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DETERMINANTS AND CONSEQUENCES OF STRESS AND BURNOUT AMONG RESIDENTS IN KORLE-BU TEACHING HOSPITAL, GHANA.

BY

NICHOLAS KOBLA AKAKPO-ASHIADEY

10937191

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH DEGREE

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DECLARATION

I Nicholas Kobla Akakpo-Ashiadey, declare that this dissertation consists of research I have conducted, and it has not been previously included in any dissertation, report or thesis submitted to the University or any other institution for the award of a degree or any other reasons, except where due acknowledgement has been made on all other works used. This research was done under the keen supervision of Dr. Franklin N. Glozah, Department of Social and Behavioural Sciences, School of Public Health, University of Ghana. All cited materials have been duly acknowledged by means of a complete reference. This final research work is being submitted to the Department of Social and Behavioural Sciences, School of Public Health, University of Ghana, in partial fulfilment of the requirements for the award of the Master of Public Health Degree.

Signature: ……

Nicholas Kobla Akakpo-Ashiadey

(STUDENT)

Date: 27th October, 2023

Signature: ……

Dr. Franklin N. Glozah

(SUPERVISOR)

Date: 27th October, 2023

DEDICATION

This work is dedicated to the evergreen memory of Maria-Lucia Akakpo-Ashiadey, a martyr whose life and death inspired me to study and practice Medicine.

Let this also be a remembrance of Isaac Akoto-Brown, a friend, and a brother.

It is finally dedicated to all residents who are braving the odds to pursue specialty training and bring specialist services to the doorsteps of Ghanaians.

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Having Mr., and Mrs. Akakpo-Ashiadey as parents has been the greatest blessing of my life. Thank you for always being there when it mattered the most. You both nurtured me with values of integrity and accountability, values that have come to define the man that I am today.

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To my loving spouse Nana Ama Oduro who has been my support throughout this year of rigorous academic work, I say thank you for the patience and love you have always shown to me. Heaven knows I am grateful. You mean the world to me.

ABSTRACT

Background: Stress and burnout continue to negatively affect postgraduate medical trainees who have enrolled in various specialty and sub-specialty training programs globally. These two psychological phenomena have been shown to not only compromise work performance but also hinder the social lives of residents and by extension their families. However, not much is known about the determinants and consequences of burnout among residents in Ghana. This study aimed at examining the determinants and consequences of stress and burnout among residents in Korle-Bu Teaching Hospital to better understand the dynamics of these two phenomena in a Ghanaian setting.

Methods: This was a facility-based analytical cross-sectional study conducted among residents in Korle-Bu Teaching Hospital. A stratified random sampling technique was used to obtain study participants from each department. Participation was voluntary and only those who consented were included in the study. Stress, burnout, and mental well-being were assessed using the Workplace Stress Survey, Maslach Burnout Inventory – Human Services Survey and the Positive Mental Health Scale respectively. Analyses were done using univariate analysis, Chi-square/Fisher's exact test and multilinear regression models where appropriate.

Results: The prevalence of stress among residents was 19.0% whereas 17.5% prevalence of burnout was observed in this study. 58.3% of participants reported having a good mental health status. Female sex, second year of training and working for more than 40 hours a week were statistically significant determinants of stress. Severe stress is associated with higher degrees of burnout. The key determinants of mental health were severe stress and higher degrees of burnout.

Conclusion: Residents in Korle-Bu Teaching Hospital experience significant levels of stress and burnout as a result of which almost half of them do not have good mental health status.

Postgraduate medical colleges and training centres should collaborate to periodically assess levels of stress and burnout, eliminate job stressors and implement well-being programmes for residents training in the hospital.

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LIST OF ABBREVIATIONS

ACGME – Accreditation Council for Graduate Medical Education

ACTH – Adrenocorticotrophic Hormone

ANS – Autonomic Nervous System

COVID-19 – Coronavirus Disease of 2019

CPR – Common Programme Requirements

CRH – Corticotrophin Releasing Hormone

EWTD – European Working Time Directive

GARH – Greater Accra Regional Hospital

GCPS – Ghana College of Physicians and Surgeons

GRs – Glucocorticoid Receptors

GRE – Glucocorticoid Response Elements

HPA – Hypothalamic-Pituitary Axis

IRB – Institutional Review Board

JD-C/S – Job Demands – Control/Support

JD-R – Job Demands - Resources

KBTH – Korle-Bu Teaching Hospital

MBI – Maslach Burnout Inventory

MBI-HSS – Maslach Burnout Inventory – Human Services Survey

MDCG – Medical and Dental Council, Ghana

PMH – Positive Mental Health

PN – Paraventricular Nuclei

PSS – Perceived Stress Scale

SAM – Sympathetic Adrenomedullary

STC – Scientific and Technical Committee

WACP – West African College of Physicians

WACS – West African College of Surgeons

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Residency training is the immediate postgraduate medical or surgical training offered to doctors and dental surgeons in their chosen areas of specialisation after meeting the mandatory requirement of full registration with the relevant statutory regulator of medical practice (Newman-Nartey et al., 2019). In Ghana, the Medical and Dental Council regulates the practice of doctors and ensures that doctors adhere to current best practices.

During residency, doctors are required to spend varied lengths of time in a training, usually tertiary institution and under the direct or indirect supervision of senior colleagues in various medical, surgical, or dental disciplines. The tertiary hospitals in Ghana that currently offer residency training include Korle-Bu Teaching Hospital, Komfo Anokye Teaching Hospital, Greater Accra Regional Hospital, Tamale Teaching Hospital, 37 Military Hospital, Ho Teaching Hospital and Cape Coast Teaching Hospital. Teaching and learning activities come in the form of didactic lectures, clinical sessions, and other activities deemed relevant by trainers.

The journey of residency is an arduous one albeit necessary if a doctor deigns to practice as a specialist or a consultant in a chosen area of medical or dental practice. The demands of work and training drive residents to commit a lot of time to their training, scrambling to meet deadlines, cater for patients and still make time for studies all to the neglect of their personal, family, and social lives (Ogundipe et al., 2014). These demands on the one hand, and failure to meet them on the other predisposes residents to stress and burnout (Bouza et al., 2020; Ogundipe et al., 2014).

Burnout is a multidimensional psychological phenomenon that has a telling on the quality of one's lifestyle, behaviour and social interactions be it at work or at home. It comprises a triad of emotional exhaustion, depersonalisation and a feeling of underachievement or ineffectiveness (Huang et al., 2021; Maghbouli et al., 2021; Shahi et al., 2022) . This syndrome has been extensively studied within the academic community where the focus has been on identifying possible causal factors be it demographic, socioeconomic, cultural, or even working conditions. For instance, Bouza et al. (2019) studied burnout among physicians in Spain and as part of their conclusions, defined work-related burnout as *"a psychological response to the chronic interpersonal and emotional work stress that appears in the professionals of service organisations who work in contact with clients or users of the organisation"*. Navines et al (2021) demonstrated that, individual and psychosocial factors are associated with stress and burnout among residents. Notable among these factors are; personality traits, choice of specialty, year of training and hours and quality of sleep. A similar association has been observed that burnout increases the risk of psychosomatic symptoms and leads to an inability to concentrate on tasks, anxiety and irritability (Navinés et al., 2016). These studies reveal not only the enormity of the problem on a global scale but also provide a plethora of findings on its implications for the persons affected, their close relations and friends, as well as their clientele. For example, higher rates of absenteeism, early retirement or resignation from medical practice and diminished productivity have been identified as some consequences of burnout syndrome among physicians in Spain (Bouza et al., 2020). The quality of care provided by physicians may be compromised when there are high levels of burnout (Dave et al., 2018).

Burnout has been shown to affect healthcare professionals, teachers, social workers, athletes, and many professionals in different endeavours. Bouza E. et al (2020) opined that the worst affected

professionals are those that bear the responsibility of caring for other humans. They further indicated that the worst prevalence is seen in healthcare providers of which physicians are most affected. Among physicians, burnout mostly affects residents who are at the core of service provision especially in tertiary teaching hospitals (Daryanto et al., 2022; Huang et al., 2021; Zhou et al., 2020).

On a global scale, a 2019 meta-analysis of burnout among 22,778 residents revealed an aggregate prevalence of 51%. This study entailed studies from all continents. It emerged that residents in radiology, neurology and surgery reported the highest prevalence of burnout (Low et al., 2019).

On the continental level, a 2019 systematic review of burnout among health workers in Africa revealed high prevalence rates among African physicians. This study included 2031 participants drawn from Ethiopia, Ghana, Nigeria and South Africa. There was a prevalence of 81% among physicians working in rural parts of South Africa. Similar findings were made in Ethiopia with 65.2%, 91% and 85.1% of physicians in the southern parts of the country experiencing high emotional exhaustion, low personal accomplishment and high depersonalisation respectively. The 200 Ghanaian physicians who were included in the study reported high emotional exhaustion (9.1 ± 2.6), low personal accomplishment (5.8 ± 1.6) and depersonalisation (5.2 ± 2.1). These studies focused on burnout among the general population of physicians. The studies included from Nigeria focused solely on burnout among residents with 45.6%, 57.8% and 61.8% reporting emotional exhaustion, depersonalisation and decreased personal accomplishment respectively (Dubale et al., 2019).

A 2022 study conducted among health workers at the peak of the COVID-19 pandemic in Ghana showed a prevalence rate of 20.57%. This study included residents who were in training (Konlan et al., 2022).

To put it simply, stress has been defined as an internal and conditioned response to external pressures. It is said to *"refer to the state of anti-homeostatic biological activation that occurs when the body fails in its attempts to adapt to the demands of its immediate environment"* (Navinés et al., 2021). This implies that there are factors within the external environment known as stressors which can trigger a stress response. Stress that relates to work is referred to as work stress, job stress or occupational stress. Work stress has been defined as *"the process of job stressors, or stimuli in the workplace, leading to strains, or negative responses or reactions"* (Glazer & Liu, 2017) . These strains or negative responses comprise physical, behavioural and psychological consequences that can affect the health and well-being of workers. It has been demonstrated that there is an association between work-related stress and cardiovascular disease and metabolic syndrome (Navinés et al., 2016). Work stress is often said to occur when employees are given tasks (demands and pressures) that exceed their knowledge, skills, or ability to fulfill the requirements of those tasks (Navinés et al., 2021) . Work stress can also yield dissatisfaction and a a decline in work performance as well as compromise work culture within organisations (Afulani et al., 2021).

Studies in a teaching hospital in India showed that 24.24% of residents in training reported a higher-than-average prevalence of stress. Such stress could potentially culminate in decreased quality of care and personal consequences for residents (Dave et al., 2018). Similar findings were made among residents in training in Brazil, when a stress prevalence rate of 17.7% was reported within an academic health setting (Pasqualucci et al., 2019).

1.2 Problem Statement

As occurs globally, residents who have enrolled into various specialty training programs in Ghana have suffered various degrees of stress and burnout. Though the aetiology of these phenomena are myriad, work-related factors have demonstrably been the major contributors (Liao et al., 2022; Navinés et al., 2016). This owes to an overarching emphasis on work output and the arduous task of meeting various training requirements and deadlines (Ogundipe et al., 2014). Dave et. al. (2018) purport that stress has consequences for both residents in training as well as the clients they are responsible for. Stress and burnout have been shown to yield a lower quality of life, depression and suicidal ideations among residents (Dimitriu et al., 2020). These might also cause residents to limit the time spent with their close relations and friends as well as curtail their indulgence in social activities and physical exercises.

The global extent of the problem of burnout among residents has been aptly captured in the reported aggregate prevalence of 51% using data collected from over 22,000 residents (Low et al., 2019). This meta-analysis can be said to represent the extent of the problem worldwide as it draws articles from all continents. Similarly, a systematic review involving over 2000 thousand healthcare providers from across the African continent revealed significant findings relating to burnout among physicians and more specifically residents in training. Resident-specific findings were drawn from studies in Nigeria with prevalence rates of emotional exhaustion, depersonalisation and low personal accomplishment being 45.6%, 57.8% and 61.8% respectively (Dubale et al., 2019). The prevalence of burnout among some Ghanaian healthcare workers studied during the peak of the COVID-19 pandemic has been pegged at 20.57%, with staff in primary health care facilities, including residents, being most afflicted (Konlan et al., 2022). The investigators also discovered that participants with perceived high workload were 2.38 times

more likely to experience burnout. Although this study did not focus solely on residents, it paints a picture that reflects the work lives of most residents in training. This is because they are burdened with a high workload and tend to work prolonged shifts including night shifts.

Unlike what was observed for burnout, literature search did not yield a global aggregate score for stress among residents. However, a systematic review and meta-analysis involving 36266 residents and including articles drawn from all continents revealed a nearly 3-fold increased odds for burnout/stress (OR, 2.84; 95% CI, 2.26-3.59) from work-related demands (Zhou et al., 2020).

Additionally, significant findings were made when residents in a teaching hospital in Gujarat, India were evaluated for stress. A prevalence rate of 24.24% was observed (Dave et al., 2018). Pasqualucci et. al. (2019), reported a stress prevalence of 17.7% among residents within an academic health system in Brazil. These studies show what pertains in teaching hospital settings where residents do train and it exposes key factors that increase the risk of stress among residents.

The impact of stress and burnout on the mental health of residents is of grave concern because, compromised mental health is consequential for residents and their patients (Dave et al., 2018; Navinés et al., 2016; Zhou et al., 2020). A Brazilian study showed a positive correlation between burnout syndrome and depression (OR= 2.7, CI = 1.7–4.1, p value < 0.000) among residents (Pasqualucci et al., 2019). According to Navines et. al. (2016), burnout is associated with increased irritability, inability to concentrate on tasks, low self-esteem and an increased risk of substance abuse. In terms of impact on patients, it has been shown that residents with higher levels of burnout and stress are more likely to provide suboptimal care, thus putting lives at risk (Dave et al., 2018). A cross-sectional study at two-university-based residency programs showed a positive correlation between burnout syndrome and a six-item assessed suboptimal care scale. Emergency physicians who participated in this study showed that they were more likely to

perform suboptimal care practices with greater frequency when the levels of burnout were high (Dave et al., 2018). This is unacceptable because it increases the risk complications and mortality among clients.

There is a need to study these psychological phenomena and their consequences among Ghanaian medical residents so we can understand their peculiar nature within the framework of postgraduate medical education in Ghana. It will be impossible to tailor evidence-based interventions to address stress, burnout and their consequences on residents and patients if there is no data on their prevalence.

Korle-Bu Teaching Hospital was chosen as the study site because it has the greatest number of residents in training. Additionally, the training centre offers postgraduate programmes in all the specialties under the postgraduate medical colleges unlike some of the remaining training institutions.

1.3 Research Questions

(1) What are the levels of stress and burnout among residents in KBTH?

(2) What factors are associated with stress and burnout among residents in KBTH?

(3) What is the relationship between stress and burnout among residents?

(4) How does stress and burnout affect the mental health of residents?

1.4 Objectives

1. To determine the levels of stress and burnout among residents in KBTH.
2. To assess factors associated with stress and burnout among residents in KBTH.
3. To determine the association between stress and burnout among residents.
4. To assess how stress and burnout affect the mental health of residents.

1.5 Significance of Study

The nature and dynamics of stress and burnout in the peculiar situation of residents at various levels of specialty training in Ghana has not been extensively explored. This study aimed at uncovering the enormity of the problem within the Ghanaian setting, thus stimulate advocacy towards its management. By elucidating the impact of preventive as well as risk factors on the severity of burnout and stress in the study group, there will be a better understanding of how residents employ preventive factors in dealing with stress and burnout in addition to the techniques used in mitigating the risk factors in the Ghanaian setting.

By exploring the association between stress and burnout, this study can potentially unearth critical periods for implementing interventions that could avert the burnout syndrome during residency training. This knowledge may be instructive for the development and timing of resident well-being programs during training.

The findings from this study may be crucial for the implementation of specific measures to mitigate the consequences of stress and burnout on residents training in Ghana.

1.6 Definition of Terms

Resident – a medical doctor who is fully registered with the Medical and Dental Council, Ghana and who has enrolled into a specialty training programme of their choice with the West African College of Physicians, West African College of Surgeons or the Ghana College of Physicians and Surgeons.

Stress –a state in which one is alerted and made anxious by events or factors within the external environment over which one does not have control (Fink, 2016).

Burnout – a multidimensional psychological syndrome which is characterised by emotional exhaustion, depersonalisation and a feeling of personal underachievement (Huang et al., 2021; Maghbouli et al., 2021; Shahi et al., 2022).

Mental health status – *"a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community"* (Galderisi et al., 2015).

1.7 Theoretical and conceptual Framework

Several social and behavioural theories have been studied and shown to underpin stress and burnout syndrome among workers. Key among these theories are the Social Cognitive Theory, Social Exchange Theory, Organisational Theory, Structural Theory, Job Demands-Control/Support and Job Demands-Resources Theory and the Emotional Contagion Theory (Edú-valsania et al., 2022). These theories ascribe the development and evolution of burnout to the effects of personal traits, outcomes of interpersonal interactions with people within the work environment and the structural and cultural set up within the work environment. The key theory of interest to this study and on which the conceptual framework is premised is the Job Demands-Control/Support and Job Demands-Resources Theory. This theory was chosen because of its versatility in elucidating stress and burnout in different work settings, albeit bearing in mind the variations in work stressors that come with different professions. Additionally, it presents a dual pathway to employee well-being and can predict outcomes for an organisation (Bakker et al., 2014).

