift workers. Aside the library, shift work occurs today in many industries and fields such as hospitality, service stations and grocery stores ((Healthfield, 2010). Shift work has demands that differentiate it from other jobs with conventional working period. It has benefits and more suitable when examined from a child care viewpoint. Sometimes shift workers are better paid and it also allows them time for other sundry activities, such as educating themselves while on the job (McIntosh, 2016).

Aside these benefits, the medical communities have reported continually that shift work increases the possibility of certain health disorders, and subsequent harmful impact on well-being of shift workers. The use of shift work can increase capacity and employment opportunities thus accelerating economic growth. However, shift work has been noted to cause health hazard in service institutions, libraries inclusive. Shift work is linked with reduced output, compromised safety, reduction in quality of life, in addition to having negative effects on wellbeing (Figueiro & White, 2013). Circadian rhythm disruption as a result of shift work is also connected to increased hazard for diabetes, metabolic disorder, circulatory ailment as well as cancer (malignant cells). It is on this note that this study was embarked upon to examine the extent of shift work's impact on librarians' efficiency and health in the study area. In this context, efficiency means providing satisfactory services as shift workers relative to their wellbeing.

Therefore, the following research questions guided the study.

1. What is the extent of shift work impact on librarians' health and efficiency?
2. Which is the preferred work shift by librarians?
3. What is the production/service (output) level per shift?

II. LITERATURE REVIEW

A. Health Consequences of Shift Work

Literature on shift work in libraries represents a distilled application of principles and practices borrowed from other

disciplines. The above shortcoming notwithstanding, the materials used are very relevant to the present study.

Research has shown that roughly ten percent of shift workers are believed to experience a sleep ailment called shift work disorder (Treadwell, 2018). According to National Sleep Foundation (2019) and Bartel, Gradisar & Williamson (2015), approximately between 25-30% of shift workers have signs of the ailment called insomnia (restlessness). Shift work is as well associated to other complications with respect to somatic, psychological health, safety and performance. Morris, Purvis, Hu and Scheer (2016) reported Cluster headaches (a frequent pain in the head, migraine-like and linked to a runny nose, some pain in the eye or temple on one side of the head) as a result of shift work. Health problems in the short term can also include fatigue, stress and loss of concentration. Other challenges are a higher rate of absence from the job and poor sexual performance, as shown in the majority of shift workers in a study (White, 2018). Dhande and Sharma (2011) stated that shift workers complain that they have more of sex related problems as a result of night shift, coupled with uneasy and disturbed friendship especially during afternoon shift. Afternoon shift workers in libraries experience disturbed relationship with friends.

Also, the long term effects of disconcerting nature of circadian rhythms have been studied. A research by Knutsson (2010) revealed that shift workers who are in service for over fifteen years were 300% more likely to have ischaemic heart disease (a common word for ailments of the heart triggered by inadequate blood provision to the myocardium). Another study suggests that for those working night shift (such as 11 p.m to 7 a.m), it may be advantageous to sleep in the evening (2 p.m to 10 p.m) rather than the morning 8 a.m to 4 p.m (Oliver, & Capshaw, 2019). The study's evening sleep respondents had 37% fewer periods of attention loss than the morning sleepers. Shift work impact could relate to whether the person is a day worker or a night worker as well as what shift one is allocated to.

The strain of shift work could make worse some health conditions such as heart diseases or digestive disorders. In addition to being separated from family and friends (especially afternoon shift), shift work can be demanding due to frequent exchange from morning to afternoon shift. These frequent changes leads to stress and can be injurious to workers wellbeing. British Broadcasting Cooptation (BBC) (2012) also reported that night or evening shift workers are more prone to the risk of having a heart attack or stroke than morning workers.

Shift workers also experience digestive complications. Chung, Lee and Kim, (2016) quoting Vakil, Van Zanten, Kahrilas, Dent, Jones, & Global Consensus Group (2006) noted that a good number of shift workers in one study recounted taking a number of treatments for digestive complications. The researchers noted that shift work was

responsible for a good number of health challenges and stated further that there is contradiction on whether shift workers have higher rates of stomach complications such as ulcers, colitis and gastritis, than do permanent day workers. Furthermore, understanding your inborn tendency could help you realize how to adjust and be more productive in the morning or evening shift work, because your natural internal clock (circadian rhythm) allows you to be alert in those hour (Figueiro & White, 2013).

