

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**

**FINANCIAL, INSTITUTIONAL AND HUMAN RESOURCE CAPACITY NEEDS
ASSESSMENT FOR ENVIRONMENTAL AND OCCUPATIONAL HEALTH IN
GHANA.**

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

JULY, 2016

DECLARATION

I, Jacqui Barnes hereby declare that this dissertation is a result of my independent work. References to other works have been duly acknowledged. I further declare that this dissertation has not been submitted for award of any degree in this or other universities elsewhere.

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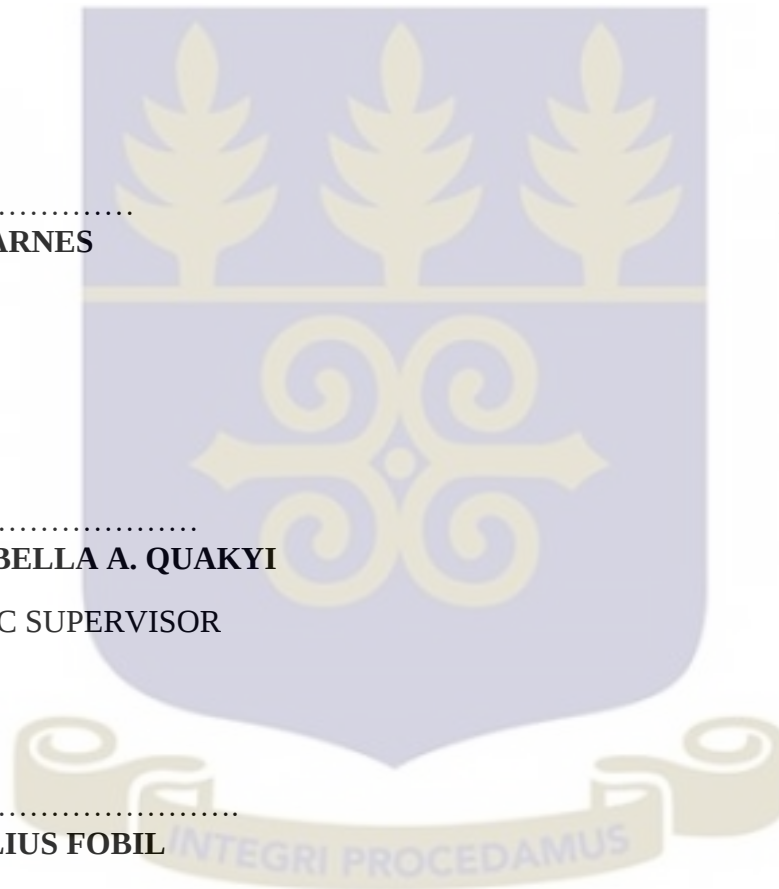
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DEDICATION

This thesis is dedicated to all who have sacrificed their comfort and supported me unflinchingly in the last year, especially my husband, Felix Barnes and my sons, Paa Kwesi and Kwamena Barnes. Special dedication also goes to my sister Cynthia Adu-Boakye and my in-laws, Col. (Rtd.) & Mrs. Barnes. Thank you for the amazing support.

God bless you all.



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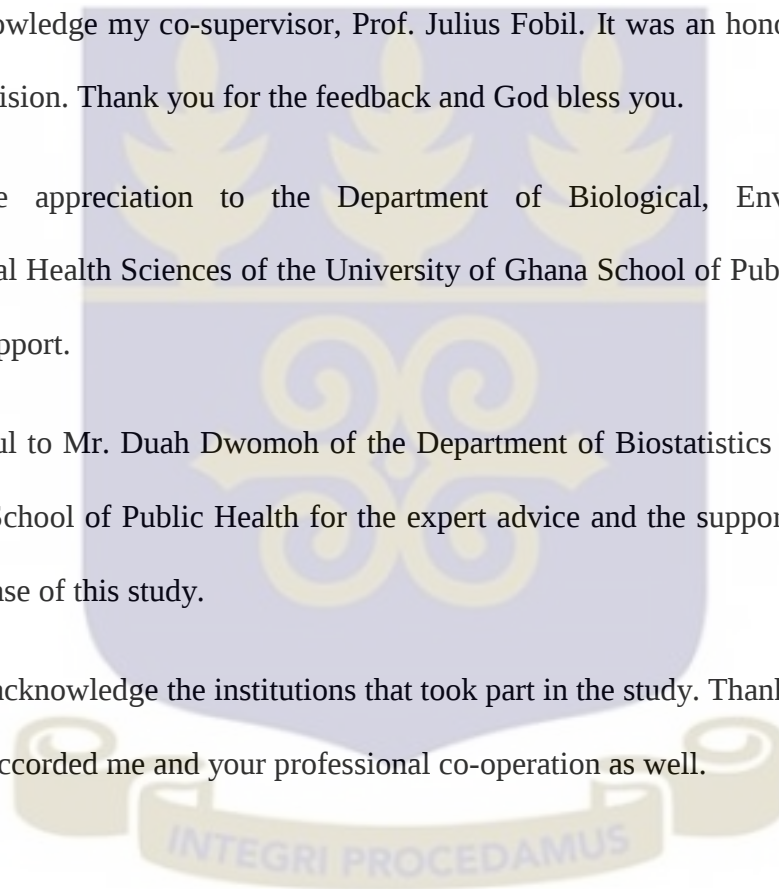
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ABSTRACT

Introduction

An increase in industrial activities without a corresponding increase in management infrastructure has significantly resulted in growing environmental and occupational health concerns. The absence of appropriate regulatory mechanisms and the requisite expertise in environmental and occupational health have mainly been responsible for most health challenges in Ghana.

Objectives

An investigation was therefore conducted to assess the financial, institutional and human resource capacity needs of Environmental and Occupational health in Ghana.

Methods

The study adopted a descriptive cross-sectional and quantitative data collection approach using a structured questionnaire. A total number of eighty four respondents were randomly selected from relevant ministries, departments, agencies, international non-governmental organizations, tertiary training institutions with accredited degree programs in environmental and occupational health and a cross-section of industrial entities with operational presence or head office in Accra, Ghana for the study.

Results

The findings of the study revealed that institutional capacity was statistically stronger, recording a mean value of $80 \pm 12.2SD$ and the most statistically significant institutional capacity attributes were the criteria for recruiting new employees and working space ($P < 0.05$). Financial capacity was also found to be statistically strong, recording a mean value of $74 \pm 15.0SD$ with environmental/occupational health and safety budget allocation being the most statistically significant attribute ($p < 0.05$). Human resource capacity however moderately influenced Environmental and Occupational health with a mean value

of 62±24.3SD and significant among the attributes were the proportion of departmental staff with Environmental and Occupational Health and Safety expertise and the total number of Environmental and Occupational Health and Safety staff ($p<0.05$). A collaborative approach where human resource, institutional and financial capacity building are harmonized will yield significant benefits for the country and eliminate the need to deal with challenges arising from poorly balanced development.

Conclusions

The study suggests that adequate and proper training and effective capacity building in Environmental and Occupational Health in Ghana should be prioritized. Positioning qualified individuals to head Environmental and Occupational health services must also be considered. This study emphasizes the need for all relevant institutions to increase funding allocation for Environmental and Occupational Health and Safety in order to invest in institutional development and human resource capacity building.

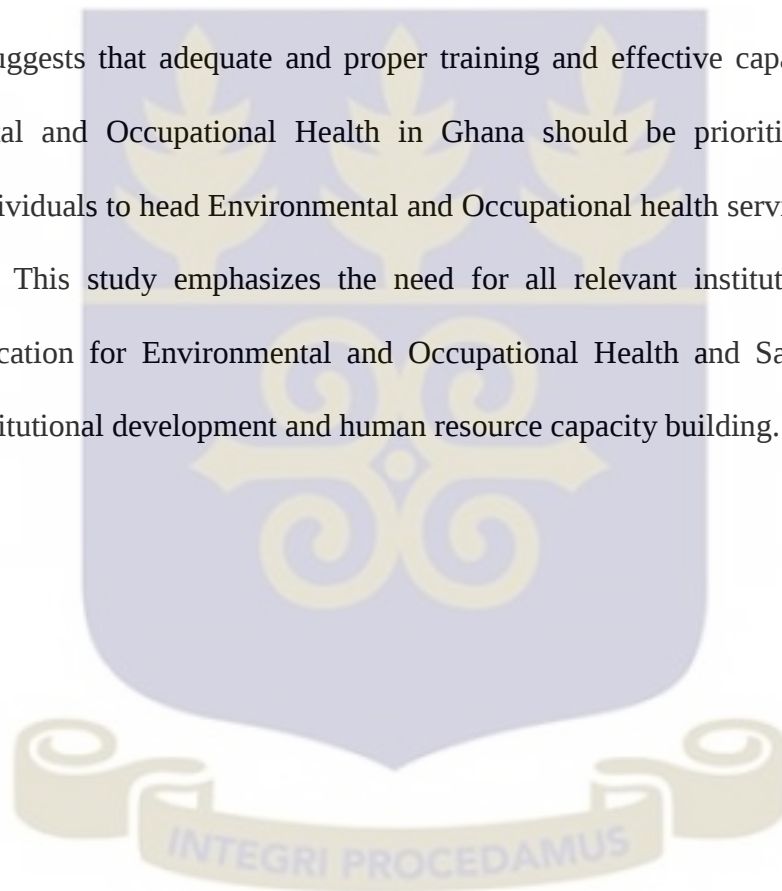
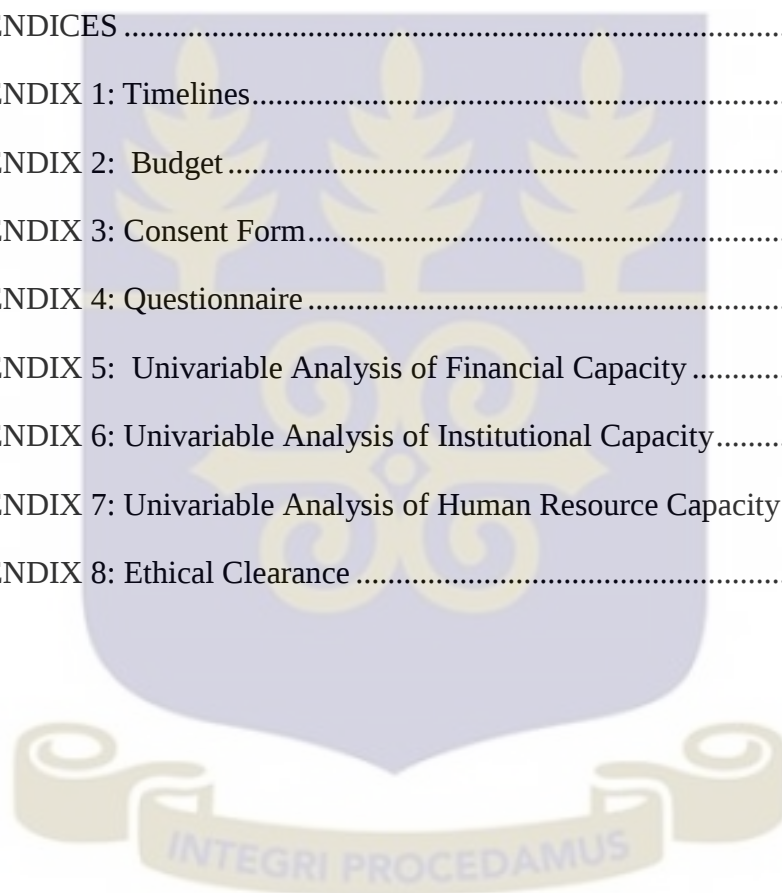


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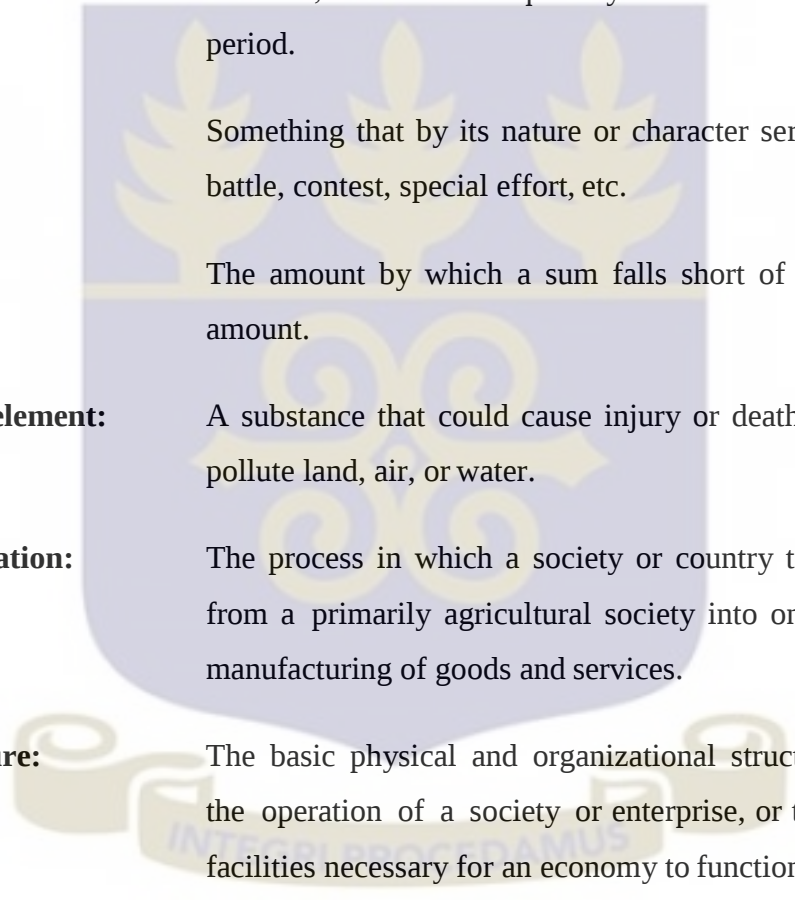
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LIST OF ABBREVIATIONS

EOHS	-	Environmental and Occupational Health and Safety
EOH	-	Environmental and Occupational Health
ILO	-	International Labor Organization
KNUST	-	Kwame Nkrumah University of Science and Technology
MSc	-	Master of Science degree
NOA-EOHG	-	Needs and Opportunities Assessment of Environmental and Occupational Health in Ghana
PM	-	Particulate Matter
UNFPA	-	United Nations Population Fund
WHO	-	World Health Organization

