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**Developing a Framework of Quality in Radiographic Service
Delivery in Ghana**

James Newlife Kwadzo Gawugah

A thesis submitted in partial fulfilment of the requirements of
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for the degree of Doctor of Philosophy

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ABSTRACT

Aim: The aim of this thesis was to develop a framework of quality in radiographic service delivery in Ghana. This aim was to fit the medico-socio-cultural context of Ghana so as to promote the radiographers with additional knowledge about quality issues in the imaging services and patient care.

Methods: Mixed methods were used with a sequential explanatory design under two phases. Phase 1 was a quantitative design which employed participants' and service perspectives. A patient satisfaction survey (questionnaire) was used to gather data from 90 adult participants who were radiographically examined and who gave voluntary consent. The service perspectives involved the basic quality assurance and quality control procedures: reject film analysis and diagnostic reference levels. Phase 2 was a qualitative design which used semi-structured interviews of six radiographers, six patients and three managers to further explore and explain the quality of service issues identified in Phase 1.

Results: A reject film analysis rate of 14.55% was achieved. Diagnostic reference level values of 70 kVp and 18 mAs, and 60 kVp and 13 mAs were used to obtain images of diagnostic quality of postero-anterior (PA) chest for patients above and below average sizes. Diagnostic reference values of 75 kVp and 32 mAs, and 62 kVp and 21 mAs achieved images of diagnostic value of antero-posterior (AP) lumbar spine for patients above and below average sizes. Diagnostic values of 56 kVp and 5 mAs, and 52 kVp and 3 mAs also achieved quality images of AP knee for patients above and below average sizes. Four quality constructs were identified with diagnostic radiographic service provision both locally and nationally. The quality framework was built around the four main constructs: departmental management role, radiography workforce/staff role, quality and safety committee roles, and quality and safety outputs that would help improve efficiency and quality of radiographic service delivery in Ghana and to ensure patient satisfaction with the services delivered to them.

Conclusions: The constructs contributed to service delivery theory by developing a unique quality framework that would provide policy-makers and managers a practical understanding of factors that affect quality of radiographic service delivery.

Key words: Framework, quality service, reject rates, radiographic service, safety outputs.

Declaration

I declare that '*Developing a framework of quality in radiographic service delivery in Ghana*' is my own work, that it has not been submitted before for any degree or examination in any other University, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

James Newlife Kwadzo Gawugah

Date: November 2016

Signed

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Table of Contents	Page
Abstract	i
Declaration	ii
Acknowledgements	iii
List of Tables	xii
List of Figures	xii
List of Abbreviations	xiv
Chapter One	1
Background	1
1.1 Introduction	1
1.2 The general health care service provision in Ghana.....	1
1.3 Diagnostic Medical imaging in Ghana.....	4
1.4 Radiographic staffing in Ghana.....	5
1.5 Challenges confronting medical imaging in Ghana.....	7
1.5.1 Radiographic consumables.....	8
1.5.2 Exposure to ionising radiation in medical imaging.....	9
1.5.3 Quality control and quality assurance programmes.....	11
1.5.3.1 Quality assurance.....	11
1.5.3.2 Quality control.....	12
1.6 Radiation protection legislation in Ghana.....	13
1.7 Radiation protection within medical imaging departments.....	14
1.8 Statement of the problem.....	16
1.9 Significance of the study.....	18
1.10 Research aims, questions and objectives.....	18
1.11 Summary.....	20
Chapter Two	21
Cultural Framework	21
2.1 Introduction	21
2.2 General overview of culture and healthcare delivery services.....	21
2.3 Culture in Ghana.....	24
2.4 The society and cultural practices in Ghana.....	24
2.4.1 Ghanaians and Ethnic backgrounds.....	25

2.4.2	Ghanaians and diverse languages.....	26
2.4.3	Religious beliefs and healthcare.....	29
2.5	Culture and health beliefs.....	31
2.6	Socio-economic status and accessing healthcare.....	33
2.7	Healthcare funding in Ghana.....	34
2.7.1	Financing of NHIS policy.....	35
2.8	Summary.....	37
 Chapter Three.....		39
Quality of service.....		39
3.1 Introduction.....		39
3.2	Quality of service in Healthcare.....	40
3.3	General definitions of service quality.....	41
3.4	Healthcare service quality frameworks.....	44
3.5	Quality of service in healthcare delivery.....	45
3.5.1	Dimensions of service quality in healthcare.....	46
3.6	Healthcare service delivery in Ghana.....	49
3.7	Measurement of healthcare service quality.....	53
3.7.1	Impacts of healthcare service user involvement.....	54
3.7.2	Framework of patient-centred care in radiography.....	55
3.7.3	Quality assurance and quality control in diagnostic radiography.....	57
3.7.3.1	Quality control process in diagnostic radiography.....	57
3.7.3.2	Quality assurance programme in diagnostic radiography.....	59
3.7.3.3	Diagnostic (dose) Reference Levels.....	60
3.7.4	Radiographic film reject-repeat analysis.....	61
3.8	Summary.....	63
 Chapter Four.....		65
Methodology and Research Design.....		65
4.1 Introduction.....		65
4.2	Situating Study in Mixed Methods.....	66
4.2.1	Justification of Methodological Choices.....	68
4.2.2	The Pragmatic Paradigm.....	68

4.2.2.1 Key elements of the pragmatic paradigm.....	70
4.2.2.2 Health services evaluation.....	73
4.2.2.3 Critiques of pragmatic paradigm.....	74
4.3 Research Design.....	75
4.3.1 Aim, research questions and objectives of the study.....	76
4.3.2 The research design process.....	77
4.3.2.1 The sequential explanatory design.....	78
4.3.2.2 Strengths and limitations of sequential design.....	78
4.3.3 Implementation of research design.....	79
4.4 Overview of the methods.....	80
4.5 Multiple data collection instruments.....	82
4.6 Research setting.....	83
4.7 Implementation of research processes.....	84
4.7.1 Phase 1 – Design of data collection instruments.....	84
4.7.2 Phase 1 – Patient Satisfaction Survey.....	86
4.7.2.1 Validity and Reliability of Patient Satisfaction Survey.....	88
4.7.2.2 Section A – demographics of participants.....	89
4.7.2.3 Section B – waiting area of imaging facility.....	89
4.7.2.4 Section C – attitude of radiographers during service delivery.....	89
4.7.2.5 Section D – the imaging services at the facility.....	90
4.7.2.6 Section E – Participant’s overall satisfaction.....	90
4.7.3 Phase 1 – Reject film analysis data sheet.....	90
4.7.4 Phase 1 – Basic QA data collection sheet.....	91
4.8 Phase 2.....	92
4.8.1 Phase 2 – Semi-structured interview schedule.....	93
4.8.2 Phase 2 – Designs of semi-structured interview schedules.....	93
4.8.2.1 Phase 2 – Interview schedule for radiographers and Managers.....	94
4.8.2.2 Phase 2 – Patients’ interview schedule.....	95
4.8.2.3 Piloting of interview schedules.....	96
4.8.2.4 Reliability, validity, transferability.....	96
4.9 Training of Radiographers for assistance in questionnaire administration.....	97
4.9.1 Training of Radiographers for filling in data collection sheets.....	99
4.10 Sampling method and sampling technique.....	101

4.10.1 Sample size.....	102
4.11 Phase 1 – data collection procedure – satisfaction survey.....	103
4.11.1 Phase 1 – Basic QA parameter procedure.....	105
4.11.2 Phase 2 – Interviewing process.....	107
4.11.2.1 Phase 2 – Interview with radiographers.....	108
4.11.2.2 Phase 2 – Interview with managers.....	109
4.11.2.3 Phase 2 – Interview with patients.....	109
4.12 Ethical considerations.....	110
4.12.1 Informed consent	111
4.12.2 Anonymity and confidentiality.....	112
4.12.3 Protection from harm.....	113
4.12.4 Privacy and right to withdraw.....	113
4.13 Data analysis.....	114
4.13.1 Interview data analysis.....	114
4.13.2 Thematic data analysis.....	115
4.14 Summary.....	115
Chapter Five.....	117
Phase 1 Results.....	117
5.1 Introduction.....	117
5.2 Patient satisfaction survey.....	117
5.2.1 Demographic details of respondents.....	117
5.3 Reject film analysis as a quality indicator.....	140
5.3.1 Determinants of reject rates	140
5.4 Analysis of QA data – Exposure parameters.....	144
5.5 Summary.....	148
Chapter Six.....	149
Phase1 – Discussion.....	149
6.1 Introduction.....	149
6.2 Patient satisfaction survey.....	149
6.2.1 Demographic characteristics of the participants.....	149
6.2.2 The patient perspective: Locating the department.....	151

6.2.3	Waiting area and waiting time at the imaging department.....	151
6.2.4	Participant’s experience in the examination room.....	154
6.2.5	Participants’ overall satisfaction.....	158
6.3	Service perspectives: Reject film analysis as a quality indicator.....	158
6.4	Diagnostic Reference Levels.....	162
6.5	Links between Phase 1 and Phase 2.....	166
6.6	Summary.....	166
 Chapter Seven.....		168
Findings – Phase 2.....		168
7.1 Introduction.....		168
7.1.1	Making decisions about the analysis.....	169
7.1.2	Thematic analysis.....	170
7.2	Stage 1: Data preparation and familiarisation.....	171
7.2.1	Stage 2: Generating preliminary codes.....	173
7.2.2	Coding, categorising and concepts.....	173
7.2.3	Stage 3: Searching for themes.....	175
7.2.4	Stage 4: Reviewing the themes.....	176
7.2.5	Stage 5: Defining and naming the themes.....	177
7.2.6	Stage 6: Writing the report.....	177
7.3	Quality of service.....	178
7.3.1	Equipment breakdowns.....	180
7.3.2	Power outages.....	183
7.3.3	Occupational stress.....	185
7.3.4	Patient care.....	187
7.3.5	Professionalism.....	190
7.3.6	Departmental management.....	193
7.4	Summary.....	196
 Chapter Eight.....		197
Discussion.....		197
8.1 Introduction.....		197
8.2	Discussion of main findings.....	197

8.2.1 Equipment breakdowns.....	198
8.2.1.1 Quality assurance and/or control programmes.....	201
8.2.1.2 Preventive maintenance/repairs and contract agreements.....	203
8.2.2 Power outages.....	205
8.2.2.1 Power fluctuation and standby generators... ..	207
8.2.3 Occupational stress.....	210
8.2.3.1 Workload increase and practice/technical errors... ..	212
8.2.3.2 Speed & efficiency.....	214
8.2.4 Patient care.....	216
8.2.4.1 Patient satisfaction and comfort.....	219
8.2.4.2 Dignity & respect.....	220
8.2.4.3 Patient-centred & practice standards.....	222
8.2.5 Professionalism & professional attitudes.....	224
8.2.5.1 Professional development/C	227
8.2.5.2 Motivation and rewards.....	229
8.2.6 Management.....	231
8.2.6.1 Departmental Management.....	232
8.2.6.1.1 Appointment scheduling systems & waiting time.....	235
8.2.6.1.2 Procurement procedures.....	237
8.3 Quality framework in radiographic service delivery.....	239
8.4 Summary.....	241
Chapter Nine.....	242
Reflexive Accounts.....	242
9.1 Introduction.....	242
9.2 Professional educationalist.....	243
9.3 Challenging situations and experiences.....	244
9.8 Knowledge acquisition through the study.....	246
9.9 Summary.....	248
Chapter Ten.....	249
Conclusions, implications and recommendations.....	249
10.1 Introduction.....	249

10.2 Limitations.....	250
10.2.1 Phase 1.....	250
10.2.2 Phase 2.....	251
10.3 The importance of quality framework in radiographic service provision in Ghana...252	
10.3.1 Implementing the Conceptual Framework: Management Roles.....	255
10.3.2 Roles of Radiography Workforce in implementing the framework.....	256
10.4 Areas for Further Research.....	257
10.5 Recommendations.....	257
10.6 Conclusions.....	258
References.....	260
Appendices.....	316
Appendix I- Approval letter-School of Allied Health Sciences, UG.....	316
Appendix II- Approval letter- Korle-Bu Teaching Hospital.....	318
Appendix III- Approval letter- Faculty Research Ethics Committee, SHU.....	319
Appendix IV- Patient Satisfaction Questionnaire – Phase 1.....	320
Appendix V- Participant Information Sheet-Phase1.....	324
Appendix VI- Participant Consent Form- Phase 1.....	326
Appendix VII- Exposure parameter data sheet – adult PA chest –Phase 1.....	327
Appendix VIII- Exposure parameter data sheet – adult AP lumbar spine-Phase 1.....	328
Appendix IX- Exposure parameter data sheet – adult AP knee- Phase 1.....	329
Appendix X- Reject film analysis worksheet- Phase 1.....	330
Appendix XI- Radiographers’ interview schedule- Phase 2.....	331
Appendix XII- Managers’ interview schedule- Phase 2.....	332
Appendix XIII- Patients’ interview schedule-Phase 2.....	333
Appendix XIV- Participant Information Sheet-radiographers/managers-Phase 2.....	334
Appendix XV- Participant Consent Form- Phase 2.....	336
Appendix XVI- Patients’ invitation letter/Participant Information Sheet- Phase 2.....	337
Appendix XVII- Radiographers’ invitation letter.....	340
Appendix XVIII- Literature Search documentation.....	341
Appendix XIX- Scatter plots showing Relationships between variables.....	344

List of tables

2.1 Ethnicity in Ghana.....	26
3.1 Definitions of service Quality.....	43
3.2 Dimensions of service quality in Healthcare.....	48
5.1 ANOVA: Overall satisfaction with service delivery-demographics.....	131
5.2 ANOVA: Overall satisfaction with service delivery.....	132
5.3 ANOVA: Overall satisfaction with service delivery.....	133
5.4 Post Hoc Tests: Overall satisfaction with service delivery.....	134
5.5 ANOVA: ‘Between-Subjects Factors’: Independent Variables	136
5.6 ANOVA: ‘Between-Subjects Factors’: Independent Variables	137
5.7 ANOVA: ‘Between-Subjects Factors’: Independent Variables	138
5.8 ANOVA: ‘Between-Subjects Factors’: Independent Variables	139
5.9 Results of Reject Analysis - Room1.....	140
5.10 Results of Reject Analysis – Room2.....	141
5.11 Results of Reject Analysis – Room3.....	142
5.12 Overall Reject Analysis of the three imaging Rooms.....	143
5.13 PART 1: Descriptive statistics of exposure parameters.....	144
6.1 Cost Analysis of rejected Films.....	160
6.2 Projections and expected DRL Values.....	164
7.1 Stages of thematic content analysis.....	171
7.2 Category of Interview Participants.....	172
7.3 Major and subsidiary themes.....	176
8.1 The Hospital Administrative Position.....	232

List of figures

1.1 Map of Ghana: geographical Location and regions.....	2
1.2 Clinical Staff hierarchy in the study setting.....	7
4.1 Sequential Explanatory Research design.....	80
4.2 General overview of the Methods.....	81
5.1 Gender of patients.....	117
5.2 Age grouping of patients.....	118
5.3 Educational status of patients.....	118
5.4 Occupational status of patients.....	119

5.5 Ethnic Background of patients.....	119
5.6 Religious background of patients.....	120
5.7 Waiting time.....	120
5.8 Impression about waiting area.....	121
5.9 Comfort at waiting area.....	121
5.10 Cleanliness of waiting area.....	122
5.11 Attitude of the Radiographer in the examination room.....	122
5.12 Explanation of examination.....	123
5.13 Caring concern of Radiographer.....	123
5.14 Impression about the Radiographer.....	124
5.15 Types of X-ray request.....	124
5.16 Patient's privacy in the examination room.....	125
5.17 Information about examination report collection.....	125
5.18 Patient's satisfaction with thoroughness of examination.....	126
5.19 Comfortable with the medium of communication.....	126
5.20 Expectation of level of care received.....	127
5.21 Ease of locating the department.....	127
5.22 Views about time spent on the examination procedure.....	128
5.23 Overall comfort.....	128
5.24 Overall satisfaction with service practice procedure.....	129
5.25 Overall satisfaction with service delivery.....	129
5.26 Overall impression about service provision.....	130
5.27 Percentage of individual causes of overall rejects (three rooms).....	144
5.28 Error bar plot with 95% CI for kVp: PA chest for various sizes of patients.....	145
5.29 Error bar plot with 95% CI for mAs: PA chest for various sizes of patients.....	145
5.30 Error bar plot with 95% CI for kVp: AP lumbar for all sizes of patients.....	146
5.31 Error bar plot with 95% CI for mAs: AP lumbar for all sizes of patients.....	146
5.32 Error bar plot with 95% CI for kVp: AP knee for all sizes of patients.....	147
5.33 Error bar plot with 95% CI for mAs: AP knee for all sizes of patients.....	147
7.1 Quality framework themes, showing six main themes & 17 sub themes.....	179
8.1 Conceptual Framework of quality of radiographic service delivery.....	240
10.1 Implementing Conceptual Framework of quality.....	254

List of Abbreviations

AHPs – Allied Health Professionals
ALARA – As Low As Reasonably Achievable
AP – Antero-posterior
ASRT – American Society of Radiologic Technologists
ATM – Automated Teller Machine
CEO – Chief executive officer
CMS – Central medical store
CPD – Continuing professional development
CR – Computed radiography
CT – Computed tomography
DH – Department of Health
DNA – Deoxyribonucleic acid
DR – Digital radiography
DRLs – Diagnostic Reference Levels
GAEA – Ghana Atomic Energy Agency
GDP – Gross domestic product
GH¢ - Ghana Cedis
GHS – Ghana Health Service
GSS – Ghana Statistical Service
HSG - Hysterosalpingography
HSR – Health Service Research
IAEA – International Atomic Energy Agency
ICRP – International Commission on Radiation Protection
ID – Identification
ISQua – International Society for Quality
IT – Information technology
kVp – Kilo voltage potential (potential kilo-voltage)
mAs – milli-ampere seconds
MDGs – Millennium Development Goals
MOH – Ministry of Health
MRI – Magnetic Resonance Imaging
MSc – Master of Science

NHIA – National Health Insurance Authority
NHIS – National Health Insurance Scheme
NRPB – National Radiological Protection Board
PA – Postero-anterior
PM – Preventive maintenance
QA – Quality Assurance
QC – Quality Control
RFA – Reject Film Analysis
RPB – Radiation Protection Board
SCoR – Society and College of Radiographers (UK)
SPSS – Statistical Package for the Social Sciences
UNSCEAR – United Nations Scientific Committee on the Effects of Atomic Radiation
USD – United States of American dollars
USB – Universal Serial Bus
WHO – World Health Organization

CHAPTER ONE

Background

1.1 Introduction

This chapter presents the overview of the thesis and discusses the general health care service provision; medical imaging, radiographic staffing, and challenges confronting radiography service provision in Ghana, including persistent shortage of radiographic consumables (films and processing chemicals). The chapter also outlines patients' exposure to ionising radiation during X-ray procedure, and lack of quality control (QC) and quality assurance (QA) programmes. Other areas covered include radiation protection legislation in Ghana and radiation protection within the X-ray departments. The chapter finally concludes with a statement of the overall problem, discussion regarding significance of the study, research aims, questions and objectives, and summary of the chapter.

There is a need for a quality service framework that takes into account a complete coverage of what patients consider in assessing quality of health service; and trying to address this very important issue may mean developing a framework of quality as well as designing systems for quality of services delivery (Silimperi et al. 2002). The following three chapters (chapters 1 to 3) therefore present a narrative review of the literature to contextualise the project, conceptualise the term 'quality' and provide a rationale for the study.

1.2 The general health care service provision in Ghana

Ghana is a developing country with its geographical location at the west coast of Africa, bordered at the east by the Republic of Togo, west by the Republic of La Cote D'Ivoire, north by the Republic of Burkina Faso and south by the Atlantic Ocean and the Gulf of Guinea. Ghana is administratively divided into ten regions which are subdivided into 265 districts. The country has a current population of approximately 25 million people with the yearly growth rate of 2.5 per cent (Ghana Statistical Service 2012). The ministry of health (MOH) made it a target to improve the health status of all people living in Ghana thereby contributing to the Government's development agenda or vision of transforming Ghana into a middle-income country with its current real Gross Domestic Product (GDP) growth of 4.9% and GDP per capita of 1,696.08 US dollars (USD) (Ghana Statistical Service 2015). Although the total funding for health care has been increasing in the last decade, health

financing is still a major challenge (WHO 2012). The increase in funding to the health sector has gone mainly into paying personal emoluments rather than to support service delivery (WHO 2012) resulting in a major funding gap existing in the sector. The geography and location of Ghana has been shown in Figure 1.1 below.

Figure 1.1 Map of Ghana: geographical location and regions.



Source: ghanaweb.com

The health system began at the time mainstream medicine was brought to Ghana by missionaries during the colonial era in 19th century, and has since undergone several reforms (Adjei 2003) with the aim of improving the quality of health care delivery in the country. It was the government's strategy to implement these changes in order to enhance effective health care provision which resulted in the creation of the Ghana Health Service (GHS) which became operational in 2001 following the enactment of GHS and Teaching Hospitals Act 1996 and the Teaching Hospital Boards (GHS 2004; MOH 2004; Adjei 2003).

The public healthcare system provides over 60% of the health care services in the country while private and non-organizational health institutions provide about 40% of the country's healthcare services (Castro-Leaf et al. 2000). Thus, other hospitals established by private individuals or organisations and also the police, the military and other government agencies or organisations offer health services to meet the health needs of Ghanaians.

Healthcare delivery in Ghana involves traditional medicinal services and orthodox medical services with the former in existence before the orthodox medicine was introduced; and although the traditional medicine is still being patronised by the public (Ofori 2011), MOH is yet to officially recommend its usage to compliment the orthodox medicine in the healthcare system. Traditional medicine, according to the World Health Organisation (WHO) is the knowledge, skills and practices of holistic health care, recognised and accepted for its role in the maintenance of health and treatment of diseases (WHO 2000). Traditional medical service delivery is based on indigenous theories, beliefs and experiences that are handed down from generation to generation (Ofori 2011). Traditional medical service providers in Ghana employ various methods in treating their patients, including the use of herbs, spiritual beliefs and local knowledge with training through apprenticeship. In this regard, the GHS designed a programme to integrate traditional medicine into the medical schools and this attested to the government's recognition of the services of the traditional medicinal practitioners in the health care system (MOH 2005).

As indicated earlier, Ghana is divided into ten administrative regions with each having a regional hospital based in the regional capital. Three of the regions (Greater Accra, Ashanti and Northern) have teaching hospitals with two in the northern sector and one in the south. The largest among the three is Korle-Bu Teaching Hospital and is located in the capital (Accra). In addition, there are district referral hospitals in almost all the district capitals, some of which were established by missionaries or churches and are therefore known as mission hospitals (Ofori 2011). These district hospitals also provide healthcare services to patients within the districts.

One of the goals of any service provider is to deliver a service that meets the needs of the client and thereby provides satisfaction to the client. Therefore, the key to customer satisfaction is consistently delivering a high-quality service (Kotler & Keller 2009). The healthcare sector is a service provision system and so delivering a quality service to clients or patients should be the main focus of the health service providers. Delivering high-quality health care services to patients and/or their relations, carers and other users of the services should remain the central focus of healthcare service providers, including radiographers. The policy document of Ministry of Health, National Health Policy: Creating Wealth through Health, clearly spelt out to promote health and vitality and to ensure access to quality health services for all people living in Ghana (MOH 2007). Although, the

government's health policy to provide affordable quality healthcare to all manner of people living in the country was appropriate and in the right direction, the policy was constrained by the absence of comprehensive norms and weak organisational and management, coupled with weak support systems such as equipment for service delivery (MOH 2007; Ghana Health Service 2004).

Diagnostic imaging facilities all over the world, including Ghana, play a crucial role in the healthcare system by ensuring that patients are provided with high quality services which are widely used because of their known benefits to society (Saunders et al. 2005). In order to enable the imaging facilities to maintain the systems in supporting high quality healthcare delivery services, quality assurance (QA) processes were proposed (ICRP 1991) and these have largely been recognized to play significant roles in maintaining high quality standards (Jabbari et al. 2012). Thus, QA initiatives in Africa and other developing countries worldwide have been highlighted at a series of meetings organised by the International Society for Quality in Health Care (ISQua) (Zanten van 1996). Despite a review conducted in 1998 in Ghana reported that a substantial progress was made in setting up QA in health sector, the report however concluded that structures at all levels were yet to be organised to provide direction and guidance for QA in health institutions (GHS 2007). The report therefore recommended that QA Policy and strategies should be developed and implemented into the health systems to ensure delivery of quality health care (GHS 2007).

With regard to the recommendation, the Institutional Care Directorate of the Ghana Health Service (GHS) was mandated to take charge of quality issues in the country's healthcare sector (GHS 2007). However, directives, policies and guidelines formulated under this Directorate were unable to include diagnostic imaging facilities, even though QA directed at equipment-user performance process was of known value in improving diagnostic value and improving departmental management and quality of patient care (Silimperi et al. 2002).

1.3 Diagnostic medical imaging in Ghana

In Ghana, diagnostic medical imaging plays a crucial role in facilitating the Government of Ghana's policy of providing affordable quality healthcare to the health care users (MOH 2004). In this regard, diagnostic X-ray departments are established in all the teaching hospitals as well as each of the ten regional hospitals and are headed by either a radiologist

or medical superintendent. However, a radiographer heads the technical group comprising radiographers and radiological technicians.

The radiographic equipment at the teaching hospitals comprises of both conventional and digital including computed tomography (CT), magnetic resonance imaging (MRI), fluoroscopy and angiography equipment. Two out of the three teaching hospitals located in the southern sector have Radiotherapy Centres. The regional and district hospitals also have general imaging facilities, and some have fluoroscopy equipment and these departments are managed by a radiographer in the absence of a permanent radiologist. About 75% of districts within the regions have hospitals with diagnostic imaging facilities which are mainly headed by a radiographer (Schandorf & Tetteh 1998a). The imaging services provided by these hospitals are mainly basic conventional or plain film X-ray investigations. However, those district hospitals do not have radiologists because they are few in the country and the majority of those few radiologists in Ghana work in regional and teaching hospitals in the main cities. The number of radiologists in the entire country is 47; out of figure about 79% are resident in Accra; 9% are in Kumasi while 2% each are in six of the regional hospitals (Cape Coast, Ho, Koforidua, Sunyani, Takoradi and Tamale). Therefore, the radiographs produced in those district hospitals are sent to the referring clinician and whenever the clinicians are not clear with some of the images, they invite the radiographers who produced them for assistance or their views.

1.4 Radiographic staffing in Ghana

Diagnostic radiographic imaging services began in 1927 in Ghana, three years after the country's premier teaching hospital was founded. As new knowledge was being developed at an increasingly rapid rate, coupled with patients' demand for high quality imaging services, it became necessary for an accelerated programme for training of more quality radiographic staff locally to help in providing quality diagnostic imaging services to healthcare users within and outside the hospital. As the demand for quality imaging service was on the rise with regard to the technological advances in imaging modalities, it became imperative that the professionals should be equipped with advanced knowledge; hence the need to train more radiographers in Nigeria, South Africa, the UK and other countries where radiography training programmes were far advanced. The training of diploma radiographers in Ghana started in September 2001.

The MOH and other healthcare stakeholders had realised the training of the radiographers had been slow, resulting in insufficient number of radiographers required to provide requisite imaging services in the imaging facilities in the healthcare institutions. Then, in 1983 MOH started training of the personnel to augment radiographers to efficiently operate radiographic equipment in most of the nation's imaging centres. The locally trained imaging service providers were initially called X-ray Operators in the 1980s. In 1983, the MOH changed the programme from two years to a three-year certificate training programme with the designation from the X-ray Operatorship to X-ray Technicians or X-ray Technical Officers which was later changed to Radiological Technicians in early 1990s. However, the majority of this group have upgraded to the grade of radiographer as the initial training programme of that group was phased out about a decade and half years ago. In addition, there is another group who assists with the imaging service provision and this group specifically works in the darkroom and is called darkroom attendants. Again, other supporting service personnel help in the provision of radiographic services in the imaging (X-ray) departments as shown in figure 1.2 on page 7.

Until 2002, degree-qualified radiographers in Ghana were all trained abroad and were few in number, with most of them working in imaging facilities within the teaching and regional hospitals (Ofori 2011). A study by Ofori (2011) noted that the actual number of radiographers required at the time to deliver an efficient and effective imaging services to meet national requirements has never been sufficient, even though the radiography profession has come of age in Ghana. In order to increase the number of trained radiographers in the country the government of Ghana then decided to introduce the degree programme in radiography in 2002 because the training of radiographers abroad was very expensive and therefore was no longer economically viable (Ofori et al. 2013). In addition, the government's decision to undertake the training of the radiographers in the University of Ghana was borne out of the difficulty of getting clinical placement experience abroad by the student radiographers. Since the start of the degree programme, the intake has been gradually increasing from the initial intake of eleven students in 2002 to 36 in 2015. The total registered or licensed radiographers nationwide at the end of 2015 were 280 (Allied Health Taskforce 2015) while 236 registered with the professional body (Ghana Society of Radiographers 2016).

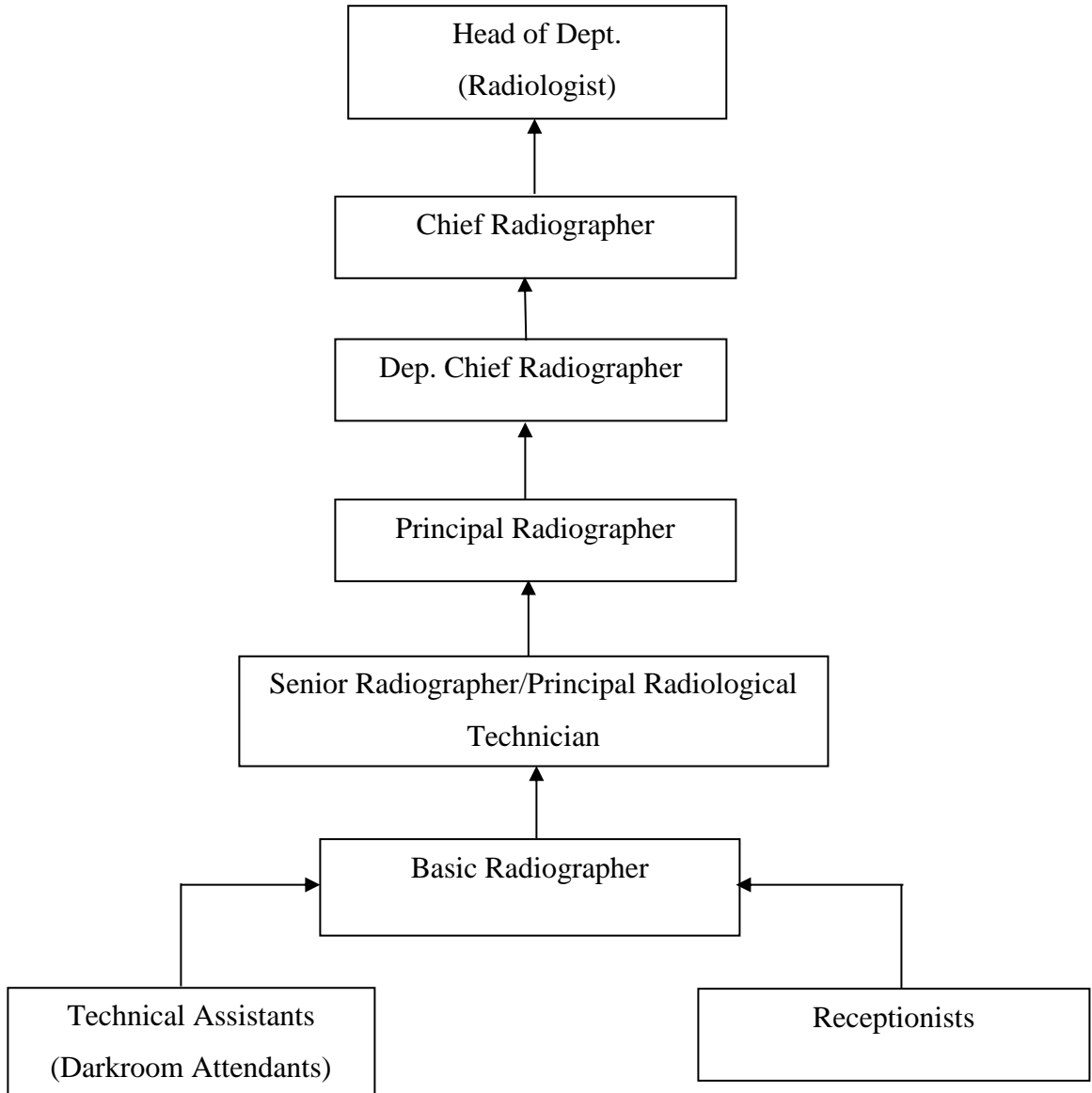


Figure 1.2 Clinical staff hierarchy in the study setting

1.5 Challenges confronting medical imaging in Ghana

Medical imaging in Ghana faces varying challenges that have been impacting, in diverse ways, on the quality of services delivered to the service users. Key challenges include persistent power (electricity) outages, shortage of radiographic consumables such as X-ray films, disinfectants, syringes and sometimes packets or envelopes for radiographs; exposure to ionizing radiation in medical imaging; lack of quality control, and quality assurance programmes.

1.5.1 Radiographic consumables

Occasionally, the medical imaging facilities or X-ray departments in Ghana experience continuous shortage of X-ray films from the Central Medical Store in Tema (CMS), a town in the Greater Accra Region, which is the point of supply of all medical items. CMS is one of the supporting units under the MOH, and is responsible for ensuring the continuous supply of good quality pharmaceuticals, medical, X-ray and laboratory supplies, through timely cost effective procurement (MOH 2012). The MOH enters into a maximum price contract on a yearly basis with suppliers to provide medical and pharmaceutical supplies (MOH 2012). However, occasionally CMS has declared an acute shortage of these items which they might blame on the late submission of the previous bills owed by various hospitals' stores and/or imaging facilities.

During the radiographic examinations, after the X-ray exposures are made the films are processed in the darkroom in order to produce hard copy images. Film processing chemical requires appropriate chemistry which should be matched with the type of the film used. However, the acquisition of a regular supply of appropriate processing chemicals often poses a problem with most imaging departments due to lack of effective procurement and distribution policies (Ofori 2011). Thus, the use of developer from manufacturer A, with fixer from manufacturer B, coupled with the use of films from manufacturer C has been a common occurrence. Mismatch of processing chemicals and films most often leads to poor image quality; this includes the provision of poor processing chemicals which mainly leave chemical artefacts on the films. This situation is not good for the production of quality radiographs or images which in turn demoralizes the radiographers and therefore affects the quality of service delivered by the radiographers.

In addition, radiographers have not been involved in the process of procurement of X-ray consumables, and therefore do not have any influence on the purchasing of radiographic consumables and accessories. According to Ofori (2011), purchases are made by procurement officers from the MOH and /or Ghana Health Services who usually have little or no knowledge of medical imaging and the impact of financial decisions or implications on the quality of resultant images.

1.5.2 Exposure to ionising radiation in medical imaging

The medical utilization of ionizing radiation in the healthcare delivery systems provides a significant part of radiation dose received by the human population. Lin (2010) argued that the radiation exposure from this source is increasing as a result of over-reliance on diagnostic imaging by referring clinicians. According to Lin (2010), the dose associated with radiographic examinations varies considerably from one imaging facility to another within the same health institution and also from one X-ray or imaging room to another within the same department.

Since the discovery of X-rays by Wilhelm Roentgen in 1895, ionising radiation has been useful for diagnostic and therapeutic purposes. However, the harmful effects of the X-rays were detected within a short period of the discovery among the early radiation workers as a result of overexposure to the ionising radiation (Ratnapalan et al. 2008; Engel-Hills 2006). Particularly, during the First World War, X-rays for medical purposes were extensively used and many leukaemia and anaemia cases were detected among those who administered the ionising radiation (Martin 2003). According to Williams (2004), both patients and medical imaging practitioners received ionising radiation doses suspected to be higher than expected and the subsequent effects observed confirmed that ionising radiation causes cancer. Evidence available suggests that the risk of radiation damage is proportional to the dose deposited in the tissue and that prolonged radiation damage to deoxyribonucleic acid (DNA) molecules in organs can induce cancer (Cohen 2002).