However, certain individuals are equally impacted upon negatively by shift adjustment generally. Their internal clocks do not adjust easily and as a result shift rotation affects them harshly more than other persons. Their biological clocks do not entrain or alter easily, so as to adopt a cycle dissimilar from a 24-hour one. This category of persons should be careful regarding the protection of their sleep time (National Sleep Foundation, 2020 and 2019).

Sequential sustenance and phase-relation organization of circadian rhythms is vital in coordinating task all over the human body (Mackay, 2019; Figueiro & White, 2013). Circadian disruption impacts the whole body-adequate sleep, alertness, effectiveness and efficiency. Above all, it is an established fact that internal disruption of circadian rhythms affects cell metabolic rate and creation (Thosar, Butler, & Shea, 2019; Chang, Scheer, Czeisler, 2011).

Prolonged circadian interruption experienced by shift workers, affect their health and comfort. However, lighting disturbs circadian rhythms and it has been employed to assuage the undesirable influence on shift workers health. Light has great impact on alertness/preparedness in shift workers and can phase shift the timing of their circadian system, so that they are more adapted to their shift work. Phase-shifting allows shift workers to deal with not sleeping at night via making provision for modification to the night/afternoon shift. The biological clock relies on light exposure control (Cuesta, Boudreau, Cermakian, & Boivin, 2017a). Light after the minimum Core Body Temperature (CBT_{min}) stimulate earlier bedtimes, and light before the CBT_{min} delays the control of the circadian system. That is, stimulate later sleep time. Core body temperature is the temperature of core environment of the body and they include such organs like the liver, heart and the blood (Cuesta, Boudreau, Cermakian, & Boivin, 2017b). In fact, the 'white' light needed to trigger/modify the biological clock is at least two degree more than the number that makes the visual system active and the circadian system is greatly delicate to blue light (Kervezee, Cermakian, & Boivin, 2019; Cuesta, Boudreau, Cermakian, & Boivin, 2017b).

Ganesan, Magee, Stone, Mulhall, Collins, Howard, Lockley, Rajaratnam, & Sletten, (2019) in their study, examined sleep involving shift types (that is day, evening, night), as well as alertness and efficiency during day and night shifts

in 52 intensive care workers. They reported that associated with shift work is impaired attentiveness and performance as a result of sleep loss and circadian system misalignment.

To realign the body's normal instincts seems difficult but based on facts that are presently available; reducing the time spent working afternoon/night could be the greatest option for workers to reduce their possibility of having chronic terminal diseases (McIntosh, 2016). The more the body is exposed to circadian disturbance by working longer hours at evening/night for longer periods of time the more the relationship with aggressive diseases, such as cardiovascular disease and various types of cancers.

B. The Preferred Work Shift

According to British Broadcasting Corporation (BBC) (2012) shift work in which an employee works the same shift regularly, is generally considered healthier for workers' health and improves the capability of the workers to develop a fulfilling lifestyle and positive family relationships. Also, Oliver and Capshaw (2019) and Treuer, Fuller-Tyszkiewicz and Little (2014) have acknowledged that employees prefer fixed shifts to rotating shifts. Senior employees prefer the morning shift while junior employees, evening shift. They basically desire the constancy of always understanding when their work is due and this allows them to arrange better, their everyday lives. It was reported in a major American study of shift work that most men are doing something for their daily bread which ordinarily they would have avoided. However, an investigation of English shift workers revealed that for their particular happiness, work rotation cannot be termed a challenge (Oliver & Capshaw, 2019). These conflicting research results according to the researcher represents to a great extent, a failure to control numerous variables that may influence employee attitudes towards shift work.