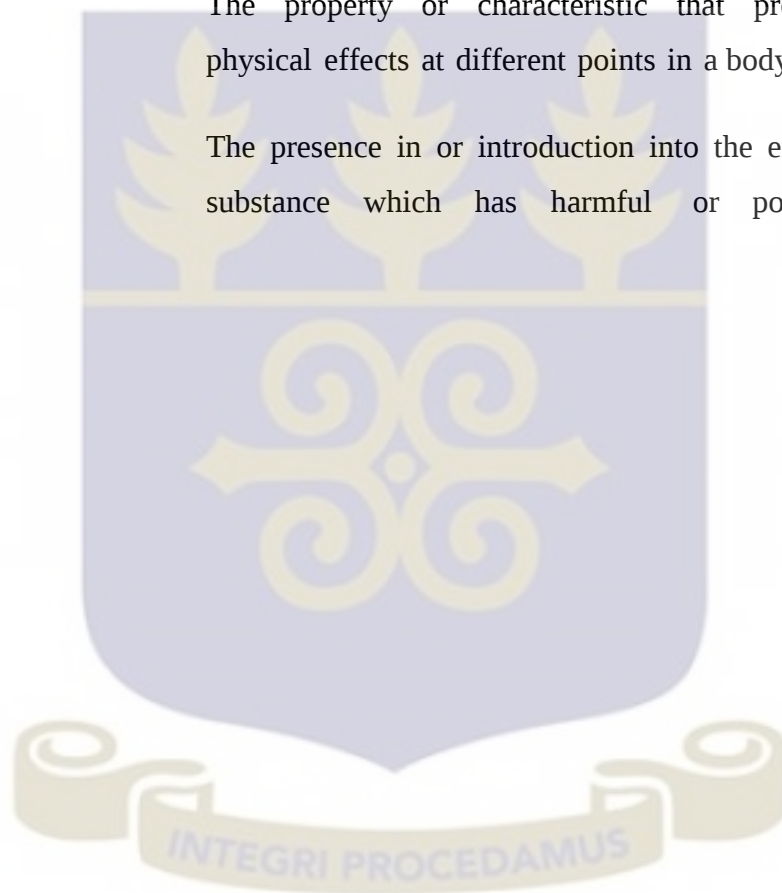


DEFINITION OF TERMS



Advocacy:	Public support for, or recommendation of a particular cause or policy.
Biomass:	Biological material derived from living, or recently living organisms.
Capacity:	Specific ability of an entity (person or organization) or resource, measured in quantity and level of quality, over a period.
Challenge:	Something that by its nature or character serves as a call to battle, contest, special effort, etc.
Deficit:	The amount by which a sum falls short of some reference amount.
Hazardous element:	A substance that could cause injury or death; or damage or pollute land, air, or water.
Industrialization:	The process in which a society or country transforms itself from a primarily agricultural society into one based on the manufacturing of goods and services.
Infrastructure:	The basic physical and organizational structure needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function.
Institution:	An established organization, especially one dedicated to education, public service, production of consumer goods, etc.
Legislature:	A deliberative body of persons, usually elected, who are empowered to make, change, or repeal the laws of a country or state; the branch of government having the power to make laws, as distinguished from the executive and judicial branches of government.

Life expectancy:	The average period that a person may expect to live.
Optimal:	Best or most favorable outcome
Particulate matter:	A complex mixture of extremely small particles and liquid droplets.
Partnership:	An arrangement where parties agree to cooperate to advance their mutual interests.
Polarity:	The property or characteristic that produces unequal physical effects at different points in a body or system.
Pollution:	The presence in or introduction into the environment of a substance which has harmful or poisonous effects



CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

A World Health Organization report in 2006 showed that environmental factors play a role in more than eighty (80) percent of the diseases that it regularly reports. This coupled with occupational health challenges as a result of poor regulation and poor management infrastructure has created a double burden for most countries. Developing countries including Ghana have been the most affected as a result of increased industrial activities and urbanization. Developed countries have achieved great feats in this regard and continue to improve. Efforts at the international level to correct, establish and maintain safe and environmentally friendly operational standards are commendable. The World Health Organization and the International Labor Organization are examples of such agencies working tirelessly in this regard. This, in the absence of complementing efforts at regional and national levels is insufficient. It remains imperative that a global concerted effort is harnessed and effected.

According to the International Labor Organization, each year there are two million occupational health-related deaths, about one hundred and sixty million occupational health-related diseases and two hundred and seventy million occupational health injuries. Most of these losses and the resultant deprivation to families, employers and countries are preventable. Appropriate regulations and infrastructure will constitute an enabling environment for safe environmental and occupational health practices to thrive.

An increase in industrial activities in Ghana with a palpable absence of managing mechanisms has resulted in growing occupational health concerns. This underscores the need to have protocols and a strong policy framework aimed at protecting human lives and limiting exposure to an acceptable minimum, while preserving the environment.

The practice of environmental and occupational health encompasses both preventive and curative aspects and is constantly being challenged to evolve. Its focus has broadened to include the study of diseases thought to be related to the environment and the linkages between them. A lot of research has gone into improving this discipline but this has mostly been in developed countries as developing countries are perceived to lack the capacity to launch into this area. The need to rise to the challenge cannot be over-emphasized. Development in the area of collaborative research, training and partnerships is long overdue. Active engagement of research/ training institutions is a recommended first step in this capacity strengthening agenda. These institutions can then objectively inform policy through evidence-yielding innovative research. This will require both human resource capacity building and matching academic infrastructure, as well as adequate financial commitment.

1.2 Statement of the problem

According to a UNFPA report (2014), the world's population has seen a tremendous increase and this has largely occurred in developing countries. This has greatly increased labour availability especially in the urban areas and contributed to development. Ghana has in the last several decades made significant developmental strides. Industrialization has been welcomed and previously abandoned land is now home to impressive establishments. The need to conserve the environment and preserve and protect the citizenry may not have been accorded due regard in the hurried flight to join the industrialization wagon. The consequence has been the generation of waste at an unprecedented rate and loss of the environment's aesthetic value through deforestation and air, water and land pollution. Sprawling industries and real estate developments have contributed more than their fair share to environmental depreciation in urban areas. Rural

dwellers continue to cling to unhealthy cultural, traditional and farming practices such as sharing water sources with domestic animals and lack of discretion with excretory habits. These and other significant factors such as climate change continue to register a strong presence as far as lowering environmental quality is concerned. Emerging details about environmental emissions from indoor and outdoor sources have been disturbing and of great concern is the unacceptable level of particulate matter (PM). These have far exceeded acceptable World Health Organization (WHO) limits (Dionisio et al., 2010). A review of existing environmental laws and enforcement must be done without compromise.

Occupational health issues go hand in hand with environmental issues and cannot be looked at separately. This has also not received enough attention in Ghana. Occupational health and safety in Ghana is governed by the Workmen's Compensation Law of 1987; Factories, Shops and Offices Act and the Labour Act, 2003 (Act 651.) These have no mechanism in place to capture data from the country's large informal sector. Data however gathered from the formal sector raises questions about the resource capacity of the governing bodies. For instance, a workmen's compensation study in 2010 revealed a backlog of ninety four (94) percent of claims. These were from both the private and public sectors. Regulatory gaps, poor monitoring and the absence of adequate legal backing have been cited. These have led to increasing labour discontent, agitation over unpaid claims and employer hostility, to name a few. There is lack of evidence to show strong government support. The shadow cast by lack of data from the informal sector and speculations of under-reporting from the formal sector leaves government and allied agencies uninformed and crippled as far as pushing the agenda of environmental and occupational health prioritisation is concerned. The disturbing findings and subsequent recommendations in Accra by Dionisio et al., (2010) lend reason to the fact that

environmental issues have not been given the due attention. Despite growing Environmental and Occupational Health concerns in Ghana, very little is being done to strengthen this area.

1.3 Justification

There is an undeniable need to strengthen capacity for Environmental and Occupational Health in Ghana. The role of academia as the pillar that informs policy through research is paramount. A Needs and Opportunities Assessment was planned and undertaken on the level of awareness of Environmental and Occupational Health in Ghana but no situational analysis has been detailed on financial, institutional and human resource capacity needs. This study seeks to establish that, to provide baseline data on the current status of financial, institutional and human resource capacity and needs in this discipline. This will in turn contribute to a good foundation on which to launch Environmental and Occupational Health training and research in Ghana.

Ghana has a decent share of academic integrity to support the growth and development of Environmental and Occupational Health in the West African region. There are internationally recognized research and training institutions which have played and continue to play various leading roles in the sciences, arts and humanities and is fully poised to do further exploits.

1.4 Research Questions

1. What are the financial capacity needs of EOH in Ghana
2. What are the institutional capacity needs of EOH in Ghana?
3. What are the human resource capacity needs of EOH in Ghana?

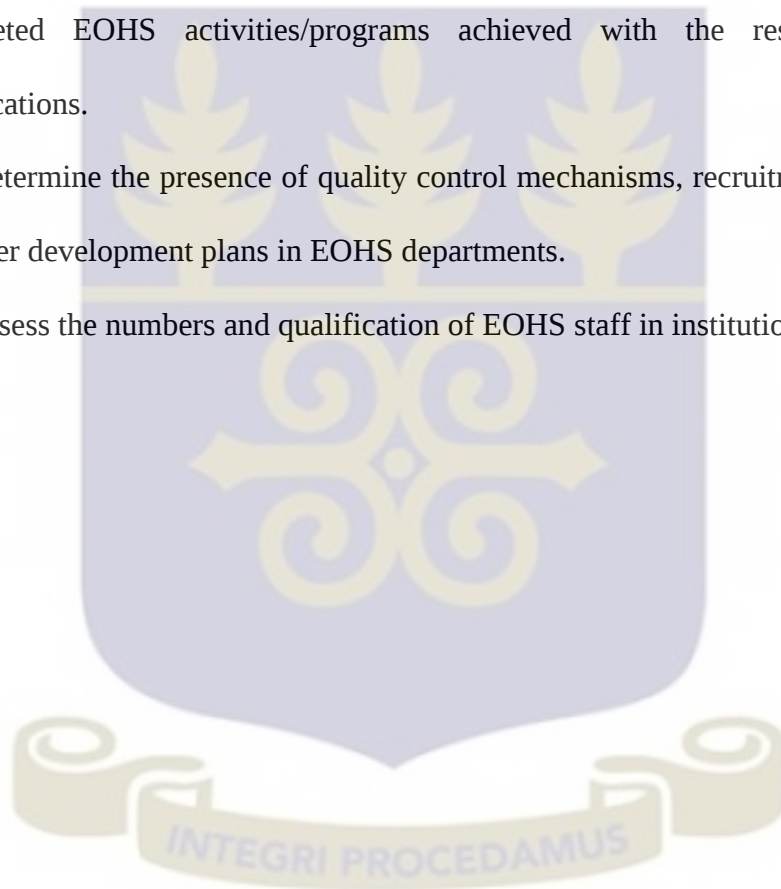
1.5 Study Objectives

1.5.1 General Objective

To assess the financial, institutional and human resource capacity needs of EOH in Ghana

1.5.2 Specific Objectives

1. To assess the annual EOHS budget allocation of institutions and the percentage of targeted EOHS activities/programs achieved with the respective budget allocations.
2. To determine the presence of quality control mechanisms, recruitment criteria and career development plans in EOHS departments.
3. To assess the numbers and qualification of EOHS staff in institutions.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

There is a global consensus that the progress of health and related services is greatly dependent on strengthening research capacity (Cooke, 2005). This will go a long way to objectively inform the development of policies. Evidence-based and evidence-informed policies have seen remarkable success in developed countries and provided lasting solutions to health challenges. Developing countries have been proposed in this positive loop (Ezeh et al., 2010; Lansang & Dennis, 2004) and the need for a paradigm shift in public health focus to accommodate emerging needs in environmental health in Africa (Nweke & Sanders, 2009) cannot be over-emphasized. Notwithstanding, the face and practice of occupational health is dynamic and promising (Zodpey, Negandhi, & Tiwari, 2009). The growth of local research in low and middle income countries has been slow and unimpressive (Adam, Ahmad, Bigdeli, Ghaffar, & Røttingen, 2011) and requires focused and deliberate interventions to realize the desired improvement in capacity (Simister & Smith, 2010).

Global attention to occupational health is also slowly gaining ground as the sub-optimal working conditions of a substantial proportion of the world's population is coming to light (LaDou, 2003; Macik-Frey, Quick, & Nelson, 2007).

2.2 EOH financial capacity and needs

The financial capacity of an institution involves the maximum output that the institution is capable of, in terms of assets, physical cash and cash flow at a point in time. There has

been a general increase in funding for research on account of increasing philanthropic organizations which have greatly complimented the traditional United Nations agencies which were almost exclusive donors (Moon et al., 2010). Adequate funding and consequent strengthening of institutional capacity are necessary drivers toward achieving optimal environmental and occupational health practice. Budget allocations to departments are influenced by a number of factors including perceived or actual relevance of the department's activities and subsequent impact on the organization's activities and objectives. This implies that where a perception is held that EOHS is paramount, funding is not expected to be a challenge and vice versa.

Funding for organizational activities may be internally generated or from external sources. Institutions generally have some control over internally generated funds as far as its channeling is concerned. External funding such as those from donor agencies come with obligations and pre-dictated conditions. These may or may not meet the priority needs of countries or institutions. Funding for health-related activities therefore tends to show a discriminatory trend (Lordan, Tang, & Carmignani, 2011), and this is determined by the donors and not a needs-based prioritization criteria. This lends reason to the observed phenomenon of some disciplines gaining more funding attention than others and subsequently performing better. Another hurdle yet to be cleared is the opinion held by decision- makers that Occupational Health and Safety (OHS) is a luxury (Radon et al., 2010). However, an increase in external funding may not necessarily bring about a resultant increase in an organization's overall financial status. This is because governments in developing countries have been shown to cut budget allocations to sectors that benefit from donor funding. This then is mere replacement and not augmentation and adds no true value to the financial status of institutions (Farg, Nandakumar, Wallack, Gaumer, & Hodgkin, 2009). There is also an argument that

adequate funding is not the fueling factor in achieving this feat but rather, a proper co-ordination of events rooted in accurate empathy and moral obligation (Martin, Grant, & D'Agostino, 2012). It appears therefore, that there is no problem with availability of funds but rather its accessibility. Relationships between donor agencies and recipient countries have come under scrutiny for conflicts of interest and subsequent compromise of public health objectives (Stuckler, Basu, & McKee, 2011).

2.3 EOH institutional capacity and needs

This involves the physical and organizational infrastructure of an institution as well as its career/curriculum development plans. The development and maintenance of partnerships, both locally and internationally appears to be a very important step in capacity building. A significant number of global partnerships especially between developed and low income countries have seen fruitful research collaborations and resulted in significant strengthening of health systems (Rosenthal et al., 2012). The strength of unity comes to play as the call for international partnerships seems to get louder (Bridbord et al., 2006; Gonzalez, Block & Mills, 2003). This in no way gives an indication or excuse for developing countries to rest on their oars as national development progress should match international standards (Frenk, 2010). A successful partnership in British Columbia, Canada between researchers, healthcare employers and healthcare unions resulted in over fifty one (51) million Canadian dollars being saved from the healthcare budget of British Columbia alone. High injury rates were also drastically reduced (Yassi, Tomlin, Sidebottom, Rideout & De Boer, 2013). Partnerships are not without challenges and the most significant is when there is a conflict of interest. These should however not be allowed to overshadow the benefits and isolated efforts should not be preferred to concerted efforts (MacLachlan, 2009) as the synergistic effects of the latter have shown to have better results. Different countries have been shown to be at various levels in the

progress ladder, ranging from occupational health non-existence to systems that have been established for almost two hundred (200) years (Radon et al., 2010). The anticipated misfit from the wide variations in institutional capacity and status should also not be a deterrent as research evidence has shown optimism (Macik-Frey, Quick, & Nelson, 2007).