The 2000 report of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) estimated that the application of radiation in medical imaging accounts for about 95% of the population exposure to ionising radiation from man-made sources and about 12% of total exposure (UNSCEAR 2000). This situation is as a result of the large number of medical imaging (X-ray) examinations being performed every year (McDonald 2009). In addition, the International Atomic Energy Agency estimated in 2002 that the annual number of all types of medical examination in the world was about 2100 million in 2000, which corresponded to an annual frequency of 360 X-ray investigations per 1000 world population.

In Ghana, a study by Ofori (2011) reported that the estimated annual X-ray examinations stood at about 125, 000 for a population of about 24 million. However, the current annual estimated X-ray examinations in Ghana stands at about 133,000 for a population of over 25 million. The increase in the annual estimated figure was as a result of more private diagnostic imaging facilities are being established across the country and are currently in operation. In addition, there has been a rapid increase in the request and use of radiographic images in the diagnosis, treatment and management of many disease conditions. Indeed, further growth in the diagnostic radiography could be expected in developing countries, including Ghana, where the facilities and services are lacking.

The National Radiological Protection Board (NRPB) reported in the UK that about 90% of the radiation dose to the UK population from man-made sources has been due to X-ray examinations (NRPB 2004). In addition, medical imaging contributes approximately 14% of the total radiation exposure while other artificial sources contribute less than 0.4% with just 0.012 arising from the disposal of radioactive waste (Williams 2004). The increase in availability of medical imaging equipment and services in many developing countries, particularly in Africa including Ghana, calls for an intensive education for radiation protection in medical imaging. It is recommended to keep radiation dose to patients as low as reasonably achievable (ALARA) to obtain the necessary quality diagnostic images (Martin & Shand 2003).

The International Commission on Radiological Protection (ICRP) also recommended an effective use of the ionising radiation by applying the principles of justification and optimisation of X-ray exposure in limiting the radiation dose to patients (ICRP Publication 60 1991). The justification of X-ray exposure implies consideration of both the benefits and harmful aspect that the X-ray procedure could provide in managing the patients as well as the degree to which the practitioners and the general public are endangered (Brennan 2003). Milu and Tomulescu (2004) however suggested that all countries must be encouraged to adopt several protective measures to prevent unnecessary or unproductive medical radiation exposures.

1.5.3 Quality control and quality assurance programmes

World-wide, significant efforts have been undertaken to improve the quality of healthcare services being delivered to patients, and quality assurance activities are critical to these efforts (Silimperi et al. 2002). In order to achieve a fundamental requirement of quality service delivery in the diagnostic imaging department (Ramlaul & Hogg 2010), there is the need to maintain total quality management through QA and QC programmes in the department.

1.5.3.1 Quality assurance

The basic task of diagnostic radiography is to provide high quality diagnostic information about any process or anatomical detail within the patient's body and by so doing the dose that the patient receives should be kept as low as reasonably achievable which is the basic aim of any QA programme (Surić et al. 2008; Martin & Shand 2003). Quality assurance in diagnostic radiography is the overall planned and systematic management programmes put in place to ensure provision of adequate and consistently high quality diagnostic images with minimum exposure of the patients (Ramlaul & Hogg 2010; Kodak 2005; WHO 2001). Silimperi et al. (2002) noted that QA served as an integral and sustainable part of a quality healthcare service delivery in the health care sector. In other words, QA programmes cover broader dimensions of quality activities or measures which are in place in the diagnostic imaging departments to ensure the attainment of quality (Ramlaul & Hogg 2010).

QA has therefore been regarded as the measurement of the actual performance of the diagnostic equipment and the efforts to modify, when necessary, the performance challenges in the light of the results measured. In addition, QA programmes play essential roles in the quality of service delivery in diagnostic imaging departments all over the world and indeed, in the UK for example, there are legal requirements (Reiner et al. 2006). Even though a study by Ofori (2011) indicated that essential elements which promote the delivery of quality services to patients were lacking in the imaging departments in Ghana, the study failed to provide recommendations as to how QA would be implemented in the imaging departments to promote quality of service delivery to patients and to reduce running cost of the departments. However, the researcher's recent investigation in the imaging departments revealed that QA situation has not changed six years after Ofori's (2011) study. Although Radiation Protection Board of the Ghana Atomic Energy Agency

(GAEA) is responsible for performing the necessary periodic QA audits on the imaging equipment, they are reluctant to undertake this very important assignment; and the reason has been attributed to the imaging department's inability to pay for the previous performance checks.

1.5.3.2 Quality control

In today's modern medicine, a large number of different diagnostic imaging procedures are performed in which patients sometimes receive significant doses of ionising radiation where the costs of diagnostic imaging services regarding the equipment and resources needed are high (Korir et al. 2011; Surić et al. 2008). The QC processes are techniques used in monitoring the components of an X-ray system at the departmental level, with the activities geared towards the area of interest to be monitored and evaluated (WHO 2001). Miles et al. in Ramlaul & Hogg (2010) noted that QC involved the practical testing of the diagnostic imaging processes to ensure that the processes conform to a set standard and ensure that quality requirements are met. This suggests that QC involves specific actions designed to keep measurable aspects of the process involved in providing a service within specified and acceptable periods (Schmitt et al. 2001). A QC process allows professionals to monitor the basic components of the imaging process at a low cost through the use of simple, inexpensive tools and minimal staff time to ensure that quality requirements are met (Miles et al. in Ramlaul & Hogg 2010).

For the diagnostic imaging equipment, the components (of the system) included light beam diaphragm alignment to check the accuracy of central X-ray beam with the centre of the radiation field and the congruency between light and X-ray beam; grid alignment to check erect and horizontal bucky systems are correctly centred and perpendicular to the X-ray beam (Foster 1991). Other QC tests included assessment of focal spot size; reproducibility and consistency of exposure parameters (tube potential and tube current-time product); and reject-repeat film analysis on periodic basis to identify the magnitude of problems and to determine the causes for the rejection (Korir et al. 2011; Surić et al. 2008). All these basic QC tests are to be performed by practising radiographers at the department level in order to minimise repeat and wasted resources in radiography service delivery and also to reduce patient radiation dose and waiting times. As indicated earlier, no regular basic QC tests have been in place in the study setting for more than three years and no radiographer has

been assigned to play a lead role. Even though the study by Ofori (2011) reported that QC kits were lacking in the diagnostic imaging departments, the findings were not implemented to motivate and encourage the stakeholders to provide basic QC tools in order to ensure performance of basic QC tests in the imaging departments.

1.6 Radiation protection legislation in Ghana

For several decades or so that medical imaging has evolved in the healthcare system in Ghana, patients and even imaging practitioners have been exposed to the ionizing radiation from natural and man-made sources without any national legislation to control them (Schandorf et al. 1995). It was therefore imperative that activities involving ionizing radiation exposure be subjected to acceptable standards of safety and safety inspections in order to protect those who would be exposed to the radiation. In view of this, the Government of Ghana recognised the need to establish the Radiation Protection Board (RPB) as the national regulatory authority to supervise and/or ensure protection of people against undue exposure to ionising radiation (Radiation Protection Institute 1993). In addition, the RPB was to regulate the introduction and conduct of any practice involving ionising radiation in the country (Radiation Protection Institute 1993). The RPB was empowered by the Radiation Protection Board Legislation Instrument -LI 1559 (1993) so as to give it a legal backing and to enable it to function as the law required.

In Ghana, the radiation protection and safety regulations for medical imaging have been published in the Radiation Protection and Safety Guide (2003) in collaboration with the Ghana Atomic Energy Act 204 (1963), as amended by the Provisional National Defence Council Law 308 (1993). This safety guide covers a range of subjects consistent with the recommendations of the International Commission on Radiation Protection (ICRP) Publication 60 (1991) and the International Atomic Energy Agency (IAEA) Basic Safety Standards (2002) which came into force in June 2003. This regulation placed emphasis on issues such as adequate training of the people registered to provide diagnostic imaging services and importance of justification and optimisation in diagnostic imaging. However, Ofori (2011) argued that the enforcement of the regulation seemed to be a daunting task in the country due to the attitudinal and cultural issues inherent in the people, coupled with lack of political will of the authorities to emphasize that the legislation remained functional (Surić et al. 2008). Thus, for political or power expediency, it may be argued that people in

authority turn a blind eye towards those people who break the laws and allow lawlessness to prevail (Ofori 2011).

1.7 Radiation protection within the medical imaging department

The ALARA principle is one of the fundamental tenets of radiation protection that states that doses from ionising radiations must be kept as low as reasonably achievable (Moore 2006). Protection of patients and staff from ionising radiation is an important consideration for the safe use of X-rays in the healthcare delivery system. Literature has indicated that the existing radiation protection philosophy is fundamentally based upon requirements for the protection of the medical imaging practitioner and was driven by the safety issues encountered during the early days of the development of X-rays for medical utilisation (Holmberg et al. 2010; Moore 2006). As the number of radiographic examinations has increased and the risks of from ionising radiation exposure has emerged, more attention has been focused on keeping the doses received to minimum (Holmberg et al. 2010; Martin 2006). Although the basic ALARA principle was established with the fundamental tenets of radiation protection for the medical imaging practitioners, the increase in the demand for X-ray examinations for diagnostic purposes calls for the consideration for the protection of the patients (IRCP 1991). However, Moore (2006) argued that the ALARA principle failed to fulfil its purpose of minimising ionising radiation doses to the patient population after three decades in the field of diagnostic imaging and this was due to the continued rise in the collective effective doses during the period as the number of diagnostic medical examinations performed continued to grow (Martin 2006).

In Ghana, the RPB has been the sole regulatory authority responsible for an inventory of all radiation sources, either imported or already in existence in the country as well as to provide a system of control for their safe use (Schandorf et al. 1995). In view of this, there has been in place a system of notification, authorisation by registration or licensing and control of radiation sources (Schandorf et al. 1995) to help the purchasing and installation of radiation equipment in the country as a way of regulating and checking the safe use of ionising radiation in the country (Inkoom et al. 2012).

All the guidance and legislation within the field of radiation protection in the healthcare system has largely relied upon the professional judgement of radiographers and the

evolving current philosophy over the past 100 years, and the ultimate purpose has been to avoid unnecessary exposures that increase the collective radiation dose to the patient population (Triantopoulou et al. 2005). Consequently, even though the protection strategies have been driven by dose reduction or containment, radiation doses to the population arising from diagnostic medical examinations continued to increase with the expanding demand for existing diagnostic imaging in the healthcare sector (Holmberg et al. 2010; Martin, 2006; Moores 2006). The rise in the radiation doses has also been attributed to the ongoing technological advancements or developments which might have offered new diagnostic capabilities (Holmberg et al. 2010).

Even though advances have been made in recent years in radiographic imaging technology and procedures, the fact still remains that X-rays carry some form of risks with them whether they are used appropriately or not (Cox et al. 2004; Picano 2004). Thus, the radiation exposure or dose connected with the imaging procedures cannot be avoided; however, there are means or measures to adopt in order to reduce the radiation doses to patients. Manning (2004) argued that ionising radiation has been one of the most studied of all carcinogens; however, there are still uncertainties in making estimates from cancer risks from low dose radiation. This presupposes that the risks associated with the use of ionising radiation cannot entirely be prevented but they can be reduced by weighing the benefits from the use of ionising radiation during imaging service delivery as against the risks associated with its use. The perceived dangers of ionising radiation have led to measures to be applied in order to reduce any risks involved in its application on patients (Prasad et al. 2004).

According to Reiner et al. (2006), though there are advancements in technological innovation in the diagnostic imaging system, conventional radiographic investigations still account for 65%- 70% of all imaging procedures worldwide. Despite the prevalence of conventional X-ray services in most developing countries (due to high running costs of the new imaging equipment installations and the prevailing economic conditions within these countries) (Ofori 2011), changes have occurred recently within the imaging sector where digital imaging equipment have been installed to replace and/or to augment their conventional counterparts. In addition, Reiner et al. (2006) noted that most imaging centres in the developing countries still operate in a “film-like” world despite the progress made.

Moreover, the major challenges facing imaging services in these developing countries (Ghana included) are severe erratic or unstable electricity supply and lack of maintenance culture. Five years after the work of Ofori in 2011, nothing really has changed because the study failed to provide recommendations for the implementation of the findings. This suggests that the findings by Ofori's work in 2011 were not implemented for the benefit of the X-ray departments and for that matter, patients. Even though the current study setting started experiencing the installation of digital equipment with the aim of improving the processes of radiography service delivery, Ofori's work did not make any technical input to the installation process. Therefore, it is important to undertake a study to seek the views of the stakeholders (managers, patients and radiographers) to establish data on quality of radiographic service delivery in the X-ray departments.

1.8 Statement of the problem

Health care and quality are inextricably linked; therefore, the provision of health care services without concern for quality is unprofessional and potentially deadly. Quality in health care systems in Africa has become a major concern due to seemingly intractable poor health indices in most countries, Ghana included (Adindu 2010). The MOH (MOH Ghana) has been concerned about quality of health care; however, improvements in quality have been slow partly because quality improvement activities have received inadequate priority (Turkson 2009). A number of studies previously conducted in public hospitals over the years, both by objective measures and in the opinions of patients and health care providers, revealed that quality of health service delivery in Ghana is inadequate (MOH 2007b; Ghana Health Service 2003). In addition, previous studies conducted within radiography departments in Ghana, in respect of quality of medical imaging services, identified problems with radiation protection (Ofori 2011; Schandorf & Tetteh 1998).

A study by Ofori (2011) investigated the barriers to the implementation of quality assurance in diagnostic imaging departments with the aim of developing a model and strategy for in-country application in Ghana. The study highlighted problems regarding lack of QA programmes in the imaging facilities in Ghana (Ofori 2011); however, it did not provide data on quality of service delivery in the imaging departments. Even though the study identified QA programmes as essential elements that ensure quality of service delivery in imaging facilities (Ofori 2011), the study did not involve the opinions of the

patients, radiographers and/or managers about the quality of service delivery in the imaging departments. Similarly, no study has been conducted to involve radiographers, patients and managers to establish quality of service delivery in the imaging departments with a view to developing an overall concept of quality of service delivery in imaging departments in Ghana.

In Ghana, at the time of undertaking this study it appeared that little attention had been focused on this critical area of research resulting in a dearth of literature available on quality of service delivery in the medical imaging facilities. Thus, there was, virtually, a lack of data on radiographic service delivery in Ghana. In addition, studies have involved patients' opinions about their experiences or perceptions of the state of quality of service provision in the public hospitals in Ghana (Atinga 2012; Ofosu-Kwarteng 2012; Turkson 2009); however, they did not seek the views of the stakeholders (patients, radiographers and managers) on quality service delivery in the imaging facilities in Ghana. Further, there is a lack of quality standard that presently guides the radiography service provision in Ghana. Also, an extensive review of the MOH policy document showed that there was no policy statement on a framework of quality of radiography service delivery in Ghana (MOH 2007a). This therefore suggests there has been no or little attention focused on the provision of quality service in the medical imaging departments in Ghana, since Ofori's work in 2011. In addition, the study by Ofori (2011) failed to provide recommendations as to how to implement the study findings in order to bridge the theory-practice gap (Chapman & Clegg 2007) within the X-ray departments in Ghana.

In view of the above problems, further studies, in a broader dimension, are required to elicit the current status of quality of service delivery in the radiography facilities in Ghana, and to establish data on opinions of patients, radiographers and managers about the quality of service delivery in imaging departments in Ghana. Thus, in the absence of available data on quality of radiographic service provision, this research aimed to gather data in order to develop an overarching framework of quality of service delivery in the radiography departments in Ghana from the views of patients, radiographers and managers.

1.9 Significance of the study

From the problems identified above, the breadth of the study would be first of its kind in Ghana and would significantly contribute to the body of knowledge on quality of service and, hopefully, to an improvement in quality of service for the future because of the awareness it would create among the radiographic service providers in the country. Once there is awareness of the overall framework of quality among the radiographers, it would contribute to the provision of improved quality of radiographic service delivery in Ghana. Subsequently, it would help in the achievement of the goal of the MOH to provide quality of care to the service users (patients) (MOH 2007a). Thus, this may be the key to improving patient safety, quality service delivery and performance of the imaging facilities.

The study aims to develop an overarching framework of quality in radiographic service delivery in Ghana and to promote activities that will provide the radiographers with additional knowledge about quality issues in imaging service provision and patient care. This study also aims to close the knowledge gap that may have existed in the professional movement towards the philosophy of advanced radiographic service provision by linking both theoretical and practical issues of quality in radiographic practice. The comprehensive approach in this study would also set a stage for future studies in Ghana and other countries aiming at addressing the challenges of quality of radiographic service delivery to patients and other service users.

Finally, it is important that quality standards of service provision should become part of the culture or policy of the radiographic service provision by the radiographers in the X-ray facilities in Ghana. The study also aims to develop a framework of quality to be incorporated in the academic curriculum to ensure that radiography students are educated in all aspects of quality of service provision issues, and to help improve the future radiography service delivery in Ghana. In addition, the Regulatory Body of radiographers would be encouraged to adopt and implement the findings as part of the routine service provision policy.

1.10 Research aim, questions, and objectives

The overarching aim of this research is to develop a quality framework for radiographic service delivery in the imaging facilities in Ghana, using both objective measurements and

subjective perceptions of patients, radiographers and managers. The study investigated the practice standards and criteria that existed in the facilities which determined service delivery compliance. Practice standards are framework statements established by the profession for judging the quality of practice, service provision and education provided by practitioners who practise in the medical imaging facilities (American Society of Radiologic Technologists (ASRT) 2013) and these standards can be used by individual imaging facilities in order to ensure quality service delivery to patients.

The research question guides the overall structure of the research in terms of conceptualisation and logistics. Therefore, every analysis or decision put forth during the study was linked to the research questions. Hence, the research questions that served as the driving force for this study were:

- What is the understanding of quality of service by radiographers and managers in Ghana?
- What quality standards /criteria do radiographers employ during imaging service provision?
- To what extent are patients satisfied with the radiography services rendered them?
- How do patients perceive the quality of service they receive?

The specific objectives of this study were to:

- conduct a narrative literature review to frame the findings of the study
- establish baseline data from perspectives of patients on quality of service issues in the imaging department
- establish baseline objective data on selected radiographic quality control measures
- explore and/or assess opinions of patients on quality of radiographic service received and their satisfaction
- compare opinions of patients with the views of radiographers on their understanding of quality of service delivery
- elicit the perspectives of radiographers and managers on quality of radiographic service delivery in the X-ray department
- explore the views of radiographers on their experiences in terms of service delivery

- develop a conceptual framework for radiographic service delivery in Ghana

1.11 Summary

This research explores the background studies on quality of service delivery issues in the medical imaging facilities in Ghana. Medical imaging has become a very important element in the health care delivery system all over the world. This diagnostic imaging service emerged in response to the increased need for the use of X-rays in the diagnosis of patients. Despite quality of healthcare provision having been high on the agenda of the MOH in Ghana, literature on the state of quality of service delivery in the medical imaging facilities has been scanty. Thus, researchers have neglected these very important issues where staff in those facilities have been exposing patients and other users of the imaging facilities to ionising radiation which can be both harmful and beneficial.

Currently, there is much interest in quality improvement in diagnostic services delivery the world over; however, in Ghana, little attention has been focused on the quality of service provision in the imaging facilities. The interest in quality improvement is being driven by factors such as patients' awareness, healthcare needs, high cost of imaging equipment, ever increasing complexity of examination equipment, possibility of increasing ionising radiation doses to patients and public, the importance of medical imaging for diagnosis of patient health care management within the healthcare sector, and the ever increasing demand for high quality health care service by the service users. It is in this regard that most countries seek to establish frameworks/concepts for addressing and managing quality issues in health care and this study is focused on developing a concept of quality in radiographic service provision in Ghana.

CHAPTER TWO

Cultural Framework

2.1 Introduction

Radiographers in Ghana have been providing imaging services on a daily basis to patients from diverse ethnic, linguistic and cultural backgrounds. While some of these people have easily identifiable and cultural attributes or beliefs, others have hidden cultural practices and beliefs. Therefore, radiographers are expected to provide patient-centred care or services which are professionally safe and culturally sensitive. This situation makes it very challenging for radiographers to easily identify each and every patient who presents at the imaging department with their cultural and ethnic beliefs and practices. This therefore calls for radiographers to be culturally sensitive while providing their routine imaging services (Williamson & Harrison 2010).

This chapter discusses the quality of healthcare delivery in relationship to the cultural framework of the society in Ghana relative to other countries. The section focuses on specific areas including the general overview of culture in line with healthcare delivery services, culture in Ghana, the society and cultural practices and differing ethnic languages used in Ghana. The chapter also encompasses Ghanaian societal and cultural norms, the general background of the people, their religious beliefs relating to the healthcare issues and culture values and health beliefs. The section continues with general socio-economic impacts and accessing healthcare, and financing for National Health Insurance Scheme (NHIS) Policy in Ghana. The section finally presents the summary of the chapter discussion.

2.2 General overview of culture & healthcare delivery services

All over the world, the healthcare service providers interact with patients and other healthcare service users from many different cultures. The healthcare sector itself is a diverse and complex environment which these culturally diverse health service users visit to receive health care. In such an environment, it is important for the health service provider to be aware of how to attend to the health needs of culturally diverse patient populations (Betancourt 2004). However, it has widely been recognised that health care providers need to take the cultural frameworks or values of patients into account prior to

health care service delivery (Hunt 2009). In addition, cultural differences should be recognised and respected by health care providers (including radiographers) to ensure maintaining relationships that promote effective communication.

Culture may be defined as the learned and transmitted values, beliefs and practices of a particular group of people with their thinking, decisions and actions being revealed in patterned ways (Ehrlich & Coakes 2013; Leininger 2002/1995). According to Thomas (2001), culture is a unified set of values, ideas, beliefs and standards of behaviour shared by a group of people, and could also be recognised as the way a person accepts, interprets, and understands experiences throughout the life cycle. Culture is thus a framework that people use in viewing the world, and this includes health and the need for healthcare.

Ghana is a multi-cultural, multi-ethnic, multi-lingual and multi-religious country (GSS 2012; Asante & Gyimah-Boadi 2004); and inevitably every Ghanaian belongs to one group or the other and is easily identified as a member of the group when he/she conforms to a particular way of life (Akuoko 2015). These cultural practices or values, norms and beliefs go a long way to affect health care delivery and its access in Ghana. Therefore, to ensure quality of health care service provision for these diverse groups requires that the healthcare providers understand how each service user's socio-cultural background, belief or values affect their health beliefs and behaviours. It is believed that when cultural values and beliefs of groups of people or individuals are appreciated and, for that matter, respected it may help healthcare providers to understand culturally determined behaviours and attributes of the patients they attend to (Vaughn et al. 2009). All cultures have systems of health beliefs to explain what causes illness, how it can be cured or treated, and who should be involved in the process. Among some societies, cultural beliefs relating to illness determine how and when health care is sought by the people and which health practices should be followed.

Concern about culture in healthcare provision has increased in recent years as health care providers and policymakers strive to close the gap in healthcare regarding patients of different sociocultural backgrounds (Carrillo et al. 1999). Sociocultural differences, when misunderstood, could adversely affect the cross-cultural healthcare provider-patient interactions (Scott, 1997) and as such, may impact differently on quality of health care

service for each individual and from nation to nation and may lead to perceived differences in healthcare quality (Chang & Kelly 2007)

Even though education has been on-going on discrimination against patients with different backgrounds within the healthcare facilities in Ghana, it was observed that some forms of ethnic, gender and insurance disparities within the healthcare system existed (Buor 2004). This challenging situation needs to be addressed in order to ensure that quality of health care services to all patients is achieved. For instance, in some ethnic tribes in Ghana, women are supposed to be subservient to men who may dominate decision making (Buor 2004). Thus, the discrimination by gender may likely influence the use of healthcare facilities by women.

Culture provides the context for all healthcare and social services throughout the human lifespan across conditions, settings and situations. Schim and Doorenbos (2010) identify culture as a mechanism through which people learn how to be in the world, how to behave, what to value, and what gives meaning to existence. Thus, culture influences healthcare delivery to patients because it is the foundation for expectations, actions, interactions, and experiences or meanings of care.

As patients, families, and communities grapple with the realities of human mortality, issues of culture come into focus in ways that heighten the relevance of cultural concern at this time in life. As social workers and other healthcare providers interact with people dealing with life-limiting conditions, issues of culture and care across cultural boundaries become critically important (Schim and Doorenbos 2010). Thus, improving quality of health care services to patients and other users requires nuanced understanding of cultural contexts for the care providers and recipients.

The challenges of providing healthcare service to patients and others with diverse cultural values, beliefs, and behaviours is a challenge for healthcare organisations, especially, in developing countries such as Ghana. In order to ensure culturally diverse patients access quality health care, patients who are culturally sensitive and continue to hold onto their individuals' values or perspectives and traditions should be encouraged to avoid the beliefs and values that may be dangerous and detrimental to their health. Eliciting and engaging a

patient's cultural values, beliefs, and perspectives should be a key component or focus of patient-centred health care service delivery (Hunt 2010).

2.3 Culture in Ghana

The culture of Ghana has been endowed with rich values or heritage. The country has over 75 ethnic or linguistic groups whose common values and perspectives represent the collective national heritage of Ghanaians. Each of the ethnic groups has unique cultural features and traditions that give identity and self-respect to the people. Since attaining independence status Ghanaians have maintained a society free from serious conflict and continue to develop their considerable natural, human and cultural resources.

Cultural diversity exists in many forms including language, ethnic group, religious affiliation, gender inequality, traditional beliefs, socio-economic status and geographical location of the people (Campinha-Bacote 2002). However, the beliefs that influence people's behaviours in most cases are often carried in their culture's folktales and passed down through family health and healing practices, regardless of ethnic origin.

In Ghana, cultural beliefs, values, and perspectives play a key role in accessing or utilization of health care services. Some cultural factors influence healthcare delivery and its access in Ghana. For example, a healthcare service provider could only talk to a female patient, who seeks healthcare service through the husband. Akuoko (2015) reported that in some instances, female patients refused to be attended to by male health care service providers mostly in the Northern part of Ghana. Moreover, in the era of globalisation and contemporary technological challenges, Ghanaians continue to recognise their culture as the most important factor in the nation's human and material development; and also recognised the need to promote unity within this cultural diversity.

2.4 The society and cultural practices in Ghana

The Ghanaian society is made up of people or citizens with diverse backgrounds including different ethnic groups, language, and religious beliefs.

2.4.1 Ghanaians and ethnic backgrounds

Ghana is divided into ten (10) geographical and administrative regions (GSS 2012) with over 75 cultural or ethnic groups living in all these geographical regions. Like most countries in Africa, Ghana is a multi-religious, multi-ethnic, and multi-cultural society (GSS 2012). Thus, everyone belongs to an ethnic group and may therefore conform to a particular way of cultural life, practices and beliefs (Akuoko 2015). The predominant among the ethnic groups are the Akans (47.5%), followed in the Mole-Dagbani (16.6%), the Ewe (13.9%) and the Guan or Ga-Dangme (7.4%) as shown by Table 2.1 below (Ghana Statistical Service 2012). Even though the Mande forms the smallest ethnic group (1.1%) in Ghana, there are other minority ethnic groups and subdivisions of each ethnic group sharing a common cultural heritage, beliefs and values, history, language and origin in co-existence. Even though there are original or indigenous inhabitants in the ten regions, it is not surprising to find another ethnic group of people migrating to settle in those regions.

Among the society, cultural beliefs relating to illnesses determine how and when health care should be sought by the people and which health services should be received. In some instances, for example, a certain number of individuals would initially seek traditional health practices before seeking orthodox or scientific medical health care, as a last resort (Chang & Kelly 2007). In addition, the past experiences of a family member with the health care services may influence the present user's adherence and continued use of the facility (Rankin et al. 2005). Therefore, understanding these experiences and behaviours from the patient's perspective could strengthen the relationship, and so ensure that misconception and culturally offensive behaviours are avoided (Chang & Kelly 2007; Potter & Perry 2005).

Additionally, religious values and other cultural backgrounds play a major role in influencing individuals' beliefs, behaviours and attitudes towards health and illnesses. For example, dilemmas may arise when patients in healthcare facility settings would wish to perform cultural practices that do not fit within the existing institutional norms and structures (Hunt 2009). Research however has shown that there is a relationship between traditional beliefs, values and religion, health knowledge and perceptions (Tomlinson 2003; Avong 2000).

Table 2.1: ETHNICITY IN GHANA

Major Ethnic Groups	Percent (%)	Total Number
Both Sexes	100.0	23,823,594
Akan	47.5	11,321,568
Ga-Dangme	7.4	1,766,287
Ewe	13.9	3,323,072
Guan	3.7	879,861
Gurma	5.7	1,363,502
Mole-Dagbani	16.6	3,963,017
Grusi	2.5	594,248
Mande	1.1	269,842
Others	1.4	342,197

Adapted from the 2010 Population and Housing Census of Ghana (GSS 2012)

2.4.2 Ghanaians and diverse languages

Culture is determined by language and customs commonly espoused by the citizens or ethnic groups. Language fulfils a representational role as it is connected to the world by some designated functions; consequently, words owe their meanings to the objects they name or designate (Scotland 2012). It has been argued that language and communication form the basis of good health care service delivery (Ehrlich & Coakes 2013; Swartz et al. 2013). Thus, effective communication with patients plays critical roles in the safety and quality of radiographic service delivery (Antwi et al. 2014). In the healthcare environment where there are vast differences in culturally defined communication behaviours and attributes (Vaughn et al. 2009), it is important for the health professional to understand the health needs or problems of the patients by interacting with them in the language that they would clearly understand and also explain or present their problems (Chang & Kelly 2007). For the radiographer to be aware of and clearly understand the patient's health and emotional needs, the former should be able to communicate effectively with the patients in the languages that both would understand.

Ghana has been identified with over 100 linguistic and ethnic groups. The current population of Ghana is approximately 25 million with ethnically diverse people who

identify themselves with different tribes (Ghana Statistical Service 2012). Even though Ghanaians speak many languages, English has been adopted as the national lingua franca and has since become the main language of government and instruction. Akuoko (2015) noted that in the past healthcare service providers worked with people who could only speak their language; and this situation is different now due to cross cultural interactions among Ghanaians.

Apart from the English language, other ethnic or indigenous languages being spoken by the different ethnic groups cause major challenges or hindrances to quality healthcare service provision whenever service providers fail to understand socio-cultural differences among the patients (Thomas 2001). This, therefore, may lead to poor health care delivery with patient dissatisfaction, poor adherence to simple instructions regarding preparation for special examinations and health promotion strategies.

Among the indigenous languages spoken in Ghana by the ethnic groups or tribes include Akan, Daagare/Wale, Dagbane, Dangme, Ewe, Ga, Gonja, Kasem and Nzema (GSS 2012). The Akan language has two dialects, namely Fante and Twi which are also widely spoken and/or recognized. Another language widely used in the northern part of Ghana by Muslims as a lingua franca is Hausa. French is also used in some sections of Ghana as a result of the latter being bordered by Francophone countries (Cote d'Ivoire, Togo, Burkina Faso) on her west, east and northern parts (Tabi & Frimpong 2003). However, those non-ethnic group members may be at difficulty understanding the message communicated and, therefore, it may become necessary to look for an interpreter which may sometimes pose a challenge as a result of misinterpretation of information. Patient diversity, cultural context and communications have been identified as factors that influence patients' response and quality of health care service delivery (Antwi et al. 2014). In addition, whenever a patient is unable to understand a radiographer due to the latter's inability to speak the same language as the patient, the radiographer may face a challenge of communicating the message and explaining the procedure clearly to the patient as well as instructing the patient during the procedure. Thus, quality of service delivery may be affected and therefore be compromised.

In Ghana, many people of other ethnic tribes learn how to speak other languages as a second language in addition to their own ethnic language and use it fluently for intergroup

communication (Akuoko 2015). For example, an Akan language is largely spoken and used by non-Akan speaking tribes across the length and breadth of the country. This therefore makes the imaging service delivery process smoother as it facilitates easy communication between patients and radiographers, thereby eliminating serious communication barriers or challenges that seem to hamper quality healthcare provision. As indicated earlier, apart from the Akan language being widely spoken all over Ghana, Ga-Adangme and Ewe are the next major languages largely used.

Radiographers in Ghana meet different groups of imaging service users with different cultural, ethnic, religious and language backgrounds. Radiographers explain the examination procedures and give instructions to the patients as to the cooperation expected from the latter. As literature has indicated, language is a powerful vehicle by which messages and culture are communicated from one person to other members of the society (Neubeck & Glasberg 2005). Thus, the language has three main cultural functions, namely; describing the world, creating or constructing individuals' vision of social reality and being a vehicle to challenge and change social reality (Neubeck & Glasberg 2005).

In some societies, cultural beliefs demand that individuals maintain eye contact when listening, while other culture beliefs expect individuals to avoid eye contact while listening. In addition, some cultures have gender taboos regarding health or 'private' issues as to who is legitimate or appropriate to speak about health-related issues. Situations like this may however lead to miscommunication and misunderstanding of healthcare issues or information when these attitudes and behaviours are misinterpreted (Chang & Kelly 2007). Therefore, it is important for radiographers practising within cross-cultural environments to endeavour to develop and integrate the knowledge of culturally determined behaviours and/or attitudes into professional practice in order to largely avoid misunderstanding of patients' issues relating to healthcare. In addition, radiographers are advised to enrich their life and deliver better services to the patients by learning as much as possible about ethnic or cultural backgrounds of patients with which they come in frequent contact (Ehrlich & Coakes 2013). Thus, when radiographers integrate cross-cultural attributes into service delivery, they may be able to perform effectively to achieve improved healthcare service delivery. In addition, for quality healthcare service provision to be achieved, language plays a critical role in that patient-provider interactions should be directed towards promoting

open communication and more accurate information sharing (Vaughn et al. 2009; Chang & Kelly 2007).

2.4.3 Religious beliefs and healthcare

Religious beliefs and spirituality has been a part of health as long as health has been a part of human existence. The influence of religious beliefs on health remains a challenge in both developed and developing world. For some Ghanaians, such beliefs are important in understanding and coping with illness and may provide a framework within which seeking healthcare services are made.

The fact that nations differ from nations, beliefs from beliefs, as well as cultures from cultures largely show that within a nation the people also differ. This suggests therefore that culture would distinguish people from people. It is in this view that Bhui (2010) defined culture as a set of guidelines which individuals inherit as members of a particular society which tells them how to view the world, experience it emotionally and behave in relation to other people, supernatural forces or God and the environment. This definition is appropriately in place and therefore shows that radiographers deliver radiographic services to patients with diverse cultural, ethnical or tribal and religious backgrounds.

In Ghana, Christianity, Islamic and traditional beliefs or faith are the main different types of religion that are usually seen as the institutionalization of shared beliefs and customary practices. Given the increasing ethnic diversity of Ghanaian culture, some understanding of the complexities of culture, religion and spirituality is essential for healthcare providers. The healthcare service provision and healings or treatments of illnesses are quite different in Ghana, especially in the rural areas, than what is experienced in some parts of the urban areas. For example, in the rural areas people believe in the utilization of traditional means of health care provision or healing by using herbal medicine more than the scientific-based (orthodox) medicine. According to the World Health Organization (2001), the traditional medicine practitioners used herbs, spiritual beliefs, and local wisdom in providing health care services to people in Ghana; and about 70% of the population resident in rural areas depended exclusively on traditional medicine for their health care. Thus, traditional healing by herbalists, fetish priests, and psychics predominate and also co-existed alongside orthodox medicine. The herbalists mainly used herb remedies in providing health care

services to people; the fetish priests used spiritual means in treating sicknesses, while psychics based their health services provision on psychic powers for treatment of diseases (MOH 2001). In addition to other factors, religious and cultural backgrounds influence an individual's beliefs, behaviours and attitudes towards health and illness (Odeh 2008).