Oliver and Capshaw (2019) noted that predominantly male dominated workers are inclined to upholding traditional work patterns involving long hours and rigid attendance at the place of work. Shift workers who work in male dominated libraries are therefore particularly unlikely to have effective work/life balance programs. This is an expression denoting the significance of stability between work-based and pleasure-based events in a worker's life (Half, 2019). Work-life based initiative is about developing a more creative workforce, with policies that assuage individual staff needs such as, the care of workers' children as well as dependents, and helping them meet their financial obligations (The FreeDictionary, 2012). Even though some libraries are presenting themselves as family-friendly employers with original work/life balance guidelines, there is often a huge gap concerning the speech-making or what they say and the actuality of work/life balance guidelines in these libraries.

In a survey conducted by the Leadership Team at Solutions Staffing (2017), more than 68% of all the respondents'

preferred the 1st shift (morning shift). The Team was not taken aback by this number, but noted that there is an additional view point worth mentioning. Usually, morning shift in light industrial employment has been 7:00 AM to 3:00 PM. The numbers reported by this investigation shows that the preference was almost evenly divided between 6:00 AM (29%) and 7:00 AM (33.2%) start times, and 3:00 PM (29.1%) and 4:00 PM (23.4%) shift end times. The Team further reported that the survey statistic played down the shortage of afternoon or evening shift workers because they are convinced that there are still lots of afternoon shift opening than there are employees who prefer that work shift. In fact, 20% of the population is not large enough percentage to take care of the demand the study concluded.

The night shift is taxing physically, however the afternoon/evening shift can be equally demanding on your social life and family. Shift workers' preferred shift, is the day shift, while shift workers' least-preferred shift is night and afternoon (Capshaw & Oliver, 2018). The scholar noted that further that this was the observation of the scholars over the last 23 years of working shift work operations.

C. Production/Service Level per Shift

No matter the nature of shift work, whether permanent or rotational, shift work has significant economic and social implications. Economically, it can create cost saving benefits. Also, Isherwood, Chinoy, Murphy, Kim, Wang, & Duffy (2020) did conclude that individual employee's motivation to produce is lowest during afternoon/night shift. The researchers further reported that the evidence as to whether or not effectiveness is degraded among shift workers is inconclusive because it is a well-known fact that human performance follows circadian patterns.

Scheer and Shea (2014) in their work concluded that performance differs between morning-oriented and evening-oriented shift workers. Morning-oriented persons perform well in the morning hours but exhibited performance decrements during evening hours, while evening-oriented persons performed poorly in the morning hours. Evening shift workers have significantly higher cortisol application in the morning shift, and significantly higher performance in the evening shift (Jacobs, 2019). Also, the usual patterns, to some extent support the idea that evening types may exhibit higher stress indications that could impair task performance.

As soon as you recognize how the body's circadian systems work, you will be able to observe how not keeping a regular timetable will have an effect on this internal clock. Shift work produce a situation where your internal clock and the outside world will not align. When this takes place, your body's internal clock sends you warning signs that conflict with the actions you're about to undertake. This could make your body to produce sleep inducing chemicals when you're on the job, otherwise make you to be wakeful and to eat when you're struggling to sleep (The National Sleep Foundation, 2020).

Note that the internal clock is to some extent flexible, so it can adjust to a new shift schedule and finally get used to it. For example, at first, if you fly past time zones, your circadian system will be out of tune with the outside environment. Nevertheless if you are out from bed and expose yourself to light on your new time zone, your internal clock automatically adapts. If there is inconsistency in your shift work (schedule rotates, or different sleep pattern on your days off) you will never get the chance to fully catch up.

It can be a challenge if your shift work arrangement does not rotate and you are to sleep during daylight. Your internal clock, assisted by light as well as other outside signals, usually sends you alerts during the day. As a result, even when you fall asleep immediately after a night shift, it is difficult to sleep in the day time for the full 7-8 hours your body requires, due to the fact that your body's internal clock is signaling you to be awake. It is very difficult to be on the alert and effective at night/evening because the circadian system usually makes your alertness to reduce, as a result, the urge to sleep can be great.

III. METHODOLOGY

The academic libraries include 2 university libraries, 3 Polytechnics, 3 Colleges of Education, 1 School of Health

Technology and 1 College of Physical Education (See Table 1). The shift system operational in the libraries is the 2-phase (Morning, 8 a.m – 4 p.m and Afternoon, 4 p.m – 10 p.m).

