

SCHOOL OF PUBLIC HEALTH  
COLLEGE OF HEALTH SCIENCES  
UNIVERSITY OF GHANA

PERCEPTION OF QUALITY OF CARE OF MEDICAL IMAGING  
SERVICES AT THE KORLE BU TEACHING HOSPITAL (KBTH)

BY

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## DECLARATION

I, Gadeka Dormenyo, do hereby declare that with the exception of references made to other people's work and textbooks which have been duly acknowledged, this dissertation is a result of my own effort. No material in this work has been presented either in whole or part to any other institution apart from the University of Ghana, for the award of any degree or certificate.

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## **DEDICATION**

This piece of work is dedicated to all friends and loved ones.



## ACKNOWLEDGEMENT

My first thanks goes to the Almighty God for His immeasurable grace, infinite wisdom and divine strength granted me. I would never have been able to come this far without Him.

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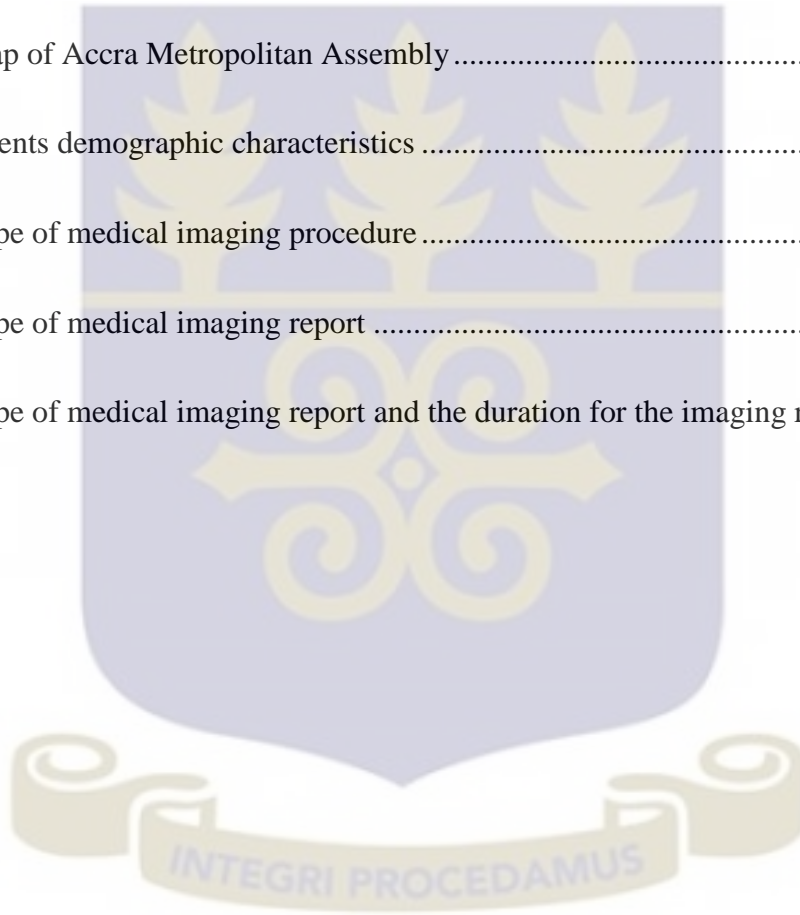


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## LIST OF ABBREVIATIONS

CR	Computed Radiography
CT	Computed Tomography
DR	Digital Radiography
GCPS	Ghana College of Physicians and Surgeons
GHS	Ghana Health Service
GP	General Practitioner
HIS	Hospital Information System
HPPM	Health Policy Planning and Management
IOM	Institute of Medicine
IVU	Intravenous Urography
KBTH	Korle Bu Teaching Hospital
KPI	Key Performance Indicator
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging
NCRPM	National Council for Radiation Protection and Management
PACS	Picture Archiving Communication System
PTC	Percutaneous Transhepatic Cholangiography

QA	Quality Assurance
RIS	Radiology information System
SPH	School of Public Health
SRSWOR	Simple Random Sampling Without Replacement
WACS	West African College of Surgeons
WHO	World Health Organization



## LIST OF DEFINITIONS

**Client:** User of a product or service. Clients may be internal that is, among the providers themselves, or external, that is, outside the providers

**Communication:** A process by which a message is passed from a sender to a receiver.

**Confidentiality:** Protection of information from persons who are not expected to have access to it.

**Efficiency:** Carrying out an activity or process with the least waste of time, effort and resources.

**Equity:** Fairness in the distribution of services.

**Guidelines:** Direction on how an activity may be carried out.

**Input:** The set of people and things needed to carry out an activity or render a service.

**Interpersonal relations:** Relationship between users and providers and among providers

**Outcome:** The ultimate effect of an activity or set of activities.

**Output:** Amount of work done

**Perspective:** Approach or point of view

**Process:** The actual performance of an activity or set of activity

**Quality:** The degree to which a product or service meets the expectations of an individual or group

**Safety:** The degree to which a service is free from risks to the user and provider.

## ABSTRACT

**Background:** The volume and complexity of medical imaging are steadily increasing with technological advances, workforce shortage, workload escalation and globalization. These factors could be potential threats to quality of care. Therefore assessing clients' perception of the quality of care of medical imaging services at the Korle Bu Teaching Hospital will help ensure optimum effectiveness of care, combat any trend in commoditization of services and to inform policy on appropriate strategies to address quality of care challenges.

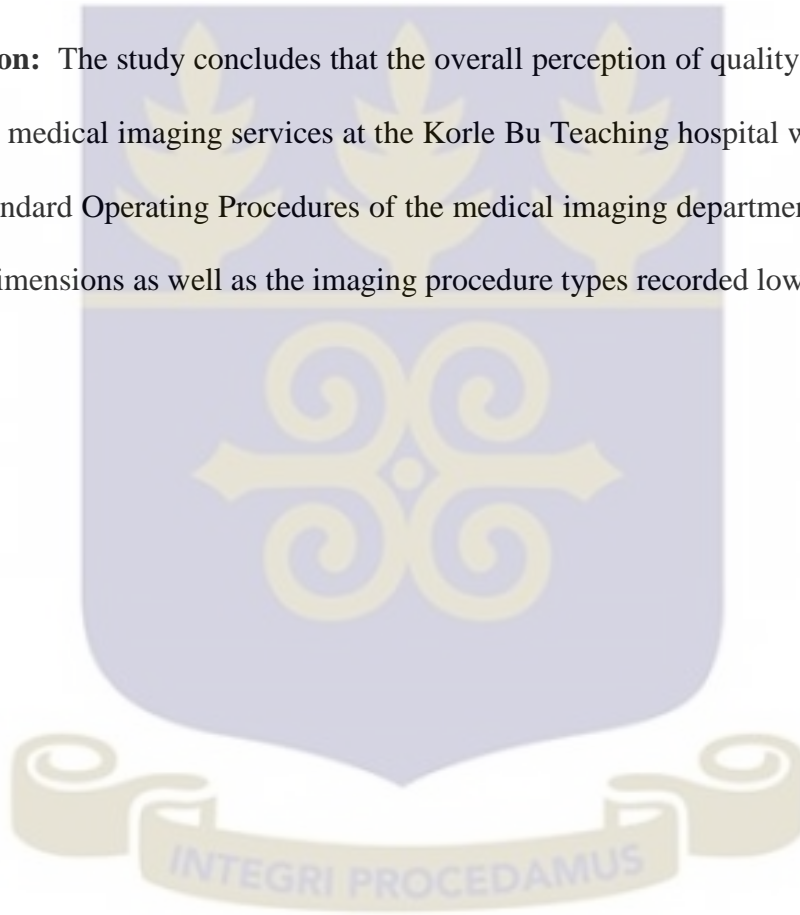
**General Aim:** The general aim of the study was to assess the clients' perception of the quality of care of medical imaging services at the Korle Bu Teaching Hospital.

**Methodology:** This research was a descriptive cross-sectional study using a mixed-method design (quantitative and qualitative) within the Donabedian healthcare evaluation framework and the dimensions of quality of health care. Structured questionnaire and In Depth Interviews (IDIs) were used. This was to improve the accuracy of judgements by collecting quantitative and qualitative data for triangulation of results. A total of 203 (191 quantitative and 12 qualitative) clients above 18 years of age who were receiving medical imaging service(s) at the imaging department KBTH took part in the study. Quantitative data were analysed using STATA Version 13. Descriptive analysis, univariate and multivariate logistic regression analysis were carried out. Qualitative data were analysed using thematic analysis.

**Results/Findings:** The quantitative results show that there were constraints with inputs, process and outcome elements of medical imaging services. The results further show that the dimensions of quality: capacity and sustainability, timeliness, safety, equity, patient-

centredness and effective communication were significantly ( $p < 0.001$ ) related to perceived quality of care. Additionally, demographic characteristics did not count in the final multivariate logistic regression. Imaging procedures clients undergo were statistically significant ( $p < 0.047$ ) in relation to clients' perception of quality of care. The qualitative findings revealed low perception of quality of care in relation to all the dimensions.

**Conclusion:** The study concludes that the overall perception of quality of care by clients accessing medical imaging services at the Korle Bu Teaching hospital was low compared to the Standard Operating Procedures of the medical imaging department. Further, all the various dimensions as well as the imaging procedure types recorded low quality of care.



## CHAPTER ONE

### INTRODUCTION

#### 1.0. Background to study

Medical imaging is an information system application that consists of a number of technological components; particularly imaging modalities, Picture Archiving Communication System (PACS), Radiology Information System (RIS) and Hospital Information System (HIS) which are linked and interfaced through a computer network (Mohd-Nor 2011). Visual representations of the interior of the human body, organs or tissues are created through careful techniques and processes using various imaging modalities in order to render medical imaging services. Medical imaging is part of the healthcare service industry and an essential component of health care which supports and improves the effectiveness of clinical decision-making.

Quality of care of medical imaging services is the extent to which the right procedure is done in the right way at the right time and the correct interpretation is accurately and quickly communicated to patient and referring physician (Hillman *et al*, 2004). It demands timely access, delivery of integrated and appropriate imaging studies and interventions in a safe and responsive facility and prompt delivery of accurately interpreted reports by capable personnel in an efficient, effective and sustainable manner (Lau, 2007). Quality care saves lives and resources of both the clients and the health system.

However implementing quality improvement programmes in medical imaging is a challenge. Methods need to be developed to collect knowledge related to quality care and to deliver that knowledge to practitioners at the point of care. Medical imaging is

increasingly performed by non-medical imaging staff and medical imaging staff at remote locations who may not have access to the same information. Meanwhile medical imaging has advanced rapidly over the last few decades as a result of technological and computing improvements (Stephanie *et al.*, 2006). Aging population with complex conditions, high patient demand for imaging procedures, increased availability of imaging modalities, expansion in the medical imaging facilities, poor quality of care and variations in practice, medical errors, injuries, and inequalities (Kwan-Hoong, 2014; Maartje *et al.*, 2009; Westert *et al.*, 2004) have characterized the medical imaging system. This is leading to the increasing trend of scrutiny by both payers and regulators. This study was to assess quality of care received during these services to ensure optimum effectiveness of care, combat current trend in commoditization of medical imaging services and to inform policy on the appropriate strategies to address quality of care of medical imaging service challenges.

Developing countries, especially in Africa, have very little data since medical imaging and quality of its services have been neglected (Gardner, & Connell, 2013). Furthermore it is the commitment of the Ministry of Health (MoH) of Ghana to deliver client focused, quality driven and results oriented services (Ministry of Health, 2012). In spite of this objective, there still continue to be low coverage of quality assurance practices and varied approaches adopted by few regions that have quality assurance programmes in place. It is however not surprising that patients often complain about the quality of services they receive at our health facilities.

Korle Bu Teaching Hospital which is Ghana's largest referral centre is among the few in African countries with sophisticated medical imaging modalities such as 1.5Tesla

Magnetic Resonance Imaging (MRI), 360 slice Computed Tomography (CT) scan, Digital Mammography, Digital Fluoroscopy and Computed Radiography (CR) machines. Notwithstanding the availability of all these equipment, there continues to be huge decrease in clients' attendance to the imaging department as against the continuous increase of the outpatient attendance at the hospital. Furthermore there is no data on the constraints associated with the processes of medical imaging services.

The purpose of this study was to assess the quality of care of services rendered at the medical imaging department of KBTH in order to inform policy on the appropriate strategies to address the situation.

### **1.1. Problem Statement**

In an era where medical imaging facilities are turning into business centres and quality of care being compromised (Ministry of Health, 2012), one would be curious to find out what the situation might be at Ghana's largest referral centre, Korle Bu Teaching Hospital (KBTH). Medical imaging department at the KBTH offers diagnostic, advisory and treatment services. In order to render these services, images of body parts, tissues or organs are created through careful techniques and processes either using Computed Tomography (CT) scan, Magnetic Resonance Imaging (MRI), Ultrasound scan, Fluoroscopy, Mammography or General X Rays.

Quality of care of these services is the extent to which the right procedure is done in the right way at the right time, and the correct interpretation is accurately and quickly communicated to the patient and referring physician (Hillman *et al*, 2004). Quality of medical imaging services therefore surpasses just satisfying but delighting clients by continuously meeting and improving upon agreed requirements (Bannerman *et al* 2005).

Moreover it is the professional, moral and legal obligation of the imaging professionals (Radiologists, Radiographers and Radiologic Technicians) to give quality care in the delivery of their services.

Poor quality of care results in loss of customers, loss of lives, loss of revenue, loss of material resources, loss of time, loss of trust, loss of recognition (Bannerman *et al* 2005).

The annual reports of KBTH, however recorded consistently huge decrease of clients' attendance to the imaging department (Korle Bu Teaching Hospital, 2013) since 2011.

The department saw a decline from 49,211 in 2011 to 36248 in 2012 representing 36% (12,963) and 39,973 in 2013 representing 23% (9,238) whereas there continue to be an ever increasing outpatient attendance at the hospital's main Central Outpatient Department (OPD). No research has been done to ascertain the root cause of the decline. Furthermore there is no data on the constraints associated with the processes of medical imaging services.

This study sought to assess the quality of care of medical imaging services at the imaging department of the KBTH using the Donabedian framework in addition to the dimensions of quality of care in medical imaging from the perspective of the clients to ensure optimum effectiveness of care, combat any trend in commoditization of services and to inform policy on the appropriate strategies to address the identified challenges.

## **1.2. Significance of the Study**

Health service provision within the public sector is more complex since it is not simply about expressed needs, but unexpressed as well and setting of priorities, allocating resources and publicly justifying what is done (Gowan *et al* 2001). Moreover, according

to Chao *et al* (2007), providing excellent service and high customer satisfaction is the challenge facing the contemporary service industry. Assessment of clients' perception of quality of care of medical imaging services in relation to the input, process and outcome elements of medical imaging would unravel the quality of care gaps in these domains and the overall quality of care. Identified challenges in these major areas in medical imaging would help inform policy on the appropriate strategies to address quality of care issues in medical imaging.

The dimensions of quality of care are vital part of medical imaging. Exploring these dimensions therefore was in the right direction. Constraints associated with medical imaging based on these dimensions would help ensure efficiency within the medical imaging system, ensure optimum effectiveness of care and combat any trend in commoditization of medical imaging services.

When quality of care gaps are identified and addressed, the gap between clients' expectation and perception would be closed. This would improve medical imaging services, increase clients satisfaction, higher utilization of medical imaging services and good reputation for the medical imaging department and KBTH in general.

Additionally the assessment of the quality of care based on the various units within the medical imaging department would help in restructuring the various units based on the need related to each unit and thereby impact positively by enhancing diagnostic, advisory and treatment or interventions in the medical imaging department.

Evaluation of quality of care in relation to clients' demographic characteristics would improve on need base assessment of the department. Strategies and policies in relation to clients' demographic characteristics would help improve perceived quality of care.

No study on quality of care of medical imaging services was conducted at the research setting and Ghana at large. Lessons learnt would be extended to other hospitals and quasi facilities. The findings of this study contributes to existing literature of quality of healthcare.

### **1.3 General Objective**

The general objective of the study was to assess the clients' perception of the quality of care of medical imaging services at the KBTH.

#### **1.3.1. Specific Objectives**

The specific objectives were to:

1. Explore perceived quality of care using input, process, outcome dimensions of medical imaging and the dimensions of quality of care.
2. Evaluate the relationships between perceived quality of care and demographic characteristics
3. Identify perceived quality of care in relation to the medical imaging procedure type and the duration of imaging report.

### **1.3.2. Research Questions**

The research questions for the study were:

1. What are the clients' perceptions of quality of care in relation to input, process, outcome dimensions of medical imaging and the dimensions of quality of care?
2. How do clients' demographic characteristics relate to perceived quality of care?
3. Do medical imaging procedure type and duration of imaging report affect clients' perceived quality of care?

### **1.4. Outline of the Dissertation**

The dissertation is presented under six chapters. Chapter one presents the introduction to the study. Background, problem statement, justification, general objective, specific objectives and research questions were presented. Chapter two presents the literature and conceptual framework in relation to the study. Chapter three contains the methods used for the study. Chapter four presents the results of the study as analysed in accordance with the objectives of the study. Chapter five describes the discussion of the results and findings in relation to existing literature. Chapter six presents the conclusion and recommendations of the study.

## CHAPTER TWO

### LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

#### 2.0. Introduction

This chapter reviewed literatures on the subject matter and important published studies by other researchers relevant to this study. This chapter is presented in eight sections. Section one discusses the background to medical imaging, its advances and operation in Ghana. Section two presents the conceptual framework of quality of care. In section three, the concept of quality is explained. Section four defines the dimensions of quality of care in medical imaging. In section five, the perspective of quality of care assessment in relation to this study is presented. Section six explains how quality of care is assessed in relation to the study. Section seven presents the importance of quality of care and section eight the summary of the chapter.

#### 2.1. Background to medical imaging

Medical imaging emerged as a result of X Rays discovery. X Rays was discovered in 1895 by Wilhelm Conrad Roentgen. These X Rays underwent refinement technologies prior to World War II. Computerization of these technologies soon after the war, led to multiple generations of innovations, and the advancements in electronics, miniaturization, visualization, and computing power (European Society of Radiology, 2012). Imaging acquisition, resolution, transmission, and manipulation also saw a breakthrough. Medical imaging modalities such as Conventional X-Ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Imaging, and Ultrasound were born out of these advancements (Laal, 2013). The development of digital imaging brought a new

generation of efficiency and speed as it offered new options for data access and transmission. This led to the advances in medical imaging.

### **2.1.1. Advances in medical imaging services**

Advanced medical imaging is an information system application that consists of a number of technological components particularly imaging modalities, PACS (Picture Archiving Communication System), RIS (Radiology Information System) and HIS (Hospital Information System) which are linked and interfaced through a computer network (Mohd-Nor, 2011). Medical imaging for the purpose of this study includes the following modalities Computed Tomography (CT) scan, Magnetic Resonance Imaging (MRI) scan, Ultrasound scan, Fluoroscopy, Mammography and Conventional X Rays. The services of medical imaging are rendered by producing visual representations of body parts, tissues or organs through careful techniques and processes by using any of the various modalities. To facilitate these service deliveries, RIS, HIS and PACS have been incorporated into the imaging system. RIS assists examination scheduling, tracking patient data and information, and permits online medical image reporting, HIS supports hospital administrative tasks such as patient registration, discharge and billing and PACS is used for the acquisition, storage, processing, and distribution of medical image data leading to faster and more precise imaging (König & Klose, 1998; Singh *et al*, 2007; Sutton, 2011).