The **Job Demands-Control/Support (JD-C/S) and Job Demands-Resources (JD-R) Theory** assesses how work stress is influenced by the extent of control/support staff have over the demands posed by their work and the resources which are available to help meet them. Job demands have been pinpointed as the main driving forces behind burnout. Conversely, job resources are the main drivers underpinning engagement (Bakker et al., 2014). According to this theory, there are lower levels of work stress when people have control over what their jobs demand of them. The same observation is made when workers have the internal and external resources needed to engage and perform their jobs (Bakker et al., 2014). Residents in training work with a multidisciplinary team within the healthcare setting. As such they do not have control over certain work-related factors such as autonomy, clear definition of roles, hours of work and conflicts which may come up at work. These constitute work stressors which can lead to burnout. In addition to these, residents do not have control over remuneration and security in their workplaces. Per this theory, residents can engage more in their work if the right resources are available to them. This is not limited to resources necessary for clinical care. Organisational resources such as human resource practices and healthy leadership may augment resident efforts to mitigate the effect of stressors thus avoid burnout (Bakker & de Vries, 2021).

Work stressors drive a reduction in productivity, increase clinical errors and have direct and indirect negative effects on individuals and the companies they work for. On an individual level, work stressors culminate in increased rates of depression, anxiety, and post-traumatic stress disorder. Indirectly they increase both tangible and intangible costs for institutions (Dopkeen, 2014).

Multiple factors have been associated with stress and burnout among residents in training. These are classified into individual and work-related factors.

Individual factors include personality traits, substance use, previous history of depression and/or anxiety as well as marital status, emotional intelligence and the quality of social relationships and leisure activities (Navinés et al., 2021).

Work-related factors that affect stress and burnout include hours of work, absence of autonomy, an unfriendly work environment, peer support and choice of specialty for residency training (Navinés et al., 2021) . Although similarities exist between the causal factors of stress and burnout as well as its implications on individual residents, interventions can only be tailored to deal with these problems within a specific setting if there is a profound comprehension of the peculiar nature of stress and burnout within same.

The conceptual framework depicts an inter-relationship between the causal factors of stress and burnout and how the two phenomena affect the mental health status of residents. It also shows how factors about the personal and social lives of residents can result in stress and burnout. Determinants were classified under demographic, work-related, past medical history, and socioeconomic factors. The factors entail those that residents may or may not be able to control as well as factors that constitute resources that residents may employ to mitigate stress and burnout.

Literature is replete with mixed findings on how demographic factors such as age, sex, marital status and having children are associated with burnout and stress. This study wants to explore how these factors may contribute to these two phenomena in the context of residency training in Ghana. Using sex as an example, some studies reveal that females were more likely to suffer burnout when compared with their male counterparts during residency (Alosaimi et al., 2015; Dyrbye et al., 2018; Rodrigues, Cobucci, et al., 2018). Other studies noted that males were more

at risk (Low et al., 2019) . Similar mixed findings were made for other parameters under demographic factors. Sex is a factor that cannot be controlled.

The framework also shows that work-related factors can precipitate stress and burnout. Factors such as long hours at work, lack of autonomy and decision-making power, year of training, dissatisfaction with specialty choice and conflicts within the work environment have been shown to trigger stress and burnout (Low et al., 2019; Navinés et al., 2021; Shahi et al., 2022). Although Navines et al (2021) explored both risk factors and protective factors in their study, this framework seeks to explore the dynamics of how risk factors precipitate these two problems among residents in the Ghanaian setting.

It is known that a previous history of mood and anxiety disorders can predispose to an increased risk of stress and burnout. Depression has been shown to be closely associated with burnout among workers (Koutsimani et al., 2019). Similarly, there exists a relationship between anxiety, stress, and burnout. This relationship is influenced extensively by coping mechanisms as was demonstrated in Chinese physicians (Zhou et al., 2016).This framework portrays depression and anxiety as determinants of burnout and depression and seeks to establish the veracity of the claim.

Socioeconomic determinants which residents cannot necessarily control contribute significantly to stress and burnout among residents in training since they find themselves within the economic space that is affected by inflation and a high cost of living. This framework seeks to explore the relationship between these factors and these two psychological phenomena.

The framework also shows that stress and burnout demonstrate a two-way relationship in which one can spark the onset of the other. This might end up creating a vicious cycle with untoward consequences for the resident.

This conceptual framework presents a unidirectional relationship between stress and burnout on the one hand, and mental health status on the other. Stress and burnout have been shown to affect the mental health of medical residents. High degrees of stress and burnout have been shown to result in a plethora of mental health problems among residents in training (da Nóbrega Lucena Pinho et al., 2021) . Trainees in US general surgery residency programmes who reported high levels of stress and burnout demonstrated a greater risk of depression and suicidal thoughts (Lebares et al., 2018). This framework wants to examine the nature of the relationship between stress, burnout, and mental health status of medical residents training in a Ghanaian setting. The aim is to see what magnitudes of stress and burnout are linked with good and poor mental health status respectively.

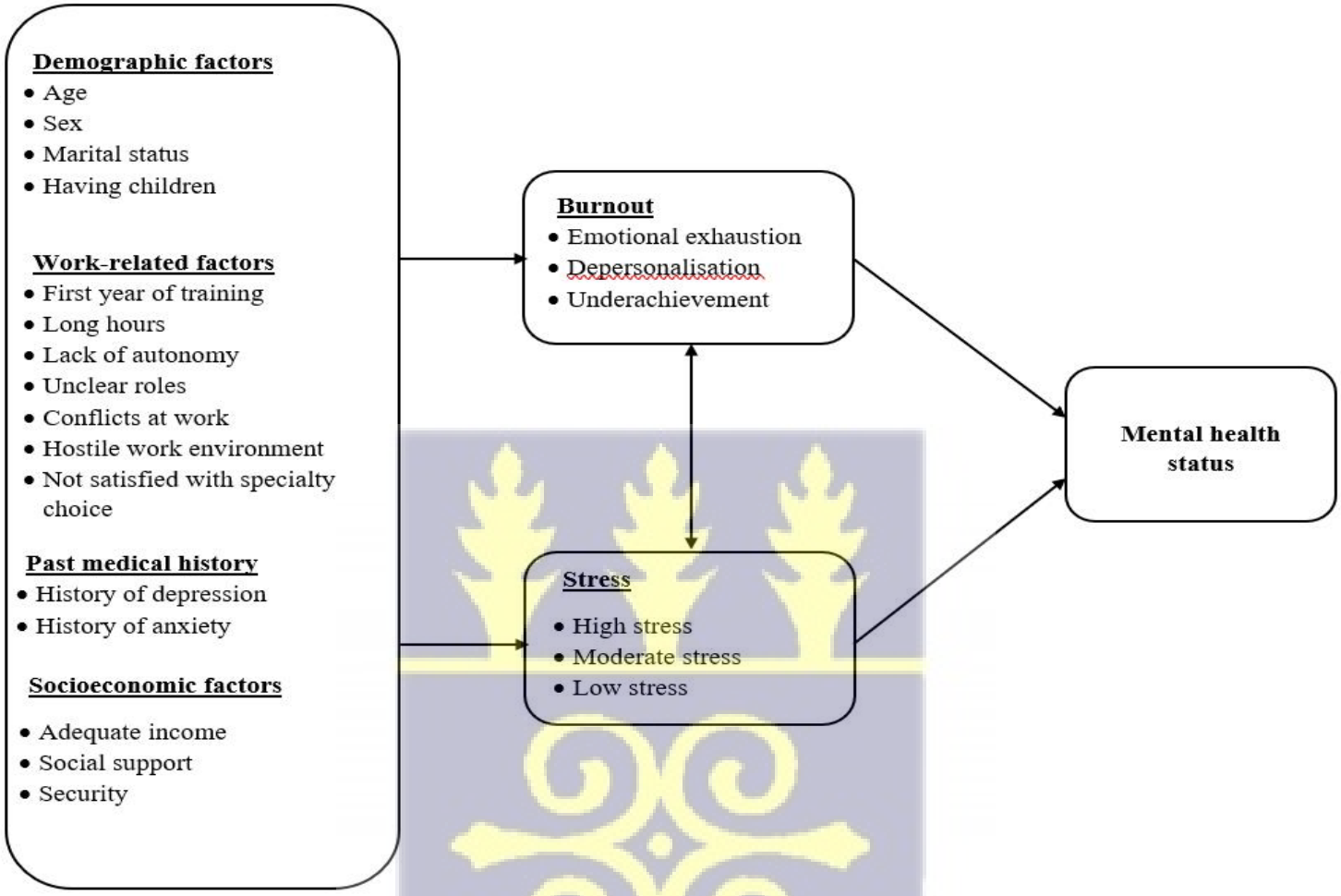


Figure 1.1 Conceptual Framework.

Source: (adapted from) Maslach, C., & Leiter, M. P. (2016). Burnout. *Stress: Concepts, Cognition, Emotion, and Behavior: Handbook of Stress*, 351–357. https://doi.org/10.1016/B978-0-12-800951-2.00044-3

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Residency training

Residency training is that critical period in the professional lives of doctors when they receive a more advanced and detailed tutelage in a chosen field within medical practice. Within the Ghanaian context, residency training is defined as the *"immediate postgraduate medical/surgical training for fully registered medical doctors and dental surgeons in a chosen specialty of their profession"* (Newman-Nartey et al., 2019). As such there are options for training doctors in both medical, surgical, and dentistry specialties once the stated requirements have been met. Currently, postgraduate medical education is organised by three colleges in the country. These are the Ghana College of Physician and Surgeons, the West Africa College of Physicians, and the West African College of Surgeons. The latter two constitute the West Africa Postgraduate Medical College (Newman-Nartey et al., 2019) . Programs are offered at the membership and the fellowship levels.

The Medical and Dental Council, Ghana (MDCG) requires doctors after graduation from medical school, to undergo a mandatory two-year housemanship training program to build competence and prepare them towards independent decision making. Consequently, they are posted to various levels of the health system as medical officers at the entry level. It is also a requirement that doctors spend various lengths of time as medical officers to gain additional professional competence, acquire more skills and offer service to people who seek services in district-level facilities. This distribution of medical officers is not cast in stone, as it is sometimes the case that even tertiary level facilities require their services.

To enter a residency program in Ghana, one must have completed housemanship training, registered permanently with the Medical and Dental Council, Ghana and then passed an entry level examination referred to as Primary Examination. It is the culture of the Ghana College of Physicians and Surgeons to interview candidates prior to offering them admission into various programs. Furthermore, residents who intend to enroll in various surgery-related specialties must undergo an 8-week training in Anatomy, Physiology and Pathology prior to commencement of actual residency. Training is offered in the teaching hospitals within the country notably Korle-Bu Teaching Hospital, Komfo Anokye Teaching Hospital, Tamale Teaching Hospital, Cape Coast Teaching Hospital and Ho Teaching Hospital. Some Ghana College of Physicians and Surgeons programs are run in the Greater Accra Regional Hospital. The West Africa Colleges of Physicians and Surgeons have accredited the 37 Military Hospital, Accra to run some of their training programs for both junior and senior residents.

Trainees are referred to as residents and they are considered vital to the delivery of clinical care in teaching hospitals both now and in the future. This assertion is premised on their position as the fulcrum around which daily patient care revolves even though they are in training and are yet to become specialists (van der Leeuw et al., 2012). Residents are further categorised as junior residents or senior residents. Junior residents are often referred to as "residents" and are training towards membership of the respective colleges. Senior residents are training towards fellowship of their chosen colleges and can sub-specialise if sub-specialty options are available. Attaining a position of senior residency requires that one must have completed the membership program and met some other requirements peculiar to each college. Most colleges will require a mandatory one-year district practice before enrolment in the fellowship program.

Training schedules are rigorous and tend to test the tenacity of trainees. In the Ghana College of Physicians and Surgeons, residents are required to acquire certain competencies within a 30-month period of continuous training and as such are obliged to fit in a lot of activities within a limited time frame. Similar obligations are imposed on residents by the West Africa College of Physicians as well as West Africa Colleges of Surgeons within a 24-month period. Daily ward rounds, weekly general ward rounds, patient counseling sessions, accompanying patients for invasive investigations, following up on laboratory reports and discussing with senior residents and consultants are typical of clinical duties assigned to residents. Training activities include morning meetings, the frequency of which varies between departments, journal clubs, preparing and making departmental and interdepartmental presentations among others. To meet all these demands, residents adopt a rigorous, inflexible schedule which pushes them towards developing stress and burnout. Some end up working longer hours, avoiding family and friends to meet work demands and limiting their recreational activities.

To mitigate the effects of training requirements on residents' lives and minimise the risk of developing stress and burnout, it is recommended that residents' schedules should be more flexible, and training programs must have some well-being activities to allow time for residents to unwind. This recommendation emanates from the work of the Accreditation Council for Graduate Medical Education (ACGME) and is premised on the understanding that the well-being of physicians is associated with improved quality of care, safety and better patient outcomes (Burchiel et al., 2017). The ACGME goes on to make recommendations on restrictions on work hours for residents. This is because prolonged working hours has been shown to increasingly tip residents into developing burnout (Hameed et al., 2018; Kijima et al., 2020) . ACGME's recommendation is succinctly captured in its Common Program Requirements (CPR) document as *"Clinical and educational work hours must be limited to no more than 80 hours per week,*

averaged over a four-week period, inclusive of all in-house clinical and educational activities, clinical work done from home, and all moonlighting." (Accreditation Council for Graduate Medical Education, 2011). Similar regulations have been instituted by the European Union and were christened European Working Time Directive (EWTD) with the aim of ensuring that employees are not subjected to long hours of work. The European Commission recommends a maximum of 48 hours of work per week for all workers within the European Union including residents in training (Commission, 2017). Literature search reveals no such specific guidelines on work hours for residents in training in Ghana. The closest is what is stipulated in Labour Act 651 (of 2003) which states that work hours must not exceed 40 hours a week (Labour Act of Ghana 651, 2003).

2.2 Burnout

Burnout is one of many psychological phenomena that affect workers in various industries and healthcare providers are not exempt. Studies have shown that it tends to affect workers whose core mandate it is to cater for other people (Friganoviü et al., 2019; Manzano-García & Ayala-Calvo, 2013). Burnout has been defined as a syndrome depicted by a triad of lack enthusiasm for work (emotional exhaustion), presence of cynicism (depersonalisation) and a personal perception of low accomplishment (underachievement) (Hameed et al., 2018). This definition runs through most research that has been done on burnout among workers. The syndrome is seen as a sustained response to persistent emotional and interpersonal stressors at work and thus situates the individual stress experience within a broader organisational framework of how people interact with their work environment and meet work demands (Maslach & Leiter, 2016). It is seen therefore as an occupational hazard (Marchalik et al., 2019). Burnout impedes intrapersonal and interpersonal functioning, consequently diminishing work quality and compromising one's

psychological health (Jiménez-Ortiz et al., 2019). It drives a decrease in productivity and pushes more and more physicians to consider changing their jobs (Kijima et al., 2020). In applying the definition of burnout to medical professionals, some authors add on the dimension of appearance of negative attitudes and conducts towards patients and hospitals as organisations (Bouza et al., 2020). To better understand burnout, it is imperative to further elucidate the three key constructs embedded within the definition and explore the relationship between them. Literature has shown that there exists a causal relationship between these three constructs. This is exemplified in the assertion that emotional exhaustion yields accentuated levels of depersonalisation and a lack of professional achievement may precipitate burnout or might as well be a sequela (Edú-valsania et al., 2022).

Emotional exhaustion as described by Maslach, and Leiter (2016) refers to that feeling of being stretched beyond one's limit and having the additional burden of a complete lack of emotional and physical wherewithal to deal with work. To be emotionally exhausted is akin to feeling drained of all of one's energy without any tangible replacement, thus rendering one incapable of mobilising the strength to face another day or meeting the needs of another client. It is evident from this description that emotional exhaustion is a recipe for increased errors or unprofessional performance in the clinical environment. Emotional exhaustion compromises the quality of patient care and can increase the risk of depression and suicide (Jiménez-Ortiz et al., 2019). It is also clear that an emotionally exhausted individual will not have the energy to meet demands from relatives and friends, thus compromising their social lives.

Cynicism or depersonalisation is said to occur when people develop negative attitudes and are cold toward others or are even detached. This yields a detachment from work and failure to maintain mutually respectful relationships with co-workers (Chaumette, 2019) . Maslach and

Leiter (2016) describe cynicism as *"a negative, hostile, or an excessively detached response to the job, which often includes a loss of idealism"*. These two definitions bring to the fore the possible implications depersonalisation can have on work and interpersonal relationships among staff as well as the staff-patient relationship in the clinical setting. Depersonalisation is said to be a sequela of overwhelming emotional exhaustion and is considered an initially protective emotional buffer that can rapidly develop into dehumanisation if left unbridled (Maslach & Leiter, 2016). As implied, people may use depersonalisation as a defense mechanism that shields them from interacting with others and engaging in work. If this approach is sustained, it can result in overt violence and abuse of others as though they were not humans. An additional consequence will be underperformance at work with a resultant increase in medical errors from which patients will suffer.

Feeling of low accomplishment also referred to as professional inefficacy is defined as a reduction in one's own perception of their competence and productivity in the work environment (Maslach & Leiter, 2016). There is a thriving negative disposition about the ability to get the job done and done right. These negative perceptions can drive one to draw conclusions of failure, ineptitude, or incompetence about themselves. These conclusions only worsen their plight. The problem of low accomplishment has a central theme which is a feeling of low self-esteem that causes the subject to feel less competent in their role (Chaumette, 2019; Rodrigues, Cobucci, et al., 2018).