The study employed descriptive survey design. The population of the study consisted of 182 library staff (Library Assistants and some Library Officers – shift supervisors) presently on shift duty in all the publicly owned academic libraries in Delta State, Nigeria. These are involved in the charging and discharging of materials to users. The entire population (182 respondents) was used for the study.

Questionnaire was used for data gathering. The questionnaire was structured by the researcher and pretested on 10 library staff from Professor Festus Nwako Nwagbo University library, Awka, Nigeria. The Cronbach Alpha Reliability Co-efficient was 0.86. Prior to the pretesting of the questionnaire, it was validated by two lecturers from Library and Information Science Department. The lecturers were requested to ascertain if the questionnaire measured what it tended to measure. This ensured face and content validity. One hundred and eighty (182) questionnaires were distributed from which 174 were returned and found usable, representing 96.7%.

TABLE I THE ACADEMIC LIBRARIES STUDIED

Sl. No.	The Ten Academic Libraries	Population of the Shift workers
1	Delta State University Library, Abraka	28
2	Federal College of Education (Technical) Asaba	20
3	Federal University of Petroleum Resources Library, Effurun	22
4	College of Education, Library Agbor	15
5	College of Health Technology Library, Ufuoma	11
6	College of Education Library, Warri	16
7	Delta State Polytechnic Library Otefe-Oghara	18
8	Delta State Polytechnic Library Ozoro	18
9	Delta State Polytechnic Library, Ogwashi-Ukwu	16
10	College of Physical Education Library, Mosogar	18
	Total	182

IV. RESULTS

TABLE II EXTENT OF SHIFT WORK IMPACT ON LIBRARY STAFFS' EFFICIENCY AND HEALTH

Sl. No.	Variables	Options		
		High Extent	Neutral	Low Extent
1	Greater loss in man-hour due to frequent illness by shift workers.	95 (34.6%)	30 (17.2%)	49 (28.2%)
2	Higher worker efficiency	64 (36.8%)	49 (28.2%)	61 (35.1%)
3	Shift work disturbs the diurnal or pulsation rhythm of workers with adverse result on their health (a diurnal rhythm is a biological rhythm that is corresponding with the day/night cycle).	75 (43.1%)	58 (33.3%)	41 (23.6%)

Table II showed that 75 (43.1%) of the respondents indicated that shift work affects the diurnal or pulsation rhythm of workers with adverse result on their health and efficiency. Also, 64 (36.8%) respondents agreed that it leads to greater loss in man-hours due to frequent illness by shift workers. Furthermore, 95 (54.6%) of the respondents also agreed that shift work leads to workers' efficiency.

TABLE III PREFERRED SHIFT WORK

Variable	Options	
	Morning Shift	Afternoon Shift
Preferred Shift work	65 (38%)	109 (62%)

The responses to the question "which is the preferred work shift?" revealed that 109 (62%) respondents prefer afternoon shift while 65 (38%) prefer morning shift. Table III revealed that the respondents prefer afternoon shift.

TABLE IV PRODUCTION/SERVICE LEVEL PER SHIFT

Variable	Options	
	Morning Shift	Afternoon Shift
Production/Service Level per Shift	123 (71%)	51(29%)

Table IV showed that a greater majority of the respondents, 123 (71%) agreed that the production/service level is higher during morning shift while 51 (29%) agreed that afternoon shift has the least production/service level. This showed that respondents' production/service level is higher during morning shift.

V. FINDINGS OF THE STUDY

The following are the findings of the study.

1. The shift workers agreed to a great extent that shift work negatively impacted on their health and efficiency.
2. The shift workers in this study preferred afternoon shift to morning shift.
3. A greater majority of the respondents agreed that the production/service level is higher during morning shift.

VI. DISCUSSION

The shift workers agreed to a great extent that shift work negatively impacted on their health and efficiency. One major problem associated with shift work writes Chung, Lee and Kim (2016), is the disruption in family, social and community life of the workers. Workers on shift find it difficult to perform their usual domestic and social roles because the irregular hours which they work interfere seriously with the usual home life. The economic benefits of shift work on employers notwithstanding, it has social implications. Economically the amount of money used to hire labor is reduced. However, the most prominent of these problems particularly where rotating shift is in operation is the disruption in circadian (daily) regularity of the individual worker. Our diurnal rhythm (daily monotony)

imposes some periodic limitations on our efficiency. Daily circadian rhythms are collaborative and require a good phase relationship to produce subjective feelings of wellbeing. Disturbance of these activities- circadian dysynchronization, whether from passage over time zones or from shift rotation, results in health effects such as disturbance of the quantity of sleep, epilepsy and thyrotoxicosis and other organ system activities.