These advancements have led to a large number of clinical applications. From the common chest X Ray to prenatal monitoring and diagnosis and follow-up of respiratory disorders, fractures, digestive disorders, and breast abnormalities (Horsch *et al*, 2004) as

well as more complex health problems such as cancer, AIDS, diseases of the central nervous system and cardiovascular diseases. It is without doubt that medical imaging has changed how physicians' measure, manage, diagnose, treat, and even think about medical illnesses and conditions. The inside of the human body is seen without making an incision. This prevents blood loss, or related risks and thereby making treatment less invasive (Thomas, Banerjee, & Busch, 2005). While imaging was once thought of primarily as a diagnostic tool, today it is also used on the front line of treating, managing, and even predicting disease. It is the standard for modern medical care for cancer, stroke, heart disease, trauma, neurological conditions, among others. This makes it essential for virtually all major medical conditions and diseases.

Cardiac catheterization, CT angiography, cardiac ultrasound, and nuclear imaging are currently being used by physicians to address heart disease instead of the usual confined stethoscope and electrocardiogram (EKG) fostering early diagnosis and treatment, helping in targeted therapy and improved survival (Mowatt *et al.*, 2005). In addition, abdominal aortic aneurysms were rarely identified until they rupture and patients die. However ultrasound scans are able to detect these aneurysms now reducing the risk of death by more than 40 percent (Fleming, Whitlock, Beil, 2005). Physicians today can use stereotactic radiosurgery which targets very narrow but extremely powerful beams of radiation on small brain tumors and early metastases without hospitalization. Guesswork is reduced to a great extent when CT and MRI are used to identify the location and nature of a stroke (Vuadens & Bougousslavsky, 1998). Physicians use CT and MRI, rather than exploratory surgery, to visualize and pinpoint brain tumors and aneurysms (White & Wardlaw, 2000). This gives them critical information about the nature and location as

well as the approach to the problem. Physicians can now use ultrasound to identify ovarian cancer earlier and faster. This information allows them to begin treatment before disease progression is uncontrollable (Wang *et al.*, 2004).

During liver cancer surgery, physicians use ultrasound to help them differentiate between diseased and healthy tissue and make adjustments as they operate. This information allows them to improve precision, reduce blood loss, and ultimately help speed-up healing (Torzilli, 2005). These experiences are not limited to only the developed countries but also Ghana.

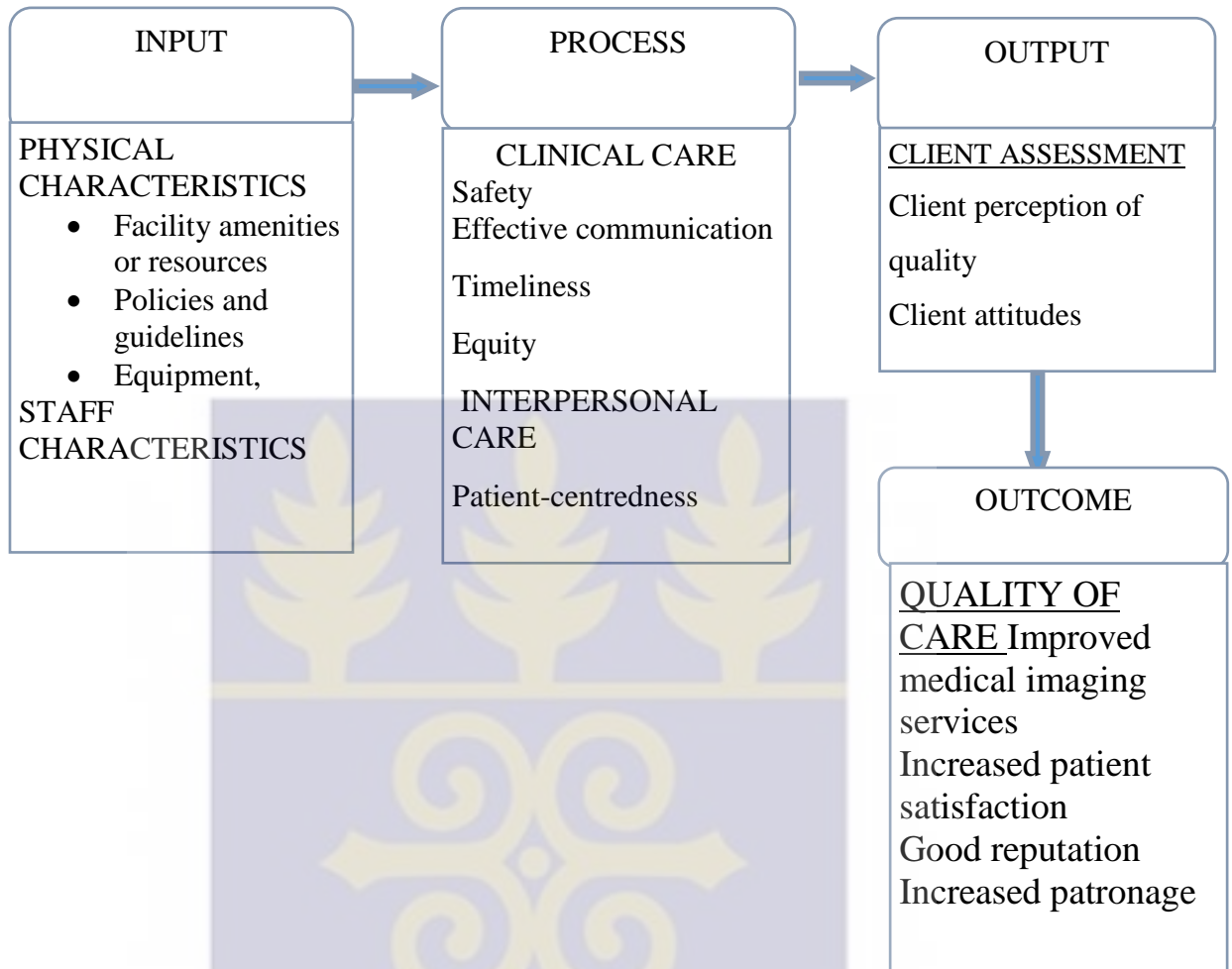
### **2.1.2. Medical imaging in Ghana**

Conventional X-ray procedures have been available for over four (4) decades in Ghana. Mammography, Ultrasound and CT scan were introduced in the early part of 1990s (Schandorf & Tetteh, 1998). The ultrasound was used mainly for fetal development assessment and for screening for anomalies (Inkoom, Schandorf, 2011). The imaging services in Ghana however have been structured in close accordance to the structure recommended by the World Health Organization (WHO). Ghana's Medical imaging system saw a transient transition from film screen radiography to computed radiography (CR) and now digital radiography (DR) in the major cities. Currently, Ghana is among the few of the African countries with sophisticated medical imaging modalities such as 1.5Tesla Magnetic Resonance Imaging (MRI), 360 slice Computed Tomography scan, Digital Mammography, Fluoroscopy, Computed Radiography (CR) and powerful ultrasound machines with 4D components. The CT scan and MRI at KBTH for instance is linked to the Picture Archival and Communication System (PACS) for faster service delivery. These advances in the imaging system have transformed the services rendered

in medical care in Ghana. Complex procedures like CT angiography, CT Intravenous urography (IVU), PTC, and so many range of procedures are carried out for diagnosis, treatment and advisory services. However as the services of medical imaging increases there has been complains about the quality of care being rendered (Ministry of Health, 2012) emphasizing the need for quality of care assessment.

## **2.2. Conceptual Framework**

The study was guided by the conceptual framework by Donabedian (2005) (Figure 2.1). The modified conceptual framework shows the various attributes of quality of care of medical imaging services. It explains how quality of care of medical imaging services could be affected based on the components of the imaging system. These components include input, process and the output (Donabedian 2005). The input consists of the physical characteristics like facility amenities, organization of resources, policies and guidelines, equipment and staff related characteristics such as staff number, availability, competence, training and supervision without which quality will be compromised (Holliday *et al* 2015). The process component include the clinical care aspect consisting of effective communication, timeliness, safety, equity and interpersonal care, which is represents patient-centredness (Sepucha and Mulley, 2009). The output component assesses the clients taking into consideration their perception and attitude. The overall quality of care appreciated based on whether there is an improvement in the various services rendered, patient satisfaction and utilization (Shiber & Larson, 1991). All these components are interdependent in achieving the desired quality of care of medical imaging.



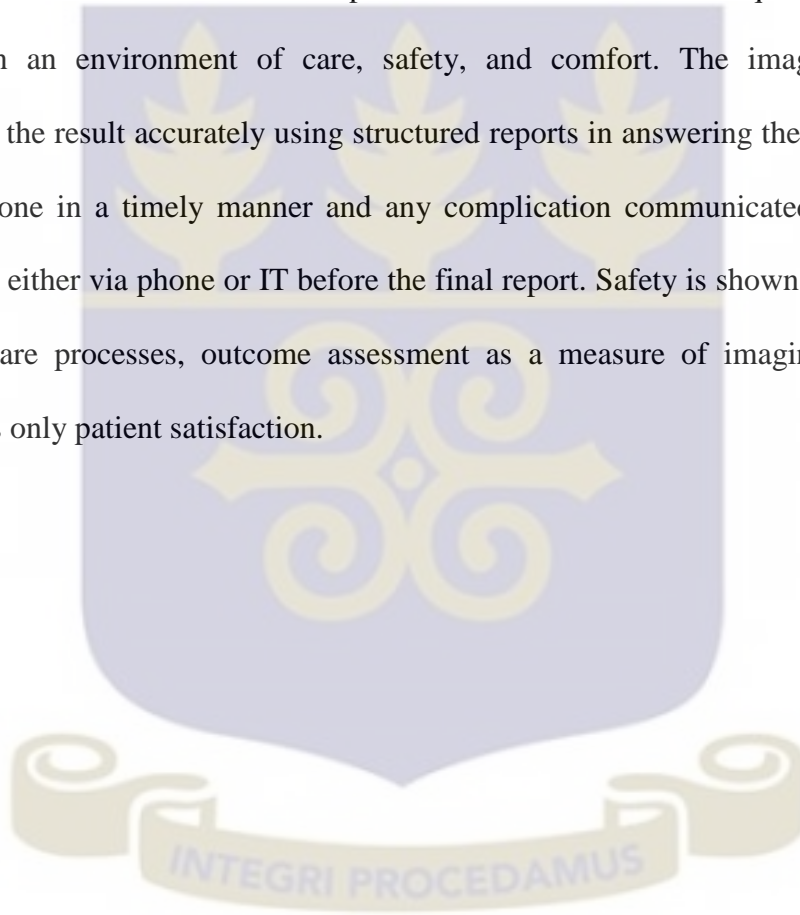
**Figure 2.1:** Conceptual Framework of quality of care of medical imaging services

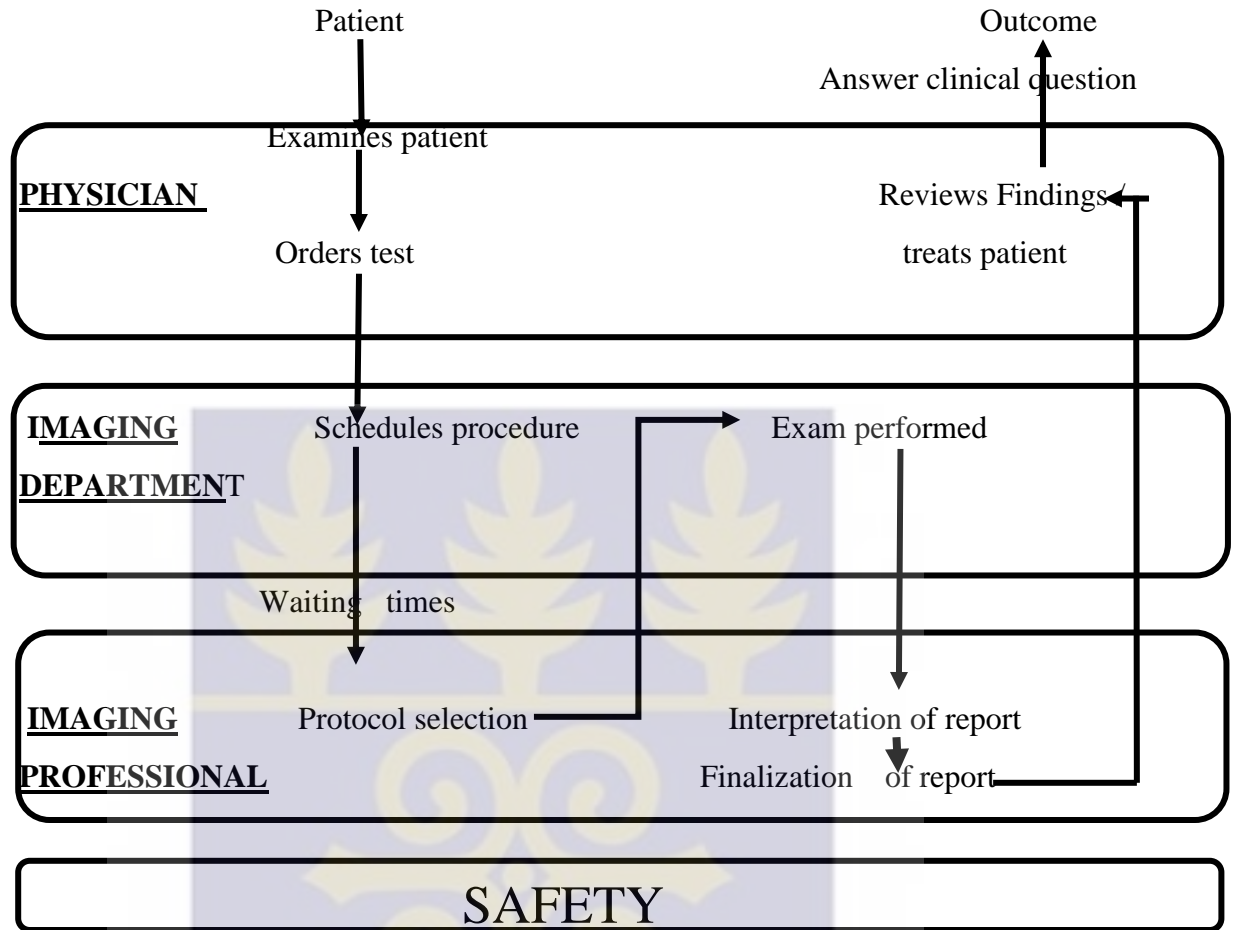
(Modified from Donabedian, 1988)

### 2.2.2. Medical Imaging Care Delivery Map

The medical imaging care delivery map (Fig 2.2) adopted from (Swensen & Johnson, 2005) was conceptualized around the metaphor of a patient’s journey through the hospital system in the context of accessibility of diagnostic imaging investigations. The various healthcare providers with whom the patient interacts along the journey form part of the

organizational culture of the healthcare institution. During the medical consultation, the physician orders examination using appropriateness guidelines. Appointment scheduled with the referring physician then patient moves to access the imaging department. At the imaging department, patient interacts with imaging professionals and he or she is educated on the procedure requested and prepare for the examination. The imaging professional selects a standardized protocol that best suits the request to examine the patient in an environment of care, safety, and comfort. The imaging professional interprets the result accurately using structured reports in answering the clinical question. This is done in a timely manner and any complication communicated to the referring physician either via phone or IT before the final report. Safety is shown as the foundation for the care processes, outcome assessment as a measure of imaging accuracy, and service as only patient satisfaction.





**Figure 2.2:** Medical Imaging Care Delivery Map (adopted from Swensen & Johnson, 2005)

### 2.3. Concept of Quality of Care

Quality has been the hot issue in health care over the past few years as the report of the Institute of Medicine, “To Err Is Human” emerged. This generated key interest in the health system performance by policy makers and academics. This prompted the formulation of health systems performance measures by major umbrella organizations such as the World Health Organization (WHO) and the OECD (WHO, 2000; Smith, 2002; OECD, 2004). The deployment of performance measurement monitoring and

improvement initiatives led to the proliferation of health and healthcare indicators (Arah *et al*, 2003). Some countries manage these proliferations through theoretical frameworks by organizing and prioritizing performance measures. The healthcare systems performance has therefore been classified by certain performance attributes which include quality of care.

Quality is defined in a broader sense to mean the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge (Institute of Medicine, 2001). The “desired health outcomes” mean outcomes sought by clients of the services and “current professional knowledge” refers to ever changing technical standards of care (McQuestion, 2006). The Institute of Medicine (IOM) however pointed out six aims of high quality in a healthcare system. These include safety, effectiveness, patient-centeredness, timeliness, efficiency and equity. In order to assess these qualities of healthcare, a model was developed by Donabedian (McDonald, Sundaram & Bravata 2007). This model states that information about quality of care can be derived from three categories: structure, process and outcome ( Donabedian, 1988). Moreover, the model is flexible enough for application in diverse healthcare settings and among different levels of delivery system

### **2.3.1. Input / Structure**

Input dimension assesses the context in which healthcare services are delivered (Holliday *et al* 2015): human resources, physical facility, equipment and organizational characteristics such as staff training. They evaluate the material resources. The structure

where care is delivered affects the process and outcomes. If facility is unpleasant, clients won't come and workers won't do a good job (McQuestion, 2006). They evaluate the material resources such as facility amenities, organization of resources, policies and guidelines, equipment, equipment servicing, consumables (Quadril, 2015), human resources such as staff number, competence, training, supervision, and organizational structure of the operation (Delis & Meghzifene, 2015) and ask whether these components are sufficient to provide quality care.

### **2.3.2. Process**

This refers to anything that is done as part of the encounter between a health care professional and a patient, including interpersonal processes, such as providing information and emotional support, as well as involving patients in decision making (Sepucha & Mulley 2009) in a way that is consistent with their preferences, and clinical process such as appropriateness of the examination, procedure protocol, accuracy of interpretation and communication of the results (Edgman-Levitan, *et al*, 1991).

### **2.3.3. Outcome**

This refers to a patient's health status resulting from the medical care received. It is incumbent upon health professionals to learn what patients consider essential to quality care and what their priorities among these essentials are (Donabedian, 2003). Despite the difficulties in measuring patient satisfaction with care, patients' evaluation of the care they receive is essential if we are to understand the patient's perspective on the extent to which healthcare goals have been met (Shiber & Larson 1991). The output component

assesses the clients taking into consideration clients' perception, attitude, behaviors, efficiency and effectiveness.

#### **2.4. Quality of Care of Medical Imaging Services**

The call for quality in healthcare in recent years is without the exemption of medical imaging since it forms an integral part of healthcare delivery. Medical literature reviews have noted reports of suboptimal medical imaging processes of care (Johnson *et al*, 2012). This informs the development of tools such as the imaging department scorecard, Plan-Do-Study-Act (PDSA) cycle by W. Edward Deming, Lean management techniques (to reduce 'waste' from processes) and Six Sigma (reduce defects and errors to acceptable levels). These powerful tools were designed to help imaging leadership to improve performance and quality in specific areas and also drive departmental performance. According to Donabedian (1988) there is no implicit definition of quality of care. Hillman *et al* (2004) therefore defined quality of care of medical imaging services as the extent to which the right procedure is done in the right way at the right time and the correct interpretation is accurately and quickly communicated to patient and referring physician. Lau (2007) on the other hand defined quality of care of medical imaging as timely access, delivery of integrated and appropriate imaging studies and interventions in a safe and responsive facility and prompt delivery of accurately interpreted reports by capable personnel in an efficient, effective and sustainable manner. These definitions captured the desirable performance parameters of National Health Performance Framework (Australian National Health Performance Committee, 2001) related to medical imaging. To measure the quality of the medical imaging system, dimensions of quality need to be assessed.

### **2.4.1. Dimensions of quality of care of medical imaging**

The achievement of an optimal quality of care not only requires solid information, accurate problem identification, and rigorous analysis; it also depends on the ability to measure and re-measure performance (Abujudeh *et al*, 2010). Lee & Yom, (2007) noted that every rational healthcare consumer prefers to use services that provide quality and best-value care. This implies that there must be best value care and adverse outcomes minimized, to prevent healthcare organizations from suffering operational setbacks.

