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# SHIFT WORK, WORK-RELATED STRESS, AND HYPERTENSION AMONG HEALTHCARE WORKERS AT THE 37 MILITARY HOSPITAL, ACCRA GHANA

**BY**

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**(10636420)**

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## DECLARATION

I, Mohammed Abubakari hereby declare that apart from references to other people's works which have been duly acknowledged, this dissertation is as a result of my own independent work and has not been submitted for the award of any degree in any institution.

**……** **…….....**

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**(Academic Supervisor)**

## DEDICATION

This thesis is dedicated to my late mother Rebecca Talata Anachina, my Father Ex WOI Abubakari Ibrahim and lovely wife, Mrs. Diana Abubakar for their motivation, support and encouragement.

## ACKNOWLEDGEMENT

I would like to express my heartfelt appreciation to my supervisor Dr. Reginald Quansah for the advice, guidance, support, and encouragement, May the God richly bless you. I thank my course mates for their support and all those who contributed to the success of this thesis in diverse ways.

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Finally, I give Glory to the Most High God for bringing me this far, Glory be to His name.

## ABSTRACT

**Background of study:** Hypertension is well documented as one of the major cause of morbidity and mortality in the developed world, the significance of hypertension in low-income countries is less well established. In Ghana, however, very little is being done about the disease and its associated risk factors, particularly among healthcare workers. There are several reports of hypertension and other chronic diseases among health care workers in medical facilities in Ghana. However, no study has been conducted to determine the association between shift work, work-related stress, and hypertension among healthcare workers at the 37 Military Hospital.

**Objective**: The general objective of the study was to assess shift work and work-related stress and their association with hypertension among healthcare workers at 37 Military Hospital.

**Methods:** Participants of this cross-sectional study included 300 healthcare workers who were randomly selected from 7 professions (Doctors, Nurses, Laboratory professionals, Public Health staff, Dental staff, Radiology staff and Ward Assistants) at 37 Military hospital. Data were collected between March and June 2018 using four-part Questionnaire and an OMRON digital sphygmomanometer was also used to measure the blood pressure of participants three times with 5 minutes resting period. Hypertension was defined according to the guideline of the National Institute for Health and Care Excellence (Systolic of $\geq 140$ and a diastolic of $\geq 90$) .

**Data management**: Collected data were coded before being entered into Statistical Package for Social Sciences (SPSS) version 24 before importing into STATA version 15. Descriptive statistics including frequency tables, pie charts and bar charts were used to display data. Frequency tables for socio-demographic, determinant of interest and outcome of interest were generated. Continuous data were reported as the mean and standard deviation (or median and

interquartile range where the data was not normally distributed), while categorical data were reported as proportions.

**Ethics**: A written consent was sought from all respondents before including them as participants in the study. Privacy and confidentiality were maintained at all times. To ensure confidentiality, the questionnaires were coded prior to dissemination and names were not required in filling out questionnaires. Participation in this study was entirely voluntary.

**Results:** The median age of the study was 30 years (IQR =. 10). The prevalence of hypertension among the selected healthcare workers at the 37 Military hospital, Accra was 7% , while about 48% of the healthcare workers were on shift work schedule. High job strain (work-related stress) among healthcare workers was found to be 41.7% which was observed to be significantly related to hypertension (IQR = 18.3, P = <0.0001) with about 86.4% of healthcare workers with hypertension having high job strain ($\chi^2$ = 19.514, p < 0.0001). 89.6% of health care workers had adequate knowledge of the risk factors for hypertension.

**Conclusion:** A significant number of healthcare workers reported experiencing high job strain and apparently work-related stress was found to be significantly associated with hypertension. It was also observed that the joint association of shift work and high job strain was significantly associated with hypertension. It is therefore explicitly possible that work-related stress and the joint association of shift work and high job strain are contributing factor to the presence of hypertension among healthcare workers at the 37 Military hospital, Accra.

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## LIST OF ACRONYMS

| Acronym | Meaning |
|---|---|
| ABPM | Ambulatory blood pressure monitoring |
| CHS | College of Health Sciences |
| CVD | Cardiovascular Disease |
| DDNS | Deputy Director of Nursing Service |
| ERI | Effort-Reward Imbalance |
| FRS | Framingham risk score |
| GHS | Ghana Health Service |
| HCW | Healthcare Workers |
| HSE | Health and Safety Executive |
| MH | Masked Hypertension |
| NCD | Non-communicable disease |
| NCO | Non-Commissioned Officer |
| OSA | Obstructive Sleep Apnea |
| SDB | Sleep Disordered Breathing |
| SSA | Sub-Saharan Africa |
| UN | United Nations |
| WHSA | Women‘s Health Study of Accra |

# CHAPTER ONE

# 1.0 INTRODUCTION

## 1.1 Background

Hypertension prevalence has been estimated to have the highest incidence in Africa by the World Health Organization (WHO), with adults age 25 and above having about 46% as compared to 35% to 40% elsewhere in the world (WHO, 2013). Several Africans who are hypertensive are however not aware of their hypertension status and may not often receive treatment or management, putting these people at a higher risk for heart attacks and stroke. The WHO's global action plan for 2013 to 2020 appeals to the member states of the United Nations' (UN) to immediately make every effort to attain target six (6) of its action plan which aims at achieving a relative reduction of 25% in the prevalence of elevated blood pressure or to control it by the year 2020 (World Heart Federation, 2016).

The West Africa's workforce has been reported to have a high prevalence of hypertension, among which significant proportions are either undiagnosed, severe or complicated. The summation of risk factors, co-morbidities, and general low awareness puts an intense medical and economic burden on the limited resources of the West African countries (Bosu, 2015).

A review by Kearney et al, ( 2004) suggests that many countries in the world, have between one quarter and one-third of their workforce recording elevated blood pressures. The report also suggests that the prevalence of hypertension over the past decade had remained constant or reduced in high-income countries but have increased in middle to low-income countries. The results pattern indicates that approximately 30% was estimated to be the most consistent prevalence of hypertension (Kearney et al., 2004).

However, in Ghana, the prevalence of hypertension as reported by Bosu (2010) state crude figures between 25% and 48%, using 140/90 mmHg as the threshold blood pressure measurement. The Women's Health Study of Accra (WHSA) in 2007 also reported an estimated prevalence of 54.6% among 1,303 women whose blood pressure were measured in an upright position. Bosu (2010) further stated that a prevalence of less than 20% was only reported in four studies. However, in spite of this cut-off used, several studies among men and women reported a higher prevalence among men than in women though differences were normally small (less than 4 percentage points) and were found, not statistically significant.

The risk factors associated with hypertension include; age, physical inactivity, high sodium intake, family history of hypertension, smoking and alcohol consumption (Addo et al., 2012). Recently, work-related stress and shift work resulting from high job demands, low job control and poor relationship at work have been implicated in the etiology of hypertension (Rosenthal & Alter, 2012).

The World Health Organization has also described Work-related stress as one's response to challenges and pressures at work that do not match the individual's knowledge and abilities (WHO, 2013). These challenges could manifest themselves as poor work design, role ambiguity, and irregular shift work, noise, high ambient temperature, poor supervisory and poor co-worker support in the workplace (WHO, 2013).

Healthcare workers are exposed to a variety of hazards at the place of work which consists of but are not narrowed to only shift work and work-related stress from intense to routine tasks, and long working hours (Maritta Kinnunen-Amoroso, 2011). Furthermore, work-related stress is also known to increase attrition rates, emotional instability, negative feelings, and

absenteeism among nurses and indirectly compromising patient care and safety (Atinga, Domfeh, Kayi, Abuosi, & Dzansi, 2014). Another study on work stress among 57 nurses at Pantang Hospital in Ghana also showed the presence of work-related stress among nurses in the hospital (Assibi Rita, Atindanbila, Prudence Portia, & Abepuoring, 2013).

On the other hand, about one in every four workers do shift work which usually falls outside the usual 7 am to 6 pm schedule. Shift work disrupts workers‘ exposure to both natural and artificial light, patterns of sleep, and feeding patterns. Shift workers as compared to the rest of the working population, are at a greater risk of developing metabolic problems which can also lead to elevated blood pressure over time (Aisbett, Condo, Zacharewicz, & Lamon, 2017).

### 1.2 Statement of Problem

Stress among healthcare workers has been a global problem for a long time. Healthcare workers are vulnerable to elevated levels of work-related stressors in their work environment (Abd El-Aal & Hassan, 2014). High level of stress has been associated with mortality and morbidity from hypertension among nurses (de Gaudemaris et al., 2011).

According to Barger et al, (2017), night shift is related with an increased risk of cardiovascular disease of about 40%. The author also stated that 30% of working adults in the United States and 44% of night shift employees report sleeping on an average of 6 or fewer hours on work nights. It is also suggested that fewer sleep duration is also related with a high risk for incidence of calcification of the coronary arteries, coronary heart diseases, incident stroke, and deaths (Barger et al., 2017).

The discussion of a study by Egungwu (2015) also suggested that the overall prevalence of high job strain among nurses at Ridge Hospital Accra was 68%. This suggested that more than half of the nurses were affected and that, a high level of work-related stress was noted among nurses working at Ridge Hospital, Accra. The author also stated that the prevalence of hypertension among the nurses was 19.5% and also showed a strong association between high job strain and the existence of hypertension (Egungwu, 2015)

Several literature studies have reported on hypertension and other chronic diseases among health care workers in medical facilities in Ghana. However, no study has been conducted to determine the association between shift work, work-related stress, and hypertension among healthcare worker at the 37 Military Hospital, considering that the 37 Military Hospital is one of the largest hospital in Ghana which serves as one of the major referral hospitals in the country and also serves as the National Disaster and Emergency Hospital, with a large number of mixed staff of both military and civilians employees providing health care services to soldiers, their dependents and the general public.

### 1.3 Conceptual framework

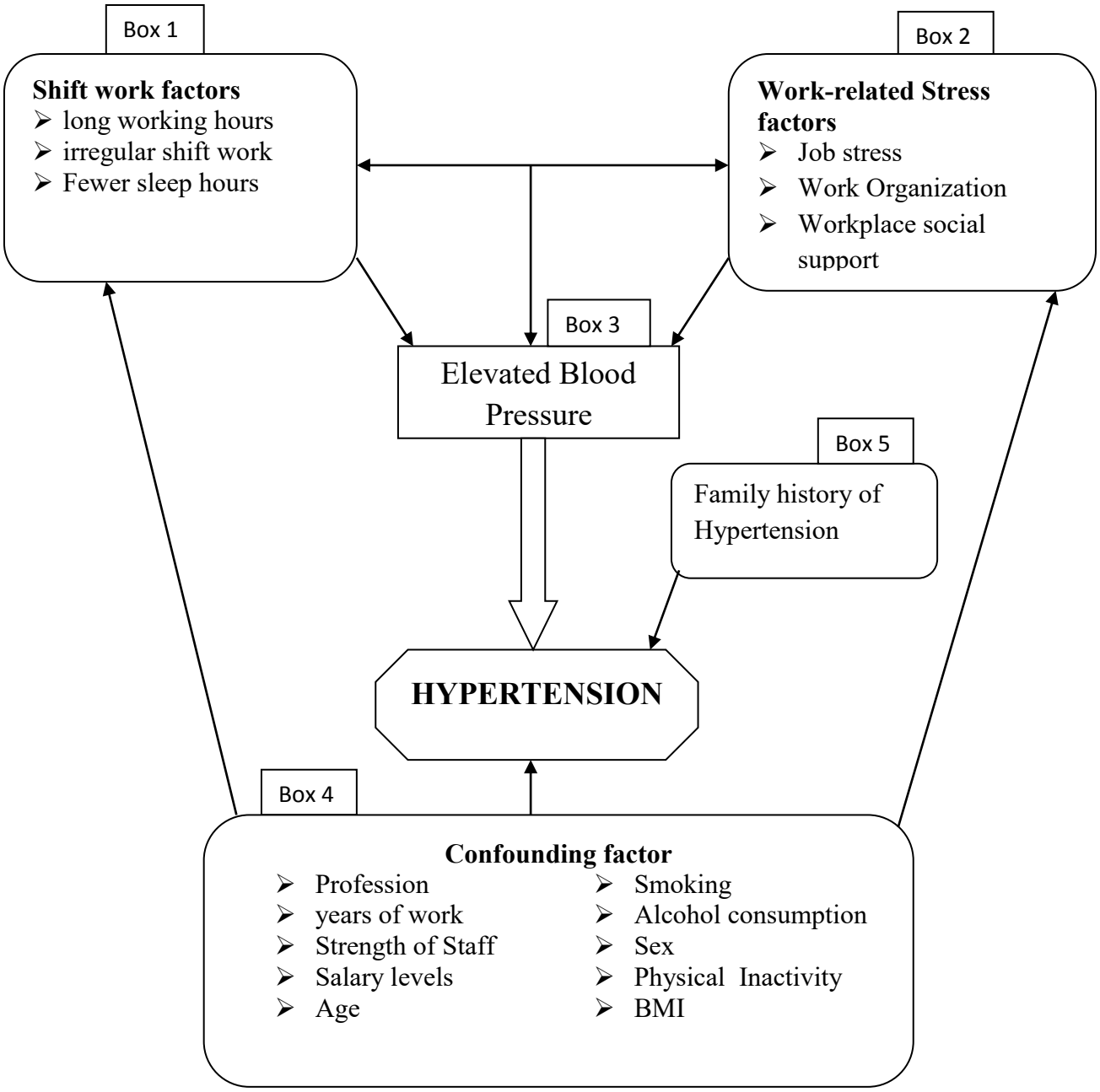



**Figure 1: Conceptual framework of factors depicting the relationship between shift work, work-related stress, and hypertension among healthcare worker.**