The religious faith plays significant role in the healthcare sector in Ghana, in that some religious groups established their own healthcare facilities in order to provide health services to their members and people living in the catchment area. According to Ghana's 2010 population census, 71.2% of approximately 25 million Ghanaians identified themselves with Christian religion or faith, 17.6% with Islam faith, while a proportion of the population is either affiliated to the traditional religion (5.2%) or not of any religion at all (5.3%) (GSS 2012). This shows that Ghana is largely a Christian nation with less than 30% of the population affiliated to other faiths or religion (GSS 2012). Although Ghana has the highest percentage of Christians in the country, the belief in traditional faith or religion is still extremely common.

Generally, there is an increasing recognition of significant links between religion and health, and there is therefore the need for healthcare providers (including radiographers) to understand patients' religious beliefs, perspectives, values and practices.

Despite the advancement in technology and science, some groups of these people are still influenced by their religious beliefs and perceptions of the world (Moodley et al. 2008). Thus, people basically divide the worldviews into two major separate states, the religious and scientific state (Strawbridge et al. 1997). Unfortunately, their world views of cultural beliefs and practices do interfere with their healthcare diagnoses and treatment in that some of the decisions regarding health choices allow an illness to deteriorate to life-threatening stage before they resort to seeking healthcare services, and sometimes lose their lives (Odeh 2008).

In Ghana, religiosity per se is not necessarily an indicator for better health outcomes; rather, the critical factor is how religious a person is and which may be influenced by his or her cultural beliefs. However, some people still believe that their religious inclinations give them a better health outcome. Thus, religious influences or beliefs affect the way people understand health, illness, diagnosis, recovery and loss (Brady et al. 1999); and so they

strategise as to the resources to use in coping, how to make decisions regarding expectations of, and relationship with health service providers, day-to-day health service provisions and overall health outcomes (Vaughn et al. 2009). Some religious faiths turn their church premises as healing grounds and many sick people are sent and even admitted there for spiritual healing. In some instances, some of the patients referred to the radiography department for radiological services for the first time, due to road traffic accident, feel reluctant to come back for review; and whenever they decide to visit after several months, some of them report that they have visited traditional healers, on peer recommendations, for speedy healing. This is not documented in any peer-reviewed journal though, but from personal experience as a practising radiographer (professional).

2.5 Culture and health beliefs

Literature indicated that most cultures have systems of health beliefs of what causes illness (Rankin et al. 2005), how it can be treated or cured and who should be involved in the treatment process. In addition, there are other societies who believe that illness is the result of supernatural phenomena and so they try to promote prayer or other spiritual interventions in order to counter the presumed disfavour of the powerful forces. Thus, cultural issues play a major role in the patient compliance with health care diagnoses and treatments.

Chang and Kelly (2007) argued that a healthcare provider should endeavour to develop cultural sensitivity in explaining and understanding situations and responses of individuals or patients in the healthcare environments. Cultural sensitivity, in its broadest sense, is awareness and utilisation of knowledge in relation to ethnicity, cultural and religious beliefs, gender, or sexual orientation (Chang and Kelly 2007). Moreover, while some cultural needs may be more easily met in the healthcare setting, there may be possibility of other cultural values and practices presenting challenges for health care providers. In the areas where cultural influences play a dominance role in some parts of Ghana, cultural challenges or factors could impede the successful delivery of health care services and could therefore directly influence patients' health (Asobayire & Barley 2013). For example, in the areas where religious convictions or cultural values prohibits or debar people from attending healthcare facilities in view of receiving health care services may pose serious problems when complex health needs arise. This suggested that difficult and complex

situations may arise when a patient requires health services which may be considered inappropriate because of religious convictions or cultural values (Brett & Jersild 2003).

In their study, Chang and Kelly (2007) suggested that multiple areas should be considered when assessing a patient's cultural beliefs, including their perceptions of illness and treatment, social organisation (family), communication behaviours, language, expression of pain, and past experience with health care services. Moreover, many ethnic groups bring their own cultural perspectives and values to the healthcare facility with their health beliefs and practices differing from those of the traditional health care culture. With different ethnic groups existing in Ghana, it presupposes that there are several important cultural beliefs among Ghanaians that the health practitioners (including radiographers) should be aware of. Although it may be the expectations of many healthcare professionals that patients would smoothly undergo the processes of the healthcare delivery, such expectations would not easily be realised due to cultural related issues such as language barriers (Neubeck & Glasberg 2005). This situation could cause the professionals to make harmful mistakes as a result of their inability or difficulty to analyse and synthesise information shared into existing behaviour patterns and may result in the patient not realising the quality of health care services offered them (Osborne 2005). As this happens, the patient's expectations of receiving quality service would not be met.

In addition, culture differences affect patients' attitudes about health care services and their ability to understand, manage, and cope with the course of an illness and the meaning of the diagnosis (Vaughn et al. 2009; Rankin et al. 2005). With their cultural and ethnical beliefs, patients and their relations or families bring these culture specific ideas and values relating to the type of illness, and expectations of how health care services would be delivered to them (Osborne 2005). Whenever a situation like this arises, it becomes a daunting task for radiographers and other healthcare providers to become familiar with the cultural dynamics of all the various ethno-cultural patients requiring the health services with regard to quality of health services expected (Osborne 2005).

In this regard, Campinha-Bacote (2002) suggested that healthcare providers should endeavour to directly engage in cross-cultural interactions with patients from culturally diverse backgrounds in order to refine or modify the health provider's existing beliefs about

a cultural group and this would afford the service provider an opportunity to assess the patients effectively.

2.6 Socio-economic status and accessing healthcare

The influence of socio-economic factors or status on health, health behaviours and access to care services is widely documented. The socioeconomic and cultural factors may be affecting people to behave differently (Vaughn et al. 2009).

In Ghana, a critical issue is where patients are required to make out-of-pocket payments to pay for their health care needs. Even though Asobayire & Barley (2013) reported that the Ghana's overall poverty rate had reduced significantly from 51.7% in 1991/92 to 28.5% in 2005/06 period and the proportion of the population living below the extreme poverty line dropped from 36.5 to 18.2% over the same period, the socio-economic constraints were reported as the overriding factors that impeded patients accessing health care services as well as the health care providers to deliver quality health services (De Graft Aikins 2007).

In addition, gender inequality in a number of social and economic areas were reported to have further compounded the challenges of accessing quality health care, resulting in reflection of women's health status in indicators such as maternal mortality, contraception and abortion (Asobayire & Barley 2013). Moreover, high maternal mortality had been reported of putting women in a low social and economic status, which was established to have further limited their access to quality health care services (Asobayire & Barley 2013).

The health needs and perspectives of different population groups are important considerations in the development and provision of healthcare services. In most developed countries, healthcare is largely funded by the government or an organisation (agency) associated with the government, such as the Ministry of Health, by using taxes collected from citizens (Schyve 2007). In the healthcare industry both public and private healthcare facilities provide health care services to the citizenry. While the Ministries of Health, for that matter Governments, undertake the funding of the public health facilities to ensure equity, quality, accessible and affordable healthcare to all citizens including the vulnerable and the poor in the society, individuals or companies however bear the responsibility of funding the private health care facilities.

Given that healthcare funding is designed to give health care protection to all citizens throughout the country including formal and informal sectors, rural and urban locations, low and high income earners, it becomes crucial as well as a challenge for developing countries (Ghana inclusive) as they seek to operate and manage effective healthcare financing systems that benefit all citizens (Addae-Korankye 2013).

Literature indicated that there are basically five forms of healthcare financing available to any particular country, namely; taxation, social health insurance, voluntary and private insurance, out-of-pocket or cash-and-carry, and donations (Mossialos et al. 2002). It was argued that identifying a sustainable source of financing health care in the world has become a major issue for discussion across the world's largest institutions and stakeholders such as World Bank and World Health Organisation (Addae-Korankye 2013). It was however noted that four of the forms of healthcare financing are presently used in Ghana; taxation, social health insurance, out-of-pocket and donations (Addae-Korankye 2013).

2.7 Healthcare funding in Ghana

The greatest asset of every country is her citizens because their general wellbeing and enhanced quality of life determine the overall progress and development of a national economy. It is in view of this that various human rights provision at the national and international levels have been adopted to protect and enhance the basic needs of citizenry, including the right to adequate and quality healthcare (Addae-Korankye 2013; Blanchet et al. 2012). There has been a growing concern in the area of healthcare financing in many developing countries in recent times, including Ghana.

Funding of health care in Ghana began with a tax-funded system that provided free health care services to all citizens, post-independence in 1957. This funding system by the government gradually became financially unsustainable in the 1970s due to economic decline leading to government's inability to provide funds and, therefore, compelled the government to introduce payment of 'low user fees' for hospital services to discourage unnecessary use of the services (Addae-Korankye 2013; Blanchet et al. 2012). With continuous decline in government spending on health care through the 1970s and 1980s leading to deteriorating "quality" of care (Addae-Korankye 2013; Agyepong & Adjei 2008;

Assensoh & Wahab 2008), the government re-enforced and expanded the user fees payment (Blanchet et al. 2012). Although the user fee system improved operating healthcare facilities, it was poorly regulated, inconsistently implemented and found to have worsened, contributing to inequality of access to health facilities, disadvantaged the poor (Blanchet et al. 2012; James et al. 2006; Nyongator & Kutzin 1999) and thus health provision compromised quality of care.

Conservative estimates from mathematical modelling by James et al. (2005) indicate that 153 000 child fatalities might safely be prevented in Africa if access to quality health care was free. Although the cash-and-carry policy was meant for full cost recovery to enable health facilities to expand and improve their services to citizens (Addae-Korankye 2013), in reality, the policy had not been perfect in that it excluded mainly the poor and vulnerable in society from accessing healthcare service (Blanchet et al. 2012). This eventually created vast inequalities in healthcare delivery system which, in the long run, led to under-utilisation of basic health services (Johnson & Stoskopf 2009). Thus, faced with very high treatment costs, many low-income households regularly ignored health care services and resorted to using alternative health treatments provided by unregulated healers (Oppong 2001).

The challenges of these various financing systems led to the search for alternative funding mechanisms for the healthcare delivery system in Ghana. Hence, by 2003, the Ghana national health insurance (NHI) Act 650 was passed into law (Ghana NHI Act 650 2003) to facilitate the establishment of a nationwide health insurance scheme which was termed National Health Insurance Scheme (NHIS). The scheme was perceived to serve as a mechanism for eradicating financial barriers to access health care services and to provide a broad range of quality health services to Ghanaians (Addae-Korankye 2013), irrespective of their socio-economic status, tribal, religious and cultural beliefs (Blanchet et al. 2012).

2.7.1 Financing for NHIS policy

Ghana's NHIS policy focuses on the poor, safe healthcare delivery and health protection. Patients of irrespective socio-economic status seem to have had satisfactory experience with the system and are willing to remain insured in future. Financing for the NHIS policy has been secured by three mechanisms, namely (a) consumption tax or VAT component of

2.5%; (b) mandatory payroll deduction of 2.5% from formal sector workers and employers' contributions and (c) a premium payment by the informal sector worker (Addae-Korankye 2013). These individual deductions and payments are paid into national health insurance fund where funding is drawn from as and when it is needed. However, provisions have been made under the Act 650 of 2003 for exemptions of the poor, the vulnerable including children below the age 18 and the aged (70+ years) from payment of the premium (Blanchet et al. 2012), irrespective of their tribes, gender and culture beliefs. The Scheme also covers people considered to be indigent; that is too poor without a job and lacking the basic necessities of life to be able to afford the insurance premiums.

Although evidence shows that the number of outpatient visits per capita in Ghana increased sharply after 2005 (Witter and Garshong 2009) (the same year the NHIS operations began), it has not been documented whether the quality of health delivery service has been achieved or not. Marquez (2013) (the World Bank Specialist in Accra) suggested that with the expansion of NHIS coverage, a concerted effort should be made to improve the delivery of quality health services across the country in accordance with evidence-based norms and guidelines that promote integrated quality health services. In addition, NHIS should be run in a way that will attract private investment to ensure sustainable funding options despite the Scheme being run as a pure social one (Marquez 2013). Under the law, the National Health Insurance Authority (NHIA) has been established in 2004 to oversee the regulation and payment of service claims to the service providers (NHIA 2004).

However, financing of the NHIS in recent years has been facing serious financial challenges such that in some instances service providers decided to decline service provision to the NHIS card holders. This situation did not only create disappointment and embarrassment to health care service providers and users but went a long way to compromise quality of health care service delivery to the citizenry.

2.8 Summary

The chapter discussed the cultural backgrounds, values and beliefs of Ghanaians and the patients who seek health care services, including X-ray services. The chapter identified Ghanaian culture to be diverse in many forms including language, ethnic group, religious affiliation, age and gender, traditional beliefs, socio-economic status and geographical locations of the people.

Language has been identified as an issue with Ghana having over 100 linguistics and ethnic groups. Thus, apart from the English Language, other indigenous languages, which may be peculiar among a particular ethnic grouping, are spoken by the citizens with the major ones as Akans, Ewe, Ga, Dagbane and Gonja. This suggested that language could be considered as an identifiable cultural pattern of mutual symbols that might convey values shared by the group members.

The chapter also discusses the ten geographical regions where the society and cultural groups are located in Ghana, with their health beliefs, practices and values. Religious beliefs and healthcare practices of Ghanaians have been discussed, where Ghana has been identified as predominately Christian country with a small fraction of the population practising traditional religions. The links between religious beliefs and healthcare suggest that most cultures have systems of health beliefs with regard to the causes of illnesses and treatment procedures to undertake or use have been discussed. It has been shown that cultural differences may compel both the patients or service users and providers to bring their own cultural perspectives and values to healthcare system with many health beliefs and practices.

The chapter finally discusses the growing concern about healthcare financing, and funding of health in Ghana after independence in 1957 was by the government which provided 'free healthcare services to all citizens'. Later, 'low user fees' was introduced which was then upgraded to 'out-of-pocket payment' or 'cash-and-carry' policy. The latter was unfriendly to the poor and vulnerable in the society to have access to quality healthcare. In view of these healthcare problems, National Health Insurance Act 650 of 2003 was legalized. This was followed by National Health Insurance Authority (NHIA) in 2004 to have oversight

responsibilities over NHIS which was introduced later in 2004 to facilitate provision of quality healthcare to every resident in Ghana.

CHAPTER THREE

Quality of service

3.1 Introduction

The literature review consists of searches of books, quality of service articles from peer-reviewed journals, Google.com and Google Scholar databases, Science Direct Database, grey literature from MOH (Ghana) library and database, and a wealth of quality of healthcare service provision policy documents from regulatory and professional bodies from the UK and other countries as indicated in Appendix XVIII.

In this chapter, related literature on quality of service and healthcare quality services are discussed. The discussion encompassed literature on quality from both inside and outside the medico-socio-culture context of Ghana. Also, the definitions and concepts of service quality, service quality in healthcare delivery and dimensions of service quality with regard to healthcare are discussed. The narrative review also covers health services delivery in Ghana, diagnostic imaging service provision and measurement of healthcare service quality.

Quality is such an important issue that may be considered a significant concept in the life of human beings. The premise of 'quality of service' has a competitive edge in gaining significant attention in market leadership by professionals, manufacturers and/or commercial companies alike. The concepts of 'quality service' and service satisfaction have been highly considered and extensively used in marketing contexts and activities. Particularly, service firms recognise not only the need to attract clients but also to forge and maintain good and long-term relationship with them so as to create a competitive edge in the marketplace (Auka et al. 2013; Zineldin 2006).

The dynamic nature of the financial system has created the need for the service providers to focus more on the consumer rather than the service or product in order to satisfy the former and to remain competitive in the marketplace (Zeithaml 2000). For instance, in the banking sector, new forms of banking channels have emerged such as Internet banking, Automated Teller Machines (ATM), phone banking and so on are forcing bankers to explore the importance of customer loyalty and attempting to maintain lasting relationships with the

clients (Auka et al. 2013). Most service organisations today realise that delivering efficient service is vital to the success of their businesses and also an added significant way of creating and maintaining customer loyalty in the service industry. Despite the quality revolution that has preoccupied the thinking of service organisations, the more accessible financial variables considered are cost and cost savings due to quality (Zeithaml 2000); thus investments in service quality do not tract directly to profit initially. Quality of service however plays a critical role in determining the success of an organisation and has been linked to positive attitudes towards the service by clients who are willing to pay premium prices (Zeithaml 2000). The situation forces service organisations to develop a better understanding of what service quality means to the clients and how it can best be achieved and measured (Parasuraman et al. 1994).

3.2 Quality of service in healthcare

Quality stands at the centre of interest in all spheres of society, including healthcare. Thus, as a measure to improve their competitive positions and to address the health needs of the patients, healthcare facilities (medical imaging departments) today have increasingly been focusing their attention on overall organisational performance in order to achieve quality of service to their patients (Al-Albri & Al-Barushi 2014; Murti et al. 2013). As the service sector is rapidly growing in the world economy, the health service organisations are also playing pivotal roles in developing and improving the quality of health services (Dagger et al. 2007). Due to the complex nature of the healthcare systems or environment, the healthcare regulators (decision-makers) and the public tend to rely on health services research as a primary source of information on how well the health system is meeting the challenge (Steinwachs & Hughes 2008). Healthcare regulators have therefore shifted towards a market-driven approach of turning patient satisfaction surveys into a quality improvement tool for overall organisational performance (Al-Albri & Al-Barushi 2014).

The importance of healthcare sectors has increased in recent years due to medical and technological progress which focuses broad attention on delivering efficient and quality healthcare services (Batalden & Davidoff 2007). Further, the advancement in technology has compelled patients and other health service users to have high expectations and needs for quality health services. Thus, driven by the technologic advances, patients and other users of healthcare are demanding improved, efficient and more reliable services than in the

past (Luke 2007). Research has shown that delivering quality service has significant relationship to clients' satisfaction (Kara et al. 2005; Johns et al. 2004). Unlike products, where quality can easily be assessed, service quality is an elusive and abstract concept that is difficult to define and measure (Lee et al. 2000).

3.3 General definitions of service quality

Defining, measuring, and delivering quality service are some of the important challenges facing healthcare organisations (Sussmane 2014). The concept of 'quality' has been utilised throughout history and continues to be of intense interest to today's contemporaries; however, it has appeared quite challenging and/or difficult to define (Reeves & Bednar 1994). Even though there are several definitions of quality of healthcare service in the literature, with each definition taking different dimensions depending on individuals' perspectives, perceptions and expectations or experiences, it is still a complex and indistinct concept (Gröonroos 2000). It is important therefore to understand these differences in definitions which are mostly dependent on personal (individual), professional, organisational and policy-makers' point of judgement with regard to the value or satisfaction with a specific system (Atinga et al. 2011).

Quality, as they say, 'lies in the eyes of the beholder' (Lexa 2006). Thus, an individual's judgement about a service or product is dependent on what he expects of it or from it. This suggests that quality is based on the user's actual experience with the service, measured against their expectations, whether technically operational or entirely subjective (Sajid & Baig 2007; Zineldin 2006; Stauss 2002). Quality of service therefore may mean doing the right thing at the right time with the health care provision and the providers, improving the standard of service delivery till excellence is attained.

According to Hoe (2007), service quality could be defined as service that meets or exceeds the needs and expectations of a client, thereby making the client happy. However, due to the subjective nature and intangible characteristics of quality, coupled with the complex nature of the healthcare sector, it is more difficult and/or challenging to define and measure quality of health services than in other sectors (Mosadeghrad 2012; Reeves & Bednar 1994). Despite the challenges, however, quality of service has been defined in many ways by different researchers (Table 3.1 below).

Mohammad & Alhamadani (2011) defined quality as accuracy and perfection. However, the pressing needs of developing service organisations and attempts to improve the services lead to universal definition for service quality in the literature which is broadly defined as meeting a client's (patient's) expectation by providing perfect service (Bakar et al. 2008). In other words, service quality is "the ability of a service delivery organisation to meet or surpass customer needs and expectations" (Bakar et al. 2008). Even though providing perfect health care service to patients could be possible, it could be a challenging aspiration, especially in the environments where some elements of patient dissatisfaction, such as the needs of different demographic and ethnic (tribal) groups, language barriers, ageing population, involvement of partner agencies, and government interventions could be beyond the facilities' control (Vukmir 2006).

Service quality has become an important research area in view of its significant relationship to client (patient) satisfaction, retention and service guarantee (Yesilada & Direktor 2010; Kara et al. 2005; Kandampully & Butler 2001) which has been recognised as a driver of organisational and financial performance (Buttle 1996). Edura & Kamaruzaman (2009) noted that service quality has increasingly been identified as the main factor in distinguishing between services and building competitive advantage among service delivery organisations. However, healthcare services occupy a unique position among other services due to the nature of the highly-involved risks which make the conceptualising and measuring of patient satisfaction and service quality in a healthcare setting more important and more complex (Taner & Antony 2006). However, some researchers interpret the concept to be client (patient) satisfaction with regard to the provision of goods and services that the users need (Yesilada & Direktor 2010; Evans & Lindsay 1999). Quality could also be defined as an ability to achieve planned operational goals where specific objectives are set for a certain specified timeframe with proven scientific methods in place to measure the outcomes (Rubin 2011).

Regarding medical imaging service delivery within the healthcare sector, quality service may be defined as 'the extent to which the right procedure is done in the right way within the set timeframe, accurately and quickly communicated to patients and referring clinicians in a timely manner' (Rubin 2011; Hoe 2007; Hillman et al. 2004). Thus, the quality in the

medical imaging service involves both technical (performance of accurate and right procedure) and functional (communication and interpersonal interactions) aspects of the service providers. On the other hand, Øvretveit (1992: p 2) defined the quality as ‘features of service where accessibility, relevance to need, equity, social acceptability, efficiency and effectiveness are achieved’. Therefore, quality service means understanding of the user’s needs and identifying or devising ways to meet or exceed them.

Donabedian (1990) also reported that health service providers’ concern is to achieve the desired outcomes of care for improving patients’ physiological functioning. Choi et al. (2005) defined service quality in terms of what to provide rather than how to provide it, assuming that patients would be satisfied if they received a scientifically appropriate treatment. There has been a suggestion that two approaches towards conceptualising health care quality exist: one is the traditional medical approach which emphasises the outcome of medical services from care provider -what is provided (Choi et al. 2005); and the other is the process of medical care which stresses the process of medical service delivery from the patient’s perspective -how the service is provided. However, Choi et al. (2005) suggested that the quality dimensions relating to how the service is delivered to the patients, regardless of their age, gender or types of service they received, should be of great concern to all healthcare service providers.

Table 3.1 Definitions of service quality

N	Authors	Year	Definition
1	Øvretveit	1992	The features of service where accessibility, relevance to need, equity, social acceptability, efficiency and effectiveness are achieved.
2	Buttle	1996	A driver of an organization and its financial performance.
3	Evans & Lindsay	1999	The total characteristics of service related to its ability to satisfy given needs of customer (patient).
4	Hillman et al.	2004	The extent to which the right procedure is done in the right way within the set timeframe, accurately and quickly communicated to patients and referring clinicians in a timely manner.

5	Lee	2006	The ability to meet or exceed customer expectations.
6	Zineldin	2006	The art of doing the right thing, at the right time, in the right way, for the right person- and achieving the best possible results.
7	Hoe	2007	The service that meets or exceeds the needs and expectations of a patient, and makes him satisfied and happy.
8	Bakar et al.	2008	The ability of a service delivery organisation to meet or surpass client expectations by providing perfect service
9	Edura & Kamaruzaman	2009	The main factor in distinguishing between services and building competitive advantage among service delivery organizations.
10	Mohammad & Alhamadani	2011	Accuracy and perfection
11	Rubin	2011	A process or ability to achieve planned operational goals where specific objectives are set for a certain specified timeframe with proven scientific methods put in place to measure outcomes.

3.4 Healthcare service quality frameworks

As indicated earlier, the challenging nature of certain healthcare practices, the existence of many participants with different interests in the provision of service and the ethical considerations add to the difficulty (Mosadeghrad 2012; Eiriz & Figueiredo 2005; Naveh & Stern 2005). The framework of quality service in health continues to develop as various providers, users and other interest groups such as governmental and insurance groups maintain focus on how to ‘improve’ the quality of health service delivery. Service quality has been considered as a critical determinant of competitiveness (Ghobadian et al. 1994) and thus focusing attention on quality of service could help an organisation to gain a lasting competitive advantage over other organisations (Auka et al. 2013; Zineldin 2006). It is regarded as an important concept essential to patient well-being and financial survival of the sector (Seawright & Young 1996). Grönroos (2000) and Lim & Tang (2000) argued that the quality of healthcare services, unlike the quality of manufactured goods, is very elusive in that (even though there are several definitions of the healthcare service quality in the literature) it is still a complex and indistinct concept and has many meanings and

interpretations. Fuentes (1999) noted that healthcare service quality is a multi-dimensional framework which reflects a judgement as to whether services delivered to patients are the most appropriate to produce the best result and whether the relationship between doctor and patient is proper. This suggests that healthcare services differ in specific ways to other service sectors. The importance of quality service delivery has compelled some healthcare institutions to implement quality programmes as a management approach to ensure health service providers maintain quality healthcare services to patients.

3.5 Quality of service in healthcare delivery

The health care system is one of the largest and fastest growing industries in the service organisations (Andaleeb 2001). Quality in healthcare has been recognised as a human necessity and therefore high quality of healthcare service provides satisfaction for patients and the public in general, healthcare providers and also better performance for the service providing organisation (Mosadeghrad 2012; Hudelson et al. 2008; Hassan 2005; Hasin et al. 2001). Quality in health care is currently at the forefront of professional, political and managerial attention, for it is primarily seen as a means for achieving increased patronage and, ultimately, as an approach to achieving better health outcomes for service users (Dagger & Sweeney 2006; Marshall et al. 1996). Bakar et al. (2008) noted in their study that, for quality of health services to patients to be realised, factors such as attitudes of service providers towards the patients, cleanliness of the healthcare facility and the quality of the hospital food should be recognised as influencing the service quality of health facilities.

In view of this, healthcare facilities have, over the years, been expected to provide patient-centred care to meet patient health needs (Mycek 1996). It has therefore become crucial for the health service providers to deliver and sustain the delivery of quality services in order to get established in the global healthcare scenario (Murti et al. 2013; Mohammad & Alhamadani 2011). It is in line with this background that service quality has become an important corporate strategy for healthcare facilities. Consequently, service providing institutions have garnered the attention of service managers, academicians and researchers to direct their efforts to comprehending the dynamics involved in client satisfaction and behavioural intentions (Murti et al. 2013).

3.5.1 Dimensions of service quality in healthcare

Quality healthcare is a multi-dimensional framework in that various variables or attributes have been identified and reported on by various researchers, depending on the focus of the study (Sower et al. 2001); and this suggests that the number of dimensional structures varied across the studies. Some empirical studies delve into what the relevant dimensions and values are at any given time in a given setting (Choi et al. 2005; Clemes et al. 2001; Sower et al. 2001; Campbell et al. 2000). Being multi-dimensional, it is imperative to understand the components (attributes) in order to improve the quality of health service delivery.

Most researchers have different opinions on the dimensionality of quality of health services (Choi et al. 2005; Sower et al. 2001) and therefore classify the components of dimensions differently based on their own opinion and experience in specific settings. However, whichever of the multitude of possible dimensions and criteria were selected to define quality would have a significant influence on the approaches and methods employed in the assessment of healthcare service provision (Schembri & Sandberg 2011). There is undoubtedly some overlap or commonality in the attributes identified. For instance, some researchers have classified service quality into two dimensions: technical and functional quality (Fiala 2012; Asubonteng et al. 1996). A study by Bowers & Kiefe (2002) evaluating quality issues in health care identified two main components of quality: technical quality and quality of delivery of health care services.

Technical quality in the healthcare context has been referred to on the basis of technical accuracy and procedures (that is, what was offered and received) (Rubin 2011; Edura & Kamaruzaman 2009; Hoe 2007). This suggests that the technical quality may be defined on the basis of technical accuracy of medical diagnoses and compliance of professional practices (procedures) (Mosadeghrad 2012; Lam 1997). However, functional quality referred to the manner in which services were delivered to the patients (that is, how the service is provided and received) (Mosadeghrad 2012; Newcomer 1997). This suggests that patients mostly tend to rely on functional attributes such as facilities, cleanliness, quality of hospital food, and attitudes of professionals towards service users (Mosadeghrad 2012; Edura & Kamaruzaman 2009; Bakar et al. 2008; Wong 2002). This means that functional attributes have a dominant effect on patients' perceptions of service quality and so it is

logical that the quality of health services be evaluated on the basis of the patients who are the final recipients of the service provision (Alrashdi 2012).

Edura & Kamaruzaman (2009) argued that, although technical quality has high priority with patients, most patients may not have the professional capability to evaluate the quality of the diagnostic intervention processes effectively. This suggests that, when patients receive health care services, especially diagnostic imaging services or medical treatments, the functional quality produced may influence the patient's perceptions of service quality. This situation may however arise when patients (users) attempt to judge the service quality offered them, by using their perceptions of how well the service meets or exceeds their expectations and needs (Edura & Kamaruzaman 2009; Douglas & Connor 2003).

Clemes et al. (2001), however, indicated that patients perceived the service quality dimensions relating to the core attribute in healthcare delivery (for instance, empathy, outcome and reliability) as more important than the service quality dimensions relating to the peripheral variables in the health service delivery (for example, food, access and tangibles). The findings suggest that patients with different geographic, demographic and behaviouristic traits have different health care needs and wants and therefore perceive different service quality dimensions as important (Clemes et al. 2001).

Campbell et al. (2000) identified six attributes, including timely, accessible, appropriate, safe, continuous and effective health services as essential constructs which determine quality healthcare. Conversely, Øvretveit (1992) based a development of a system for improving quality in healthcare on three dimensions of quality; namely professional, client and management quality. While the professional dimension focused on care providers' views of whether the user needs were met with correct techniques and procedures, client quality focused on whether service users feel they receive what they want from the services provided (Mosadeghrad 2012). Management quality, on the contrary, focused on the services delivered in a resource-efficient way (Øvretveit 1992).

Bakar et al. (2008) classified service quality dimensions under three constituents; namely interpersonal attributes, accessing health services, and amenities. The interpersonal traits encompassed courtesy (respect) for the clients, emotional support and cultural

appropriateness; accessing health services involved waiting times, duration for service delivery and appointment delays, while amenities included physical environment, waiting area and furnishings (Bakar et al. 2008). The quality dimensions by Bakar et al. (2008) confirmed the functional aspects outlined by Edura and Kamaruzaman (2009) and Mosadeghrad (2012) who argued that patients mostly rely on facilities, cleanliness, and healthcare professionals' attitudes toward patients in the facility.

In their study to determine patients' satisfaction with quality of healthcare delivery in two hospitals in Northern Ghana, Atinga et al. (2011) identified three variables; support (care), environment of the facility and waiting time. Schneider (2006) also identified quality dimensions to be effective, efficient, accessible, timely, acceptable, evidence-based, equitable, safe and client-centred. Having been able to identify the quality dimensions in the literature on healthcare settings in general, it would be prudent to investigate whether these constructs exist in the imaging facilities in Ghana. The current study therefore intended to investigate easy accessibility of facility, cleanliness of and comfort in the waiting area, empathy, and radiographers' interpersonal relations and attitudes towards service patients. The summary of the quality dimensions is presented in Table 3.2 below.

Table 3.2 Dimensions of service quality in healthcare

N	Authors	Year	Dimensions
1	Øvretveit	1992	Professional, client and management
2	Parasuraman et al.	1994	Tangibles, reliability, responsiveness, assurance and empathy
3	Asubonteng et al.	1996	Technical and functional
4	Campbell et al.	2000	Timely, accessibility, appropriateness, safety, continuous, effectiveness
5	Clemes et al.	2001	Food, access, outcome, admission, discharge, reliability, tangibles, assurance, empathy and responsiveness
6	Scheider	2006	Effective, efficient, accessible, timely, acceptable, evidence-based, equitable, safe, client-centred
7	Bakar et al.	2008	Interpersonal attributes, access with locations, and amenities

8	Edura & Kamaruzaman,	2009	Facilities, cleanliness, quality of hospital food, healthcare professionals' attitudes toward patients
9	Atinga et al.	2011	Support/care, environment of the facility, courtesy, waiting time, communication
10	Mosadeghrad	2012	Cleanliness, facilities, quality of hospital food and healthcare professionals' attitudes toward patients.

3.6 Healthcare service delivery in Ghana

Healthcare users in developing countries, including Ghana, are increasingly becoming aware of the right to quality health care service (Masterneh & Mouseli 2013; Almoajel 2012). The goal of health systems and governments all over the world is to ensure universal access to quality care and optimal patient safety (Boateng & Awunyor-Vitor 2013). Consequently, many health sector stakeholders, governmental health agencies and healthcare users have now been advocating for quality service delivery (Smith et al. 2006; Lapsley 2000) as a mechanism to meet the demands for quality service and value for money by users (Abuosi & Atinga 2013). In line with this, Ghana has pursued extensive health care system reforms since early 1960s with the intended goals of improving access, efficiency and reducing health inequalities (Frimpong 2013; MOH 2007).

In Ghana, MOH has been tasked to ensure good health to all citizens and to reduce the impact of ill-health on socio-economic development (MOH 2007); and as such the MOH has determined to ensure access to health care delivery is improved and this therefore remains a central goal of the health sector reform so as to attain 'health for all' by the year 2020 (MOH 2012b). The MOH has attempted to achieve these goals through significant state control and interventions through public national health system (Frimpong 2013). Quality health service provision is a crucial indicator in measuring the developmental challenges of every country; hence, quality of care delivery affects all sectors of the economy because a healthy working population is a backbone of every economy in offering skilled and unskilled workers for increased productivity and growth of the national economy and/or income (MOH 2007).

In Ghana, the MOH is the policy-making body and has oversight responsibility for organising the health sector-wide policy formulation, monitoring and evaluation of progress to achieve the set targets, Ghana Health Service has been responsible for implementing the policies of the MOH as well as management of quality health service delivery (MOH 2012b; GHS 2009/2007; MOH 2006). The MOH is also responsible for mobilisation of resources for health sector development (GHS 2007). Even though the Ghana government organises the health sector, private health sector is also involved in a crucial role in the market for health-related goods and services. However, little has been empirically documented concerning the size and configuration of private health care providers and their contribution to health sector outcomes (MOH 2012a). For example, the World Health Organisation reported that self-financed private health care providers accounted for about 40% of total patient care (WHO 2006).

Despite a dearth of evidence on the quality and efficiency of private provision of health care as compared with public provision of health services in Ghana (WHO 2006), it appears that an effectively regulated private health sector would present just as much quality as the public health sector. The introduction of the National Health Insurance Scheme (NHIS) in 2003 by the Ghana Government to remove financial barriers to accessibility of health care covered all public health institutions and mission healthcare facilities without their private counterparts (Atinga et al. 2011). Patients therefore pay in cash for all healthcare services rendered them in most of the private healthcare facilities.

A major challenge in Ghana is the lack of funding in order to finance the high initial cost of capital equipment. Nevertheless, support from foreign manufacturers and donors has made this a reality and the medical devices industry is growing at a rapid rate (MOH 2012). The key drivers of growth include government investment into public hospital revitalisation and the National Health Insurance Scheme, which have made healthcare goods and services more affordable to Ghanaians.

The healthcare delivery in Ghana has come under scrutiny owing to perceived all-round inadequacy thereby rendering the health service delivery below expectation. In Ghana, Peprah (2014) and Atinga et al. (2011) argued that there was not much direct pressure to improve health service quality in the past but now public health services are faced with

increased competition from the private sector. A study by Agyepong et al. (2004) revealed that the provision of the health service is currently highly competitive between public and private health providers, and this thus places the service quality on the agenda of the national policies on healthcare. Although high quality and affordable health service delivery is an increasingly difficult challenge to health service providers, the MOH is determined to ensure provision of quality, efficient, and equitable healthcare to all residents through the health policy (MOH 2006). Also, the Health Ministry has a policy of providing free healthcare services for certain vulnerable groups such as children under five, elderly people aged above 70, and pregnant women (MOH 2008).

During the 1970s and 1980s, the government financed healthcare systems until the spending on healthcare severely declined, leading to deteriorating quality of care (Agyepong & Adjei 2008; Assensoh & Wahab 2008). The situation was due to severe economic setback Ghana had experienced which led to a fall in government's expenditure on health care system. The situation caused an introduction of a user fee termed 'cash and carry' which was expanded throughout the healthcare sector (Blanchet et al. 2012). The fee level was not a flat rate, rather it varied according to the health services provided. However, the cash and carry policy disadvantaged the poor and vulnerable in the society against access to equitable and quality healthcare.