Judging about the quality of services is based on the presence of the dimension of the quality. Dimensions of medical imaging services are grouped as follows based on the above definitions since assessment of quality according to (Donabedian, 1988) should be determined by the conceptual and operational definition of what “quality of medical care” means.

#### **2.4.1.1. Effective Communication**

This has two main components: effective communication of the results of the imaging procedure to either the patient or the referring physician and effective communication during the care process. Communication is a top tier quality measure in medical imaging and its improvement will undoubtedly improve patient care and satisfaction (Abujudeh *et al* 2010). There is lack of direct contact between the radiologists and GPs making the radiology report usually the sole method of communicating medical imaging findings (Royal College of Radiologists, 2008). This lack of direct contact makes it difficult for GPs to discuss and clarify imaging issues and for the imaging professionals to get feedback from GPs regarding what they want. Dissatisfaction could potentially cause GPs

to find alternative providers for their imaging needs. Moreover little is known about interactions and communication processes regarding healthcare providers' and clients' perspectives on expectations and experiences of diagnostic imaging investigations within the medical encounter (Makanjee, Bergh & Hoffmann, 2015). Optimal communication of clinical information between the radiologist and referring physician is critical to patient care (Johnson *et al.*, 2006). This however must be bidirectional. According to Epstein (2002) a major contributor to client dissatisfaction is poor communication and unprofessional behaviors.

#### **2.4.1.2. Safety**

Safety according to the National Patient Safety Foundation, (2000) is the degree to which health care processes avoid, prevent, and ameliorate adverse outcomes or injuries that stems from the processes of healthcare itself. Advanced diagnostic imaging can benefit patients when used appropriately. On the other hand when used inappropriately, results in minimal clinical benefits, wastes scarce health care resources and can even jeopardize both staff and patient safety. Safety metrics considered most relevant to an imaging department include radiology-generated infections, medication error rates, patient falls, contrast material-induced nephropathy, critical test reporting, critical test results reporting, specimen labelling errors (biopsy), universal protocol, hand hygiene, medication reconciliation, and correct image labelling (National Quality Forum 2007; You-Ling *et al* 2014). A study by Opoku, Antwi and Sarblah (2013) reported that there are no safety screenings undertaken for staff and other individuals apart from patients who come to the MRI suit at the KBTH. This according to them led to the occurrence of wheel chair pulled by the magnetic field into the MRI gantry.

CT scans deliver high quality imaging and are becoming the dominant imaging modality. It however also represents the largest contributor to an increase in population radiation exposure based on reports from the National Council on Radiation Protection and Measurement, (2009). Ionizing radiation can result in the following 3 harmful effects: 1) cell death and teratogenic effects, 2) carcinogenesis, and 3) genetic effects or mutations in germ cells (National Council on Radiation Protection and Measurement, 2009). There is little or no information to estimate either the frequency or magnitude of adverse genetic effects on future generations. MRIs do not use ionizing radiation but also pose safety risks due to the use of contrast agents and its high magnetic fields and radiofrequencies. As medical imaging departments transition from an analog to digital environment, there is a potential for increased patient exposure as staff adjust to digital imaging technology (Watson and Odle, 2013). In addition, it is important that measures be put in place for protection of staff, clients and others. Management should promote a good and safe ambience, be prepared to manage adverse healthcare events, and minimize the risks associated with fire, electrocution, and other disasters (Indian Journal of Radiology and Imaging, 2010). Safety metrics considered most relevant to an imaging department include radiology-generated infections, medication error rates, patient falls, contrast material-induced nephropathy, critical test reporting, critical test results reporting, specimen labelling errors (biopsy), universal protocol, hand hygiene, medication reconciliation, and correct image labelling (National Quality Forum, 2007; You-Ling, Burleson, Tallant, Seidenwurm, & Rybicki, 2014).

#### **2.4.1.3. Patient-centredness (Responsiveness)**

This is the degree to which a health system functions by placing the patient or client at the centre of its healthcare delivery. Evans et al stated that patient centredness has two components which includes respect for the client (dignity, confidentiality, need for information) and client orientation (prompt attention, provision of basic amenities, choice). This means respect for clients' dignity and confidentiality is practiced, patients are involved in decision making and at liberty to make choices, clients are attended to promptly, good quality of amenities are available and clients have the right to make choice of provider. Caring for the patient is a fundamental aspect of medical imaging and also a part of their education (Booth 2008; Halldorsdottir 2008). According to Eriksson (2002) touch, eye contact and standing close to client as well as avoiding technical language are important caring behaviors. Several studies show that time spent with health care provider, willingness of the health professional to listen to clients are among factors that affect client satisfaction with health care (Leddy & Kaldengberg, 2003).

#### **2.4.1.4. Timeliness**

Timeliness is the degree to which clients are able to obtain care promptly (Institute of Medicine, 2001). Short waiting time at the imaging department is one of the hallmarks of a well-managed imaging department. A key measureable timely process metrics according to Swensen and Johnson (2005) include access times (time for next available appointment), waiting times (appointment time to examination start), standardized protocols (percentage of time standardized protocols were used), and finalization times (examination completion to report finalization time). Waiting time for the purpose of this study includes waiting time prior to the procedure, waiting time for getting the result and

waiting time for the report. It has been identified that lengthy patient waiting times is directly proportional to dissatisfaction (Anderson & Camacho 2007). Apart from the waiting time, the imaging report should be delivered to the referring physician in a timely manner.

#### **2.4.1.5. Equity**

Equity in this context is the extent to which a medical imaging system deals fairly with all clients. This means delivering health care which does not vary in quality because of personal characteristics such as gender, race, ethnicity, geographical location, or socioeconomic status. According to Evans *et al* (2001), optimal health for all means attaining better health levels with less health inequality. According to Daniels (2013) this implies a principle of fairness in access to care that is appropriate for particular situations, even though methods, utilization, and outcomes may differ. However, some inequalities can be unavoidable, such as the differences in health between elderly and young people. Gwatkin, and Ergo (2013) reported that what is fair and achievable in promoting the highest possible health of all people depends on the situation in which people live.

#### **2.4.1.6. Capacity and Sustainability**

Capacity means the ability of the individuals and/or the team to provide medical imaging based on skill and knowledge. Sustainability means there is infrastructure such as workforce, facilities, equipment, equipment servicing mechanisms and organizational culture and the medical imaging system has innovative ways in responding to emerging needs.

## **2.5. Perspectives of Quality of Care of Medical Imaging Services**

Parasuraman *et al* (1988) defined service quality as comparing clients' perceptions and expectations. According to Parasuraman *et al* (1988) expectations are consumer wants; what they feel an ideal service provider should offer. Perceptions refer to the consumer's service evaluation. Service quality is thus, a function of the differences or gaps between client's perception and expectation.

### **2.5.1. Client's perspective**

Studies suggest that considering patients varying needs in the healthcare delivery process, ignoring their perceptions could be a major setback towards meeting their demands (Hibbard and Jewett, 1997). Patients' quality perceptions and expectations are a significant driving force that explains the relationship between health care quality and utilization.

Moreover, patients lack the knowledge to assess technical quality. Typically their quality judgement is based entirely on their subjective experiences. Assessing patients' quality perceptions, expectations and satisfaction is significant since these factors can considerably influence their health status and treatment outcome (Baker *et al*, 2008). According to Bannerman *et al*, 2005, clients satisfaction is based on the promptness of attention, good staff attitude, adequate information, privacy, confidentiality, clean environment and respect for clients and their rights. It has been shown that simple modification in language and behavior during patient care can impact quality of care and which in turn affect patient satisfaction positively.

## **2.6. Assessment of quality of care**

The quality of health care measure being employed in this study is the Donabedian's model (McDonald, Sundaram, Bravata 2007). The model states that measurement of quality of care can be achieved through three approaches: the outcome of care (client satisfaction, client perception of quality and efficiency), process of care (which is based on the assumption that one is interested in the power of medical technology to achieve results but in whether what is now known to be "good" medical care has been applied) and the use of structure (context) of the health system ( Donabedian, 1988). The process approach requires that relevant dimensions, values or standards to be used in assessment be specified. According to Donabedian (1988), standards can either be empirical or normative. Empirical standards are derived from actual practice and are generally used to compare medical care in one setting with another or with statistical averages and ranges obtained from a larger number of similar settings. Normative standards are derived from sources that legitimately set the standard of knowledge and practice in dominant medical care system. This includes standards set by text books, publications and highly qualified practitioners.

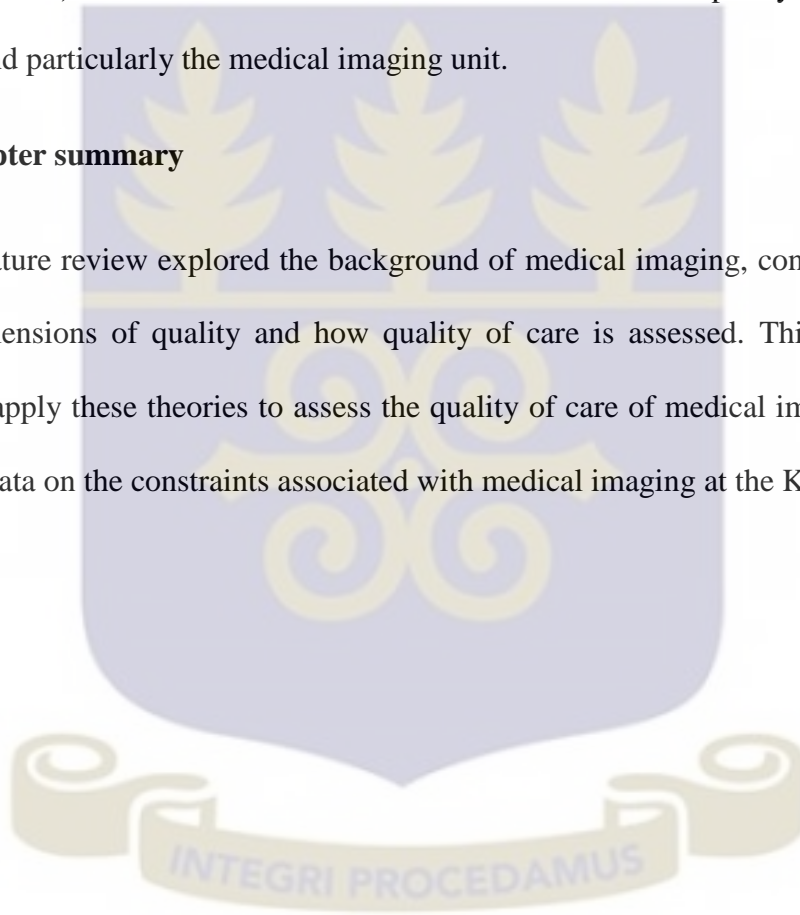
## **2.7. Importance of Quality of Care of Medical Imaging Services**

Quality assurance (QA) is a fundamental component of every successful medical imaging operation. Medical imaging QA program must be able to efficiently and effectively monitor and respond to quality problems. However, as medical imaging QA has expanded into the depths of its operations, the task of defining and measuring quality has become more difficult. Key performance indicators (KPIs) are highly valuable data points and measurement tools that can be used to monitor and evaluate the quality of services

provided by a medical imaging operation. As such, KPIs empower a medical imaging QA program to bridge normative understandings of healthcare quality with on-the-ground quality management. Adopting a KPI-driven QA program is both good for patient care and allows a radiology operation to demonstrate measurable value to other health care stakeholders (Harvey *et al*, 2015). It is therefore not surprising that Opoku, Antwi and Sarblah (2013) found that there was no effective and efficient policy and guidelines at KBTH and particularly the medical imaging unit.

## **2.8. Chapter summary**

The literature review explored the background of medical imaging, concept of quality of care, dimensions of quality and how quality of care is assessed. This study therefore seeks to apply these theories to assess the quality of care of medical imaging services to provide data on the constraints associated with medical imaging at the KBTH



## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0. Introduction**

This chapter presents the methods employed for the study. The chapter is presented in nine sections. Section one presents research design. Section two presents the study area. Section three presents the study population. In section four presents the variables. Section five presents sampling and sampling procedure. Section six presents data analysis. Section seven presents data handling. Section presents ethical considerations and section nine the summary of the chapter.

#### **3.1. Research Design**

This research was a descriptive cross-sectional study using a mixed-method design (quantitative and qualitative) within the Donabedian (2005) evaluation framework for assessing structure, process and outcome dimensions of quality of health care. This framework was further classified based on the dimensions of quality of care identified in the definitions by Hillman *et al* (2004) and Lau (2007) for medical imaging services: effective communication, safety, patient-centredness, timeliness, equity and capacity and sustainability. The mixed-method approach involved structured questionnaires and Indepth Interviews (IDIs). This was to improve the accuracy of judgements by collecting quantitative and qualitative data for triangulation of results.

#### **3.2. Study Area**

The study was conducted at the main Radiology Department of the Korle Bu Teaching Hospital (KBTH). KBTH is located within the Accra Metropolitan Assembly of Ghana

(Fig 3). KBTH is the third largest hospital in Africa and the leading national referral centre with over 2000 beds (KBTH, 2013). It has twenty one (21) clinical and diagnostic departments. KBTH is the clinical training and research centre for the six (6) schools under the College of Health Sciences. KBTH has over 4000 medical and paramedical staff with an average of 347,297 annual patients' attendance (KBTH, 2013). Figure 3.1 below shows the map of Accra Metropolitan Assembly.

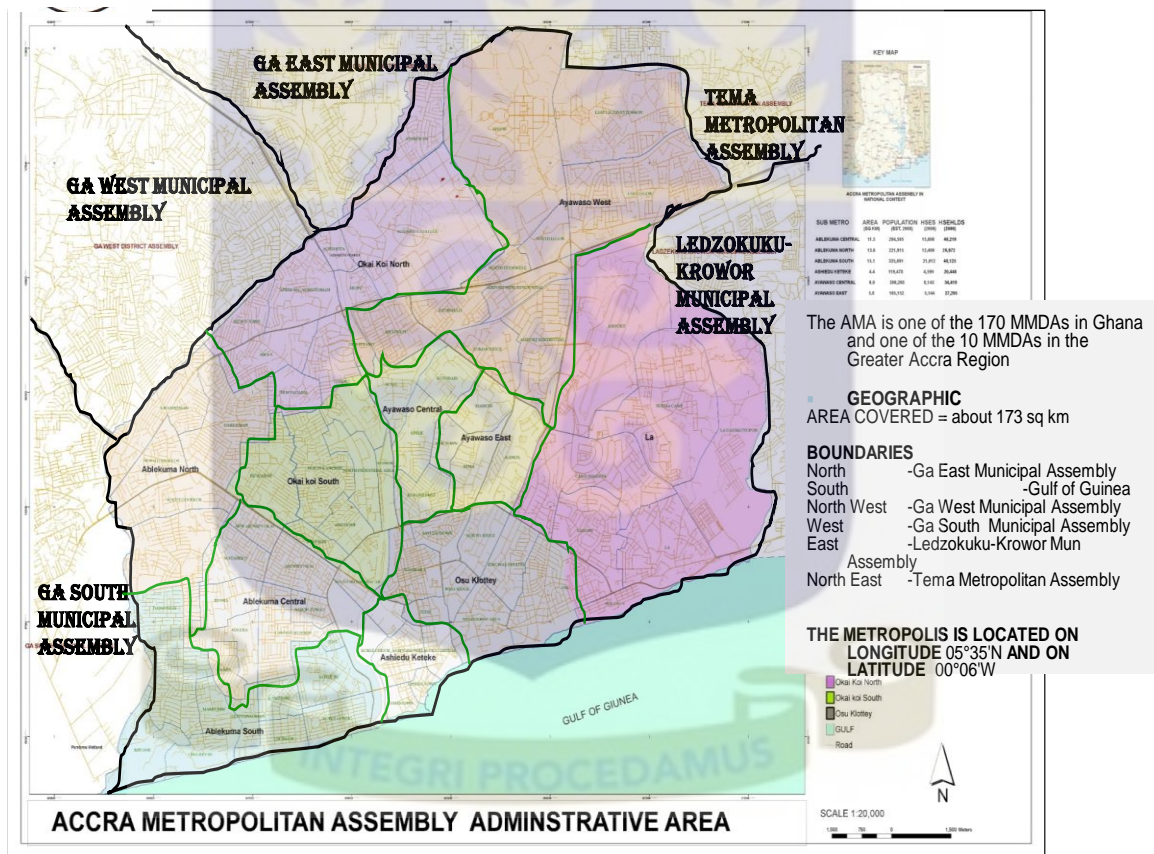


Figure 3.1: Map of Accra Metropolitan Assembly

The radiology department consists of forty seven (47) medical imaging staff: seven (7) consultant radiologists, fourteen (14) Residents, eighteen (18) Medical Radiographers and ten (10) Radiography Technical Officers. The department records an average of 38,195 cases per annum. The department is an internationally accredited training centre for Radiologists of the West African College of Surgeons (WACS) and the Ghana College of Physicians and Surgeons (GCPS). The main department consists of a CT scan / MRI unit, Mammography unit, an Ultrasound unit, two (2) Fluoroscopy rooms, and four (4) Conventional radiography rooms (computed radiography) of which two (2) are functional. The CT scan and MRI are linked to the Picture Archival and Communication System (PACS) for faster service delivery.

The requesting practitioner and the imaging professionals work as team to obtain better outcomes of care. For the purpose of this study, the referring clinicians are doctors who request imaging examinations from any of the remaining 20 main clinical departments of the KBTH. At the imaging department the requested examination is performed by the medical imaging professionals (radiologists and radiographers). Radiographers and Radiography Technical Officers do the CT scan, MRI scan, General X rays and the Radiologists perform the ultrasound procedures. The special procedures are performed by a team of radiologists and the radiographers. The reports are written by the radiologists. Two main types of patients access radiology services: those who need only the result (images) and those who need both the result and imaging reports. The readiness of the reports vary. CT scan, General X rays, Mammography and special procedure (fluoroscopy procedures) reports take two (2) working days, MRI reports take one (1) week while ultrasound reports are instant (same day). Reports are normally written by the

resident radiologists and then endorsed by the consultant/specialist radiologist or both write together. However in a state of emergency, instant reports are issued. Some imaging procedures at the department require that patients be booked. These include MRI, mammography, ultrasonography and special procedures (fluoroscopy procedures) while General X rays and the CT scans are 'walk in' procedures.

The medical imaging department runs 24 hours General X ray imaging services. CT scan and MRI services are available from 8:00am to 8:00pm every day while hysterosalpingography (HSG) and mammography for only week days. Ultrasound services are available from Monday to Friday but dedicated personnel are placed on 'on call' duty for weekends. The elderly, infants, emergency and clients who are staff are attended to before the regular clients. The processes within the medical imaging department are clearly stated in the departmental SOPs (Appendix 4).

### **3.3. Study Population**

The study population included clients receiving medical imaging service(s) at the main imaging department of KBTH.

#### **3.3.1. Inclusion criteria**

The study considered only clients above the age of eighteen (18) accessing medical imaging services at the main imaging department of KBTH.

#### **3.3.2. Exclusion criteria**

Clients undergoing fluoroscopy procedures apart from hysterosalpingography (HSG) were not involved because the waiting time and procedural time for these procedures

vary greatly depending on the nature of the case. Clients below the age of 18 years were excluded.

### 3.4 Variables

Table 3.1 presents the variables measured in the study.