**Figure 1 above is a conceptual framework showing the different associations and factors that tend to influence shift work, work-related stress, and hypertension among healthcare workers at the 37 Military Hospital.**

Shift work [Box1] and work-related stress [Box2] is thought to be impacted by confounding factors (occupation, years of work Experience, Strength of Staff, salary levels, smoking, alcohol consumption, physical inactivity, age, BMI, and sex) [Box4]. The family history of hypertension[Box5] is also thought to impact on hypertension. It is also thought that shift work factors [Box1] and work-related stress factors [Box2] also tend to impact on elevated blood pressure [Box3] both individually and jointly, leading to hypertension among healthcare workers at the 37 Military Hospital.

### 1.4 Justification

The 37 Military Hospital is one of the largest and major referral hospital in Ghana. The hospital has a very high client turn-over operating 24 hours per day and 7 days per week providing services to the general public all year round. Shift workers play a vital role in a 24-hour service delivery at the 37 military hospital. Shift work, specifically, night work and work-related stress, can have a harmful effect on the health and well-being of workers due to the disturbances of the natural circadian rhythms of the psycho-physiological functions, commencing with the wake or sleep cycle; interferences with work routine and effectiveness over the 24 hour period, including some resultant errors and accidents (Costa, 1996).

Hypertension, on the other hand, is one of the silent killers in the world. It is accountable for at least 51% of deaths from stroke and 45% of deaths from heart diseases (WHO, 2013). In Ghana,

a considerable proportion of the adult population are hypertensive (Addo et al., 2012). The costs of hypertension include lost productivity, economic and social costs to families for care and anti-hypertensive drugs (Van De Vijver et al., 2013). There is the need to reduce the weight of work-related stress and hypertension among healthcare workers. Findings from this study will make meaningful contributions toward the reduction and control of Shift work, workplace stress and hypertension among healthcare workers at the 37 Military Hospital, Ghana and the World as a whole. It will also add to research knowledge base in the country.

## 1.5 Objectives

### 1.5.1 Main Objective

The main objective of the study was to assess work-related stress, shift-work and their association with hypertension among healthcare workers at 37 Military Hospital.

### 1.5.2 Specific Objectives

1. To determine health care workers' knowledge on risk factors of hypertension.

2. To determine the prevalence of hypertension among healthcare workers.

3. To determine the independent association of shift work and work-related stress with hypertension among healthcare workers.

# CHAPTER TWO

## 2.0 LITERATURE REVIEW

This chapter begins with the definitions of Shift work, Health effects of shift work, irregular shift work, work-related stress under which job stress, work organization, and workplace social support were discussed. Also some confounding factors (strength of the staff, lifestyle, Physical inactivity, and Body Mass Index ) and the prevalence of hypertension where discussed. were discussed. Others discussed in this chapter include hypertension among healthcare workers, shift work and hypertension, and work-related stress and hypertension concluded the chapter.

### 2.1 Shift work

The definition of shift work is quite comprehensive according to Yeom et al., (2017). It is frequently defined as –work beyond the usual daily working hours (about 7–8 AM to 5 –6 PM)", as well as, night shift, early morning shift, and rotational work shift. Several reports and research in the past decades have pointed to the interruption of the endogenous circadian rhythm as the main effect of shift work on health. This eventually induces the obliteration of biological homeostasis (Fontanarosa & Fisher College, 2017).

According to Bazyar et al., (2017), shift work is an unusual working pattern in comparison to the workday. This work pattern is an integral part of the provision of services in many industrial, economic and service activities. Although many studies have reported the relationship of shift work to other diseases like type 2 diabetes, overweight or obesity, blood pressure, cholesterol and total cholesterol as an indicator of lipid metabolism and cardiovascular disease, very limited evidence considered the correlation between shift work and the Framingham risk score (FRS). The results of Bazyar et al., (2017) revealed that changes in FRS

and other factors were not significant during the period of 5-year study. Therefore, they conclude that the observed difference in results of multilevel modeling is not because of the shift work effect, but this difference is related to the baseline, and that showed a significant relationship between FRS and shift work .

Shift work as defined by Sampsa et al, (2010) also suggested that both working at varying periods within the day (morning, afternoon, and night shifts) or working at regular but abnormal hours of the day (permanently on afternoon shift or permanently on night shift). The major challenge is the organization of the 24-hour operations of shift work plus serving as one of the main causes of circadian stress. Nevertheless, shift work may or may not comprise of working at night, moreover night work and other unusual working times may also result in circadian stress. (Sampsa Puttonen & Mikko Härmä, 2010).

According to a review by Aisbett, et al. (2017), it was suggested that night shift hours usually begin from 9 p.m. to 8 a.m. while evening shifts start from 2 p.m. to 12 midnight. Early morning shifts comprise of work beginning from 4 a.m. through 7 a.m. Therefore early morning shift and night shift seriously contribute to shorter sleep hours, whilst evening shift work gives longest sleep durations. Such rosters are usually for the healthcare workers, and other factory workers, aviation of emergency services (Aisbett et al., 2017).

### 2.1.1 Health effects of Shift work

Shift work is one of the most obvious and vivid components of the working environment. Shift work has been evidently connected to several cases of acute and chronic issues on the organism, most of them associated with the circadian rhythmicity of the human body. The major impacts concern sleep, awareness, and performance, but also a lasting health effect (Torbjorn Akerstedt,

2014). The health impacts of work shift has been keenly studied. However, different studies have assessed the impact of work shift on health and established that it could be linked with cardiovascular diseases, high serum cholesterol level, cerebrovascular diseases, gastrointestinal disorders, reproductive system disorders, mental illness such as depression, and others (Oh et al., 2014).

Another study found that workers exposed to job strain and shift work with effort-reward imbalance (ERI) are highly at risk for masked hypertension (MH) i.e., normal clinic blood pressure when not active but high blood pressure during normal daily activities(Landsbergis, Travis, & Schnall, 2013).

### 2.1.2 Irregular Shift Work

The health profession is a day-and-night profession. The demand for irregular shift work in the healthcare causes discord in the physiological and psychological system of healthcare workers. A study conducted among nurses employed in four university hospitals using the Work Ability Index Questionnaire and Occupational Stress Assessment Questionnaire identified occupational stressors to include irregular shift work, public criticism, the hazard at work, poor organization of work and interpersonal conflict at the workplace (Golubic, Milosevic, Knezevic, & Mustajbegovic, 2009). Another study on occupational stress among hospital nurses in China indicated that night shift work is a contributory factor to stress among nurses in the hospitals (Wu, Chi, Chen, Wang, & Jin, 2010).

### 2.1.3 Fewer sleep hours

Sleep disturbance could also be a crucial area, which has been understudied in the mechanisms leading to the prediction of elevated blood pressure or hypertension. Poor sleep is also related to high levels of inflammation and circulating monocytes and increased risk for hypertension (Floam et al., 2015). Not much is also known about the unwanted side effects of connection linking endogenous environmental with behavioral rhythms and circadian physiological rhythms, as it occurs constantly in rotating shift workers and night workers (Wang, Czeisler, & Shea, 2013). Also, a suboptimal connection between the daily behaviors and endogenous circadian rhythms and happen in millions of people who run shift work, and this circadian disruption could predispose them to the negative health effects of work shift, plus fatigue and less sleep, gastrointestinal disorder, harmful metabolic cycle, and higher risks of developing obesity and hypertension (Carlota et al., 2011)

## 2.2 Work-related stress

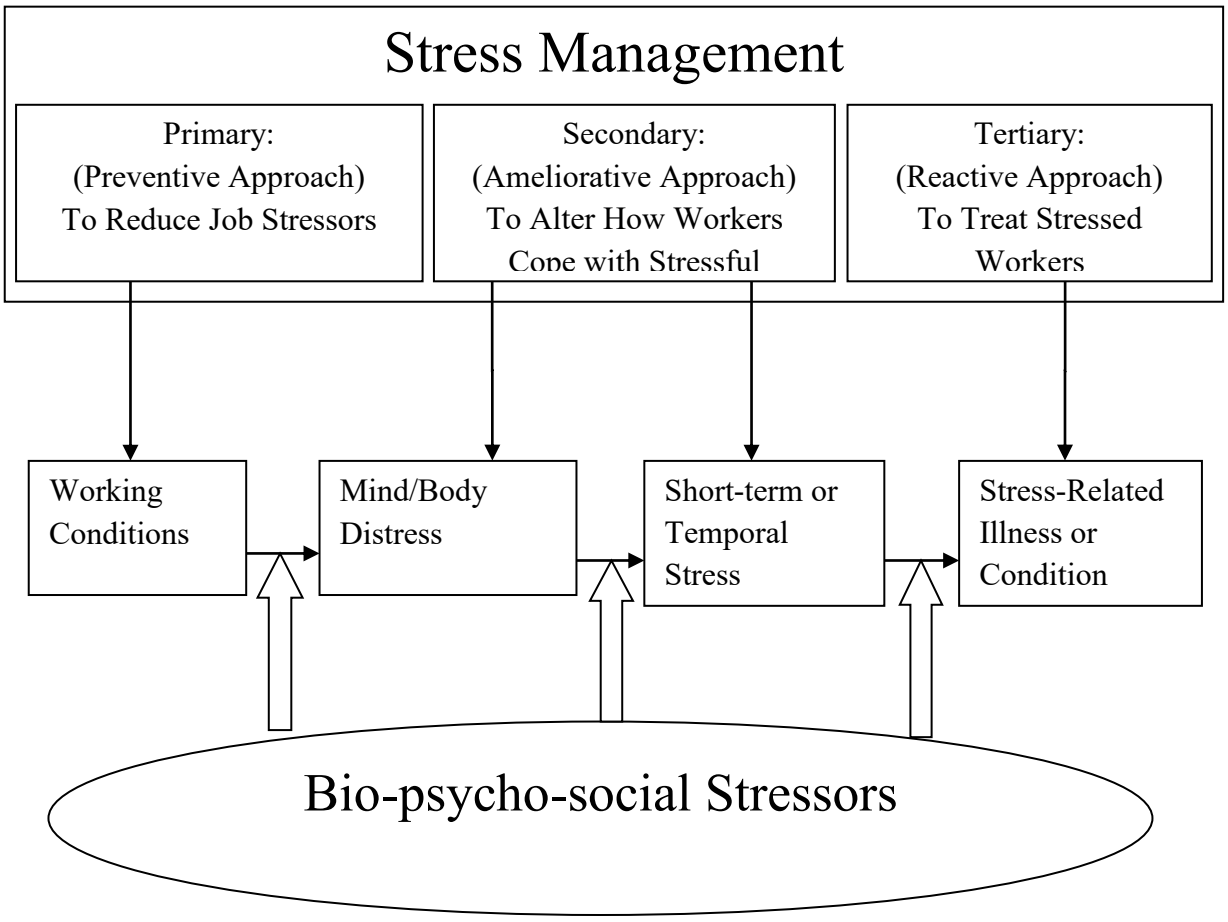
### 2.2.1 Job Stress

Job stress has been noted to be an increasing worry among workers, employers, occupational safety and health regulators, advocates, and workers compensation programs, (Sarafis et al., 2016). The Authors Sarafis et al., (2016), also defined Occupational stress as the circumstances in which job-related factors interrelate with an employee, altering their psychological and physiological condition in a way that, a person is mandated to deviate from his/her usual functioning.