Also, the shift workers in this study preferred afternoon shift to morning shift. This finding is not in line with Dhande and Sharma (2011) to the effect that there is the feeling that individual job performances during afternoon shift may be adversely affected due to fatigue. The respondents' preference for afternoon shift may be as a result of the fact that their monthly pay can no longer make ends meet and so uses the morning period to make up for the deficiency. They make use of the morning period for their individual businesses (it has longer hours) than the afternoon or evening shift. There is limited evidence regarding many of the effects of shift on employees and many of the data that have been reported are contradictory.

Furthermore, this study revealed that a greater majority of the respondents agreed that the production/service level is higher during morning shift while afternoon shift has the least production/service level. This finding agrees with Isherwood, Chinoy, Murphy, Kim, Wang and Duffy (2020) who reported that individual employee's motivation to produce is lowest during afternoon shift. What baffled the researcher in this study is why did the respondents prefer afternoon shift when they know that the shift has the least service level? The apparent low productivity/service during afternoon or night shift may be due to the fact that most afternoon shift workers use the morning period to do other businesses and by the time they resume in the afternoon are tired. Looking at shift work from a sleep management standpoint, most shift workers don't have adequate sleep while on the night shift. As a result, makes it less attractive for making high alertness possible. However, it permit employees to meet up with other responsibilities like childcare management, school runs, engaging in a second job, in addition to spending time together with their families.

Afternoon shift permits a lot of shift workers to control their sleep routine better so they often feel better on this schedule than on a night shift schedule. Afternoon shift workers get more sleep than either morning shift or night shift. The major disadvantage is that it requires going to work during the evening hours when family and friends are available. This can be an obstacle for parents because it may mean not being with their families as the shift lasts (Capshaw & Oliver, 2018).

The study corroborates Scheer and Shea (2014) who reported that performance differs between morning-oriented and evening-oriented persons. The study suggested that morning oriented persons performed well in the morning

hours but exhibited performance decrements during the evening hours, while evening-oriented persons performed poorly in the morning hours.

VII. LIMITATIONS

This research seems to be the first of its kind because the researcher could not locate works which have the same bearing with the present study, hence the use of interdisciplinary approach in the literature review.

VIII. RECOMMENDATIONS

According to McIntosh (2016), most shift workers are doing shift work because it is what the job requires not out of personal desire. The researcher noted further that UCLA Sleep Disorders Center put forward a number of suggestions for shift workers to apply.

1. Two or three days before evening shift elapse, delay your bed time and waking up by 1 or 2 hours. This should make it easier to adapt to a new shift schedule.
2. Set aside extra period to enable you adjust to a new work shift schedule, without shortening the time for sleeping
3. Putting on special goggles/dark glasses could help shift workers avoid daylight as well as some other light signal when they are done with night shift.
4. Try as much as possible to stay on the same sleep schedule every day of the week, this is to assist in aligning the body clock with the work shift arrangement.

The common message we can garner from the UCLA experts is that having good-quality sleep reduces disturbance to the body's circadian rhythms and it is the best approach to make shift workers stay healthy (Wallace, & Haber, 2019). Even though this area of study requires further in-depth and critical examination, evidence points to the fact that measures need to be taken to save from harm a significant part of the working population. In fact current and future result should completely be used in employment guiding principles and public health interventions that are aimed at minimizing risks amongst workers on shift.