Continuous education for the occupational health expert is required to maintain excellent delivery and must not be compromised on. This process has been termed “Knowledge infrastructure” and defined as “the sum of all resources and means available to find relevant new knowledge for problems at hand” (Hugenholtz, Schreinemakers, A-Tjak, & van Dijk, 2007). Career development programs have proved relevant and recent calls to improve this area have not been discounted (McDonald, 2005). A good career development plan has been shown to be a non-financial incentive and a great motivating factor as well as improving staff retention. For training institutions, a “national curricula strengthening body” (Ueffing et al., 2009) has been recommended to ensure overall improvement and to maintain competitive standards. Training in Occupational Health and Safety has been shown to positively affect worker practices (Robson et al., 2012). A study in Australia showed that an increase in the number of Occupational Health specialists has drawn the needed attention to its policy and practice, carving for itself, an operational and strategic niche in organizations (Zanko & Dawson, 2012). Work-based training and upgrade programs have been shown to be effective (Matovu et al., 2013). This includes the utilization of online resources and eliminates the need to cover physical distances before receiving certified training (Birch & Burnett, 2009).

A never-ending cycle of improvement is necessary for maintenance of organizational infrastructure to deal with emerging health challenges (Baker et al., 2005) and

occupational health disparities (Landsbergis, Grzywacz & LaMontagne, 2014). These emerging challenges are dynamic and present at different periods, thus a stagnated system will fall short of achieving its targets. The presence of strong and dynamic quality control mechanisms are an added asset and a boost to institutional capacity. An initiative in a general hospital in Southern Thailand to improve output of its staff included training programs targeted at preventing work place violence. This decreased the risk of becoming a victim of violence by forty (40) percent and acted as a measure to control and improve quality of service delivery (Kamchuchat, Chongsuvivatwong, Oncheunjit, Yip & Sangthong, 2008). This trend has served as an example not just in the Thai region but also in the larger Asian region. A dedicated department with appropriate structures and minimal interference is paramount and has become a common phenomenon for most institutions. The models however differ in complexity from institution to institution, as well as mode of adaptation. The developing world continues to take cues from the developed world in this regard.

2.4 EOH human resource capacity and needs

Human resource is defined as the personnel of a business or organization, regarded as a significant asset in terms of skills and abilities. It is the most easily available and potentially cost-effective resource and when harnessed appropriately can contribute significantly to national growth.

Empowered human resource in organizations significantly helps in the achievement of the targeted objectives (Jabbour, Jabbour, Teixeira, & Freitas, 2012) and it is known that the developing world currently lacks the required expertise to address environmental and occupational challenges presented by industrialization (Forst, 2004). Developed countries also however have their fair share of human resource challenges (Baker et al.,

2005) and have come a long way from managing coal miners, plantation and construction workers in the not too distant past to skilled corporate employees and relatively unskilled farm workers to name a few. Parallel managing entities such as union groups ensure fairness to an extent and minimize potential excesses.

The call for impartial measures and approaches toward research capacity strengthening may have brought to light the fact that general efforts at improvement in Sub Saharan Africa have been on the rise but a low human resource capacity is producing an unhealthy balance (Minja et al., 2011). In all decisions concerning staff or employee numbers, financial implications are considered and the debate of quality and quantity is unavoidable and invariably considered. A small number of skilled employees may work well for one organization while a large number of relatively unskilled employees under the supervision of a skilled and experienced employee solve the labor concerns for some organizations. Strength in numbers and the value of quality continue to tango for the number one spot.

Skilled labor force counts toward quality, as suitably qualified and skilled personnel will better be in a position to steer EOH affairs. These experts will also have to be guarded against knowledge stagnation to better serve in their disciplines. This will make room for overall growth of the organization or institution. This is a competitive platform and may work against new graduates who are considered relatively inexperienced as it is time and cost saving for institutions to employ experienced persons.

Depending on the demands of the labor market and human resource availability, employers may either have to recruit unqualified persons to fill certain vacancies or may have to import the requisite human resource at the expense of local expertise. These present different challenges at different stages in the organization.

CHAPTER THREE

3.0 METHODOLOGY

This chapter presents the methods of the study. It involves the following areas: the study site, study design, study population, sample size and sampling procedure, data collection, ethical considerations, data processing and statistical analysis and quality assurance.

3.1 Study design

The research undertaken was a questionnaire-based cross-sectional study. The study provides a snapshot of the frequencies and attributes of the financial, institutional and human resource capacity needs of environmental and occupational health of selected institutions at a point in time. Data on the sector of the institution (private or public), mandate, financial capacity needs, institutional capacity needs and human resource capacity needs were obtained from the study subjects one at a time.

3.2 Study area

The study was carried out in Ghana, West Africa and all the institutions recruited had operational presence in the national capital, Accra.

Ghana covers a land area of 238,533km and bordered on the East by Togo, the West by Cote d'Ivoire, the South by the Gulf of Guinea and the North and North West by Burkina Faso. Ghana's population from a United Nations estimate in 2011 stood at twenty five (25) million and is unevenly distributed with an estimated rural-urban

migration of ten (10) percent, according to the Ghana Living Standards Survey in 2008.

3.2.1 Greater Accra Region

The Greater Accra Region (GAR) is the smallest in terms of size and occupies a land area of 3,245km² in the southern part of Ghana. The capital is Accra, which is also the nation's capital. The region's population at the 2010 census was 4,010,054 and is the second most populated region with a population density of 1200/km². The boundaries to the north and east are the Eastern Region and the Volta Lake respectively, on the south by the Gulf of Guinea, and on the west by the Central Region. The manufacturing and services industries constitute the bulk of economic activities in the Greater Accra Region.

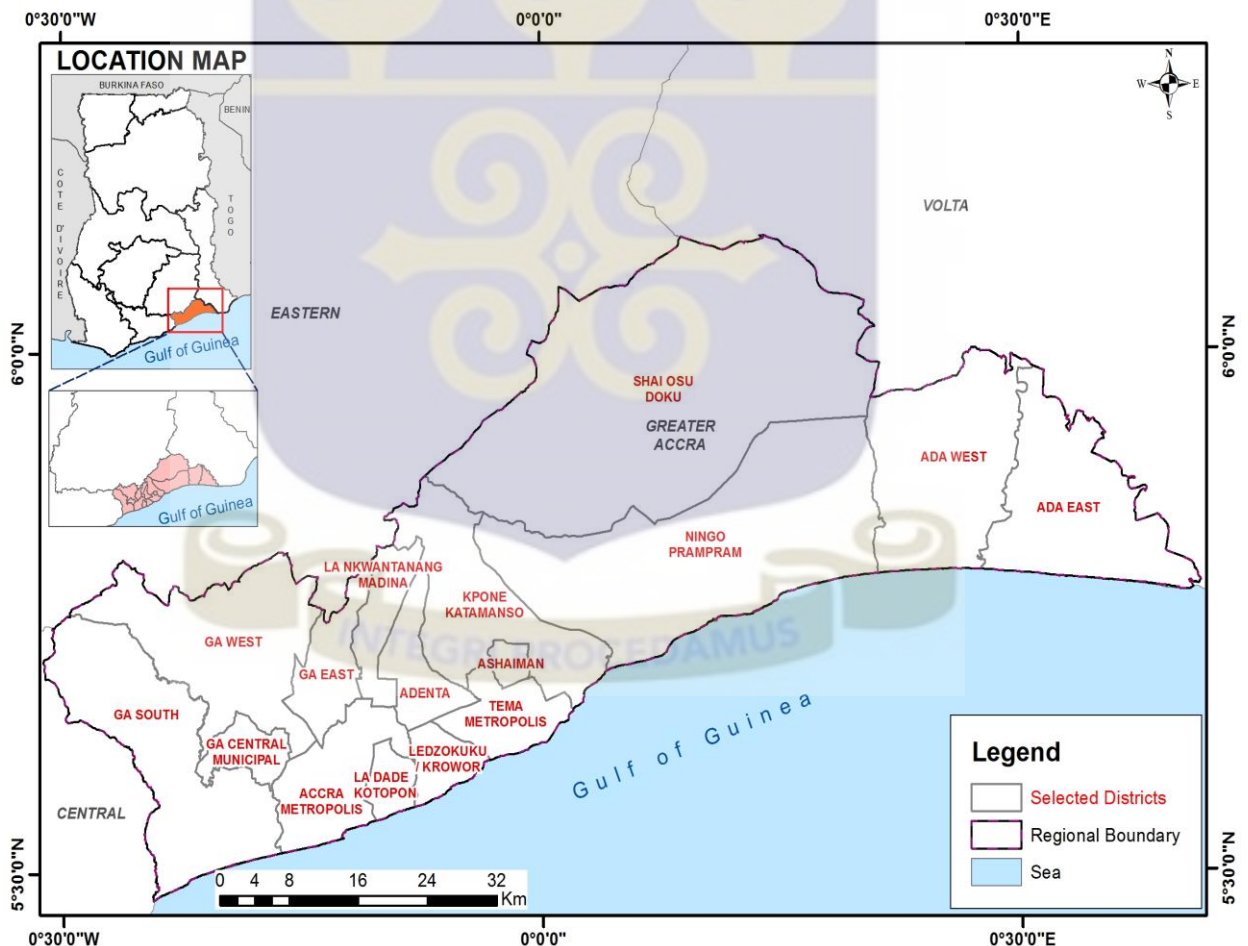


Figure 1: Map of Ghana with the Greater Accra Region highlighted

3.3 List of Attributes

Financial Capacity Attributes: Proposed annual budget, annual budget allocation, EOHS budget allocation, percentage of EOHS targets achieved annually, auxiliary funding and budget structure.

Institutional Capacity Attributes: Adequacy of physical space, career/curriculum development plan, presence of quality control mechanism, operational capacity, staff recruiting preference and existence of inter-organizational partnerships.

Human Resource Capacity Attributes: EOHS staff numbers, minimum required staff numbers (per institutional protocol), team leader or head of department's degree qualification and expertise, degree qualification of senior and junior staff, institutional educational requirements and the proportion of EOHS staff with EOHS expertise.

3.4 Sampling

Sampling method

The following was the criteria for selection:

1. Medium and large scale industries with operational presence or head office in Accra and were duly and legally registered.
2. Relevant international Non-Governmental Organizations with resident presence in Ghana.
3. Relevant ministries, departments and agencies in Accra, Ghana.
4. Tertiary training institutions recognized by the National Accreditation Board and with degree programs in environmental and occupational health and safety qualified to participate in the study.

An extensive internet search using the Google search engine and the websites of the Association of Ghana Industries, Government of Ghana, ghanabusinessdirectory.net, the business directory of ghanaweb.com and yellowpages.com.gh was conducted to select the institutions. A total of three hundred and eleven entities were identified.

The sample size generated online at www.surveysystem.com was seventy four (74), using a confidence level of 95%. An extra ten (10) was added to account for losses and so a sample size of eighty four (84) was obtained.

The eighty four (84) institutions were selected using an online random number generator (www.randomnumbergenerator.com). They were categorized and grouped based on six (6) broad mandates: Research and Training; Policy; Services; Manufacturing and Processing; Monitoring and Extraction.

All tertiary training institutions and research centers were grouped under ‘Research and Training’. Eight (8) such institutions were selected.

Pharmaceutical companies, textiles manufacturing companies, food and beverage processing companies and raw and intermediate materials processing companies were grouped under ‘Manufacturing and Processing’. Twenty eight (28) such institutions were selected for the study.

Institutions that were directly into mining and oil and gas drilling were categorized as ‘Extraction’. Nine (9) of the selected institutions were categorized as such.

Institutions or enterprises involved in waste management; municipal water purification and supply; power generation; automotive sales and servicing; biomedical and health services; border and immigration services; petroleum products storage, distribution and refinery; print media and building and construction were categorized under ‘Services’. Twenty (20) selected institutions fell under this category.

All ministries and departments as well as international aid and non-governmental

organizations were categorized as ‘Policy’ and this mandate was represented by sixteen (16) institutions.

Those mandated to ensure compliance with government-regulated protocols were grouped under ‘Monitoring’. Three (3) of these were selected. The selected institutions and their mandates are shown in Table 1.

Table 1: Mandate of Selected Institutions

Mandate	Number
Research and Training	8
Manufacturing and Processing	28
Extraction	9
Services	20
Policy	16
Monitoring	3

3.5 Data Collection Technique/Tools

A two-step approach was utilized in the study. The first part of the study involved making enquiries on the presence of a functional environmental and occupational health and safety department within the facility. Contact was made with the selected institutions via emails and phone calls using details obtained from the internet. This initial contact was to verify their existence. These were all followed up with visits to verify the authenticity of the claims. In all situations, the purpose of the study was made clear to respondents and further clarification given if requested. Most of the institutions requested to know if it was

a government audit that had been contracted to the School of Public Health and masked as research. Assurance was given that it was an independent study being conducted and the government of Ghana was not involved. The institutions that had no functional environmental and occupational health department did not proceed further with the study. Where the authorized or relevant persons were not available during the visits even though prior appointments had been made, enquiries were channeled through emails and or phone calls to contact persons listed on the institution's website or senior employees who had active accounts on LinkedIn, a professional networking website.

The institutions that had functioning environmental and occupational health and safety departments were further engaged in the second step.

The second step involved completing a four page questionnaire ordered in five sections. The first section contained the introduction and purpose of the study, the privileges and courtesies owed them as participating institutions and the ethical obligations of the principal investigator. It also contained the consent form which all participating institutions were required to sign before completing the questionnaire. The second part contained the background details. These specifically required institutions to state whether they were private or public entities, their mandate and duration of operation in Ghana. The third, fourth and fifth parts consisted of financial, institutional and human resource capacity indicators respectively.

Under the financial capacity section, each institution was requested to state their annual budget allocation and the amount proposed before the allocation, preferably in Ghana cedis. Where this was not adhered to, all foreign currencies quoted were converted to Ghana cedis using Bank of Ghana rates of 9th July, 2015 (week 28), which was available on their website, www.bog.gov.gh (US\$=GHC 3.5445; €=GHC 3.9121). Other details that served as indicators of financial capacity were percentage of annual budget dedicated to

EOHS activities; percentage of targeted EOHS activities that were achieved during the year; the presence or absence of auxiliary funding and whether the departmental budget structure was flexible or fixed.

Questions in the section that addressed institutional capacity sought to find out about the presence or absence of a career or curriculum development program or plan for staff, the presence of a quality control mechanism and the institutions' staff recruiting preference or criteria. The institutions were also asked about current operational status, whether they were operating at maximum capacity or not and whether they had undergone any kind of expansion since commencing operations. The adequacy of space was also an indicator that was used and related questions were stated as objectively as possible. One attribute used was 'desk sharing'. They were specifically asked if staff had to share desks on account of lack of space. They were also asked if staff had to work in shifts as an improvised measure necessitated by lack of space. The presence or absence of partnership(s) with other institutions was also used as an attribute of institutional capacity.