According to Nakao, 2010, The US National Institute for Occupational Health and Safety define job stress as ~~–t~~he injurious physical and emotional response that occurs when the requirements

of a job do not match the capabilities, resources, or needs of the worker". Job stress has been associated with a number of adverse mental health and physical outcomes, as well as cardiovascular disease, anxiety, depression, and insomnia. Demanding working conditions are also likely to affect an employee's health by contributing directly to unhealthy lifestyles or by indirectly reducing the person's capability to create affirmative changes to his/her lifestyle attitude, such as sedentary lifestyle and smoking. Job stress can also be as a result of the job itself (i.e. intense workload, low decision making input) or due to the societal and organizational attributes, where work is being undertaken (e.g., inadequate communication, interpersonal divergence).

**Figure 2: Job stress process and systemic approach to stress management.**




The diagram above shows the systemic approach to stress management and Job stress process and how boi-psycho-social stressors affect several aspects of working conditions. The amalgamation of the focused individual and organization approaches is the most capable way to deal with stress in the workplace, and these include four recommended approaches are for an all-inclusive mind or body healthcare at the work environment: with emphases on individuals making use of managerial lines, recruiting company healthcare workers, and making reference to medical resources outside the company (Chrousos, 1992).

### 2.2.2 Work Organization

Work organization consists of numerous aspects including the speed of work (assembly line's speed, quotas), workload, number of people working on a job (staffing levels), how long they stay on the job, duration of days away from work, rest breaks, the job design, and skill mix of workers on the job, tasks assignments and responsibilities, and training for the work to be done (AFL-CIO Department of Safety and Health, 2006). Work organization can contribute to work-related stress depending on the design of work activities (variety or repetition), the number of workloads, the exposure to workloads, the number and length of actions, the design of a workstation, equipment design and tool, and environmental features (Pascale et al, 1999).

Organization in the workplace has also been found to be very imperative, particularly in the forecast of job satisfaction and results (Gelsema, van der Doef, Maes, Akerboom, & Verhoeven, 2005). The authors further suggest that designing the job and a better planning of work are advantageous for health outcomes and therefore the availability and quality of equipment, materials, and instruments could bring down somatic complaints, which is associated with job stress.

### 2.2.3 Work Place Social Support

Social support at the workplace plays a very import role when it comes work-related. According to Schwartz et al, (1996) social support mobilization is sometimes considered by individuals as simply one of the numerous forms of adhering attitude. There are also substantial figures of autonomous research bodies exploring both the moderating and the direct impact of social support on a variety of diseases and deaths associated with social support at the workplace.

It was also stated that the utilization of social support is dependent on the environment, which includes the presence of other factors. According to a study by Johnson and Hall, (1988) into cardiovascular disease and work stress, the authors added on to the work of Karasek et al.'s (1981) on demand-control model and discovered that those who have a low control, high demands, and low social support at the workplace are at greatest risk of getting cardiovascular diseases (Johnson & Hall, 1988).

### 2.3 Confounding factor

#### 2.3.1 Staff strength

The limited numbers of staff in the workforce of the health sector in sub-Saharan Africa (SSA) and the level of inadequately trained workers in the health sector have reached a catastrophic level, restricting the efficient dropping of morbidity and mortality rates related to hypertension. In Africa, however, there are about 2.7 doctors and 12.4 nurses per 10,000 people, as compared to North America's 21.5 doctors and 44.9 nursing/midwifery personnel per every 10,000 people. According to Gyamfi et al, (2017), the acute shortage of healthcare workers in Ghana is the biggest constrains to providing adequate care and management of elevated blood pressure. The author further stated that the ratio in Ghana, however, stands at one physician and nine nurses per 10,000 every people. Also, health workers limited numbers is thought to be partly associated with the relocation of healthcare professionals seeking greener pastures, bigger wages, more advanced technologies and a more secure political environment.

### 2.3.2 Lifestyle factors

The associated risk factors with regard to the commencement of hypertension are numerous, however while the Center for Disease Control (CDC) summarizes these risk factors into modifiable and non-modifiable factors, the World Health Organization (WHO) suggests they can be classified into four major risk factors, namely behavioral risk factors, metabolic factors, social determinants and cardiovascular diseases. The behavioral risk factors that are related with the development of hypertension include; physical inactivity, unhealthy diet, smoking, and harmful intake of alcohol (Onyango, Kombe, Nyamongo, & Mwangi, 2017).

#### 2.3.2.1 Sodium Intake

Several other studies also suggest that the development of high blood pressure is known to be as a result of high intake of sodium and some other studies also reflect an affirmative relationship between blood pressure and urinary sodium excretion (Rizwan et al., 2014). Kavishwar et al., (2017) also stated that an important risk factor for cardiovascular diseases in rural India has to do with changes in the lifestyle factors.

#### 2.3.2.2 Alcohol Intake

Some epidemiologic studies have suggested that alcohol intake has both positive and negative effects on cardiovascular health. It has also been generally reported that high alcohol intake is a contributing risk factor for cardiovascular diseases (Rehm et al., 2017). Another epidemiological evidence has also suggested that moderate alcohol consumption might have a protective effect against chronic diseases. However, the results of these observational studies have limitations because they are affected by several confounding variables or reverse causation

when investigating the association between alcohol intake and a danger for chronic diseases (Shin, Cho, & Davey Smith, 2017).

According to Piano, (2017), associating alcohol intake may to cardiovascular disorders such as arterial disease, coronary heart disease, stroke, hypertension, peripheral , and cardiomyopathy have extensively studied and that even though many lifestyle, genetic, and biological difference influence the interconnection between the use of alcohol and cardiovascular diseases, the pattern and dosage of alcohol intake appear to transform the results the most.

#### 2.3.2.3 Physical Inactivity

physical inactivity is a serious public health issue in the today's world. According to medical research reports, regular exercising is a defensive mechanism in relation to the risk factor associated with cardiovascular diseases and therefore clinicians need to recommend exercises to clients (Getty et al., 2018).

Another research work by Kang et al., (2015) suggested that one way o reduce the risk of cardiovascular diseases is through physical activity through both free times physical activity and workplace physical activity are thought to reduce cardiovascular risk by reducing the incidence of coronary heart diseases and stroke.

There are also other risk factors for hypertension, including lifestyle behaviours (Physical inactivity, unhealthy diets, smoking, and alcohol intake) to genetic factors such as obesity and the aging process. Out of these numerous risk factors, physical inactivity and obesity are the most associated with hypertension (Werneck et al., 2018).

### 2.3.4 Body Mass Index

Hypertension prevalence is increasing and according to some clinical evidence, it's association with obesity is said to be a key public health concern. Previous studies of the relationship between hypertension and obesity have its foundation from cross-sectional comparisons, short follow-up intervals, little assessments of blood pressure and weight, follow-up only through middle age, and modified for only baseline characteristics which are said to vary with age (Hasan M. Shihab et al., 2012).

Obesity and overweight are said to be independently related to risk factors for hypertension. The incidence of overweight and obesity is said to be increasing globally and thus Body mass index (BMI), waist circumference (WC), waist-stature ratio (WSR), and waist-hip ratio (WHR) are the pointers usually used to measure the degree of obesity (Ren et al., 2016).

Another work published by Kong et al., ( 2017) indicated that the association of obesity to metabolic disorders, including type 2 diabetes mellitus (DM), and cardiovascular diseases (CVD) is close. These factors are now the foremost causes of most deaths in the world today. The authors of Kong et al., ( 2017) also stated that, even though elevated body mass index (BMI) is normally pointed as one of the indicators of obesity, the association that exists between body mass index and general mortality and between body mass index and cardiovascular diseases still remains a very controversial topic.

## 2.4 Prevalence of Hypertension

According to Soumya Mohanty, Surekha Kishore and Surabhi Mishra (2018) as per World Health Organization report, about 40% of people aged more than 25 years were hypertensive in 2008. One major risk factors for the occurrence of coronary heart disease is elevated blood

pressure. Hypertension is also known to be associated with cardiovascular disease (CVD). A new category patients who have a systolic blood pressure of 120 to 139 mm Hg or a diastolic of 80 to 89 mm Hg are known as pre-hypertension as defined for by the Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure designated in 2003 (Soumya Mohanty, Surekha Kishore, Surabhi Mishra, 2018).

A study by Kearney et al., (2004) also revealed that hypertension varied extensively, having a low rate of about 3.4% among men in rural Indian and high rates of about 72.5% among Polish women. other developed countries, hypertension incidence ranged within approximately 20% and 50%. From the data of the National Health and Nutrition Examination Survey 1999–2000, hypertension prevalence was 27.1% and 30.1% among men and women respectively in the United States' crude adult population. The authors also stated that the prevalence of Hypertension is largely in black females than in black males with proportions ranging being 35.8 and 30.9% respectively, and the same pattern in the white race, also with proportions being 30.2 and 27.7%, among females and males respectively.

The extent of hypertension new cases reported in the Ghanaian public facilities by outpatient has increased more than ten-times ranging from about 49,087 in the year 1988 to about 505,180 in the year 2007. Comparing hypertension to the sum total of diseases reported by outpatients increased from 1.7% to 4.0% in all ages over the same period, in most regions, hypertension is among the top five commonest source of outpatient morbidity. Nevertheless, Accra as the capital city of Ghana, the toll of hypertension advanced from the fourth to become the second to malaria as the commonest source of outpatient morbidity in 2007 (Bosu, 2010a).

## 2.5 Hypertension Among Healthcare Workers

Healthcare workers (HCWs) have been identified to be faced the risk of cardiovascular diseases because of the extreme shifts work, work-related stress, and harmful lifestyles (Cuauhtemoc Arturo Juarez-Perez et al, 2015).

According to a study among the employees of the College of Health Sciences (CHS) reports a prevalence of 34% and 43% for hypertension and overweight respectively among employees of the College of Health Sciences. The most interesting findings of this study also showed that hypertension and overweight rates among this group, which also includes highly educated health professionals, teachers, and other health staff who are working with the college of health sciences are not different from those reported for the general population in earlier studies in Ghana. Those earlier studies on hypertension reported an average prevalence ranging between 19% and 48%, across studies (Aryeetey & Ansong, 2011).

Healthcare workers are more likely at risk of hypertension than the other workforces because the services they provide is in nature 'customer contact'. This, therefore, explains the high physical presence required for such categories of workers. Healthcare workers‘ going to work even as at when they are ill does not only expose the patients to risk but also increase the likelihood of committing medical errors and decreases productivity. Hence, in healthcare sectors, the contemporary growing concerns for quality healthcare including the need for medical efficacy and patient safety outcomes and the rising costs due to employees‘ health protection programs is one of the motives for studying sickness presenteeism such as hypertension among healthcare worker as an important research agenda worldwide (Mekonnen, Tefera, & Melsew, 2018).

### 2.6 Shift work and Hypertension

Poor sleep due to work shift is recognized to be independently associated with hypertension as it is often characterized by recurrent episodes of intermittent hypoxia. There is a growing evidence that obstructive sleep apnea (OSA) a kind of Sleep Disordered Breathing (SDB) is common among patients with hypertension, ranging from 37% to 56% as well as evidence that managing sleep-disordered breathing may help improve blood pressure (BP) values and response to hypertensive treatment (Njamnshi et al., 2017).