**Table 3.1: Table of Variables**

VARIABLE	INDICATOR
<b>Dependent Variable</b>	
Quality of care of medical imaging services	
<b>Independent Variables</b>	
Demographic Factors	Age, sex, marital Status, religion, educational qualification, procedure type, report time
Input	<u>Physical characteristics</u> Capacity and sustainability
Process	<u>Clinical care</u> Effective communication, timeliness, patient-centredness, safety, equity
Output	<u>Clients assessment</u> Client attitudes, Client behaviors

### 3.5. Sampling and sampling procedure

#### 3.5.1. Sample Size for Clients (patients and care givers)

Adopting sample size formula by Cochran 1963 for cross-sectional study:

$$n = \frac{(Z_{\alpha})^2 p(1-p)}{d^2} \dots \dots \dots (1)$$

where:

n: sample size

p: the proportion of clients receiving medical imaging services in the department,  $p=50\%$ .

Proportion of 50% was used because it was difficult getting the particular proportion from literature and due to the limited time for the study, pilot study could not be carried out to determine it. The 50% however gave the maximum and appropriate sample size needed for better inferential statistics about the population.

d: margin of error, 8%

Precision (margin of error) of 8% instead of 5% was chosen because of the limited duration for the study. The 5% precision would have given a bigger minimum sample size which could not have been achieved within study duration. However the 8% gave a minimum but a sufficient sample size needed for the study.

$Z_{\alpha/2}=1.96$  since  $\alpha=5\%$  at 95% Confidence Level

Inputting the above into equation (1), the minimum sample size for clients required for this study was given by

$$n = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.08)^2} = 150.06$$

Using expected loss ratio of 10%, the final minimum sample size was:

$$n_o = \frac{150.06}{0.9} = 166.74 \approx 170.$$

Therefore the final minimum sample size for the clients was 170.

### **3.5.2. Sampling Procedure**

Systematic random sampling technique was employed to select participants. Data collection was done from 1<sup>st</sup> to 15<sup>th</sup> of June, 2016. The proportions of clients sampled from each unit was based on the average clients' turnout at the various units two weeks to the data collection obtained from the medical imaging clients' registry. These were 400 CT scan clients, 500 General X ray, 60 MRI, 90 HSG, 70 Mammography and 200 Ultrasound. The proportions of clients over the two weeks period therefore were 52 CT scan, 65 General X ray, 8 MRI, 12 HSG, 9 Mammography and 26 Ultrasound clients. These represented the minimum sample sizes from the various units within the two weeks period. Systematic random sampling based on every 7<sup>th</sup> client was used for recruiting all clients at the various units based on the proportions. A coin was tossed each morning during the data collection at each unit to determine the first client then after every 7<sup>th</sup> client technique applied. Systematic random sampling was suitable for both the booked and the "walk-in" clients. The "walk in" clients formed the majority.

### **3.5.3. Questionnaire Design and Administration**

Participants were given consent form (Appendix 1) to read and sign prior to answering the questionnaire (Appendix 2). Questionnaire and consent forms were read out and explained to participants who were not able to read or write and consent form signed by a witness. Adapted seven-point Likert scale questionnaire and an interview guide (Appendix 3) by Hollis (2006) on "service quality evaluation in internal healthcare service chains" modified into a five-point Likert scale (Appendix 2) ranging from '1=strongly disagree' to '5=strongly agree' and in accordance with the standard prescribed by the World Health Organization (WHO, 1999; WHO, 2015) and the

Standard Operating Procedures (SOPs) of the Medical Imaging Department of KBTH. This questionnaire was adapted because dimensions of quality of care for an internal healthcare service can be used for external healthcare service assessment and vice versa (Hollis, 2006). The questionnaire had two sections. Section one encompassed the demographic characteristics (age, sex, marital status, religion, educational level and some aspect relating the procedure: type of medical imaging procedure and the duration for the imaging reports. Section two consisted of the variables describing the perceived quality of care. There were 35 items related to perceived quality of care. Each questionnaire took 15-30 minutes on the average to be completed. Information was gathered on age, sex, education, religion, marital status, procedure type, reporting time and self-perceived quality of care based on the Donabedian framework (input, process and outcome) and the dimensions of quality of care by Hillman *et al* (2004), Lau (2007) and Institute of Medicine (2001): effective communication, safety, patient-centredness, timeliness, equity and capacity and sustainability. Information gathered was based on the clients' previous and immediate experiences.

#### **3.5.4. Purposive sampling / Interview Participants**

Purposive sampling involving maximum variation sampling strategy was applied to recruit twelve (12) In-depth Interview (IDI) participants. Purposive sampling was used because of the limited study duration. Purposive sampling method is time-effective and essential when dealing with a specific characteristic of study participants (participants' perceived quality of care). There were two chosen participants from each unit (CT scan, MRI, General X ray, Ultrasound, Mammography and HSG). One of these two people received medical imaging services more than three times at the imaging department while

the other had three or less. This was also to help improve the data quality. The IDIs were chosen because IDIs give more information on sensitive issues. The interviewees were included based on their acceptability, willingness to participate and provide information for this study. Reflective interview guide (Appendix 3) which started from general questions and gradually move to more specific questions was used. All interviews lasted between 30-60 minutes and recorded using an audio recorder. Notes were also taken. Both the recording and the notes were to help ensure accuracy of data and to facilitate analysis. The IDIs were carried out at the CT scan Rest Room of the main imaging department at KBTH by the principal investigator. Participants were assured of confidentiality.

### **3.6. Data Handling**

- Pretesting of Data collection tools were done at the Korle Bu Polyclinic prior to data collection to validate the survey tools.
- Study materials were explained to participants prior to interview.
- Research assistants were trained to carry out survey accurately.
- Questionnaires were cross checked by principal researcher.

#### **3.6.1. Data Storage / Data Protection**

Questionnaires were kept in a locked file and stored in a locked cabinet. A soft copy of data collected were coded and locked on a computer using a password and only accessible to the principal researcher.

### **3.6.2. Pretesting**

The questionnaire was designed to reflect objectives of the study. Pretesting of data collection tools were done at the Korle Bu Polyclinic with 10 participants to validate survey tools. The purpose was to establish if the tools were clearly worded and devoid of major biases and can seek the type of information intended. Pretesting was carried out with the aim of eliminating irrelevant questions so as to make it reliable.

### **3.7. Statistical Analysis**

Data from the questionnaires were entered into Epi Info 7 and then transferred from Microsoft Excel to STATA Version 13 for cleaning, merging and analysis. Cleaning of the data was done by running frequencies of the variables. This checked inconsistently coded data. Inconsistently coded data were double checked with raw data from the questionnaire. Statistical differences in demographic characteristics in relation to quality of care were evaluated by linear regression. Both univariate and multivariate regressions were performed.

Two methods were used for the analysis of the Likert scale responses. Firstly, the answers were coded on a scale from 1 (strongly disagree) to 5 (strongly agree) and analysed numerically. The composite score was calculated for the overall items on the perceived quality of care to determine the outcome variable (quality of care of medical imaging). The minimum score was 36 and the maximum was 180. The composite mean was then calculated using Stata Version 13. The relations between the dimensions and quality of care were analyzed initially using the univariate logistic regression analysis. Multivariate logistic regression analyses was done to exclude high intercorrelated

independent variables. A mean of less than 3.00 (neutral) was considered low quality and a mean above neutral was considered high quality. A confidence interval of 95% was used to show significant relations between the dependent and the independent variables.

Linear regression was used because the outcome variable (quality of care of medical imaging) is normally distributed. It is also a continuous variable. Normality was determined by using histogram and q-ladder commands in STATA Version 13. The results were presented in frequencies, mean and percentages.

Audio tape recorded data and minutes taken from the IDIs were subjected to careful verbatim transcription. Some of the transcribed data were translated from Twi into English. Transcripts of IDIs were read and reread by the principal investigator, searching for any emergent themes and recurrent ideas. Codes were assigned to themes and sub-themes based on Donabedian framework: input-process-outcome and the dimensions of quality of care of medical imaging services: effective communication, safety, patient-centredness, timeliness, equity and capacity and sustainability respectively.

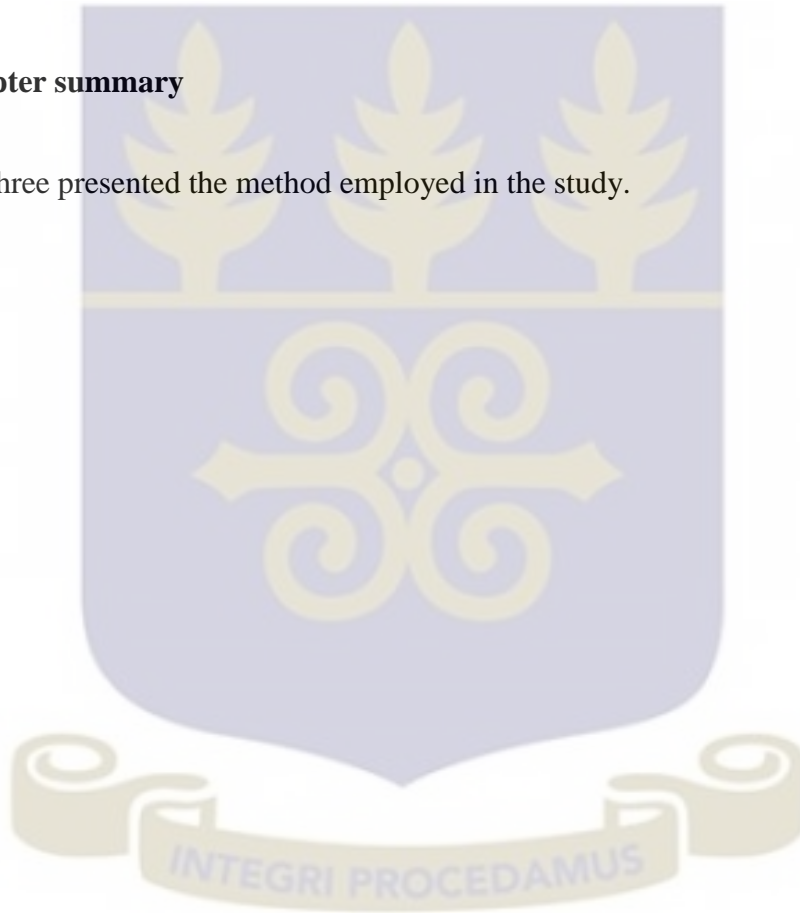
### **3.8. Ethical Consideration**

The proposal was submitted to the Health Policy Planning and Management Department (HPPM) of the School of Public Health which was then forwarded for ethical clearance from the Ghana Health Service Ethical Review Committee (GHS-ERC). Clearance was obtained from GHS-ERC prior to data collection. Participation in this study was entirely voluntary and participants had the option not to participate or to discontinue their participation without any adverse consequence. Participants were given sufficient information about the study to enable them decide whether to take part or not.

Participants were assured of the fact that this work was purposely academic and that no harm was intended. The study did not enquire any major cost for participants except the participants' time that was spent in answering the questionnaire and interviews. Written informed consent forms were given to participants across all cadre to sign. Informed consent was in English. However consents form was read out to patients who could not read or write and verbal consent was obtained.

### **3.9. Chapter summary**

Chapter three presented the method employed in the study.



## CHAPTER FOUR

### RESULTS

#### 4.0. Introduction

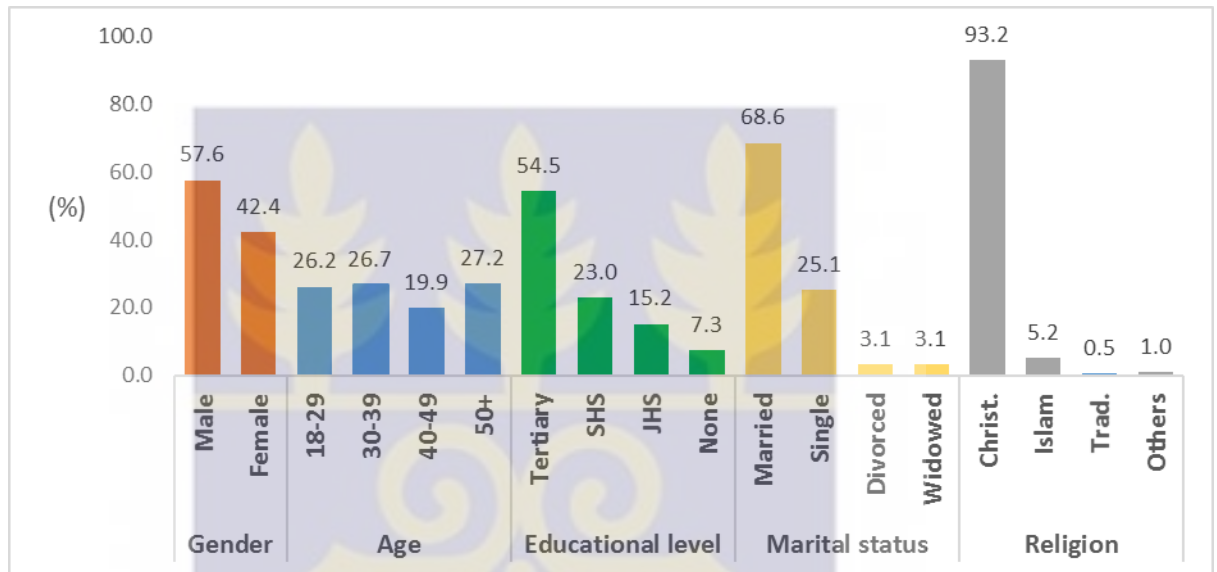
This chapter comprises the findings of the study and it is presented in accordance with the aim and objectives of the study. The chapter is in six sections. Section one presents demographic characteristics of clients. Section two presents assessment of perceived quality of care using the Donabedian's framework. Section three presents clients' perceived quality of care based on the dimensions of quality of care. Section four presents the relation between demographic characteristics and perceived quality of care. Section five presents perceived quality of care based on the imaging procedure type and duration of medical imaging reports. Section six presents chapter summary.

#### 4.1. Demographic characteristics of clients

Figure 4.1 presents demographic characteristics of the 191 clients surveyed. More than half of the clients 110 (57.6%) were males. Age group of clients was evenly distributed with 26% being in age group 18-29 and 30-39 years. More than half of the clients 104 (54.5%) had tertiary level education while 14 (7.3%) had no formal education. Majority of the clients 131 (68.6%) were married while 6 (3.1%) were divorced and widowed. Almost all the clients 178 (93.2%) were Christians while 1 (0.5%) was a traditionalist.

A total of 12 clients from all the six imaging units: CT scan, Ultrasound, MRI scan, General X ray Mammography and HSG participated in the IDIs. The clients are people who access medical imaging services. The age of the participants ranged from 18 – 50

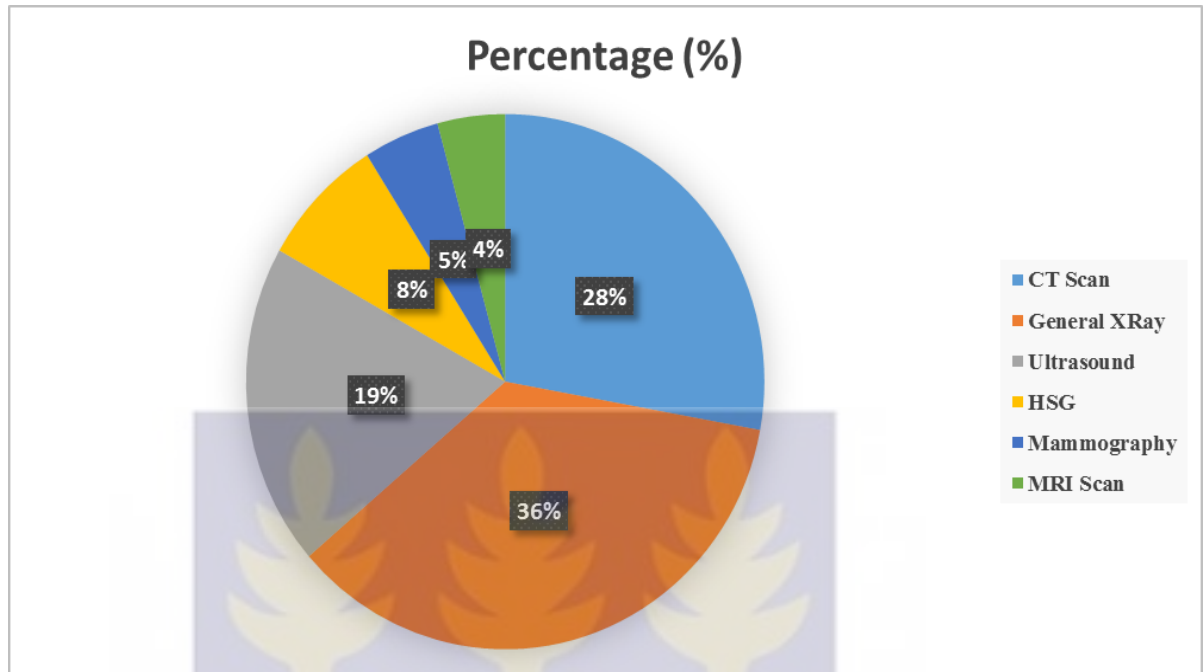
years with a mean of 35.5years. More than half of the participants (70.4%) are married. Almost all participants (83.3%) had formal education. More than half (66.7%) had tertiary education. There were more female participants (58.3%) than males. All the participants were Christians.



**Figure 4.1: Clients demographic characteristics**

#### 4.2. Type of medical imaging procedure

Figure 4.2 presents the type of medical imaging examination undergone by clients. Most clients 68 (36%) came for General X-ray, 53 (28%) CT scan, 37 (19%) Ultrasound, 15 (8%) HSG while the least 8 (4%) was MRI.

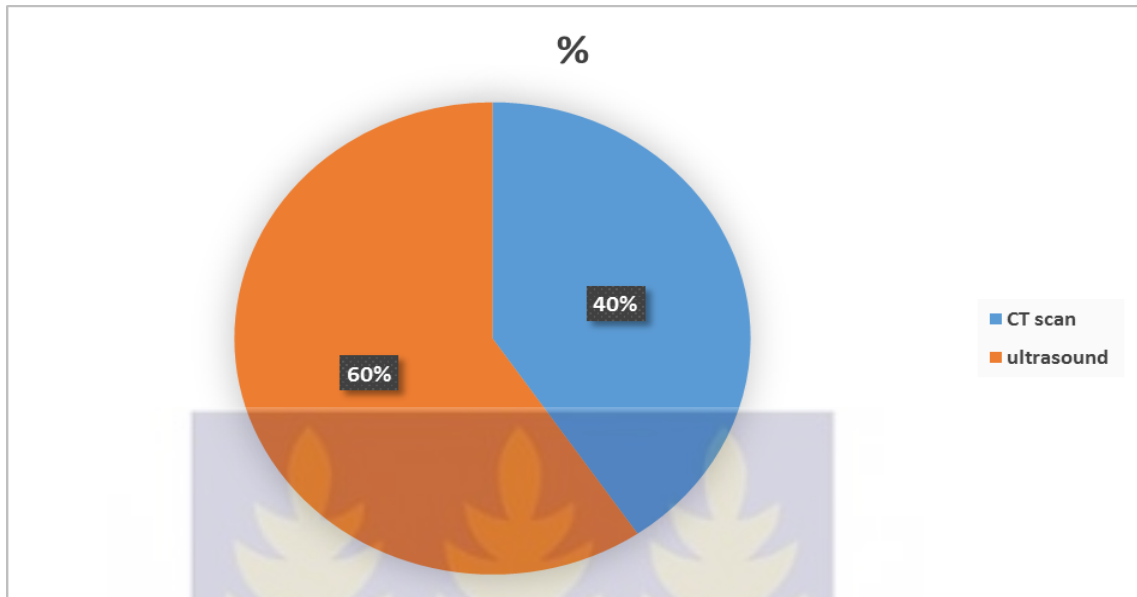


**Figure 4.2: Type of medical imaging procedure**

#### **4.3. Type of medical imaging report**

Forty two (42) of the clients received imaging reports comprising of 60% Ultrasound scan and 40% CT scan. This is shown in figure 4.3.