Human resource attributes that were used in the study were current staff numbers (total number of staff, number of senior staff, and number of junior staff) and degree qualifications and expertise of departmental heads, degree qualifications of senior staff and junior staff and percentage of EOHS departmental staff with EOHS expertise. The human resource section also contained requests for details on minimum required staff numbers and degree qualifications for the various categories of staff (per institutional protocol) in the EOHS department. Persistent performance of overtime duties and constant backlog of work load were also enquired about. These were used as objective indicators of adequacy of staff numbers.

The contact details of the principal investigator were made available to the resource persons at the various institutions to be used if the need for clarification arose.

The questionnaires were delivered to the contact persons in the institutions and picked up at an agreed date, upon notification of completion. In situations where it was not possible to make appointments, walk-in visits were made and the relevant persons were met either the same day or a scheduled date to explain the study and its purpose. Per prior agreement, emails were sent to departmental heads or other delegated persons with the questionnaire attached when no meeting could be arranged. These were filled and returned at later dates.

3.6 Quality control

Questionnaires were brief and easy to understand. They were pre-tested in small scale industries in the Greater Accra Region, precisely in and around the Tema industrial area and institutions with non-degree awarding programs in environmental and occupational health in Ghana.

3.7 Data processing

All the questionnaires were examined and the ones with incomplete responses were excluded from analysis. Forms were created in Microsoft Office Excel (2013) and data entered via same after validation was done in the Excel forms. All ‘yes’ and ‘no’ responses were coded 1 and 0 respectively except for the attribute ‘shared desks’ where ‘yes’ was coded 0 and ‘no’ 1. This was because desk sharing was an indication of inadequate space and had to be assigned a lower capacity score. All string data were also recoded into numerical data for ease of analysis.

3.8 Data Analysis

The data was imported into STATA (version 13) software for analysis, after cross-

checking with hard copies to ensure consistency. After the summary statistics were obtained, the variables, financial, institutional and human resource capacity were created. This was done in the following manner. Financial capacity was created using the percentage of budget proposal approved and the percentage of EOHS targets achieved based on the budget allocation. Institutional capacity was created using the presence or absence of a quality control mechanism, the presence or absence of inter-organizational partnership and a career/curriculum development plan. Human resource capacity was created using the percentage of staff with EOHS training/skills. All the attributes for a particular variable had equal scores and summed up to one hundred (100) percent. These variables were then scored and graded. The grading was done as follows: Less than fifty (50) percent - very weak; fifty (50) to fifty nine (59) percent - weak; sixty (60) to sixty nine (69) percent - moderate; seventy (70) to seventy nine (79) percent - strong; eighty (80) percent or more - very strong.

Univariable analysis was carried out with all the attributes that were not included in creating the respective variables. A multiple linear regression analysis with robust standard error estimation for confidence interval was carried out on the attributes that showed significant associations with the variables.

3.9 Ethical Considerations

Ghana Health Service Ethical Approval: A proposal was sent to the Ethical Review Committee of the Ghana Health Service Research and Development Division

Institutional Approval: Approval was sought from participating institutions before the study commenced.

Informed Consent: Each participant signed a consent form after a detailed description of the purpose and nature of the study was given.

Potential Risks and Benefits: The study posed no potential risk nor harm to participants. Instead,

the outcome of the study will help contribute significantly to strengthening EOH in Ghana.

Privacy and Confidentiality: Representatives of the participating institutions completed the questionnaires in their respective institutions and no reference was made to any institution and its contribution. All information gathered was and is still being treated as confidential.

Data Storage and usage: Information obtained from participants is password protected and only accessible to the principal investigator, supervisor and co-supervisor.

Voluntary withdrawal: Participants had the option to withdraw voluntarily at any point during the study and not incur any penalty.

Compensation: Participants received no financial benefit or incentive at any point during the study.

Conflict of interest: The principal investigator has no conflict of interest in this study.

3.10 Limitations of the Study

Enquiries about financial details of institutions appeared very sensitive and some of the participating institutions declined to comment. Some of the multi-national institutions had a long chain of command and had still not received permission to go ahead with the study as at the time data analysis was commencing. These institutions had to be exempted from the analysis, which resulted in a relatively low response rate.

Some resource persons in the institutions were not accustomed to research and would not permit an assessment of any kind on their premises. The limited access presented by this challenge prevented certain important details such as physical space and details of quality control mechanisms from being objectively assessed.

Reliability was however achieved through reassurance of ethical obligations of the principal investigator and direct contact with superior persons in the institutions on a professional networking website.

CHAPTER FOUR

4.0 RESULTS

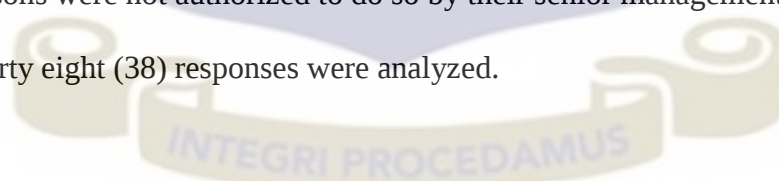
4.1 Introduction

This chapter is sectioned under financial capacity, institutional capacity and human resource capacity.

Twenty one (21) institutions did not have an EOHS department and did not progress to the second step of the study. This constituted twenty five (25) percent of responses obtained. One (1) institution was defunct and was also struck out.

Forty three (43) institutions out of the sixty two (62) that had EOHS departments responded making sixty nine (69) percent and the remaining nineteen (19) cited various reasons for their inability to respond, the commonest being management's decision not to authorize the release of institutional information. Five (5) questionnaires were incomplete and were not included in the data entry. All five (5) institutions declined to state their average annual budget and other details related to their financial capacity as the contact/resource persons were not authorized to do so by their senior management.

A total of thirty eight (38) responses were analyzed.



4.2 Background Characteristics

The background details obtained from the participating institutions are shown in Table 2.

Table 2: Summary of Background Characteristics

Variable	Frequency (N=38)	Percentage
Category		
<i>Private</i>	20	52.6
<i>Public</i>	18	47.4
Mandate		
<i>Manufacturing/Processing</i>	12	31.6
<i>Research/Training</i>	3	7.9
<i>Policy</i>	3	7.9
<i>Extraction</i>	4	10.5
<i>Services</i>	13	34.2
<i>Monitoring</i>	3	7.9
Duration of Operation		
<i>Less than ten years</i>	8	21.1
<i>More than ten years</i>	30	78.9

Out of thirty eight (38) responses received, twenty (20) were in the private sector, representing fifty three (53) percent and eighteen (18) were in the public sector, representing forty seven (47) percent. Twelve (12) of the respondents were in the manufacturing/processing category and constituted thirty two (32) percent of the responses obtained, while thirteen (13) entities were categorized as service providers, representing thirty four (34) percent. The policy, monitoring and research/training categories were each represented by three (3) institutions and constituted eight (8) percent each. The extraction industry was represented by four (4) companies, constituting ten (10) percent of responses. Eight (8) of the institutions had been operating in Ghana for ten (10) years or less and represented twenty one (21) percent, while thirty (30) had been operating for more than ten (10) years. The latter constituted seventy nine (79) percent of responses received.

4.3 Financial Capacity

Table 3 shows the summary of details emerging from the second part of the questionnaire.

Table 3: Summary of Attributes of Financial Capacity

Attributes	Frequency (N=38)	Percentage
Budget Proposal (Approval Rate-%)		
≤50	25	65.7
51-59	-	-
60-69	1	2.6
70-79	2	5.2
≥80	10	26.3
EOHS Allocation (%)		
0-25	32	84.2
26-50	-	-
51-75	3	7.9
76-100	3	7.9
Percentage of EOHS Targets Achieved		
0-25	2	5.3
26-50	7	18.4
51-75	13	34.2
76-100	16	42.1
Budget Structure		
Fixed	15	39.5
Flexible	23	60.5
Auxiliary Funding		
Available	16	42.1
Not Available	22	57.9

Twenty five (25) institutions had less than fifty (50) percent of their proposed budget figure approved. This constituted sixty six (66) percent of the responses. Seventeen (17) of the twenty five (25) institutions were from the public sector, out of which three (3) were Research and Training institutions, two (2) were Monitoring institutions and twelve (12) were categorized under ‘Services’. Only one (1) public institution had an approval rate greater than fifty (50) percent. Eight (8) private institutions had approval rates less than fifty (50) percent, four (4) were Manufacturing and Processing entities, three (3)

were categorized under 'Services' and one (1) was categorized under 'Extraction'. Thirteen (13) of the thirty eight (38) institutions had budget approval rates greater than fifty (50) percent. No institution had an approval rate between fifty one (51) and fifty nine (59) percent. One (1) institution had its budget approval rate between sixty (60) and sixty nine (69) percent, two (2) had approval rates between seventy (70) and seventy nine (79) percent. All three (3) were private institutions. Ten (10) had approval rates of eighty (80) percent or more, out of which nine (9) were private institutions and one (1) was a public institution. Thirty two (32) institutions, constituting eighty four (84) percent had up to twenty five (25) percent of their annual budget allocated to the EOHS department while no institution allocated between twenty six (26) and fifty (50) percent of their budget for EOHS related activities. Three (3) institutions each allocated between fifty one (51) and seventy five (75) percent and more than seventy five (75) percent of their budget, representing eight (8) percent each. Two (2) of the institutions that allocated more than seventy five (75) percent of their budget were public institutions categorized under 'Monitoring' and 'Research and Training' and the third was a private institution categorized under 'Services'. With their respective budget allocations, two (2) institutions achieved up to twenty five (25) percent of EOHS targets and seven (7) institutions achieved between twenty six (26) and fifty (50) percent. These constituted five (5) and eighteen (18) percent respectively. Thirteen (13) institutions achieved between fifty one (51) and seventy five (75) percent of set targets and sixteen (16) achieved more than seventy five (75) percent of EOHS targets. These represented thirty four (34) and forty two (42) percent of responses obtained respectively. Most of the institutions that achieved a greater percentage of EOHS targets were from the private sector. Twenty three (23) of the institutions, constituting sixty (60) percent of responses obtained, accommodated flexibility in their EOHS budgets to cater for urgent EOHS

needs that may arise. Nineteen (19) of these were private institutions and four (4) were public institutions. Fifteen (15) institutions, comprising one (1) private and fourteen (14) public enterprises, maintained fixed budgets. The institutions with fixed budgets represented forty (40) percent of responses obtained. Sixteen (16) of the institutions, representing forty two (42) percent benefited from auxiliary funding, thirteen (13) of these were government agencies and three (3) were private institutions. Twenty two (22) institutions, consisting of seventeen (17) private and five (5) public entities had no such benefit. The institutions without auxiliary funding constituted fifty eight (58) percent of responses obtained.

The lowest annual budget stated was six hundred thousand cedis and the highest was over four billion cedis, each representing three (3) percent of participating institutions. Thirty four (34) out of the thirty eight (38) responding institutions, representing eighty nine (89) percent of responses had an average annual budget less than one billion cedis. The remaining four (4), making up eleven (11) percent had annual budgets over one billion cedis.

The financial capacity variable was created by merging the budget approval rate and proportion of targets achieved. Each of these attributes had equal value and summed up to one hundred (100) percent. The financial capacity was then scored in the following manner: Less than fifty (50) percent - very weak; fifty (50) to fifty nine (59) percent - weak; sixty (60) to sixty nine (69) percent - moderate; seventy (70) to seventy nine (79) percent - strong; eighty (80) percent or more - very strong. The results are shown in Table 4. The mean financial capacity score was 74 ± 15.0 . Institutions with lower budget approval rates and lower proportions of achieved EOHS targets had lower financial capacity scores.

Table 4: Financial Capacity Score

Capacity score	Frequency (N=38)	Percentage
Very Weak	1	2.6
Weak	6	15.8
Moderate	10	26.3
Strong	5	13.2
Very Strong	16	42.1

4.3.1 Univariable Analysis of Financial Capacity.

A univariable analysis was carried out to determine the associations between all attributes used in the study and financial capacity. The results showed correlation between fifteen (15) attributes and financial capacity. One (1) of these attributes was a background attribute (mandate $p=0.0191$). The observed difference was between the extraction mandate and the manufacturing and processing mandate. Nine (9) of these attributes were categorized under human resources. These were total number of EOHS staff ($p=0.0002$), minimum required number of staff ($p=0.0327$), number of senior staff ($p=0.0001$), number of junior staff ($p=0.0173$), number of full time staff ($p=0.0173$) and the presence and persistence of task backlog ($p=0.0043$). Three (3) of the correlations fell under institutional capacity and were staff recruitment criteria ($p=0.0081$) with the observed significance falling between academic experience only and work and academic experience. Two (2) of them were under financial capacity and were EOHS budget allocation ($p=0.0031$) and auxiliary funding ($p=0.0428$). The detailed analysis is displayed in Appendix 4.

4.3.2 Multiple Linear Regression Analysis

A multiple linear regression analysis was further conducted on the attributes that correlated with financial capacity. The attributes that showed significant correlation with financial capacity after multiple linear regression analysis were the total number of EOHS staff ($p=0.004$), number of senior staff ($p=0.001$), staff recruiting preference ($p=0.001$), persistent task backlog ($p=0.010$) and working space ($p=0.031$). The results are displayed in Table 5.



Table 5: Multiple Linear Regression Analysis of Financial Capacity with Robust Standard Error Estimation for Confidence Interval

Financial Capacity Score					
Variable	Adjusted Regression Coefficient	95% Confidence Interval		t value	P value
		Lower	Upper		
Total Number of Staff	-2.2	-7.04	2.65	-0.97	0.004
Minimum Number of Staff Required	0.12	-0.99	1.23	0.23	0.716
Number of Senior Staff	3.74	-0.18	7.29	2.25	0.001
Number of Junior Staff	3.38	-0.17	6.93	2.04	0.716
Number of Full Time Staff	-1.26	-3.75	1.23	-1.08	0.187
Percentage of Staff with EOHS Skills/Training	-0.25	-0.53	0.03	-1.90	0.053
EOHS Budget Allocation(% Annual Budget)	0.01	-0.20	0.22	0.10	0.066
Mandate					
<i>Policy Services</i>	Ref				
<i>Manufacturing/Processing</i>	-1.11	-15.49	13.26	-0.17	
<i>Research/Training</i>	-11.14	-33.72	11.44	-1.06	
<i>Extraction</i>	-8.08	-37.55	21.38	-0.59	0.241
<i>Monitoring</i>	-10.61	-36.13	14.90	-0.89	
<i>Monitoring</i>	-4.72	-17.29	7.86	-0.80	
Team Leader Qualification (degree)					
<i>First</i>	Ref				
<i>Second</i>	5.21	-4.14	14.54	1.20	0.874
<i>Terminal</i>	4.69	-8.67	18.05	0.75	
Recruiting Preference					
<i>Work Experience</i>	Ref				
<i>Academic Experience</i>	27.82	13.09	42.54	4.05	0.001
<i>Work and Academic Experience</i>	33.99	18.46	49.51	4.70	
Qualification of Senior Staff (degree)					
<i>First</i>	Ref				
<i>Second</i>	13.97	0.77	27.18	2.27	0.157
<i>Terminal</i>	17.36	-7.05	41.76	1.53	
Team Leader Expertise					
<i>Non-EOHS</i>	Ref				
<i>EOHS</i>	6.81	-5.20	18.82	1.22	0.361
Persistent Backlog					
<i>Present</i>	Ref				
<i>Absent</i>	11.39	-0.41	23.18	2.07	0.010
Skills Development Plan					
<i>Absent</i>	Ref				
<i>Present</i>	3.34	-7.75	14.43	0.65	0.448
Working Space					
<i>Adequate</i>	Ref				
<i>Not Adequate</i>	-8.99	-19.78	1.78	-1.79	0.031
Auxiliary Funding					
<i>Not Available</i>	Ref				
<i>Available</i>	-10.38	-27.16	6.40	-1.33	0.118

From Table 5, a unit increase in total number of staff will decrease financial capacity score by 2.2 units and a unit increase in number of senior staff will increase financial capacity score by 3.74 units, controlling for all other factors.