In view of this, the Government of Ghana was compelled to introduce the NHIS (Akazili et al. 2012) under Act 650 (NHIS Act 2003) to provide a broad range of quality of health care services to all citizens, irrespective of their status. The NHIS was to help ensure quality of health care delivery and to increase affordability and utilization of health services in general among the poor and most vulnerable citizens (Blanchet et al. 2012). Even though the user fee policy was intended to improve healthcare facilities and quality of service provision, it was rather inconsistently implemented, poorly regulated, and found to have worsened access for the poor and vulnerable in society who could not experience the quality of healthcare service (Blanchet et al. 2012; Nyonator & Kutzin 1999).

Ghana is among the sub-Saharan African countries that are making considerable progress towards universal access to quality health care outcome indicators (Alhassan et al. 2013; Ghana National Health Insurance Act 2012) in that the percentage of antenatal and

postnatal coverage improved from 42.2% and 33.3% in 2008 to 91.3% and 64.7% in 2011, respectively (Ghana Health Service 2011). However, a recent report on the Millennium Development Goals (MDGs) indicated that it would be challenging to attain the 2015 MDGs due to a number of factors, including understaffing in some health facilities, inequitable distribution of health professionals for healthcare sector, de-motivated staff and inadequate healthcare infrastructure (Alhassan et al. 2013; United Nations Development Programme 2010). Meanwhile, there is a suggestion that these health-related MDGs may be attained if more comprehensive quality improvement measures, such as a health sector human resource approach, are put in place (Agyepong et al. 2004). Even though Franco et al. (2002) suggested that health worker motivation is a major contributing factor that facilitates healthcare quality improvement, the factors that motivate healthcare workers fluctuate over time, even in a stable working environment. Despite reforms are directed towards improving healthcare practising environments and workers' incentives, they have not always had the anticipated impact on the effectiveness of health service delivery (Franco et al. 2002).

Again, the GHS continues to grapple with inadequate and erratic flow of funds for service provision resulting in delayed reimbursement of NHIS (GHS 2009); however, the GHS has made tremendous strides in improving the health status of Ghanaians, especially, implementation of policies on free maternal care and NHIS resulting in an increase in access and utilization of health services (GHS 2009). A study by Atinga et al. (2011), on "Managing healthcare quality in Ghana: a necessity of patient satisfaction", reported a 28.4% increase of service utilization in public hospitals between 2006 and 2007 alone. In spite of this achievement by GHS, the long delays in reimbursement of the health facilities for services provided to the insured patients by the various district schemes have seriously affected the ability of health care facilities in delivering quality services. Although, there are potential benefits associated with access to health insurance, enrolment into the NHIS after a decade of implementation has not been encouraging as expected (Kusi et al. 2015). Thus, after this period of implementation, NHIS enrolled 34% of the national population of about 24.6 million (Kusi et al. 2015). Meanwhile, the Minister of Health has called on corporate bodies such as banks, for assistance in building up municipal and district health systems to help augment the health care facilities in the country and to ensure access and equity (Ghana News Agency 2013).

3.7 Measurement of healthcare service quality

The provision of health care is generally complex, both to the healthcare managers and providers, due to diversity of the system and the changing health needs of different users of the health services. In view of the diverse and complex nature of existing healthcare structure, delivering and measuring quality of healthcare service may be a challenging process. Though quality is the cornerstone of all successful organisations, delivering and measuring quality are some of the important challenges healthcare institutions have been facing because of the technical and functional forms of quality (Sussmane 2014). Whereas technical quality (healthcare procedure itself) may be more important to the providers of the radiographic services, functional quality (experiences of how services were delivered) could perhaps be superior and relevant from the patients' subjective perspectives and experiences with the health care system (Chang et al. 2006).

To be able to measure health service quality would put healthcare providers in a stronger position to make informed decisions about how to allocate resources in a way that maximises quality of service delivery (Peprah & Atarah 2014; Wong 2002). Mensah et al. (2014) noted that measuring healthcare service quality would help the service providers to identify specific and often unmet needs of patients. On the contrary, health professionals and policy makers continually seek to maintain the status quo with the belief that it has always been done this or that way, to the detriment of the patients. It is therefore imperative for health institutions to accentuate their commitment to providing high service quality through service quality evaluation. In view of this, quality of health care service is largely evaluated relative to the patients' expectations and/or perspectives (Schembri & Sandberg 2011).

A study by Peprah and Atarah (2014), on "assessing patients' satisfaction using SERVQUAL model", concluded that it is important for the healthcare service provider to understand patient's health needs, expectations and opinions to be able to assess their satisfaction with the quality of service they receive. Meanwhile, the extent to which patients and other healthcare users are satisfied with the health service deliveries is a key determinant underpinning the health behaviour of the users and utilisation of healthcare services (Peprah 2014; Smith et al. 2006). This suggests that there would never be any single comprehensive criterion by which to measure the quality of health care service in

different settings. Many dimensions to quality exist in X-ray service provision that need to be measured, including examination appropriateness, communication, performance improvement, safety and efficiency (Rubin 2011; Man et al. 2002).

3.7.1 Impacts of healthcare service user involvement

Studies by Boivin et al. (2014) and Abelson et al. (2003) indicated that effective patient involvement in the service delivery could foster mutual influence and so ensure an agreement between patients and healthcare providers, which could result in collective decisions about health care services and policies that are more acceptable to those concerned. In the UK, Turnbull & Weeley (2013) reported that patient groups have embraced a shift in healthcare service delivery from medically oriented approach to a patient-centred and patient-driven approach. However, the study was silent on the funding and the extent the service delivery based on the patient-driven or whatever approach will discern. Meanwhile, studies by Mockford et al. (2012) and Abelson et al. (2003) identified the lack of robust evidence of impact and cost of public involvement in the service planning and delivery; although user involvement seeks to share commitments to democratic ideals leading to shared decision making towards quality of health care delivery. Indeed, if policy allows for user involvement, it would be difficult to discern the extent of the involvement in the health service planning and delivery. Crawford et al. (2002) argued that engaging patients in the delivery processes does not seem an easy task because no consensus has been established on which methods are most effective under different circumstances. However, Ridley & Jones (2001) suggested that if healthcare institutions would embrace patient-centred concept, it would help tailor the provision of more appropriate and relevant services in view of meeting the patient's health needs and expectations but not to involve them in the decision making or planning.

Kujala (2003) argued that, public involvement in the healthcare delivery processes is important because it could lead to service provider understanding the user expectations and requirements and, for that matter, enable the necessary improvement in the service provision processes. Notwithstanding the benefits of involving the public in the service delivery, several perceived challenges have been identified that stand in the way of developing effective and holistic involvement (Boivin et al. 2014). Some of the challenges that could impede effective patients' involvement in the service provision are lack of

understanding of scientific literature or resource implications which could lead to unrealistic decisions, and bias recruitment of some views of vulnerable patients or those from disadvantaged socio-economic groups (Boivin et al. 2014). It was however suggested that adoption of patient-centred concept would rather help in improving care services to meet the patients' health needs (Mockford et al. 2012).

3.7.2 Framework of patient-centred care in radiography

Patient-centred care framework has been regarded as a guide for informing and involving patients, responding quickly and effectively to their health needs and expectations, and ensuring that they are treated in dignified and supportive manner (Dunn 2003). Mensah et al. (2014) noted that patients search for health care that they can feel comfortable, courteous, and empathetic with as well as the quality of the services that the healthcare practitioner provides. According to Reynolds (2009), patient-centred care focuses on the patient and an individual's particular health care needs that call for opportunities for enhancing the care environment, communication and caring interactions. Although patient-centred care has been considered as an integral part of quality of personal, professional, and organisational relationships in some healthcare facilities (Epstein & Street 2011), it appears the framework is not in existence in the radiography facility. Even though radiographers play critical specialised technical and caring roles in the diagnosis and managing of diseases and injuries (Reeves & Decker 2012), they tend to offer much shorter episodes of care and therefore less close involvement with patients as compared to other allied health professions (physiotherapy, occupational therapy and therapy radiographers) (Reeves cited in Reeves & Decker 2012). It was suggested that radiographers are more image-focused rather than patient-centred care as the profession is more distanced from the patients (Reeves and Decker 2012). Indeed, this suggests that patient-centred care concept is lacking in the radiography practice.

The Institute of Medicine (2001), an American non-governmental organization, defined 'patient-centred care' as a framework that ensures a partnership among practitioners, patients, and their relations to ensure that decisions respect the patients' wants, needs, and preferences and provide the support that patients need to make decisions as they participate in the care process. This, therefore, requires that health service providers should develop empathy, good interpersonal relationships and communication skills necessary to address

patients' needs effectively (William et al. 2014; Reynolds 2009). Empathy, on the other hand, plays a paramount role in the health care environment by optimising communication and rapport with patients in order to gain a better understanding of their health needs (Williams et al. 2014). However, Onwuzu et al. (2014) observed that for the concept of patient-centred care to be achieved, certain practices such as long waiting times, lack of information, uncommunicative attitudes of professionals, and failure to seek patients' views and their preferences should be kept to the barest minimum within the health service delivery system.

Again, diagnostic radiography is mostly performed before the diagnosis is established for the patients and this shows the relevant role diagnostic radiography plays in health delivery system. This situation is in a sharp contrast to other allied health professions (physiotherapy, speech and language therapy, occupational therapy and therapy radiographers) where the service is offered to the patients after the diagnosis has been established (Reeves & Decker 2012). In those professions, the professionals are in close involvement with the patients and in this situation patient-centred care may be described as in operation.

Apart from the less closeness opportunity that the diagnostic radiographers offer to patients, they never actually hear of what happens to the patients again unless they come back for follow-up investigations. Thus, the radiographers' time of encountering patients and other imaging service users is not only limited, but the fact that most of the radiographers' concerns are mainly image-focused rather than patient-centred (Reeves & Decker 2012).

However, Reynolds (2009) argued that patient-centred care required that the imaging service provider becomes a patient or user advocate and strives to provide service that is not only effective, but also safe as in the ALARA principle (Uffmann & Schaefer-Prokop 2009; Mihić et al. 2008). Although radiographers integrate technical skills with effective patient interaction (Beyer & Diedericks 2010), they lack patient-centred care in that they are more concern with the technical aspects and producing of radiographs (Reeves & Decker 2012).

It has been argued that the field of radiography is complex and presents a multitude of ethical issues thereby suggesting that radiographers have ethical duties to perform, which include treating patients with respect and dignity, maintaining patient privacy and confidentiality at all times (SCoR 2013; Etheredge 2011; Beyer & Diedericks 2010). Reynolds (2009) argued that most patients are unable to evaluate a practitioner's level of technical skill or training other than the dimensions or qualities that they could assess, such as communication skills, empathy, interpersonal relationship, courtesy, cleanliness, etc. It is therefore imperative that the standards of these qualities that patients could easily recognise and evaluate are improved thereby satisfying the patients (Pai & Chary 2012; Reynolds 2009). Singh et al. (1999) also suggested the need to seek information and opinions from the patients concerning efficiency, usage, and ways of improving the service delivery at the facilities.

3.7.3 Quality assurance and quality control in diagnostic radiography

Medical radiography is a very important diagnostic tool employed to obtain vital diagnostic information about a patient's health status, and it continues to play an excellent role in the diagnosis or absence of patient pathology (Begum et al. 2011). Therefore, an efficient application of ionizing radiation in the diagnostic imaging facility is an important step to prevent unnecessary exposure of patients and imaging professionals to ionizing radiation with its adverse radiation dose effect (Ebisawa et al. 2009). It was due to the adverse effect of the radiation that the World Health Organization (WHO) and the International Atomic Energy Agency (IAEA) were considered to play a catalytic role in the design and implementation of QA and QC programmes in the early 1980s (WHO 1982).

3.7.3.1 Quality control process in diagnostic radiography

Quality control in diagnostic radiography is the process of continuous monitoring of the X-ray equipment and ancillary accessories to ensure continued and reliable performance in service delivery (Boone 2002). In other words, QC procedures on X-ray machines and ancillary accessories are routine measurements of the physical parameters of various components of the X-ray equipment, such as light beam alignment checks, timer accuracy, tube leakage tests, etc. In diagnostic radiography, QC measures (processes) are established to ensure reliable performance and reproducible quality outcomes from the X-ray machines and accessories; and this is done to monitor the system to function properly or efficiently

without deficiency (Samei & Ravin 2008). According to Hoe (2007), QC consists of a series of standardized tests which are performed to detect any changes in the X-ray equipment functioning from its original level of performance and these tests are carried out routinely to allow prompt corrective actions to maintain the radiographic image quality (Ebisawa et al. 2009).

QC can be regarded as an ongoing, periodic evaluation of procedures tailored towards detecting changes that may cause clinically significant degradation in the image quality and/or a significant increase in radiation exposure to patients (Boone 2002). Ebisawa et al. (2009) and Kirberger (1999) contended that good quality radiographs are essential for making accurate diagnoses and many factors, such as X-ray exposure parameter settings, the choice of ancillary X-ray equipment (cassette properties, film/screen combinations, and properties of grids) and darkroom environment and processing influence the quality of radiographs. This suggests that the QC on radiographic equipment would contribute to the production of diagnostic images of high quality by reducing the variations in the performance of the equipment and unnecessary radiation dose to the patients and service providers. Thus, QC activities are directed at addressing the needs of a particular equipment within the X-ray department to ensure consistent optimal image quality, a safe working environment, and compliance with standardized tests (Hoe 2007; Boone 2002).

A study by Begum et al. (2011) about quality control tests in some diagnostic X-ray units in Bangladesh concluded that, imaging facilities without appropriate QC activities could contribute to a large radiation implication to patients and could also affect quality of diagnostic images which may lack accurate diagnostic information. The study suggested that, QC tests should regularly be conducted on diagnostic X-ray equipment within the departments according to the established QC protocol and then compare the measured parameter values with the relevant acceptance limits (Begum et al. 2011).

On the other hand, a study by Sungita et al. (2006) on diagnostic X-ray facilities as per QC performances in Tanzania noted that, lack of QC and, for that matter, preventive measures as well as repair services in place for X-ray machines may ruin the benefits of reduced dose to patients and imaging professionals, and may delay early diagnosis of patients. The study argued that the QC strategies are important not only to ensure that patients receive the

lowest possible radiation risk but also maximum health benefits from X-ray procedures (Sungita et al. 2006).

3.7.3.2 Quality assurance programme in diagnostic radiography

Quality assurance in the diagnostic imaging facility has been regarded as of a paramount importance for supporting the provision of quality services that lead to better diagnostic yield and thus accurate and timely management of patients (Usha et al. 2013). In other words, QA employs planned and systematic actions that provide adequate and effective performance of a diagnostic X-ray facility in order to deliver consistently high quality services to patients with minimum risks at the lowest possible cost (WHO 1982). The definition of QA thus suggests that QA programmes have key goals of ensuring that the imaging procedures being performed yield the expected diagnostic information in order to diagnose the patient while at the same time maximise the safety of the patient and professionals without undue impact on the quality of the service delivery (WHO 2001). The GHS (2007) also recommended an introduction of QA programmes in the health facilities to ensure delivering improved quality service to the patients.

A study by Korir et al. (2011), in establishing a QA baseline for radiological protection of patients undergoing diagnostic radiology, argued that the ALARA (as low as reasonably achievable) principle is even inadequate without QA measures in the diagnostic radiography. The ALARA principle is a sort of a practice code which was proposed and approved for the professions that employ ionising radiation at a time when there was an increase of awareness of the risk and a constant development of scientific knowledge about radiation health effects (ICRP 1977). Thus, as the introduction of new exposure situations are on the increase and the number of application of ionising radiations are fast on the rise, the ALARA principle was adopted for the first time and incorporated in the subsequent ICRP's recommendation (ICRP 1977). As QA programmes are directed towards the safety of both the patients and professionals, the ICRP in their publication 60 recommended the adoption of analysis of QC tests as well as ALARA principle (justification and optimisation) in the radiological investigations (ICRP 1990).

It was argued that no medical imaging service could produce high quality service without having been properly managed (WHO 1999); this therefore suggests that poorly controlled

medical imaging equipment techniques and facilities could cause serious harm to both operators of the equipment and patients. Thus, as the equipment improves, so does the quality of diagnostic information which can be derived from the radiographic images (WHO 1999).

3.7.3.3 Diagnostic reference levels

Diagnostic reference levels (DRLs) are practical tools employed in diagnostic radiography or radiology and nuclear medicine. Launders et al. (2001) argued that DRLs were not originally proposed as a guide to dose optimisation; rather as a mechanism for identifying poor techniques during practice. Thus, the overriding purpose of a DRL is to help avoid radiation dose to the patient that does not contribute to the clinical purpose of a medical imaging process (ICRP 2002). A DRL is therefore a level set for a standard procedure, for typical examinations for groups of standard-sized patients or standard phantoms and for broadly defined equipment (ICRP 1996); thus, if this level is consistently exceeded, then a review of procedures and/or equipment should be made and corrective action should be taken as appropriate (ICRP 1996).

Although the levels are expected not to be exceeded for standard procedures, however, it is emphasised that exceeding this standard level does not imply automatically that an examination is inadequately performed; and meeting the level does not mean the practice has been good because the image quality may still be inadequate (ICRP 1996). In other words, the objective of DRLs is to achieve acceptable image quality of adequate diagnostic value with the imaging procedure. This suggests that DRLs represent the dose level at which an investigation of the appropriateness of the dose should be initiated without compromising the required level of image quality.

As the principle of optimisation of radiation protection indicates, the source-related process should keep the magnitude of individual doses (exposures) as low as reasonably achievable below the appropriate dose constraints, with consideration of economic and social factors (ICRP 2006). This suggests that DRLs play a critical role in managing the radiation dose to patients so that the dose is consistent with the clinical purpose (ICRP 1996). However, the application of DRLs would depend on local, regional or national established standards. Whereas there is a vast information on DRLs in the UK, USA and other developed and,

even, some developing countries, there is virtually no literature or document on the topic in Ghana since a search conducted yielded no results. Again, despite there is a wide range of data available on patient dose values in Ghana, there is relatively dearth of published articles on the subject.

3.7.4 Radiographic film reject-repeat analysis

The diagnostic radiography profession has an important goal to produce the best diagnostic information by delivering the least ionising radiation dose to patients (Jabbari et al. 2012; Bushberg et al. 2002). It is however not uncommon to encounter poor or suboptimal quality radiographs which may require repetition of the examination procedures; thus, increasing the radiation exposures to the patients and, also, prolonging the time for the procedure resulting, eventually, in the delay of diagnosis and management of the patients (Usha et al. 2013; Zewdenh et al. 2008). This implies that the radiographic images produced after rejection and subsequent repetition impose critical challenges within the medical imaging facility whereby patients are subjected to unnecessary ionising radiation and prolonged patients' waiting times (Waalder & Hofmann 2010).

Radiographic reject analysis is defined as the critical evaluation of rejected radiographs that is performed in order to establish the main causes (reasons) for rejection of the X-ray films which are identified as being suboptimal and would play no useful part in the diagnostic process of the patient (Nwobi et al. 2011). Therefore, the reject film analysis (RFA) is a process of analysing radiographic images that are rejected in an X-ray department as having inadequate diagnostic quality and need to be repeated.

Zewdenh et al. (2008) noted that the use of RFA as a component of overall QA programmes in the radiography services has been a well-established procedure to explore causes of reject and repeat of X-ray examinations. The ability of imaging departments to identify potential problem areas, scrutinise the reasons for these problems and come up with ways to rectify them therefore explicitly emphasises the importance of RFA as an integral part of standard diagnostic imaging evaluation, and the basis for optimization of radiographic imaging, as well as planning of quality service delivery (Zewdenh et al. 2008).

RFA is one of the QC procedures used in evaluating diagnostic imaging equipment to identify malfunctioning (problem) areas leading to poor diagnosis and quality services to patients (Nwobi et al. 2011). According to Nol et al. (2006) and D'Ambrosio (1995), RFA is a long-established protocol of QC in the diagnostic imaging and has been one of the methods for assessing quality levels. Muhogora et al. (2008) argued that poor-quality images would add unnecessary administration of ionising radiation exposures to patients through repeated radiographic procedures and increase social costs in addition to delay in patient management. Dunn and Roger (1998) noted that RFA has been used as a quality indicator of radiographic imaging services and it has been recommended for managers of imaging facilities.

A study by Ofori (2009) on the development of quality standards for diagnostic imaging in Ghana mainly focused on the imaging equipment performances and the technical aspects of the imaging processes (procedures). The study indicated that there were no local or national QA systems and no functional supervisory structure for diagnostic imaging services in Ghana. In addition, the study emphasised that a huge potential financial saving may be achieved with the implementation of the recommended QA framework. However, six years later, the recommended QA framework is yet to be implemented in the diagnostic radiography departments in Ghana. Again, this suggests that financial implications in the diagnostic imaging services have not been tackled six years after the study.

Further, the study noted that the absence of local and national QA systems and functional supervisory structure for diagnostic imaging services in the country had caused adverse effects on quality and patient radiation protection in Ghana for many years. Again, the study fell short of identifying exactly what these adverse effects might have been. In addition, the inability to implement the findings to offset or minimise the 'unidentified' adverse effects in quality and patient radiation protection in the practice six long years after the study suggests that the quality problems still exist.

Again, the study concluded that there was much to be accomplished before the QA framework would translate into reality. The study did not explain what actually needed to be done. This implies that, although the study focused on development of quality standards and QA, in specific, six years after the study the quality issues identified in the study have

not been tackled since the QA framework has not yet been operational. In view of the above clear gaps existing in the study by Ofori (2009), the current study is geared towards identifying quality of service delivery in a broader scope in the X-ray departments with the view to developing an over-arching concept of quality in radiographic service delivery in Ghana. One of the most consistent findings from clinical and health services research is the failure to translate research into practice and policy and as a result of these evidence-practice and policy gaps, patients could not benefit optimally from advances in healthcare and are therefore exposed to unnecessary risks (Grimshaw et al. 2012). On the contrary, the findings of the current study would be disseminated to the radiographers during conferences, seminars and clinical meetings. In addition, copies of the findings would be presented to the Ministry of Health, School of Allied and Biomedical Sciences (University of Ghana), heads of the premier hospital and the X-ray department as well as the radiographers' professional body for onward implementation to benefit the X-ray departments and patients at large. The researcher would ensure that the findings are used in policy formulation so that the investment in the study results in benefits for the entire Ghanaian populace.

3.8 Summary

Quality is an important issue that should be considered a significant concept in the life of human beings. The concept should be regarded as a cornerstone of all service organizations, including the healthcare industry. Thus, healthcare facilities (including medical imaging) should realize the need to focus on service quality as a measure to improve upon the quality of service delivery procedures. This could be achieved if the diagnostic imaging service providers and managers adopt a policy of patient-centred service delivery.

The radiological service providers and managers should endeavour to understand their patients' or users' health needs and so should ensure that the service delivery should meet, or even exceed, those health needs and expectations. Understanding the health needs of the patients will help the service providers to tailor the health delivery processes in order to ensure effective and efficient service provision.

Since quality of service of healthcare service delivery is a multi-dimensional concept which mostly reflects the judgement of patients and other users, it is important to seek the opinions of the service users by involving them in the development and planning of service delivery. The changing nature of health service needs and the demand for improved and efficient service delivery have encouraged the patients and users of health services to request and insist on quality of service delivery at the healthcare facilities. Therefore, diagnostic imaging service providers in Ghana should endeavour to embrace patient-centred service delivery to the users, with quality of service being paramount. Since the diagnostic imaging services play a crucial role in the healthcare delivery system in Ghana, it is therefore necessary for the imaging service providers to determine and ensure that the service users are provided with quality service they deserve. This is what they should do by providing the service users an opportunity to assess the quality of service, and also express their opinions about the quality of the imaging service they receive. Quality has become one of the more pressing issues in today's health service delivery and patients mostly tend to rely on functional variables rather than technical attributes when evaluating healthcare service quality. Even though technical quality may be of high priority in the care provision to the patients, most patients may not have the capability to evaluate the quality of the diagnostic intervention processes effectively. However, in respect of the radiological service provision, service users should be offered opportunity to express their opinions, feeling, experiences and expectations about the quality of services they receive. In addition, the views. The chapter also discussed the concept of patient-centred care in radiography practice and highlighted that diagnostic radiography focused on imaging techniques rather than patient-centeredness. The chapter touched on the importance of QA and QC programmes in diagnostic radiography to ensure regular checks, monitoring and maintenance of imaging equipment in order to ensure high quality standards in the facility. The dose requirement and radiographic image quality were also discussed.

CHAPTER FOUR

Methodology and Research Design

4.1 Introduction

In the previous chapter the literature was reviewed in conjunction with the framework which guided the conduct of this research. This chapter outlines the methodology and research design. These involved the setting out of the underlying philosophical assumptions guiding the research process and detailing what was done and why. The scientific tools for investigating social problems are numerous and varying; though each approach has its own strengths and weaknesses (Evans et al. 2013; Choudrie & Dwivedi 2005). Due to the epistemological and ontological assumptions underpinning different methods, their suitability for investigating social research problems depends largely on the research context being investigated. Reflecting on this view, the study has been situated within the tradition of mixed methods research whereby both qualitative and quantitative approaches were employed (Morgan 2014). However, the research welcomes the opportunities of complementary strengths to be gained from a quantitative-qualitative combination. The path of the study highlighted by the sequential explanatory design has also been discussed in this chapter.

In the discussion that follows, the methodological issues and challenges of doing real-world research are outlined (Creswell 2009). The epistemological stance for this research is based, philosophically, on a methodological pragmatism with theoretical perspective of conceptual design thinking (Dalsgaard 2014; Morgan 2014). The methodology employed is mixed methods design, using quantitative and qualitative paradigms, in two phases with data collection through objective and subjective procedures. Data analysis was performed using SPSS version 16.0; descriptive method and content analysis. With the pragmatist perspective of conceptual design thinking, and the overarching aim of developing a concept of quality in radiographic service delivery, pragmatism may help achieve the purpose.

For pragmatic researchers, choosing a methodology that best suits to answer research question(s) is what they endeavour to achieve (Creswell 2009; Johnson & Onwuegbuzie 2004) rather than be pre-occupied with ontological and epistemological debates about truth and reality (Cherryholmes 1992). The first part of the chapter discusses key elements of the

research process, which used a pragmatic mixed methods framework in this study. This section contributes to literature that makes the case for using both deductive and inductive forms of knowledge to achieve a holistic understanding of phenomena under study (Creswell & Plano-Clark 2011; Creswell 2009; Johnson & Onwuegbuzie 2004; Tashakkori & Teddlie 2003). The second part will elaborate details of the specific methodological and design choices made in the conduct of this study. Based on the earlier methodological discussion, this section outlines the features of sequential explanatory design that was adapted to meet the needs of this study. The choice of this design over others has been explored briefly. The data collection and analysis techniques used have been discussed along with ethical issues concerning the study.

4.2 Situating study in Mixed Methods

The bases of all scientific studies are guided or underpinned by certain philosophical assumptions about the world. These assumptions (Creswell 2009) or paradigms (Kuhn 1962) largely influence or determine the direction of the research processes and, for that matter, the research outcomes (Patton 2002). With regard to scientific knowledge, two worldviews have mainly dominated; positivist (quantitative) and interpretivist (qualitative). These approaches were previously regarded as irreconcilable with one another to use in understanding the world of science and its challenges because of disagreement over the truths and how the knowledge of those truths may be acquired (Cherryholmes 1992).

This study has therefore been situated within a mixed methods tradition which rejects the main assertions of the incompatibility thesis (Howe 1988). The latter argued that qualitative and quantitative research paradigms with their different data types and methods of analysis were not compatible with one another; and should not be used together in the same study. However, having deeply thought of the arguments on compatibility challenges, this researcher shares a view that careful integration of the different components, including beliefs, methods, data types, analysis techniques and findings may reveal contrasting dimensions of the phenomenon under study, thereby increasing the depth of conceptual understanding of it. Thus, the two components were integrated in such a way that they became interdependent throughout the research and thereby generated an outcome that was greater than what would have been possible by any single component (Sidiqui & Fitzgerald 2014; Bazeley 2010). The interdependency of the components is a mean of using one

component to validate the other in developing in-depth understanding of the research problem (Carroll & Rothe 2010).

Considering the increasing complex nature of healthcare sector challenges, healthcare researchers' responses have been far more multifaceted in that they are expected to respond to the research context innovatively by using available data types and analysis techniques appropriately to answer their research questions (Padgett 2012). While it is argued that the use of mixed methods strategy has been an expanding area of research (Sidiqi & Fitzgerald 2014), it presupposes that the use of different methods together in the same study is not new. Indeed, it is possible to trace a long history of providing answers to research questions with data from different strategies, approaches, and methods that are likely to result in complementary strengths and non-overlapping limitations (Creswell & Plano-Clark 2011; Johnson & Onwuegbuzie 2004).

Mixed methods design was considered the best suited strategy for this study to further explore quantitative statistical findings with qualitative data results and to provide a strong and complementary answer to the research questions (Creswell 2009; Creswell et al. 2003). The most obvious advantage of mixed methods approach is its potential to overcome some of the problems associated with the conventional research methods (Creswell & Plano-Clark 2011).

After critically analysed potential benefits and disadvantages of quantitative and qualitative methods, the researcher considered the use of both methods in this research in order to use the most valuable features of each (Mackenzie & Knipe 2006). By rejecting the issue of incompatibility of different method data types and subsequent techniques of analysis, researchers are able to exploit the entire available research strategies, rather than to be constrained or restricted by ontological or epistemological limits (Creswell 2009; Johnson & Onwuegbuzie 2004). What is most crucial is the research question that the research methods should follow in a way that offers the best chance to obtain useful answers. Further, the era of integration of quantitative and qualitative methods may be seen as a pragmatic response that health services researchers would use to maximise their understanding of a particular complex situation (Creswell & Plano-Clark 2011; Morgan 2007; Johnson & Onwuegbuzie 2004).

Many opportunities lie in the vast middle ground to use both quantitative and qualitative approaches for synergistic ends (Padgett 2012). Thus, mixed methods research offers an alternative way of knowing and doing research that traverses the positivist-interpretivist dichotomy (Morgan 2014; Creswell & Plano-Clark 2011). The following section provides a discussion of the pragmatic paradigm and the research process involved.

4.2.1 Justification of methodological choices

Justification for why methods should be combined may vary depending on researchers' aims, beliefs, and values. A number of advocates who argue that mixed methods are the 'best' way to conduct research claim that it can answer research questions that are not amenable to quantitative or qualitative approaches alone; that it can provide stronger inferences; and that it enables the presentation of a greater diversity of views.

In health service research (HSR) practice, the reasons for using mixed methods are more diverse, and sometimes less than conceptualisations suggest. Despite criticisms and logistical difficulties of a lone researcher doing a mixed methods study, the researcher is of the opinion that a strategy that utilizes multiple data types offers the best opportunity to answer the research questions being investigated in this study. The choice of the strategy has been borne out of a conviction that HSR does not operate in isolation from the world it seeks to understand; rather the research process and the outcomes are shaped by the researchers, institutions and the problems as the main units of analysis (Creswell & Plano-Clark 2011). This presupposes that research endeavours are guided not only by the social problems and the research participants, but also by the values and opinions of the investigators. This is what has motivated the choice of the research methodology and design of this study, which are discussed in the next section.

4.2.2 The Pragmatic Paradigm

Paradigms are theoretical constructs for illuminating fundamental assumptions about the nature of reality (Patton 2002). However, the pragmatic paradigm puts aside ontological and epistemological debate about what and how the social world can be known. In doing so, the pragmatic researcher identifies the importance of using different, but complementary, approaches to better answer research question(s). In other words, the pragmatic paradigm advances multiple pluralistic approaches to knowing, using 'what

works', a focus on research questions as important with all types of methods to follow to answer the questions (Creswell 2009), and this has been espoused by this research. Thus, the researcher considered pragmatism as the appropriate epistemological stance for this study to achieve its aims and objectives.

Regarded as a new paradigm, pragmatism has been used in social research and its frequent linkage with mixed methods research has heightened its awareness (Hall 2013; Pearce 2012; Morgan 2007; Johnson & Onwuegbuzie 2004; Maxcy 2003; Patton 2002; Howe 1988). However, there are legitimate questions to answer: what philosophical paradigm is the best foundation for mixed methods research, and to what extent has mixed methods research actually made use of the foundations of pragmatism as a philosophy? (Denzin 2010).

With regard to its linkage with mixed methods, the pragmatic paradigm has overcome the differences in epistemological beliefs, based on the epistemological philosophy, and has provided new directions for understanding the nature of health and social research (Morgan 2014). Pragmatism also helps to shed light on how research approaches can be mixed fruitfully (Hoshmand 2003); the bottom line is the research methods are mixed in the ways that offer the best opportunities for answering important research questions. According to Tashakkori & Teddlie (2003), methodological pragmatism challenges the concepts such as 'truth' and 'reality' and rather focuses on what works as the truth regarding the research questions under investigation.

Pluralistic in its assumptions, methodological pragmatism involves research design and operational decisions based on 'what works best' when answering the questions being investigated (Creswell & Plano-Clark 2011; Creswell 2009). Drawing on the works of classical philosophical pragmatists, such as Charles Sanders Peirce (1839-1914), William James (1842-1910), Mead (1863-1931), and John Dewey (1859-1952) who argued that the present was always a new starting point (Creswell & Plano Clark 2011; Holloway & Wheeler 2010; Creswell 2009; Johnson et al. 2007; Robson 2002; Cherryholmes 1992), it can be argued that pragmatist researchers are able to think beyond and counter the dualisms that preoccupy methodological researchers (Johnson & Onwuegbuzie 2004). For these pragmatists, the truth was what worked best and provided solutions to problems (Patton

2002; Cherryholmes 1992). By so doing, they attempt to conduct innovative and dynamic research that was flexible and adaptable, responding as the study unfolded.

Although Creswell (2009) asserted that the recent pragmatist worldview writers included Rorty (1990), Murphy (1990), Patton (1990), and Cherryholmes (1992), the researcher believes Feilzer (2010), Gray (2009), Morgan (2007), and Maxcy (2003) should rather be considered the recent writers who had advanced pragmatist philosophy because these authors have been more current in advancing the paths of pragmatist philosophy as opposed the counterparts in the 1990s. Other researchers advocated for pragmatism after having used whatever philosophical premise or methodological approach that worked best for a particular research problem at stake (Gray 2009; Robson 2002). Indeed, social research study is ongoing while the concept and use of pragmatism is still evolving, and researchers keep choosing pragmatism as their philosophical stance in their various strategies, such as in the current study. The next section outlines the key elements of the pragmatic paradigm in practice along with some comments on how they guide the conduct of the thesis.

4.2.2.1 Key elements of the Pragmatic Paradigm

Six common elements of doing research exist: ontology, epistemology, methodology, axiology, methods and rhetoric. Each of these elements plays a role in the design and execution of a research project as they determine what and how the social world can be known, with the problems it faces (Creswell & Plano-Clark 2011). Gaining understanding of these philosophical orientations could provide a grounding for a researcher to position and conceptualize his/her research designs, a rationale for choosing specific methods to answer a research question(s), and why a specific approach was chosen over other options (Scotland 2012). In this section of the discussion, each element is described in relation to the research process of the study.

Ontology is the first element of the philosophical assumption and concerns with a question of what constitutes the nature of reality (Crotty 1998). In simple terms, ontology is associated with a central question of whether social entities need to be perceived as objective or subjective. Objectivism is an ontological position that asserts that social phenomena and their meanings have an existence that is independent of social researchers (Bryman 2008). On the contrary, subjectivism perceives that social phenomena are created

from perceptions and consequent actions of those social researchers concerned with their existence. Ontological perspective expects the researcher to take a position regarding his/her position of how things are and how things really work. From the stances of objectivism and subjectivism ontological positions, what actually needs to be done, perhaps, is to provide multiple perspectives of phenomena that, taken together, account for the subjective experience of socially situated agents (Teddlie & Tashakkori 2009).