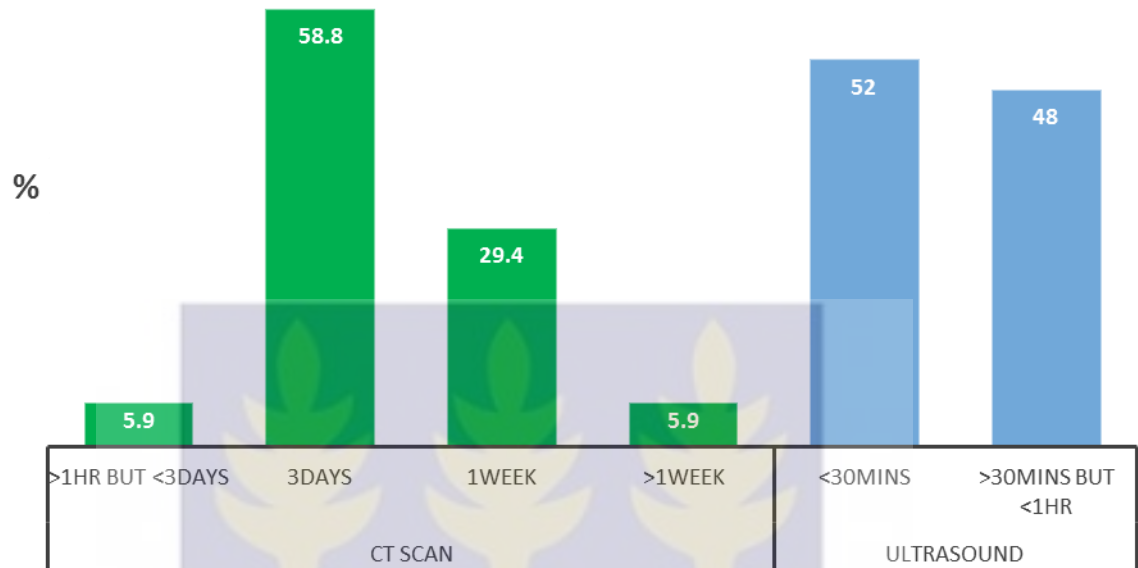


**Figure 4.3: Type of medical imaging report**

#### **4.4. Type of medical imaging report and the duration for the imaging report**

Figure 4.4 shows the medical imaging report type and the duration. More than half of the Ultrasound clients (52%) received their reports in less than 30 minutes and 48% received theirs after 30 minutes but less than one hour. More than half of the CT scan clients (58.8%) received their reports on the third day, 29.4% in one week while 5.9% received it after a week.





**Figure 4.4: Type of medical imaging report and the duration for the imaging report**

#### 4.5 Perceived quality of care using the Donabedian’s framework

This section presents the results based on the Donabedian’s framework. Respondents were asked to show their perception of quality of care using some identified indicators.

##### 4.5.1 Input Qualities (Capacity and sustainability)

Table 4.1 presents the overall perception of quality of care based on the inputs of medical imaging. The overall quality is low. This is statistically significant [2.212, CI:(1.85, 2.58),  $p < 0.001$ ]. Respondents were asked to show within a range, whether they ‘agreed or disagreed’ to certain statements. Response to the general perception of quality of care based on ‘staff appearance are neat’ was that respondents ‘strongly disagree’ representing low quality of care. However, respondents were to indicate the overall quality of care. Clients who ‘disagree, agree or strongly agree’ compared to

those who 'strongly disagree' were all towards high quality with significant associations except those who disagree [0.01, CI:(-0.03, 0.05),  $p < 0.660$ ].

Respondents were asked to show their perception of quality of care by rating 'the physical facility is visually neat and appealing'. In general, there was low quality of care in terms of 'the physical facility is visually neat and appealing'. The response: 'Disagree, neutral, agree and strongly agree' were statistically significant compared to 'strongly disagree' and were all towards high quality of care. In terms of responses to the perception of: 'imaging machines are always available and working well', the overall perceived quality of care was low. There was no significant difference [0.129, CI:(-0.003, 0.289),  $p < 0.113$ ] between those who 'disagree' and those who 'strongly disagree' that imaging machines were always available and working well.

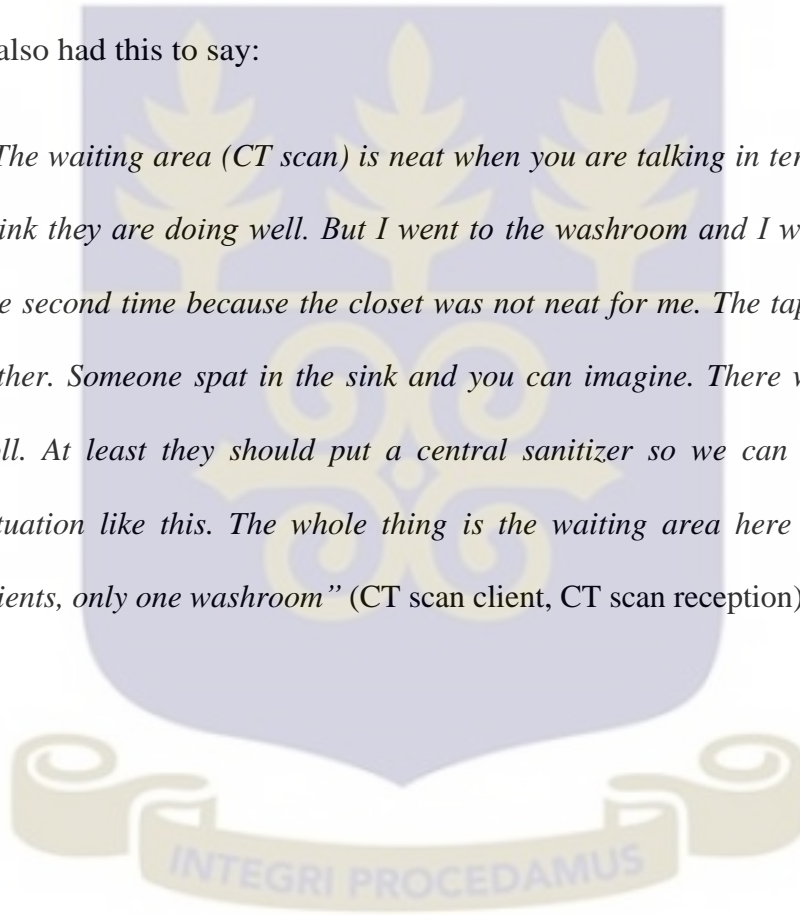
It was found that responses showing 'neutral, agree and strongly agree' compared to 'strongly disagree' were statistically significant and were towards high perceived quality of care. Clients 'strongly disagree' to the statement that 'when staff promised to do certain thing by certain time, they actually do'. This represents low quality. The results showed that 'Disagree, neutral, agree and strongly agree' were statistically significant compared to 'strongly disagree'. Although the overall perceived input quality was low, clients perceived high quality in terms of the availability of staff compared to those who 'disagree'. There was significant relations between 'disagree, neutral, agree and strongly agree' compared to 'strongly disagree' (Table 4.1).

This is supported by the perceived quality based on the IDIs. This is how clients perceive some aspects of the input dimension of quality:

*“The corridor is not okay. It’s not neat. The floor is not that clean. The examination room, the machines and what I laid on are clean but as for the waiting area.... they should paint the wall”* (HSG client, HSG waiting area).

Another also had this to say:

*“The waiting area (CT scan) is neat when you are talking in terms of Korle Bu. I think they are doing well. But I went to the washroom and I wouldn’t like to go the second time because the closet was not neat for me. The tap was not flowing either. Someone spat in the sink and you can imagine. There was also no toilet roll. At least they should put a central sanitizer so we can use especially in situation like this. The whole thing is the waiting area here of more than 50 clients, only one washroom”* (CT scan client, CT scan reception).



**Table 4.1: Assessment of Input Qualities (Capacity and sustainability) of medical imaging at KBTH using multivariate logistic regression**

<b>Input qualities</b>		<b>Quality of care</b>		
<b>Capacity and sustainability</b>	<b>Likert Scale</b>	<b>Coefficient</b>	<b>95% CI</b>	<b>P-Value</b>
Staff appear neat	Strongly disagree	Ref	-	-
	Disagree	0.010	(-0.033, 0.053)	0.660
	Neutral	0.045	(0.016, 0.073)	0.002*
	Agree	0.069	(0.0402, 0.098)	0.000*
	Strongly agree	0.104	(0.0731, 0.135)	0.000*
The physical facilities is visually neat and appealing	Strongly disagree	Ref	-	-
	Disagree	0.031	(0.002, 0.059)	0.034*
	Neutral	0.053	(0.025, 0.081)	0.000*
	Agree	0.084	(0.056, 0.112)	0.000*
	Strongly agree	0.098	(-0.143, 0.490)	0.000*
Imaging machines are always available and working well	Strongly disagree	Ref	-	-
	Disagree	0.129	(-0.003, 0.289)	0.113*
	Neutral	0.050	(0.035, 0.066)	0.000*
	Agree	0.068	(0.053, 0.082)	0.000*
	Strongly agree	0.102	(0.080, 0.125)	0.000*
When they promise they fulfil	Strongly disagree	Ref	-	-
	Disagree	0.023	(0.011, 0.034)	0.000*
	Neutral	0.059	(0.047, 0.071)	0.000*
	Agree	0.084	(0.072, 0.096)	0.000*
	Strongly agree	0.109	(0.089, 0.129)	0.000*
Staff are always available on duty whenever I come to the imaging department	Strongly disagree	Ref	-	-
	Disagree	0.106	(0.024, 0.188)	0.000*
	Neutral	0.137	(0.063, 0.211)	0.000*
	Agree	0.159	(0.087, 0.231)	0.000*
	Strongly agree	0.199	(0.126, 0.273)	0.000*
Ref		<b>2.212</b>	<b>(1.850, 2.575)</b>	<b>0.000</b>

CI, confidence interval; \* significant associations according to CI

#### 4.6.2 Process qualities

Clients perception of different aspects of quality of care of medical imaging services based on the process dimensions are presented in Table 4.2. Overall, clients perceived low quality of care in relation to the process dimension. This is statistically significant [2.01, CI:(1.74, 2.27),  $p < 0.001$ ]. These are presented in the following dimensions of quality of care of medical imaging.

##### 4.6.2.1 Timeliness

Overall, clients perceived low quality of care based on the timeliness of the care process. This is statistically significant [2.82, CI:(2.71, 2.92),  $p < 0.001$ ]. The responses showed that clients ‘strongly disagree’ to the statement that ‘waiting time is less than one hour’. The responses, ‘Disagree, neutral, agree and strongly disagree’ were statistically significant compared to ‘strongly disagree’. However, ‘disagree, neutral, agree and strongly disagree’ compared to those who ‘strongly disagree’ are all toward high quality of care. Additionally, results showed that clients ‘strongly disagree’ to the statement that ‘imaging reports are always ready by the time stated’. In addition, the results indicated that ‘disagree, neutral, agree and strongly disagree’ were statistically different compared to ‘strongly disagree’ and were all towards high quality of care.

In terms of the IDIs, participants’ description of perceived quality of care based on whether the imaging reports is always ready by the time showed some responses. For instance, a participant stated:

*“I came and I left my collection slip in the box. I waited for about an hour before*

*I was told something. Brother think about yourself. No one came to tell me anything while I was waiting. I continued waiting after they told me to sit. I decided to go and ask the receptionist later about how long I will wait. The first time I went, she said I should go and sit. I waited for awhile, no signal so I went to ask again, and this time she said this in Twi harshly to me: madam I say go and sit down and wait. So I went back but I started feeling hungry so I went back because I didn't know how long I was supposed to wait. Then she said again in Twi: madam I told you to sit. So I said sorry madam it's because am feeling hungry and I don't know how long I was supposed to sit then she said I can go and eat. I spent more than four hours” (a female CT scan client).*

An ultrasound client had this to say:

*“The waiting time for ward patients is too long. At times 1 to 2 hours”*

#### **4.6.2.2 Equity**

Perceived quality of care based on equity by clients was low. This was however, significant [2.84 CI:(2.74, 2.93),  $p < 0.001$ ]. Results showed that clients ‘strongly disagree’ to the assertion that ‘first come first served is the criteria’ used in attending to them. There was no statistically significant relation between ‘strongly disagree and disagree’ [0.019 CI:(-0.003, 0.041),  $p < 0.084$ ]. However, response: ‘neutral, agree and strongly agree’ were statistically significant compared to responses: ‘strongly disagree. Neutral, agree’ and ‘strongly disagree’ compared to those who ‘strongly disagree’ were all toward high quality of care. Similar responses were recorded during the IDIs. This is

what one client said:

*“No ....no its not first come first served. There were two people, they said they paid an amount higher (GHS185.00) than what we paid (GHS120.00) so they were attended to before some of us though we were here before they came. They were even told they would get their report that day while we were to get our report on the 3<sup>rd</sup> day” (HSG client).*

Another client from the CT scan unit responded in a similar tone:

*“No this department it’s not about first come first serve. We were told when we were sitting at the reception (CT scan /MRI) that they would take care of the elderly, emergency, infants and those in uniform first before the regular people. But as I was waiting some other people who didn’t belong to the categories mentioned were attended to first before some of us. So you can come here at dawn, someone may come at say 11:00am. They might attend to that person before you” (a female CT scan client).*

#### **4.2.2.3 Safety**

The results of clients’ perception of quality of care based on the safety dimension of medical imaging was low. This was statistically significant [2.21, CI:(1.85, 2.58),  $p < 0.001$ ]. Respondents ‘strongly disagree’ that the safety measures in place were high. Overall, clients ‘strongly disagree’ to the statement that lead material was used to cover part(s) of their body that was not being imaged during radiation procedures. There were significant associations between responses: ‘disagree, neutral, agree’ and ‘strongly

disagree' compared to 'strongly disagree'. Quality of care based on the availability of hand sanitizer for clients was low. Clients 'strongly disagree' to the claim that there was hand sanitizer for use as a way of infection control. The responses: 'Disagree and neutral' were statistically significant compared to 'strongly disagree'.

Moreover, results showed that clients 'strongly agree' that the table, bed couch or bucky they were examined on was neat compared to those who responded 'strongly disagree'. This was statistically significant [0.06, CI:(0.05, 0.08),  $p < 0.001$ ]. Additionally, the results indicated that clients across all imaging procedure 'strongly disagree' to the statement that an explicit consent was sought from them. During the IDIs, a client's response to whether lead material was ever used to cover any part of his body during radiation procedure was in the negative:

*"From my experience, on several occasions, no protective material as you are saying was used on me during the procedure"* (General X ray client).

#### **4.2.2.4 Effective communication**

The results showed that overall, perceived quality of care was low based on the level of communication. This was significant [2.88, CI:(1.75, 2.27),  $p < 0.001$ ]. The results showed that clients 'strongly disagree' to the assertion that while 'they were waiting, staff constantly spoke to them and informed them why the delay and also assured them that they would be attended to. The responses: 'Disagree, neutral, agree' and 'strongly agree' were statistically significant compared to 'strongly disagree'. Additionally, the results indicated that client 'disagree' to the statement that they understood the instructions given

them during the care process. Responses: 'Disagree, neutral, agree' and 'strongly agree' compared to 'strongly disagree' were statistically significant. Response from the IDIs support the quantitative result:

*Staff don't mind you waiting for long without telling you anything (General X ray client).*

Another had this to say:

*Communication gap is very wide. No one talks to you about anything. They don't care about the time. You can wait for so long and no one comes to tell you anything (Ultrasound client).*



**Table 4.2: Assessment of clients' perception of quality based on process, timeliness, equity and safety dimensions using multivariate logistic regression**

<u>Timeliness</u>	Likert Scale	Quality of care		
		Coefficient	95%CI	P-Value
Waiting time was less than 1 hour	Strongly disagree	Ref	-	-
	Disagree	0.040	(0.026,0.050)	0.000*
	Neutral	0.121	(0.086, 0.157)	0.000*
	Agree	0.083	(0.051, 0.116)	0.000*
	Strongly agree	0.106	(0.075, 0.136)	0.000*
My imaging report is always ready by the time stated	Strongly disagree	Ref	-	-
	Disagree	0.025	(0.006,0.044)	0.013*
	Neutral	0.069	(0.054, 0.084)	0.000*
	Agree	0.099	(0.075, 0.118)	0.000*
<u>Equity</u>				
First come first served is used as a criteria in attending to us	Strongly disagree	Ref		
	Disagree	0.019	(-0.003, 0.041)	0.084
	Neutral	0.100	(0.086, 0.113)	0.000*
	Agree	0.088	(0.054, 0.123)	0.000*
	Strongly agree	0.104	(0.068, 0.139)	0.000*
<u>Safety</u>				
Lead material (a bit heavy material) was used to cover part of my body during the examination	Strongly disagree	Ref	-	-
	Disagree	0.030	(0.022, 0.038)	0.000*
	Neutral	0.064	(0.047 -0.081)	0.000*
	Agree	0.088	(0.068 0.107)	0.000*
	Strongly agree	0.123	(0.082 0.177)	0.000*
Hand sanitizer in the department that patients can use when in the department and before leaving the department	Strongly disagree	Ref	-	-
	Disagree	0.030	(0.023 0.174)	0.000*
	Neutral	0.058	(0.042, 0.074)	0.006*
The table or stand I was examined on was neat	Strongly disagree	Ref		
	Agree	0.032	(0.021, 0.043)	0.000*
	Strongly agree	0.063	(0.050, 0.076)	0.000*
I was asked for my consent before the examination	Strongly disagree	Ref		
	Disagree	0.023	(0.016,0.031	0.000*
	Neutral	0.051	(0.035, 0.066	0.000*
	Agree	0.057	(0.027, 0.087	0.000*
Ref		<b>2.011</b>	<b>1.754, 2.268</b>	<b>0.000</b>

#### 4.2.2.5 Patient-centredness (Responsiveness)

Table 4.3 (p. 57) presents perceived quality of care based on the patient-centredness or responsiveness to care. The care quality was perceived as low. This was however, statistically significant [2.20, CI:(1.92, 2.48),  $p < 0.001$ ]. Overall, clients' perception of quality of care based on promptness to care was low: They were asked to respond to the statement: when I got to the imaging department and either dropped the request form into the request box or handed it to a staff, the staff on duty got back to me in less than 10 minutes. Responses: 'neutral, agree and 'strongly agree' compared to 'strongly disagree' showed significant differences. These differences were towards high quality. Clients 'strongly disagree' to the statement: 'staff did not respond when I greeted him or her'. Responses: 'Disagree, neutral, agree' and 'strongly agree' compared to 'strongly disagree' were statistically significant ( $P < 0.001$ ). However, overall perceived quality of care for the statement: 'staff smiled during our interaction' was low.

Nevertheless, there was significant association between the responses: 'disagree, neutral' and 'agree' compared to 'strongly disagree' and were all towards high quality. Responses: 'strongly agree' to the statement whether the staff answered questions asked by clients compared to 'strongly disagree' was statistically significant ( $p < 0.001$ ) and towards high perceived quality. However, the overall quality of care was low. In addition, clients 'strongly disagree' to the assertion that the procedure was explained to them. This represents low quality of care. There were significant statistical differences in the responses: 'disagree, agree' and 'strongly agree' compared to 'strongly disagree'. In

addition, clients perceived quality of care to be low in terms of the statement as to whether they can contact the department when they need to.