A recruiting preference of academic experience only, increases financial capacity score 27.82 times more than a preference of work experience only. Recruiting preference of both work and academic experience increases financial capacity score 33.99 times more than a preference of only work experience, controlling for all other factors.

Possession of EOHS expertise by departmental heads increases financial capacity score 6.81 times more than non-EOHS expertise.

Institutions without task backlogs will increase the financial capacity score 11.39 times more than those with backlogs, holding all other factors constant. The task backlog attribute was used as an objective indicator of sufficiency of staff numbers. Thus institutions with adequate staff numbers will increase the financial capacity score 11.39 times more than those with insufficient staff numbers. Institutions with inadequate working space will decrease the financial capacity score 8.99 times more than their counterparts with adequate space.



4.4 Institutional Capacity

A summary of the details obtained about institutional capacity are outlined in Table 6.

Table 6: Summary of Attributes of Institutional Capacity

Attributes	Frequency (N=38)	Percentage
Quality control		
<i>Present</i>	37	97.4
<i>Absent</i>	1	2.6
Career/Curriculum Development Plan		
<i>Present</i>	24	63.2
<i>Absent</i>	14	36.8
Current Operational Capacity		
<i>Maximal</i>	4	10.5
<i>Sub-maximal</i>	34	89.5
Recruiting Preference		
<i>Work and Academic exp.</i>	26	68.4
<i>Work experience</i>	9	23.7
<i>Academic experience</i>	3	7.9
Inter-organizational Partnership		
<i>Present</i>	26	68.4
<i>Absent</i>	12	31.6
Space (Desk sharing)		
<i>Adequate</i>	16	42.1
<i>Inadequate</i>	22	57.9

As outlined in Table 6, Thirty seven (37) of the institutions, constituting ninety seven (97) percent had a quality control mechanism in place and only one (1) institution, representing three (3) percent had none. The institution that had no quality control mechanism in place was a private and entity that was categorized under ‘Services’. Twenty four (24) institutions, representing sixty three (63) percent had a career/curriculum development plan for their staff. Thirteen (13) of these were public institutions while eleven (11) were private entities. Fourteen (14) institutions had no career/curriculum development plans for their staff, five (5) of which were public institutions and nine (9) were from the private sector. Thus, thirty seven (37) percent of

institutions had no career/curriculum development program for their staff. Four (4) of the institutions were at the time of the study operating at maximum capacity and this represents eleven (11) percent of responses. All these institutions were private sector institutions. Three (3) of them were Manufacturing and Processing industries and one (1) was an extraction industry. Thirty four (34) institutions, constituting eighty nine (89) percent were not operating at maximum capacity.

Twenty six (26) institutions, representing sixty eight (68) percent of institutions listed both work and academic experience as their recruiting preference. Sixteen (16) of these were private institutions and ten (10) were public institutions. Nine (9) institutions, constituting twenty four (24) percent stated work experience as their preference. Four (4) were from the private sector and five (5) from the public sector. Three (3) institutions, constituting eight (8) percent stated academic experience as their preference and all these were Research and Training institutions in the public sector.

Twenty six (26) institutions, which is sixty eight (68) percent were in some form of inter-organizational partnership and twelve (12) were in no kind of partnership. The latter constitutes thirty two (32) percent of responses, ten (10) of which were in the private sector and two (2) in the public sector.

The number of institutions that reported insufficient working space and compromised by sharing desks were twenty two (22) and constituted fifty eight (58) percent while the remaining sixteen (16) institutions, forming forty two (42) percent of responses had no such challenge. Out of the twenty two (22) institutions that reported inadequate working space, fifteen (15) were public institutions while seven (7) were private institutions. Eighteen (18) institutions employed shift work while twenty (20) did not. This represented forty seven (47) percent and fifty three (53) percent respectively. The reasons given were operational schedule, that is, twenty four (24) hour work cycle with two or

three shifts and optimization of space. Thirty (30) institutions had undergone some form of physical expansion since commencing operation. Twelve (12) of them were public institutions and eighteen (18) were private institutions. Eight (8) institutions, six (6) public and two (2) had undergone no expansion. Seventy nine (79) percent of institutions had undergone expansion and twenty one (21) percent had not. All institutional capacity attributes except working space, shift work and physical expansion, were merged to create the variable, institutional capacity. Each of these attributes had equal value and summed up to one hundred (100) percent. The institutional capacity was scored in the following manner: Less than fifty (50) percent - very weak; fifty (50) to fifty nine (59) percent - weak; sixty (60) to sixty nine (69) percent - moderate; seventy (70) to seventy nine (79) percent - strong; eighty (80) percent or more - very strong. The mean institutional capacity score was 80 ± 12.2 . Table 7 outlines the results.

Table 7: Institutional Capacity Score

Capacity score	Frequency (N=38)	Percentage
Very Weak	0	0
Weak	1	2.6
Moderate	7	18.4
Strong	9	23.7
Very Strong	21	55.3

4.4.1 Univariable Analysis of Institutional Capacity

A univariable analysis was carried out to determine the associations between all attributes used in the study and institutional capacity. The detailed results obtained are shown in Appendix 5. The significant attributes were, sector ($p=0.0066$) and mandate ($p=0.0128$) both of which were background variables. Significant human resource attributes were

total number of staff ($p=0.0043$), number of senior staff ($p=0.0001$), number of full time staff ($p=0.0001$), number of part time staff ($p=0.00459$), persistent overtime work ($p=0.0477$), proportion of departmental staff with EOHS expertise ($p=0.0081$) and degree qualification of departmental head ($p=0.0224$). The significance in the degree qualification of the departmental head occurred between second degree and first degree; and between terminal degree and first degree. Financial attributes that correlated with institutional capacity were EOHS budget allocation ($p=0.0441$), percentage of EOHS targets achieved ($p=0.0292$) and auxiliary funding ($p=0.0219$).

4.4.2 Multiple Linear Regression Analysis of Institutional Capacity

Table 8 shows the attributes that showed significant correlation with institutional capacity after multiple linear regression analysis was performed. These were number of senior staff ($p=0.006$), number of full time staff ($p=0.014$), proportion of departmental staff with EOHS skills/training ($p=0.017$), EOHS budget allocation and overtime work ($p=0.012$). A unit increase in number of senior staff will increase institutional capacity score 1.78 times and a unit increase in number of full time staff will decrease institutional capacity score 0.56 times, controlling for all other factors. A unit increase in proportion of departmental staff with EOHS skills/training will increase institutional capacity score 0.28 times, controlling for all other factors. A unit increase in EOHS budget allocation will increase institutional capacity score 0.12 times.

Table 8: Multiple Linear Regression Analysis of Institutional Capacity with Robust Stand Error Estimation for Confidence Interval

Variable	Adjusted Regression Coefficient	Institutional Capacity Score		t value	p- value
		Lower	Upper		
Number of Senior Staff	1.78	0.18	3.74	1.90	0.006
Number of Full Time Staff	-0.56	-1.27	0.16	-1.62	0.014
Number of Part Time Staff	-1.65	-3.62	0.32	-1.76	0.168
Percentage of Staff with EOHS Skills/Training	0.28	0.09	0.48	3.01	0.017
EOHS Budget Allocation(% of Annual Budget)	0.12	-0.02	0.26	1.77	0.014
Percentage of EOHS Targets achieved	0.05	-0.24	0.34	0.39	0.618
Mandate					
<i>Policy</i>	Ref				
<i>Services</i>	-4.54	-14.51	5.42	-0.95	
<i>Manufacturing/Processing</i>	1.77	-16.03	19.56	0.21	
<i>Research/Training</i>	-13.74	-36.73	9.25	-1.25	0.979
<i>Extraction</i>	0.62	-22.81	24.05	0.06	
<i>Monitoring</i>	-4.38	-24.08	15.33	-0.47	
Team Leader Qualification (degree)					
<i>First</i>	Ref				
<i>Second</i>	2.34	-12.22	7.55	-0.49	0.355
<i>Terminal</i>	4.00	-21.44	13.44	-0.48	
Qualification of Senior Staff (degree)					
<i>First</i>	Ref				
<i>Second</i>	-4.13	-12.19	3.94	-1.07	0.774
<i>Terminal</i>	4.31	-8.37	16.98	0.71	
Sector					
<i>Public</i>	Ref				
<i>Private</i>	5.62	-9.04	20.28	0.80	0.391
Persistent Overtime					
<i>Present</i>	Ref				
<i>Absent</i>	8.49	3.11	13.87	3.30	0.012
Auxiliary Funding					
<i>Not Available</i>	Ref				
<i>Available</i>	9.66	4.98	24.30	1.38	0.275

4.5 Human Resource Capacity

A summary of the details obtained on human resource capacity are outlined in Table 9.

Table 9: Summary of Human Resource Attributes

Attribute	Frequency (N=38)	Percentage
Team Leader Expertise		
<i>EOHS</i>	25	65.8
<i>Non-EOHS</i>	13	34.2
Team Leader Qualification		
<i>First Degree</i>	5	13.2
<i>Second Degree</i>	25	65.8
<i>Terminal Degree</i>	8	21.0
Senior Staff Qualification		
<i>First Degree</i>	18	47.4
<i>Second Degree</i>	19	50.0
<i>Terminal Degree</i>	1	2.6
Junior Staff Qualification		
<i>Other</i>	28	73.7
<i>First Degree</i>	10	26.3
Operational Staff Number		
<i>Minimum Required</i>	32	84.2
<i>Optimum</i>	6	15.8
Overtime		
<i>Present</i>	20	52.6
<i>Absent</i>	18	47.4
Task Backlog		
<i>Present</i>	31	81.6
<i>Absent</i>	7	18.4
Staff Schedule		
<i>Full Time</i>	24	63.2
<i>Part Time</i>	14	36.8

From Table 9, five (5) out of thirty eight (38) team leaders had a first degree representing thirteen (13) percent, twenty five (25) had a second degree, representing sixty six (66) percent and eight (8) had a terminal degree, representing twenty one (21) percent. Out of the eight (8) institutions whose team leaders had terminal degrees, six (6) were from public institutions, specifically Research and Training, Policy and Monitoring. For the institutions that had team leaders with second degrees, three (3) were from the public sector with two (2) of them being Monitoring agencies and one (1) being a Policy outfit.

The twenty two (22) from the private sector were mainly from the Services and Manufacturing and Processing categories. The five (5) institutions that had team leaders with first degrees were all from the private sector.

Twenty five (25) team leaders had training/skills in EOHS and this constitutes sixty six (66) percent and thirteen (13) had no EOHS training, constituting thirty four (34) percent of responses obtained. Out of the twenty five (25) team leaders with EOHS expertise, ten (10) were from the public sector, implying eight (8) public sector institutions had team leaders with no EOHS expertise. Fifteen (15) out of the twenty (20) private institutions that took part in the study had team leaders with EOHS expertise and team leaders from the remaining five (5) institutions had no EOHS expertise. Senior staff in eighteen (18) of the institutions had first degrees and constituted forty seven (47) percent of responses, second degrees were observed for senior staff in nineteen (19) institutions, making up fifty (50) percent and one (1) institution reported a terminal degree, which is three (3) percent of pooled responses. Thirty two (32) respondents, representing eighty four (84) percent indicated a first degree as the minimum required qualification for senior staff and six (6) institutions indicated a second degree. All the six (6) institutions were public agencies in the Research and Training and Policy categories and represented sixteen (16) percent of responses. Seven (7) required a minimum of first degree for junior staff and thirty one (31) required other qualification (non-degree), representing eighteen (18) and eighty two (82) percent respectively.

Twenty eight (28) institutions had staff operating with the minimum required degree qualification and sixteen (16) of them were public institutions, while twelve (12) were private institutions. Only two (2) public institutions and eight (8) private institutions, making a total of ten (10) had staff with degree qualifications above the minimum recommended. In all, seventy four (74) percent of institutions had staff with minimum

recommended degree qualifications and twenty six (26) percent had staff with degree qualifications above the minimum recommended.

Twenty three (23) of the institutions had less than fifty (50) percent of EOHS staff having the requisite EOHS training and fifteen (15) institutions had more than fifty percent of their EOHS staff possessing the requisite training and skills. These figures represented sixty one (61) and thirty nine (39) percent respectively. Ten (10) institutions, constituting twenty six (26) percent, all private and multinational stated a local deficit in skill and had to import the needed skill to meet their operational requirements. The remaining eighteen (18) institutions were of the opinion that the local skill and caliber met their operational requirements. Fifteen (15) of these institutions were public and three (3) were private.

Job descriptions of senior staff were categorized as specialized and requiring training by twenty seven (27) institutions, which make up seventy one (71) percent and eleven (11) institutions, which constitute twenty nine (29) percent described as non-specialized and required no training. Junior staff job descriptions in thirty two (32) institutions were described as non-specialized and require no training while six (6) institutions indicated that junior staff job descriptions were specialized and required training. These constitute eighty four (84) percent and sixteen (16) percent respectively.

Thirty two (32) institutions, making up eighty four (84) percent of responses were currently operating with the minimum required number of staff and only six (6) had staff numbers that were higher than their minimum required. These institutions constituted sixteen (16) percent of the responses received. Out of the thirty two institutions operating with the minimum required number of staff, fourteen (14) belonged to the public sector and eighteen (18) belonged to the private sector.

Twenty (20) of the respondents cited the presence and persistence of overtime work by staff and constituted fifty three (53) percent. Twelve (12) of these institutions were from

the private sector and eight (8) were from the public sector. Eighteen (18) did not have a challenge with persistent overtime work and represented forty seven (47) percent. Thirty one (31) institutions had a persistent and constant backlog of duties to be performed, out of which nineteen (19) belonged to the private sector and eleven (11) to the public sector. Seven (7) institutions had no challenges with persistent backlog of duties and constituted eighteen (18) percent of responses. The institutions that indicated a persistent and constant backlog of duties constituted eighty two (82) percent of the responses obtained. An imbalance in the task-staff ratio and hence, inadequate staff numbers was listed as the most recurring reason for the overtime work and persistent backlog.

Out of the thirty eight (38) respondents, fourteen (14) had both full time and part time staff, representing thirty seven (37) percent and twenty four (24) had only full time staff, representing sixty three (63) percent.