IX. CONCLUSION

Production/service (output) level is higher during morning shift. Therefore, for the library to be able to gain the full potentials of shift work, management or library Authorities need to inject more technical assistance/supervisors during evening/afternoon shift to boost coordination of shift workers. Shift work affects the diurnal or pulsating rhythm of individuals with adverse results on library staff health and efficiency. Thus, the disruption in the sleeping habits may affect the library workers to the point where their working capacity may be impaired or lost. In order to maximize the library's capacity utilization, granting of sufficient rest periods, periodic medical examinations and

free gift to best shift worker and enhanced salary is recommended. This is important so as to improve staff efficiency and output since the shift workers in this study acknowledged that even when they know that service level is lower during afternoon shift, they prefer it. They do other trades for extra earnings before continuing their shift work. Adequate lighting could be used to reduce/mitigate circadian rhythms' disruption in shift workers in afternoon/night. A shift worker whose pulse corresponds to diurnal activity by a light/dark cycle should go through phase modification when adjusting to a new light/dark cycle (or sleep/wake cycle, especially the night/ afternoon shift workers) researchers have noted.

REFERENCES

- [1] Bartel, K. A., Gradisar, M., & Williamson, P. (2015). Protective and risk factors for adolescent sleep: a meta-analytic review. *Sleep Med Rev.*, 2, 72-85.
- [2] BBC News (July, 2012). *Shiftwork: Link to increase risk of heart problems.* Retrieved from www.bbc.co.uk/news/health-18996082.
- [3] Capshaw, D., & Oliver, B. (2018). *What is the Worst Shift to Work? Night Shift? Afternoon Shift?* Retrieved from <https://shift-work.com/news/news/what-is-the-worst-shift-to-work-night-shift-afternoon-shift>.
- [4] Chang, A. M., Scheer, F. A., & Czeisler, C. A. (2011). The human circadian system adapts to prior photic history. *Journal of Physiology*, 589, 1095-1102.
- [5] Chung, T. H., Lee, J., & Kim, M. C. (2016). Impact of night-shift work on the prevalence of erosive esophagitis in shipyard male workers. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4927591>.
- [6] Cuesta, M., Boudreau, P., Cermakian, N., & Boivin, D. B. (2017a). *Skin Temperature Rhythms in Humans Respond to Changes in the Timing of Sleep and Light.* Retrieved from <https://pubmed.ncbi.nlm.nih.gov/28569119>.
- [7] Cuesta, M., Boudreau, P., Cermakian, N., & Boivin, D. B. (2017b). *Rapid resetting of human peripheral clocks by phototherapy during simulated night shift work.* DOI: 10.1038/s41598-017-16429-8.
- [8] Dawn, M. (2018). *What are the three work shifts.* Retrieved from <https://careertrend.com/three-work-shifts31594.html>.
- [9] Dhande, K. K., & Sharma, S. (2011). Influence of shift work in process industry on workers' occupational health, productivity and social life: An ergonomic approach. *Journal of Human Factors in Ergonomic and Manufacturing Archive*, 22(3), 260-268.
- [10] Figueiro, M. G., & White, R. D. (2013). *Health consequences of shift work and implications for structural design.* Retrieved from <https://www.nature.com/articles/jp20137#citeas>.
- [11] Ganesan, S., Magee, M., Stone, J. E., Mulhall, M. D., Collins, A., Howard, M. E. Lockley, S. W., Rajaratnam, S. M. W. & Sletten, T. L. (2019). *The impact of shift work on sleep, alertness and performance in healthcare workers.* Retrieved from <https://www.nature.com/articles/s41598-019-40914-x>.
- [12] Half, R. (2019). *Making Work-life balance a part of employee retention.* Retrieved from <https://www.roberthalf.com/blog/management-tips/making-work-life-balance-a-part-of-employee-retention>.
- [13] Handy, J. (2010). *Maintaining family life under shiftwork schedules: A case study of a New Zealand Petrochemical Plant.* Retrieved from <https://mro.massey.ac.nz/bitstream/handle/10179/5999/NZJP-Vol391-2010-3-Handy.pdf>.
- [14] Heathfield, S. M. (2018). *Shift work and the employees who work shifts.* Retrieved from <https://www.thebalancecareers.com/shift-work-1918258>.
- [15] Heatfield, Susan M. (2010). *Shift work.* Retrieved from About.com.
- [16] Isherwood, C. M., Chinoy, E. D., Murphy, A. S., Kim, J. H., Wang, W., & Duffy, J. F. (2020). *Scheduled afternoon - evening sleep leads to better night shift performance in older adults.*