Responses: ‘Disagree agree’ and ‘strongly agree’ compared to ‘strongly disagree’ were statistically significant. Responses ‘agree’ and ‘strong agree’ compared to ‘strongly disagree’ were towards high quality while ‘disagree’ was towards low quality. In terms of responses to privacy, clients ‘agree’ that when they were being attended to, other clients were entering the procedure room. Lastly, clients ‘strongly agree’ to the statement, ‘staff did not shout at me’ representing high perceived quality of care compared to ‘strongly disagree’.

The IDIs confirm the patient- centredness dimension in the qualitative findings. A client said:

*“I believe they are fairly organized but I would wish that we have systems in place so that we can do prior booking either over phone or email or anything so you know exactly what it is that you are dealing with then you can manage your time better but as you can see sometimes you have to walk in here and spend the entire day here. Whereas if they have help lines that you can call to do prior booking it would have made the process better”* (Female abdominopelvic CT scan client)

Another interviewee also said:

*The receptionist gave a small chit during the booking and told me what to do before coming.....but for the procedure itself, no one told me anything. When I*

*came two of my colleague clients said they did it before and it was painful so I was scared. But the staff didn't tell me anything at all. They should be counseling people. They should at least brief the procedure especially to those of us who never had it before (HSG client).*

Additionally, in terms of the explanation of the procedure and safety a General X ray client had this to say.

*The procedure is not explained to us (General X ray client).*



**Table 4.3: Clients perception of quality of care based on Patient-centredness and effective communication**

Patient-centredness	Likert Scale	Quality of care		
		Coefficient	95%CI	P-Value
The staff got back to me in <u>MORE</u> than 10minutes after I gave him / her the request form or after picking it from the box	Strongly disagree	Ref		
	Disagree	0.024	(0.006, 0.041)	0.008*
	Neutral	0.108	(0.068, 0.147)	0.000*
	Agree	0.079	(0.045, 0.113)	0.000*
	Strongly agree	0.102	(0.066,0.137)	0.000*
Staff didn't respond when I greeted him/her	Strongly disagree	Ref	-	-
	Disagree	0.028	(0.019, 0.036)	0.000*
	Neutral	0.007	(0.055, 0.078)	0.000*
	Agree	0.113	(0.073, 0.154)	0.000*
	Strongly agree	0.093	(0.046, 0.140)	0.000*
Staff smiled during our interaction	Strongly disagree	Ref		
	Disagree	0.032	(0.022, 0.043)	0.000*
	Neutral	0.064	(0.079, 0.075)	0.000*
	Agree	0.086	(0.264, 0.102)	0.000*
staff offered me seat	Strongly disagree	Ref		
	Disagree	0.038	(0.003,0.074)	0.036*
	Neutral	0.059	(0.021, 0.096)	0.003*
	Agree	0.094	(0.057, 0.130)	0.000*
	Strongly agree	0.129	(0.092, 0.166)	0.000*
The staff answered my questions	Strongly disagree	Ref		
	Neutral	0.038	(0.010, 0.159)	0.010*
	Agree	0.065	(0.028, 0.102)	0.001*
	Strongly agree	0.118	(0.076, 0.159)	0.000*
The procedure was explained to me	Strongly disagree	Ref	-	-
	Disagree	0.025	(0.015, 0.035)	0.000*
	Neutral	0.057	(0.040, 0.073)	0.000*
	Agree	0.080	(0.071, 0.089)	0.000*
	Strongly agree	0.113	(0.100, 0.129)	0.000*

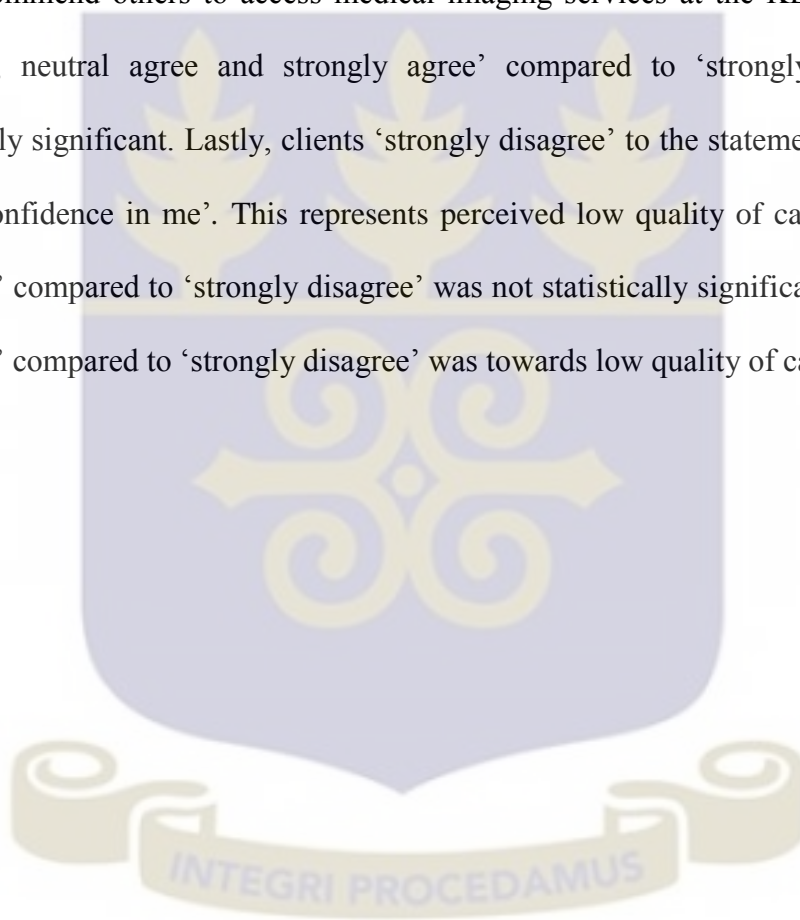
I can contact service providers when I need to	Strongly disagree	Ref		
	Disagree	0.037	(0.0293, 0.045)	0.000*
	Neutral	0.057	(0.043, 0.071)	0.000*
	Agree	0.091	(0.079, 0.101)	0.000*
No one enters the examination room while examination is on going	Strongly agree	0.116	(0.093, 0.139)	0.000*
	Strongly disagree	Ref		
	Disagree	0.039	(0.029, 0.050)	0.000*
	Neutral	0.055	(0.037, 0.073)	0.000*
	Agree	0.076	(0.064, 0.089)	0.000*
	Strongly agree	0.110	(0.098, 0.123)	0.000*
	Strongly disagree	Ref		
	Disagree	0.285	(-0.142, 0.712)	0.189
<b>Effective communication</b>	Neutral	0.189	(0.009, 0.369)	0.040*
	Agree	0.310	(0.145, 0.475)	0.000*
	Strongly agree	0.330	(0.166, 0.493)	0.000*
	Strongly disagree	Ref		
While I wait, staff constantly speaks to me why the delay and assures me that I will be attended to	Disagree	0.019	(0.011, 0.026)	0.000*
	Neutral	0.043	(0.029, 0.055)	0.000*
	Agree	0.068	(0.054, 0.082)	0.000*
	Strongly agree	0.077	(0.023, 0.130)	0.005*
I understood the instructions given	Strongly disagree	Ref		
	Disagree	0.012	(-0.013, 0.037)	0.326
	Neutral	0.049	(0.029, 0.069)	0.000*
	Agree	0.083	(0.065, 0.102)	0.000*
	Strongly agree	0.109	0.089	0.000*
Ref		<b>2.011</b>	<b>1.754, 2.268</b>	<b>0.000</b>

CI, confidence interval; \* significant associations according to CI

#### 4.2.3 Outcome qualities

Table 4.4 presents the perceived quality of care based on the outcome measures of the Donabedian's model. Results showed that overall, client perceived that quality of care in accordance with the outcome dimension was low. This was however, significant [2.64, CI:(2.53, 2.76),  $p < 0.001$ ]. Clients responded 'strongly disagree' to the statement that

‘they are satisfied with medical imaging services’. Responses: ‘disagree, agree’ and ‘strongly agreed’ compared to ‘strongly disagree’ were statistically significant in terms of the statement ‘I am very satisfied with medical imaging services received’. Responses: ‘disagree, neutral, agree and strongly agree’ compared to ‘strongly disagree’ were towards high quality. Additionally, clients ‘strongly disagree’ to the statement that they ‘will recommend others to access medical imaging services at the KBTH’. Responses: ‘disagree, neutral agree and strongly agree’ compared to ‘strongly disagree’ were statistically significant. Lastly, clients ‘strongly disagree’ to the statement ‘staff behavior instills confidence in me’. This represents perceived low quality of care. The response: ‘disagree’ compared to ‘strongly disagree’ was not statistically significant. The response: ‘disagree’ compared to ‘strongly disagree’ was towards low quality of care.



**Table 4.4: Assessment of clients' perception of quality of care based on the outcome dimension of medical imaging using multivariate linear regression**

Dimensions of care	Likert Scale	Quality of care		
		Coefficient	95% CI	P-Value
I am very satisfied with the medical imaging service received	Strongly disagree	Ref	-	-
	Disagree	0.013	(-0.007, 0.034)	0.194
	Neutral	0.046	(0.026, 0.066)	0.000*
	Agree	0.083	(0.062, 0.105)	0.000*
	Strongly agree	0.111	(0.081, 0.140)	0.000*
I will recommend others to access service here	Strongly disagree	Ref	-	-
	Disagree	0.048	(0.024, 0.071)	0.000*
	Neutral	0.090	(0.063, 0.118)	0.000*
	Agree	0.112	(0.083, 0.142)	0.000*
	Strongly agree	0.130	(0.094, 0.166)	0.000*
Staff behaviour instils confidence in me	Strongly disagree	Ref	-	-
	Disagree	0.021	(-0.005, 0.046)	0.107
	Neutral	0.042	(0.014, 0.069)	0.004*
	Agree	0.070	(0.039, 0.099)	0.000*
	Strongly agree	0.109	(0.072, 0.147)	0.000*
Ref		<b>2.648</b>	<b>2.530 2.764</b>	<b>0.000</b>

CI, confidence interval; \* significant associations according to CI

During the IDI, one client did not hesitate but to say this:

*“Well Korle Bu is the last stop for everybody. Not because of anything but due to range of procedures that are done here. The experts are here too. I will recommend based on that. You have consultants so it's like you have no option”*

(Female CT scan client).

Another had this to say:

*“Yes I will recommend others to come here. The place they told me to go first, the*

*cost of the examination was more than two times what I paid at Korle Bu. I will recommend people based on the cost but not on any other thing. I will give them 5 on the scale of zero to ten” (HSG client)’*

#### **4.3 Relationships between demographic characteristics of clients and quality of care**

Table 4.5 (p. 63) presents results on the relationship between clients’ demographic characteristics and quality of care. The overall perception of quality of care based on the sex of the clients using the univariate logistic regression was a little above neutral representing high quality. There was no significant association between males and females’ perception of quality of care though males recorded lower quality of care [-0.002, CI:(-0.011, 0.006)  $P < 0.605$ ] compared to the females. The final multivariate logistic regression (Table 4.7) does not account for sex as a relevant element for clients’ perception of quality of care. The relationship between clients’ age and quality of care was statistically significant with age group 50 and above [0.13, CI:(0.02, 0.25)  $p < 0.025$ ] on the univariate analysis (Table 4.5). The overall quality of care based on age was low [2.99, CI:(2.91, 3.07)  $p < 0.000$ ].

Nonetheless age groups (30-39 years) and (40-49 years) were a little above *neutral* in terms of the perceived quality of care compared to age group (18-29 years). In addition, as observed (Table 4.5), perception of quality of care increases as one ages. However the final multivariate regression (Table 4.7) does not account for age in clients’ perceived quality of care. In addition, perceived quality of care based on the marital status using univariate analysis recorded lower quality of care for singles and divorced clients

compared to the married. There was no significant relation [0.001 CI:(-0.019, 0.019)  $p < 0.995$ ] between divorced and married clients' perception of quality of care. Widows however, perceived high quality of care compared to the married respondents. The final multivariate analysis (Table 4.7) does not account for marital status in clients' perceived quality of care.

Perceived quality of care across educational level was lower for Senior High School (SHS) and clients without any formal education compared to clients with tertiary education. Clients with Primary or Junior High School (JHS) education perceived care to be of higher quality compared to those with tertiary education. There was a significant relationship between clients with other religious sects apart from Christianity, Islam and Traditionalist [0.53, CI:(0.12, 0.94),  $p < 0.011$ ] compared to Christian clients in the univariate analysis. Islam, Traditionalists and Others perceived higher quality of care compared to Christians. This category of religious sect named 'others' was a limitation in the study since it was not defined. However, the final multivariate logistic regression did not account for religion (Table 4.7). The demographic characteristics did not contribute to the overall perception of quality of care of medical imaging services

**Table 4.5: Relationship between demographic characteristics and quality of care**

Demographic characteristics	Quality of care		
	Coefficient	<b>CRUDE</b> 95%CI	<i>P-Value</i>
<b>Sex</b>			
Female	Ref		
Male	-0.006	(-0.091, 0.079)	0.890
Constant (k)	3.052	(2.987, 3.117)	0.000
<b>Age (years)</b>			
18 – 29	Ref	-	-
30 – 39	0.037	(-0.074, 0.152)	0.524
40 – 49	0.076	(-0.048, 0.200)	0.230
50+	0.131	(0.017, 0.246)	0.025
Constant (k)	2.988	(2.906, 3.069)	0.000
<b>Level of education</b>			
Tertiary	Ref		
SHS	-0.003	(-0.108, 0.102)	0.954
Primary/JHS	0.051	(-0.072, 0.173)	0.418
No education	-0.003	(-0.170, 0.163)	0.969
Constant (k)	3.042	(2.985, 3.099)	0.000
<b>Marital status</b>			
Married	Ref	-	
Single	-0.078	(-0.175, 0.018)	0.112
Widowed	-0.156	(-0.396, 0.083)	0.199
Divorced	0.239	(-0.000, 0.478)	0.050
Constant (k)	3.065	(3.015, 3.116)	0.000
<b>Religion</b>			
Christian	Ref		
Muslim	0.038	(-0.149, 0.224)	0.691
Traditionalist	0.332	(-0.244, 0.907)	0.257
Others	0.532	(0.124, 0.940)	0.011*
Ref	3.039	(2.996, 3.083)	0.000

CI, confidence interval; \* significant associations according to CI

#### 4.4 Perceived quality of care based on the procedure type and duration of report.

The procedures clients ‘undergo’ had significant relationship with quality of care (Table

4.6). This was observed in relation to MRI scan: [0.24, CI:(0.02, 0.45),  $p<0.032$ ] and [0.23, CI:(0.01, 0.06),  $p<0.017$ ] using univariate and final multivariate regression models respectively. Clients who had MRI scan and Mammography perceive higher quality of care compared to those who undergo CT scan. However CT scan clients also perceive high quality of care. The overall quality of care in relation to clients who undergo General X ray, Ultrasound and HSG was low. However clients who perceived much lower quality of care were those of the HSG unit followed by Ultrasound and then General X ray (Table 4.6).

Duration of report was statistically significant with the quality of care clients perceived in relation to clients who were able to receive their reports in more than 30 minutes but less than one hour [-0.29, CI:(-0.51, -0.08),  $p<0.013$ ] in the univariate regression analysis. Notwithstanding, clients who received reports in more than 30 minutes but less than one hour still perceive lower quality of care. These were ultrasound clients. CT scan clients who received their reports on the third day and up to a week perceived much lower quality of care. The longer the duration of the report, the lower the quality of care. However the final multivariate logistic regression did not account for the duration of report as an important measure of clients' perceived quality (Table 4.7).

**Table 4.6: Relationship between type of medical imaging procedure, duration of reports and quality of care using linear regression**

Demographic characteristics	<u>Quality of care</u>					
	Coefficient	<u>CRUDE</u>		<i>P-Value</i>	<u>ADJUSTED</u>	
95%CI					Coefficient	95%CI
<b>Procedure underwent</b>						
<b>CT Scan</b>	Ref	-	-	-	-	-
<b>MRI scan</b>	0.235	(0.020, 0.450)	0.032*	0.029	(0.005, 0.053)	0.017 *
<b>General X Ray</b>	-0.013	(-0.117, 0.091)	0.809	-0.015	(-0.0300, 0.000)	0.050
<b>Ultrasound</b>	-0.066	(-0.188, 0.055)	0.284	-0.006	(-0.0226, 0.010)	0.487
<b>Mammography</b>	0.177	(-0.028, 0.381)	0.090	0.006	(-0.015, 0.0272)	0.569
<b>HSG</b>	-0.147	(-0.313, 0.019)	0.081	0.001	(-0.016, 0.0185)	0.902
<b>Constant (k)</b>	3.061	(2.983, 3.139)	0.000			
<b>Report time</b>						
<b>&lt;30mins</b>	Ref		-			
<b>&gt;30mins-&lt;1hr</b>	-0.287	(-0.512, -0.062)	0.013*			
<b>1hr – &lt;3days</b>	0.260	(-0.167, 0.688)	0.231			
<b>3days</b>	-0.117	(-0.348, 0.113)	0.316			
<b>&gt;3days- a week</b>	-0.011	(-0.595, 0.573)	0.970			
<b>&gt;week</b>	-0.084	(-0.348, 0.179)	0.529			
<b>Constant (k)</b>	0.103	(-0.324, 0.531)	0.634			
	3.040	(2.883, 3.196)	<b>0.000</b>			
Ref				<b>1.082</b>	<b>0.912, 1.252)</b>	<b>0.000</b>



**Table 4.7: Overall assessment of clients' perception of quality of care of medical imaging services at KBTH using multivariate logistic regression.**

<b>Input qualities</b>		<b>Quality of care</b>		
<b>Capacity and sustainability</b>	<b>Likert Scale</b>	<b>Coefficient</b>	<b>95% CI</b>	<b>P-Value</b>
Staff appear neat	Strongly disagree	Ref	-	-
	Disagree	0.010	(-0.033, .053)	0.660
	Neutral	0.045	(0.016, 0.073)	0.002*
	Agree	0.069	(0.040, 0.098)	0.000*
	Strongly agree	0.104	(0.073, 0.135)	0.000*
The physical facilities is visually neat and appealing	Strongly disagree	Ref	-	-
	Disagree	0.031	(0.002, 0.059)	0.034*
	Neutral	0.053	(0.025, 0.081)	0.000*
	Agree	0.084	(0.056, 0.112)	0.000*
	Strongly agree	0.098	(-0.143, 0.490)	0.000*
Imaging machines are always available and working well	Strongly disagree	Ref	-	-
	Disagree	0.129	(-0.003 0.289)	0.113*
	Neutral	0.050	(0.035, 0.066)	0.000*
	Agree	0.068	(0.053, 0.082)	0.000*
	Strongly agree	0.102	(0.080, 0.125)	0.000*
Staff served me with neat gown	Strongly disagree	Ref	-	-
	Disagree	0.015	(-0.003, 0.033)	0.108
	Neutral	0.0485	(0.031, 0.066)	0.000*
	Agree	0.086	(0.069, 0.102)	0.000*
	Strongly agree	0.113	(0.089, 0.136)	0.000*
When they promise they fulfil	Strongly disagree	Ref	-	-
	Disagree	0.023	( 0.011, 0.034)	0.000*
	Neutral	0.059	( 0.047, 0.071)	0.000*
	Agree	0.084	(0.072, 0.096)	0.000*
	Strongly agree	0.109	( 0.089, 0.129)	0.000*
Imaging staff are always available on duty	Strongly disagree	Ref	-	-
	Disagree	0.106	( 0.024, 0.188)	0.000*
	Neutral	0.137	( 0.063, 0.211)	0.000*
	Agree	0.159	(0.087, 0.231)	0.000*
	Strongly agree	0.199	(0.126, 0.273)	0.000*