Other Studies have examined the role of shift work in resting blood pressure levels and daily blood pressure in field circumstances, and whether shift work may influence the circadian profile of blood pressure. Some studies suggested there is an insignificant association between work shift and elevated blood pressure, however other studies reported similar levels of blood pressure in work shift and day workers, while in some studies workers on shift have had considerably higher blood pressure levels more than the day workers (Sampsa Puttonen & Mikko Härmä, 2010).

A study by Barger et al., (2017) also suggested that insufficient sleep, either aggravated by decreased sleeping time or obstructed sleep apnea (OSA), and persistent circadian distraction produced by night shift work negatively affect the regulation of cardiovascular functions and are also associated with a rise in the risk of case of cardiovascular disease and death.

### 2.7 Work-related stress and hypertension

Previous reports gave a relationship between stressors of work and ambulatory blood pressure, which also has to do with Masked hypertension (MH) such as normal blood pressure readings during rest periods and recording higher blood pressure during normal daily working activities.

This has become a usual dilemma and a serious risk factor for cardiovascular diseases. (Landsbergis, Travis, & Schnall, 2013).

Studies looking at the health effects of stress usually classified the factors likely impact on the relationship between stress and blood pressure into categories of three, namely, environmental, psychological and physiological (Cohen, Keessier, & Gordon, 1995). The authors also stated that a suitable replica for comparative to stress methods presumes that environmental stressors are primary stimuli, that interacts with a person's psychological composition to create a perceived stress level. This psychological constituent involves both the person's personality, that may be partially determined genetically and his/her earlier experiences (Cohen et al., 1995).

# CHAPTER THREE

# 3.0 METHODS

## 3.1 Study type

A cross-sectional study was conducted between March and June 2018 among healthcare workers at 37 Military Hospital, Accra, Ghana.

## 3.2 Study Location

The 37 Military Hospital is a specialist military based Hospital located in the South – Eastern part of Greater Accra Region. It is located close to the Flag Staff House, i.e. the seat of government, at the intersection of the Liberation road and Giffard road. It is the largest Military Hospital in Ghana supported by various Medical Reception Stations (MRSs) in the various military garrisons across the country. It serves as one of the major referral hospitals in Ghana. The 37 Military Hospital serves as the National Disaster and Emergency Hospital.

The hospital has a mixed staff of both military and civilians. The hospital even though its core mandate was to provide health care to soldiers and their dependents, it has over the years diversified to providing health care services to the general public. The hospital has 14 out-patient departments and 10 in-patient departments (wards and emergencies). It also has an estimated staff capacity of about 3500 comprising both military and civilian employees. It has a bed capacity of about 500 beds, an estimated annual Outpatient attendance of about 26486 visits, an annual Inpatient attendance of about 13208. About 85% of the annual attendance is from the general public.

### 3.4 Source/Study population

The study population, in this case, were healthcare workers in departments who are Doctors, Physician, Medical Assistants, Nurses, Ward Assistants, Laboratory staff, Radiology staff, Dental Technicians, Public Health staff and Pharmacy staff at the 37 Military Hospital who were willing to voluntarily take part in the study. The study targeted health care workers who work during the day and those who run the night shift. Permission was sought from the hospital management to exclude some healthcare workers in Accident and Emergency department for reason of inability to follow study protocol due to nature of their work. In this study, three hundred (300) healthcare works were consented to take part in the study.

### 3.5 Inclusion criteria

The study participants included healthcare workers who were permanent employees of the hospital and have worked for six months or above at the 37 Military Hospital who were willing to voluntarily take part in the study.

### 3.6 Exclusion criteria

The study excluded all other personnel who did not fall within the mentioned professions and all who belonged to the source population but did not wish to participate or follow the study protocols.

### 3.7 Sample Size

Hypertension prevalence (BP ≥ 140/90 mmHg ± antihypertensive treatment) in the adult population in Ghana is ranged between 19.3 % to 54.6% (Agyemang, Smeeth, & Edusei, 2012).

According to a study by Mitwalli et al., (2013) on the distribution, awareness, and attitude of high blood pressure among health professionals in Saudi Arabia, indicated 63.9 % of healthcare professionals are aware of hypertension and monitored their blood pressure.

For this study, taking into considering an assumption by Egungwu,(2015) which assumed an average prevalence of 37% to calculate the sample size. This was because healthcare workers are knowledgeable and may be aware of the health effects of shift work and work-related stress and may adopt means to minimize its effects. Therefore for this study, an average prevalence of hypertension (37%) was used for the calculation of the sample size.

Using the formula by (Cochran & Wiley, 1977)

$n_0 = Z^2 pq/d^2$

Where

$n_0$ = estimated sample size

Z = confidence level (95% level of confidence = 1.96)

p = the probability of being hypertensive = 0.37

q = 1 - p = which is the probability of not being hypertensive

= 1 – 0.37 = 0.63

d = 0.05 as the acceptable margin of error. Therefore

$$n_0 = \frac{(1.96)^2(0.37)(0.63)}{(0.05)^2} = 358$$

The total number of healthcare workers in the hospital who were considered in the study was 1,116.

Therefore, the sample size for the study was n.

$$n = \frac{\frac{n_0}{1+(n_0-1)}}{N}$$

Where n = sample size

N = total population

$n_0$ = 358

Therefore,

$$n = \frac{\frac{358}{1+(358-1)}}{1095} = 269.98 \approx 270$$

Putting into consideration a 10% non-response rate due to the busy work schedule of healthcare workers, the minimum sample size for the study was 300 healthcare workers.

### 3.8 Sampling Method

Simple Random Sampling was used in this study. The hospital had health care workers in different job categories which were considered as different strata. In each department, the duty roaster of all healthcare workers was requested from the hospital headquarters to be made available to the research team. Numbers were allocated to all the personnel on the list. Using a random number generator, healthcare workers were selected proportionately for the study separately for each department using simple random sampling. Professionals such as nurses, doctors and ward assistants who are located in more than one departments were sub-sampled from the various wards and departments proportionate to their numbers in the various wards and

departments, to make up for the required sample size for that particular profession by using stratified sampling method as indicated in table 1 below.

**Table 1: Proportionate distribution of healthcare workers in each department.**

| Srl | Job Category | Number available in dept | Number to be selected |
|---|---|---|---|
| 1. | Nurses | 444 | 112 were selected by sub-sampling proportionate to their numbers in the various wards/OPDs |
| 2. | Laboratory Staff | 58 | 22 |
| 3. | Pharmacy Staff | 65 | 17 |
| 4. | Doctors/Physician Assistants/Student Doctors | 147 | 50 were selected by sub-sampling proportionate to their numbers in the various wards/OPDs |
| 5. | Ward Assistants | 234 | 51 were selected by sub-sampling proportionate to their numbers in the various wards/OPDs |
| 6. | Public Health staff | 71 | 18 |
| 7. | Dental Staff | 46 | 13 |
| 8. | Radiology staff | 45 | 12 |
| | Total | N= 1,095 | n= 300 |

### 3.9 Study Variables

#### Dependent variable

The dependent variable for this study was Hypertension which is defined as sustained elevated systolic blood pressure of 140mmHg or above and/or diastolic blood pressure of 90mmHg and above, based on the average of three properly measured blood pressure readings (Ritchie, Campbell, & Murchie, 2011).

#### Independent variables

The independent variables included; Shift work which is said to be work comprising recurring times in which diverse groups of workers perform the same work in a relay. It is also defined as ―work that takes place outside the traditional working hours of about 7 am or 8 am to 5 pm or 6 pm". It may involve evening or night shifts, early morning shift, and rotational work (Yeom et al., 2017). However, this study looked at the typical Ghanaian shift work period, (i.e. morning shift, afternoon shift, and night shift).

The other independent variable in this study was Work-Related Stress, where Stress has been defined by Esia-Donkoh, (2014) as a complex concept which is explained as any circumstance that threatens or is perceived to threaten one's well-being and thereby tax one's coping abilities, and work-related stress also defined as high work demand, high decision latitude (or control), and low workplace social support by Moen, Kelly & Lam (2013). The strength of Staff, and role conflict/ambiguity (opposing and incompatible institutional demands) at the workplace (Theorell, Karasek, & Eneroth, 1990).

Confounding Factors that were considered in this study included; education, occupation, years of work experience, age, sex, family history of hypertension, and lifestyle (alcohol consumption, smoking), Strength of Staff, physical inactivity and Salary levels (Bosu, 2010).

### 3.10 Data Collection

#### 3.10.1 Data Collection Tool

A questionnaire having five (5) parts was used to collect socio-demography, family history of hypertension, knowledge on hypertension, shift work, work-related stress, lifestyle factors and the measurement of Blood Pressure.

The first part of the questionnaire was used to collect Socio-demographic data on factors such as educational level, age, sex, Family history of hypertension, and occupation of eligible participant. The height of eligible participants was measured using a portable stadiometer and the weight was also measured using a bathroom weighing scale calibrate by the Ghana Standards Authority (GSA), and a portable BMI Matrix chat was used to calculate their BMI. The second part assessed participant's Knowledge on hypertension where questions were asked about the factors contributing to hypertension and also most recent BP recordings of participants recorded. The third part of the questionnaire was used to assess lifestyle factors of participants where questions were asked about physical activity, alcohol intake, and smoking.

The fourth part of the questionnaire was also used to assess shift work schedule and work-related stress; where a Job Content Questionnaire designed by Karasek et al., (1990), was used to collect data on psychosocial aspects of work; job demand, job control, supervisor and co-worker support at the workplace. Questions included: On job demand included, –My job involves a lot of repetitive work", –My job requires working very fast", –My job requires

working very hard", "My job requires lots of physical effort" and "I am asked to do an excessive amount of work". Questions on job control included "My job allows me to make a lot of decision on my own", "I am allowed to decide how to do my work" and "I have a lot to say about what happens on my job". Questions on job support included "My supervisor pays attention to what I am saying", "If work gets difficult, my colleagues will help me" and "People I work with are getting the job done". Each of the concepts of stress was graded on a 4 point scale (strongly disagree, disagree, agree, and strongly agree,).

There were also questions on shift work considering the standard shift work index manual (Folkard & Descartes, 2016), where questions areas included: " Do you run shift?", " what type of shirt do you run ", and " How long do you stay on a particular shift schedule ".

Finally, the fifth part of the was used to measure participant's blood pressure, whereas an OMRON digital electronic sphygmomanometer was used to measure the blood pressure of eligible participants three (3) times within 5 minutes resting period and the mean recording was taken.

### 3.10.2 Data collection procedure

A meeting was held with all healthcare workers in the various source departments to explain the purpose of the research to them. Questions in the questionnaire were also explained to them to ensure clarity of all questions. Healthcare workers were assured of the confidentiality of any data collected from them.

Participants were guided to complete the questionnaire at their various departments. During the interview, the blood pressures of participants were measured using an OMRON digital

electronic sphygmomanometer after a 5 minute resting period. The measurement was repeated three (3) times and the average blood pressure readings were taken. The weight of participants was taken in their working uniform with all pockets completely emptied and expressed in the nearest 0.5kg body weight. The heights of participants were also measured using a standard stadiometer and also expressed in meters.

### 3.10.3 Quality Control

Training was organized for research assistants to help with data collection. Data extraction forms and questionnaires were critically examined each day after data collection. Data handled by the research assistants were cross-checked for consistency and completeness. Research assistants also cross-check data gathered by the principal investigator. The questionnaires were pretested at Arakan medical station in Burma Camp to ascertain the average time needed to complete the questionnaire, check for inconsistencies and the general understanding of questions.

### 3.10.4 Data Processing and Analysis

Before the onset of data collection, research assistants were trained in the administration of questionnaires to study population and also address issues pertaining to and arising from the questionnaires. Completed questionnaires where be cross-checked and data were coded before entering them into the Statistical Package for Social Sciences (SPSS) version 24. To ensure that the data entered into the computer is accurate, the research assistants and the principal

investigator independently cross-checked each entry. Data were then imported into STATA version 15 for analysis.