- Retrieved from https://oem.bmj.com/content/77/3/179?int_source=trendmd&int_medium=cpc&int_campaign=usage-042019.
- [17] Jacobs, M. (2019). *Physiological differences in stress reactivity between morning and evening chronotypes*. Retrieved from https://scholar.umw.edu/student_research/281.
- [18] Kervezee, L., Cermakian, N., & Boivin, D. B. (2019). *Individual metabolomic signatures of circadian misalignment during simulated night shifts in humans*. DOI: 10.1371/journal.pbio.3000303.
- [19] Knutsson, A. (2010). *Gastrointestinal disorders among shift works*. *Scandinavian Journal of Work Environment Health*, 36, 85-95. DOI: 10.5271/sjweh.2897.
- [20] Leadership Team at Solutions Staffing. (2017). *How to think about the shifting preferred shift start times*. Retrieved from <http://www.solutionsstaffing.com/insights/for-employers/shiftingshiftstarttimeshrk>.
- [21] Mackay, R. D. (2019). *All about shift work*. Retrieved from <https://www.thebalancecareers.com/all-about-shift-work-4689266>.
- [22] McIntosh, J. (2016). *The impact of shift work on health*. Retrieved from <https://www.medicalnewstoday.com/articles/288310>.
- [23] Morris, C. J., Purvis, T. E., Hu, K., & Scheer, F. A. (2016). *Circadian misalignment increases cardiovascular disease risk factors in humans*. *Proc Natl Acad Sci USA*, 113(10), E1402–E1411.
- [24] National Sleep Foundation. (2020). *How shift work affects the circadian system*. Retrieved from <https://www.sleepfoundation.org/shift-work-disorder/what-shift-work/how-shift-work-affects-circadian-system>.
- [25] National Sleep Foundation. (2019). *Shift work disorder*. Retrieved from <https://www.sleepfoundation.org/shift-work-disorder/what-shift-work>.
- [26] Nigerian Vanguard. (2019). *What shift work does to human health*. Retrieved from <https://www.vanguardngr.com/2019/04/what-shift-work-does-to-human-health>.
- [27] Oliver, B., & Capshaw, D. (2019). *Employee shift work schedules: An introduction*. Retrieved from <https://www.shift-work.com/about/employee-shift-work-schedules-an-introduction>.
- [28] Scheer, F. A., Shea, S. A. (2014). *Human circadian system causes a morning peak in prothrombotic plasminogen activator inhibitor-1 (PAI-1) independent of the sleep/wake cycle*. *Blood*, 123(4), 590-593.
- [29] Smith, M. R., Eastman, C. I. (2012). *Shift work: health, performance and safety problems, traditional countermeasures, and innovative management strategies to reduce circadian misalignment*. *Nat Sci Sleep*, 204, 111–132.
- [30] The FreeDictionary (2012). *Work life balance*. Retrieved from thefreedictionary.com/work%2flife.
- [31] Thosar, S. S., Butler, M. P. & Shea, S. A. (2019). *Role of the circadian system in cardiovascular disease*. DOI: 10.1172/JCI80590.
- [32] Treadwell, L. (2018). *Types of work shift schedules*. Retrieved from <https://careertrend.com/list-5790170-types-work-shift-schedules.html>.
- [33] Treuer, K. V., Fuller-Tyszkiewicz, M., & Little, G. (2014). *The impact of shift work and organizational work climate on health outcomes in nurses*. Retrieved from <https://www.researchgate.net/publication/264987301>.
- [34] Vakil, N., Van Zanten, S. V., Kahrilas, P., Dent, J., Jones, R., & Global Consensus Group. (2006). *The Montreal definition and classification of gastroesophageal reflux disease: A global evidence-based consensus*. Retrieved from <https://reference.medscape.com/medline/abstract/16928254>.
- [35] Wallace, P. J., & Haber, J. J. (2019). *Top 10 evidence-based countermeasures for night shift workers*. Retrieved from <http://orcid.org/0000-0002-1737-0994>.
- [36] White, D. M. (2018). *Shift Work and Relationships*. Retrieved from <https://psychcentral.com/lib/shift-work-and-relationships>.