The lowest number of staff observed for the participating institutions was three (3) and the highest was sixty one (61), with both responses being from the services sector.

Number of senior staff ranged from one (1) to eighteen (18) and number of junior staff ranged from three (3) to forty three (43).

The attributes of human resource capacity that were merged to form the human resource variable were proportion of departmental staff with EOHS skills/training and departmental head's expertise. These attributes were assigned equal value and added up to one hundred (100) percent.

The human resource capacity was graded in the following manner: Less than fifty (50) percent - very weak; fifty (50) to fifty nine (59) percent - weak; sixty (60) to sixty nine (69) percent - moderate; seventy (70) to seventy nine (79) percent - strong; eighty (80) percent or more - very strong. The mean human resource capacity score was 62 ± 24.3 . The results are shown in Table 10.

Table 10: Human Resource Capacity Score

Capacity score	Frequency (N=38)	Percentage
Very Weak	15	39.6
Weak	5	13.3
Moderate	5	13.3
Strong	5	13.3
Very Strong	8	20.5

4.5.1 Univariable Analysis of Human Resource Capacity

A univariable analysis was carried out with all the attributes that were not included in the human resource variable. The detailed results are shown in Appendix 6. The attributes that correlated with human resource capacity were mandate ($p=0.0205$) and the significance occurred between extraction and manufacturing/processing, number of senior staff ($p=0.0001$), number of junior staff ($p=0.0175$), number of full time staff ($p=0.0001$), persistence of task backlog ($p=0.0004$), head of department's degree qualification ($p=0.0308$) with the significance occurring between terminal degree and first degree, degree qualification of senior staff ($p=0.0012$), degree qualification of junior staff ($p=0.0071$), career development plan ($p=0.0007$), recruitment preference ($p=0.0184$) with the significance occurring between work experience only and work and academic experience, proportion of budget proposal that is approved ($p=0.0037$) and percentage of targeted EOHS activities that is achieved ($p=0.0001$).

4.5.2 Multiple Linear Regression Analysis of Human Resource Capacity

A multiple linear regression analysis was carried out using all the attributes that showed correlation with the human resource variable. The results are outlined in Table 11. The attributes that showed significant correlation with human resource capacity score were number of senior staff ($p=0.022$), degree qualification of senior staff ($p=0.022$) and persistent task backlog ($p=0.010$). A unit increase in number of senior staff will increase human resource capacity score 5.47 times, controlling for all other factors. A second degree senior staff qualification will increase human resource capacity score 21.48 times more than a first degree, controlling for all other factors. Institutions without a persistent task backlog will increase the human resource capacity score 18.83 times more than institutions with a backlog. This means institutions with adequate staffing will increase human resource capacity score 18.83 times more than those with insufficient staff numbers.

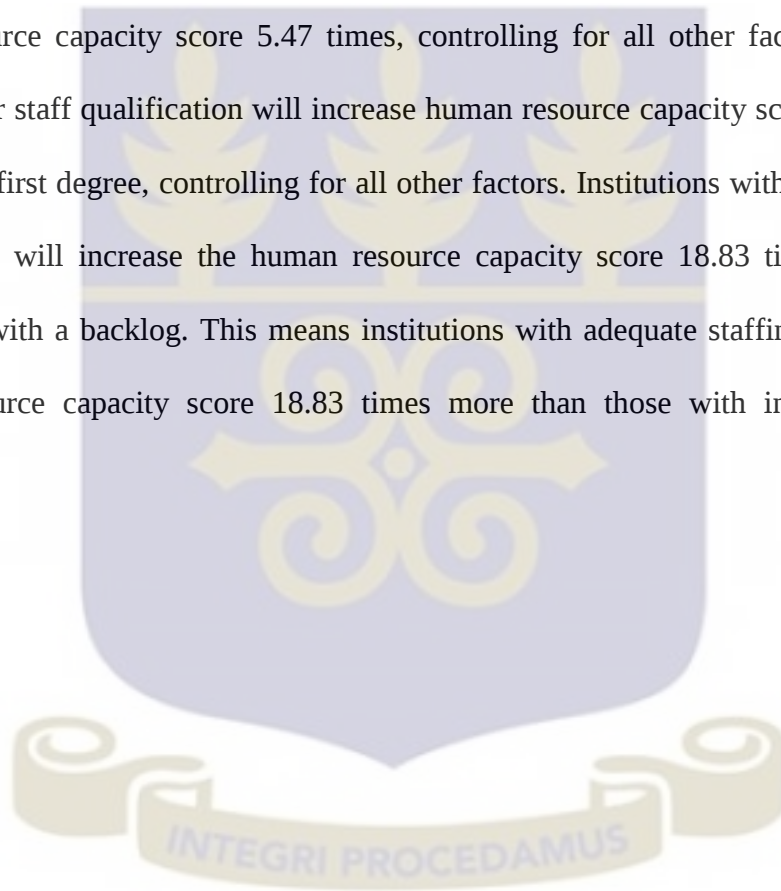


Table 11: Multiple Linear Regression Analysis of Human Resource Capacity with Robust Standard Error Estimation for Confidence Interval

Human Resource Capacity Score					
Variable	Adjusted Regression Coefficient	95% Confidence Interval		t	p- value
		Lower	Upper		
Number of Senior Staff	5.47	2.31	8.62	3.65	0.022
Number of Junior Staff	0.90	-4.33	6.13	0.36	0.753
Number of Full Time Staff	-1.77	-6.58	3.04	-0.77	0.919
EOHS Budget Approval Rate	-0.11	-1.29	1.07	-0.20	0.101
Percentage of EOHS Targets achieved	0.22	-0.71	0.27	-0.96	0.685
Mandate					
<i>Policy</i>	Ref				
<i>Services</i>	16.51	-1.50	34.52	1.93	
<i>Manufacturing/Processing</i>	1.79	-24.18	27.76	0.15	
<i>Research/Training</i>	-6.91	37.57	23.75	-0.48	0.194
<i>Extraction</i>	16.86	24.43	58.14	0.86	
<i>Monitoring</i>	13.28	-8.53	35.08	1.28	
Team Leader Qualification (degree)					
<i>First</i>	Ref				
<i>Second</i>	-14.45	-38.43	9.54	-1.27	0.285
<i>Terminal</i>	-13.37	-43.87	17.14	-0.92	
Qualification of Senior Staff (degree)					
<i>First</i>	Ref				
<i>Second</i>	21.48	5.94	37.02	2.92	0.022
<i>Terminal</i>	34.96	-3.92	73.85	1.90	
Recruiting Preference					
<i>Work Experience</i>	Ref				
<i>Academic Experience</i>	14.76	-27.39	56.90	0.74	0.284
<i>Work and Academic Experience</i>	13.89	-30.61	58.39	0.66	
Qualification of Junior Staff					
<i>Certificate</i>	Ref				
<i>First degree</i>	Ref				
Persistent Backlog	14.04	-1.24	29.31	1.94	0.261
<i>Present</i>					
<i>Absent</i>	Ref				
	18.83	-3.20	40.87	1.80	0.010
Skills Development Plan					
<i>Absent</i>	Ref				
<i>Present</i>	5.96	-13.40	25.31	0.65	0.835
Working Space					
<i>Adequate</i>	Ref				
<i>Inadequate</i>	9.18	-10.01	28.37	1.01	0.815

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This chapter considers the findings, in relation to the specific objectives of the study.

5.2 Financial Capacity Needs

Financial capacity needs assessments are a common aspect of any organizational planning or programming process. Every organization is more likely to encounter challenges and difficulties if they do not have a strong financial resource capacity. These challenges are even greater in situations where coordination among donors and development partners is limited. Sixteen (16) of the institutions had a financial capacity score of eighty percent or more and were categorized as very strong while twenty two (22) institutions scored less. The result is an indication that, there is a sub-optimal financial capacity for majority of the participating institutions. However, those institutions that had high financial capacity strength may partly be due to a general increase in funding, either from internal or external sources. The observed trend in increasing level of financial and technical assistance for public institutions and non-Governmental organizations from philanthropic organizations has brought relief to recipient institutions and some United Nations agencies which were almost exclusive donors (Moon et al., 2010). From the results, increasing departmental staff numbers was found to increase financial capacity. Fifteen (15) institutions allocated up to ten (10) percent of their annual budget to the EOHS department and this constituted forty (40) percent of the responses obtained. This is an indication that most of the organizations give priority to EOHS.

The results obtained showed that human resource attributes correlated positively with financial resource attributes. This implies that an improvement and increase in human

resource capacity will improve financial capacity. The results are in agreement with the findings of Jabbour et al., (2012) who proposed that financial capacity increases as human resource strengthening significantly improves. The findings also confirm a study by Martin et al., (2012) who proposed that funding is the major driving force for financial capacity in most established organizations. According to Minja et al., (2011), funding for organizational activities may be internally generated or from external sources. There was a general observation that most of the institutions have some control over their internally generated funds as far as its channeling is concerned. The relatively strong financial capacity observed in the study also agrees with the findings of Lordan, Tang, & Carmignani (2011), who proposed that funding for health-related activities tends to show discrimination and in favor of some disciplines to the detriment of other disciplines, accounting for their consequent better performance.

5.3 Institutional Capacity Needs

An assessment of institutional capacity normally includes the dimensions of policy, legal and regulatory framework, management and accountability, resources and processes (intra- and inter-organizational relationships) and how resources and information flow both formally and informally. All institutional capacity attributes except working space, shift work and physical expansion recorded a very weak and low capacity score. This may be attributed partly to weakness of technical assistance programs and projects that focus on meeting capacity needs. There was a significant difference in the performance between senior and junior staff and this could be attributed to the degree of qualification. This is so because research has shown that a good career development plan in institutions will increase the number of senior staff and this educational strategy confirms a similar research work conducted by MacDonald (2005) and Robson (2012), who also asserted that

training and upgrade of staff also affects worker practices and improves outcomes of product and service delivery in institutions. To ensure this, the encouragement of continuous education in institutions as agreed by Baker et al (2005) is imperative. A significant number of global partnerships especially between developed and low income countries have seen fruitful research collaborations and resulted in significant strengthening of health systems (Rosenthal et al., 2012). Career development programs have proved relevant and recent calls to improve this area have not been discounted (McDonald, 2005). Information and Communications Technology (ICT) is also regarded as one of the most useful tools and replaces the need for professionals, especially those from developing countries to cover physical distances in their quest for knowledge. A good career development plan has been shown to be a non-financial incentive and a great motivating factor as well as improving staff retention. The cost of training experts abroad far exceeds that for training them locally, so an effective local training system will be more efficient.

5.4 Human Resource Capacity Needs

Traditionally, capacity development and organizational strengthening focused almost entirely on human resources, processes and organizational structuring. Many capacity initiatives ultimately concentrate on the human resource needs, either because this level is considered the most critical, or because it is the most effective to address. It considers the individual's capacity to function efficiently and effectively within an organization and within the broad environment. Majority of the institutions had weak human resource capacity and hence a stronger need. The weak human resource capacity observed in some selected institutions in the study could partly be due to lack of the requisite number of skilled employees or relatively unskilled employees under the supervision of skilled and

experienced employees. Jabbour et al., (2012) noted that empowered human resource in organizations significantly helps in the achievement of the targeted objectives. More often, capacity assessments of individuals are based on an established job description or some other format that lays out the performance and skills requirements of the position and the individual filling that position (Forst, 2004). This is normally combined with a skills assessment of the individual. The assessment is designed to identify the individual's capacity gaps so that training and development plans can then be tailored to address them. Increasingly, the dimensions of accountability and incentives, performance, values and ethics are becoming even more important at the level of human resources capacity needs assessments.

The result of the study also confirms a similar research by Minja et al., (2005) and Forst (2004) which showed weak human resource capacity in low and middle income countries and these present different challenges at different stages in the organization. Depending on the demands of the labor market, financial strength and human resource availability, employers may either have to recruit unqualified persons to fill certain vacancies or may have to import the requisite human resource at the expense of local expertise (Ueffing et al., 2009). It is known that the developing world currently lacks the required expertise to address environmental and occupational challenges presented by industrialization (Forst, 2004). From the study, about twenty eight (28) institutions had staff operating with the minimum required degree qualification in environmental and occupational health disciplines and only ten (10) had staff with degree qualifications above the minimum recommended. These constituted seventy four (74) and twenty six (26) percent respectively. The significant finding that eighty four (84) percent of participating institutions had the minimum required number of staff could account for the observation

that eighty two (82) percent of the institutions had a persistent task back log and eighty nine (89) percent were not operating at maximum capacity as far as production or delivery is concerned. The finding that senior staff with a second degree will increase human resource capacity about twenty one (21) times more than those with a first degree suggest that staffing, training and development, performance management and other human resource development practices are investments that could enhance the efficacy of an organization. This investment directly affects the employee's motivation and consequent performance delivery. This is an indication that most of the institutions studied need to give significant priority to human resource capacity needs. The call for impartial measures and innovative approaches toward human resource capacity strengthening may have brought to light the fact that general efforts at improvement in Sub-Saharan Africa have been on the rise but a low human resource capacity is producing an unhealthy balance (Minja et al., 2011).

Human resource is the most easily available and potentially cost-effective resource and when harnessed appropriately can contribute significantly to organizational and national growth. The human resource capacity was the lowest in the variables studied in the needs assessment that influenced EOH in Ghana. Significant among the attributes were the proportion of departmental staff with EOHS training/skills and the total number of EOHS staff. There is a perception among some participants that some senior officers entrusted with environmental and occupational health tasks are running their organizations without the necessary qualifications at technical level as far as EOHS issues are concerned, although they may have some other qualifications.

CHAPTER SIX

6.0 Conclusions and Recommendation

6.1 Conclusion

This study investigated the financial, institutional and human resources capacity needs of Environmental and Occupational health in Ghana. The study observed that institutional capacity was the statically strongest among the capacity needs assessment and the most statistically significant institutional capacity attributes were the criteria for recruiting new employees and working space. Financial capacity was also observed to be statistically stronger with Environmental/Occupational Health and Safety budget allocation being the most statistically significant attribute. Human resource capacity however was the least observed and significant among the attributes were the proportion of departmental staff with EOHS training/skills and the total number of EOHS staff. The results obtained also showed that human resource attributes correlated positively with financial resource attributes indicating that an increase in human resource attributes will increase the financial strengths of the institutions.

There is therefore the urgent need to build human resource capacity in Environmental and Occupational Health of relevant institutions in Ghana. However a convergence of resources in a multi-prong approach where human resource, institutional and financial capacity building are harmonized will yield significant benefits for the nation and eliminate the need to deal with challenges arising from polarized development. Financial, institutional and human resource capacities were observed to complement one another and one should not be developed at the expense of the others. This study emphasizes the need for the commitment of all stake holders to ensure effective capacity building in Environmental and Occupational Health in Ghana.

6.2 Recommendation

Based on the findings of the study, some effective measures were recommended. These suggestions will ensure efficient human resource, institutional and financial capacity building in the studied institutions.