Descriptive statistics including frequency tables, pie charts and bar charts were used to display the data. Frequency tables for socio-demographic, determinant of interest and outcome of interest were then generated. Continuous data were reported as the mean and standard deviation (or as a median and interquartile range where the data was not normally distributed), while categorical data were reported as proportions. The knowledge level among staff was determined based on the number of risk factors respondents were able to identify. Those who were able to identify five of the eight stated risk factors were categorized into high (adequate) knowledge group. Those who identified three or four risk factors had a fair level and less than three were classified as low or inadequate knowledge. The association between the knowledge level and hypertension status were determined using chi-square test.

The determinants of interest (work-related stress and shift work) were compared between categories of the outcome (hypertension). Chi-square test was used to compare the difference in proportions. The main determinant of shift work was based on the response of the staff to whether the healthcare worker was involved in a shift schedule. The dichotomous response was compared with the hypertension status to determine the association between work shift and hypertension using the Chi-Square test.

To determine the work-related stress, the job content questionnaire was used. This enabled the determination of staff job control, job demand, and job support. Job demand, job control, and job support scores were used to determine the job strain (work-related stress) of the healthcare worker. Job strain was then categorized as ‗High Job Strain' and ―Low Job Strain'. A high job

strain was arrived at when a health worker had high job demand, low job control, and low job support. A low job strain was also based on low job demand, high job control, and high job support. Two other groups, Active and Passive could be deduced from the Job Content Questionnaire. In this study, no healthcare worker was categorized into the active and passive groups. Only the High and Low Job Strain categories were maintained.

High job demand was determined as a score of five positive responses to the seven questions on job demand from the questionnaire. Low job control was a positive response to any of the four questions on job demand. Low job support was a positive response to any of the four questions on job support. High job strain (high stress) and low job strain (low stress) was then compared to hypertension status of health workers to determine the association.

### 3.10.5 Ethical Consideration

An introductory letter was obtained from the School of Public Health, University of Ghana and sent to the Institutional Review Board of 37 Military Hospital for an ethical approval to undertake the study.

A written consent was used to seek the concern of all respondents before including them as participants in the study. Privacy and confidentiality were maintained at all times. To ensure confidentiality, the questionnaires were coded prior to dissemination and names were not required in filling out questionnaires. To ensure privacy, data collected was stored in a password-protected electronic device and safely locked in a cabinet. Access was limited only to the principal investigator and the research supervisor. Data collected was strictly for research purposes only.

Participation in the study was completely voluntary. There was no consequence for refusal to participate in the study. Refusal to answer any question had no consequence. Withdrawal from the study at any point in time was allowed and there was no consequence for doing so**.** Findings from the study would also be made available to the management of 37 Military Hospital and at the Hospital headquarters to be made available to the study participants. The findings would also be made available to all related stakeholders.

# CHAPTER FOUR

# 4.0 RESULTS

## 4.1 Background Characteristics

The median age of the study participants was 30 years (IQR=10) and 62.3% were females. The median body mass index was observed to be 24.5kg/m$^2$ (IQR=5.3). It was observed that 56% were not married. Among the participants, 37.3% were nurses, 16.7% clinicians and 7.7% of public health staff. In addition, 41.7% had no dependents and 18.0% had more than four dependents. The results show that 55.7% of the staff used commercial forms of transportation and 44% of the respondent had a blood relative or family member with hypertension. The results show that 92% perform some kind of exercise with 3.7% and 29.3% ever smoking a cigarette and drinking alcohol respectively. The background characteristics of the participants are shown in Table 4.1.

**Table 4.1 Background Characteristics of Respondents (n=300)**

| Background characteristics | Frequency | Percent |
|---|---|---|
| **Median Age (range) = 30 yrs (20, 59)** | | |
| ***Age groups (yrs)*** | | |
| 20-29 | 145 | 48.3 |
| 30-39 | 109 | 36.3 |
| ≥40 | 46 | 15.3 |
| ***Sex of respondent*** | | |
| Male | 113 | 37.7 |
| Female | 187 | 62.3 |
| **Median BMI (range) = 24.5kg/m$^2$ (16.1, 43.0)** | | |
| ***BMI (kg/m$^2$)*** | | |
| Underweight | 14 | 4.7 |
| Normal Weight | 154 | 51.3 |
| Overweight | 91 | 30.3 |
| Obese | 41 | 13.7 |

***BMI – Body Mass Index***

**Table 4.1 Continued**

| Variable | Frequency | Percent |
|---|---|---|
| ***Marital Status*** | | |
| Not married | 168 | 56.0 |
| Married | 132 | 44.0 |
| ***Profession*** | | |
| Nurse | 112 | 37.3 |
| Health Assistant | 51 | 17 |
| Clinician | 50 | 16.7 |
| Public Health Staff | 23 | 7.7 |
| Laboratory staff | 22 | 7.3 |
| Pharmacy staff | 17 | 5.7 |
| Dental staff | 13 | 4.3 |
| Radiology staff | 12 | 4 |
| ***Income status*** | | |
| <GHC1000 | 120 | 40.0 |
| GHC1000 – 2000 | 98 | 32.7 |
| >GHC2000 | 82 | 27.3 |
| ***Number of dependents*** | | |
| None | 125 | 41.7 |
| 1 – 4 | 121 | 40.3 |
| >4 | 54 | 18.0 |
| ***Mode of transport*** | | |
| Own car | 106 | 35.3 |
| Taxi/Commercial | 167 | 55.7 |
| Walking | 27 | 9.0 |
| ***Family history of hypertension*** | | |
| Yes | 131 | 43.7 |
| No | 169 | 56.3 |
| ***Years of service*** | | |
| <5 years | 135 | 45.0 |
| ≥ 5 years | 165 | 55.0 |
| ***Engagement in any form of exercise*** | | |
| Yes | 276 | 92.0 |
| No | 24 | 8.0 |
| ***Ever smoked cigarette*** | | |
| Yes | 11 | 3.7 |
| No | 289 | 96.3 |
| ***Ever drunk alcohol*** | | |
| Yes | 88 | 29.3 |
| No | 212 | 70.7 |

### 4.2 Knowledge of staff on risk factors for hypertension

From the study, 269 participants representing 89.6%, had high knowledge, identifying five or more of the risk factors for hypertension, 26 participants representing 8.7% had medium knowledge identifying between three and four risk factors and 5 participants representing 1.7% identifying two or less number of the risk factors for hypertension on the knowledge score.

### 4.3 Prevalence of Hypertension

Hypertension prevalence among healthcare worker at the 37 Military Hospital was 7%, which was defined as having a blood pressure of ≥140/90mmHg.

Table 4.4 shows the association of background characteristics and hypertension. The results show that age ($\chi^2$= 13.3485, p=0.002), Body mass index ($\chi^2$= 10.7844, p=0.021) years of service ($\chi^2$= 4.758, p=0.029), income bracket ($\chi^2$= 7.2931, p=0.026) and family history of hypertension ($\chi^2$= 14.0478, p<0.0001) were significantly associated with hypertension among the staff at the 37 Military Hospital. (Table 4.2).

**Table 4.2: Bivariate Analysis of Background Characteristics and Hypertension Among Healthcare Workers at 37 Military Hospital**

| Variable | No Hypertension (N=278) | Hypertension (N=22) | $\chi^2$ | P value |
|---|---|---|---|---|
| | n (%) | n (%) | | |
| ***Age group*** | | | | **0.002¥** |
| 20-29 | 140 (50.4) | 5 (22.7) | | |
| 30-39 | 101 (36.3) | 8 (36.4) | | |
| ≥40 | 37 (13.3) | 9 (40.9) | | |
| ***Sex*** | | | 0.1063 | 0.744 |
| Male | 104 (37.4) | 9 (40.9) | | |
| Female | 174 (62.6) | 14 (59.1) | | |
| ***BMI Class*** | | | | **0.021¥** |
| Underweight | 13 (4.7) | 1 (2.6) | | |
| Normal Weight | 147 (52.9) | 7 (31.8) | | |
| Overweight | 85 (30.6) | 6 (27.3) | | |
| Obese | 33 (11.9) | 8 (36.4) | | |
| ***Marital Status*** | | | 0.347 | 0.556 |
| Not married | 157 (56.5) | 11 (50.0) | | |
| Married | 121 (43.5) | 11 (50.0) | | |
| ***Profession*** | | | | 0.052¥ |
| Nurse | 106 (38.1) | 6 (27.3) | | |
| Health Assistant | 49 (17.6) | 2 (9.1) | | |
| Medical Dr./Dentist/PA | 47 (16.9) | 3 (13.6) | | |
| Public Health Staff | 20 (7.2) | 3 (13.6) | | |
| Laboratory staff | 16 (5.8) | 6 (27.3) | | |
| Pharmacy staff | 16 (5.8_ | 1 (4.6) | | |
| Dental staff | 12 (4.3) | 1 (4.6) | | |
| Radiology staff | 12 (4.3) | 0 (0.0) | | |
| ***Years of service*** | | | **4.7585** | **0.029** |
| <5 years | 130 (46.8) | 5 (22.7) | | |
| ≥5years | 148 (53.2) | 17 (77.3) | | |

*% - Column Percentages, $\chi^2$ - Chi Square Figure, ¥ - Fisher's Exact P-value, Significant level (95%) –* p<0.05*

**Table 4.2: Continued**

| Variable | No Hypertension (N=278) n (%) | Hypertension (N=22) n (%) | $\chi^2$ | P Value |
|---|---|---|---|---|
| ***Income bracket*** | | | **7.2931** | **0.026** |
| <GHC1000 | 116 (41.7) | 4 (18.2) | | |
| GHC1000 - 2000 | 91 (32.7) | 7 (31.8) | | |
| >GHC2000 | 71 (25.5) | 11 (50.0) | | |
| ***Dependants*** | | | | 0.050¥ |
| None | 121 (43.5) | 4 (18.2) | | |
| 1 - 4 | 109 (39.2) | 12 (54.5) | | |
| >4 | 48 (17.3) | 6 (27.3) | | |
| ***Frequent mode of transport*** | | | | 0.264¥ |
| Own car | 96 (34.5) | 10 (45.5) | | |
| Taxi/Commercial vehicle | 155 (55.8) | 12 (54.5) | | |
| Walking | 27 (9.7) | 0 (0) | | |
| ***Family history of hypertension*** | | | **14.0478** | **<0.0001** |
| Blood relative has hypertension | 113 (40.6) | 18 (81.8) | | |
| No relative has hypertension | 165 (59.4) | 4 (18.2) | | |
| ***Perform any exercise*** | | | | 0.401¥ |
| Yes | 257 (92.5) | 19 (86.4) | | |
| No | 21 (7.6) | 3 (13.4) | | |
| ***Ever smoked cigarette*** | | | | 1.000¥ |
| Yes | 11 (4.0) | 0 (0.0) | | |
| No | 267 (96.0) | 22 (100.0) | | |
| ***Ever drunk alcohol*** | | | 0.071 | 0.790 |
| Yes | 81 (29.1) | 7 (31.8) | | |
| No | 197 (70.9) | 15 (68.2) | | |

*% - Column Percentages, $\chi^2$ - Chi Square Figure, ¥ - Fisher's Exact P-value, Significant level (95%) –* p<0.05*

### 4.4 Association between knowledge and hypertension

From the study results in Table 4.3, 86.9% had adequate knowledge on the risk factors to hypertension. Specifically, 94.3% of the staff indicated that obesity was a risk factor for hypertension. Also, 93.7% indicated that hypertension was determined with a measurement blood pressure of 140/90mmHg or above, and 92.3% knew that regular exercise prevented hypertension. In addition, 54.3% indicated sex to be a risk factor of hypertension and this was

significantly associated with the hypertension status ($\chi^2$ = 5.035, p = 0.025). Awareness of hypertensive status prior to the study was also significantly associated with current hypertensive status ($\chi^2$ = 4.201, p = 0.040).