As ontology asks questions about the nature of reality, epistemology is concerned with the nature and forms of knowledge (Cohen et al. 2007). Epistemological assumptions have been concerned with how knowledge can be created, acquired and communicated; in other words what it means to know. Pragmatism is pluralist in that it accepts varieties of competing interests and forms of knowledge. Thus, epistemology has been addressed in relation to an epistemological dualism that separates research along objective-subjective lines within the social sciences (Bryman 1998): objectivism in association with the research of post-positivist approaches while subjectivism with interpretive research of constructivist methods. In order to counter this dichotomy, the researcher welcomes the pragmatist researcher's efforts to replace epistemology with a principle of practicality (Creswell & Plano-Clark 2011). This principle is about collecting data, analysing and integrating together whatever data types that can answer the research question(s).

Axiology is one of the elements of the research process and has to do with the place of values in shaping the researcher's study (Creswell & Plano-Clark 2011). Axiology focuses on questions about what ought to be, and deals with the nature of values and character of a researcher. Many health sciences researchers appeared divided in relation to values. Health service research (HSR) on the other hand, mainly gears at investigating usage and cost of the service, quality of the delivery and the effects of the services for individuals and populations as a whole (Lohr & Steinwach 2002). Thus, HSR is not about gathering data for the sake of transforming facts from one place to another. Rather, as axiology influences the entire research process by enabling meaningful inferences and conclusions to be drawn, it is the same way that health services research systematically seeks knowledge which leads to improvement in the quality of health service delivery to patients (Dewey et al. 2011). Health service research requires views from a wide range of backgrounds, for instance, health professionals and patients as non-professionals who potentially use the services.

Therefore, considering values as an inevitable portion of the research process expects post-positivist and constructivist researchers to be, explicitly and reflexively, identified as potentials to influence or shape the process and outcome of the research. Thus, for health service research, the quality of service delivered would be assessed based on the expectations, perceptions, experiences and the differences the service makes in transforming the health and wellbeing of the patients.

Methodology is another element of the research process which emerges from the ontology, epistemology, and axiology and attempts to address the question of how knowledge is gained (Guba & Lincoln 1994). In the research process, methodology refers to the philosophy underpinning the research and the design. This may be contrasted with research methods which are specific tools and procedures used for data collection and analysis (Creswell & Plano-Clark 2011; Crotty 1998). Methodology, on the other hand, is the strategy or plan of action that lies behind the choice and use of particular methods (Crotty 1998). Thus, methodology is concerned with why, what, from where, when and how data is collected and analysed. Indeed, social researchers have treated quantitative and qualitative paradigms as incompatible components at the level of integration and reasoning. While quantitative methodologies and methods are traditionally grounded in deductive reasoning by testing and refining a priori theory, qualitative counterparts deal with inductive reasoning involving theory generation. Thus, the combined use of the two methodologies may offer an opportunity to capture a comprehensive, nuanced and expansive picture of quality of radiographic service delivery which may provide opportunity for policy and further research. In line with this, the research shares a pragmatist's view whereby this study attempts to counter the link between methodology and methods by adopting plurality of methods (Berger & Paul 2013).

The other element of the research process is rhetoric or the language and communication of the research findings (Creswell & Plano-Clark 2011). Indeed, language fulfils a representational role as it is connected to the world by some designative functions; consequently words owe their meaning to the objects they name or designate (Scotland 2012). This is important because it establishes how research scholars share and communicate their knowledge as a way of setting the boundaries of what is deemed professionally acceptable. In trying to follow the natural sciences, it is clear that researchers

operating in the post-positivist worldviews tend to adopt formal language and use definitions agreed upon in presenting their research findings. On the contrary, researchers operating from a constructivist paradigm tend to adopt an informal or literary way that attempts to ensure and convey to the reader the subjective meanings and experiences of original accounts. The current study embraces both formal and informal language in reporting the findings, and this agrees with pragmatic researchers thereby bridging the gap between the contrasting worldviews.

4.2.2.2 Health services evaluation

Health services research is a scientific and systematic investigation of the use, costs, delivery and effects of health care services for individuals and public in general (Lohr & Steinwachs 2002). In other words, HSR involves the process of systematically seeking scientific knowledge that may lead to improvements in the quality of health service delivery to the service users (Crobie & Davies 1996). A study into the health services and delivery systems has mainly been geared towards addressing the challenges being encountered by the health professionals in the quest of providing improved health care services to meet patients' health needs. HSR has the potential to contribute to the efforts of overcoming the challenges by providing valid traits of the complex interactions among components of the current health service delivery systems and by assessing impacts of efforts to improve quality of service delivery (Curry et al. 2013).

Mixed methods approach can help in the evaluation of complex interactions among system components and therefore shape the improvement of quality service initiatives. The growing role of mixed methods in HSR has been evident from the publications of mixed methods studies and recent overviews of practices in mixed methods (Curry et al. 2013; Ozawa & Pongpirul 2013; Creswell et al. 2011). This growing success reflected the potential of mixed methods studies to capture the experiences, emotions, and motivations of providers and users of health delivery services. In addition, the wider use of mixed methods reflects its ability to meet practical needs for assessing and understanding the complexity of health services delivery, which often results in an underlying focus on pragmatism (Curry et al. 2013; Ozawa & Pongpirul 2013; Creswell & Plano Clarke 2011). Thus, by applying a pragmatic mix of methods that work best in real-world situations provides ways to

overcome the assumed incompatibilities among research paradigms (Onwuegbuzie & Leech 2005).

4.2.2.3 Critiques of Pragmatic Paradigm

Although pragmatism has gained support as a stance for mixed methods approach or design where both quantitative and qualitative approaches are adopted (Feilzer 2010; Morgan 2007; Johnson & Onwuegbuzie 2004), it was still criticised by a section of researchers from both divides of the approaches. In contrast, Gray (2009) contended that the pragmatic approach was feasible in that the fundamental values of current quantitative and qualitative researchers were highly compatible, both including the value-ladenness of facts; thus reality was formed of multiple complexities, constructed and stratified. For a mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews, and different assumptions as well as different forms of data collection and analysis (Creswell 2009; Morgan 2007; Cherryholmes 1992).

The characteristics of the rejection of the linkage of the components of methods with the assumptions of those paradigms purported to be incompatible serves as the underlying philosophy for the use of mixed methods. Whereas the concept and practices of mixed methods research are still evolving, evidence such as the increase in mixed methods PhD theses suggests a larger application of mixed methods in different disciplines (Creswell 2009). For pragmatists, integrating the two research traditions or paradigms within a single study (Creswell 2009) makes use of the strengths of both sides thereby producing mutually illuminating findings (Woolley 2009) despite the dichotomy many researchers perpetuated against integrating qualitative and quantitative paradigms (Mackenzie & Knipe 2006). In addition, mixed methods was proposed to improve validity of theoretical propositions and to obtain a more complete (less biased) picture of the phenomenon under study than is possible with a more narrow methodological approach (Creswell et al. 2003).

On the contrary, mixed methods applications are not without their critics. Whereas there appeared to be a general agreement among the advocates of mixed methods regarding paradigm pluralism, disagreement relating to incompatibility from outside the mixed methods community continues; particularly what is considered as philosophical incoherence regarding epistemology, ontology, methodology and axiology connects

(Morgan 2007; Johnson & Onwuegbuzie 2004). Despite the ongoing debates on combining both paradigms in a single study, researchers have agreed that things have moved on and there is the need for 'multiple ways of seeing and hearing' thereby exploiting the inherent duality of the data analysis (Creswell & Plano-Clark 2011; Feilzer 2010). Thus, multiple ways are visible in everyday life, and mixed methods approach has become a natural outlet for research. Therefore, mixed methods approach has been recognised as an accessible route to research questions or problems that are best answered using mixed methods and the value of using it has been seen (Creswell & Plano-Clark 2011; Feilzer 2010).

Further, studies have been criticised for failing to integrate the data and findings from the qualitative and quantitative components to create a 'whole rather than the sum of the parts' (O'Cathain et al. 2009). These are perhaps not surprising, given the general lack of agreement in the methods literature about the best way to conduct health services and social science research. The current study, however, treats all sections and phases as a whole study as opposed by the sum of the parts.

4.3 Research design

In this section, the research design is elaborated through a discussion of the aims, research questions and objectives of the study; the design process; data collection and analysis; and access to participants. The section ends with the outline of the ethical issues that guided the study. Even though the researcher did not anticipate any harm to the research participants, however, recognising and responding to the ethical dimension of research is fundamental aspect of the research governance process (Slowther et al. 2006). For instance, the data collection process might conflict with the participants' right to privacy, dignity and comfort. In this regard, the researcher considered all aspects of ethical dimensions concerning the participants' vulnerability (particularly patients), anxiety, anonymity, and confidentiality and therefore highly recognised ethical issues throughout the research and data collection processes (Barbour 2014; WHO 2013; Rogers 2004). The researcher ensured to strive for consistency of thoughts and actions as well as acting with sincerity, and also respect the autonomy of the research participants (Slowther et al 2006).

4.3.1 Aim, research questions and objectives of the study

As indicated in Chapter One section 1.10 page 19, the overarching aim of this study was to develop a concept of quality service delivery in diagnostic radiography in Ghana. Based on this aim, both objective and subjective perceptions of patients, radiographers and managers were investigated. The research questions that this study sought to answer were:

- What is the understanding of quality of service by radiographers and their managers in Ghana?
- What quality standards /criteria do radiographers employ during imaging service delivery?
- To what extent are patients satisfied with the radiography services rendered them?
- How do patients perceive the quality of service they receive?

The main objectives were to:

- conduct a systematic literature review to frame the findings of the study
- establish baseline data from perspectives of patients on quality of service issues in the X-ray department
- establish baseline objective data on selected radiographic quality control measures
- explore and/or assess opinions of patients on quality of radiographic service received and their satisfaction
- compare these with the views of radiographers on their understanding of quality of service delivery
- elicit the perspectives of radiographers and managers on quality of radiographic service delivery in the X-ray department
- explore the views of radiographers on their experiences in terms of service delivery
- develop appropriate concept of radiographic service delivery for radiography profession in Ghana

This study was concerned with the methodological strategy of how to integrate quantitative and qualitative data in developing an overall quality concept for radiographic service delivery in Ghana. Guided by the principles and assumptions of methodological pragmatism, the research questions were placed at the centre-stage; and ontological and

epistemological debate about the status of reality and knowledge placed to one side. Given the empirical focus of the study, a decision was taken to investigate the topic in two phases (Phase 1 and 2), using quantitative methods in Phase 1 and qualitative approach in Phase 2. The intention was that the Phase 1 study, which was objective (deductive) in nature, would establish a baseline data to inform the implementation of Phase 2. Then, the Phase 2 study which would be a subjective (inductive) in nature, was used to compare the views of patients, radiographers and managers based on the baseline data established in Phase 1.

4.3.2 The research design process

The study design was supported by the tenets of the pragmatic paradigm; hence, the choice of the mixed methods approach for this study. Although mixed methods designs are not just an arbitrary collection of both quantitative and qualitative data to examine what each tells about a given situation, it was however argued that all the mixed methods used in healthcare and social science studies were based on their appropriateness for a particular study (Morgan 2007; Creswell et al. 2004).

Mixed methods research may therefore provide strengths that may offset the limitations of both quantitative and qualitative approaches. Indeed, it was argued that the use of quantitative methods creates a situation whereby voices of participants are not directly heard (Creswell 2014).

In contrast, qualitative research is seen as deficient because of the personal interpretations made by the researcher, perceived bias created by researcher's interpretation and the general difficulty in generalising the findings to a large group because of the limited number of participants involved (Creswell 2014; Teddlie & Tashakkori 2012). Mixed methods research helps answer questions that cannot be answered by quantitative or qualitative methods alone, thereby providing a bridge across the sometimes adversarial divides between quantitative and qualitative researchers (Creswell 2014).

Effective mixed methods research involves making purposeful and logical decisions about what types of data and steps for analysis would be most appropriate to provide answers for the research question(s) (Creswell 2014; Creswell et al. 2004). There are multiple examples in the literature of studies employing designs that are useful, not only for establishing

methodological legitimacy but also for providing appropriate practice for other researchers to replicate. As mixed methods research has achieved good momentum in the recent times (Siddiqui & Fitzgerald 2014; Teddlie & Tashakkori 2012; John & Onwuegbuzie 2004), so are examples of different designs being implemented. Each design has its own usages, procedures, strengths and limitations that are dependent on research context. However, given the aims and objectives of this thesis, a sequential explanatory mixed methods design was adopted for the current study (Creswell & Plano-Clark 2011; Creswell et al. 2004).

4.3.2.1 The sequential explanatory design

The study adopted a sequential explanatory approach which encompassed both quantitative and qualitative methods. This design was a deliberate choice to conduct the study in two sequential phases (Phase 1 & 2). The aim of this choice of design was to collect and analyse quantitative data in order to establish baseline data in Phase 1, the findings of which were used to inform the conduct of the Phase 2 (qualitative study).

In most studies, a greater emphasis or priority is usually placed on an initial phase followed by the second phase (Creswell & Plano-Clark 2011). Though examples in the literature show that qualitative element takes priority over quantitative element or vice versa (Creswell & Plano-Clark 2011; Creswell 2009), in the current study both phases were given an equal priority or weighting.

The purpose of Phase 2 was to gather qualitative data by exploring further the views of the participants on the issues established in the baseline data in Phase 1 in order to refine, explain or interpret the findings of the Phase 1 study. The findings from both Phases were then combined and integrated as a complete thesis.

4.3.2.2 Strengths and limitations of sequential design

The strengths and limitations of this design are widely documented in the literature in line with any sequential design (Morgan 2014; Plano-Clark 2011; Creswell 2009; John & Onwuegbuzie 2004; Creswell et al. 2004). In support, the sequential explanatory design is the simplest and the most straightforward to implement because the steps fall into two clear separate stages (Creswell & Plano-Clark 2011; Creswell et al. 2003).

The design was characterised by the collection and analysis of quantitative data, followed by the generation and analysis of qualitative data. In addition, the design was reported in two distinct phases with a final discussion that brought the findings together (Creswell et al. 2003). The Phase 1 study was also used to guide the purposive sampling of patient participants for qualitative study (Palinkas et al. 2013; Creswell & Plano-Clark 2011; Patton 2002). Nonetheless, this design has some form of inherent difficulties. The main limitation of this design is concerned with the length of time involved in the data collection to complete the two separate phases, particularly as the two phases were given equal priority (Creswell & Plano-Clark 2011; Creswell et al. 2003). Treating each phase as separate and performing the study sequentially implies that the design requires allocation of extra time and resources which are always non-existing for a small scale, time-limited research. Another limitation was that Phase 2 could not usually be planned in detail until Phase 1 study was completed (Creswell & Plano-Clark 2011). This was addressed in the design of this study through initial planning and responding to the quantitative findings as they unfolded, considering what they might mean for implementation of Phase 2.

4.3.3 Implementation of research design

It can be argued that all research designs operate from a premise of intentionality. For mixed methods designs, the desire is to link or combine both quantitative and qualitative methods. As such, specific procedures are required to carry this process out. The summary of the implementation of the study designs was represented in Figure 4.1

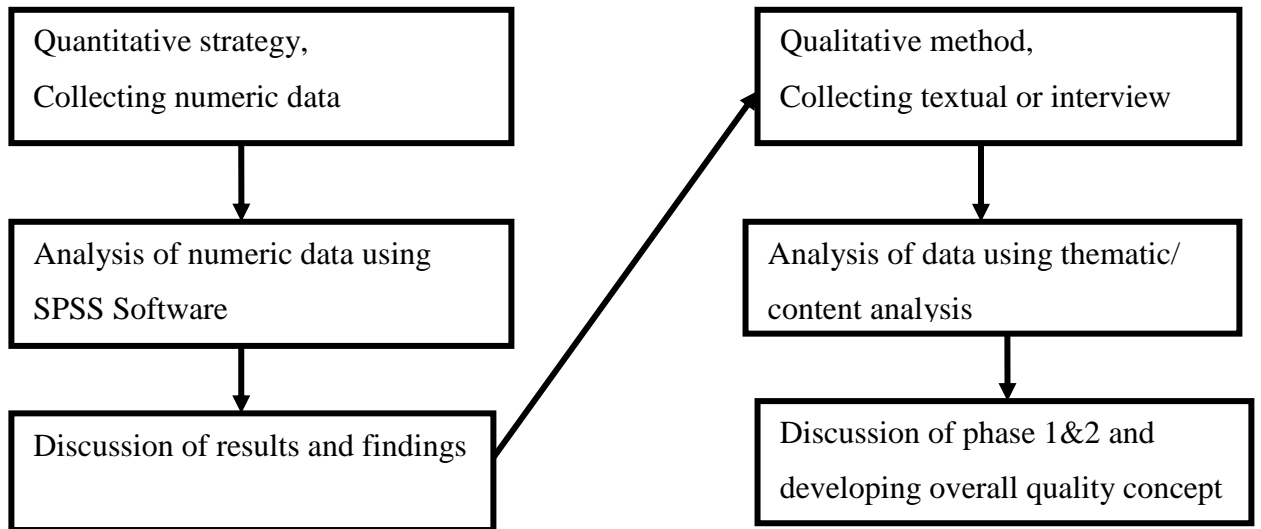
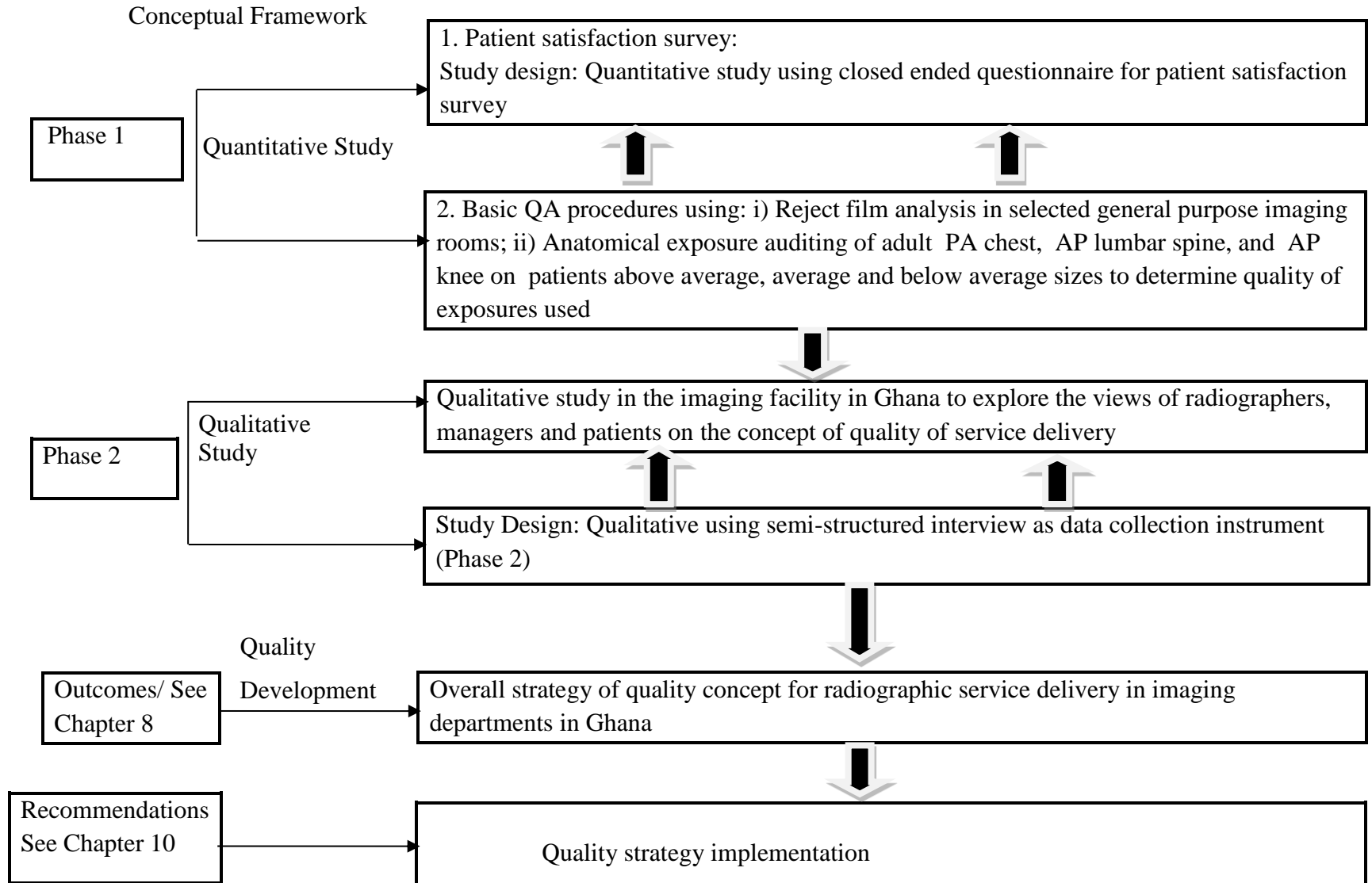


Figure 4.1 Sequential explanatory research design: Adapted from Creswell & Plano Clark (2011)

4.4 Overview of the Methods

An overview of the methods is demonstrated in figure 4.2, which started with the patient satisfaction survey and leading through to the overall development of the quality concept for radiographic service delivery in X-ray departments in Ghana. In this study, two types of data were gathered and used to show different dimensions of the phenomenon under study. As indicated earlier, the data collection processes included two phases as outlined in the figure 4.2.

Figure 4.2: General overview of the methods



4.5 Multiple data collection methods

Methodological triangulation involves employing several data collection methods such as questionnaires, use of specially designed data sheets, and in-depth interviews to enable the researcher to answer the research question(s). Teddlie & Tashakkori (2003) and Creswell et al. (2003) argued that all data collection methods have limitations and, therefore, the use of multiple data collection methods or techniques could neutralize or cancel out some of the disadvantages of certain methods. In addition, the strengths of each method may complement each other (Byrne & Humble 2007). Bryman (2006) asserted that the role of mixed methods approach in terms of recognizing the potential of data generated through different methods, suggested that multi-strategy research provides a wealth of data that allows researchers to discover and use the ensuing findings that they have not anticipated.

The use of several data collection methods in the current study provides a broader perspective of the phenomenon under study rather than the use of a single data collection method (Saks & Allsop 2007; Morse 2003). For instance, the details of qualitative data could provide broader insights that were not available through the use of quantitative surveys. Thus, there was a wide consensus that using different types of methods could strengthen the study findings (Creswell & Plano-Clark 2011). Also, because healthcare services and social phenomena are so complex, the use of different kinds of methods was needed to best understand these complexities (Creswell et al. 2003). However, the researcher was cautioned that the use of several methods does not guarantee validity and credibility of findings; it was the responsibility of the researcher to ensure that all the data collection methods used maintained the required standards (Parahoo 2006).

Based on the discussion above, the researcher's choice of data collection instruments was influenced by the research approach adopted (Hek & Moule 2006). Again, the pragmatic principles of 'what works' supported the use of multiple data collection methods, with the aim that the use of quantitative data collection instruments (questionnaire and other data collection sheets) and qualitative tools (semi-structured schedules) would provide a better, broader scope, and verified insights of data in respect of quality of radiographic service delivery to patients by the radiographers in Accra. Hence, multiple data collection was

highly favoured and adopted to help gather a wide range of data for the study (Creswell 2009; Mason 2006).

4.6 Research setting

The study was conducted in the X-ray department situated in the Premier Hospital in Accra, Ghana. The X-ray facility is the largest in the country which has many imaging modalities, including two suites each of computed tomography and magnetic resonance imaging (MRI) equipment. This Premier Hospital has been the largest referral hospital in Ghana and served thousands of patients from both Ghana and the neighbouring countries, including Burkina Faso, Togo, Ivory Coast, Nigeria and other African countries (RAD-AID 2012). The rationale for choosing this facility was grounded on the fact that many patients from different cultural and ethnic backgrounds with varying health care problems have been seeking healthcare service from this facility. In addition, this setting has been chosen to examine the quality of imaging service delivery to patients and to establish baseline data from the perspectives of patients receiving the services. Then, the issues bordering on quality would be explored with the view of developing an overall strategy of quality in radiography practice in Ghana. The setting for the study [Imaging (X-ray) Department in the premier Hospital] attracts Ghanaians from almost all parts of the country since the department is situated in the premier hospital which serves as the leading and largest referral hospital in Ghana. This presupposed that the patient mix in the hospital in this multi-ethnic/ lingual and multi-cultural city (Accra) provided diversity in the data generated.

Ghana's current population figure stands around 25 million (Ghana Statistical Service 2012) and the research setting has professionals with different health professional backgrounds or views and serving patients from diverse cultural, ethnic and religious backgrounds, it was believed that the study would gather rich and broad scope of data to answer the research questions. Indeed, the premier hospital is Ghana's largest hospital and also the third largest hospital in Africa (RAD-AID 2012). As the largest in West Africa, the hospital serves over 500,000 patients each year. In addition, the X-ray department in the premier hospital is the researcher's local work station and this therefore made the data collection process easy. In

view of the above discussion, the imaging facility within the premier hospital (Accra) was therefore considered the best setting for this study.

The premier hospital is a referral one and is located in Accra, the capital of Ghana. The capital is in the Greater Accra region, one of the ten regions in Ghana, where 48.5% of Ghanaian doctors are located (MOH 2014). A report by MOH also indicated that Accra has witnessed the highest number of doctors per capita, with a doctor-to-patient ratio of one to 3,540 patients (MOH 2012). Accra is metropolitan area with a current population of about four million people with multi-ethnic and multi-cultural backgrounds (GSS 2012). The research setting attracts Ghanaians from almost all parts of the country who are referred to the hospital for healthcare services. This presupposes that the patient mix in this multi-cultural, multi-ethnic and multi-religious city would provide diverse data that was anticipated to answer the research questions and objectives (Asante & Gyimah-Boadi 2004).

4.7 Implementation of research processes

The overall study is in two phases; Phase 1 and Phase 2. As indicated earlier in the discussion, Phase 1 was quantitative design while Phase 2 employed qualitative methods.

4.7.1 Phase 1- Design of data collection instruments

Phase 1 was carried out in three selected X-ray rooms at the study setting. For this Phase, three different data collection techniques were employed; namely, the patient satisfaction survey (questionnaire), together with specially designed data sheets for recording reject/repeat films (RFA) data, and exposure parameter data of tube potential (kVp) and tube current-time product (mAs) for selected radiographic projections (PA chest, AP lumbar spine, and AP knee for adult patients above average, average and below average sizes).

While the patient satisfaction questionnaire was used to collect data from adult patients (minimum age of 18 years) who visited the research setting for plain X-ray services other than special cases such as fluoroscopy and mammography investigations (Peprah & Atarah 2014), the RFA and exposure parameter data sheets were used to collect objective data on

rejected (repeated) radiographs and exposure factors used for the selected radiographic projections, respectively (Mosadeghrad 2012; Hoe 2007; Boone 2002).

For the purpose of this research, three imaging rooms were selected and used for the study. The choice of these rooms was informed by the data from the patient register that showed that the rooms recorded high daily patient throughput with the selected projections as the most frequent radiographic examinations. In addition, the choice of the rooms was made based on the fact that they used conventional X-ray films other than digital radiography (DR) or computed radiography (CR). Further, the rooms were used for plain conventional (general) X-rays rather than specialised examinations.

Conventional plain X-ray rooms were purposefully chosen because plain X-ray examinations remain important basic investigative tools for the diagnosis and management of many disorders and injuries in hospital settings in many developing countries, including Ghana (Manenti et al. 2015; Usha et al. 2013; Hampson & Shaw 2010; Ferrando et al. 2005). Plain film X-ray examinations are important primary investigative tools because they normally take a few minutes to perform. Moreover, plain film X-ray examinations are mainly performed in the selected rooms within the study setting.

This choice of the sampling technique was made in order to collect important data that could provide answer to the research questions (Teddlie & Yu 2007). Although convenience sampling offers opportunity of drawing or selecting samples that are both easily accessible and willing to participate in any study (Teddlie & Yu 2007), the technique is not suitable for this study.

With respect to the room selection, room one was a dedicated chest imaging room. This room was chosen because it was acknowledged in the literature that, of all the diagnostic X-rays, chest X-ray was the most frequently requested and performed examination (Al-Senawi et al. 2009); and, as such, had been used as a diagnostic tool for patients who presented with chest pain or injury, shortness of breath, heart failure, pneumonia, or persistent cough (Hobbs 2007). Again, plain chest X-rays played important roles in routine pre- and post-operative for patients who undergo major surgeries (Ali et al. 2013; Ferrando

et al. 2005). In imaging rooms two and three, radiographic examinations of lumbar spine and knee were mainly performed.

4.7.2 Phase 1- Patient Satisfaction Survey (Questionnaire)

The questionnaire instrument (Patient Satisfaction Survey) (Appendix IV p.320) was designed by the researcher using information from peer reviewed literature on quality of health service delivery, patient satisfaction and expectations of the quality of service (Peprah 2014; Alzolibani 2011; Lis et al. 2011; Gill & White 2009; Hoe 2007; Heidegger et al. 2006; Sofaer & Firminger 2005; Newsome & Wright 1999). In addition, the questionnaire items were developed based on the research objectives and questions. Satisfaction and service quality have been recognized as critical to developing service improvement strategies (Gill & White 2009). The tool was a structured questionnaire specifically developed to collect quantitative data from adult patients (minimum age of 18 years) who visited and went through the conventional radiographic examinations in the three selected X-ray rooms in the study setting. A questionnaire is relevant when large amounts of information can be collected from a large number of participants in a short period of time to answer the research questions.

Guided by the fact that a questionnaire is a tool to elicit relevant and accurate information and views of the patients, the researcher designed the instrument in well-formatted and explicit terms. Balnaves & Caputi (2001) argued that the use of a well-formatted and explicit questionnaires has largely helped improve the probability of getting accurate responses. The response format was closed ended with multiple choices and this was maintained throughout the design in order to encourage the respondents to provide frank and honest responses (Bird 2009; Neal 2009). In order to motivate the respondents, the instrument was designed in a simple and clear language with a consistent format (Neal 2009). The questionnaire was designed under five sections to ensure clarity and easy analysis of responses: A-demographics of participants, B- waiting area of imaging facility, C- participant's experience with the professional during the procedure in the examination room, D- the imaging facility, and E- participant's overall satisfaction (Appendix IV p. 320).

The questionnaire consisted of 26-items of multiple-choice questions. Right from the outset of the design, the researcher started critiquing the individual questions, to see whether they would collectively generate the right information required to answer the study's questions or aims and objectives. This was to ensure validity and reliability of the questionnaire. The researcher ensured that all the questions were sequenced in a logical order to allow smooth transition from one topic to the other. This was accomplished by grouping related questions under sections with short headings describing the sections.

In this regard, the instrument was designed under five basic types of questions, namely; classification, behavioural, knowledge, perception and feeling (Bird 2009). Classification was employed here to identify the characteristics of the participants while behavioural was used to identify what the participants did. Knowledge types of questions were designed to elicit factual information from the participants; and the feeling type aimed to explore the participants' response to their experiences and thoughts. The questions mainly focused on quality of service delivery in the diagnostic imaging department. It was suggested that patients' opinions or expressions should supplement the usual indicators of quality in health care and also as an important source of information in developing an effective plan of action for quality improvement in healthcare facilities (Boyer et al. 2006; Newsome & Wright 1999).

In the healthcare sector, the importance of measuring patient satisfaction has been well articulated with its concept studied and measured extensively as a stand-alone construct and as an outcome measure (Heidegger et al. 2006; Newsome & Wright 1999), particularly in quality care assessment studies (Sofaer & Firminger 2005).

Guided by the above discussion, the questionnaire (Appendix IV, p.325) was numbered and structured under five sections to enable easy analysis of data and also to elicit accurate and appropriate information from the participants. In order to achieve reliability and validity, the questionnaire was kept short, simple precise and devoid of ambiguity and double-barrel questions (Bird 2009; Rattray & Jones 2007).

4.7.2.1 Validity and reliability of patient satisfaction questionnaire

The hallmark of science and, for that matter, research is the pursuit of the truth and limitation of errors (Roberts et al. 2006) and to evaluate the truth or reality, the concepts of validity and reliability should be applied in the assessment of a research study (Murphy & Yelder 2010). Validity and reliability are the mechanisms that are employed to measure or assess quality of the research data and output (Polit & Beck 2012).

Validity of an instrument (questionnaire) describes the closeness of what is being measured and to what extent it measured what it is intended to measure (Roberts et al. 2006). The questions in the 'satisfaction survey' are therefore intended to measure patients' satisfaction with quality of radiographic service delivery and nothing else. Other types of validity, such as content and criterion-related validity, exist. While content validity addresses how well the items on the measure adequately covers a content area, criterion-related validity provides evidence about how well items on the tool correlate with other instruments of similar constructs (Kimberlin & Winterstein 2008). On the other hand, reliability of an instrument is related to how far the tool (questionnaire) will produce similar results in different circumstances, assuming no other factors are altered (Roberts et al. 2006). Thus, reliability describes the consistency of assessment outcomes. Kazi & Khalid (2012) argued that valid and reliable questionnaire helps to collect better quality data with high comparability which has the potential to increase credibility of the data and research output. Therefore, reliability and validity are the main two criteria most widely used to determine whether an instrument is usable or not (Kember & Leung 2008).

Given the above discussions, the patient satisfaction questionnaire was piloted on four radiographers and six patients to check wording, length of the questions, and also clarify the questions to ensure expected data were accurate (Noble & Smith 2015; Kazi & Khalid 2012; De Vaus 2002). Sampson (2004) argued that pilot studies are used to refine research instruments such as questionnaires for rewording, clarity and simplicity and this focuses on minimising measurement errors. The researcher however pre-tested the questionnaire to validate it. The piloting was carried out on two different days and this is termed test-retest reliability (Kimberlin & Winterstein 2008). After the piloting, the responses were analysed to determine whether the questions were simple in terms of wording, understanding, and in

logical order before final administration to the participants (Noble & Smith 2015; Kazi & Khalid 2012; Polikandrioti et al. 2011; Kember & Leung 2008; De Vaus 2002; Polit et al. 2001). At the end of the piloting, few suggestions and comments provided by both participants were used to make amendments on the questionnaire, particularly concerning wording and length of some questions which they indicated they had problems with. The researcher also sought the advice and support from experts in the field of research for their inputs in w the amendments of few areas in the instrument before final administration (Neale 2009).

4.7.2.2 Section A- demographics of participants

This section was designed purposely to gather the demographic data of the participants. The capital city of Ghana (Accra) where the premier hospital was situated is a metropolitan area where people with different cultural, ethnic and religious backgrounds, as well as age and language differences existed. This section therefore was to collect data on the cultural, ethnicity, language and religious differences about the participants in order to ascertain the background characteristics of the patients who received services from the imaging facility and also to determine an approximate indication of representativeness of the data. In addition, the section was to determine both the educational and occupational status of the participants in order to ascertain whether it would have any influence or effect on the participants' satisfaction with the service delivery.

4.7.2.3 Section B- waiting area of imaging facility

This section focused mainly on the patients' waiting area in the imaging facility. The section was designed with the aim of collecting information from the participants about their views and impressions regarding the facility's waiting area; and also to establish the length of time that they had waited for their turn to be called for the procedure. Again, the section sought to ascertain the participants' comfort as they waited for their turn. In addition, the section intended to determine the participants' views about the cleanliness of the waiting area at the imaging unit. Overall, this section aimed to determine whether the above issues relating to the waiting area influenced the participants' satisfaction about the service delivery.

4.7.2.4 Section C – attitude of radiographers during service delivery

This section focused on the attitude of the radiographers towards patients in the X-ray room. The section sought to gather data from the participants on their views about the attitudes of the radiographers during service provision and to determine whether the latter treated the patients with dignity and respect. Again, the section was to ascertain whether the radiographers communicated with the patients professionally during the examination. The section also sought to establish the participants' impression about the caring attitude and concern of the radiographers regarding their privacy during service delivery. In addition, the section intended to determine the types of requests (X-rays) frequently ordered by the referring clinicians; to determine whether the participants were informed as to how to collect their reports after the procedure was done. In effect, this section intended to determine whether the radiographers' attitude, including the points discussed above had relation or connection with the participants' satisfaction with the care services they expected.