- The institutions should train sufficient staff in Environmental and Occupational Health in order to enhance its human resource capacity base. This has to be properly aligned with positioning appropriately trained persons to head Environmental and Occupational Health services.
- The institutions should foster and partner with other relevant organizations at all levels in order to synergize the multiple benefits that stand to be gained in Environmental and Occupational Health in Ghana.
- Finally, the institutions and all relevant stakeholders should support the development of an objective policy framework for Environmental and Occupational health in Ghana.



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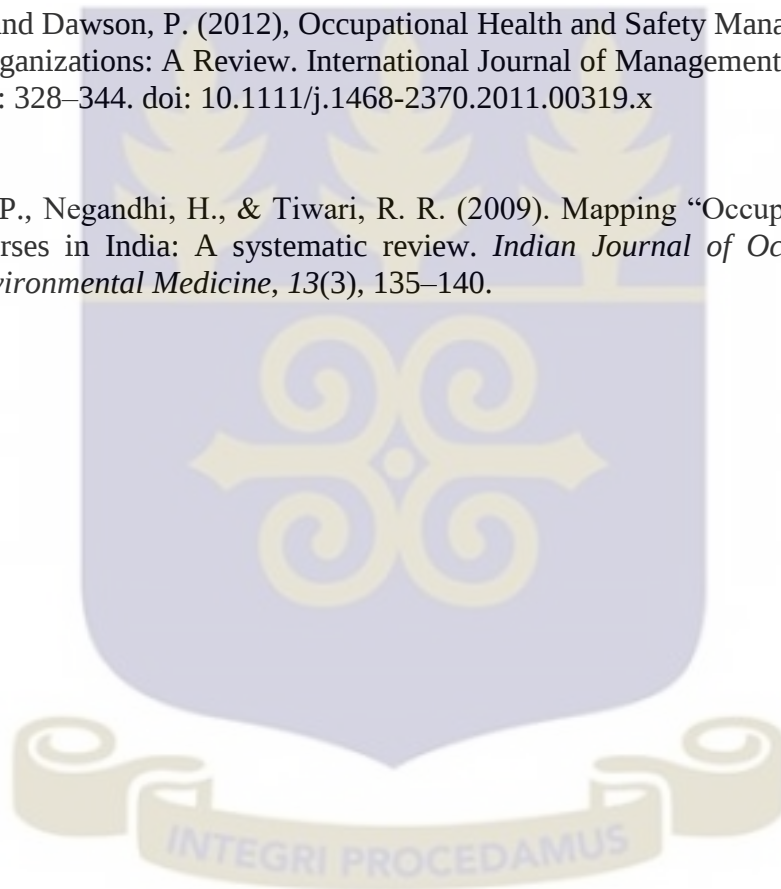
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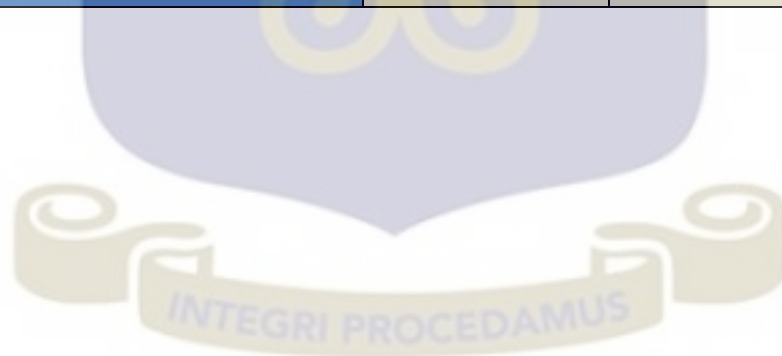
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APPENDICES

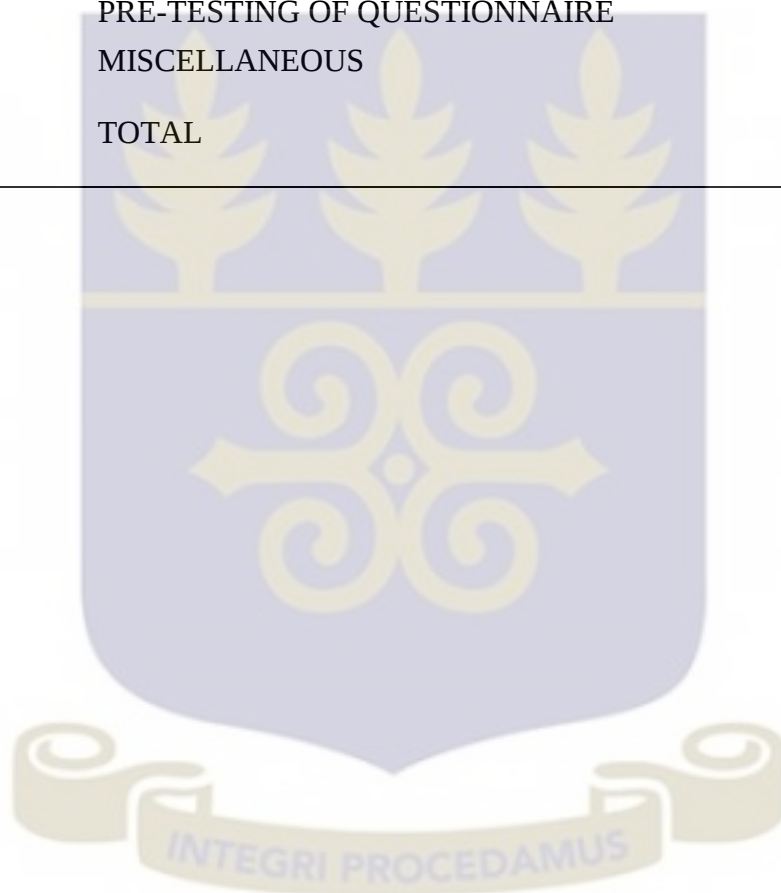
7.1 APPENDIX 1: Timelines

Stage or Activity	May	June	July
1: Pre-testing of Tools			
2: Data Collection			
3: Data Entry			
4: Analysis and Result Write up			
5: Submission			



7.2 APPENDIX 2: Budget

NUMBER	ITEM/ ACTIVITY	AMOUNT (GHC)
1	STATIONARY, PHOTOCOPYING, PRINTING, BINDING	350.00
2	TRANSPORTATION	1,200.00
3	COMMUNICATION	800.00
4	PRE-TESTING OF QUESTIONNAIRE	500.00
5	MISCELLANEOUS	200.00
6	TOTAL	3,050



7.3 APPENDIX 3: Consent Form

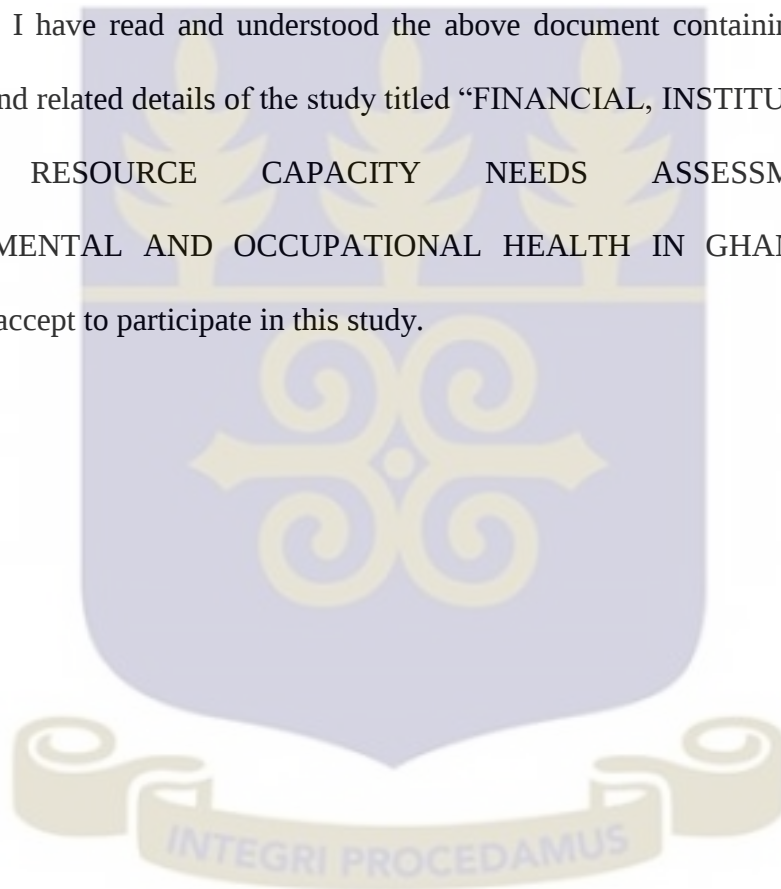
Kindly read the information below and sign accordingly before proceeding to complete the questionnaire.

I, _____ (please state full name), representing
_____ (please state institution name)

declare that I have read and understood the above document containing the purpose, procedure and related details of the study titled “FINANCIAL, INSTITUTIONAL AND HUMAN RESOURCE CAPACITY NEEDS ASSESSMENT FOR ENVIRONMENTAL AND OCCUPATIONAL HEALTH IN GHANA.” I hereby voluntarily accept to participate in this study.

Signature:

Position:



7.4 APPENDIX 4: Questionnaire

FINANCIAL, INSTITUTIONAL AND HUMAN RESOURCE CAPACITY NEEDS ASSESSMENT FOR ENVIRONMENTAL AND OCCUPATIONAL HEALTH IN GHANA.

Good morning/afternoon. Thank you for making time to complete this questionnaire. Your passion and commitment are highly appreciated and your invaluable contribution is held in the highest regard. This is to establish a baseline to build capacity in Environmental and Occupational Health through partnerships. Your involvement will contribute immensely to improving the face, performance and practice of Environmental and Occupational Health in Ghana. Please note the following courtesies and obligations owed you as a participant in this study:

Privacy and confidentiality: No reference will be made to you or your institution at any time during or after this study. Your anonymity and confidence will also be preserved.

Potential risks and benefits: There would be no potential harm in this study. Instead, the outcome will contribute significantly to strengthening Environmental and Occupational health in Ghana.

Voluntary withdrawal at any time from the study is permitted, should you so desire. There will be no penalties for such action(s) taken.

Compensation: There will be no financial or material incentives at any time before, during or after the study.

Data storage and usage: Electronic data will be securely locked with required password access and these details will only be known to the principal investigator. This is to prevent unauthorized access.

If you have any questions or require further clarification, you are welcome to ask or share your ideas with us and you may contact us through the details provided on the next page. THANK YOU.

Dr. Jacqui Barnes
(Principal Investigator)
Phone: 024-465-8869
Email: faithinv@yahoo.com

Ms. Hannah Frimpong
(Administrator, Ghana Health Service- Ethical Review Committee)
Phone: 024-323-5225/050-704-1223

PLEASE NOTE: APART FROM THE BACKGROUND DETAILS, ALL QUESTIONS ARE RELATED TO THE ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY SECTION/ DEPARTMENT OF THE INSTITUTION.

SECTION A: BACKGROUND INFORMATION (KINDLY TICK WHERE AND WHEN APPROPRIATE, AND SUPPLY TEXT WHERE AND WHEN APPROPRIATE)	
REMARKS	
NAME OF INSTITUTION/ORGANIZATION	
SECTOR: Private () Public () MANDATE: Policy () Services () Manufacturing/Processing () Research/Training () Extraction () Monitoring () How long has your organization been operating in Ghana?	
SECTION B: FINANCIAL CAPACITY	
What is the annual budget of the institution?	

	What proportion of the budget is allocated to EOHS department?	
	What proportion of the proposed EOHS budget is approved?	
	Based on the EOHS budget allocation, what proportion of departmental targets is achieved annually?	
	Does the institution benefit from auxiliary funding?	
	Is the EOHS budget structure: fixed () or flexible ()	
	Kindly state the reason for your choice above.	
	SECTION C : INSTITUTIONAL CAPACITY	
	Do your staff have to share desks? Yes () No () Please give reasons if you answered 'yes'.	
	Has the outfit undergone any physical expansion since it started operation (in Ghana) Yes () No ()	
	Does your organization have a career development plan for staff? Yes () No ()	
	If you answered "Yes" above, kindly explain	
	What technical infrastructure do you have in place? ICT center () Laboratory () Other ()-please specify	

Do you have a quality control mechanism in place? Yes () No () If you answered 'Yes', kindly explain	
Is your organization operating at maximum capacity? Yes () No ()	
Kindly explain your answer above.	
Is your organization in any partnership with another institution? Yes() No ()	
If you answered "Yes" to the question above, kindly explain:	
SECTION D HUMAN RESOURCE CAPACITY	
Total number of staff in Environmental & Occupational Health and Safety (EOHS) section:	
Total number of senior staff..... junior staff.....	
What is the minimum required number of staff per institutional protocol?	
Does the institution employ shift work? Yes () No () Please give reasons if you answered 'yes'.	
Is the job description of senior staff general () or requires training () Is the job description of junior staff general () or requires training ()	
What is the qualification of the EOHS departmental head? Terminal degree () Second degree () First degree () Other()- please specify	
What is the expertise of the EOHS departmental head? EOHS () Non-EOHS()	

What is the degree qualification of senior staff? Terminal degree () Second degree () First degree () Other()- please specify	
What is the minimum required qualification for senior staff? (Per institutional protocol) Terminal degree () Second degree () First degree () Other()-	
What is the degree qualification of junior staff? Terminal degree () Second degree () First degree () Other()-	
What is the minimum required degree qualification for junior staff? Terminal degree () Second degree () First degree () Other()-	
Does the local (national) intellectual caliber generally meet your skill/expertise requirement? Yes () No ()	
Kindly explain your answer above and the measures put in place	
What are your eligibility criteria for recruitment? Work experience () academic qualification () both ()	

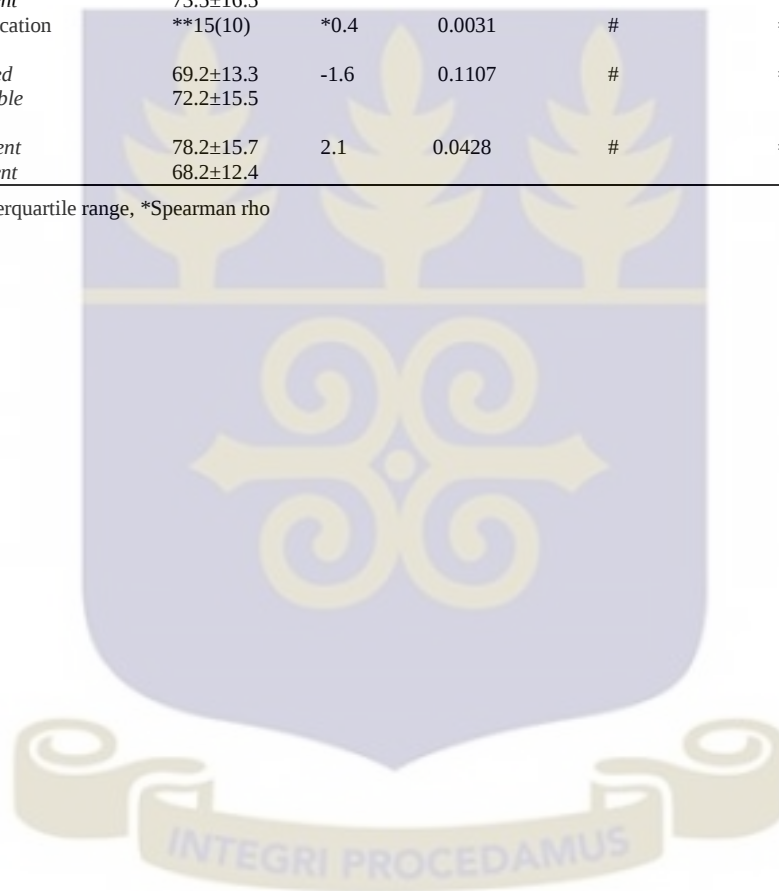
Thank you for your time and co-operation with this exercise. The results of this study will be available to your outfit on request.