**Table 4.3: Bivariate analysis of Knowledge and hypertension (n=300)**

| Variable | No Hypertension (N=278) | Hypertension (N=22) | $\chi^2$ | P value |
|---|---|---|---|---|
| | n (%) | n (%) | | |
| **Knowledge level** | | | 2.736 | 0.255 |
| Inadequate | 5 (1.8) | 0(0.0) | | |
| Fair | 26 (9.4) | 0 (0) | | |
| Adequate | 247 (88.8) | 22 (100.0) | | |
| **Specific knowledge parameters** | | | | |
| High salt intake is a risk factor to HPT | 240 (86.3) | 17 (77.3) | 1.362 | 0.221¥ |
| Obesity can lead to hypertension | 263 (94.6) | 20 (90.9) | 0.521 | 0.359¥ |
| Regular exercise prevents hypertension | 255 (91.7) | 22 (100.0) | 1.971 | 0.393¥ |
| HPT is treatable | 113 (40.6) | 9 (40.9) | 0.001 | 0.981 |
| HPT is measured at 140/90mmHg | 260 (93.5) | 21 (95.5) | 0.128 | 1.000¥ |
| Alcohol contributes to HPT | 245 (88.1) | 20 (90.9) | 0.153 | 1.000¥ |
| Sex of an individual is a risk factor to HPT | 146 (52.5) | 17 (77.3) | 5.035 | **0.025*** |
| Aware of hypertensive status prior to study | 166 (59.5) | 18 (81.8) | 4.201 | **0.04*** |

***HPT – Hypertension, % - Column Percentages, $\chi^2$ - Chi Square Figure, ¥ - Fisher's Exact P-value, Significant level (95%) –* p<0.05***

### 4.5. Shift Work Schedule and Work-Related Stress

#### 4.5.1 Shift Work Schedule among healthcare workers at 37 Military Hospital

It was observed from the study that, 48.3% of the staff had a shift schedule with about 62.1% of those with shift schedule having sleep hours of six hours or less. Also, 23% of the participants had morning as their frequent shift. About 23.7% had all three shifts (Table 4.4).

**Table 4.4: Shift Work Among Healthcare Workers at 37 Military Hospital (n=300)**

| Variable | Frequency | Percent |
|---|---|---|
| ***Have a shift schedule*** | | |
| No | 155 | 51.7 |
| Yes | 145 | 48.3 |
| ***Frequent shift schedule*** | | |
| Daytime workers | 155 | 51.7 |
| Morning | 69 | 23.0 |
| Afternoon | 48 | 16.0 |
| Night | 28 | 9.3 |
| ***Number of shift schedules*** | | |
| Daytime workers | 155 | 51.7 |
| One shift schedule | 34 | 11.3 |
| Two shift schedules | 40 | 13.3 |
| Three shift schedules | 71 | 23.7 |
| ****Years in shift work*** | | |
| Less than 5 years | 87 | 60.0 |
| 5 years or more | 58 | 40.0 |
| ****Hour of sleep among shift workers*** | | |
| <6 hours | 90 | 62.1 |
| >6 hours | 55 | 37.9 |

* - ***(n=145)***

### 4.5.2 Work-related stress among healthcare workers

The study showed that 59.7% had a high job demand, 43.7% had low job control and 38.3% had a low job support.

Those who had a perceived low job strain were 58.3% with 41.7% had a perceived high job strain (Table 4.5).

**Table 4.5: Work-related stress among healthcare workers at 37 Military Hospital (n=300)**

| Work-related stress indicator | Frequency | Percent |
|---|---|---|
| ***Job Demand*** | | |
| Low | 121 | 40.3 |
| High | 179 | 59.7 |
| ***Job Control*** | | |
| Low | 135 | 45.0 |
| High | 165 | 55.0 |
| ***Job Support*** | | |
| Low | 151 | 50.3 |
| High | 149 | 49.7 |
| ***Job Strain*** | | |
| Low | 175 | 58.3 |
| High | 125 | 41.7 |

### 4.6 Association between Shift Work and Hypertension

Of those having hypertension, 54.5% had a shift schedule. Having a shift schedule was not associated with hypertension among staff ($\chi^2$= 0.367, p=545). It was observed that, among the shift schedule factors, the number of years a staff worked in a shift schedule was independently associated with hypertension status ($\chi^2$=10.236, p=0.003). Other shift work variables and its association with hypertension status are shown in Table 4.6.

**Table 4.6: Bivariate Analysis of Shift work and hypertension among healthcare workers at 37 Military Hospital (n=300)**

| Variable | No Hypertension | Hypertension | $\chi^2$ | P value |
|---|---|---|---|---|
| | n (%) | n (%) | | |
| ***Have Shift Schedule*** | | | 0.367 | 0.545 |
| No | 145 (52.2) | 10 (45.5) | | |
| Yes | 133 (47.8) | 12 (54.5) | | |
| ***Frequent Shift Schedule*** | | | | 0.586¥ |
| Daytime workers | 145 (52.2) | 10 (45.5) | | |
| Morning | 65 (23.4) | 4 (18.2) | | |
| Afternoon | 43 (15.5) | 5 (22.7) | | |
| Night | 25 (8.9) | 3 (13.6) | | |
| ***Number of shift schedules*** | | | | 0.058¥ |
| Daytime workers | 145 (52.2) | 10 (45.5) | | |
| One shift schedule | 29 (10.4) | 5 (22.7) | | |
| Two shift schedules | 39 (14.0) | 1 (4.6) | | |
| Three shift schedules | 65 (23.4) | 6 (27.3) | | |
| ***Number of years worked in shift schedule (n=145)*** | | | | **0.003¥** |
| *Mean years of shift work (95% CI) = 5.5 (4.8, 6.2)* | | | | |
| <5 years | 85 (63.9) | 2 (16.7) | | |
| ≥5 years | 48 (36.1) | 10 (83.3) | | |
| ***Hours of sleep among shift workers (n=145)*** | | | | 0.212¥ |
| ≤6hours | 85 (63.9) | 5 (41.7) | | |
| >6 hours | 48 (36.1) | 7 (58.3) | | |

***% - Column Percentages, $\chi^2$ - Chi Square Figure, ¥ - Fisher's Exact P-value, Significant level (95%) –* p<0.05, CI – Confidence Interval***

After controlling for confounders such as age, BMI, marital status and income level, shift work indicators were not statistically significant in influencing hypertension among staff. This is shown in Table 4.7.

**Table 4.7: Shift work and hypertension among healthcare workers**

| Variable | UOR (95% CI) | P value | AOR (95% CI) | P value |
|---|---|---|---|---|
| ***Have a shift schedule*** | | | | |
| No | 1 | | 1 | |
| Yes | 1.3 (0.5, 3.1) | 0.546 | 1.3 (0.5, 3.6) | 0.494 |
| ***Number of shift schedule*** | | | | |
| Daytime workers | 1 | | 1 | |
| One shift schedule | 2.5 (0.8, 7.9) | 0.117 | 2.0 (0.6, 7.2) | 0.276 |
| Two shift schedules | 0.4 (0.1, 3.0) | 0.353 | 0.5 (0.1, 4.1) | 0.480 |
| Three shift schedules | 1.3 (0.5, 3.8) | 0.588 | 1.5 (0.4, 4.8) | 0.485 |
| ***Frequent shift schedule*** | | | | |
| Daytime workers | 1 | | 1 | |
| Morning | 0.9 (0.3, 3.0) | 0.852 | 1.0 (0.3, 3.8) | 0.958 |
| Afternoon | 1.7 (0.6, 5.2) | 0.363 | 1.9 (0.5, 6.4) | 0.330 |
| Night | 1.7 (0.5, 6.8) | 0.424 | 1.5 (0.3, 6.6) | 0.621 |
| ***Number of years in shift work*** | | | | |
| <5 years | 1 | | 1 | |
| ≥5 years | 8.9 (1.9, 42.1) | 0.002 | 6.1 (0.9, 42.2) | 0.065 |

***Adjusted for Age, Sex, BMI, Marital status, Profession, Years of service, Income level, Alcohol consumption and physical activity, CI – Confidence Interval, UOR – Unadjusted Odds Ratio, AOR – Adjusted Odds Ratio, Significance level = 95% (α = 0.05).***

### 4.7 Association between Work-related Stress and Hypertension

In Table 4.8, work-related stress among staff is observed to be significantly associated with hypertension status. About 86.4% of staff with hypertension had a high job strain ($\chi^2$= 19.514, p<0.0001).

**Table 4.8: Bivariate Analysis of Work-related stress and hypertension among healthcare workers at 37 Military Hospital (n=300)**

| Variable | No Hypertension (N=278) n (%) | Hypertension (N=22) n (%) | $\chi^2$ | P value |
|---|---|---|---|---|
| ***Job Demand*** | | | **7.031** | **0.008** |
| Low | 118 (42.4) | 3 (13.6) | | |
| High | 160 (57.6) | 19 (86.4) | | |
| ***Job Control*** | | | **16.412** | **<0.0001** |
| Low | 116 (41.7) | 19 (86.4) | | |
| High | 162 (58.3) | 3 (13.6) | | |
| ***Job Support*** | | | **12.329** | **<0.0001** |
| Low | 132 (47.5) | 19 (86.4) | | |
| High | 146 (52.5) | 3 (13.6) | | |
| ***Job Strain (stress)*** | | | **19.514** | **<0.0001** |
| Low | 172 (61.9) | 3 (13.6) | | |
| High | 106 (38.1) | 19 (86.4) | | |

*% - Column Percentages, $\chi^2$ - Chi Square Figure, Significant level (95%) –* p<0.05, CI – Confidence Interval*

After controlling for identified confounders among the participants, high job demand (OR = 7.3, p=0.005), low job control (OR = 11.2, p=0.001), low job support (OR= 9.4, p=0.001) and high job strain (OR = 18.3, p<0.0001) were statistically associated with hypertension. This is shown in Table 4.9.

**Table 4.9: Work related stress and hypertension among healthcare workers**

| Variable | UOR (95% CI) | P value | AOR (95% CI) | P value |
|---|---|---|---|---|
| **Job Demand** | | | | |
| Low | 1 | | 1 | |
| High | 4.7 (1.4, 16.2) | 0.015 | 7.3 (1.8, 29.3) | **0.005** |
| **Job Control** | | | | |
| High | 1 | | 1 | |
| Low | 8.8 (2.6, 30.6) | 0.001 | 11.2 (2.8, 45.0) | **0.001** |
| **Social Support** | | | | |
| High | 1 | | 1 | |
| Low | 7.0 (2.0, 24.2) | 0.002 | 9.4 (2.4, 37.6) | **0.001** |
| **Job Strain** | | | | |
| Low | 1 | | 1 | |
| High | 10.3 (3.0, 35.6) | <0.0001 | 18.3 (4.4, 76.8) | **<0.0001** |

*Adjusted for Age, Sex, BMI, Marital status, Profession, Years of service, Income level, Alcohol consumption and physical activity, CI – Confidence Interval, UOR – Unadjusted Odds Ratio, AOR – Adjusted Odds Ratio, Significance level = 95% (α = 0.05).*

# CHAPTER FIVE

# 5.0 DISCUSSION

## 5.1 Main Findings

The study assessed work-related stress and shift work and their association with hypertension among healthcare workers are the 37 Military hospital. The study showed a high knowledge level of staff on hypertension with 89.6% having adequate knowledge of the risk factors for hypertension. Seven percent of the staff were identified to be hypertensive. Among the staff, 48.3% had a shift schedule whiles 41.7% had high job stain (work-related stress).

There was no significant association between work shift and hypertension. There was, however, high job demand, low job control, and low social support were inconsistently associated with hypertension. Also there was a significant association between high job strain and hypertension

## 5.2 Methodological Validity

The study has a number of strengths. There was a hundred percent participation rate among staff who were proportionately selected from all departments of the hospital and this has the potential of minimizing selection bias. The sample size was small and this resulted in wide confidence intervals as observed for the estimates in the study.