4.7.2.5 Section D - the imaging services at the facility

The questions under this section intended to ascertain how easy the participants located the imaging facility, and to determine whether the location of the facility influenced the participants' satisfaction with the service delivery. Also, the section was to elicit the views of the participants about the time they spent during the procedure. The section also aimed at establishing the overall comfort of the participants in respect of receiving radiographic services in the facility. Again, the section intended to determine whether patients' expectation and satisfaction were influenced by service delivery at the facility.

4.7.2.6 Section E - participant's overall satisfaction

This section largely focused on the overall satisfaction of the participants with reference to service delivery processes. The section aimed to ascertain whether the participants' experiences with service provision at the imaging facility influenced their overall satisfaction with service delivery. In addition, the section intended to determine how the patients rated their overall impression of service delivery at the imaging facility; and if this rating was influenced by their overall satisfaction with the service delivery.

4.7.3 Phase 1 - Reject film analysis data sheet

In addition to the survey tool, reject film analysis data sheet (Appendix X, p.335) was self-designed using literature from the WHO's document (WHO 2001). The designed sheet was used to collect data on rejected X-ray films in the selected imaging rooms. The intention or purpose of the data sheet was to identify and/or assess the causes for rejecting the films and/or repeating the examination (WHO 2001). All the selected rooms for the project were using X-ray films as opposed to digital imaging (Foos et al. 2009). RFA had been identified as a quality indicator and one of the integral components of a QA programme, in an imaging department, used to recognise the factors responsible for diagnostically suboptimal radiographs leading to rejection and repetition of radiographic examinations (Usha et al. 2013; Andersen et al. 2012; Jabbari et al. 2012; Clark & Hogg 2003).

It is noted that factors that cause reduction in the diagnostic information of the image could largely cause repetition of the radiographic examinations leading to additional radiation doses to patients and imaging service providers (Usha et al. 2013; Jabbari et al. 2012). Johnston and Brennan (2000) argued that there was considerable evidence that substantial reductions in the medical exposures were possible without detriment to quality of service delivery to patients; and this could be achieved by using the recommendation of International Atomic Energy Agency that regular monitoring of patients' radiation dose should be an essential component of QA programmes in any diagnostic imaging facility (IAEA 2003).

The factors that were considered as the causes or reasons for rejection and, for that matter, repetition included dark or over-exposed and light or under-exposed films; positioning and centring errors; patient motion; darkroom and cassette fogs, as well as static, artefact and mechanical error categories (Jabbari et al. 2012; WHO 2001).

4.7.4 Phase 1 – Basic QA data collection sheet

In radiography, the first priority should be quality service delivery to patients, which is the primary objective of any QA programme. It was in this regard that the QA data collection sheets (Appendices VII, VIII, IX) were self-designed by the researcher and were based on the tools used for the collection of data to produce diagnostic reference levels (to gather

exposure parameters) for the selected radiographic projections (potero-anterior (PA) chest, antero-posterior (AP) lumbar spine and AP-knee) of large-, medium- and small-sized patients who were examined by the chosen X-ray procedures in the selected imaging rooms (Rooms 1, 2 and 3). The selected rooms have been performing conventional radiography examinations using X-ray films.

The exposure parameters collected included tube potential (kilo voltage potential-kVp) and the product of tube current and time (mAs). These parameters were collected with a view to determining the quality of exposure parameters the radiographers selected for various sizes of patients to produce the required diagnostic images (Nworgu & Bamidele 2014; Martin 2007; International Commission on Radiological Protection 1996). The radiation from the X-rays depends primarily upon the kVp and the mAs, and these parameters determined or defined the dose to the patients depending on individual tissue absorption of the radiation (Kumar et al. 2011).

The exposure parameters were collected in order to evaluate and establish diagnostic reference levels for the selected radiographic projections (Nworgu & Bamidele 2014; Martin 2007; Wall & Shrimpton 1998) of PA chest, AP lumbar spine and AP knee views in producing the required images of diagnostic value for large, medium and small patients in the selected imaging rooms. It was in this regard that the data sheet was designed to collect the exposure parameters (kVp & mAs) employed in the selected rooms for the selected anatomical projections as indicated above.

4.8 Phase 2

Phase 2 used qualitative methodology whereby the views of the invited participants were collected using semi-structured interview schedules as the data collection method. The semi-structured interview schedule was designed by the researcher based on the gaps identified by the baseline data established in Phase 1 as well as issues from quality of healthcare service delivery literature (Mosadeghrad 2012; Hudelson et al. 2008; Hassan 2005).

For Phase 2, a semi-structured interview schedule was employed to gather qualitative data from patients, radiographers and managers. The researcher anticipated that the use of these different data collection tools could supplement each other and hence boost the rigour, trustworthiness, credibility and dependability of the data (Zohrabi 2013; Kimberlin & Winterstein 2008; Golafshani 2003).

Three different participant groups, including radiographers, managers of radiographers and patients were involved in this phase. The qualitative method allowed the researcher to identify issues from the perspectives of the study participants, understand their opinions, feelings, meanings and interpretations of their experiences regarding radiographic services in the study setting (Hennink et al. 2011). Guided by the earlier discussions, the researcher designed three interview schedules (Appendices XI, XII & XIII) for the three participating groups respectively.

4.8.1 Phase 2 - Semi-structured interview schedule

An in-depth or semi-structured interview was designed to further explore, clarify and understand the objectively measured variables on quality of service delivery based on the findings from the patient satisfaction survey and basic QA measurements. A semi-structured interview schedule was a one-to-one method of data collection which involved the investigator and the participant with the purpose of generating textual data from the latter (Hennink et al. 2011). Interviews have been described as conversations with a purpose whereby the researcher's purpose was to explore issues of quality of radiographic service delivery by using the semi-structured interview guide (Hennink et al. 2011).

Although interviews have limitations such as interviewer-bias (Shenton 2004), the researcher ensured that the issue of bias was brought to the barest minimum by asking open-ended questions that could elicit depth of information from relatively few people (Guion et al. 2011). Guion et al. (2011) noted that qualitative interviews have been excellent tools used in planning and evaluating programmes in order to update measures to improve them because open-ended questions were used to deeply explore the respondent's feelings and perspectives on the subject.

4.8.2 Phase 2 - Designs of semi-structured interview schedules

In view of the above discussions, interview schedules for radiographers, managers, and patients were designed as data collection tools for Phase 2. The researcher designed the three different interview schedules for radiographers; managers and patients (Appendices XI, XII & XIII). The three schedules were designed using open-ended questions. Although the open-ended questions were used in the design, the contents of each schedule varied based on each group of participants involved. However, the three schedules focused on quality of service delivery which was the main subject area of the study being explored. While the schedules for the radiographers and managers were designed using professional language due to their professional backgrounds, the schedule for patients was carefully designed in simple, clear and unambiguous language or words. The rationale for using simple and clear words was to encourage or enable the respondents to expound on the topic.

After the discussion of Phase 1, the gaps identified in the findings concerning quality of service issues were taken into account and were particularly used to inform the basis of the design of the semi-structured interview. Some of these issues identified in the findings were patient complaints regarding waiting time, unmet patients' expectations, patient dissatisfaction with service delivering, and excessive electricity outages currently affecting radiographic service delivery in the setting. In addition, service delivery issues in the quality literature review were considered appropriate for exploring from the perspectives of the radiographers, managers and patients.

As suggested by Gill et al. (2008), the researcher designed the schedules by using simple language and questions in order to explore the views of the participants about the phenomenon under study so as to help address the aim and objectives of the research.

4.8.2.1 Phase 2 - Interview schedule for radiographers and managers

Unlike the interview schedules for radiographers and managers where few technical and professional words were used, that of the patients was carefully designed without the use of professional or technical 'jargon'. Even though technical and professional words were employed in the schedules for radiographers and managers, the words were however carefully chosen to ensure the questions were simple, clear and understandable. The choice

of the terms and wording of questions was to try to ensure the participants provided frank and honest responses (Barbour 2014; Hennink et al. 2011; Holloway & Wheeler 2010). The researcher endeavoured to avoid the use of sensitive questions which had the potential to demotivate participants (Hennink et al. 2011; Holloway & Wheeler 2010). The schedule for radiographers consisted of nine questions, interspaced with four probing questions on quality issues pertaining in their units of service provision as well as the department as a whole (Appendix XI p. 331). For the managers, the schedule contained six questions, interspaced with five probing questions (Appendix XII p. 332).

4.8.2.2 Phase 2 - Patients' interview schedule

In designing the interview schedule, the researcher highly considered the participants' autonomous, privacy, and dignity in order to avoid causing anxiety and discomfort with regard to the type of questions to be included on the schedule. Thus the researcher avoided questions that focused on the participants' private lives (Barbour 2014). Therefore the interview schedule for the patients was focused on the quality findings highlighted in Phase 1, as elaborated under section 4.8.4.1. The interview schedule was purposely designed to elicit the views of the patients on the quality of services delivered to them by the radiographers (Barbour 2014; Hennink et al. 2011; Holloway & Wheeler 2010). The schedule consisted of seven main question items, in addition to five prompting or probing questions (Appendix XIII p.333).

Further, the backgrounds of the patients as non- health-professionals were considered with regard to the choice and level of the language used in the design of the interview schedule as well as the logical structuring of the questions. The questions were made simple and clear, devoid of professional 'jargon'. This rationale was to ensure that all the patients understood the questions on the interview schedule to demonstrate consistency with the responses (Hennink et al. 2011). The researcher also made sure that no sensitive questions were asked to cause anxiety and discomfort to the patients. The questions in the interview guide were open, short and simple, and included only one question at a time (Hennink et al. 2011). The researcher ensured that the questions in the interview schedule followed logical order so as to avoid confusing the interviewee, and also to avoid reducing quality of the interview data (Noble & Smith 2015; Hennink et al. 2011).

4.8.2.3 Piloting of interview schedules

The instruments designed for the research for data collection were piloted, except the interview schedule for managers because the managers are only three in the department (administration, finance, logistics and general); the piloting could have been done with managers of different hospitals but ethical clearance did not cover that arrangement. Thus, involving them in the pilot study and the main research could potentially bias the data. Piloting had been widely articulated in the literature for its essential and critical role in ensuring that the data generated is of quality and credible due to reliability and validity of the research instruments (Gill et al. 2008; Sampson 2004). Pilot studies, also termed 'feasibility' studies are experimental, explorative, preliminary, or pre-testing of the data collection tool to assess the relevance of the questions and the feasibility of the design (Thabane et al. 2010; Teijlingen & Hundley 2002).

As indicated earlier, the interview schedules for radiographers and patients were piloted with two each of senior radiographers and patients, respectively. Polit & Beck (2014) argued that piloting of interview schedules serves as a training exercise and as preparation towards the conduct of the main interview. After transcribing and analysing the pilot data, the researcher reworded the main and probing questions to ensure clarification in the questions and to avoid confusion in the major and probing questions (Hennink et al. 2011). The questions were also arranged in logical order for simplicity. The radiographers involved in the pilot studies were excluded from the main interview process in order to avoid bias in the main data interview processes as well as ensuring credibility of the data.

4.8.2.4 Reliability, validity, and transferability

Key indicators of the quality of a measuring instrument are the reliability and validity of the measures. Whereas reliability focuses on the extent to which results are consistent over time and accurate representation (sample size) of the total population under study, validity aims at determining whether the research truly measures that which it was intended to measure or how truthful the research results are (Kazi & Khalid 2012; Golafshani 2003). Thus, if the findings of the study could be reproduced under a similar methodological process, then the research instrument may be considered as reliable. Validity requires that an instrument is reliable; however, an instrument could be reliable without being valid. It

has been debated that the use of reliability and validity is to measure quality and integrity or trustworthiness of a study output (Kazi & Khalid 2012; Roberts et al. 2006).

Although Zohrabi (2013) argued that reliability, validity and generalisability concepts are mostly associated with quantitative methods and not applied to the qualitative paradigm, on the contrary, Noble & Smith (2015) noted that the concepts are applicable to qualitative methods thereby validity implies integrity or trustworthiness of the methods employed and the precision in which the findings accurately reflect the data. On the other hand, reliability describes consistency within the employed analytical procedures (Noble & Smith 2015). However, Polit and Beck (2012) argued that qualitative researchers evaluate a research quality by employing trustworthiness which encompasses credibility, transferability, confirmability, and dependability.

In support, Patton (2002) noted that validity and reliability concepts should be of concern to any qualitative researcher who designs a study, analyses findings and judges the quality of the study. While generalisability or external validity was used in quantitative research, transferability or fittingness was used in qualitative research to represent the applicability of findings in another similar context (Noble & Smith 2015). However, to ensure reliability in qualitative research, trustworthiness should be considered crucial. Based on this, the researcher piloted the interview schedules with two each of radiographers and patients to ensure that the schedules were clear, simple and without any ambiguity; and this was done to ensure trustworthiness of the data. Thus, the piloting of the interview schedules prior to the main data collection process for Phase 2 of the study was appropriate to enhance credibility of the findings. Credibility concerns with the focus of the study and refers to the confidence in how well the data addressed the intended focus (Polit & Beck 2014).

4.9 Training of Radiographers for assistance in questionnaire administration

The researcher met with the radiographers during one of their regular weekly meetings and discussed with them about the research project. In addition, the researcher requested for three volunteers to be trained in assisting him during the administration of the satisfaction survey. Three senior radiographers volunteered to assist in the survey data collection process. The researcher arranged and met with them after close of work so that together

they fixed the day and time for the training before the study process started. We agreed on one hour training for two days, Thursday and Friday after work. We agreed on these days because they are generally less busy days within the week.

During the training, the researcher provided each of the radiographers with a copy of the questionnaire (Appendix IV p.320), 'Participant Information Sheet' (Appendix V p.324) and 'Consent Form' (Appendix VI p.326). The training focused on translation of the instructions and contents or items of the questionnaire, information sheet and consent form from the original English language into local languages to the patients at the waiting areas of the selected rooms. In addition, each of the radiographers was assigned specific local language translation to undertake. It was agreed that the researcher read the questionnaire, information sheet and consent form in English while the senior radiographers did the translation into the assigned local languages (Twi, Ewe, Fante, Ga, Hausa and Krobo). These local languages are spoken by the various ethnic tribes or groups in Ghana. The researcher considered the translation necessary to ensure the intended meaning of every item on the questionnaire remained the same to every patient. In addition, the translation was deemed proper to offer every patient the opportunity to participate voluntarily in the study, irrespective of their educational backgrounds.

Meanwhile, one of the radiographers could speak three local languages, including Twi, Ga, and Hausa, and this made it easier for the researcher not to engage or involve many translators in the data collection processes. The other two radiographers also did the translation in one or two local languages. The researcher reminded the radiographers to keep to their roles and avoid the temptation of influencing the response options for the patients because of unethical and bias implications.

At the end of the two-day training session, rehearsal exercises were undertaken and the researcher was convinced and satisfied with the training process. At the end of the training period, a question of what should be done in case a patient volunteered to participate in the study but could not read or write? The researcher felt a consent form was necessary here to protect self and privacy of the participants from ethical issues and if the participants could voluntarily give consent by thumbprinting the consent form. What it meant was that the

researcher should provide an ink pad to be used in case the situation arose. Giving consent by signing the consent form showed that the participants were duly informed and fully understood the processes involved before they voluntarily offered to participate. Again, the professionals were reminded not to influence the choice of the options patients in that category. In view of this, the researcher agreed to provide an ink-pad for thumbprinting during the main study process.

4.9.1 Training of Radiographers for filling in data collection sheets

Although the data collection proformas for RFA and exposure parameter data were not specifically piloted, the researcher provided training for the radiographers in the selected X-ray rooms as to how to fill in the data sheets. The training was an hour session and this was done four days before the main week for the data collection. During the training session, the researcher took his time to demonstrate to the radiographers as to how the filling in of the forms should be done. The radiographers were also given samples of the forms to study and acquaint themselves with them. They were informed that both RFA and parameter data would be collected concurrently. The researcher used three different sizes of containers to demonstrate to the radiographers as to how to assess the patient sizes. At the end of the training session, the researcher invited their views on the logical order of the variables and appropriateness of the variables in the design of the instruments (De Vaus 2002). The researcher also encouraged them to feel free to ask questions in case they were unclear with the filling in processes. The radiographers were also encouraged to be honest with the filling in of the data collection forms. The researcher assured them not to view the exercise of data collection on rejected X-ray films as 'witch-hunting'. He made them aware that the exercise was to help identify causes or reasons for rejection and to recommend for remedies or mechanisms to be put in place to reduce the rate of rejection and/or repetition of X-ray films. The practitioners were also informed that on the day for reject data collection, all old boxes of unused films would be removed from the worktops in the darkrooms and new boxes of different film sizes would be provided. Also, all old rejected films would be removed from the film viewing area. Again, two empty boxes of 35x43 cm sizes would be placed at the film viewing area in which the rejected films would be dropped so that at end of the day the data sheets would be used to cross-check the number of films in the boxes. This was done to ensure quality of the data collected.

At the end of it all, the radiographers demonstrated clearly that they understood the processes and the researcher was also convinced. Again, the researcher sought the advice and support from experts in the field of research for their inputs in standardising the data sheets and this ensured the logical order of the variables (Neale 2009).

4.10 Sampling method and sampling technique

Sampling procedures in research are of two categories; probability and non-probability (Hek & Moule 2006). While probability sampling procedures are primarily focused on large sample of representativeness as in quantitatively oriented studies due to the dominance of generalisation of the findings, non-probability sampling, as used in qualitative research, does not concern itself with a representative sample (Hek & Moule 2006; Sim & Wright 2000). In addition, probability sampling is mainly aimed at generalising the research findings rather than the information gained (Sim & Wright 2000). However, in explanatory design (and for that matter mixed methods design) the idea of generalisation may not be among the purposes of the study (Creswell & Plano-Clark 2011; Teddlie & Yu 2007). Therefore, probability sampling technique was not chosen for this study.

Non-probability sampling technique includes the following categories; snowball, quota, purposive and convenience sampling. Nonprobability sampling allows a researcher to select individuals who are available and may be studied (Creswell & Plano-Clark 2011). Thus, for snowball sampling technique, a researcher is led to other participants who meet the study criteria as those previously sampled, particularly when the study involves a group of secret membership while for convenience sampling, participants who are available and easily accessible at the time of sampling are recruited (Teddlie & Yu 2007). Quota sampling, on the other hand, aims at sampling non-randomly according to a fixed quota whereas purposive sampling involves selecting participants based on a specific purpose in mind rather than random sampling (Teddlie & Yu 2007; Tashakkori & Teddlie 2003; Sim & Wright 2000).

Although purposive and convenience sampling have some similarities, the research questions and objectives focused on specific quality of service delivery issues. Moreover,

whether the methodology employed was quantitative or qualitative, the researcher was of the view that sampling techniques should be selected in order to maximise efficiency and validity (Palinkas et al. 2013). Nevertheless, sampling should be consistent with the research aims and/or objectives as well as assumptions inherent in the use of either method. Therefore, purposive sampling technique which focused on selecting participants based on a specific purpose in mind and ensured that the participants who met the inclusion criteria were sampled, was utilised in this study (Polit & Beck 2012; Teddlie & Yu 2007; Hek & Moule 2006).

Purposive technique has widely been employed in qualitative research for selection of information-rich cases in relation to the phenomenon under study. The technique allowed the researcher to obtain sufficient participants from the target population (patients) (Hek & Moule 2006). Thus, the researcher sampled the patients who went through the radiographic procedure and voluntarily consented to participate in the study. These patients were invited to take part in the study because the researcher regarded them as ‘experienced’ patients as they had already gone through the procedures or received some radiographic services; and they were offered the opportunity to tell their own story (Barbour 2014). In addition, the sampling technique ensured that radiographers and managers with radiographic service delivery experiences were recruited for the study in Phase 2.

Purposive sampling was used in the selection of the imaging (X-ray) rooms. Purposive sampling is a non-probability sampling technique used in selecting units or institutions, individuals, or groups of individuals, based on specific purposes associated with answering a study’s questions (Padgett 2012; Teddlie & Yu 2007). Again, purposive sampling affords a researcher, who is interested in a particular unit or setting, to select participants who have special knowledge or experience about that unit (Padgett 2012). In view of these definitions, the researcher chose the 3 imaging rooms in which plain film of selected radiographic projections (PA chest, AP lumbar spine and AP knee) are most frequently performed.

4.10.1 Sample size

Sample size selection is a well-recognized aspect in any research. The internal and external validity of any scientific study rests, to a large extent, on the adequacy of the sample to meet the research aims and objectives (Uprichard 2011). The choice of sample size has been regarded as an important aspect in mixed methods research because it determines the extent to which the researcher can make statistical and/or analytic generalizations.

However, the discussion of sample size considerations has tended to be dichotomised, with small samples being associated with qualitative research and large samples being linked to quantitative (Onwuegbuzie & Collins 2007). Onwuegbuzie & Collins (2007) argued that the size of the sample should be informed primarily by the research objective, research question(s), and, subsequently, the research design.

Nevertheless, small samples may be used in quantitative research that represents exploratory research. Although Onwuegbuzie & Collins (2007) noted that power analyses may help researchers by providing information regarding appropriate sample sizes for both quantitative and qualitative research phases of mixed methods investigations, the determination of the sample size for Phase 1 in this study was based on the number of patients who went through the procedures in the selected rooms in a month's period. The researcher got this information from the registers in the three X-ray rooms in which patients' particulars and body parts were documented. Access to these registers was made possible by the Chief Radiographer (one of the managers and Head of the technical group).

In each register, the researcher found that approximately 350 patients (adults and under age) were radiographed every month and adults constituted 90% (315), approximately on each register. In Ghana, the adult age has been pegged at 18 years. This means that the three rooms together attended to 945 adult patients in one month. In addition, the researcher found that few patients were recorded on Fridays in the three rooms and he was informed that that has always been the case. Based on these pieces of information, the researcher decided to recruit eight percent (4%) of the adult patients from each room for five weeks to constitute the study participants. Having computed the 8% of the approximate adult patients for five weeks, a sample size of 189 ($4\% \times 315 \times 5 \times 3 = 189$) was targeted for the period.

However, at the end of the five- week data collection process for Phase 1, a total of 90 participants were recruited (See section 4.10 p. 97).

Although quantitative study mainly focuses on large numbers of respondents in order to generalise the findings from the sample (De Vaus 2002), the main purpose of this study was not for generalisation of the findings but rather to develop a concept of quality for radiographic service delivery. For Phase 2 study, a total of 15 participants including six each of the radiographers and patients, and 3 of the managers were recruited. The researcher invited the radiographers from the three chosen imaging rooms to participate in the study. From those invited, two radiographers from each of the three rooms voluntarily agreed to participate in the study. At this stage, these radiographers are very experienced and were allowed to tell their own story regarding quality of service delivery (Barbour 2014). Onwuegbuzie and Leech (2007) argued that sample sizes in qualitative phases should not be too large that it becomes difficult to extract thick, rich data; and not too small that it could not achieve data saturation.

4.11 Phase 1: data collection procedure – Patient satisfaction survey

Patients who presented at the three selected imaging rooms in the facility (setting) for general purpose X-ray examinations (other than specialised investigations such as computerised tomography scan, fluoroscopy and magnetic resonance imaging scan) were invited to participate in the study. The data collection process started on 2nd June through to 4th July 2014; thus, lasted for approximately five (5) weeks.

In view of the cultural and ethnic diversity of Ghanaians (National Commission on Culture 2004), this period was considered appropriate to allow for participants across the diverse cultural and ethnic backgrounds to be involved in the study. It was anticipated that involving participants of different cultural and ethnic backgrounds would help the purpose of gathering a broad range of opinions from the respondents on the issues of quality of radiographic service delivery in the radiography facility. In addition, the broad range of opinions might help in this phase of study to achieve the aim of establishing baseline data on quality service delivery.

The data collection process involved the principal researcher and the three senior radiographers who volunteered and were trained by the researcher for assistance. The latter played a vital role by translating the Participant Information Sheet (Appendix V p. 324), the Participant Consent Form (Appendix VI p. 326), instructions and the questions on the patient satisfaction survey (Appendix IV p. 320) from the original English language into six local languages, including Twi, Ewe, Fante, Ga, Hausa and Krobo. The researcher reminded the senior radiographers that patients who voluntarily consented to participate in the study should be given the chance. The informed consent from the participants showed that they were informed and fully understood the processes involved and they voluntarily offered to participate.

During the data collection process, the researcher played his role of reading the instructions and the questions on the satisfaction survey as well as participant information sheet and informed consent form in English to the patients at their waiting areas. The three senior radiographers took their turn to perform the translation processes. The participants who volunteered to partake in the study were supported to sign the consent forms. These participants were invited to the researcher's office nearby to sign the informed consent forms and this was done to minimise the potential influence of selection and its implications for bias (Padgett 2012; Creswell & Plano-Clark 2011). Those who willingly and voluntarily signed the informed consent forms were allowed to participate in the study after they went through the imaging procedure. The signing of the informed consent form was undertaken as part of the ethical issues guiding the conduct of this study.

After each participant went through the imaging procedure, he or she was invited to office to fill in the questionnaire. They were however asked to indicate the language that they were comfortable with and would want to use. The participants were encouraged to feel free in deciding the language they wanted to use. Those who wanted to use any other language apart from English language were allowed to do so. However, the radiographers played their roles by translating every question in the questionnaire into the participant's preferred language. In all, 22 of the respondents asked the researcher or any of the researcher's colleagues to assist them to fill in the questionnaire with their (participants')

choice of the response options. They were allowed to make their own choice of response options which were used to fill in the questionnaire for them.

At the end of the process, the researcher thanked every participant for taking part in the study and also reminded them that the study was in two phases and if it would interest them to participate in the second phase. Some of the participants were not sure of their time schedules during the second phase of the study and so could not leave their contact particulars. However, at the end of the five week period of the process, 18 participants expressed interest to participate in Phase 2 of the study. They therefore left their contact particulars with the researcher for him to invite them as and when the time was due for the second phase.

The patients who consented to participate in the study were all adults. Although all the patients who visited the selected imaging rooms for the services were informed about this study in the waiting area, not all of them participated in the study. That is some of the patients decided not to participate. However, no record was taken about the total number of patients who visited the department for the services during the data collection period neither was the number of the patients who could not volunteer to participate. At the end of the data collection process, 90 adult patients voluntarily participated.

4.11.1 Phase 1: Basic QA parameter procedures

Basic quality assurance data collection was in two-folds: data for reject film analysis and exposure parameter auditing were collected concurrently for two weeks in the three selected imaging rooms. Prior to the start of the data collection processes, the researcher arranged and held a meeting with all the radiographers in the 3 selected imaging rooms involved in the study. The meeting took place in one of the radiographers' clinical meeting rooms. The meeting was made easy as the researcher is a radiographer himself and had one time practised in the same department. The meeting was used to discuss, explain and demonstrate the procedure for completing reject film data sheet; particularly how the radiographers would enter the information in the designated columns appropriately.

The radiographers were asked to remove all previous rejected radiographs from the dry or working bench in order to avoid mixing them up with the current rejected films. In addition, the researcher informed them that, on the starting day new boxes of different sizes of films should be supplied to the darkroom attendants. Again, they were told to place three old empty film boxes at the film viewing area in which the rejected radiographs were dropped after they were recorded on the data (recording) sheets. This arrangement was made in order to cross-check with the rejected films in the boxes with the recorded sheets to ensure the rejected categories matched with the records.

The record sheets were left in a folder at the film viewing area by collective agreement. Each of the radiographers was given the recording sheet during the meeting to study and to see what the requirements were. The researcher demonstrated to them as to how to complete the record sheets. At the end of the demonstration, the researcher invited questions from the colleagues in order to clarify areas which they were not clear with. The researcher wanted to know if the arrangements discussed were understood and if they all agreed on the arrangements so far. There were no dissenting views. Again, the researcher reassured the colleague radiographers and other supporting staff in the three imaging rooms to do away with any fear of suspicions of 'witch-hunting'. They were therefore encouraged to honestly record all the rejected films.

Then, the researcher distributed the second data collection sheet on exposure parameter settings (kVp and mAs). Again, the researcher discussed and demonstrated to them how the recording was to be carried out. The researcher made the radiographers aware that they were to use their discretion as to the sizes of the patients they attended to; such as who was large, medium, and small patient. All the data on the patients and the exposure factors they used in producing postero-anterior chest, antero-posterior projections of lumbar spine and knee joint were to be recorded. After the researcher had demonstrated to them, some of them expressed their difficulty with the sizes of patients. Some were of the views that the use of patients' weight would have been ideal and easier. Although their views and suggestions were brilliant, it was difficult to provide three sets of scales for the three rooms at that period because the data were collected concurrently in the three rooms. They were

made aware that what was actually being measured here were the specific exposure parameters selected by them for the selected projection.

After the deliberations, we agreed to commence on the first working day of the following week. We also agreed that all data collection sheets were issued early morning on the first working day and then collected at 3.00pm of the last working day (Friday) in the week. The exposure parameter settings were recorded by the radiographers in charge of the selected imaging (X-ray) rooms.

At the beginning of the new working day of the week on which the data collection started, the researcher went round all the selected rooms to remind the radiographers and to make sure that all the discussions were implemented. The data collection sheets for the RFA were put in a folder and placed at the X-ray image viewing area. In addition, new X-ray film boxes of different sizes were supplied to the darkrooms. All these processes and procedures were discussed with the radiographers at the meeting.

The data collection sheets for exposure parameter settings were also kept in folders and left with the radiographers in the selected X-ray rooms. The exposure factors were recorded after the factors were set on the control console prior to making an exposure. The completed data collection sheets were collected at the end of the last working day of the week from each imaging room involved. After two weeks' working period, both data sheets were collated separately. RFA data were analysed descriptively using a standard formula (see results chapter) while data for exposure parameter auditing were entered into SPSS software for analysis.

4.11.2 Phase 2: Interviewing process

The data collection process involved interviewing the research participants in a quiet office selected deliberately for this research activity. This special office (room) was arranged within the research setting, free from disturbances and safe from any harm to both the researcher and participants (Barbour 2014; Hennink et al. 2011). The interview procedure involved three different participant groups (radiographers, patients and managers). First, the researcher arranged the interview process with radiographers as contacting the patients to arrange time with them took a little longer. The researcher took this decision in order to

save time while arrangements were made to contact and invite the patients who participated in Phase 1 and agreed to participate in the Phase 2 interviews.

Prior to the start of the interview process, the researcher took the following steps:

- (1) An appointment was made with each participant at a time suitable and convenient to both
- (2) Made sure the office for the interview was quiet and conducive for conversation
- (3) Sitting positions were arranged to enhance face-to-face interviewing
- (4) A recorder was arranged and prepared to enable smooth recoding of the interviews
- (5) Made the office comfortable by making water, fruit juice and soft drinks available.

4.11.2.1 Phase 2: Interview with radiographers

Though the researcher fixed the dates and time with the radiographers based on their convenient time, some of them kept giving excuses about their inability to come.

Prior to starting of each interview session, the researcher tried to create a congenial environment by thanking the participants for the time and willingness for coming to participate in the interview. Each radiographer was reminded of the approximate length of time for the session as 30 minutes. The researcher

- (i) gave the participant information sheet (Appendix XIV p. 334) and reminded them of the aims of the study
- (ii) provided the participants with informed consent form to sign (Appendix XV p. 336)
- (iii) reminded the participants that probing questions would be asked to determine additional information or to explore more about the information
- (iv) sought permission to record the interviewing process (Holloway & Wheeler 2010).

Interview processes were audio-recorded, with the permission from the participants.

Permission to record the interview process was necessary because the information they provided was strictly confidential and they needed to get an assurance that the recording would be treated with confidentiality and would be used purposely for the study (Barbour 2014; Polit & Beck 2012; Rossman & Rallis 2012; Hennink et al. 2011; Holloway & Wheeler 2010). During the interview session, the researcher adopted active listening skills

to reflect upon what the interviewee was saying so as to interpret what was said, and if possible, seek clarity and understanding throughout the interview (Hennink et al. 2011).

4.11.2.2 Phase 2: Interview with managers

The procedure was not different from the other participants. The interview sessions with the managers took place in their own offices. Each manager was reminded of the approximate length of time for the session as 45-50 minutes. Much longer time was given to the managers than radiographers because the researcher anticipated that the managers might share more on the topic. The researcher then reminded each manager of the aims of the study and gave the participant information sheet (Appendix XIV p. 334) and consent form to sign (Appendix XV p. 336). The managers were then reminded that probing questions would be asked to determine additional information or to explore further. The researcher also sought permission from the managers to record the interviewing process (Holloway & Wheeler 2010).

The interview procedure was not different from that of the radiographers; the only differences were it took place in their own offices and on three different days within three weeks. Although there were interruptions here and there, the researcher was able to complete the interview schedules with the managers. At the end of the session, the researcher assured the managers that the information would be treated with confidentiality.

4.11.2.3 Phase 2: Interview with patients

When it was the turn of patients, it became difficult getting those who participated in Phase 1 and left their contact particulars to be contacted. After discussing the difficulty with the Director of studies, a new group of patients who went through the radiographic procedures in the selected rooms (and were willing to voluntarily participate in the study) was recruited. In total, the researcher recruited six patients for the interview.

The interview procedure was the same as that for the radiographers (see 4.11.2.1 p.108). The interview with patients took place in the researcher's specially arranged office. Participants were reminded that their participation was voluntary and they could decide to withdraw from participating in the study without any negative effect on them. In addition,

any information they provided would be discarded and would not be used whatsoever in the study. They were also assured of their confidentiality and anonymity throughout the study and their names would not appear anywhere in the research. Further, any information they provided would be safely protected by researcher on the encrypted USB Memory sticks (pen-drives); and the researcher's pass-worded laptop. Participants were also given information sheet (Appendix XVI, p.337) which spelt out the aims of the study and consent form (Appendix VI, p.326) for them to sign. Prior to the start of the interview process, the researcher asked the patients about the language they would feel comfortable with and would like the researcher to use. This was done to protect and manage the vulnerable status of the patients. The patients were also encouraged to talk about the subject as frankly and honestly as they knew it. Participants were also reminded that any information they provided would not be regarded as right or wrong. They were also assured of their comfort. Although the interview session for each patient lasted less than 20 minutes, it was difficult to complete more than two interviews for the patients in a day.

The researcher also considered the vulnerability status of the participants as well as the power dynamic relationship and therefore ensured that the positions of the researcher did not play any significant role within the interview. The researcher reminded the participants if they would want to receive a copy of the transcript of the interview. However, none of the patients was willing to collect a copy of the transcript even though they were made aware they could listen to it to see if that was all what they said. The researcher assured them that the information they provided would be treated with confidentiality. At the end of the session, the researcher thanked the participants for their time and willingness to participate voluntarily and to share information with him (Gill et al. 2008).

4.12 Ethical considerations

Every research process is guided by the principles of research ethics. Given that the research topic was not envisaged to be particularly sensitive, no major ethical issues were envisaged to arise in its conduct. However, the researcher was obliged to maintain high ethical standards during the study. As with health service researchers, the researcher was aware to use ethical principles to protect self and research participants from any risk of harm (Holloway & Wheeler 2010); the researcher ensured that appropriate ethical standards

were observed throughout the study (Barbour 2014; Creswell & Plano-Clark 2011). Hence, every effort was made to address all ethical issues for this thesis, including participant information sheets (Appendices V p.324 & XIV p.334) and consent forms (Appendices VI p.326 & XV p.336).

Prior to starting the study, ethical approvals were sought and obtained from the Ethics and Protocol Review Committees of the School of Allied Health Sciences, University of Ghana (Appendix I, p.316) and the Faculty Research Ethics Committee, Sheffield Hallam University (Appendix III, p.319). Permission was also sought and granted from the Premier Hospital involved according to their gate-keeping role (Appendix II, p.318). Although the hospital had given approval for the use of the imaging facility for the study, the researcher again held an informal discussion with the head of the imaging department (gate-keeper) concerning the study, and showed a copy of the approval or permission letter to him (Appendix II, p.318). In addition, participant information sheets were prepared for the radiographers and managers (Appendix XIV, p.334), and patients (Appendix V, p.324) and were made available to the study participants as well as invitation letters to radiographers in charge of the selected imaging rooms (Appendix XVII, p.340). The other ethical measures considered in this study included consent, confidentiality and anonymity, protecting self and participants from harm, privacy and right to withdraw from the study.