Literature is replete with various instruments for measuring burnout, the commonest of which is the Maslach Burnout Inventory (MBI). A form of the MBI has been adapted for use in personnel involved in human services and has been christened the Maslach Burnout Inventory - Human Services Survey (MBI-HSS). This tool is relevant for measuring burnout in healthcare providers

since the core beneficiaries of their services are people. It entails questions that cover all three constituent constructs of burnout.

2.3 Stress

2.3.1 Definition of stress

Defining stress is a highly subjective and somewhat tricky exercise. Wide variations do exist in what stress means to different people. This variation is further widened if one evaluates the different conditions that can be considered stressful. This makes it quite difficult to assemble an all-inclusive and yet detailed definition of stress. It has been defined as *"...a condition in which an individual is aroused and made anxious by an uncontrollable aversive challenge—for example, stuck in heavy traffic on a motorway, a hostile employer, unpaid bills, or a predator"* (Fink, 2016) . To give a more biological definition, stress refers to *"any stimulus that will activate (i) the HPA system, thereby triggering the release of pituitary adrenocorticotropin (ACTH) and adrenal glucocorticoids and (ii) the SAM system with the consequent release of adrenaline and noradrenaline"* (Fink, 2016). It has also been described as *"...a state of derailed homeostasis and a main environmental risk factor for psychiatric diseases"* (Leistner & Menke, 2018) . Others have simply defined stress as an internal and conditioned response to external pressures. In all these definitions, it is apparent what ingredients are essential in the definition of stress. Firstly, there must exist an external threat within the environment. The second component is that one must assess this threat and decide whether it is a challenge that can be dealt with or not. Lastly there is a response to the threat. Stress can be characterised as arising from health-related events and from work. Work stress is the subject matter of this research.

2.3.2 Work stress

Work stress has been used synonymously with job stress or occupational stress. It connotes *"a harmful psychobiological response, which appears when the requirements of the job do not match the capabilities, resources or needs of the worker"* (Navinés et al., 2016) . This implies that job stressors could present in the form of inadequate work resources, inadequate remuneration, unfriendly work schedules, and a lack of requisite skills to match job requirements. The second dimension to this definition is the component of the psychobiological response which implies a psychological and biological reaction from the worker. These can have physical, behavioural and psychological consequences for the individual and can adversely affect the organisation (Glazer & Liu, 2017).

2.3.3 Stress response

The psychobiological response to stress comprises the activation of three internal systems which are linked to each other. These are the sensory systems in the brain, the Autonomic Nervous System (ANS) and the Hypothalamus-Pituitary-Adrenal (HPA) axis (Fink, 2016).

The sensory systems constitute the point of input which is responsible for receiving and appraising stimuli or stressors (de Kloet, 2016). This appraisal is done against the background of previous encounters with similar challenges. Appraisal is thus based on what is known about the situation at hand and the memories of what transpired during previous exposures. We can therefore perceive appraisal as an assessment of the event as a threat, harm, or challenge. Threat appraisal is the feeling that there is an imminent bad or harmful event. Harm appraisal connotes the impression that something bad has already happened. Challenge appraisal is the belief that one can make some gains or improvements from an albeit difficult situation (Carver & Vargas, 2012). The way an event or a situation is appraised feeds into the next two stages of the response.

The autonomic nervous system is responsible for homeostasis and it comprises the sympathetic and parasympathetic nervous systems (Ganong & Barrett, 2012) . Homeostasis is the phenomenon in which the body tries to maintain a constant internal environment even after significant disturbances (McCarty, 2016) . The primary function of the sympathetic nervous system is to organise and deploy resources during emergencies and stressful situations. On the other hand, the parasympathetic nervous system enhances relaxation, digestive and growth functions (Brannon, L., et. al. 2013). The activities of the autonomic nervous system are mediated by chemical messengers known as neurotransmitters which ensure the transmission of information from one nerve to the other. The major neurotransmitters in the sympathetic nervous system are adrenaline and noradrenaline and acetylcholine is found largely in the parasympathetic nervous system (LeBouef T, et al., 2022). During the stress response, the sympathetic nervous system essentially disorganises homeostasis. It causes an increased perfusion of skeletal muscles, increased gluconeogenesis and glycogenolysis in the liver and a reduction in perfusion of the skin and the digestive tract (McCarty, 2016). The aim is to ensure immediate survival by equipping the individual with much needed resources to fight or flee. The parasympathetic nervous system steps in to restore normalcy when the stressful event has been removed.

The third system involved in the stress response is the hypothalamic-pituitary-adrenal (HPA) axis which comprises three anatomical structures – the hypothalamus, the pituitary gland, and the adrenal glands (Ganong & Barrett, 2012) . This HPA axis is the most essential part of the neuroendocrine system whose core duty it is to mount a response to internal and external stressors (Leistner & Menke, 2020). On perceiving and appraising a signal, the hypothalamus is stimulated to produce Corticotrophin Releasing Hormone (CRH) from its Paraventricular Nuclei (PN). CRH is transported to the anterior pituitary via the hypothalamic-pituitary portal system

where it induces a group of cells called corticotrophs to produce Adrenocorticotrophic Hormone (ACTH). ACTH when released into circulation goes to stimulate the adrenal cortex to produce the glucocorticoid stress hormone, Cortisol. Production of cortisol initiates a negative feedback system by binding to glucocorticoid receptors in the hypothalamus and the pituitary gland to inhibit the production of CRH and ACTH respectively. This singular act ensures the return to homeostasis (Leistner & Menke, 2018).

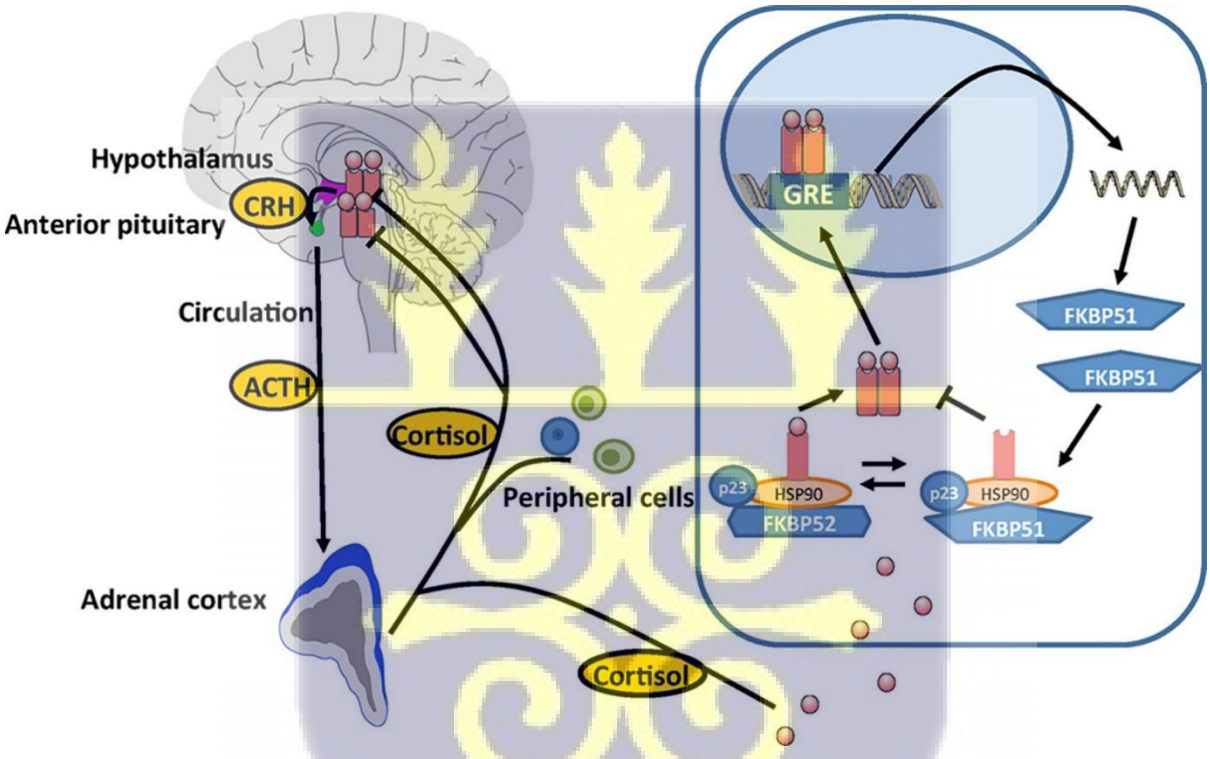


Figure 2.1 The hypothalamic–pituitary–adrenal (HPA) axis: Neurons in the paraventricular nucleus of the hypothalamus release corticotropin-releasing hormone (CRH), which induces the subsequent secretion of adrenocorticotropic hormone (ACTH) from the pituitary. This triggers the production of glucocorticoids (cortisol) by the adrenal cortex. Following activation of the system, negative feedback loops are activated in order to shut the HPA axis down and return to a set homeostatic point. The responsiveness of the HPA axis and the ability to return to the homeostatic point are determined by the ability of glucocorticoids to regulate CRH and ACTH release by binding to glucocorticoid receptors (GRs). Therefore, the sensitivity of the GR substantially defines the function of the HPA axis. The unliganded GR forms a part of a superchaperone complex, which consists of hsp90 dimer, p23 (a cochaperone molecule) and the cochaperones FKBP51 or FKBP52 (encoded by their respective genes FKBP5 and FKBP4). When FKBP51 is bound to the GR complex via hsp90, the receptor has low affinity for cortisol.

When cortisol binds to the GR, FKBP51 is exchanged for FKBP52, which allows the nuclear translocation of the ligand-bound GR. The GR can directly bind to the DNA via glucocorticoid response elements (GREs) and induces FKBP5 mRNA expression and subsequently FKBP51 production, completing an ultrashort negative feedback loop on GR sensitivity.

Reprinted from Leistner and Menke (2018).

2.4 Coping

A discussion on stress will be incomplete without mentioning and explaining coping and its relevance to the stress response. Coping would not be necessary if there were no stressors, and conversely the presence of stressors is often accompanied by some efforts to cope. Coping has been defined as; *"efforts to deal in some manner with the threatening or harmful situation, to remove the threat or to diminish the various ways in which it can have an impact on the person"* (Carver & Vargas, 2012) . This portrays coping as having to require some effort from the individual. These efforts should essentially target the removal of the threat and/or empowering the individual to better deal with the effects of the threat. Another dimension is captured in this definition as *"the effort exerted by the individual to deal with demands from the environment, in order to make those demands more tolerable and reduce stress and conflict"* (Braun-Lewensohn & Mayer, 2020). This definition highlights the setting of stressors, which is the environment and projects the aims of these measures to be making the demands more tolerable and reducing its impact.

Opinions vary as to whether coping is necessarily a planned response or can be involuntary. Some authorities in the field would limit the nature of coping to voluntary responses only whereas some extend it to include involuntary responses too (Carver & Vargas, 2012) . The argument exists also that planned efforts that have been repeatedly executed may make it more effortless or involuntary over time. This makes it even more difficult to separate the two. Based

on these distinctions, coping has been classified based on the approach involved. These include problem-focused versus emotion-focused coping, engagement (approach) versus disengagement (avoidance) coping and other newly developed approaches. This literature review will discuss the first two categories enumerated above.

2.4.1 Problem-focused versus emotion-focused coping

According to Lazarus and Folkman (1987), problem-focused coping entails attempts made to remove or modify the stressor (Yoon et al., 2018). This requires that one tackles the source of the threatening stimulus and removes it or otherwise evades it.

Emotion-focused approach, per the same theory proposed by Lazarus and Folkman (1984) states that in coping with a stressor, one may have to manage or modulate the emotions that may result from exposure to the stressor (Carver & Vargas, 2012; Yoon et al., 2018) . In other words, employing the emotion-focused approach means working on oneself. The aim is to adjust to the stressor and perceive it as a usual part of life.

2.4.2 Engagement versus Disengagement coping

Engagement coping is otherwise known as approach coping. This approach to coping means that one confronts the stressor directly and/or indirectly by dealing with the emotions aroused by the stressor Dettmers, J., Krause, A., & Berset, 2016) Carver et. al., (2012) indicate that engagement coping is a congregation of all types of problem-focused coping and some components of emotion-focused coping such as emotional support, cognitive restructuring, and acceptance.

Disengagement coping, also known as avoidance coping entails attempts to avoid actively tackling a problem head-on. It is characterised by dissociating oneself from goals. According to

Lazarus and Folkman (1984), disengagement is a type of emotion-focused coping which is aimed at escaping or minimising negative emotions arising from the stressor Dettmers et al., 2016)

2.5 Theoretical Perspectives

2.5.1 Burnout

Several theories have emerged to explain the aetiopathogenesis of burnout. Notable among them are Social Cognitive Theory, Social Exchange Theory, Organisational Theory, Demands-Resources Theory, Structural Theory and Theory of Emotional Contagion (Edú-valsania et al., 2022). The **Social Cognitive Theory** emphasises the role of forethought in influencing human motivation and action (Conner, M., & Norman, P. 2015). ***Perceived self-efficacy*** is the most relevant construct under this theory for burnout because burnout occurs when workers entertain doubts about their effectiveness as individuals and as a team (Edú-valsania et al., 2022; Manzano-García & Ayala-Calvo, 2013) . **Social Exchange Theory** demonstrates how behavioural interactions between people tend to mutually reinforce the behaviours of others. There essentially is an exchange of activities which is premised on the expectation of mutual beneficence (Zoller & Muldoon, 2019). Demonstrably, the element of reciprocity is crucial to the social exchange theory. (Enayat et al., 2022). Per this theory, an absence of reciprocity results in depletion of the emotional resources of residents, which yields emotional exhaustion and ultimately burnout (Edú-valsania et al., 2022) . The **Organisational Theory** postulates that burnout is a product of stressors within an organisation and insufficient coping strategies on the part of workers (Edú-valsania et al., 2022) . These work stressors often precede decreased organisational commitment, a coping strategy which then yields low personal achievement and emotional exhaustion. Conversely, emotional exhaustion occurring from work stressors could be seen as the first step in the cascade that leads to depersonalisation as a coping strategy and yields

low personal achievement as a product (Edú-valsania et al., 2022). The **Demands-Resources Theory** states that burnout occurs and thrives in a milieu of high job demands and inadequate resources (Bakker & de Vries, 2021). Burnout thus occurs when the demands of work exceed the resources that are available to the worker. The **Structural Theory** sees burnout as sequel to failure on the part of the worker to successfully cope with persistent job stressors (Edú-valsania et al., 2022). Professional failure and a feeling of low accomplishment are the end products of this failure to successfully cope with the job stressors. The **Theory of Emotional Contagion** postulates that people tend to conform to the emotional states they perceive during an interaction with other people (Herrando & Constantinides, 2021). Burnout can therefore be contagious among people who work together in the same environment and share similar experiences and beliefs about work.

2.5.2 Stress

The Cognitive Appraisal Model, Conservation of Resources Theory and the Illness Representation Model are leading theories and models that elucidate stress.

The **Cognitive Appraisal Model** proposed by Richard Lazarus and Susan Folkman in 1984 exemplifies the role of the individual-environment interaction during a stressful situation and states that the stress response is moderated largely by individual appraisal processes (Obbarius et al., 2021). Cognitive appraisal and the individual's emotional reaction are core to outcomes of coping (Hulbert-Williams, N. J. et al., 2013). There are two types of appraisals, the primary appraisal, and the secondary appraisal. The primary appraisal involves an evaluation of the importance and/or implications of the stressor and the secondary appraisal on the other hand refers to an assessment of one's own resources and abilities to surmount the stressor (Obbarius et al., 2021).

The **Conservation of Resources** states that people are driven to obtain and retain resources that are fundamental to their survival and that stress develops when there is some damage or loss of these resources (Carver & Vargas, 2012; Hobfoll et al., 2016) . This theory stands on two key principles. The first principle states that the loss of resources is more important or more damaging than gaining resources. Secondly, it postulates that in order to protect resources, recover losses or obtain more resources, people must make investments (Hobfoll et al., 2016).

The **Illness Representation Model** dwells on stress from illnesses and other health-related events. It does not view stress from the perspective of work stressors (Carver & Vargas, 2012; Hobfoll et al., 2016).