The staff got back to me in <u>MORE</u> than 10minutes after I gave him / her the request form or after picking it from the box	Strongly disagree	Ref		
	Disagree	0.024	(0.006, 0.041)	0.008*
	Neutral	0.108	(0.068, 0.147)	0.000*
	Agree	0.079	(0.045, 0.113)	0.000*
Staff didn't respond when I greeted him/her	Strongly disagree	Ref	-	-
	Disagree	0.028	(0.019, 0.036)	0.000*
	Neutral	0.007	(0.055, 0.078)	0.000*
	Agree	0.113	(0.073, 0.154)	0.000*
Staff smiled during our interaction	Strongly disagree	Ref		
	Disagree	0.032	(0.022, 0.043)	0.000*
	Neutral	0.064	(0.079, .075)	0.000*
	Agree	0.086	(0.264, .102)	0.000*
Staff offered me seat	Strongly disagree	Ref		
	Disagree	0.038	(0.003,0.074)	0.036*
	Neutral	0.059	(0.021, 0.096)	0.003*
	Agree	0.094	(0.057, 0.130)	0.000*
The staff answered my questions	Strongly disagree	Ref		
	Neutral	0.038	(0.010, 0.159)	0.010*
	Agree	0.065	(0.028, 0.102)	0.001*
	Strongly agree	0.118	(0.076, 0.159)	0.000*
The procedure was explained to me	Strongly disagree	Ref	-	-
	Disagree	0.025	(0.015, 0.035)	0.000*
	Neutral	0.057	(0.040, 0.073)	0.000*
	Agree	0.080	(0.071, 0.089)	0.000*
I can contact service providers when I need to	Strongly disagree	Ref		
	Disagree	0.037	(0.0293, 0.045)	0.000*
	Neutral	0.057	(0.043, 0.071)	0.000*
	Agree	0.091	(0.079, 0.101)	0.000*
No one entering the examination room while	Strongly disagree	Ref		
	Disagree	0.039	(0.029, 0.050)	0.000*

examination is being carried out	Neutral	0.055	(0.037, 0.073)	0.000*
	Agree	0.076	(0.064, 0.089)	0.000*
	Strongly agree	0.110	(0.098, 0.123)	0.000*

Staff did not shout at me	Strongly disagree	Ref		
	Disagree	0.285	(-0.142, 0.712)	0.189
	Neutral	0.189	(0.009, 0.369)	0.040*
	Agree	0.310	(0.145, 0.475)	0.000*
	Strongly agree	0.330	(0.166, 0.493)	0.000*

**Effective communication**

Whiles I wait, staff constantly speaks to me why the delay and assures me that I will be attended to	Strongly disagree	Ref	-	-
	Disagree	0.019	(0.011, 0.026)	0.000*
	Neutral	0.043	(0.029, 0.055)	0.000*
	Agree	0.068	(0.054, 0.082)	0.000*
	Strongly agree	0.077	(0.023, 0.130)	0.005*

Instructions understood	Strongly disagree	Ref		
	Disagree	0.012	(-0.013, 0.037)	0.326
	Neutral	0.049	(0.029, 0.069)	0.000*
	Agree	0.083	(0.065, 0.102)	0.000*
	Strongly agree	0.109		0.000*

Waiting time was less than 1 hour	Strongly disagree	Ref	-	-
	Disagree	0.040	(0.026, 0.050)	0.000*
	Neutral	0.121	(0.086, 0.157)	0.000*
	Agree	0.083	(0.051, 0.116)	0.000*
	Strongly agree	0.106	(0.075, 0.136)	0.000*

My imaging report is always ready by the time stated	Strongly disagree	Ref	-	-
	Disagree	0.025	(0.006, 0.044)	0.013*
	Neutral	0.069	(0.054, 0.084)	0.000*
	Agree	0.099	(0.075, 0.118)	0.000*

**Equity**

First come first served is used as a criteria in attending to us	Strongly disagree	Ref		
	Disagree	0.019	(-0.003, 0.041)	0.084
	Neutral	0.100	(0.086, 0.113)	0.000*
	Agree	0.088	(0.054, 0.123)	0.000*
	Strongly agree	0.104	(0.068, 0.139)	0.000*

<b>Safety</b>	Strongly disagree	Ref	-	-
Lead material (a bit heavy material) was used to cover part of my body during the examination	Disagree	0.030	(0.022, 0.038)	0.000*
	Neutral	0.064	(0.047 -0.081)	0.000*
	Agree	0.088	(0.068 0.107)	0.000*
	Strongly agree	0.123	(0.082 0.177)	0.000*
Hand sanitizer in the department that patients can use when in the department and before leaving the department	Strongly disagree	Ref	-	-
	Disagree	0.030	(0.023 0.174)	0.000*
	Neutral	0.058	(0.042, 0.074)	0.006*
Table I was examined on was neat	Strongly disagree	Ref	-	-
	Agree	0.032	(0.021, 0.043)	0.000*
	Strongly agree	0.063	(0.050, 0.076)	0.000*
Consent	Strongly disagree	Ref	-	-
	Disagree	0.023	(0.016, 0.031)	0.000*
	Neutral	0.051	(0.035, 0.066)	0.000*
	Agree	0.057	(0.027, 0.087)	0.000*
I am very satisfied with the medical imaging service received	Strongly disagree	Ref	-	-
	Disagree	0.013	(-0.007, 0.034)	0.194
	Neutral	0.046	(0.026, 0.066)	0.000*
	Agree	0.083	(0.062, 0.105)	0.000*
	Strongly agree	0.111	(0.081, 0.140)	0.000*
I will recommend others to access service here	Strongly disagree	Ref	-	-
	Disagree	0.048	(0.024, 0.071)	0.000*
	Neutral	0.090	(0.063, 0.118)	0.000*
	Agree	0.112	(0.083 0.142)	0.000*
	Strongly agree	0.130	(0.094, 0.166)	0.000*
Staff behaviour instils confidence in me	Strongly disagree	Ref	-	-
	Disagree	0.021	(-0.005, 0.046)	0.107
	Neutral	0.042	(0.014, 0.069)	0.004*
	Agree	0.070	(0.039, 0.099)	0.000*
	Strongly agree	0.109	(0.072, 0.147)	0.000*
<b>Ref</b>		<b>1.1417</b>	<b>(1.058, 1.225)</b>	<b>0.000</b>

CI, confidence interval; \* significant associations according to CI

## **CHAPTER FIVE DISCUSSIONS**

### **5.0 Introduction**

This chapter comprises the findings and their relationship to existing literature presented in accordance with the aim and objectives of the study. The chapter is in five sections. Section one presents assessment of perceived quality of care using the Donabedian's framework. Section two presents clients' perceived quality of care based on the dimensions of quality of care. Section three presents the relationship between demographic characteristics and perceived quality of care. Section four presents perceived quality of care based on the imaging procedure type and duration of medical imaging reports. Section five presents the chapter summary.

### **5.1 Perceived quality of care based on the input, process and outcome (Donabedian's framework)**

The assessment of quality of care using input, process and outcome dimensions revealed areas where improvement was needed. The general quality of care for medical imaging using the Donabedian's framework are discussed under input, process and outcome and presented.

#### **5.2.1 Inputs**

The elements constituting the input aspect of the Donabedian (2003) model according to Gardner, Gardner and Connell (2013) are physical, material and professionals of clinical

services. There was a significant association between the input dimension and quality of care ( $p < 0.001$ ). Which means that input dimension of medical imaging was very relevant and major contributor to what clients' perceive as quality of care and is consistent with Wu & Hsieh (2011). The quality of the physical and the human resources used to deliver medical care to ensure quality of care depends on the structure of care (Rubenfeld, 2004). Overall, quality of care based on the input measures available for medical imaging was low. This was however contrary to the study by Ball, Weaver and Abbott (2003) which reported that quality of care has improved due to new medical technologies. Clients 'disagreed' that staff appeared neat. This perception might be because clients were not able to differentiate the staff of medical imaging from other people in the department since the staff do not wear any identified uniform such as white coat. The physical facility was also not neat and appealing. The IDI disclosed that the CT / MRI scan unit was neat apart from the washrooms while the waiting areas for General X ray, Ultrasound, HSG and Mammography were not neat and appealing. However, it has been observed that medical innovations in the areas of equipment, facilities and medical personnel provide direct support to the quality attributes of the input dimension (Wu & Hsieh, 2011). Clients also 'disagreed' that when the medical imaging staff promised to do certain things concerning their care at the department, they did it. Perceived quality in relation to the availability and functionality of imaging machine was low ( $p < 0.001$ ). This implies that availability and functionality of the imaging machines in relation to the clients' number is insufficient. However innovations in the input dimensions would have an important impact on the quality of care (Baker, 2001).

### 5.2.2 Process

There was a significant association between process dimension and perceived quality of care ( $p < 0.001$ ). This supports the finding of Smitz, Naranjo and Kaimal (2011), who observed that process characteristics had most influence on quality outcomes. The overall perceived quality of care using the process dimension was low ( $p < 0.001$ ). This was contrary to studies by Wu and Hsieh (2011) which reported the process dimension has the highest variance as compared to the input and outcome dimensions. Innovations in the process elements are directly related to the outcome of quality of care (Wu & Hsieh, 2011). This implies that more is expected of the department in terms of the process element: waiting time, reporting time, first come first served issues, use of lead materials for radiation protection, provision of hand sanitizer for clients, promptness and commitment to the care process, explanation of procedure, contact to the department for prior booking and enquiries, constant and effective communication with clients and staff attitude. All these various elements of the process dimension recorded were perceived low in the multivariate regression (Table 4.7).

### 5.2.3 Outcome

Outcome dimension was significantly associated with the clients' perception of quality of care ( $p < 0.001$ ). Overall, perceived quality of care was low in relation to the outcome dimension ( $p < 0.001$ ). Clients 'strongly disagreed' that they were very satisfied with the care received. Clients' satisfaction is a strong indicator for quality of care (Korkmaz et al., 2016). Similar study by Akkaya, Bulut and Akkaya (2012) recorded high clients'

satisfaction.. Moreover, clients did not ‘agree’ that they would recommend the medical imaging department to anyone based on the quality of care, but would do so based on other factors such as the availability of the consultants, range of different specialties and the lower cost of medical imaging examinations. Finally clients ‘strongly disagreed’ that staff’s behaviour instilled confidence in them. Improving the quality of care will lead to an increase in clients’ satisfaction (Chow & Goh, 2002).

### **5.3 Perceived quality of care based on dimensions of quality of care**

This section presents the discussions based on the dimensions of quality of care:

#### **5.3.1 Capacity and sustainability**

There was a significant association ( $p < 0.001$ ) between clients’ perception of quality of care and capacity and sustainability measures of medical imaging. Overall, quality of care based on the capacity and sustainability elements of medical imaging was low. Clients ‘disagreed’ that staff appeared neat. The physical facility was also not neat and appealing. Clients also ‘disagreed’ that when the medical imaging staff promised to do certain things concerning their care at the department, they did it. Perceived quality in relation to the availability and functionality of imaging machine was low. The possibility that the department would be able to sustain itself was low as the various elements identified for capacity and sustainability were low.

### 5.3.2 Timeliness

Perceived quality of care based on timeliness of the care process showed a significant association ( $p < 0.001$ ). This shows that timeliness is very relevant in clients' perception of quality of care. Timeliness is very critical in clients' perception of care (Vogus & McClelland, 2016). The overall perceived quality of care in relation to timeliness was however low. Clients' perception of quality of care is strongly influenced by perceived waiting time rather than actual wait time (Thiedke, 2007). Clients strongly disagree that waiting time was less than one hour. This is contrary to the departmental Standard Operating Procedures (SOPs) (Appendix 4) where the maximum waiting time for the various imaging procedures per body parts are: General X ray 15 minutes, MRI: 1 hour, CT scan: 30 minutes, Ultrasound: 30 minutes, Mammography: 30 minutes and HSG: 30 minutes. Waiting time was statistically significant with perceived quality of care ( $p < 0.001$ ). This agrees with a study by Blomberg *et al* (2010) in relation to patients' perception of quality of care in the radiology department. Similar studies confirmed that waiting time affects client's satisfaction and the overall quality of care (Franze'n *et al.*, 2007; Muntlin *et al.*, 2006).

Additionally, clients 'strongly disagreed' that imaging reports were always ready by the time stated by the imaging professionals. The overall quality of care was low. The duration for medical imaging reports according to the SOPs of the various departments (Appendix 4) such as Ultrasound and CT scan is instant or at most 1 hour and 3 days respectively. Although the ultrasound clients received their reports within one hour as

stated by the SOPs of the department, they still perceived low quality of care. The longer the duration, the lower the perceived quality of care. Meanwhile, 29.4% of the clients received their CT scan reports in a week's time while 5.9% received theirs after one week. This is contrary to the SOPs by the department. This is consistent with study by Korkmaz *et al* (2016) where long duration of investigative or medical report process was found as a major reason for dissatisfaction and low perceived quality of care.

### **5.3.3 Equity**

Quality of care in relation to equity was statistically significant ( $p < 0.001$ ). Overall, perceived quality of care in relation to equity was low. Clients 'strongly disagreed' that first come first served was the criteria used in attending to them. Although the departmental SOPs stated that the aged, infants, and clients who are staff should be attended to before the regular clients, the IDIs stated otherwise, leading to the low quality of care. Clients believed that other clients who did not fall into the above categories were also attended to before them.

### **5.3.4 Safety**

Clients' perception of quality of care was significantly associated with the safety dimension of care ( $p < 0.001$ ). The overall perceived quality based on safety was low. Clients strongly disagreed that lead (radiation protection material) material was used to cover part of their body which was not the area of interest during the radiation procedures. This was contrary to the departmental SOP which stated that radiation safety measures should always be considered during medical imaging including the use of lead

materials (gonad shield, lead aprons, lead skirts). Furthermore, clients strongly disagree that hand sanitizer was available for their use as a mean of infection control. During the IDIs, clients also pointed out that there were inadequate washrooms and even the current number lacks certain amenities like soap, water and toilet rolls. Clients who underwent MRI ‘strongly agreed’ that they were screened. This supports a study, which found that screening processes were done for patients and relatives before entering the MRI examination room (Opoku, Antwi, & Sarblah, 2013). Additionally, clients ‘strongly agreed’ that the couch, bucky or bed they were examined on were neat. This implies that a lot needs to be done by the department in terms of radiation protection using lead materials if other methods are not effective. Moreover as perceived quality of care based on the availability of hand sanitizer is low, critical look has to be given to this aspect of safety. When these areas are addressed it will positively enhance the overall perception of safety issues. Better information and education about medical radiation and associated benefits and risk consequences are needed (Dauer *et al.*, 2011).

### **5.3.5 Effective communication**

Perceived quality of care based on effective communication was statistically significant ( $p < 0.001$ ). This confirms how important communication is in medical imaging. However, the overall quality was low. Clients ‘strongly disagreed’ that while they were waiting, staff got back to them to let them know why the delay and assure them they would be attended to. Moreover, clients also attested to the fact that they did not understand the instructions given at the medical imaging department very well. This has been confirmed by the Institute of Medicine (2003), that inefficient communication among health care

providers and patients is one major root cause of inequality and dissatisfaction leading to low quality of care. Additionally, Booth and Manning (2006), confirmed that medical imaging staff used parental styles of communicating with their clients. According to them, parental style of communication is a practitioner-centred approach rather than patient-centred, which often results in non-compliance with instruction. Striving for interactive dialogue between imaging professionals and clients in addition to being ideally skilled at interpersonal communication and able to convey empathy, use active and effective listening strategies and be respectful of clients' concerns will improve the quality of care (Hyer & Covello, 2007).

### **5.3.6 Patient centredness**

There was a significant association between perceived quality of care and patient-centredness ( $p < 0.001$ ). Overall, clients perceived low quality of care in relation to patient-centredness. Meanwhile patient-centredness is crucial for high quality care (Mead, Nicola & Bower, 2000). The clients 'strongly disagreed' that when they drop the request form into either the request box or hand it to the staff, the staff gave feedback in less than 10 mins. This was statistically significant ( $p < 0.001$ ). This means that promptness and commitment to care was lacking. This supports a study, which found that medical imaging at the study site did not have an approachable attitude (Antwi, Kyei & Quarcoopome, 2014). Similar study by Reeves and Decker (2012) revealed that imaging staff are distanced from their patients by technology and task focusing on producing image(s). However, clients 'strongly agreed' that when they greeted the staff, the staff responded. Also clients strongly agree that staff answer when question is asked.

Furthermore clients 'strongly agreed' that staff answered when a question was asked. However, clients 'strongly disagreed' that explanation of the procedure was done. This agrees with studies by Imam *et al.*, (2007). However this was also contrary to the department's SOPs (Appendix 4). This means that information concerning the procedures was very important in patient's perceived quality of care. Similar findings were reported in earlier studies (Bolejko *et al.*, 2008; Tornqvist *et al.*, 2006). The demand for information before medical imaging is examination is vast (Bolejko *et al.*, 2008). This will help reduce anxiety, nervousness and fear and enable the patient to cooperate during the examination. This agrees with the notion that procedural and behavioral information strengthen clients' sense of control and influence their ability to prepare for the situation (Mitchell, 2008). Perceived quality of care was low with regards to whether client could contact the service providers when the need arises.

#### **5.4 Relationship between demographic characteristics and quality of care**

Relationships between demographic characteristics and quality of care using univariate logistic regression confirmed that there was no significant association ( $p < 0.496$ ) between sex of clients and perceived quality of care. However, the overall quality of care was above neutral representing high quality of care. The males perceived lower quality of care compared to females which confirmed earlier study by Al- Assaf (2009). Contrarily, Blomberg *et al.* (2010), found lower perceived quality of care for females. This might be because males are given higher priority in developing countries such as Ghana than females leading to their high expectation of quality of care which could not be met.

However this study confirmed earlier ones where no significant effect of sex on perceived quality of care was found (Blomberg *et al.*, 2010; Franze'n, *et al.*, 2007).

Perceived quality of care and the age of the clients were statistically significant with age group 50 years and above ( $p < 0.025$ ) in the univariate analysis. The overall quality of care was however, low. This confirms a study, which found that clients' age influenced perceived quality of care (Rahmqvist, 2001). Clients in age groups (30-39 years) and (40-49 years) also perceived higher quality of care compared to age group 18-29 years. Clients in Age group of 50 years and above perceived high quality of care compared to age group (18-29 years). In addition, the perceived quality of care increased with age. These findings confirm similar studies (Blomberg *et al.*, 2010; Rahmqvist, 2001). Additionally Korkmaz *et al.*, (2016) found that as age of clients increases, satisfaction also increases leading to high perceived quality of care. This variation in perceived quality of care might be due to the fact that the younger clients have higher expectation which cannot be easily met (Al- Assaf, 2009). However as clients become more familiar with the health care delivery overtime, their expectation may decrease with the resultant increase in satisfaction leading to high quality of care.

There was no significant association between marital status and perceived quality in relation to divorced clients and married ( $p = 0.050$ ). Singles and widow clients recorded lower quality compared to the married. Divorced clients perceive higher quality of care compared to married clients. This was contrary to the findings by Imam *et al.*, (2007) where married individuals perceived higher quality of care than the unmarried.

Perceived quality of care and educational levels was lower for SHS and clients without formal education compared to those with tertiary education. Clients with Primary or Junior High School (JHS) education perceived care to be of higher quality compared to those with tertiary education. Similar study by Blomberg *et al* (2010) and Franze'n *et al* (2007) found that clients with lower level of education had high perceived quality of care.