4.12.1 Informed consent

The researcher had a moral obligation to strictly consider the rights of the participants who provided the knowledge. Prior to the data collection for the survey, the researcher gave every participant the information sheet after the contents were explained to them. The research processes of ensuring anonymity and confidentiality were also explained to them (Barbour 2014; Holloway & Wheeler 2010). Further, the researcher explained to the participants that they have the right to withdraw from the study at any time if they wish so without any negative effects on their person or the services they received.

In addition, the researcher clarified how the data would be managed and protected. It was also emphasised that the researcher's computer used for the study was protected with password and only the researcher could have access to the computer. Again, they were

informed that only those involved directly with the study would have access to the data gathered. The participants were also informed that a copy of the data would be made available to anyone who wished to discuss any concerns further at the end of the data collection process.

The researcher also met with the radiographers after their usual clinical meeting and arranged time with them in order to discuss the purpose of the study and data collection procedure with them. After close of work, the researcher met with them in one of their clinical meeting rooms. The researcher discussed, explained and demonstrated the procedure for all the processes of data collection, particularly how the radiographers would record data on the designated (RFA and exposure parameter sheets) columns appropriately. In Phase 2, the researcher invited six each of radiographers and patients as well as three managers for the interview session. They voluntarily agreed to participate in the study. Prior to starting the interview session, the researcher gave the information sheet to each of them after it was explained to them and all questions about the study were addressed by the researcher. Consent was also sought and obtained from the participants who signed the form (Appendix XV p.336) after studying it.

The researcher considered it very important to establish trust between the participants and himself and respected them as autonomous beings; thus enabling them to make their own decisions. The researcher also ensured that the relationship between him and the participants was close, based on a position of equality as human beings (Holloway & Wheeler 2010). Thus the interviews took place in an atmosphere of power equality in that the researcher made sure that a participant-centred concept played a central role throughout the interview process (Karnieli et al. 2009). This relationship was built on mutual trust, particularly during the interviews where participants were made to feel able to ask questions.

4.12.2 Anonymity and confidentiality

The participants were assured of anonymity and confidentiality. The researcher guaranteed anonymity by informing and assuring the participants that their identities would not be disclosed. The researcher achieved this by carefully removing the details known to identify

the individual participants outside the research domain, such as names, place of work and area of residence. Again, the researcher assured the participants that the information they provided or shared with him would be kept confidential and only those who were directly involved in this study such as Director of studies and research supervisors as well as those involved in the statistical analysis were privy to the raw data. In addition, the USB storage device (pen-drive) on which the research data files were stored was encrypted and kept under lock in the researcher's drawer. For security sake, the data would also be kept in the researcher's pass-warded laptop. The storage device would be kept for three years in case of any queries about the study after which the device and the data will be destroyed. Again, the hard copies of the data, particularly the interview transcripts, were also kept locked in a separate cabinet from the signed consent forms so that the information could not be linked to a particular participant. The interview transcripts were anonymised with ID codes. In addition, the computers used by the researcher during the study were protected with passwords.

4.12.3 Protection from harm

The researcher informed all the participants that it was not envisaged that the study would be harmful to them in any way; however they might feel anxious or stressful for participating in the interview (Holloway & Wheeler 2012). The researcher was also prepared to debrief the participants as well as provide emotional support in case of any unexpected distressing memories and strong emotions that the interviews might provoke or cause them (Holloway & Wheeler 2010; Butler 2003). The researcher ensured that the participants did not assume the researcher's role as an expert by explaining the study to them. The researcher therefore made a conscious effort to avoid any comment that could make the participants feel power inequality and therefore feel psychologically stressed (Karnieli et al. 2009).

4.12.4 Privacy and right to withdraw

The researcher respected the privacy of the participants which is part of the principle of respect for autonomy, and was also argued to have a close link with confidentiality (Holloway & Wheeler 2010). The participants were reminded that they could withdraw voluntarily from the study without any negative effect, and any information they provided

would be discarded. The patients were made aware that their decision to withdraw from the study would not affect the services delivered to them.

4.13 Data analysis

The data gathered in Phase 1 were analysed using two different methods. The survey and basic quality control (exposure auditing) data were analysed quantitatively using Statistical Package for the Social Sciences (SPSS) software version 21.0. The results were displayed using tables, frequency distributions, percentages and graphs for pictorial presentation of information as suggested by Burns & Grove (2005). In addition, ANOVA analysis, including three-way analysis, was performed to assess any significant difference or relationships existing between the variables employed in the questionnaire. The outcomes were presented in tabular forms (Results Chapter).

Again, the RFA data was analysed descriptively using the standard formula,

$$\text{Reject Rate} = \frac{\text{Number of rejected films}}{\text{Total number of films used}} \times 100\% \quad (\text{Zewdeneh 2008}).$$

4.13.1 Interview data analysis

Interview data analysis requires that the researcher becomes immersed in the data. The immersion in the raw data began with the interview transcription whereby the researcher transcribed verbatim and then tried to draw out some key ideas and recurrent themes (Barbour 2014). The researcher read and re-read the entire interview, identifying several topics which became primary categories or labelled categories and manually reduced into themes, codes and/or phrases, which were analysed using content analysis (Turner 2010). The researcher decided to use the manual method over a computer software programme such as NVivo to manage the data analysis process because the datasets were not large. In addition, the researcher needed to undertake additional training to be able to efficiently use the software; and given the study timeframe it was imperative to use the manual process (Burnard et al. 2008). According to Rossman and Rallis (2012), the process of interview data analysis involved assigning meaning to the data by labelling, coding, and categorizing; building analytic descriptions, finding patterns and constructing themes. Kvale (2007) noted that the themes or codes should be consistent phrases, expressions, or ideas that are common among the study participants.

4.13.2 Thematic data analysis process

This qualitative data analysis method is a manual and an iterative approach which allowed the researcher to examine the interview (textual) data and identify the main themes as to the way they were expressed and the actual words used in the interviews (Barbour 2014). In this analysis, the researcher attempted to develop coding frames, out of which he developed codes, sub-categories and themes (Barbour 2014; Hsieh & Shannon 2005). This was done in order to reduce the volume of the textual data.

The researcher kept revising the data in order to interrogate themes and build up explanations. By so doing concepts were developed and the researcher analysed these concepts in order to find the commonalities and/or differences abiding with these concepts. Then, a combination of deductive and inductive approach was utilized to construct the ideas contributed by the research participants in relation to the existing or reviewed literature.

4.14 Summary

This chapter described the methodology and research design; and elaborated on the mixed methods designs. The chapter also discussed the pragmatic paradigm and its key elements as well as critical areas of the pragmatic paradigm. It also highlighted on the justification of the methodological choices and again presented the research aims, questions and objectives.

The chapter also discussed the research design process and explained the sequential explanatory design and its strengths and limitations. In addition, the chapter described the multiple data collection methods and the research setting. The research phases were discussed as well as the implementation of the phases.

The design of data collection instruments was discussed, including patient satisfaction survey, RFA data collection sheet, QC data collection sheet, and semi-structured interview schedules. The chapter also highlighted the reliability, validity, transferability and dependability as well as rigour and trustworthiness concepts and their appropriateness in research process. Sampling methods and sampling techniques, including sample size were discussed.

The data collection processes, including patient satisfaction surveys, RFA and QC data collection processes and interviewing with radiographers, managers and patients were highlighted.

The chapter highlighted the ethical considerations which ensured that the researcher maintained high ethical standards throughout the research process. The ethical issues regarding the study were addressed in-depth by obtaining approval from institutions involved in the study, and also ensuring research participants' informed consent.

The chapter also discussed the data analysis using SPSS software to analyse quantitative data; as well as descriptive analysis of RFA data and finally, thematic data analysis of the qualitative or textual data.

CHAPTER FIVE

Phase 1 - Results

5.1 Introduction

The chapter presents the results of the quantitative phase of the research; namely the patient satisfaction survey and the baseline quality control data from the three (3) selected X-ray rooms in the study setting. The chapter also presents the demographic characteristics of the participants in the survey, and determinants of reject rates. The data was analysed using SPSS for descriptive statistics, ANOVA and scatter plots in SPSS statistics for mean differences and interactions between variables, and error bar plots of exposure parameters for DRLs. The demographic results were presented in a graphical form or pictorial forms as suggested by Burns & Grove (2005). The rest of the results were displayed using tables, percentages and graphs for pictorial presentation of information.

5.2 Patient satisfaction Survey

5.2.1 Demographic details of respondents

The total of 90 participants, sampled between five weeks (2nd June to 4th July 2014), voluntarily consented to participate in the study. The participants' demographic details included age, gender, education and occupational statuses, as well as ethnic and religious backgrounds.

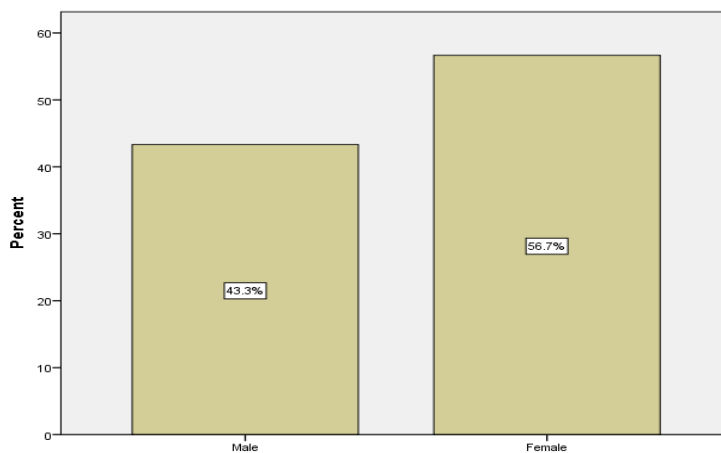


Figure 5.1 Gender of patients

Figure 5.1 demonstrated that 56.7% (n=51/90) of the participants constituted females and 43.3% (n=39/90) males.

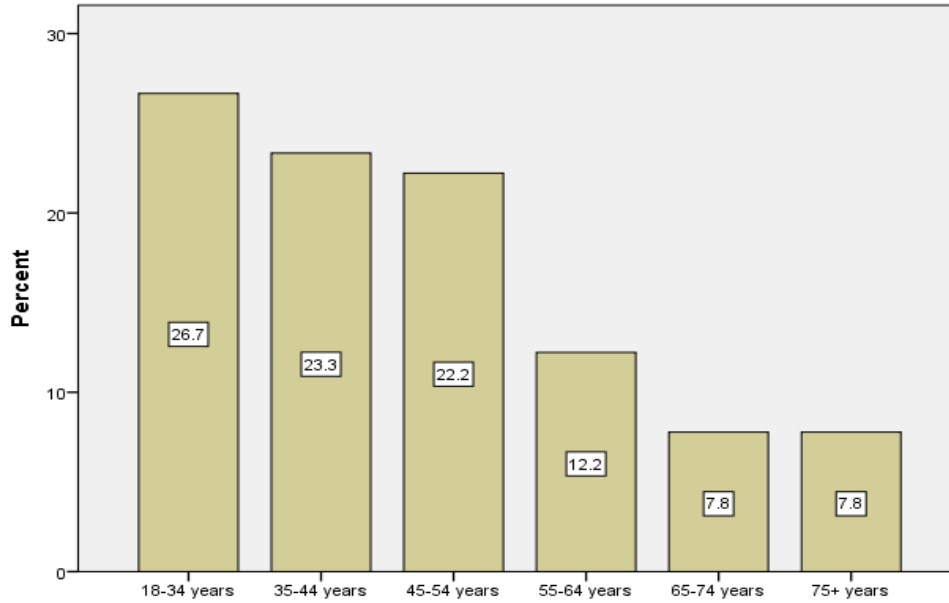


Figure 5.2 Age groupings of patients

In the figure 5.2, majority of the participants (26.7%, n=24) were within the age group of 18-34 years; 23.3% (n=21) and 22.2% (n=20) fell in the age groups of 35-44 and 45-54 respectively. 12.2% (n=11) of the participants fell in the age group of 55-64 while 7.8% (n=7) each of the participants were recorded in the age groups of 65-74 and 75+ respectively.

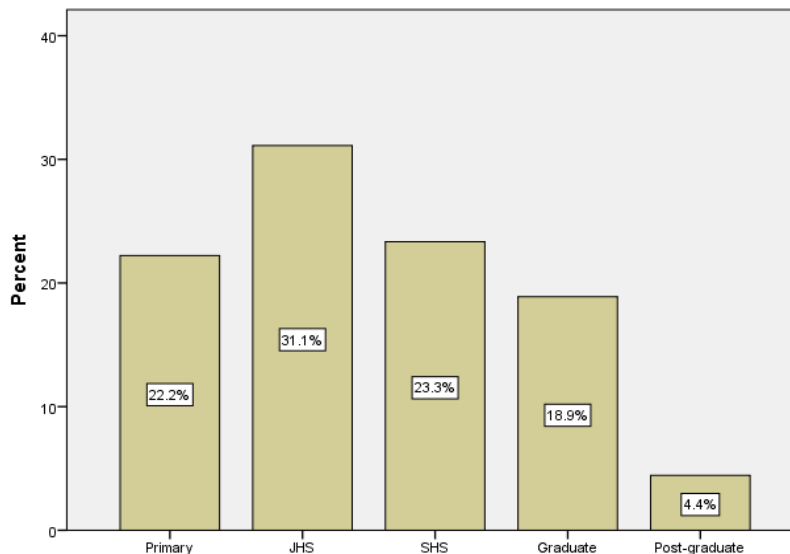


Figure 5.3 Educational status of patients

The figure showed 22.2% (n=20) of the participants attended primary education; 31.1% (n=28) attended Junior High School while 23.3% (n=21) reached Senior High Secondary. Again, 18.9% (n=17) of the participants attained graduate level of education and 4.4% (n=4) attained post-graduate education.

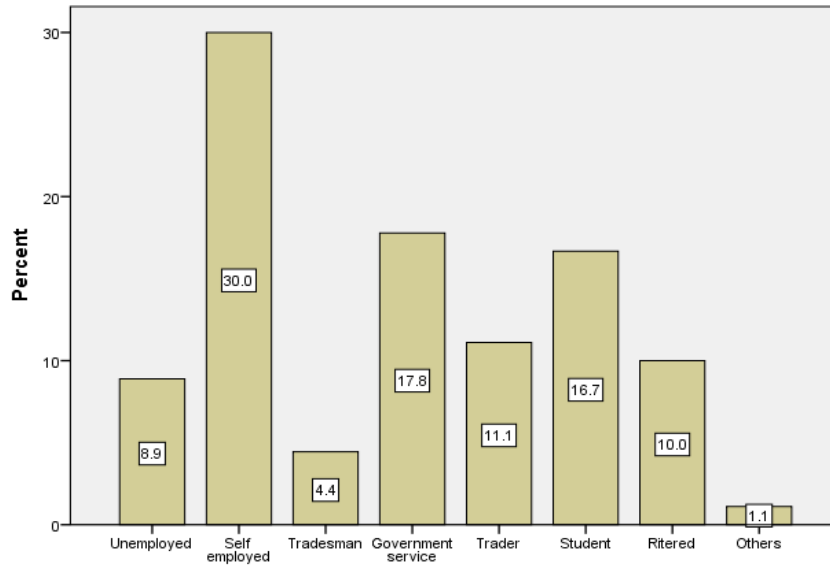


Figure 5.4 Occupational status of patients

The figure 5.4 showed 30.0% (n=27) of the participants were self-employed; 17.8% (n=16) of them were within the government service, while 16.7% (n=15) of the participants were students.

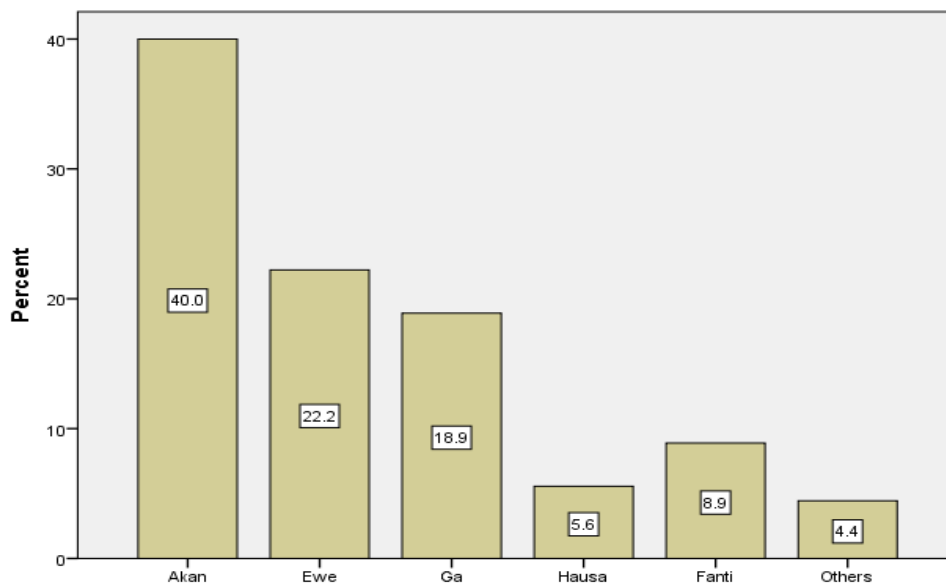


Figure 5.5 Ethnic Background of Patients

Figure 5.5 revealed that majority (40.0%, n=36) of the participants were Akan extract; 22.2% (n=20) were Ewe ethnic tribes; while Ga ethnic tribes formed 18.9% (n=17). The rest of participants were Fanti (8.9%, n=8), Hausa (5.6%, n=5), and other ethnic tribes (4.4%, n=4).

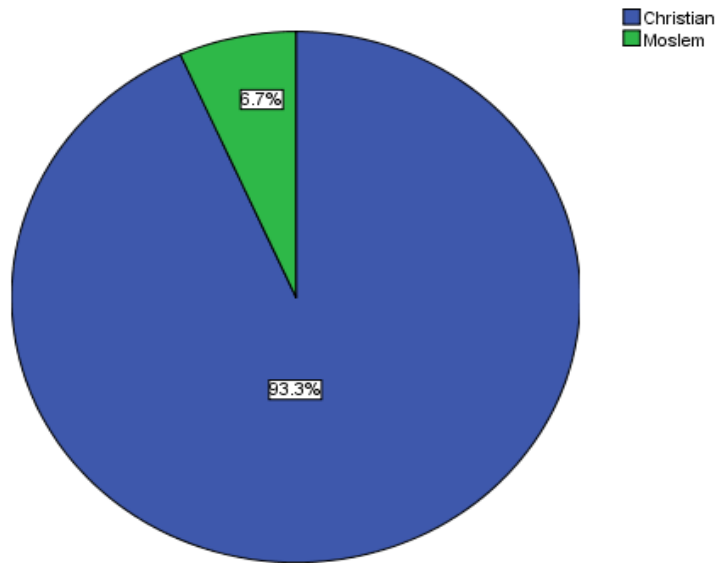


Figure 5.6: Religious background of patients

The figure illustrated the religious backgrounds of the participants, with Christians constituted majority (93.3%, n=84) and Moslems constituted 6.7% (n=6).

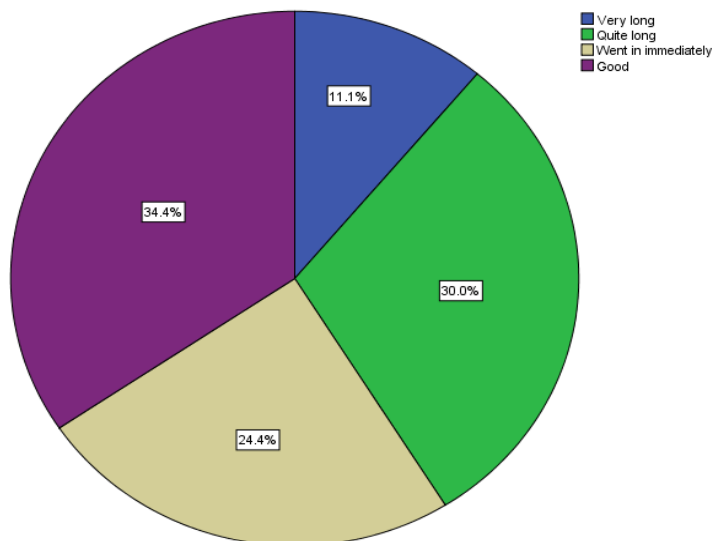


Figure 5.7 Waiting Time

The figure showed majority of the participants (34.4%, n=31) indicated the waiting time was good; 41.1% (n=37) recorded the waiting time was either quite long or very long; 24.4% (n=22) indicated they were attended to immediately.

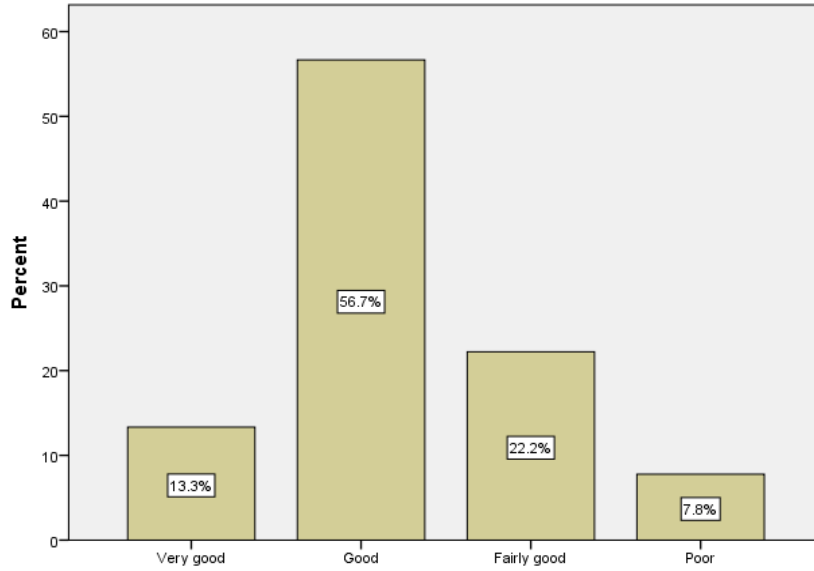


Figure 5.8 Impression about waiting area

Figure 5.8 highlighted the participants' impression about the waiting area with majority (70.0%, n=63) indicating the waiting area was either good or very good; 22.2% (n=20) recorded the waiting area as fairly good while 7.8% (n=7) indicated waiting area was poor.

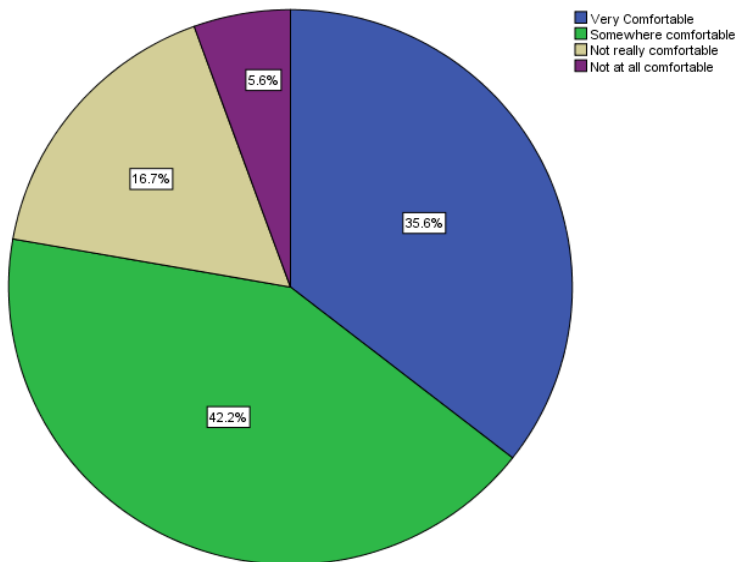


Figure 5.9 Comfort at waiting area

In figure 5.9, majority (77.8%, n=70) of participants reported they were either somewhat comfortable or very comfortable at the waiting area, while 22.3% (n= 20) indicated they were either not really comfortable or not at all comfortable at the waiting area.

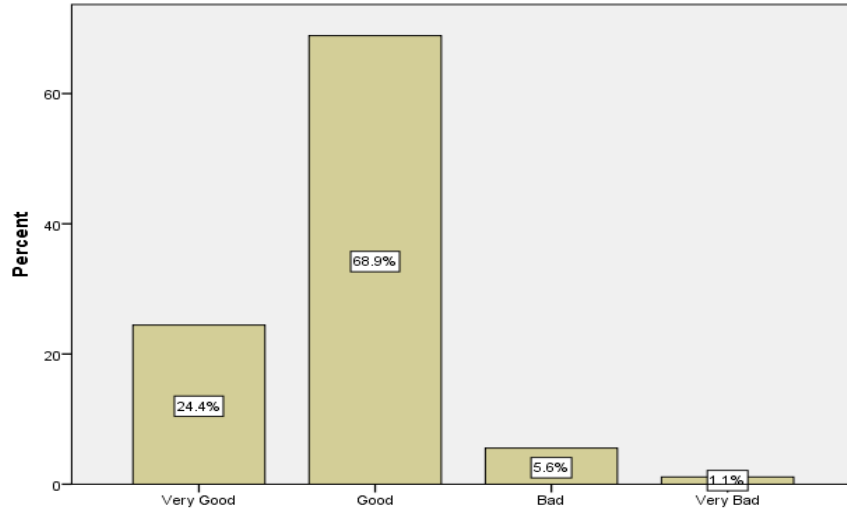


Figure 5.10 Cleanliness of waiting area

Figure 5.10 showed majority of the participants (93.3%, n=84) reported cleanliness of waiting area was either good or very good, while 6.7% (n=7) reported cleanliness of the area was either bad or very bad.

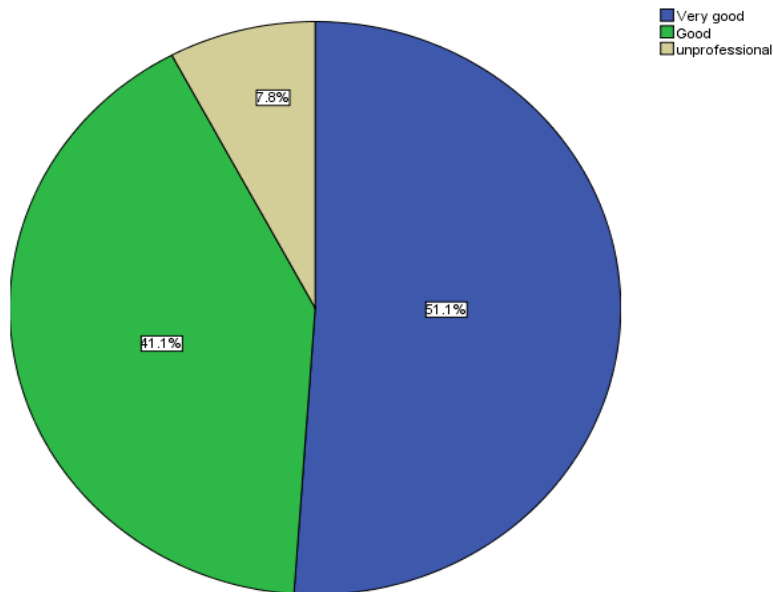


Figure 5.11 Attitude of the Radiographer in the examination room

The figure illustrated the participants' experience with the radiographer in the examination room whereby a majority of 51.1% (n=46) indicated that the attitude of the radiographer was very good; 41.1% (n=37) indicated the attitude was good, while 7.8% (n=7) of the participants expressed the view that the radiographer's attitude was unprofessional.

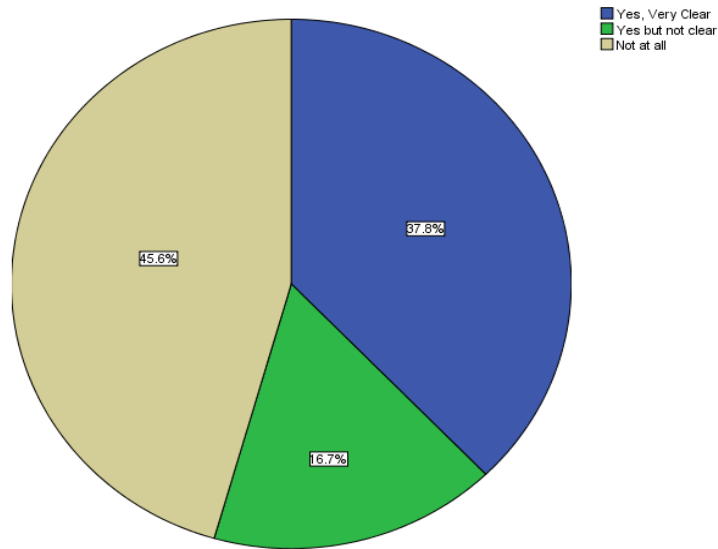


Figure 5.12 Explanation of examination

The figure illustrated the explanation of the examination by the radiographer to the participants whereby 45.6% (n=41) indicated the examination was not explained to them at all, while 54.5% (37.8% +16.7%, n=49) indicated they received an explanation which was very clear to 37.8% (n=34) while 16.7% (n=15) were not clear with the explanation.

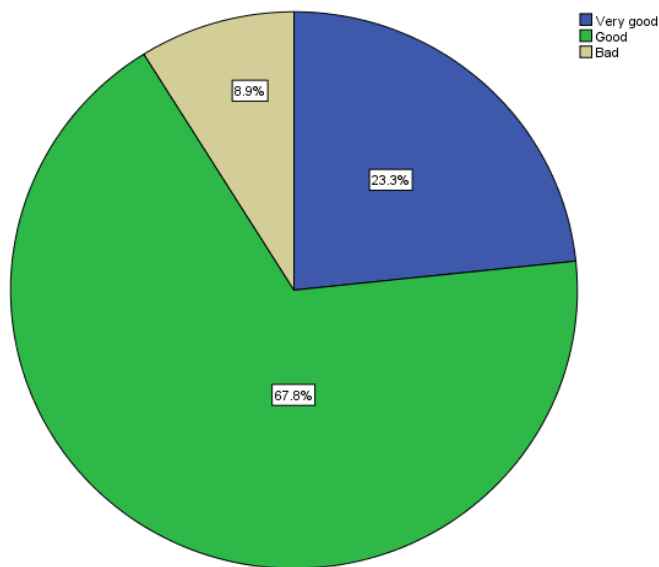


Figure 5.13 Caring Concern of Radiographer

The figure showed that 67.8% (n=61) of the participants indicated the caring concern of the radiographer was very good; 23.3% (n=21) reported the radiographer caring concern was good while 8.9% (n=8) recorded the caring as bad.

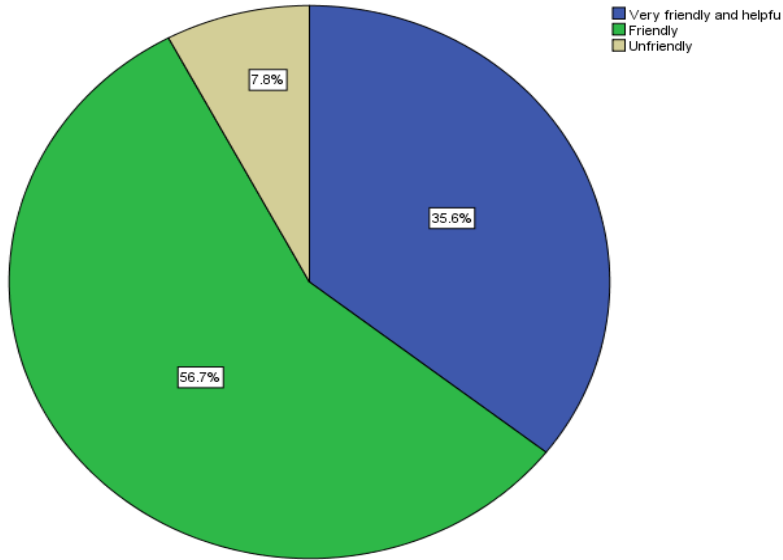


Figure 5.14 Impression about the Radiographer

The figure showed most of the participants (56.7%, n=51) indicated the radiographer was friendly; 35.6% (n=32) showed that the radiographer was friendly and helpful, while 7.8% (n=7) were of the view that the radiographer was unfriendly.

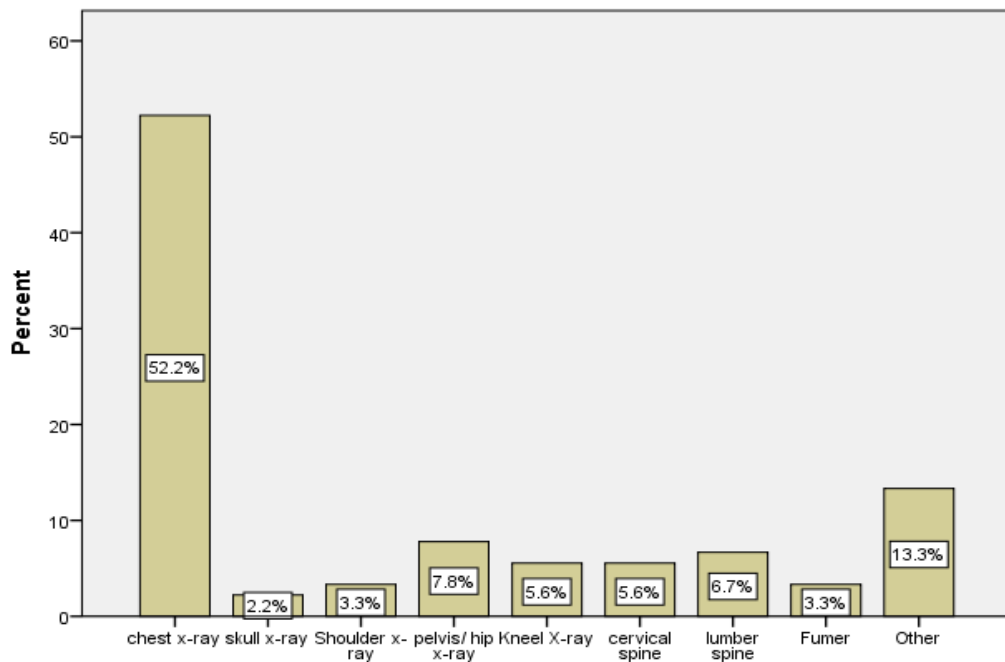


Figure 5.15 Type of X-ray request

The figure showed chest X-ray formed the largest (52.2%, n=47) request or case performed, with the rest of the requests constituting 47.8% (n=43).

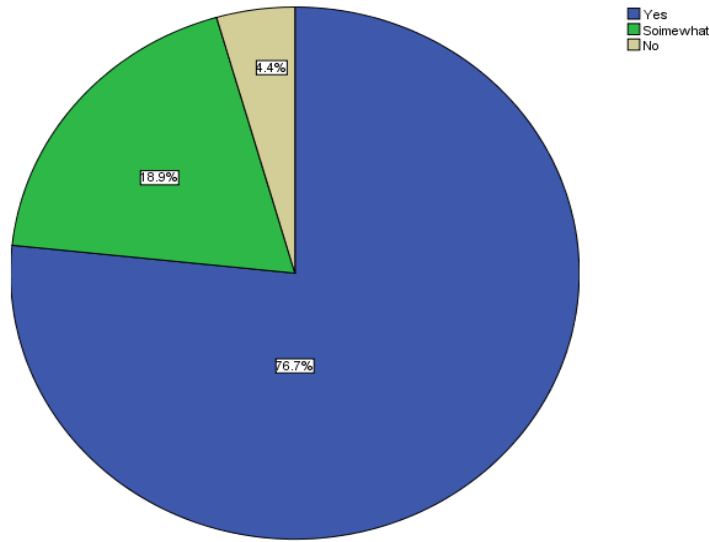


Figure 5.16 Patient's privacy in the exam room

Figure 5.16 showed that majority of the participants (76.7%, n=69) agreed that they were given privacy in the examination room, while 18.9% (n=17) of the respondents indicated they were somewhat given privacy and 4.4% (n=4) were not given privacy in the room.