2.5.3 Work stress

Theories and models relevant to work stress include the Field Theory, Role Stress Theory, Person-Environment Fit Theory, Transactional Theory, Job Demands – Control/Support And Job Demands-Control Theory And Effort-Reward Imbalance Theory (Glazer & Liu, 2017) . The **Field Theory** posits that behaviour is a product of all coexisting facts in the environment and that these facts make up an ever-changing field. Critical to this theory is the existence and influence of external stimuli which come in the form of "helping forces" which enable, and "hindering forces" which impair progress towards achievement of goals (Berthaume et al., 2014). The **Role stress Theory** essentially considers how people perceive the relationship between their level of qualification and the jobs they have been assigned in an organisation and how these affect their attitudes towards work stressors. In this theory, could include *"role ambiguity, conflict, incongruity, over/underload, and over/under-qualification"* (Yong, 2021) . ***Role overload*** is said to occur when one lacks the capacity and the resources to meet others' role expectations whiles ***role conflict*** refers to the situation in which the others' expectations of one's

role are incongruous with the norms, standards, and values that underly that role (Zhang et al., 2019) . The **Person-Environment Fit Theory** assesses the level of compatibility between a person and the environment in which they are (which can be an organisation) and relates this to performance and the risk of developing burnout (Paluch & Shum, 2022). A person-environment fit is said to exist if a worker has the requisite skills to perform a job and has been given an enabling environment to deliver. Conversely, any variation to either party to this theory results in a misfit which yields negative outcomes, including higher incidence of work stress and ultimately burnout (Glazer & Liu, 2017; Paluch & Shum, 2022) . The **Transactional Framework** is premised on the cognitive appraisal process. It states that individuals experience the same stressor differently and it is all based on their primary and secondary appraisal outcomes. Stressors which were appraised as threats often resulted in an unwillingness to engage and often lead to burnout whereas those appraised as challenges stimulated engagement and yielded a lower level of burnout (Kożusznik, M. et al., 2012). The **Job Demands-Control/Support (JD-C/S) and Job Demands-Resources (JD-R) Model** assesses how work stress is influenced by the extent of control/support over job demands and the resources which are available to help deal with same. Job demands have been identified as the main driving forces behind burnout. Conversely, job resources are the main drivers behind engagement (Bakker et al., 2014). According to this theory, there are lower levels of work stress when people have control over their job demands and have the internal and external resources needed to engage and perform their jobs. The **Effort-Reward Imbalance Model** considers the adequacy of returns on investments of effort into a particular venture and relates it to stress. It states that stress occurs when rewards provided after completion of tasks that are effort-intensive are woefully inadequate (Babamiri et al., 2022; Brooks et al., 2019; Cho et al., 2021; Heckenberg et

al., 2020). A paucity of rewards for work done has been shown to induce stress reactions that compromise mental and physical health (Brooks et al., 2019).

2.6 Tools for measuring stress.

Various tools exist for the measurement of stress among various work groups but the most popular and most extensively studied is the Perceived Stress Scale (PSS) which comes in three forms (Ruisoto et al., 2020). These are the PSS-4, PSS-10, and PSS-14. This scale assesses to what extent people feel they are unable to control, predict or are overwhelmed with situations they encounter in life (Schneider et al., 2020). Questions on this scale are Likert type questions which offer the opportunity for individuals to choose how often they harbour certain perceptions which are linked to stress. Various studies have shown Cronbach's α values ranging between 0.78 and 0.89 for PSS-14; 0.65 and 0.91 for PSS-10 and 0.42 and 0.83 in the case of PSS-4. There is also demonstrable convergent validity between these scales and a plethora of health problems (Ruisoto et al., 2020). The Workplace Stress Survey is also used to assess stress among workers. It comprises 10 questions measured on a 10-point Likert Scale: Strongly Disagree [Scores of 1-4], Agree Somewhat [Scores of 5-7] and Strongly Agree [Scores of 8-10]. The scale was categorized into Low stress [10-30], Moderate stress [31-69] and Severe stress [70-100].

2.7 Levels of stress and burnout among residents

This question seeks to establish the point prevalence of stress and burnout among residents who are currently in training in Korle-Bu Teaching Hospital, a tertiary teaching hospital. There is a wide variation in the prevalence of burnout among physicians. This is largely influenced by factors such as the settings of their practice, level of specialisation, and unique factors in the work environment.

On a global scale, Low Z. X. et al., (2019) reported an aggregate prevalence of burnout to be 51.0% after conducting a meta-analysis involving over 22,000 residents from almost all specialty areas. This study included research publications from all continents. Most of the studies used the Maslach Burnout Inventory – Human Services Survey (MBI-HSS) to evaluate burnout in residents. Having over half of the physicians in postgraduate medical training suffer burnout is a worrying statistic since it has implications for work performance, patient safety and physician well-being. Zis et al., (2014) observed a prevalence of 14.4% when they assessed burnout among residents in the largest hospital in Greece using the Maslach Burnout Inventory.

A systematic review including studies done in Sub-Saharan Africa showed high levels of burnout among physicians from Ethiopia, Nigeria, Ghana, South Africa and other Sub-Saharan African countries (Dubale et al., 2019). This review involved 65 articles with South Africa and Nigeria contributing 27 and 13 articles respectively. Most of the studies used the Maslach Burnout Inventory to assess burnout. Other tools used included the Professional Quality of Life Scale (ProQOL) and Copenhagen Burnout Inventory. According to this review, 81% of doctors practicing in rural areas of South Africa admitted being afflicted with burnout with 31% reporting high levels of burnout in all subscales. Ghanaian physicians had high scores on emotional exhaustion (9.1 ± 2.6), depersonalisation (5.2 ± 2.1) and low personal achievement (5.8 ± 1.6). Similar findings were made among residents in Nigeria who also had a high prevalence of burnout, with 45.6%, 57.8% and 61.8% recording high scores in emotional exhaustion, depersonalisation and decreased personal accomplishment respectively. These scores do not vary much from the global aggregate score reported by Low et al., (2019). In Ethiopia 65.2% of physicians working in the south reported high emotional exhaustion, 91% had low personal achievement whiles there was a high depersonalisation score in 85.1%.

Just like Ghana, Pakistan is a lower-middle-income country which happens to be the setting for a cross-sectional study on burnout in medical residents which reported a prevalence of 46.5% (Mahmood et al., 2021). This study also found that females had higher emotional exhaustion (24 females to 4 males; $p<0.05$). Konlan D. K. et. al., (2022) reported a prevalence of burnout among healthcare workers in Accra during the COVID-19 pandemic as 20.57%. This study included some residents but did not distil the specific prevalence of the syndrome among this group.

There is a wide variation in the prevalence of stress among healthcare workers. During the peak of the COVID-19 pandemic, a prevalence of 41.97% perceived stress was recorded among healthcare workers in Thailand (Yubonpunt et al., 2022). This value far exceeds the prevalence recorded among healthcare worker in Trinidad and Tobago who were studied during the pandemic as well. Among 395 healthcare workers assessed, 17.97% admitted to being stressed (Nayak et al., 2021) . A nationwide observational study showed the prevalence of high-level stress among healthcare workers managing COVID-19 patients to be 3.7% (Wilson et al., 2020). This variation in prevalence could be due to the differences in the tools that were used to evaluate stress among the various study populations.

A 2019 study conducted in Brazil reported a prevalence of stress among medical residents to be 17.7% (Pasqualucci et al., 2019) . It also revealed the presence of depression and anxiety symptoms in 19% and 16% respectively among the participants. A higher prevalence of stress was found in residents in a teaching hospital in Gujarat, India. A prevalence of 24.24% was reported (Sarthak Dave, Minakshi Parikh, Ganpat Vankar, 2018). The prevalence of depression and anxiety found in this study group were 27.71% and 36.58% respectively. These findings tell of an association between stress, depression, and anxiety.

2.8 Factors associated with stress and burnout.

Several predisposing factors for stress and burnout have been identified in the work environment. Navines et al., (2021) classified these factors into protective factors and risk factors. These factors are further classified into work-related and individual-related factors. Thus, there are individual and work-related factors which are deemed protective against stress and burnout and there are some which are considered risk factors for developing these two phenomena (Navinés et al., 2021) . Individual protective factors include been married, ability to show empathy, emotional intelligence, adequate sleep hours, regular physical exercise, leisure activities and social support among others. Role identification, supervision, structured mentorship, peer support and resident's choice of specialty are protective work-related factors. Conversely, individual risk factors include personality traits, history of depression or anxiety, emotional distress, and high expectations. Work-related risk factors include spending long hours at work, on-call duties, lack of autonomy and a hostile work environment (Mahmood et al., 2021; Navinés et al., 2021) . Mahmood et al., (2021) opine that inadequacy of protective factors contributes more to the development of burnout than risk factors do. They further indicate that having a supportive social network, spending time with friends, a strong financial standing and being able to celebrate achievements were protective against burnout. Significant risk factors for burnout were identified to be poor work conditions, tight schedules with long hours at work, and absence of appreciation of efforts invested by employees (Mahmood et al., 2021). Other causes of burnout include bureaucratic obligations, an ever-changing work environment, micro-managing of units by administrators, inadequate supervision in the clinical environment, overly sensational media reportage on medical errors, unavailability of resources needed to provide care, poor work-life balance and a clientele that is increasingly inclined towards litigation (Low et al., 2019).

Choice of specialty is another factor that has been associated with an increased risk of stress and burnout. Low et al., (2019) reported that residents in radiology, neurology and general surgery had the highest prevalence of burnout with scores of 77.16%, 71.93% and 58.39% respectively. In another study, general surgery, anaesthesiology, obstetrics/gynaecology and orthopaedics residents were reported to have had the highest levels of burnout, with average scores of 40.8% (Rodrigues, Cobucci, et al., 2018). Dyrbye et al., (2018) reported higher rates of burnout among residents in urology, ophthalmology, general surgery, neurology, and emergency medicine residents.

The year or level of training was also associated with an increased prevalence of burnout. Literature reports mixed findings on this association. Prevalence of burnout has been shown to progressively decline with an increase in experience on the job with 24.3%, 10% and 8.6% of residents in year 2, year 3 and years 4 plus, respectively reporting burnout (Mahmood et al., 2021). This is most likely due to factors such as familiarisation with protocols and procedures, building on clinical proficiency and acclimatisation with the work environment. Higher levels of stress were recorded among more junior residents (Sarthak Dave, Minakshi Parikh, Ganpat Vankar, 2018) . There was no difference in burnout between senior and junior residents in a Pakistani study that evaluated 110 residents (Zubairi & Noordin, 2016).

There are mixed reports on the relationship between sex and burnout. A 2018 study of second-year residents in the United States of America showed burnout to be more common among female residents with a relative risk of 1.19 [95%CI, 1.09 to 1.29] (Dyrbye et al., 2018). There was no association between burnout and gender among European and United States urology residents who were studied in 2019 (Marchalik et al., 2019). The female gender was found to have had a significant association with stress when residents in Saudi Arabia were evaluated for

stress in 2015 (Alosaimi et al., 2015) . Low et al., 2019 found out that burnout was more prevalent among male residents. Similar findings were made in a French national survey among anaesthesia and intensive care residents (Jaulin et al., 2021).

Generally, prolonged working hours have been associated with a higher prevalence of stress and burnout. Stress has been reported to be more common in residents who worked at least 12 hours in a day (Sarthak Dave, Minakshi Parikh, Ganpat Vankar, 2018). Similar associations have been found between burnout and hours of work. It has been found that there is a statistically significant association between working at least 80 hours per week and burnout during an observational study in Nepal (Shahi et al., 2022). On the contrary and quite surprisingly, a study that evaluated the association between work hours and burnout in 181 residents in Saudi Arabia showed that there was no statistically significant association between work hours and burnout (Hameed et al., 2018).

In relating specific factors to the subscales of burnout, it has been shown among Ethiopian physicians that recognition of efforts by hospital authorities, monthly salary and age of the physician were negatively associated with emotional exhaustion (Lrago et al., 2018). Conversely, the number of patients managed per week was positively associated with emotional exhaustion. Lrago et al., (2018) also found out that age, working in a primary level hospital, social support, end-of-month salaries and adequate professional training were negatively associated with depersonalisation. Working in primary facilities made Ethiopian physicians in this study feel less accomplished whereas monthly remuneration made them feel more accomplished.

The availability of structured mentorship, readily accessible mental health services and use of physical exercise and use of various relaxation methods were deemed protective against burnout

and stress. Working at least 3 weekends in a month and unavailability of mental health services were deemed highly risky for developing burnout (Marchalik et al., 2019).

2.9 Association between stress and burnout

High levels of work stress have been shown to positively correlate with the incidence of burnout in workers. This is particularly relevant in the setting of failure to adequately deal with stressors in the work setting. Work stress has been shown to have significant associations with all three subscales of burnout when 488 Paediatric Nurses in China were assessed (Liao et al., 2022). They concluded that stress was indirectly associated with burnout and this association was weakened by social support. Similarly, secondary traumatic stress has been shown to have a statistically significant positive correlation with burnout among critical care nurses in Korea (Jeong & Shin, 2022). An international survey of Neonatal Intensive Care Unit (NICU) healthcare professionals also showed a significant positive correlation between perceived stress and level of burnout with $r = 0.473$, $p < 0.001$. Pasqualucci et al., 2019 also noted a significant positive correlation between burnout on the one hand and anxiety, depression, and stress on the other hand. According to this study, residents who reported being stressed were almost 3 times more likely to develop burnout when compared to those who were not stressed. Similar findings were made among general surgery residents in the United States of America in a study conducted by Smeds et al., (2020). They discovered that burnout was associated with higher scores on the perceived stress scale. Lower scores of burnout were linked with lower stress scores. Additionally, lower burnout scores were associated with higher scores in self-efficacy, which is an underlying theme in low personal achievement, a key construct of burnout.

These studies buttress the point about stress and burnout being intricately related and the latter is seen as an ultimate consequence of failed stress response or stress management process.

2.10 Consequences of stress and burnout on the lives of residents

Stress and burnout can have dire implications for residents. Their effects are not limited to the individual currently afflicted but extend to those within their social support networks as well as the patients who are the beneficiaries of care. The friends and families of such individuals must grapple with their absence from home and events of sociocultural importance. Patients and their relations might be direct or indirect victims of sub-optimal care or medical negligence.

On an individual level, work stress has been shown to increase the incidence of cardiovascular diseases through direct and indirect mechanisms (Navinés et al., 2016). Cardiovascular diseases include hypertension, artherosclerosis, cerebrovascular diseases and acute coronary syndrome. Indirectly, work stress drives the development of unhealthy lifestyles such as smoking, poor dietary habits and settling for a sedentary lifestyle. These habits result in changes in the characteristics or dimensions of the vasculature. As a result of these lifestyle changes, there could be deposition of artherosclerotic plaques in the blood vessels, including the coronary vessels. Direct mechanisms that result in cardiovascular pathology include an activation of inflammatory response via the production of various chemical mediators such as cytokines and acute phase reactants (Navinés et al., 2016).

Burnout and stress can adversely affect the mental health of residents. Stress is said to be a major risk factor for mental health problems (Obbarius et al., 2021) . The same can be said of the association between burnout and mental health conditions. Thus, there exists a bidirectional relationship between stress and burnout and mental health conditions such as depression and anxiety. It has been shown that new entry residents who enter training programmes in a good state of well-being tend to experience high levels of burnout and subsequently develop depression by the end of internship (Lebensohn et al., 2013).

Resident stress and burnout have been shown to impair the quality of care provided to patients within the clinical setting. The results of a systematic review show moderate evidence of patient safety concerns in the form of medical errors and sub-optimal care that can be traced back to burnout. (Dewa et al., 2017) . There was higher rated of reported multiple medication errors among residents who had high scores in the subscales of burnout (De Oliveira et al., 2013).

The immediate social circles of residents may suffer their (residents') absence or reduced involvement in social events or activities because of work stress and burnout. Given the impact of these syndromes on residents, they may end up using their free time to rest or engage in some form of stress management rather than go out with friends and family. This makes them unavailable to meet the needs of their families and in itself may be a source of conflicts which can compromise the social support that will hitherto be offered.

2.11 Mental health conditions among residents

The World Health Organisation (WHO) defines mental health as a *"a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community"* (Galderisi et al., 2015). Building on the WHO definition, it is evident that productivity is dependent on one's ability to cope with stressors within and without the work environment.

It has been postulated that mental health disorders are rife among healthcare providers. They have been observed to have higher rates of depression and anxiety as a result of work conditions including but not limited to work overload and workplace bullying (Gray et al., 2019; Sarthak Dave, Minakshi Parikh, Ganpat Vankar, 2018). Among trainee medical doctors, it has been shown that failure to deal with work stressors is significantly associated with mental health

problems (Jaulin et al., 2021; Lebensohn et al., 2013; Nayak et al., 2021; Sarthak Dave, Minakshi Parikh, Ganpat Vankar, 2018). The prevalence of depression, anxiety and substance abuse among trainee medical doctors appear to show similar trends across geopolitical and economic jurisdictions. Jaulin et. al. (2021) evaluated stress, anxiety and depression among 519 anaesthesia and intensive care residents in France and reported that 19.8% of them reported symptoms of anxiety whiles 7.8% of them experienced depressive symptoms. These findings were associated with a 55.7% prevalence of perceived high stress among these same residents. Dave et. al. (2018) conducted a similar study among 520 residents in teaching hospital in India using the Depression, Anxiety and Stress Scale (DASS)-42 tool. It emerged that 27.71% had experienced depression whereas 36.58% of them had anxiety symptoms. A 24.24% prevalence of stress was reported in this study. These mental health disorders were associated with long duty hours, lack of satisfaction from their jobs and failure to adopt hobbies as a means of relieving stress. Literatures search did not reveal a study conducted among residents in Ghana to assess their mental health status and how this is impacted by work stressors. However, a study conducted during the COVID-19 pandemic among healthcare workers in the Greater Accra Regional Hospital (GARH) revealed interesting findings. As many as 18.9% of participants reported that they were experiencing severe depression during the pandemic. High state anxiety was reported by 71.1% of the participants in the study whiles 26.3% reported high levels of stress (Arthur-Mensah et al., 2022).

It is apparent that the mental health of frontliners in healthcare, thus residents is greatly influenced by stressors within the work environment. These may trigger the onset of mental health disorders such as depression and anxiety among them.

2.12 Conclusion

Stress and burnout are two psychological phenomena that affect workers and have been shown to be particularly rife in workers who deal with the care of other people. Residents are particularly at risk of these two problems.

Literature is replete with various prevalence rates of these conditions among residents and other healthcare workers across the globe. There are details of how specific conditions within and without the work environment increase the risk of developing stress and burnout. These then serve as the targets of interventions aimed at addressing these problems.