The main independent variables were also based on standard measures. For instance, the definition of work shift was based on the standard system that is run by the 37 Military hospital. Also, the measure for work-related stress was based on the Job Content Questionnaire Karasek et al., (1990). The Job Content Questionnaire is widely used and has been applied in many settings with results of its reliability and validity (Egungwu, 2015). In addition, to the best of

my knowledge, not many studies have evaluated both exposures to work shift and high job strain and their association with hypertension in Ghana. The main outcome of interest which is hypertension was measured using standard protocols from the guidelines of the National Institute for Health and Care Excellence (Systolic of ≥ 140 and a diastolic of ≥ 90). The average of three readings from an electronic sphygmomanometer was used to determine hypertension status of healthcare workers. The measurement was taken after the participants had rested for about five minutes interval and the mean measurement results recorded.

### 5.3 Comparison with previous studies

The study among healthcare workers at the 37 Military hospital showed that the staff had good knowledge of some of the risk factors of hypertension with more than eighty percent having adequate knowledge. For instance, on diet, about more than eighty-five percent indicated that high salt intake was a risk factor for hypertension and 94% indicated obesity to be a risk factor. Other risk factors identified by staff were alcohol intake, sex, and physical activity. Similar to Daitey, (2014), knowledge on diet as a risk factor to hypertension was high among a section of bank workers. The good knowledge among healthcare workers at 37 Military hospital is supported by the findings of Olayinka, Owolabi, David, and Amole, (2015) which found a good knowledge level among health workers in Nigeria. Also, it is similar to the finding of Abah, Dare, & Jimoh, (2014), which also showed good knowledge of hypertension among pharmacist in Jos, Nigeria. Among staff in the University of Ibadan, Nigeria however, knowledge was fair with even a lower level of knowledge on risk factors to hypertension (Abdullahi & Amzat, 2011). This shows that educational background of health workers contribute to their increased knowledge on hypertension compared to non-health workers with usually average or low

knowledge level (Abdullahi & Amzat, 2011; Fazel et al., 2015; Oladapo, Salako, Sadiq, Soyinka, & Falase, 2013).

The study among health workers at the 37 Military Hospital showed that seven percent were hypertensive. The mean systolic and diastolic blood pressures fell within the lower limits of the mean blood pressures estimated from his study on the determinants of mean blood pressure and hypertension among workers in West Africa (Bosu, 2016). The study showed a lower prevalence of hypertension when compared with the 19.5% of staff from the Ridge hospital (Egungwu, 2015). Among some senior officers and managerial assistants in Sri Lanka, the prevalence of hypertension was 32.4% and 29.4% respectively (Gamage & Seneviratne, 2016), and these levels are also observed to be higher than that of the 37 Military hospital staff. Even among some younger professionals in India, the prevalence of hypertension was observed to be 31%, which is also higher than what was observed from this study (Babu, Mahapatra, & Detels, 2013). The study among some black and white Americans on shift work and hypertension showed a prevalence of 30.8% (Ceide et al., 2015). This show that, compared to several other populations, the prevalence of hypertension among staff at the 37 military hospital was lower.

Several factors were however identified to be independently associated with hypertension among healthcare workers at the 37 Military hospital in Ghana. Among the demographic factors included age, body mass index, number of dependants and the number of years of service and these determinants agrees with the findings of Bosu, (2016) including age, obesity and other socio-economic factors as associating factors to hypertension. Egungwu, (2015) similarly, found that age, body mass index, number of dependants among other socio-demographic characteristics were independently associated with hypertension status. Furthermore, findings from the 37 Military hospital show that hypertension increased with age and even BMI.

However, Babu et al., (2013) found among some software professionals that, hypertension rather decreased with age, citing the increase in pressure and high job stress in the early years of software professionals, with the perceived pressure reducing as they gain experience in the software business. It was also noted that, having a family history of hypertension was independently associated with hypertension. This was, however, unlike Egungwu, (2015) where family history was not associated with hypertension status among nurses at the Ridge hospital. However, Asfaw, Gebrehiwot, & Shiferaw, (2015) identified that those with a family history of hypertension were more than twice as likely to be hypertensive. Most of the lifestyle factors such as drinking or smoking were not identified to be significantly associated with hypertension. The level of physical activity, however, was independently associated with hypertension among staff and this is similar to the findings of Bosu, (2016) as well as Daitey, (2014) as the latter identified among some bank workers in Accra, that physical activity was independently associated with hypertension status. The level of physical activity was not a significant factor in determining hypertension among staff after controlling for other confounders. Also, the non-association of drinking and other lifestyle factors from the 37 Military hospital is congruent with findings of Asfaw et al., (2015).

Among the staff at the 37 Military Hospital, about 48% had a shift schedule, which was either defined as morning, afternoon or night shift. Majority of those in shift work were frequently involved in the morning shift, followed by the afternoon with the night shift being the least frequent. This is similar to the findings of Ceide et al., (2015) indicating the most shift workers are in the daytime shift. The findings indicated that shift work among healthcare workers at the 37 Military hospital was not associated with their hypertension status. This to an extent, is supported by work done by Hermansson, (2015), which showed no association between shift

work and cardiovascular diseases using reviews of previous studies, although, Vangelova, (2017) identified a relationship between shift work and cardiovascular diseases, especially among men in Bulgaria. Another study on the relationship between shift work and high blood pressure among hospital workers in King Faud University Hospital, Saudi Arabia, showed that shift work did not increase blood pressure and was not associated with hypertension among workers (Alshahrani, Alenazi, Alkhadra, Alsaeed, & Alhalafi, 2015). However, several studies have identified an association between shift work and hypertension. One of such studies was among some retired workers in the United States (US), where a significant association between shift work and hypertension was identified and attributed to age and length of work (Guo et al., 2013). Also, findings of Ceide et al., (2015) indicated significant association of shift work and hypertension among black shift workers but not in white shift workers in the US. This revealed possible contributory factors such as short sleep periods of fewer than six hours, increasing the odds of hypertension among black shift workers (Ceide et al., 2015).

Among some factory workers in Ethiopia, shift work was identified to be independently associated with hypertension (Asfaw et al., 2015). Also, in Japan, a study on shift work as a risk factor for increasing blood pressure showed that, alternating shift work was a significant independent risk factor for increasing blood pressure and that the effect of shift work was higher than that of age and body mass index (Suwazono et al., 2008). This finding from Suwazono et al., (2008) is unlike the study in the 37 Military hospital where age ($p<0.0001$) and BMI ($p=0.021$) were independently significant risk factors to hypertension. Night shift workers have also been identified as a higher risk group for hypertension as found in a public university in Brazil (Pimneta, Kac, Souza, & Silqueira, 2012). It could be deduced that most situations of significant association of shift work and hypertension occurred in factories and other

organizations unlike findings from hospitals where shift work was in most cases have not been found to be significantly associated with hypertension (Alshahrani et al., 2015; Asfaw et al., 2015; Ceide et al., 2015; Guo et al., 2013; Pimneta et al., 2012). More than six in ten of those involved in shift work at the 37 Military Hospital were short sleepers (having less than six-hour sleep), although this was not significantly associated with hypertension as found by Ceide et al., (2015) among the black American shift workers and Bosu, (2016) among university staff. The increase in years of working in a shift schedule, however independently increased the odds of having hypertension among staff working in a shift schedule for more than 5 years at 37 Military hospital by 8.9 and this was significant ($p=0.002$). The contribution of the years of working in shift work schedule to hypertension among staff in the study hospital is consistent with findings among workers in Ulsan, Korea which found the odds of developing hypertension for shift workers to be 1.3 and this increased for those who had been in continuous shift work for over 20 years (Yeom et al., 2017). However, after controlling for background characteristics of healthcare workers, years of shift work was not significant although the odds of having hypertension among those who remained in shift work for more than five years was about six times that of their counterparts.

In all, about four in ten of the staff from the 37 Military hospital had a high job strain (work-related stress). This is compared to close to seven in ten of staff from the Ridge hospital who had high job strain as identified by Egungwu, (2015). Before and after controlling for confounders among staff, the determinants of job-related stress were statistically significant in influencing hypertension ($p<0.05$). This is consistent with the findings from the Ridge hospital in the Greater Accra region of Ghana, where a strong association was found between all determinants of work-related stress and hypertension (Egungwu, 2015) and agrees with the

review by Spruill, (2010) concluding the many longitudinal studies that have indicated the significant association between job-related stress and hypertension. An example is a study by Vrijkotte, van Doormen, and Geu, (1999) on the effects of work stress on ambulatory blood pressure, heart rate and heart rate variability. It reveals the repeated association between work-related stress and cardiovascular diseases especially, hypertension. Also, similar to the findings from this current study and that of the Ridge hospital, Owolabi, Owolabi, OlaOlorun, & Olofin, (2012), identifies the high level of stress among staff in a hospital in Nigeria and its significant association with hypertension prevalence. In Sri Lanka, high job stress was also associated with hypertension among workers (Gamage & Seneviratne, 2016). With the significant association between stress and hypertension, a conscious effort to briefly manage stress among workers can yield a significant result in reducing staff blood pressure (McCraty, Atkinson, & Tomasino, 2003). The result from a study on job strain, workplace discrimination and hypertension among older workers did not show any significant association between job strain, explained as occupational stress and hypertension (Mezuk, Kershaw, Hudson, Lim, & Ratliff, 2011). These findings support the findings from Bosu, (2016) and Egungwu, (2015) among others.

# CHAPTER SIX

# 6.0 CONCLUSION AND RECOMMENDATIONS

## 6.1 Conclusion

The study conducted to assess work-related stress and shift work among staff at the 37 Military hospital and their association with hypertension use three hundred workers. The overall prevalence of hypertension was 7% among the staff. The staff had adequate knowledge of the risk factors to hypertension. About 48% of the staff had a shift work schedule. Shift work among staff was not associated with hypertension.

High Job Strain interpreted as work-related stress level was found among 41.7% of the staff. It was observed to be significantly associated with staff hypertension status.

Also, 22.3% of the healthcare workers had both shift work and high job strain. The joint association of shift work and high job strain was associated with hypertension among healthcare workers.

The study, therefore, concludes that work-related stress is a predictor of hypertension among healthcare workers at the 37 Military hospital.

## 6.2 Recommendations

Based on the findings of the study, the hospital‘s management should institute regular stress management activities for staff at the hospital. Also, the management and its mental health or counseling unit should promote the use of counseling and psychosocial support services in the hospital. Periodic orientation and reminders of staff to utilize such counseling and stress relieving activities should be encouraged.

The healthcare worker at the hospital should be motivated to regularly check their status through screening activities to know their BMI and BP levels and manage them appropriately. The hospital management should encourage physical activities among staff to keep staff healthy.

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# APPENDICES

## APPENDIX 1: CONSENT FORM

**Title of study: SHIFT WORK, WORK-RELATED STRESS, AND HYPERTENSION AMONG HEALTHCARE WORKERS AT 37 MILITARY HOSPITAL, ACCRA, GHANA**

**Principal investigator**: Mohammed Abubakari,.

**Address**: Department of Biological, Environmental and Occupational Health Science, University of Ghana, Accra, Legon or 37 Military Hospital, Public Health Division. Mobile: 0244890073 Email Address: abujung2@gmail.com

### Introduction

I am a student of the School of Public Health, University of Ghana conducting a research on shift work, work-related stress and hypertension among healthcare workers. Please kindly spend some few minutes to fill out the questionnaire. All information collected will be treated as confidential and no one will be able to trace any information back to you.

### General Information about Research

This consent form explains the study you are about to participate in. I would like you to read or have someone read it to you so that you can understand the study. You may ask for clarification of anything you do not understand.

This study will assess the relationship between shift work, work-related stress, and hypertension among nurses at 37 Military Hospital, Accra, Ghana. Healthcare workers due to their profession, high job demand, and work schedule are exposed to a lot of stressful situation likely

to lead to work-related stress and hypertension. There are reports of hypertension and other chronic diseases among health care workers in medical facilities in Ghana. These conditions are known to have severe negative health effects on the individuals. You will be asked to answer questions about yourself and blood pressure, shift work, work-related stress and your blood pressure will be measured, in addition your height and weight will be measured to enable the investigator calculate body mass index. Completing the questionnaire and the taking your blood pressure measurement will take about 20 minutes. It is hoped that the findings of this study will help identify the issues associating shift work and work-related stress to hypertension among healthcare workers at 37 Military Hospital.