7.5 APPENDIX 5: Univariable Analysis of Financial Capacity

Variables		Financial capacity Score <i>mean ± SD</i>	t-test	t-value	ANOVA F-test Statistic	p-value	Posthoc based on Bonferroni
Sector							
	Private	76.6±15.3	1.1	0.2718	#	#	Between Extraction and Manufacturing/Processing
	Public	71.1±14.7			#	#	
Mandate							
	Policy	69.2±11.8	#	#	3.18	0.0191	
	Services	78.1±15.4	#	#			
	Manufacturing/processing	68.3±14.1	#	#			
	Research/Training	59.0±10.0	#	#			
	Extraction	92.9±1.5	#	#			
	Monitoring	73.7±5.8	#	#			
Duration of operation in Ghana							
	Up to ten years	76.9±19.9	0.6	0.5502	#	#	
	More than ten years	73.2±13.8					
EOHS Staff Number per Institution							
Total Number of Staff		**9(8)	*0.56	0.0002	#	#	
Minimum required Number of Staff		**11(5)	*0.34	0.0327	#	#	
Number of Senior Staff		**4(4)	*0.65	0.0001	#	#	
Number of Junior Staff		**4.5(6)	*0.38	0.0173	#	#	
Number of Full Time Staff		**8(7)	*0.4	0.0173	#	#	
Number of Part Time Staff		**0(2)	*0.1	0.6350	#	#	
Persistent Overtime							
	Present	75.95±16.2	0.9	0.4010	#	#	
	Absent	71.8±13.8					
Backlog							
	Present	70.8±14.6	3.0	0.0043	#	#	
	Absent	88.1±6.7					
Team Leader Qualification							
	First degree	56.6±6.8	#	#	4.6	0.0159	
	Second degree	77.08±13.7	#	#			
	Terminal degree	75.25±16.4	#	#			
Team Leader Expertise							
	EOHS	65.6±12.6	-2.7	0.0111	#	#	
	Non-EOHS	78.4±14.5					
Qualification of Senior Staff							
	First degree	67.5±12.8	#	#	7.7	0.0017	
	Second degree	81.6±12.9	#	#			
	Terminal degree	47.5±	#	#			
Minimum Required Senior Staff Qualification							
	First degree	75.1±14.4	1.0	0.3141	#	#	
	Second degree	68.2±18.2					
Qualification of Junior Staff							
	First degree	75.5±14.9	-0.3	0.7458	#	#	
	Second degree	75.4±16.2					
Minimum Required Junior Staff Qualification							
	Certificate	74.1±16.0	0.1	0.9024	#	#	
	First degree	73.4±10.7					
Proportion of Staff with EOHS Training/Skills		**35(50)	0.5	0.0020	#	#	
Recruiting Preference							
	Academic experience	53.3±6.3	#	#	5.5	0.0081	
	Work experience	68.6±12.2					

Work and Academic experience	78.2±14.2				
Working Space					
Adequate	68.8±16.5	2.7	0.0100	#	#
Inadequate	81.2±11.6				
Shift Work					
Present	70.1±13.1	-1.7	0.1061	#	#
Absent	78.2±16.3				
Quality Control Mechanism					
Present	74.6± -	-	-	#	#
Absent	52.5± -	-	-	#	#
Skills Development Plan					
Present	66.5±13.2	-2.5	0.016	#	#
Absent	78.4±14.5				
Inter-organizational Partnership					
Present	74.2±14.7	-0.1	0.8915	#	#
Absent	73.5±16.5				
EOHS Budget Allocation	**15(10)	*0.4	0.0031	#	#
Budget Structure					
Fixed	69.2±13.3	-1.6	0.1107	#	#
Flexible	72.2±15.5				
Auxiliary Funding					
Present	78.2±15.7	2.1	0.0428	#	#
Absent	68.2±12.4				

**Median and interquartile range, *Spearman rho



7.6 APPENDIX 6: Univariable Analysis of Institutional Capacity

Institutional capacity Score						
Variables	<i>mean ± SD</i>	t-test	p-value	ANOVA F-test statistic	p-value	Posthoc based on Bonferroni
Sector						
<i>Private</i>	75.0±14.6	-2.9	0.0066,	#	#	
<i>Public</i>	85.4±4.8					
Mandate						
<i>Policy</i>	87.5±0					
<i>Services</i>	82.7±8.1					
<i>Manufacturing/Processing</i>	69.8±12.5	#	#			
<i>Research/Training</i>	87.5±0			3.5	0.0128	Between Manufacturing/Processing and Services
<i>Extraction</i>	84.4±18.8					
<i>Monitoring</i>	87.5±0					
Duration of Operations in Ghana						
<i>Up to ten years</i>	79.7±14.8	-0.1	0.9496	#	#	
<i>More than ten years</i>	80.0±11.7					
EOHS Staff Number per Institution						
Total Number of Staff	**9(8)	*0.5	0.0042	#	#	
Minimum Number of Staff Required	**11(5)	*0.2	0.2733	#	#	
Number of Senior Staff	**4(4)	*0.6	0.0001	#	#	
Number of Junior Staff	**4.5(6)	*0.1	0.5069	#	#	
Number of Full Time Staff	**8(7)	*0.6	0.0001	#	#	
Number of Part Time Staff	**0(2)	*-0.3	0.0459	#	#	
Persistent Overtime						
<i>Present</i>	76.3±14.0	-2.0	0.0477	#	#	
<i>Absent</i>	84.0±8.3					
Backlog						
<i>Present</i>	79.0±11.8	-1.0	0.3433	#	#	
<i>Absent</i>	83.9±13.9					
Proportion of Staff with EOHS Training/Skills	**35(50)	0.4	0.0081	#	#	
Team Leader Qualification (degree)						
<i>First degree</i>	67.5±6.8					Between Second degree and First degree; Between Terminal degree and first degree
<i>Second</i>	80.5±12.5	#	#	4.2	0.0224	
<i>Terminal</i>	85.9±8.0					

Team Leader Expertise						
<i>EOHS</i>	80.8±9.7	0.3	0.7650	#	#	
<i>Non-EOHS</i>	79.5±2.7					
Qualification of Senior Staff (Degree)						
<i>First</i>	75.0±10.5					
<i>Second</i>	84.2±12.4			3.2	0.0538	Between Second degree and First degree
<i>Terminal</i>	87.5±					
Minimum Required Senior Staff Qualification (Degree)						
				#	#	
<i>First</i>	79.3±11.3	-0.7	0.4636			
<i>Second</i>	83.3±17.1					
Qualification of Junior Staff						
<i>Certificate</i>	77.7±12.0	-2.0	0.0547	#	#	
<i>First degree</i>	86.2±10.9					
Minimum Required Junior Staff Qualification						
<i>Certificate</i>	78.6±12.2	-1.4	0.1673	#	#	
<i>First degree</i>	85.7±11.2					
Working Space						
<i>Adequate</i>	82.0±14.4	0.9	0.3723	#	#	
<i>Inadequate</i>	78.4±10.3					
Annual Budget						
	**200.5(537.1)	*-0.1	0.7445	#	#	
Budget Proposal						
	78.2±13.0	0.1	0.6443	#	#	
EOHS Budget Allocation						
	**15(10)	*0.3	0.0441	#	#	
Percentage of EOHS Targets Achieved						
	**75(26)	*0.4	0.0292	#	#	
Budget Structure						
<i>Fixed</i>	75.8±12.9	-1.7	0.0938	#	#	
<i>Flexible</i>	82.6±11.1					
Auxiliary Funding						
<i>Available</i>	76.1±14.4	-2.4	0.0219	#	#	
<i>Not Available</i>	85.2±5.0					

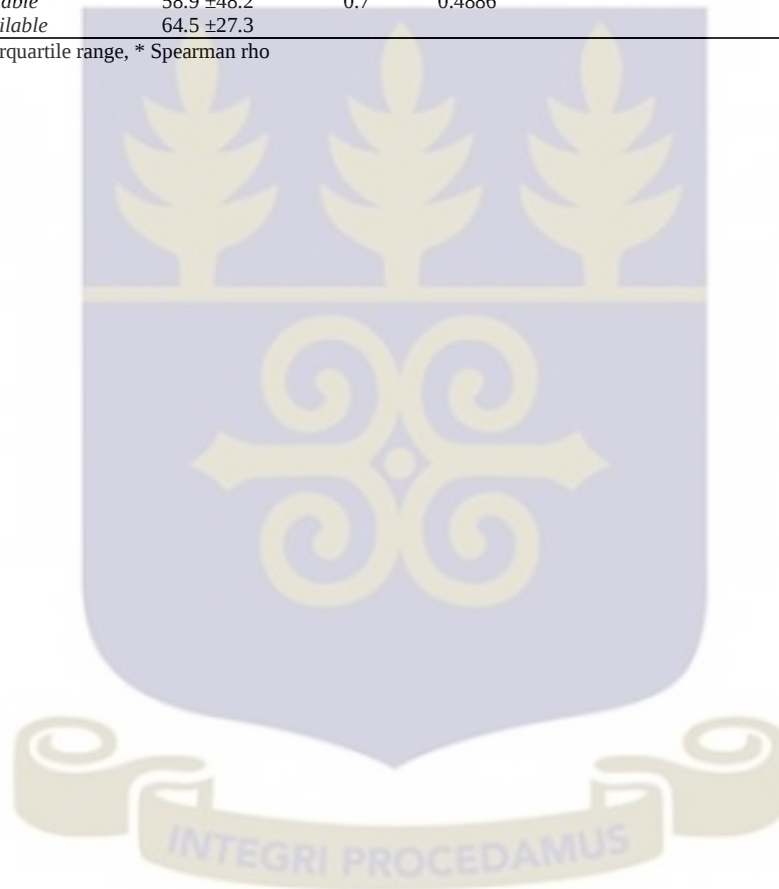
** Median and interquartile range, *Spearman rho

7.7 APPENDIX 7: Univariable Analysis of Human Resource Capacity

		Human Resource capacity Score					Posthoc based on Bonferroni
Variables		mean $\pm$ SD	t-test	p-value	ANOVA F-test statistic	p-value	
Sector							
	Private	61.4 $\pm$ 27.2	-0.2	0.8521	#	#	
	Public	62.9 $\pm$ 21.5					
Mandate	Policy	51.7 $\pm$ 7.6					
	Services	62.8 $\pm$ 18.9	#	#	3.13	0.0205	Between Extraction and Manufacturing/Processing
	Manufacturing/Processing	48.7 $\pm$ 16.4					
	Research/Training	68.3 $\pm$ 2.9					
	Extraction	94.3 $\pm$ 35.2					
	Monitoring	74.4 $\pm$ 42.6					
Duration of Operations in Ghana							
	Up to ten years	72.9 $\pm$ 33.4	1.4	0.1616	#	#	
	More than ten years	59.3 $\pm$ 21.1					
Number of Senior Staff		**4(4)	*0.8	0.0001	#	#	
Number of Junior Staff		**4.5(6)	*0.38	0.0175	#	#	
Number of Full Time Staff		**8(7)	*0.7	0.0001	#	#	
Number of Part Time Staff		**0(2)	*0.0	0.8682	#	#	
Persistent Overtime							
	Present	63.9 $\pm$ 23.1	0.5	0.6429	#	#	
	Absent	60.1 $\pm$ 26.1					
Backlog							
	Present	55.9 $\pm$ 17.7	-3.9	0.0004	#	#	
	Absent	89.8 $\pm$ 31.6					
Team Leader Qualification							
	First degree	45.5 $\pm$ 14.7					
	Second	59.9 $\pm$ 23.8	#	#	3.9	0.0308	Between Terminal degree and First degree
	Terminal	79.6 $\pm$ 22.2					
Qualification of Senior Staff (Degree)							
	First	48.0 $\pm$ 10.4					
	Second	75.4 $\pm$ 27.0	#	#	8.2	0.0012	Between Second degree and First degree
	Terminal	65.0 $\pm$ -					
Minimum Required Senior Staff Qualification (Degree)							
	First	60.0 $\pm$ 23.8	-1.2	0.2196			
	Second	73.4 $\pm$ 26.0					
Qualification of Junior Staff							
	Certificate	56.0 $\pm$ 20.3	-2.9	0.0071	#	#	
	First degree	79.4 $\pm$ 27.4					
Minimum Required Junior Staff Qualification							
	Certificate	59.6 $\pm$ 23.6	-1.4	0.1824	#	#	
	First degree	73.3 $\pm$ 10.0					
Working Space							
	Adequate	71.2 $\pm$ 27.4	2.0	0.0487	#	#	
	Inadequate	55.6 $\pm$ 20.0					
Shift Work							
	Present	67.5 $\pm$ 26.7					
	Absent	57.4 $\pm$ 21.6	-1.3	0.2062	#	#	
Quality Control Mechanism							
	Present	62.8 $\pm$ 24.3	-	-	#	#	
	Absent	37.5 $\pm$ -					
Skills Development Plan							
	Present	71.8 $\pm$ 24.8	-3.7	0.0007	#	#	
	Absent	45.6 $\pm$ 11.4					
Inter-Organizational Partnership							

<i>Present</i>	66.8 ±24.5	-1.8	0.0836	#	#	
<i>Absent</i>	52.1 ±21.5					
Recruiting Preference						
<i>Work experience</i>	45.3± 8.3					
<i>Academic experience</i>	49.2 ±14.2	#	#	4.5	0.0184	Between Work experience and Work/Academic experience
<i>Work and Academic experience</i>	69.5 ±25.7					
Annual Budget	**200.5(537.1)	*0.3	0.998	#	#	
Budget Proposal	78.2 ±13.0	*0.5	0.0037	#	#	
EOHS Budget Allocation	**15(10)	*0.3	0.0847	#	#	
Percentage of EOHS Targets Achieved	**75(26)	*0.6	0.0001	#	#	
Budget Structure						
<i>Fixed</i>	55.5 ±22.0	-1.4	0.1763	#	#	
<i>Flexible</i>	66.5 ±25.2					
Auxiliary Funding						
<i>Available</i>	58.9 ±48.2	0.7	0.4886			
<i>Not Available</i>	64.5 ±27.3					

** Median and interquartile range, * Spearman rho



7.8 APPENDIX 8: Ethical Clearance