Similarly, there are various theories that explain concepts of stress and burnout as well as how to deal with both phenomena.

To better deal with stress and burnout, it is crucial that one understands the unique nature of these conditions within various settings. One can then fashion techniques that comprehensively address these problems within the context of that setting.

CHAPTER THREE

3.0 METHODS

3.1 Study design

This study was a facility-based analytical cross-sectional study in which quantitative data was collected. This approach was used because the study requires participants to within a given period of time, provide information on their experiences during training. The facility-based approach was used because residents were required to work within the hospital setting and it was thus the best location to get them to complete questionnaires.

3.2 Study location

The study was conducted in Korle-Bu Teaching Hospital, a tertiary teaching hospital and a major referral centre in Ghana and West Africa. This hospital was chosen for the study because it offers training positions to most of the residents admitted for training in the postgraduate medical colleges currently running programmes in Ghana.

Korle-Bu Teaching Hospital is in the Ablekuma South Sub-Metropolis of the Accra Metropolitan Area. It is the premier referral centre in Ghana with a current bed capacity of 2000. The facility has 21 departments which provide services to an average of 1500 out-patient department clients and 250 in-patient admissions daily. The various clinical and diagnostic departments constitute the specific training sites for residents who opt to train in the hospital. There are three centres of excellence which serve as specialty and sub-specialty training centres for residents as well. These are the National Cardiothoracic Centre, the National Reconstructive Plastic Surgery and Burns Centre and the National Centre for Radiotherapy and Nuclear Medicine. These departments and centres make Korle-Bu Teaching Hospital attractive to residents from the three colleges above. The hospital currently has over 600 residents in various departments of the hospital.

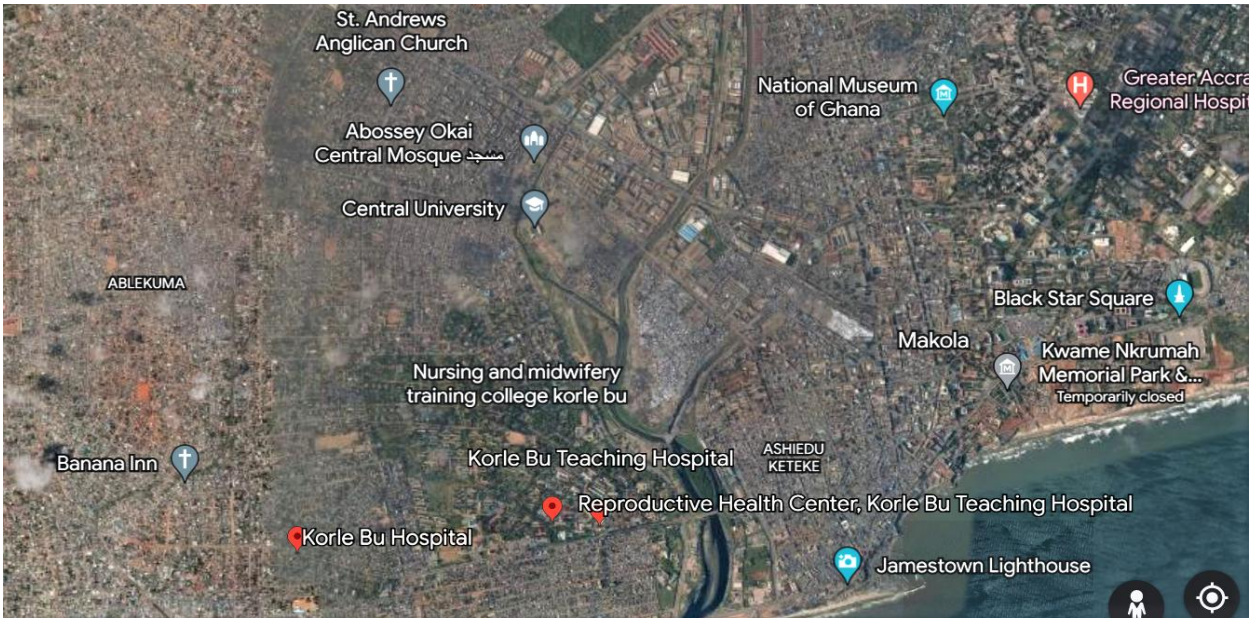


Figure 3.1: Map showing the location of Korle-Bu Teaching Hospital in Southern Accra. (Source: Google Earth)

3.3 Population and sample

Ghana currently has several residents enrolled in training in the major training centres. In Korle-Bu Teaching Hospital, there are 632 residents of which 466 fall in the category of junior residents. The remaining residents are distributed among Komfo Anokye Teaching Hospital, 37 Military Hospital, Greater Accra Regional Hospital, Cape Coast Teaching Hospital, Ho Teaching Hospital and Tamale Teaching Hospital. The sample was drawn from both senior and junior residents in Korle-Bu Teaching Hospital. At the time of conducting this research, Korle-Bu Teaching Hospital was providing training for residents in all specialty areas offered by the postgraduate medical colleges. This meant that respondents could be drawn from all specialty areas and would make the sample more representative. This characteristic informed the decision to conduct the research in Korle-Bu Teaching Hospital.

3.4 Sampling technique

A stratified random sampling technique was employed in obtaining participants for this study. Stratified random sampling is a probability sampling technique that involves dividing a population of interest into subgroups based on shared characteristics or variables. These subgroups are known as strata. Simple random sampling is then used to obtain participants from each stratum. On the basis of the numbers obtained from each stratum, this sampling technique is sub-classified into proportionate and disproportionate stratified random sampling. To use the proportionate method, one must ensure that the number of elements derived from each stratum is proportional to the representation of the stratum in the population of interest. Conversely, there is no proportional relationship between the sample from each stratum and the representation in the population if one uses the disproportionate method. In order to use data from a disproportionate sample to estimate a population parameter, the population arrangement must be weighted so as to mitigate the effect of the disproportionality (Iliyasu & Etikan, 2021).

In applying this sampling technique to residents in Korle-Bu Teaching Hospital (KBTH), their total number was obtained from the office of the Director of Medical Affairs as 632, out of which 466 were junior residents. Per this data, the department of Obstetrics and Gynaecology had the most residents (63) and the Department of Psychiatry had the least number of residents (3). Proportional sampling was used to determine the number of residents needed from each department. Once this number was determined, the list of residents in each department was obtained from the office of the head of department. This became the sampling frame for that department. Simple random sampling was then done to select participants from that sampling frame. Selected participants who declined participation were replaced through the same process of simple random sampling.

3.5 Inclusion and exclusion criteria

3.5.1 Inclusion criteria

All residents who are currently enrolled in postgraduate programmes in the various departments of Korle-Bu Teaching Hospital who have consented to participate in this study.

3.5.2 Exclusion criteria

Residents who are training in Korle-Bu Teaching Hospital but were outside the facility on external rotations or for any other reasons.

3.6 Study variables

The primary outcome variable of this study was the mental health of residents. Stress and burnout were secondary outcome variables. Stress was subclassified into high stress, moderate stress, and low stress, while the subscale of burnout was emotional exhaustion, depersonalisation, and low personal achievement.

For the factors associated with stress and burnout, the dependent variables were high, moderate, and low stress for stress and emotional exhaustion, depersonalisation, and low personal achievement for burnout respectively. The independent variables were the causal factors which include demographic, work-related, socioeconomic factors, and past medical history.

In assessing the relationship between the phenomena of stress and burnout, the independent variable was stress (high, moderate, and low) and the dependent variable was burnout (emotional exhaustion, depersonalisation, and low personal achievement).

In assessing how burnout affects residents, the dependent variables were captured with the Positive Mental Health Scale. The independent variables in this case were burnout (emotional

exhaustion, depersonalisation, and low personal achievement) and stress (high, moderate, and low).

3.7 Sample size determination

The sample size was determined using the formula for estimating a proportion for a finite population. This is done by first determining the sample size for an infinite population and then using that to determine the sample size for a finite population. The formula for an infinite population is stated below as:

$$n = \frac{Z^2_{1-\frac{\propto}{2}}(P(1-P))}{MOE^2}$$

Where n = sample size

P = population proportion

MOE = margin of error / level of precision

Z = standard normal deviate

$\propto$ = level of significance

The sample size for a finite population n^* is determined by the formula:

$$n^* = \frac{n}{\left[1 + \frac{Z^2 P(1-P)}{\varepsilon^2 N}\right]}$$

Where n = sample size for an infinite population

n^*= sample size for a finite population

P = population proportion determined from literature

Z = standard normal deviate

N = population size

ε = margin of error

For this study the level of confidence is pegged at 95%, giving us an $\propto = 0.05$. The population proportion derived from literature = 51%, therefore P = 0.51. This proportion was derived from a meta-analysis on burnout that included studies from all continents (Low et al., 2019).

The study aims to estimate the prevalence within 5 percentage points of the true population proportion, therefore the margin of error (MOE) = 0.05. The formula thus reads:

$$n = \frac{1.96^2\,(0.51\ x\ 0.49)}{0.05^2}$$

$$n = 384$$

For the finite population:

$$n^* = \frac{384}{\left[1 + \frac{1.96^2\ x\ (0.51\ x\ 0.49)}{0.05^2\ x\ 632}\right]}$$

$$n^* = 239$$

However, to correct for a 10% response rate, the sample size comes up to 263 participants.

3.8 Data collection approach

Collection of data for this research commenced on February 17, 2023 and ended on March 20,2023. Data collection was done after ethics approval was obtained from the Institutional Review Board (IRB) and Scientific and Technical Committee (STC) of Korle-Bu Teaching Hospital with number **KBTH-STC/IRB/000198/2022.** Following this approval, a letter of

introduction was obtained from the Medical Directorate of the Hospital, introducing the principal investigator to the heads of departments in Korle-Bu Teaching Hospital. Residents were approached and briefed at the departmental level through the chief resident in each department and with approval from the head of department. At the briefing, the topic, aim and objectives of the study were discussed. Participants were also briefed on the questionnaire and how it should be completed. Voluntary participation and the need to consent prior to participation were discussed.

Trained co-researchers then handed the questionnaires to participants, taking time to answer and address any concerns from them. Residents were allowed adequate time to complete the questionnaires at their own convenience. On average, it took approximately 15 minutes to complete each questionnaire.

3.9 Data collection tool

Data was collected using a self-administered, structured questionnaire comprising the Workplace Stress Survey and the Maslach Burnout Inventory – Human Services Survey which have been validated for measurement of stress and burnout, respectively. The Positive Mental Health Scale was used to assess the mental health of residents.

The Workplace Stress Survey was developed by the American Institute of Stress as a tool to measure the extent of stress at the workplace. It employs a 10 by 10 matrix to measure one's perceptions about their ability to handle stress emanating from the work environment (Goel & Verma, 2021). It comprises 10 questions measured on a 10-point Likert Scale: Strongly Disagree [Scores of 1-4], Agree Somewhat [Scores of 5-7] and Strongly Agree [Scores of 8-10]. An aggregate score was generated by scoring each response to each question. The scale was categorized into Low stress [10-30], Moderate stress [31-69] and Severe stress [70-100]. Lower

scores on this scale signify a better stress handling capacity whereas the converse is true of overwhelming workplace stress (Goel & Verma, 2021).

The MBI-HSS tool was used to measure the three constructs of burnout: Emotional Exhaustion (EE) using 9 items to assess physical and emotional depletion, Depersonalization (DP) using 5 items to measure negative or cynical feeling and Personal Accomplishment (PA) using 8 items to measure how one perceives one's own competence. The MBI-HSS is a 7-point Likert Scale with options: 0 = Never, 1= At least a few times a year, 2= At least once a month, 3= Several times a month, 4= Once a week, 5= Several times a week and 6= Everyday). Scores for each construct were then computed and categorized. For EE, the scale was categorized as Low (<17), Moderate (18-29) and High (≥ 30). Additionally, the DP scale was categorized as Low (<5), Moderate (6-11) and High (≥ 12). Finally, PA was also categorized as Low (<33), Moderate (34-39) and High (≥ 40). Scores for EE, DP and PA were summarized as means and standard deviations. Burnout was computed as a composite variable using scores from participants with High EE, High DP and Low PA scores based on previous literature (Afulani et al., 2021; He et al., 2014; Smith et al., 2008). Thus, medical residents with High EE, High DP and Low PA scores were categorized as experiencing burnout and those outside these parameters were categorized as not having burnout. The Maslach Burnout Inventory-Human Services Survey (MBI-HSS) was developed in 1996 by Maslach et al. and has over the years become the preferred instrument for measuring burnout. This stems mainly from its high reliability with a Cronbach's alpha of 0.87 (Konlan et al., 2022).

The mental health status of participants was also measured using the Positive Mental Health Scale. It consists of nine questions measured on a four-point Likert-Scale: Do not agree [0],

Disagree [1], Tend to agree [2] and Agree [3]. On this scale, the term "Do not agree" refers to a stronger disagreement with the statement as compared to the term "Disagree", thus the former was scored "0" and the latter scored "1". A scale was then generated by aggregating the scores which ranged from 0 to 27. The distribution was subjected to normality test using the Wilk-Shapiro test and yielded a p-value of <0.0001 signifying the distribution was not normally distributed. The median value of the distribution [19] was used as the cutoff point to recategorize the scale into negative mental health [0-18] and positive mental health -19-27]. The Positive Mental Health Scale has been shown to have a high internal consistency with a Cronbach's alpha of 0.93 and test – retest reliability of 0.81, 0.77 and 0.74 when retesting was done at after 1 and 4 weeks respectively (Lukat et al., 2016). It is thus a good instrument for assessing positive mental health.

The data collected included sociodemographic variables of residents, data on stress and on burnout as well as data on the consequences of the two phenomena. Electronic versions of the questionnaire (which were worded exactly as was demonstrated in the questionnaire in Appendix 3) were used for data collection among residents who preferred this option. This approach also allowed room for simultaneous data entry.

3.10 Data analysis

Data collected was analyzed using STATA version 17 (StataCorp, 2021). A univariate analysis of background characteristics was conducted and reported in frequencies and percentages.

Chi-square/Fisher's Exact where appropriate were used to determine the relationship between socio-demographic characteristics and Stress; socio-demographic characteristics and Burnout and socio-demographic characteristics and Mental Health. Multiple linear regression models were used to determine the factors associated with Stress and Mental Health while a multivariate

logistic regression was used to determine the factors associated with burnout. Based on this, a dichotomous variable was created “0” (no burnout) and “1” (burnout). The outcome of interest was burnout.

Strengths of association between independent variables and dependent variables were determined using coefficients [For Stress and Mental Health] crude odds ratio [For Burnout only]. Variables with p-value of <0.05 in unadjusted regression models were considered for inclusion into the multilinear and multivariate logistic regression analyses. For Stress and Mental Health, adjusted coefficients were used for final interpretations while adjusted odds ratios were used for interpreting results from the model on burnout. A correlation matrix was also used to assess the relationship between stress, burnout and mental health. Pearson correlation coefficient [r] and p-values were used for interpretation. P-values less than 0.05 were considered statistically significant in all analyses.

3.11 Quality control

Data quality control was done using STATA I/C version 17 to ensure all variables were appropriately captured for analysis. This included data cleaning and testing for normality.

3.12 Ethical issues

Ethical approval was obtained from the IRB and STC of Korle-Bu Teaching Hospital with protocol number **KBTH-STC/IRB/000198/2022.**

Prior to entry into each department, a letter of introduction obtained from the Medical Directorate of Korle-Bu Teaching Hospital was presented to the office of the head of department. Researchers proceeded to contact residents only after permission was granted by the head of department.

Each participant was informed that participation in the study was voluntary and were required to sign an informed consent form prior to completing questionnaires.

3.12.1 Potential risks

This study did not have or pose any risk to the study participants. This notwithstanding, measures were taken to ensure that the questions in the tool were clear, concise and non-sensitive.

3.12.2 Potential benefits

This study unearthed significant determinants of the phenomena of stress and burnout experienced by residents within the context of postgraduate medical education in Ghana. Findings from this research may set the tone for further research into stress and burnout among residents in Ghana. It could potentially draw the attention of key stakeholders in postgraduate medical education in Ghana to the need for resident well-being programs as well as restrictions on work hours for residents. Similar well-being programs and restrictions on work hours are found in postgraduate medical education programs in developed countries. No monetary rewards were given to participants. They were however verbally appreciated for their participation.

3.12.3 Consenting process

All participants were required to give consent prior to participation in the study. An informed consent and voluntary participation form was attached to each questionnaire and was signed prior to completion of the questionnaire. Participants were informed that they could leave the study at any point in time without any consequences. All information obtained from participants up till the point of departure from study was destroyed should a participant decide to opt out.

3.12.4 Privacy and confidentiality

The study entailed the collection of demographic data such as age, marital status, and sex. This data was considered personal information. Per the design of the research tool, the anonymity of respondents was maintained as there were no specific identifiers that could be linked to each respondent. The data obtained from each of the respondents was kept strictly confidential and was used solely for the purpose of analysis and discussion to meet the objectives of this study. The process of data collection was done in a setting that provides adequate privacy for each resident.

3.12.5 Data storage/security and usage

The data obtained from the questionnaires was stored on an external hard drive belonging to the primary investigator and same was kept under lock and key at the residence of the primary investigator. The primary investigator had solitary access to the stored data as the data files were password protected. The data collected will be kept for a period of five years after data collection and subsequently destroyed.