**Possible Risk and Discomforts**

There are no risks associated with the study. However, you may experience a little discomfort from the blood pressure measurement.

**Possible Benefits**

This research may not benefit you immediately. However, data gathered would help increase knowledge of shift work, work-related stress, and hypertension among healthcare workers. It will also help the healthcare management team to put in place measures to protect healthcare workers from hypertension and other related diseases. In addition, this research may provide add up to the research knowledge-base on shift work, work-related stress, and hypertension.

**Confidentiality**

Questionnaires will be labeled using codes instead of participant‘s name. This is to ensure confidentiality and privacy and also keep an encrypted file that coordinates numbers to names on a secure laptop. To ensure privacy, data collected will be stored in a password-protected electronic device and safely locked. Access will be limited only to the principal investigator and the project supervisor.

**Compensation**

There will be no compensation packages for participants, however, to show appreciation for the participant's time spent, some snacks (Pie and a bottle of mineral) may be given to the participant after completing the questionnaire.

**Voluntary participation and Right to Leave the Research**

Participant opinions and experiences are important to us, so we want you to be honest and truthful in answering our questions. Your participation, however, is voluntary and you are free to withdraw at any time. You may stop answering the questionnaire if it makes you uncomfortable at any point. You may also decline if feel measuring your blood pressure make you uncomfortable.

**Termination of participation by the Researcher**

Participants are at will to choose interview location to increase privacy. In the case of an adverse event or situation of distress, a subject's participation in the study will be concluded.

**Declaration of conflict of interest**

I, Mohammed Abubakari (Principal Investigator), declare that to the best of my knowledge there is no actual, perceived or potential conflict of interest that will or may arise as a result of my involvement with this study.

**Contacts for Additional Information**

In cases of any questions regarding the research, you can contact:

- 37 Military Hospital Institutional Review Board

Administrator, Prince Yaw Ashitey (mobile: 0243004247)

- Department of Biological, Environmental and Occupational Health Science, University of Ghana, Legon, Accra.
- Dr Reginald Quansah,

Mobile number: +233 (0) 500 410 123 or (0) 272 620 401

Email: rquansah@ug.edu.gh or yaw121@yahoo.co.uk

## APPENDIX 2: VOLUNTARY AGREEMENT

The above document describing the benefits, risks, and procedure for the research "Shift work, Work-Related Stress, and Hypertension among healthcare workers at 37 Military Hospital" has been read and explained to me. I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree to participate as a volunteer.

| | |
|---|---|
| Date | Name and signature or mark of volunteer |

**If volunteers cannot read the form themselves, a witness must sign here:**

I was present while the benefits, risks, and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

| | |
|---|---|
| Date | Name and signature or mark of volunteer |

**Statement by the Researcher**

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above volunteer,

| | |
|---|---|
| Date | Name and signature of person who obtained consent |

## APPENDIX 3: QUESTIONNAIRE

**Shift work, Work-related stress, and hypertension among healthcare at 37 Military Hospital, Accra, Ghana.**

### PART I. DEMOGRAPHIC DATA & FAMILY HISTORY OF HYPERTENSION

1. Age (At last birthday) .....
2. Sex: 0. Male ☐ 1. Female ☐
3. Weight ……. kilograms Height ……. ..meters BMI.....
4. Marital status: 1. Single☐ 2. Married ☐ 3. Divorced ☐

   4. Separated ☐ 5. Co-habiting ☐ 6. Widowed ☐
5. Profession: 1. Medical Doctor/Dentist/PA ☐ 2. Nurse ☐ 3. Pharmacy staff ☐

   4. Public Health staff ☐ 5. Health Assistant ☐ 6. Radiology staff ☐

   7. Laboratory staff ☐ 8. Dental staff ☐
6. Rank/Position 1. Commissioned Officer ☐ 2. Senior NCO ☐ 3. Junior NCO ☐

   4. Senior Staff ☐ 5. Principal Staff ☐ 6. Chief Staff Officer ☐ 7. DDNS ☐

   8. Junior staff ☐
7. Years of service (work service)

   1. <5 ☐ 2. 5 - 9 ☐ 3. 10-14 ☐ 4. 15-20 ☐ 5. >20 ☐
8. Income bracket

1. <GHC500 ☐ 2. GHC500-900 ☐ 3. GHC 1000-2000 ☐ 4. >GHC2000 ☐

9. How many dependents do you have? 1. None ☐ 2. 1-4 ☐ 3. >4 ☐

10. Mode of transportation? 1. Own car ☐ 2. Family car ☐ 3. Taxi/Commercial ☐

4. Walking ☐

11. Do you have blood relatives with a history of hypertension? 0. Yes ☐ 1. No ☐

12. If yes, what is the relation? 1. Father ☐ 2. Mother ☐ 3. Siblings ☐ 4. Child ☐

5. Grandparent ☐ 6. Other (Specify) .....

13. How often do you see your doctor for blood pressure checkups? 1. Monthly [ ]

2. every 3-4 months ☐ 3. every 6 months☐ 4. once a year ☐ 5. Nil ☐

14. Have you had a blood pressure reading of 140/90mmHg or above in the last 1year

0. Yes ☐ 1. No ☐

15. Has your doctor diagnosed you as being hypertensive? 0. Yes☐ 1. No ☐

16. If yes, what was your blood pressure reading on diagnosis? .....

17. Have you been prescribed any medication to lower your blood pressure?

0. Yes ☐ 1. No ☐

18. If yes, list medication and dosage.....

**PART II: KNOWLEDGE OF HYPERTENSION**

19. Does salt intake lead to hypertension? 0. Yes ☐ 1. No ☐

20. Does obesity lead to hypertension? 0. Yes ☐ 1. No ☐

21. Can regular exercising prevent hypertension? 0. Yes ☐ 1. No ☐

22. Which of the following influences on hypertension? a. Work overload ☐ b. Obesity ☐ c. Work-related stress ☐ d. a, b, & c ☐ 1. a & b only ☐ 1. None ☐

23. Can hypertensive be treated your work? 1. Yes ☐ 2. No ☐

24. Which blood pressure reading would you classify as and above as hypertensive?

0. 140/90mmHg and above ☐ 1. Below 140/90mmHg ☐

25. Does alcohol consumption contribute to hypertension? 0. Yes ☐ 1. No ☐

26. Does the sex of an individual have any influence on hypertension? 0. Yes ☐ 1. No ☐

27. What was your last blood pressure reading? .....mmHg

28. Before your blood pressure measurement, were you aware of your hypertension status?

1. Yes ☐ 2. No ☐

**PART III: LIFESTYLE FACTOR**

29. What type of Physical activity do you do currently? 1. Aerobic ☐ 2. Workout ☐

3. Cycling ☐ 4. Running/Jogging ☐ 5. Swimming ☐ 6. Walking ☐ 7. None ☐

30. What is the frequency per week of the physical activity you engage in? 0. None ☐

1. Once a week ☐ 2. 2-3 times a week ☐ 3. 4-7 times a week ☐

31. Have you ever smoked a cigarette? 0. Yes ☐ 1. No ☐

32. Do you currently smoke cigarettes? 0. Yes ☐ 1. No ☐

33. If yes, how many cigarettes do you smoke a day on average?

1. 1-9 cigarettes ☐ 2. 10-20 cigarettes ☐ 3. >20 cigarettes ☐

34. Do you drink alcohol? 0. Yes ☐ 1. No ☐

35. If yes. Please specify the type and frequency of alcohol you drink.

**Type** : 1. Whisky ☐ 2. Rum ☐ 3. Beer ☐ 4. Wine ☐ 5. Liquor ☐

5. Other Specify .....

**Frequency**: 1. 1 bottle per day ☐ 2. 1 per week ☐ 3. 2 - 4 per week ☐

4. > 5 per week ☐ 6. once per month ☐ 7. Occasionally ☐

**PART IV: SHIFT WORK ASSESSMENT**

36. Do you run shift? 0. Yes ☐ 1. No ☐

37 If yes, please tick where appropriate the type and frequency per week and month in the matrix below.

| Months | | 1. No of Days On Morning Shift | 2. No of Days On Afternoon Shift | 3. No of Days On Night Shift |
|---|---|---|---|---|
| November 17 | Week 1 | | | |
| | Week 2 | | | |
| | Week 3 | | | |
| | Week 4 | | | |
| December 17 | Week 1 | | | |
| | Week 2 | | | |
| | Week 3 | | | |
| | Week 4 | | | |
| January 18 | Week 1 | | | |
| | Week 2 | | | |
| | Week 3 | | | |
| | Week 4 | | | |
| February 18 | Week 1 | | | |
| | Week 2 | | | |
| | Week 3 | | | |
| | Week 4 | | | |
| March 18 | Week 1 | | | |
| | Week 2 | | | |
| | Week 3 | | | |
| | Week 4 | | | |

38. On the average, how many hours do you stay on following shifts in a day? 1. Morning..... 2. Afternoon..... 3. Night .....

39. On the average, how many hours of shift work per week do you run?.....

40. On the average, how many years have you been on shift work? .....

41. On the average, how many hours of sleep do you get in a day? 1. ≤ 6 hrs ☐ 2. > 6 hrs

42. In the last 12 months , which of the following has been you most frequent shift schedule? 1. Morning ☐ 2. Afternoon ☐ 3. Night☐

**WORK-RELATED STRESS INDEX**

Please tick where appropriate/applicable to you.

| | | Strongly disagree (1) | Disagree (2) | Agree (3) | Strongly Agree (4) | Undecided (5) |
|---|---|---|---|---|---|---|
| 43 | My job involves a lot of repetitive work | | | | | |
| 44 | My job allows me to make a lot of decision on my own | | | | | |
| 45 | My job requires a high level of skill | | | | | |
| 46 | I have a lot to say about what happens on my job | | | | | |
| 47 | I have an opportunity to develop my special ability | | | | | |
| 48 | My job requires working very fast | | | | | |
| 49 | My job requires working very hard | | | | | |
| 50 | My job requires lots of physical effort | | | | | |
| 51 | I am asked to do an excessive amount of work | | | | | |
| 52 | I have enough time to get the job done | | | | | |
| 53 | I am free from conflicting demands others make | | | | | |
| 54 | If work gets difficult, my colleagues will help me | | | | | |
| 55 | People I work with are getting the job done | | | | | |
| 56 | My supervisor pays attention to what I am saying | | | | | |
| 57 | I feel anxious at work | | | | | |

**PART V: BLOOD PRESSURE (BP) MEASUREMENTS**

| BP | 1st Reading | 2nd Reading | 3 Reading | Mean BP |
|---|---|---|---|---|
| Systolic(mmHg) | | | | |
| Diastolic (mmHg) | | | | |

## APPENDIX 4: ETHICAL APPROVAL

**Institutional Review Board**
37 Military Hospital
Neghelli Barracks
ACCRA
Tel: 0302 769667
Email:irbmilhosp@gmail.com

/ 2March 2018

**ETHICAL CLEARANCE**

**37MH-IRB IPN 208/2018**

On 13th February 2018, the 37 Military Hospital (37MH) Institutional Review Board (IRB) at a Board Meeting reviewed and approved your protocol.

**TITLE OF PROTOCOL: Shift work, Work-Related Stress, and Hypertension among Healthcare Workers at the 37 Military Hospital.**

**PRINCIPAL INVESTIGATORS: Mohammed Abubakari**

Please note that a final review report must be submitted to the Board at the completion of the study.

Please report all serious adverse events related to this study to 37MH-IRB within seven (7) days verbally and fourteen (14) days in writing.

This certificate is valid until 12th February 2019.

**DR EDWARD ASUMANU**
(37MH-IRB, Vice Chairperson)

37 MILITARY HOSPITAL
INSTITUTIONAL REVIEW BOARD
Date 12-03-18

Cc: Brig Gen MA Yeboah-Agyapong
Commander, 37 Military Hospital