There was a significant relationship between religion and perceived quality of care based on other religious sects ( $p < 0.011$ ). Religious sects like Islam, Traditionalists and 'Others' perceived higher quality of care compared to Christians. 'Other' religious sects perceived higher quality of care compared to Christians, Muslims and traditionalists. However, one limitation to this study was that this 'other' religious sect was not defined. However, the final multivariate logistic regression did not account for the demographic characteristics. The demographic characteristics did not contribute to the overall perception of quality of care of medical imaging services (Korkmaz *et al.*, 2016). Studies by Yildirim, Kocoglu and Goksu (2005) showed no effect of sex and age on perceived quality of care whereas Dolek, Turaba, & Akbinar (2005) found sex and age to be significant.

### **5.5 Relationship between medical imaging procedure type, duration of medical imaging reports and quality of care**

The medical imaging procedure clients undergo had significant association with quality of care ( $p < 0.047$ ) as observed in relation to MRI scan in the univariate and the multivariate logistic regression (Table 4.6 and 4.7). MRI and Mammography clients had higher perceived quality compared to CT scan clients. In addition, the findings showed that General X ray, HSG and Ultrasound perceive low quality of care. However much

lower quality of care was recorded at the HSG unit followed by Ultrasound and then General X ray. It is argued that 'exclusivity' within the medical imaging system whereby certain members of staff work with only one imaging modality lead to the lack of patient-centred care and the degree of the perceived quality of care in the imaging department (Reeves & Decker, 2012).

Additionally duration for the imaging report is significantly associated with quality of care ( $p < 0.013$ ). It was observed that the longer the duration of the report, the lower the perception of the quality of care.

Ultrasound clients who received reports in more than 30 minutes but less than one hour perceived lower quality of care compared to clients who received their reports in less than 30 minutes. Furthermore, CT scan clients who received reports on third day and in a week's time perceived much lower quality of care compared to those who received theirs in less than three days. The duration of the Ultrasound reports as recorded fell within the timeframe captured in the departmental SOPs. The lower quality of care observed implies clients were not satisfied with the allotted timeframe for imaging reports. Similarly about 30% of clients received CT scan reports in a week's time while 5.6% received theirs in more than a week's time. These were contrary to the departmental SOPs which state that CT scan should be ready in at most three working days' time.

## **5.6. Chapter summary**

The chapter has discussed the findings of the study in relation to existing literature. The next chapter presents the summary, conclusion and recommendations.

## CHAPTER SIX

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### 6.0. Introduction

This chapter presents the summary, conclusion and recommendations of the study. The chapter is in five sections. Section one presents the summary of the study. Section two presents the conclusion. Section three presents the recommendations based on the findings of the study. Section four presents the limitations and section five presents future research suggestions.

#### 6.1. Summary of the study

The general aim of the study was to assess the clients' perception of quality of care of medical imaging services at the KBTH. The perception of the clients was assessed as planned using input, process and outcome dimensions of medical imaging system as well as the dimensions of quality of care: capacity and sustainability, timeliness, safety, equity, patient-centredness and effective communication. Both quantitative and qualitative data were collected. Stata Version 13 was used to analyse the quantitative data while thematic analysis was employed for the qualitative. The conclusions of the study are presented based on the objectives.

#### 6.2. Conclusion

The study (both the qualitative and quantitative findings) concludes that, overall there is low quality of care provided by the KBTH Imaging Department with regards to timeliness, safety, equity, patient-centredness, effective communication, capacity and

sustainability dimensions of quality of care compared to the departmental SOPs. In addition, the inputs, process and outcome dimensions of medical imaging are low.

The multivariate logistic regression does not account for demographic characteristics. However the univariate analysis confirmed males perceived lower quality of care compared to females and age group 50 and above perceived higher quality of care compared to age groups (18-29), (30-39) and (40-49). Moreover, divorced clients' perceived higher quality of care compared to Singles and Widowed, SHS and clients without formal education compared to those with tertiary education perceived lower quality of care while clients with Primary or Junior High School (JHS) education perceived higher quality of care. Islam, Traditionalists and Others perceived higher quality of care compared to Christians.

Additionally, the overall quality of care was lower across HSG, General X ray and Ultrasound units than CT scan, MRI and, Mammography units. Ultrasound clients who received imaging reports after 30 minutes perceived lower quality of care compared to those who received theirs in less than 30 minutes. CT scan clients who received imaging reports in one week and above a week perceived much lower quality of care. The longer the duration for imaging report, the lower the quality of care.

### 6.3 Recommendations

Based on the findings and conclusions drawn from this research, the following recommendations are made:

- There should be regular training for medical imaging and non-medical imaging professionals especially the front desk personnel on human relations and effective communication.
- A dedicated personnel who have understanding of the various units or the staff at the various units should constantly inform clients on timely bases the progress of care process while clients are in the waiting area.
- Proper scheduling, taking into consideration the duration for each examination based on the body parts and dedicated help lines for prior booking and collection of reports will help reduce the waiting time.
- The Standard Operating Standards should be reviewed in the areas of duration for reports, safety, equity and patient-centredness. Set up operational audit to determine whether they are in compliance with the SOPs.
- The corridor of the main General X ray unit and the washrooms of the various units should be kept clean at all times. The wall of the General X ray should be painted and more washrooms should be created for clients. Overhead water tanks should be provided at the department to help improve the water and sanitation system.
- An award system should be instituted to motivate workers who perform well in the area of quality of care.

#### **6.4. Limitations to the study**

The first limitation is the duration of the study. Because of the limited time for the study, a precision of 8% was used instead of the usual 5%. This resulted in the smaller sample size used in the study.

The second is the fact that the “others” as captured in the demographic characteristics under religion of clients could not be defined. Apart from Christianity, Islam and Traditionalists, “others” was supposed to capture all other religion. This was however significant in clients’ perceived quality of care in the univariate analysis.

The third is that bias might be introduced in the translation of the questions to clients who could not read or write. Also selection bias in the qualitative study might have influenced the information acquired from the clients. However despite these limitations, internal and external validity was not adversely affected in the study.

The final limitation is the use of the cross-sectional study. Cross-sectional study design is temporal and responses can be different if measured at another time.

#### **6.5 Future research**

There is the need for further studies to assess the perception of quality of care from the perspective of the referring clinician at the KBTH. There is also the need to include other facilities in future studies.

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## APPENDICES

### Appendix 1: Informed Consent Form for Patients and Caregivers

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### Introduction

Dear Participants, quality of care of medical imaging services is the extent to which the right procedure is done in the right way at the right time, and the correct interpretation is accurately and quickly communicated to the patient and referring physician. This study seeks to assess the quality of care of services being rendered at the imaging department of the KBTH to help ensure efficiency within the medical imaging system, ensure optimum effectiveness of care, combat any trend in commoditization of medical imaging services and help inform policy on the appropriate strategies to address quality of care of medical imaging service challenges. I hope you will help us to make this study a success.

### Procedure, Possible Risk and Benefits

Questions will be asked on your assessment of care received at the medical imaging department of the KBTH. It will involve the use of questionnaire.

No risk or discomfort is foreseen concerning your participation in this research apart from your time that will be spent on answering the questionnaire. Each questionnaire will take 15-20 minutes on the average to complete.

No direct benefit to participant, however the outcome of this study will be used to inform policy on the quality of care which will lead to improvement of medical imaging services.

**Right to Refuse and Confidentiality**

Your participation in this study is voluntary and you are at liberty to withdraw at any time. There will not be any penalty in opting out of this study or not answering any question. However your opinion will enable us understand the deficits in the quality of care of medical imaging services and also help us address any challenge in delivering these services. This study has been reviewed and approved by the Institutional Review Committee of the Korle Bu Teaching Hospital (KBTH-IRB). Participant personal identification such as names and address will not be written on questionnaire. Each questionnaire will be given a unique identification number.

You may contact me on the telephone number provided and email address or the IRB Office between the hours of 8am – 5pm through the landline 0302666766 or email address: [rdo@kbth.gov.gh](mailto:rdo@kbth.gov.gh). Thank you.

**PARTICIPANT CONSENT FORM**

I have been thoroughly briefed on the entire methodology and significance of the ongoing study which is being conducted by Gadeka Dormenyo. On my own free will, I hereby consent to be part of the study, based on my understanding of what the study entails.

I am doing this on condition that under no circumstance should my references be made to my actual identity to any other person(s) after providing all the information requested from me for this particular study as promised by the researcher.

Respondent signature..... Date .....

Witness' signature ..... Date .....

Researcher signature .....Date .....

**Appendix 2: Questionnaire on Quality of Care of Medical Imaging Service at Korle Bu Teaching Hospital**

**Introduction:** I will therefore take a few minutes of your precious time to answer these questions as candidly as possible. Your responses remain confidential and reports resulting from this research will in no way contain data that may possibly identify you. Please answer each item by marking the appropriate **box** with  $\surd$ .

**Section One: Demographic Information**

1. Gender            1. Female     2. Male

2. Age in years ( **above 18 years**)

                         1. 18-29     2. 30 -39     3. 40 – 49     4. 50 and above

3. Educational Level: 1. Tertiary     2. SHS     3. JHS     4. None

4. What is your marital status?

                         1. Married

                         2. Single

                         3. Divorced

                         4. Widowed

5. What is your religion?

                         1. Christianity

                         2. Islam

                         3. Traditionalist

                         4. Others

6. Type of procedure to undergo?

                         1. CT scan

                         2. MRI scan

                         3. General X ray

                         4. Ultrasound scan

                         5. Mammography

                         6. HSG

                         7. To pick Report

7. Type of Report

                         1. CT scan

                         2. MRI scan

                         3. General X ray

                         4. Ultrasound

                         5. Mammography

                         6. HSG

8. My report took

                         1] <30mins    2] >30mins but <1 hour    3] > 1 hour less than 3 days    4] 3 days    5] > 3 days but less than a week    6] 1 week    7] < A week

8. Which part of the body was examined (CIRCLE THE CORRESPONDING NUMBER)

1. Brain CT
2. Abdominopelvic CT
3. Abdomen
4. Pelvic CT
5. Chest CT
6. Upper Extremities (Arm, Elbow, forearm and hands) CT
7. Lower Extremities
8. Cervical spine CT
9. Thoracic spine CT
10. Lumber spine CT
22. Upper Extremities
23. Abdomen X Ray
24. Pelvic X Ray
25. Lower extremities X ray
30. Others (please specify).....
11. Brain MRI
12. Lumber spine MRI
13. Thoracic Spine MRI
14. Cervical spine MRI
15. Lower Extremities MRI
16. Upper Extremities MRI
17. Shoulder MRI
18. Chest X Ray
19. Skull X Ray
20. Shoulder X ray
26. Cervical Spine X ray
27. Thoracic spine X ray
28. Lumber Spine X ray
29. Upper Extremities X ray

**Section two: Quality of Care from Patients' Perspective. A modified questionnaire (Hollis, 2006).** Listed below are a number of statements intended to measure your perceptions about quality and hospital operations. **Please indicate the extent to which you DISAGREE OR AGREE with each statement by CIRCLING one of the five numbers next to each statement.** Remember, there are no right or wrong answers - we are interested in what you feel is important in delivering excellent quality of care.

<b>Input Qualities</b>						
<b>Physical Characteristics</b>		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
1.	Staff appear neat	1	2	3	4	5
2.	The physical facilities is visually neat and appealing	1	2	3	4	5
3	Imaging machines are always available and working well	1	2	3	4	5
4	Service providers served me with neat hospital gown	1	2	3	4	5

5	When they promise to do something by a certain time they do it	1	2	3	4	5
6	Staff are always available on duty whenever I come to the imaging department	1	2	3	4	5
<b>Process Qualities</b>						
<b>Clinical and Interpersonal care</b>						
<b>Timeliness</b>						
7	Waiting time was less than 1 hour	1	2	3	4	5
8	Waiting time was more than 1 hour	1	2	3	4	5
9	My imaging report is always ready by the time stated	1	2	3	4	5
<b>Equity</b>						
10	First come first served is used as a criteria in attending to us	1	2	3	4	5
11	First come first served is used as a criteria in attending to us except in an emergency	1	2	3	4	5
<b>Safety</b>						
		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
12	Lead material (a bit heavy material) was used to cover part of my body during the examination	1	2	3	4	5
13	Hand sanitizer in the department that patients can use when in the department and before leaving the department	1	2	3	4	5
14	I was screened before going into the MRI room	1	2	3	4	5
15	The table or stand I was examined on was neat	1	2	3	4	5

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16	I was asked for my consent before the examination	1	2	3	4	5
<b>Patient-Centredness (Responsiveness)</b>						
17	The staff got back to me in <u>LESS</u> than 10minutes after I gave him / her the request form or after picking it from the box	1	2	3	4	5
18	The staff got back to me in <u>MORE</u> than 15minutes after I gave him / her the request form or after picking it from the box	1	2	3	4	5
19	Staff greeted me when I came to the unit	1	2	3	4	5
20	I greeted the staff when I came	1	2	3	4	5
21	Staff didn't respond when I greeted him/her	1	2	3	4	5
22	Staff smiled during our interaction	1	2	3	4	5
23	I was offered a seat by the staff	1	2	3	4	5
24	I asked the staff question (s)	1	2	3	4	5
25	The staff answered my questions	1	2	3	4	5
26	The procedure was explained to me	1	2	3	4	5
27	I can contact service providers when I need to	1	2	3	4	5
28	When I was being attended to, other patients were not entering the examination room	1	2	3	4	5
29	Staff did not shout at me	1	2	3	4	5
30	Staff did not disclose any information about me to anyone without my concern	1	2	3	4	5

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>Effective Communication</b>						
31	I understood the instructions given me at the imaging department	1	2	3	4	5
32	Whiles I wait, staff constantly speaks to me why the delay and assures me that I will be attended	1	2	3	4	5
<b>Outcome (General Assessment)</b>						
33	I am very satisfied with the medical imaging service received	1	2	3	4	5
34	I will recommend others to access service here	1	2	3	4	5
35	Staff behaviour instils confidence	1	2	3	4	5
<b>Challenges</b>						
36	There are things about the medical imaging system that need to be	1	2	3	4	5
Kindly state the challenge that needs to be addressed						

**Thank you for your time and assistance. Your responses are important to the overall success of this research and are greatly appreciated**



### **Appendix 3: Interview Guide on the Quality of Care of Medical Imaging Service at the KBTH**

**Introduction:** The purpose of this interview is to discuss how you perceive the quality of care delivered by staff of the imaging department. This will help to ensure optimum effectiveness of care and to inform policy on the appropriate strategies to address any challenge. Your cooperation is therefore needed. The things discussed in this interview are confidential. Information you provide is aggregated with other results so that you cannot be identified.

1. How would you describe your experience in this department from the time you came in to the time your report was ready?  
What does quality of care mean to you?
2. How do you evaluate the quality of care of the following:
  - a. Input/ capacity and sustainability (imaging equipment, staff appearance and attitude, physical environment and other amenities)
  - b. Process
    - Safety
    - Timeliness (time before being attended to and before getting your report?)
    - Equity (first come first served)
    - Patient-centredness / responsiveness
    - Communication
  - c. Outcome of care (are you satisfied with the quality of care, will you recommend others to access medical imaging here)
3. How do your expectations influence your assessment of the quality of care?  
If your expectations are met are you satisfied with quality of care?  
What challenges have you identified?

## Appendix 4: CHECKLIST

### STAND OPERATING PROCEDURES FOR KBTH MEDICAL IMAGING

#### DEPARTMENT

#### UNITS AT THE IMAGING DEPARTMENT

#### General X Ray, CT Scan, MRI Scan, Ultrasound, Mammography and Fluoroscopy

- General X Ray equipment runs 24hours
- The General X Ray unit works on shift bases: 8am-2pm, 2pm-8pm and 8pm – 8am
- CT Scan and MRI units run on shift bases from 8am to 8pm
- All other unit closes by 5pm however there is on call duty for emergency ultrasound procedures

#### Equipment

- Ensure the equipment is always clean
- The imaging staff is in charge of all imaging machine in the hospital
- The imaging staff do not maintain machine when there is error or fault detected on the machines
- The Imaging staff after verbally informing the HOD of a machine fault goes to the engineering department and obtain engineering report which is attached to a letter advising the Chief Executive through the head of department about the fault.
- Work will commence only after the reply

### **Cleanliness of the physical environment**

- The orderly cleans the room floors and corridor with parazone and liquid soap to disinfect and prepare the place for use
- Use methylated spirit soaked in cotton wool to clean the couch/ bucky and the protective lead glass screen for staff
- Infection control officer and the administrator of the department supervises cleanliness

### **At the reception [INTERPERSONAL CARE]**

- Drop request into the request box or hand it to the personnel on duty
- Attend to patient / client immediately request is given to you or dropped into the request box
- Offer your client seat
- Speak politely to the patient
- The patient will be identified
- The examination will be confirmed
- The patient is billed
- Payment will be confirmed
- Give a pre instructions on the processes at the unit and assure the patient.

### **Performing imaging test of patient/ [CLINICAL AND INTERPERSONAL CARE]**

- Request form must be completely filled out

- The request must be submitted to the imaging staff on duty and he or she must assess the procedure
- Cross check if patient has adequately prepared for the procedure
- Explain the procedure to the patient
- Patients will be prepared according to the procedure to be done
- Appropriate instructions will be given to patients prior and during the procedure
- Patient will be informed about what to expect during contrast administration
- Patient will be informed about the approximate duration of the procedure
- Instruct the patient to change into appropriate clothing (Hospital gown) with the opening side to the back
- Changing for chest, abdomen and pelvis procedures involves all clothes to be taken off except underwear (both male and female)
- Changing for HSG involves the patient changing into her night gown
- Patient is told to wait patiently in the changing room until he / she is called
- Lead patient into the examination room
- Routine procedures performed at the various unit include: abdomen, chest, extremities, pelvis, shoulder, skull, thoracic cage, vertebrae column, brain(head), breast, specials eg HSG
- Acquire appropriate images
- For CT scan and MRI, patient will be monitored and IV line taken out
- For CT and MRI scan the patient will be directed to the reception for a collection slip for their report after the procedure

- Review acquired images and ensure that the image is satisfied for dispatch
- Inform patient of the end of the examination
- Help patient down from the couch
- Instruct patient to change back
- Inform patient of when and where to pick up images
- All incidental report or untoward incident should be reported to your immediate supervisor
- Patients wait in the waiting area while the result is being processed
- The result/report is given to the patient
- Cleaning of the machine(couch/bucky/bed) is done in-between patients
- The machine room doors should be closed during scanning or during taking of x rays
- Staff should not be in the examination area during scanning or taking of the x rays
- Examinations of patients on admission are done on non-peak hours except for emergency.

### **Patient radiation safety**

- Always practice and observe radiation safety procedures
- Always practice and observe radiation safety procedures by applying the 10day rule for women of child bearing age
- Always practice and observe radiation safety procedures by providing lead aprons for persons assisting the patient.

- Make sure our x ray indicators are functioning at the entrance of the door
- Make sure the entrance door and changing room doors are closed during scanning
- Patient should be educated on x ray signs
- Pregnant patients, the abdomen and gonadal areas should be covered with lead.

### **Staff protection from radiation**

- Staff wear lead apron
- Staff go behind the lead protective screen during radiation exposure.

### **Waiting times**

- General X Rays procedures: 10 – 15minutes per body part
- CT Scan procedures: 15 minutes per body part
- MRI Scan procedures: 40 – 60 minutes per body part
- Ultrasound procedures: 20 – 30 minutes per body part
- Mammography procedures: 10 -20minutes
- Fluoroscopy (Special) procedures eg HSG: 30 minutes

### **REPORTING TIMES**

- General X Rays procedures: 3 days
- CT Scan procedure: 3 days except emergencies
- Fluoroscopy (Special) procedures eg HSG: 3 days
- Mammography procedures: 3 days
- MRI procedures: 1 week
- Ultrasound procedures: 1 hour (instant)

**Appendix 5: Ethical Approval**