CHAPTER FOUR

4.0 RESULTS

4.1 Sociodemographic characteristics of residents at Korle Bu Teaching Hospital

This study involved two hundred and eighty-five residents at the Korle Bu Teaching Hospital. Table 1 shows that the mean age of the residents was 34.8(±4.07). Also, more than half (64.5%) were aged less than 35 years while few (10.9%) were 40 years and more. More (53.0%) of the participants were male and reported seeing 10-20 patients per day (55.9%). The 6 respondents who did not indicate the number of clients seen daily were residents from public health who were not engaged in field work at the time of data collection. They however completed other sections of the questionnaire. A greater proportion were married (69.8%), were Christians (94.0%) and indicated they worked more than 40 hours per week (85.3%). Residents who participated in this study were enrolled in different colleges including Ghana College of Physicians and Surgeons (GCPS) (35.1%), West African College of Physicians (WACP) (7.0%), West African College of Surgeons (WACS) (6.7%) and both GCPS and WACP (24.6%). The residents in this study were in different years of their training: 29.8% were in their first year, 28.4% were in their second year and 8.4% were in their sixth year. Participants were drawn from various specialties with Paediatrics and Child Health, and Surgery constituting 13.3% each, Internal Medicine making up12.6% of participants and Obstetrics and Gynaecology and Radiology contributing 11.2% each of participants. Psychiatry had the least number of residents in this study (0.7%).

Table 4.1: Sociodemographic characteristics of participants

Characteristic	Frequency	Percentage
Age	***Mean (SD) = 34.8(±4.07)***	
<35 years	184	64.6
35-39 years	70	24.5
40+ years	31	10.9
Total	285	100
Sex		
Female	134	47.0
Male	151	53.0
Total	285	100
Marital status		
Single	81	28.4
Married	199	69.8
Others	5	1.8
Total	285	100
Religion		
Christianity	268	94.0
Islam	14	4.9
Others	3	1.1
Total	285	100
Number of children	***Mean (SD) = 1.4(1.24)***	
No child	103	36.1
1-2 children	126	44.2
3+ children	56	19.7
Total	285	100
College enrolled in		
GCPS	100	35.1
GCPS & WACP	70	24.6
GCPS & WACS	76	26.7

WACP	20	7.0
WACS	19	6.7
Total	285	100
Year of training		
Year 1	85	29.8
Year 2	81	28.4
Year 3	48	16.8
Year 4	33	11.6
Year 5	14	4.9
Year 6	24	8.4
Total	285	100
Area of specialty		
Anaesthesia	9	3.2
Dental Surgery	9	3.2
Emergency Medicine	5	1.8
Family Medicine	27	9.5
Internal Medicine	36	12.6
Laboratory Medicine	8	2.8
Obstetrics & Gynaecology	32	11.2
Ophthalmology	21	7.4
Otorhinolaryngology	11	3.9
Paediatrics & Child Health	38	13.3
Psychiatry	2	0.7
Public Health/Community Medicine	14	4.9
Radiology	32	11.2
Radiotherapy & Oncology	3	1.1
Surgery	38	13.3
Total	285	100
Weekly working hours	***Mean (SD) = 50.0(17.76)***	
<40 hours/week	42	14.7
40+ hours/week	243	85.3

Total	285	100
Patients seen per day	***Mean (SD) = 15.5(9.84)***	
<10 patients/day	70	251
10-20 patients/day	156	55.9
20+ patients/day	53	19.0
Total	279	100

GCPS – Ghana College of Physicians and Surgeons; WACP – West African College of Physicians; WACS – West African College of Surgeons.

4.2 Prevalence of stress

Results of the stress level of the residents is presented in figure 3. Overall, 19.0% [95% CI: 14.8% - 23.9%] of the participants had severe stress, 11.6% [95% CI: 8.3%-5.9%] had low stress and majority, 69.5% [95% CI: 63.9%-74.6%] were moderately stressed.

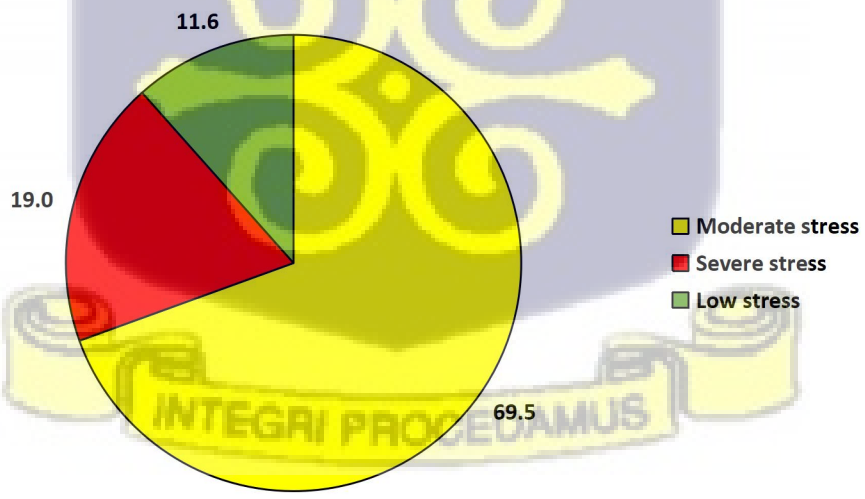


Figure 4.1: Prevalence of stress among residents.

4.3 Prevalence of emotional exhaustion, depersonalisation, and personal accomplishment

The summary of scores for each construct is summarized in Table 2. Overall, 29.1% of the residents had low emotional exhaustion, and 37.2% had high emotional exhaustion. Furthermore, the distribution of the three categories of depersonalization for the residents were: Low (42.1%), Moderate (33.3%) and High (24.6%). Regarding personal accomplishment, a striking majority (73.3%) of the participants had low personal accomplishment while only 6.7% had high personal accomplishment (Figure 4). Overall, the prevalence of burnout syndrome among the residents was 17.5% [95% CI: 13.5%-22.4%] (Figure 5).

Table 4.2: Scores of constructs of burnout among residents

Variable	Minimum	Maximum	Mean	SD
Emotional Exhaustion	0	50	25.6	11.2
Depersonalisation	0	25	7.5	5.5
Personal Accomplishment	0	48	27.9	7.9

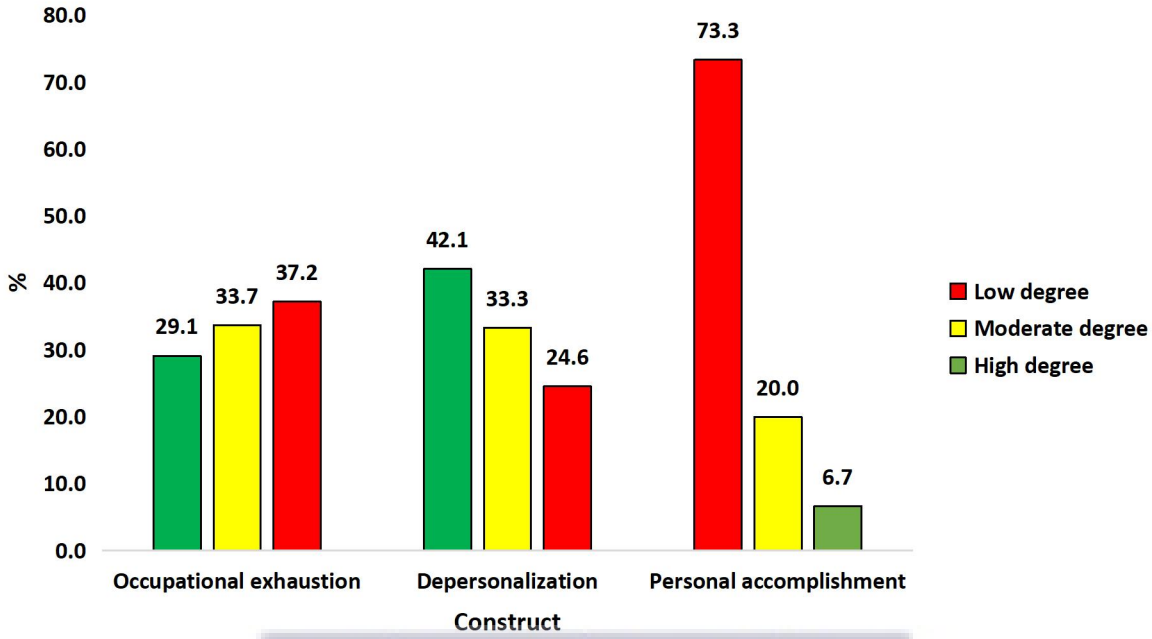
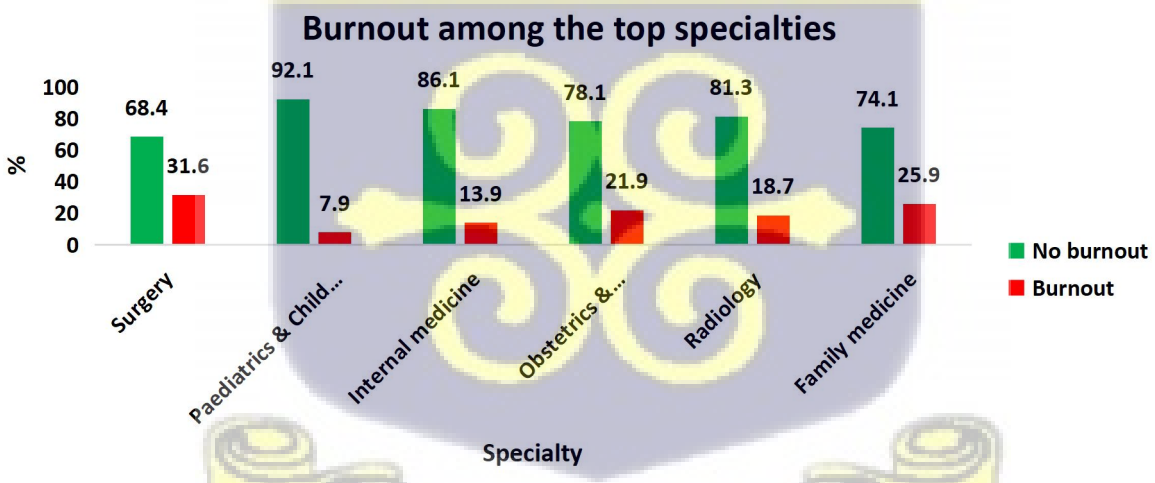
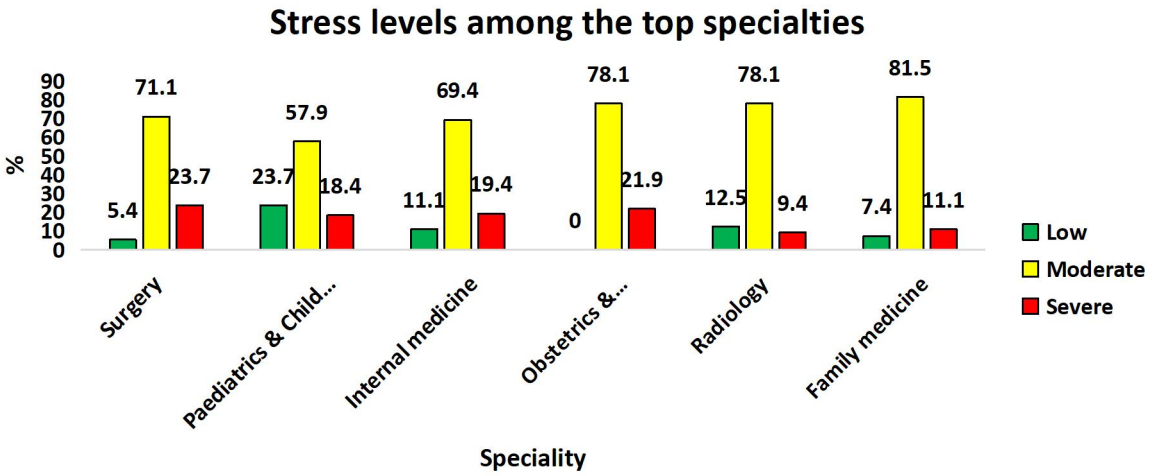


Figure 4.2: Prevalence of constructs of burnout among residents





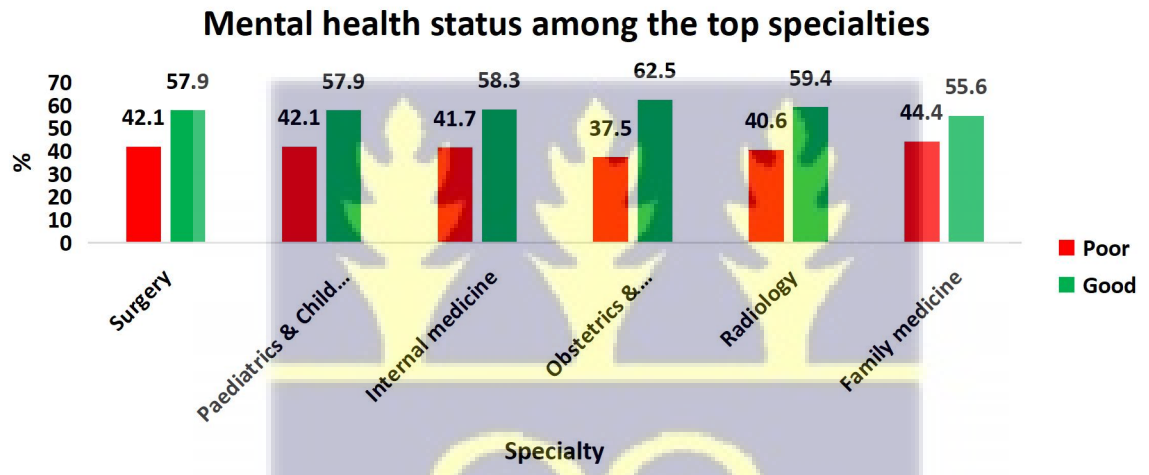


Figure 4.4: Distribution of stress, burnout and mental health status among the top specialties

4.4 Mental health status of participants

The mental health status of participants was also assessed. Overall, 58% [95% CI: 52.4%-63.9%] reported their mental health status as good. (Figure 6)

4.5 Factors associated with stress among residents.

Table 3 summarizes the factors associated with stress among study participants. Pearson's chi-square test was used to assess the association between demographic, workplace characteristics of

respondents and stress (Table 4). Sex (p=0.026), year of training (p=0.004), weekly working hours (p=0.005), burnout (p<0.0001) and mental health status (p<0.0001) were significantly associated with stress. The proportion of severe stress was significantly higher in female residents compared to males. Also, the percentage of severe stress was significantly higher among residents in the second year compared to the others. Furthermore, residents who worked 40 hours and more per week were significantly severely stressed compared to those who worked less hours. A multilinear regression model was used to predict factors associated with stress (Table 3). The model predicted postgraduate college, weekly working hours, burnout status and mental health status to be significant factors associated with stress. For residents who were enrolled in the WACP, there was an 8.55 unit decrease in stress compared to those enrolled in GCPS and the other colleges (β=-8.55, 95% CI: -15.72- -1.40, p=0.019). There was a 6 unit increase in stress for residents who worked 40+ hours per week compared to those with fewer working hours (β=6.08, 95% CI: 1.39-10.76, p=0.010). Similarly, for residents who experienced burnout, there was a 9 unit increase in stress compared to those with no burnout (β=9.08, 95% CI: 4.90-13.26, p<0.0001). However, good mental health was significantly associated with almost a 7 unit decrease in stress (β=-6.69, 95% CI: -9.95- -3.40, p<0.0001).

Table 4.3: Factors associated with stress among residents.

Variable	Stress				Unadjusted	Adjusted
	Low=33 n(%)	Moderate=198 n(%)	Severe=54 n(%)	X^2 (p-value)	Coef.(95%CI) p-value	Coef.(95%CI) p-value
Age						
<35 years	18(54.6)	132(66.7)	34(63.0)		1	
35-39 years	10(30.3)	48(24.2)	12(22.2)	3.15(0.534)	-1.29(-5.2-2.61) 0.514	
40+ years	5(15.1)	18(9.1)	8(14.8)		1.07(-5.67-7.84) 0.754	
Sex						
Female	21(63.6)	83(41.9)	30(55.6)	**7.30(0.026*)**	1	
Male	12(36.4)	115(58.1)	24(44.4)		1.03(-2.37-4.44) 0.550	
Number of children						
No child	10(10.3)	74(37.4)	19(35.2)		1	
1-2 children	17(51.5)	85(42.9)	24(44.4)	0.93(0.920)	-0.64(-4.49-3.20) 0.742	
3+ children	6(18.2)	39(19.7)	11(20.4)		1.01(-3.59-5.62) 0.665	
College enrolled in						
GCPS	10(30.3)	71(35.9)	19(35.2)		1	1
GCPS & WACP	11(33.3)	42(21.2)	17(31.5)		1.29(-3.44-6.03) 0.591	1.30(-2.87-5.49) 0.539
GCPS & WACS	5(15.2)	60(30.3)	11(20.4)	14.04(0.081)	-1.30(-5.29-2.69) 0.521	-1.80(-5.91-2.30) 0.388
WACP	6(18.2)	11(5.6)	3(5.6)		-9.04(-16.85- -1.23) **0.023***	-8.55(-15.72- -1.40) 0.019*
WACS	1(3.0)	14(7.1)	4(7.4)		1.49(-4.97-7.94) 0.650	4.61(-2.01-11.23) 0.172

Year of training						
Year 1	11(33.3)	59(29.8)	15(27.8)		1	1
Year 2	4(12.1)	39(19.7)	21(38.9)		2.89(-1.52-7.30) 0.198	1.05(-3.17-5.27) 0.625
Year 3	4(12.1)	56(28.3)	5(9.3)		-0.40(-5.27-4.46) 0.870	-1.12(-5.97-3.73) 0.650
Year 4	3(9.1)	20(10.1)	10(18.5)	**25.59(0.004**)**	2.80(-3.46-9.06) 0.379	2.32(-3.08-7.72) 0.399
Year 5	5(15.1)	9(4.6)	0(0.0)		-9.76(-18.81- -0.71) **0.035***	-4.57(-12.37-3.23) 0.250
Year 6	6(18.2)	15(7.6)	3(5.6)		-3.92)-10.16-2.31) 0.217	-5.40(-11.52-0.73) 0.084
Weekly working hours						
<40 hours/week	11(33.3)	26(13.1)	5(9.3)	**10.78(0.005**)**	1	1
40+ hours/week	22(66.7)	172(86.9)	49(90.7)		8.88(3.94-13.82) <**0.0001***	6.08(1.39-10.76) 0.010*
Patients seen per day						
<10 patients/day	11(34.4)	47(24.1)	12(23.1)		1	1
10-20 patients/day	17(53.1)	111(56.9)	28(53.8)	2.55(0.636)	2.27(-1.94-6.49) 0.290	1.30(-2.60-5.20) 0.512
20+ patients/day	4(12.5)	37(19.0)	12(23.1)		5.39(0.35-10.43) **0.036***	3.67(-1.22-8.55) 0.141
Burnout status						
No burnout	33(100.0)	167(84.3)	35(64.8)	19.13(<**0.0001***)	1	1
Burned out	(0.0)	31(15.7)	19(35.2)		12.36(8.65-16.08) <**0.001***	9.08(4.90-13.26) <**0.0001***
Mental health status						
Poor	8(24.2)	76(38.4)	35(64.8)	16.89(<**0.0001***)	1	1
Good	25(75.8)	122(61.6)	19(35.2)		-8.66(-11.97- -5.35) <**0.0001***	-6.69(-9.95- -3.43) <**0.0001***

*p<0.05, **p<0.01, ***p<0.001

4.6 Factors associated with burnout among residents.

There was a statistically significant association between burnout, stress levels ($p<0.0001$) and mental health status ($p<0.0001$) based on Pearson's chi square analysis. The proportion of burnout was significantly higher among residents who were moderately and severely stressed compared to those with low stress (Table 4). Additionally, the proportion of burnout was significantly higher among residents with poor mental health status compared to those with good mental health status.

A logistic regression was also used to predict factors which influence burnout among the participants. The model predicted that residents with severe stress were more likely to experience burnout compared to those with low stress (AOR=24.94, 95% CI: 1.42-43.63, p=0.028). However, residents with good mental health status were 70% less likely to experience burnout compared to those with poor mental health status (AOR=0.30, 95%CI: 0.16-0.60, p=0.001).

Table 4.4: Factors associated with burnout among residents

Variable	Burn out No N=235 n(%)	Yes N=50 n(%)	p-value	Model I COR(95%CI)p-value	Model II AOR(95%CI)p-value
Age					
<35 years	149(63.4)	45(75.0)		1	
35-39 years	58(24.7)	12(24.0)	0.4447	0.88(0.43-1.82) 0.731	
40+ years	28(11.9)	3(6.0)			
Sex					
Female	113(48.1)	21(42.0)	0.434	1	
Male	122(51.9)	29(58.0)		1.28(0.69-2.37) 0.435	
Number of children					
No child	80(34.0)	23(46.0)		1	
1-2 children	107(45.5)	19(38.0)	0.277	0.62(0.31-1.21) 0.161	
3+ children	48(20.4)	8(16.0)		0.58(0.24-1.40) 0.226	
College enrolled in					
GCPS	80(34.0)	20(40.0)		1	
GCPS & WACP	58(24.7)	12(24.0)		0.83(0.37-1.83) 0.640	
GCPS & WACS	63(26.8)	13(26.0)	0.868	0.82(0.38-1.79) 0.627	
WACP	18(7.7)	2(4.0)		0.44(0.09-2.08) 0.303	
WACS	16(6.8)	3(6.0)		0.75(0.20-2.84) 0.671	
Year of training					
Year 1	71(30.2)	14(28.0)		1	
Year 2	66(28.1)	15(30.0)		1.15(0.52-2.57) 0.729	
Year 3	38(16.2)	10(20.0)		1.33(0.54-3.29) 0.531	
Year 4	27(11.5)	6(12.0)	0.907	1.13(0.39-3.23) 0.824	
Year 5	13(5.5)	1(2.0)		0.39(0.05-3.24) 0.383	
Year 6	20(8.5)	4(8.0)		1.01(0.30-3.42) 0.982	
Weekly working hours					
<40 hours/week	37(15.7)	5(10.0)	0.298	1	

40+ hours/week	198(84.3)	45(90.0)		1.68(0.62-4.53) 0.303	
Patients seen per day					
<10 patients/day	60(26.1)	10(20.4)		1	
10-20 patients/day	129(56.1)	27(55.1)	0.479	1.26(0.57-2.76) 0.571	
20+ patients/day	41(17.8)	12(24.5)		1.76(0.69-4.45) 0.235	
Stress					
Low	33(14.0)	0(0.0)		1	1
Moderate	167(71.1)	31(62.0)	<0.0001*	12.56(0.75-21.10) 0.078	1.10(0..65-18.67) 0.096
Severe	35(14.9)	19(38.0)		36.80(2.14-63.40) 0.013*	24.94(1.42-43.63) 0.028*
Mental health status					
Poor	84(35.7)	35(70.0)	<0.0001*	1	1
Good	151(64.3)	15(30.0)		0.24(0.12-0.46) <0.0001*	0.30(0.16-0.60) 0.001*

*p<0.001

4.7 Factors associated with good mental health among residents.

Pearson's chi-square test was used to assess the association between demographic, workplace characteristics of respondents and mental health status (Table 5). Stress (p<0.0001) and burnout (p<0.0001) were significantly associated with good mental health. The proportion of good mental health was significantly higher among those with low stress compared to those with high stress. Also, good mental health was significantly higher among residents with no burnout compared to those with burnout. It is clear from these findings that stress and burnout are mediating phenomena between work stressors and mental health status. This is premised on the fact that, work stressors such as weekly working hours and years of training are associated with more severe forms of stress, which in turn is associated with burnout. These two phenomena then increase the risk of poor mental health status among residents.

A multilinear regression predicted that there was a 2.27 unit increase in good mental health for residents enrolled at the WACS compared to others (β=2.27, 95% CI: 0.27-4.27, p= 0.026). However, there was almost a 3 unit (β=-2.98, 95% CI: -4.51- -1.46, p<0.0001)

decrease in good mental health and 5.77 unit (β=-5.77, 95% CI: -8.00- -3.52, p<0.0001) decrease in good mental for residents who were moderately and severely stressed respectively. Experiencing burnout was also significantly associated with a 3-unit decline in good mental health (β=-3.05, 95% CI: -4.59- -1.50, p<0.0001).

Table 4.5: Factors associated with good mental health among residents.

Variable	Mental Health			Unadjusted	Adjusted
	Poor N=119 n(%)	Good N=166 n(%)	X^2 (p-value)	Coef.(95%CI) p-value	Coef.(95%CI) p-value
Age					
<35 years	80(67.2)	104(62.6)		1	
35-39 years	28(23.5)	42(25.3)	0.81(0.665)	0.31(-1.10-1.72) 0.666	
40+ years	11(9.2)	20(12.1)			
Sex					
Female	58(48.7)	76(45.8)	0.24(0.622)	1	
Male	61(51.3)	90(54.2)		0.89(-0.28-2.07) 0.135	
Number of children					
No child	47(39.5)	56(33.7)		1	
1-2 children	52(43.7)	74(44.6)	1.49(0.475)	0.04(-1.30-1.31) 0.995	
3+ children	20(16.8)	36(21.7)		0.29(-1.35-1.93) 0.728	
College enrolled in					
GCPS	40(33.6)	60(36.1)		1	1
GCPS & WACP	32(26.9)	38(22.9)		-0.37(-1.98-1.24) 0.650	-0.48(-1.91-0.95) 0.508
GCPS & WACS	34(28.6)	42(25.3)	4.29(0.368)	-0.32(-1.82-1.17) 0.670	-0.44(-1.79-0.911) 0.524

WACP	9(7.6)	11(6.6)		-0.83(-3.45-1.79) 0.534	-1.84(-4.15-0.47) 0.117
WACS	4(3.4)	15(9.0)		2.20(0.45-3.94) 0.014*	2.27(0.27-4.27) 0.026
Year of training					
Year 1	29(24.4)	56(33.7)		1	
Year 2	40(33.6)	41(24.7)		-1.26(-2.79-0.26) 0.104	
Year 3	21(17.6)	27(16.3)		-0.78(-2.44-0.88) 0.356	
Year 4	17(14.3)	16(9.6)	7.04(0.217)	-1.55(-3.79-0.70) 0.176	
Year 5	4(3.4)	10(6.0)		1.54(-1.35-4.4) 0.295	
Year 6	8(6.7)	16(9.6)		0.62(-1.55-2.78) 0.575	
Weekly working hours			0.74(0.390)		
<40 hours/week	15(12.6)	27(16.3)		1	
40+ hours/week	104(87.4)	139(83.7)		-1.25(-2.74-0.25) 0.103	
Patients seen per day					
<10 patients/day	29(24.8)	41(25.3)		1	
10-20 patients/day	67(57.3)	89(54.9)	0.19(0.910)	-0.59(-2.08-0.91) 0.441	
20+ patients/day	21(17.9)	32(19.8)		0.47(-1.28-2.22) 0.598	
Stress					
Low	8(6.7)	25(15.1)		1	1
Moderate	76(63.9)	122(73.5)	16.89(<0.001*)	-3.14(-4.69- -1.59) <0.0001	-2.98(-4.51- -1.46)<0.0001*
Severe	35(29.4)	19(11.4)		-6.52(-8.67- -4.35) <0.001	-5.77(-8.00- -3.52)<0.0001*

Burnout status					
No burnout	84(70.6)	151(91.0)	19.98(<0.001*)	1	1
Burned out	35(29.4)	15(9.0)		-4.05(-5.57- -2.53) <0.0001	-3.05(-4.59- -1.50) <0.0001

*p<0.001

4.8 Correlation matrix between stress, burnout, and mental health of residents

There was moderate positive correlation (Table 6) between stress and occupational exhaustion (r=0.576, p<0.001) and depersonalization (r=0.423, p<0.001). However, there was a negative moderate correlation between good mental health and stress (r=-0.420, p<0.001) and a negative weak correlation between personal accomplishment and stress (r=-0.228, p<0.001). There was also a moderate positive correlation between personal accomplishment and good mental health (r=0.446, p<0.001) and a moderate negative correlation between occupational exhaustion and mental health (r=-0.511, p<0.001).

Table 4.6: Correlation between stress, burnout and mental health among residents

Variables	(1)	(2)	(3)	(4)	(5)
(1) Stress	1.000				
(2) Occupational Exhaustion	0.576*	1.000			
p-value	(0.000)				
(3) Depersonalization	0.423*	0.607*	1.000		
p-value	(0.000)	(0.000)			
(4) Personal accomplishment	-0.278*	-0.228*	-0.173*	1.000	
p-value	(0.000)	(0.000)	(0.003)		
(5) Mental Health	-0.420*	-0.511*	-0.410*	0.446*	1.000
p-value	(0.000)	(0.000)	(0.000)	(0.000)	

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

The focus of this study was to assess the prevalence of stress and burnout among residents who were enrolled in postgraduate medical programmes in a Ghanaian setting. This was necessitated by the arduous nature of residency training and the fact that residents found themselves in the middle of care provision in tertiary teaching hospitals in Ghana. This study sought to further evaluate the factors that are associated with both phenomena as well as study the dynamics between them. Assessing the impact of stress and burnout on the lives and mental health of residents was also of interest to this investigation. The expectation was that data derived from this study would not only yield a better comprehension of these phenomena among residents but also draw the attention of key stakeholders to take steps through policies, procedures, and protocols in minimising these phenomena and alleviating their effects on residents. These steps are expected to ultimately result in approaches to training that are optimised to ensure the production of more complete specialists in Ghana.

5.2 Levels of stress and burnout among residents

5.2.1 Levels of stress.

Although most of the participants in this study (69.5%) reported being moderately stressed, a striking 19.0% of them reported having severe stress. This is particularly disturbing because it reflects the presence of stressors within the work environment. It also poses questions about the availability of facilities and measures which enable residents to cope with these levels of stress. For those departments that have such measures in place, one would be asking about their

effectiveness. The prevalence of severe stress in this study is slightly higher than that found among medical residents in a study conducted in Brazil with a reported prevalence of 17.7% (Pasqualucci et al., 2019) . It is however worthy of note that a higher prevalence of stress (24.24%) was found among residents who were training in a teaching hospital in Gujarat, India (Sarthak Dave, Minakshi Parikh, Ganpat Vankar, 2018). They concluded that the levels of stress experienced by residents could result in personal problems and poorer patient outcomes.

In terms of distribution by specialty, the highest proportions of severe stress were observed in residents in Surgery (23.7%), Obstetrics and Gynaecology (21.9%) and Internal Medicine (19.4%). This suggests that there may be peculiar stressors within the set-up or culture of these departments that may not be seen in other departments, and even if present may not play as significant a role as does in the top three aforementioned departments.

5.2.2 Levels of burnout

The overall prevalence of burnout syndrome reported among residents in Korle-Bu Teaching Hospital from this study was 17.5%. The overall prevalence of burnout was determined by calculating the proportion of residents who reported high degrees of emotional exhaustion, high degrees of depersonalisation and low personal achievement. This prevalence is higher than that recorded in medical residents in a Greek study, with a reported prevalence of 14.4% (Zis et al., 2014). It was however, markedly below the global aggregate prevalence of 51% as reported in a meta-analysis involving over 22,000 residents (Low et al., 2019). This finding is also below that obtained when residents in Pakistan, a lower-middle income country were assessed for burnout (46.5%) (Mahmood et al., 2021). It is however somewhat identical to findings made by Konlan et. al. (2022) when they assessed the levels of stress among healthcare workers at the apogee of

the COVID-19 pandemic. They determined the prevalence of burnout to be 20.57% when they assessed health workers in hospitals in Accra, including Korle-Bu Teaching Hospital.

Considering the subscales of burnout, 37.2% of residents had high degrees of emotional exhaustion, 24.6% had high degrees of depersonalisation and 73.3% had low personal achievement scores. A systematic review that included data obtained from residents in Nigeria showed that the scores obtained for emotional exhaustion and depersonalisation from this study were lower than what was observed among Nigerian residents (45.6% and 57.8% respectively). A higher proportion of residents in Korle-Bu Teaching Hospital (73.3%) had low personal achievement when compared with Nigerian residents (61.8%) (Dubale et al., 2019) . These differences may reflect differences in approaches to training, work schedules and the nature of the work environment. The systematic review by Dubale et al., (2019) showed that Ghanaian physicians in general had emotional exhaustion scores of 9.1±2.6, depersonalisation scores of 5.2±2.1 and low personal achievement scores of 5.8±1.6. In this study however, the scores for residents in Korle-Bu Teaching Hospital were 25.6±11.2 for emotional exhaustion, 7.5±5.5 for depersonalisation and 27.9±7.9 for low personal achievement. These variations in the subscales of burnout between residents and physicians in general may be due to the demands imposed by the rigorous nature of residency training. Demands that other physicians may not be required to meet. Having only 6.7% of residents with self-perception of high achievement is a worrying statistic. It suggests that only a handful of residents are confident of achieving their targets in terms of training goals and client care.

The top three proportions of burnout were seen in residents from Surgery (31.6%), Family Medicine (25.9%) and Obstetrics and Gynaecology (21.9%). These findings share some similarities with findings made from a systematic review with meta-analysis published in 2018

and included 4,664 medical residents. The highest proportions of burnout were seen in general surgery, anaesthesiology, obstetrics and gynaecology and orthopaedics residents with each recording 40.8% prevalence of burnout (Rodrigues et al., 2018) . Another meta-analysis performed in 2019 revealed the top three specialties most affected by burnout were radiology (77.16%), neurology (71.93%) and general surgery (58.39%). The same study indicated that the least proportions were seen in psychiatry (42.05%), oncology (38.36%) and family medicine (35.97%) (Low et al., 2019) . The appearance of general surgery among the top three most affected specialties may suggest precipitating factors which are inherent to the nature of surgical training globally. A critical look at the variations in the top three most affected specialties shows that epidemiology of burnout among medical specialties is not only dependent on the content of the specialty involved. It is also influenced by factors that are peculiar to the work culture within specific training centres and the demands of specific postgraduate medical colleges. This would explain, at least to an extent, the reason why a specialty may appear among the top three most affected in one study but not in another.

5.3 Factors associated with stress and burnout among residents in KBTH.

5.3.1 Factors associated with stress.

The sociodemographic factors that were found to be significantly associated with stress were sex, year of training, and weekly working hours, burnout, and mental health status were also significantly associated with stress.

The proportion of severe stress was shown to be significantly higher in females (55.6%). This finding contradicts Sarthak et al., (2018) who opined that there was no significant association between sex and stress levels among residents in a teaching hospital in India. It however aligns with findings from a 2015 evaluation of stress levels among residents in Saudi Arabia (Alosaimi

et al., 2015) . These differences in findings are most likely rooted in the variations and/or peculiarities of work stressors in these centres as well as the availability of resources for dealing with the phenomenon among residents.

This study showed that second year residents had a higher prevalence of severe stress among all year groups (21%). This could be due to the practice where second year residents may be called on to do extra work to cover for senior colleagues who are preparing for board examinations and also to allow time for first year residents to find their feet.

It is also evident from this research that working for more than 40 hours every week is significantly associated with severe stress. Multilinear regression modelling showed that there was a 6-fold increase in stress for residents who worked at least 40 hours in a week. This finding draws attention to the importance of regulating work hours to ensure resident well-being. Regulating work hours will not only afford residents enough time to recover from stressors but will also limit their exposure to stressors in the work environment.

5.3.2 Factors associated with burnout.

Pearson's chi-square analysis revealed a statistically significant association between burnout, stress, and mental health status. The association between stress and burnout will be discussed in the next section.

It was observed in this study that the prevalence of burnout was significantly higher among residents who reported poor mental health status compared to those with good mental health. One's ability to deal with emotional exhaustion, depersonalisation, and low personal achievement would require good mental health. Logistic regression of the data obtained showed that residents who reported good mental health status were 70% less likely to suffer burnout. It is

therefore imperative that efforts are made to periodically evaluate the mental status of residents and steps taken to safeguard same.

5.4 Relationship between stress and burnout among residents in KBTH.

A statistically significant relationship was observed between stress and burnout from this study. Moderate and severe stress resulted in significantly higher prevalence of burnout among study participants. As predicted by the logistic regression model, residents with severe stress were more likely to experience burnout when compared to those who had low stress. A moderate positive correlation was observed between stress and emotional exhaustion and depersonalisation. It is clear from these observations that failing to deal with job stressors in the work environment will ultimately result in burnout. A similar observation was made among 269 medical residents in a Greek study. This team of researchers used the Copenhagen Burnout Index whereas the Maslach Burnout Inventory-Human Services Survey was used in this study. Despite the difference in the tools used, there was a significant positive correlation between moderate and high levels of stress on one hand, and burnout on the other hand (Papaefstathiou et al., 2019). A similar relationship was found between stress and burnout among residents in Duke University, Durham, USA where higher perceived levels of stress were associated with higher degrees of burnout (Goldhagen et al., 2015). This suggests that irrespective of how these two psychological phenomena are measured, there is bound to be a positive correlation between stress and burnout. This relationship also appears to hold true irrespective of the geopolitical location of residents. Key stakeholders in postgraduate medical education in Ghana can strategically take advantage of this relationship and ensure the availability of resources to comprehensively deal with stress among residents. This will ultimately lead to a lower prevalence of burnout among residents.

5.5 Consequences of stress and burnout on the mental health of residents.

The proportion of participants who reported higher scores on the Positive Mental Health Scale, thus good mental health was 58.3%. Stress and burnout were shown in this research to be significantly associated with the mental health status of participants with p-values <0.0001 for both phenomena. Good mental health status was seen more in those residents who experienced lower levels of stress and had lower degrees of burnout. This finding is consistent with findings from a study among residents in general surgery in USA which showed that higher degrees of burnout was linked with increased incidence of depression (OR 4.8; $p < 0.0001$) and suicidal ideations (OR 5.7; $p < 0.0001$) (Lebares et al., 2018). Multilinear regression analysis of data from this research showed a 3-fold and almost 6-fold decline in mental health status among residents who had moderate and high levels of stress respectively. Similarly, there was a 3-unit decline in good mental health for residents who suffered burnout during their training. These findings epitomise how mental health status can be impacted by stress and burnout resulting from factors within the work environment. It also indicates that small improvements in working conditions, schedules and the work environment would result in significant improvements in the mental health status of residents in Korle-Bu Teaching Hospital. These changes can then be applied to other training centres within the country.

5.6 Linkage between findings and the conceptual framework.

The conceptual framework depicted a relationship between work stressors and stress and burnout with the former being causal factors of the two psychological phenomena. This relationship is grounded in the jobs demands control/support and job demands resources theory. Findings from this study support the assertion that work stressors indeed culminate in stress and burnout. This study revealed that weekly work hours and year of training were associated with stress. It must

be stated however that this study did not reveal a similar direct relationship between work stressors and burnout.

The study sought to explore the nature of the relationship between the two phenomena. The conceptual framework depicts a bidirectional relationship between stress and burnout. This concept was supported by findings from this study. A statistically significant relationship was found between stress and burnout and residents with moderate to severe levels of stress were found to be at an increased risk of burnout.

The conceptual framework depicts the scenario in which mental health status is determined by the incidence of stress and burnout. This aspect of the framework is supported by findings from this study. Residents who experienced lower levels of stress and burnout were found to have better mental health status when compared with their colleagues with higher levels of stress and burnout.

The findings from this study largely confirms the conceptual framework which was based on the theory of job demands – control/support and jobs demands-resources.

5.7 Study implications for residency training in Ghana.

The research team believes that the ultimate aim of residency training in Ghana is to produce specialists who are well versed in their chosen fields and are able to practice with the highest levels of professionalism. This will ensure that patients who are catered for receive holistic care. Achieving this target requires that measures are implemented to ensure holistic training is given to residents. Training that is not limited to the acquisition of medical knowledge, but also embraces the safeguarding of the mental health of residents through measures to decrease the prevalence of stress and burnout.

A 19% prevalence of stress and 17.5% prevalence of burnout among residents warrant urgent action to comprehensively address precipitant factors. It is equally disturbing to note that 73.3% of participants in this study reported having high levels of low personal achievement. Encountering such perceptions during residency can make postgraduate training unpopular, more so in those specialties that have the lowest degrees of personal achievement. Having a good mental status could have implications for how quickly residents are able to complete their training programmes, especially for those who are required to conduct research as a part of their training. It is therefore troubling to find that 41.7% of residents performed poorly on the Positive Mental Health Scale.

Measures should be taken to periodically assess training schedules and environments in teaching hospitals, ensuring that residents are not exposed to unnecessary stress. It implies that postgraduate medical colleges in Ghana must collaborate with training centres to regulate work hours (in accordance with Labour laws) of residents while also ensuring that residents make the most of time allotted for training. Lessons on recommended work hours can be learned from the American Council for Graduate Medical Education.

The findings from this study also have implications for resident well-being programmes. It should encourage the incorporation of wellness programmes into residency training. Postgraduate medical colleges in Ghana need to spearhead the implementation of recreational activities for residents during training. Indeed, participation should be mandatory for residents. These programmes should be assessed from time to time to better understand their impact on resident stress and burnout, as well as mental health.

The prevalence of stress and burnout ascertained in this study should cause policy makers and other stakeholders to consider designating resource persons at the colleges and in the training

centres to help residents who are experiencing significant stress and burnout. This will in the short to medium terms offer support to residents who are dealing with these phenomena silently.

The findings from this research can fuel the creation of awareness on the presence of stress and burnout among residents. This we believe will stimulate residents to become more cognizant of these phenomena and understand the need to seek help in averting their impact on their lives and mental health.

It is believed that this research will draw attention to the problems of stress and burnout among residents and will serve as the first steps towards an integration of regular evaluation of stress and burnout into training programmes. We believe that postgraduate medical colleges can do yearly evaluations on a national level. That way they can establish the enormity of the problem on a larger scale and thus lead national dialogue on the impact of stress and burnout on residents.

5.8 Limitations

This study was limited by the fact that it was a single centre study. The findings would have been more representative of the postgraduate medical training landscape if it was a multicentre study. Additionally, the approach to sampling which was planned to be stratified random sampling was hampered by the absence of some residents in the training centre at the time of data collection. This was due to participation in external rotations outside the hospital and embarking on mandatory annual leave. This led to the situation where researchers had to recruit participants who were available in their departments at the time of data collection.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Stress and burnout are psychological phenomena that have a negative telling on residents in postgraduate medical training globally. Those training in Korle-Bu Teaching Hospital are not exempted. The prevalence of severe stress and burnout is 19.0% and 17.5% respectively among residents in training in Korle-Bu Teaching Hospital. The highest proportions of stress were observed in residents in surgery, obstetrics and gynaecology and internal medicine whereas surgery, family medicine and obstetrics and gynaecology residents recorded the highest proportions of burnout among study participants.

This study confirms that higher degrees of burnout are precipitated by moderate and severe forms of stress. Female residents were noted to have had statistically significant levels of stress when compared with their male counterparts.

Majority of residents have good mental health status. Also, mental health status is significantly associated with stress and burnout. Furthermore, poorer mental health is precipitated by severe stress and higher degrees of burnout.

6.2 Recommendations

It is recommended that postgraduate medical colleges in Ghana should assess the prevalence of stress and burnout among residents they have enrolled on a yearly basis. This can be taken up by the councils of postgraduate medical colleges and conducted during the annual general scientific meetings of the colleges.

Assessment of the mental health status and well-being of residents is equally important. This can be achieved through the implementation of medical screening of residents before and during their training. The current nature of medical examination prior to commencement of residency training does not include mental health assessment. The office of the director of medical affairs of each training institution can ensure that mental health assessment is incorporated into regular medical examination for residents. These are likely to contribute significantly to the production of more competent specialists with demonstrate professionalism in their practice.

Additionally, it is recommended that postgraduate medical colleges and training centres collaborate to implement resident well-being programmes to ensure that residents are protected from stress and burnout. Additionally, there must be a framework for monitoring the implementation of these well-being programmes at the departmental level. Such well-being programmes can be in the form of regular recreational activities for residents, provision of counseling services and debriefing sessions following critical events that occur in the work environment. These are likely to result in a better mental health status for residents during their training.

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APPENDICES

APPENDIX 1: Participant information sheet.

FORM A: PARTICIPANT INFORMATION SHEET

Protocol Number: KBTH-STC/IRB/000198/2022

Study title: Determinants and consequences of stress and burnout among residents in Korle-Bu Teaching Hospital, Ghana.

Principal investigator: Dr. Nicholas Kobla Akakpo-Ashiadey, School of Public Health, University of Ghana.

Tel: +233241963184

Email: mawusicobbs@gmail.com | nkakakpo-ashiadey@st.ug.edu.gh

General Information

Hello, I am a Master of Public Health student at the School of Public Health, University of Ghana and I am conducting a study on stress and burnout among residents in Korle-Bu Teaching Hospital. This is in partial fulfilment of the requirements leading to the award of the MPH degree.

A member of the research team will explain to you the details of the processes involved in this study and how it affects you. Your participation is voluntary. This form is an informed consent form that details the study procedure, its benefits, and risks and how measures will be taken to protect your privacy and maintain confidentiality. Please do well to ask any questions if you require any further explanation. Kindly note that you will be required to sign this form if you decide to voluntarily participate in this study.

Study procedure

This study requires that you complete a questionnaire which assesses various subscales under stress and burnout. Completing this questionnaire could take between 10 to 15 minutes of your time. The questionnaire has been carefully and concisely designed to facilitate the process of responding.

Possible benefits

There are no direct or immediate benefits for participation in this study. The findings from this study will however inform interventions targeted at the prevention of stress and burnout among residents in postgraduate medical training in Ghana.

Possible risks

This study will require you to commit between 10 to 15 minutes of your time to answer the questions in the research tool. Measures have been taken to keep the questions concise and straight to the point.

Confidentiality

All the information you provide will be treated with utmost confidentiality. Only members of the research team, including my supervisor, will have access to your information. Personal information collected will be used purely for the purposes of this research and none other. Your data will be secured by adherence to the ethical guidelines pertaining to the security of physical and electronic data. All completed forms will be securely kept by the researcher and no one else will have access to your information.

Compensation

No compensation will be provided for your participation in this study. But please note that the research team appreciates your role in contributing to an improvement in postgraduate medical education in Ghana.

Voluntary participation and right to leave the research.

Your participation in this study is voluntary. Please note that you are free to refuse/discontinue participation at any point during the study without any consequences.

Your rights as a participant

This research has been thoroughly reviewed and approved by the Scientific and Technical Committee and Ethics Review Board of Korle-Bu Teaching Hospital. Kindly note that you can contact this committee between the hours of 8 am to 5pm on Monday to Friday if you have any concerns whatsoever about your rights as a research participant. You can contact the Scientific and Technical Committee on +233302667759/673034-6 or reach them via rdo@kbth.gov.gh

APPENDIX 2: Voluntary Agreement Form

FORM B: VOLUNTARY AGREEMENT FORM

Participants declaration

I acknowledge that I have read the information in the participant's information sheet, which was written in a language that I understand (English). I fully comprehend the contents and any potential implications for me as a participant. I also understand that I can withdraw from the research even after signing this form.

I agree to participate in this study.

Name of Participant: _____

Participant's signature: _____

Date and time: _____

APPENDIX 3: Questionnaire

FORM C

QUESTIONNAIRE

DETERMINANTS AND CONSEQUENCES OF STRESS AND BURNOUT AMONG RESIDENTS IN KORLE-BU TEACHING HOSPITAL, GHANA.

Respondent Code: _____ Date: _____

Personal information

1. Please indicate your age in years. _____
2. Please indicate you sex *(tick the appropriate box)*.

   [ ]$_1$ Male [ ]$_2$ Female
3. Marital status.

   [ ]$_1$ Single [ ]$_2$ Married [ ]$_3$ Divorced/Separated [ ]$_4$ Co-habiting [ ]$_5$ Widowed
4. Please state your religion. _____
5. Number of children *(indicate 0 if none)*. _____
6. Postgraduate college enrolled in.

   [ ]$_1$ GCPS [ ]$_2$ WACP [ ]$_3$ WACS [ ]$_4$ GCPS & WACP [ ]$_5$ GCPS & WACS
7. Year of training.

   [ ]$_1$ Year 1 [ ]$_2$ Year 2 [ ]$_3$ Year 3 [ ]$_4$ Year 4 [ ]$_5$ Year 5 [ ]$_6$ Year 6
8. Please indicate your specialty area. *(Circle the number corresponding to your specialty)*

   01 – Anaesthesia

   02 – Dental surgery

   03 – Emergency Medicine

04 – Family Medicine

05 – Internal Medicine

06 – Laboratory Medicine

07 – Obstetrics & Gynaecology

08 – Ophthalmology

09 – Otorhinolaryngology

10 – Paediatrics & Child Health

11 – Psychiatry

12 – Public Health / Community Medicine

13 – Radiology

14 – Radiotherapy & Oncology

15 – Surgery

9. Please indicate the **average number of hours** you spend at work **per week**. _____

10. Please state **the average number of patients** you see **daily**. _____

Stress

Instruction: Please enter a number from the sliding scale below, which best describes you.

STRONGLY DISAGREE **AGREE SOMEWHAT** **STRONGLY AGREE**

1 2 3 4 5 6 7 8 9 10

11. I can't honestly say what I really think or get things off my chest at work. _____

12. My job has a lot of responsibility, but I don't have very much authority. _____

13. I could usually do a much better job if I were given more time. _____

14. I seldom receive adequate acknowledgement or appreciation when my work is really good. _____

15. In general, I am not particularly proud or satisfied with my job. _____

16. I have the impression that I am repeatedly picked on or discriminated against at work. _____

17. My workplace environment is not very pleasant or safe. _____

18. My job often interferes with my family and social obligations, or personal needs. _____

19. I tend to have frequent arguments with superiors, coworkers, or customers. _____

20. Most of the time I feel I have very little control over my life at work. _____

Burnout

Please indicate how frequently the following statements apply to you by ticking the box corresponding to the number of your choice. ***There are no right or wrong answers.***

0 = Never
1 = At least a few times a year
2 = At least once a month
3 = Several times a month
4 = Once a week
5 = Several times a week
6 = Every day

		0	1	2	3	4	5	6
21	I feel emotionally exhausted because of my work.							
22	I feel worn out at the end of a working day.							
23	I feel tired as soon as I get up in the morning and see a new working day stretched out in front of me.							
24	I can easily understand the actions of my colleagues/supervisors							
25	I get the feeling that I treat some clients/colleagues impersonally, as if they were objects.							
26	Working with people the whole day is stressful for me.							

		0	1	2	3	4	5	6
27	I deal with other people's problems successfully							
28	I feel burned out because of my work							
29	I feel that I influence other people positively through my work							
30	I have become more callous to people since I have started doing this job							
31	I'm afraid that my work makes me emotionally harder							
32	I feel full of energy							
33	I feel frustrated by my work							
34	I get the feeling that I work too hard							
35	I'm not really interested in what is going on with many of my colleagues							
36	Being in direct contact with people at work is too stressful							
37	I find it easy to build a relaxed atmosphere in my working environment							
38	I feel stimulated when I have been working closely with my colleagues							
39	I have achieved many rewarding objectives in my work							
40	I feel as if I'm at my wits' end							
41	In my work I am very relaxed when dealing with emotional problems							
42	I have the feeling that my colleagues blame me for some of their problems							

P.T.O.

Mental health assessment

Instruction: Please indicate to what extent you agree with each of the statements below by ticking the box corresponding to your choice. Please do not leave out any statement.

		0 = Do not agree	1= Disagree	2 = Tend to agree	3 = Agree
43	I am often carefree and in good spirits.	○	○	○	○
44	I enjoy my life.	○	○	○	○
45	All in all, I am satisfied with my life.	○	○	○	○
46	In general, I am confident.	○	○	○	○
47	I manage well to fulfill my needs.	○	○	○	○
48	I am in good physical and emotional condition.	○	○	○	○
49	I feel that I am actually well equipped to deal with life and its difficulties.	○	○	○	○
50	Much of what I do brings me joy.	○	○	○	○
51	I am a calm, balanced human being.	○	○	○	○

The research team is grateful to you for taking time to participate in this study.