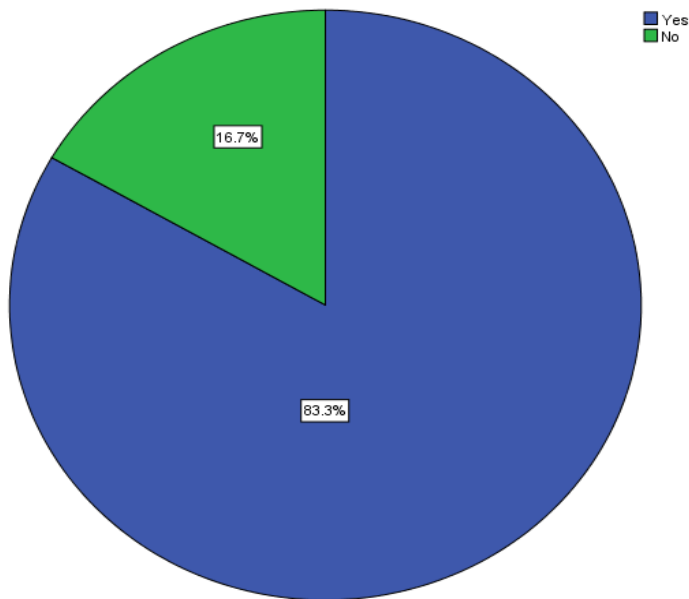


Figure 5.17 Information about examination report collection

The figure demonstrated 83.3% (n=75) of the participants were informed about collection of the report while 16.7% (n=15) indicated that they were not informed about the availability of the report collection.

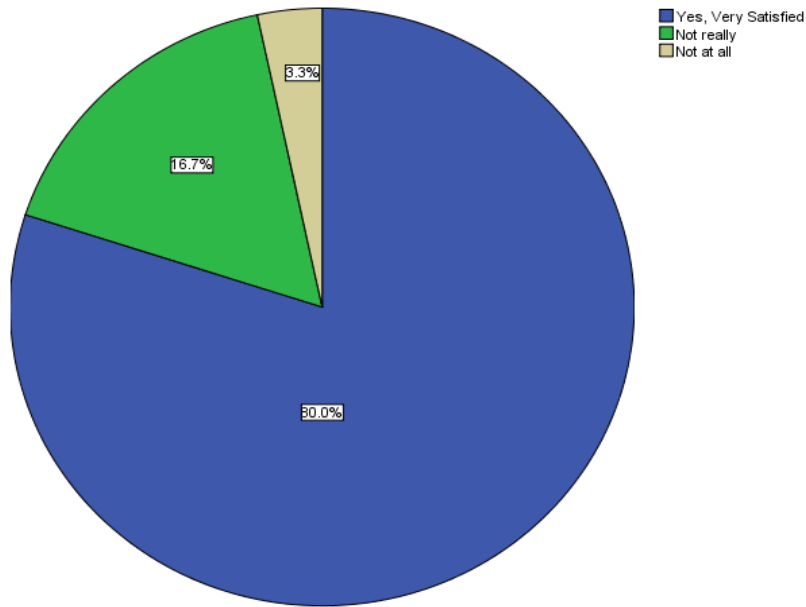


Figure 5.18 Patient's satisfaction with thoroughness of exam

Figure 5.18 highlighted 80.0% (n=72) of the participants were very satisfied with the thoroughness of the examination; 16.7% (n=15) were not really satisfied, and 3.3% (n=3) were dissatisfied with the thoroughness of the examination.

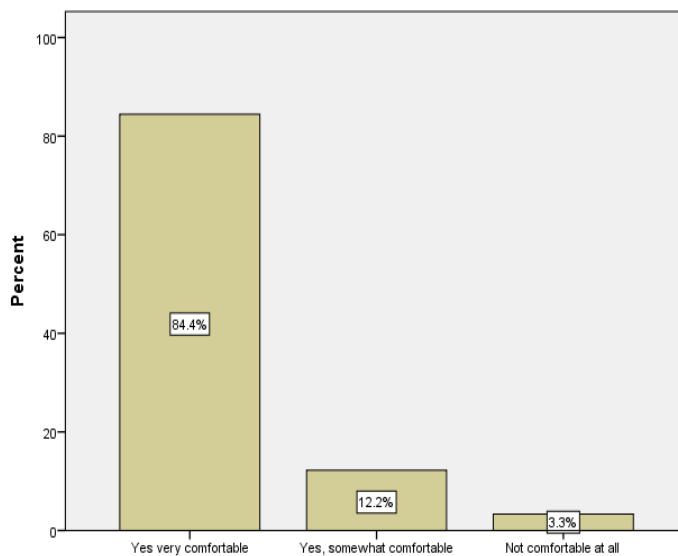


Figure 5.19 Comfortability with the medium of communication

Figure 5.19 demonstrated that 84.4% (n=76) of the participants were very comfortable with the medium of communication; 12.2% (n=11) were somewhat comfortable while 3.3% (n=3) were not comfortable at all with the medium of communication.

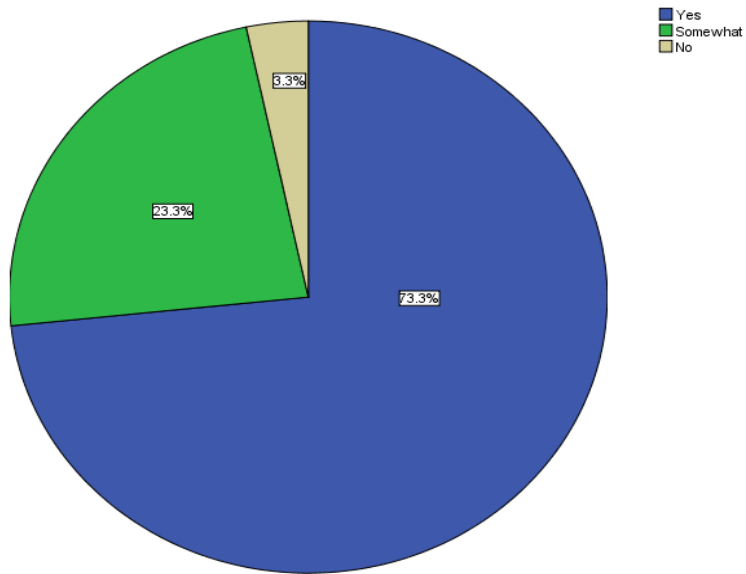


Figure 5.20 Expectation of level of care received

In figure 5.20, majority of the participants (73.3%; n= 66) agreed that their expectations of care were largely met while 3.3% (n=3) indicated their expectations were not realised.

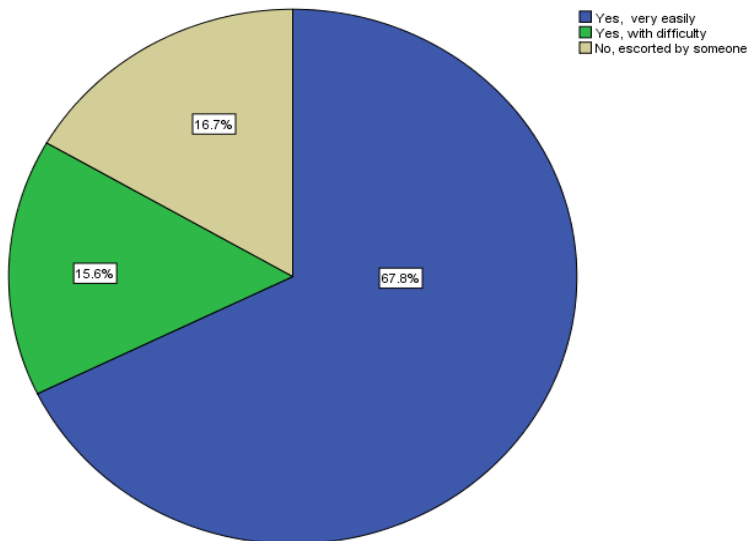


Figure 5.21 Ease of locating the department

In figure 5.21, 67.8% (n=61) of the participants easily located the imaging facility; 15.6% (n=14) located the facility with difficulty, and 16.7% (n=15) were escorted by someone to the department.

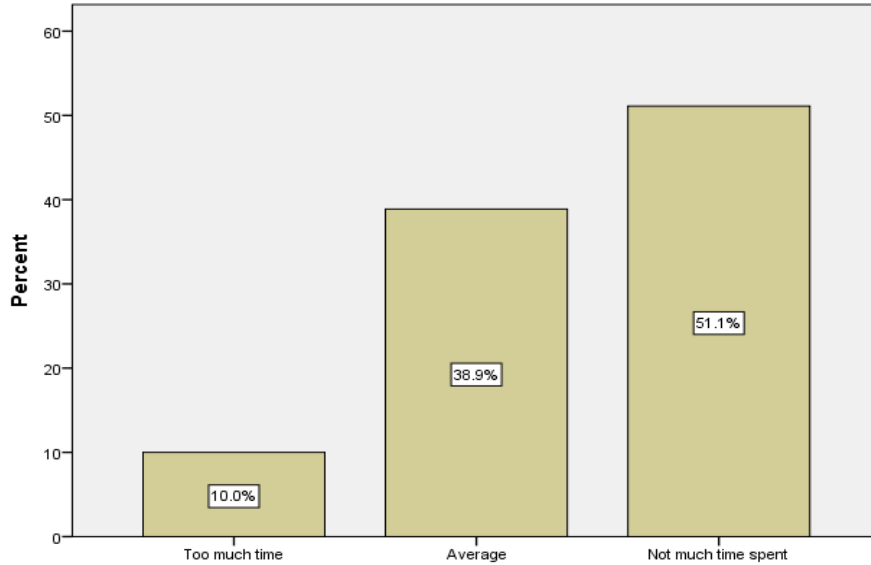


Figure 5.22 Views about time spent on the exams procedure

The figure showed the majority of the participants (51.1%, n=46) indicated not much time was spent during the examination, while 11.1% (n=10) were of the view that too much time was spent.

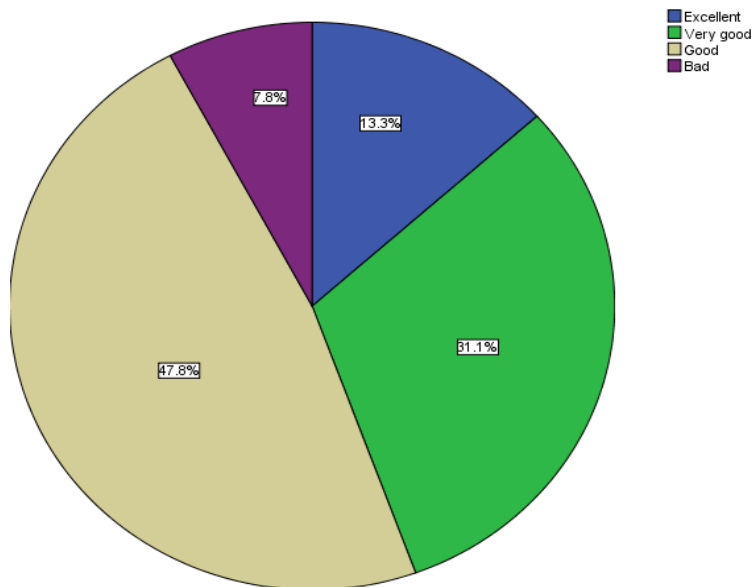


Figure 5.23 Overall comfort

Figure 5.23 illustrated 47.8% (n=43) of the participants indicated their overall comfort was good while 31.1% (n=28) indicated overall comfort was very good. In addition, 13.3% (n=12) experienced excellent overall comfort and 7.8% (n=7) were of the view that the level of overall comfort was bad.

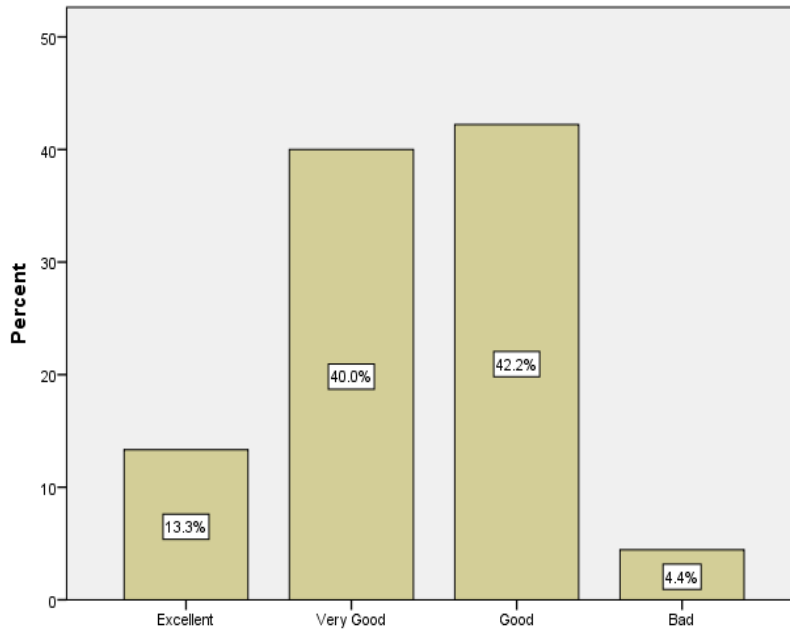


Figure 5.24 Overall satisfaction with practice procedure

Figure 5.24 showed that 42.2% (n=38) of the participants had good overall satisfaction with service provision procedure; 40.0% (n=36) had very good overall satisfaction while 4.4% (n=4) were dissatisfied with the service procedure.

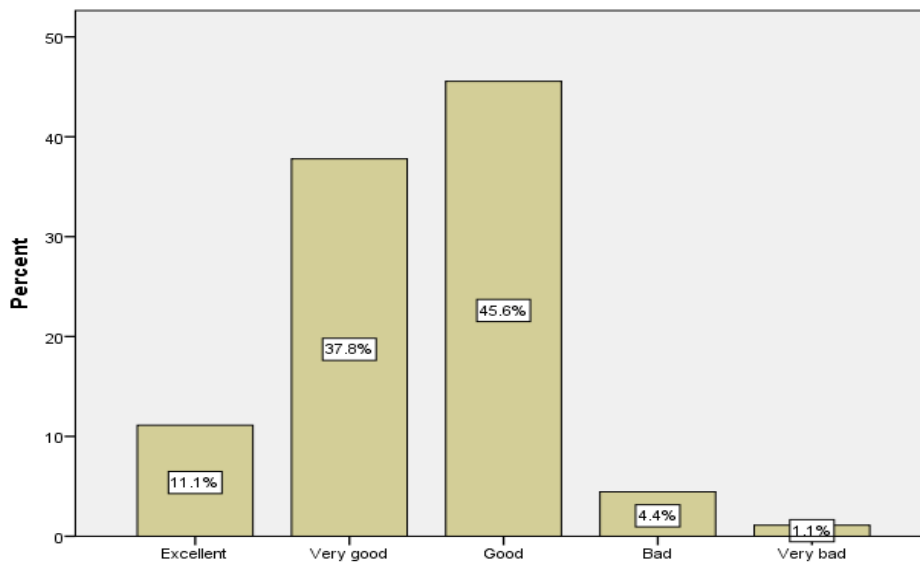


Figure 5.25 Overall satisfaction with service delivery

The figure illustrated 45.6% (n=41) of the participants reported their overall satisfaction with the service delivery was good; 37.8% (n=34) of them indicated overall satisfaction was very good and 11.1% (n=10) reported the overall satisfaction was excellent.

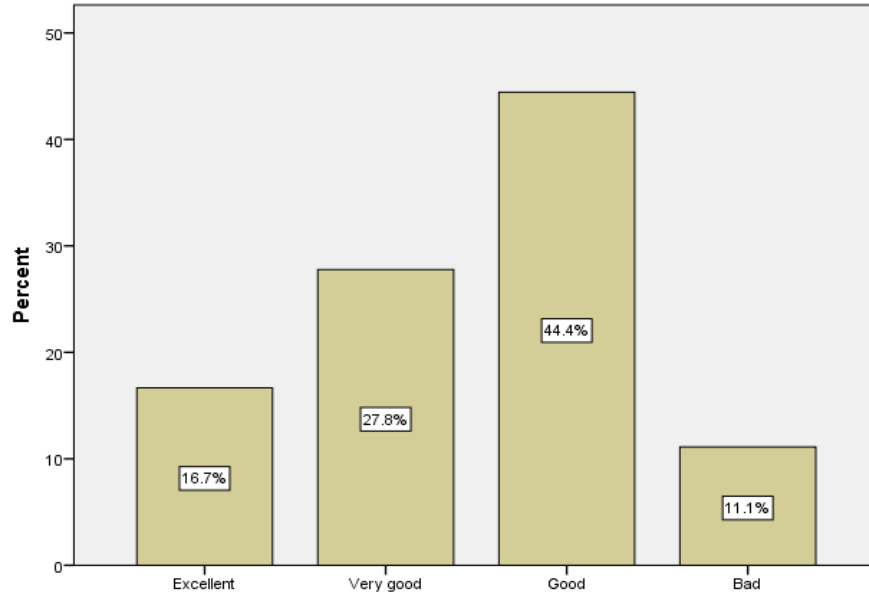


Figure 5.26 Overall impression about service provision

Figure 5.26 showed 88.9% (n=80) of the participants indicated overall impression about the service delivery was either good, very good or excellent; and 11.1% (n=10) indicated their overall impression about service delivery was bad.

Table 5.1 ANOVA: Overall satisfaction with service delivery – demographics

Variables		Sum of Squares	df	Mean Square	F	Sig.
Gender of patients	Between Groups	.471	4	.118	.463	.763
	Within Groups	21.629	85	.254		
	Total	22.100	89			
Age groupings of patients	Between Groups	5.878	4	1.470	.603	.662
	Within Groups	207.244	85	2.438		
	Total	213.122	89			
Educational status of patients	Between Groups	4.770	4	1.193	.876	.482
	Within Groups	115.685	85	1.361		
	Total	120.456	89			
Occupational status of patients	Between Groups	6.842	4	1.711	.424	.791
	Within Groups	342.813	85	4.033		
	Total	349.656	89			
Ethnicity	Between Groups	8.592	4	2.148	.962	.433
	Within Groups	189.730	85	2.232		
	Total	198.322	89			
Religious Background of patients	Between Groups	.212	4	.053	.837	.505
	Within Groups	5.388	85	.063		
	Total	5.600	89			

Table 5.1 showed that participants' demographic characteristics or status did not have any significant influence on their overall satisfaction with the service delivery.

Table 5.2 ANOVA: Overall satisfaction with service delivery

Variables		Sum of Squares	df	Mean Square	F	Sig.
Waiting time	Between Groups	19.587	4	4.897	5.508	.001
	Within Groups	75.569	85	.889		
	Total	95.156	89			
Impression about waiting area	Between Groups	9.700	4	2.425	4.589	.002
	Within Groups	44.922	85	.528		
	Total	54.622	89			
Comfort at waiting area	Between Groups	15.975	4	3.994	6.725	.000
	Within Groups	50.480	85	.594		
	Total	66.456	89			
Cleanliness of waiting area	Between Groups	4.833	4	1.208	4.340	.003
	Within Groups	23.667	85	.278		
	Total	28.500	89			
Attitude of the Radiographer	Between Groups	11.022	4	2.755	9.339	.000
	Within Groups	25.078	85	.295		
	Total	36.100	89			
Explanation of the examination	Between Groups	6.286	4	1.572	1.960	.108
	Within Groups	68.169	85	.802		
	Total	74.456	89			
Caring concern of radiographer	Between Groups	4.324	4	1.081	4.030	.005
	Within Groups	22.798	85	.268		
	Total	27.122	89			
Impression about the Radiographer	Between Groups	9.053	4	2.263	8.363	.000
	Within Groups	23.002	85	.271		
	Total	32.056	89			
Type of X-ray request	Between Groups	40.003	4	10.001	.836	.506
	Within Groups	1016.619	85	11.960		
	Total	1056.622	89			
Patient's privacy in the examination room	Between Groups	.677	4	.169	.567	.687
	Within Groups	25.378	85	.299		
	Total	26.056	89			
Information about exams report collection	Between Groups	.220	4	.055	.380	.822
	Within Groups	12.280	85	.144		
	Total	12.500	89			

Table 5.2 showed strong significant correlations between participants' overall satisfaction with service delivery and waiting time, impression about waiting area, comfort at waiting

area, cleanliness of waiting area, attitude of the radiographer, caring concern of radiographer and impression about the radiographer. However, type of X-ray request, patient privacy in examination room and information about exams report collection did not have any significant impact participants' overall satisfaction.

Table 5.3 ANOVA: Overall satisfaction with service delivery

Variables		Sum of Squares	df	Mean Square	F	Sig.
Patients satisfaction with the thoroughness of the exams	Between Groups	4.145	4	1.036	4.906	.001
	Within Groups	17.955	85	.211		
	Total	22.100	89			
Comfortability with the medium of communication	Between Groups	.791	4	.198	.885	.477
	Within Groups	18.998	85	.224		
	Total	19.789	89			
Expectation of the level of care received by the patient	Between Groups	5.553	4	1.388	6.232	.000
	Within Groups	18.936	85	.223		
	Total	24.489	89			
Ease of location of facility	Between Groups	2.908	4	.727	1.247	.298
	Within Groups	49.580	85	.583		
	Total	52.489	89			
Views on time spent on the exams procedure	Between Groups	4.173	4	1.043	2.490	.049
	Within Groups	35.616	85	.419		
	Total	39.789	89			
Overall Comfort	Between Groups	19.980	4	4.995	10.478	.000
	Within Groups	40.520	85	.477		
	Total	60.500	89			
Overall impression about service provision	Between Groups	36.665	4	9.166	21.742	.000
	Within Groups	35.835	85	.422		
	Total	72.500	89			

Table 5.3 showed significant influences between participants' overall satisfaction with service delivery and patient's satisfaction with thoroughness of exams, expectation of care received, time spent on exam procedure, overall comfort and impression about service provision.

Table 5.4 ANOVA-Post Hoc Test: Overall satisfaction with service delivery

Variables		Sum of Squares	df	Mean Square	F	Sig.
Waiting time	Between Groups	19.587	4	4.897	5.508	.001
	Within Groups	75.569	85	.889		
	Total	95.156	89			
Impression about waiting area	Between Groups	9.700	4	2.425	4.589	.002
	Within Groups	44.922	85	.528		
	Total	54.622	89			
Comfort at waiting area	Between Groups	15.975	4	3.994	6.725	.000
	Within Groups	50.480	85	.594		
	Total	66.456	89			
Cleanliness of waiting area	Between Groups	4.833	4	1.208	4.340	.003
	Within Groups	23.667	85	.278		
	Total	28.500	89			
Attitude of the Radiographer	Between Groups	11.022	4	2.755	9.339	.000
	Within Groups	25.078	85	.295		
	Total	36.100	89			
Caring concern of radiography staff	Between Groups	4.324	4	1.081	4.030	.005
	Within Groups	22.798	85	.268		
	Total	27.122	89			
Impression about the Radiographer	Between Groups	9.053	4	2.263	8.363	.000
	Within Groups	23.002	85	.271		
	Total	32.056	89			
Patients satisfaction with the thoroughness of the exams	Between Groups	4.145	4	1.036	4.906	.001
	Within Groups	17.955	85	.211		
	Total	22.100	89			
Expectation of the level of care received by the patient	Between Groups	5.553	4	1.388	6.232	.000
	Within Groups	18.936	85	.223		
	Total	24.489	89			
Views on time	Between Groups	4.173	4	1.043	2.490	.049

spent on the exams procedure	Within Groups	35.616	85	.419		
	Total	39.789	89			
Overall Comfort	Between Groups	19.980	4	4.995	10.478	.000
	Within Groups	40.520	85	.477		
Overall impression about service provision	Total	60.500	89			
	Between Groups	36.665	4	9.166	21.742	.000
	Within Groups	35.835	85	.422		
	Total	72.500	89			

Table 5.4 showed that all the variables have strong significant influences on participants' overall satisfaction with the service delivery. This means that all the variables contributed largely to the participants' overall satisfaction with the service delivery.

Table 5.5: ANOVA: ‘Between-Subjects Factors’- Independent variables

Dependent Variable: Overall satisfaction with service delivery

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	33.411 ^a	26	1.285	3.522	.000	.592
Intercept	213.760	1	213.760	585.799	.000	.903
W1	3.806	3	1.269	3.477	.021	.142
W2	3.364	3	1.121	3.073	.034	.128
W3	5.064	3	1.688	4.626	.005	.181
W1 * W2	4.220	5	.844	2.313	.054	.155
W1 * W3	1.129	4	.282	.773	.547	.047
W2 * W3	2.817	3	.939	2.573	.062	.109
W1 * W2 * W3	.000	0000
Error	22.989	63	.365			
Total	604.000	90				
Corrected Total	56.400	89				

a. R Squared = .592. Independent: W1- Length of waiting time; W2- Impression about waiting area; W3- Comfort at waiting area

Table 5.5 showed three-way ANOVA to determine if there was interaction effect between the three independent variables (W1/W2/W3) and overall satisfaction with service delivery. For W1 – there was significant interaction effect on overall satisfaction with service delivery; ($F(26, 63) = 3.522, p < .021, \text{partial } \eta^2 = .592$) (where $\text{partial } \eta^2 = \text{magnitude of effect}$).

For W2 – there was significant interaction effect on overall satisfaction with service delivery; ($F(26, 63) = 3.522, p < .034, \text{partial } \eta^2 = .592$)

For W3 – there was strong influence on overall satisfaction with service delivery; ($F(26, 63) = 3.522, p < .005, \text{partial } \eta^2 = .592$)

There was significant effect between W1+W2 and overall satisfaction with service delivery. Confirmation of these relationships is represented by scatter plots (Appendix XIX p. 342).

Table 5.6: ANOVA: ‘Between-Subjects Factors’: Independent variables

Dependent Variable: Overall satisfaction with service delivery

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	23.667 ^a	16	1.479	3.299	.000	.420
Intercept	163.382	1	163.382	364.370	.000	.833
E1	3.525	2	1.762	3.930	.024	.097
E2	.420	2	.210	.469	.628	.013
E3	1.749	2	.874	1.950	.150	.051
E1 * E2	.833	3	.278	.620	.605	.025
E1 * E3	.243	3	.081	.180	.909	.007
E2 * E3	.096	2	.048	.107	.899	.003
E1 * E2 * E3	.363	1	.363	.810	.371	.011
Error	32.733	73	.448			
Total	604.000	90				
Corrected Total	56.400	89				

a. R Squared = .420. Independent: E1- Attitude of radiographer; E2- Explanation of examination; E3- Caring by radiographer

Table 5.6 indicated three-way ANOVA to determine if there were interaction effects between the three independent variables (E1+E2+E3) and patients’ overall satisfaction with service delivery.

For E1 – significant effects existed and accounted for patients’ overall satisfaction with service delivery; ($F(16, 73) = 3.299, p < .024, \text{partial } \eta^2 = .420$)

There was no significant effect between the rest of the variables and overall satisfaction.

Table 5.7: ANOVA: ‘Between-Subjects Factors’: Independent variables

Dependent Variable: Overall satisfaction with service delivery

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	18.421 ^a	13	1.417	2.836	.002	.327
Intercept	163.031	1	163.031	326.242	.000	.811
E3	5.168	2	2.584	5.170	.008	.120
E8	1.824	2	.912	1.825	.168	.046
E10	.312	2	.156	.312	.733	.008
E3 * E8	.599	2	.299	.599	.552	.016
E3 * E10	1.887	2	.944	1.888	.158	.047
E8 * E10	.807	1	.807	1.615	.208	.021
E3 * E8 * E10	.000	0000
Error	37.979	76	.500			
Total	604.000	90				
Corrected Total	56.400	89				

a. R Squared = .327. Independent: E3- Caring by radiographer; E8- thoroughness of examination procedure; E10- expected care

Table 5.7 showed three-way ANOVA that determined if there were interaction effects between the three independent variables (E3+E8+E10) and overall satisfaction with delivery.

For E3 – there was significant interaction effect that influenced patients’ overall satisfaction with the service delivery; $F(13, 76) = 2.836, p < .008$, partial $\eta^2 = .327$)

There was no significant interaction effect between the rest of the independent variables and patients’ overall satisfaction with service delivery.

Table 5.8: ANOVA: ‘Between-Subjects Factors’: Independent variables

Dependent Variable: Overall satisfaction with service delivery

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	35.833 ^a	22	1.629	5.306	.000	.635
Intercept	148.369	1	148.369	483.337	.000	.878
F2	1.214	2	.607	1.977	.146	.056
F3	.145	3	.048	.157	.925	.007
OSP1	7.776	3	2.592	8.444	.000	.274
F2 * F3	1.000	4	.250	.815	.520	.046
F2 * OSP1	1.837	5	.367	1.197	.320	.082
F3 * OSP1	1.456	3	.485	1.581	.202	.066
F2 * F3 * OSP1	.576	1	.576	1.877	.175	.027
Error	20.567	67	.307			
Total	604.000	90				
Corrected Total	56.400	89				

a. R Squared = .635. Independent: F2- time spent; F3- overall comfort; OPS1- practice procedure

Table 5.8 revealed three-way ANOVA that determined if there were interaction effects between the three independent variables (F2+F3+OSP1) and patients’ overall satisfaction with service delivery.

For OPS1 – there was significant interaction effect that influenced patients’ overall satisfaction with service delivery; $F(22, 67) = 5.306, p < .0005, \text{partial } \eta^2 = .635$

There was no significant interaction effect between the rest of the independent variables and patients’ overall satisfaction with service delivery.

5.3 Reject film analysis as a quality indicator

5.3.1 Determinants of reject rates

A reject rate had been defined as the number of rejected films, expressed as a percentage of the total number of films used during the period; thus the

$$\text{Reject Rate} = \frac{\text{Number of rejected films}}{\text{Total number of films used}} \times 100\% \quad (\text{Zewdeneh 2008}).$$

Table 5.9 Results of Reject Analysis - Room1

Chest Room			
Causes/Reasons	No. of Rejects	Reject Percent	Reject Rate (%)
Over-exposed film	10	23.80	3.41
Under-exposed film	6	14.29	2.05
Position error	1	2.38	0.34
Centring error	0	0.0	0.0
Patient motion	12	28.57	4.10
Darkroom fog	7	16.70	2.39
Cassette fog	2	4.76	0.68
Static	0	0.0	0.0
Artefact	3	7.14	1.02
Mechanical	1	2.38	0.34
Other	0	0.0	0.0
Total Rejects	42	100.0	
Good film	251		
Total films	293		Reject Rate: 14.33%

Table 5.9 highlighted percentages of individual causes of rejected films, reject rates for individual causes and the overall reject rate of 14.33% in the X-ray Room 1.

Table 5.10 Results of Reject Analysis – Room2

General Room			
Causes/Reasons	No. of Rejects	Reject Percent	Reject Rate (%)
Dark film	14	26.9	4.52
Light film	13	25.0	4.19
Position error	6	11.5	1.93
Centring error	0	0.0	0.0
Patient motion	8	15.3	2.58
Darkroom fog	0	0.0	0.0
Cassette fog	1	1.9	0.32
Static	0	0.0	0.0
Artefact	6	11.5	1.93
Mechanical	4	7.7	1.29
Other	0	0.0	0.0
Total Rejects	52	100.0	
Good film	258		
Total films	310		Reject Rate: 16.77%

Table 5.10 illustrated percentages of individual rejected films and overall reject rate of 16.77% in the General-purpose X-ray Unit, as well as percentage reject rates of individual causes.

Table 5.11 Results of Reject Analysis – Room3

Causes/Reasons	A & E Room		
	No. of Rejects	Reject Percent	Reject Rate (%)
Dark film	10	15.38	2.04
Light film	13	20.0	2.65
Position error	8	12.30	1.63
Centring error	1	1.54	0.20
Patient motion	18	27.70	3.67
Darkroom fog	7	10.77	1.43
Cassette fog	0	0.0	0.0
Static	0	0.0	0.0
Artefact	6	9.23	1.22
Mechanical	2	3.08	0.41
Other	0	0.0	0.0
Total Rejects	65	100.0	
Good film	425		
Total films	490		Reject Rate: 13.27%

Table 5.11 demonstrated percentages of individual causes of rejected films, reject rates of individual causes of reject and overall reject rate of 13.27% in room 3.

Table 5.12 Overall Reject Analysis of the three imaging rooms

Causes/Reasons	X-ray Room 1, 2 and 3		
	No. of Rejects	Reject Percent	Reject Rate (%)
Dark film	34	21.38	3.11
Light film	32	20.13	2.93
Position error	15	9.43	1.37
Centring error	1	0.63	0.09
Patient motion	38	23.90	3.48
Darkroom fog	14	8.81	1.28
Cassette fog	3	1.89	0.27
Static	0	0.0	0.0
Artefact	15	9.43	1.37
Mechanical	7	4.40	0.64
Other	0	0.0	0.0
Total Rejects	159	100.0	
Good film	934		
Total films	1093		Reject Rate 14.55%

Table 5.12 highlighted the overall reject rate of 14.55% for Room1, 2 and 3, as well as percentages of individual causes of rejected films.

N=159

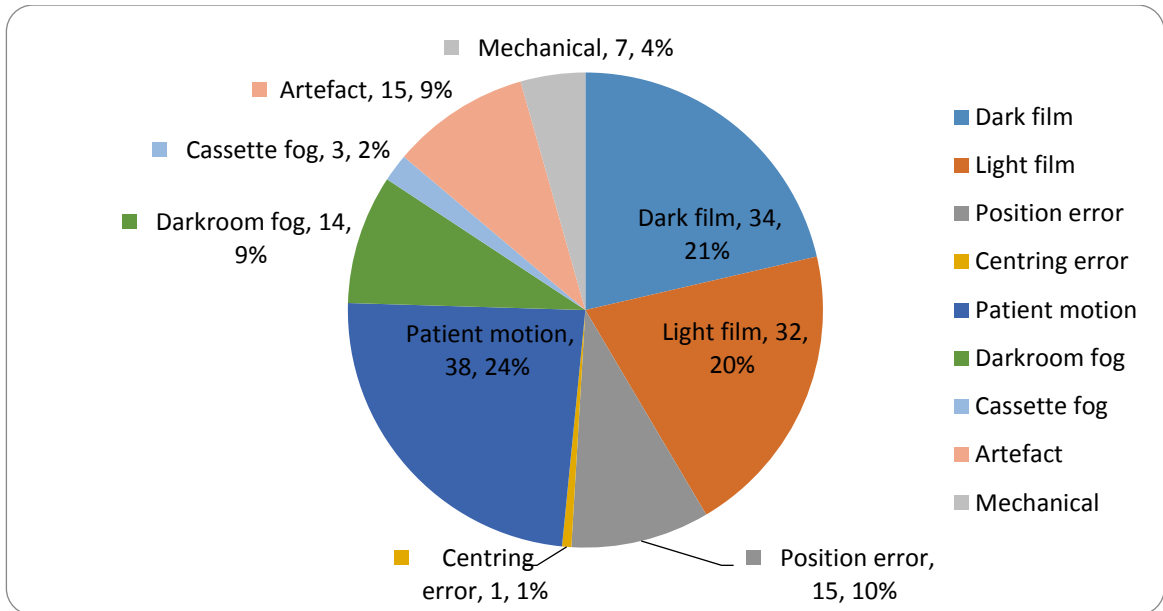


Figure 5.27: Percentage of individual causes of overall film rejects in the 3 rooms.

The figure demonstrated individual percentage causes of reject rates within the overall reject rates in the three imaging rooms.

5.4 Analysis of QA data: Exposure parameters

Table 5.13 Part 1: Descriptive statistics of used exposure parameters

Protocol	Variable	N	Max	Min	Mean	SD
Chest PA	kVp	40	70	60	61.75	3.85
	mAs	40	25	10	15.84	3.67
Lumbar AP	kVp	40	84	57	65.75	8.25
	mAs	40	40	14.2	23.91	6.16
Knee AP	kVp	40	58	48	54.55	2.05
	mAs	40	6.3	2.8	4.12	0.87

Table 5.13 highlighted descriptive statistics of maximum and minimum exposure values (kVp & mAs) employed for PA chest, AP lumbar spine and AP knee views in Rooms 1, 2 & 3 respectively.

Part 2: Bar plot: 95%CI of the exposures for small, medium and large patient sizes

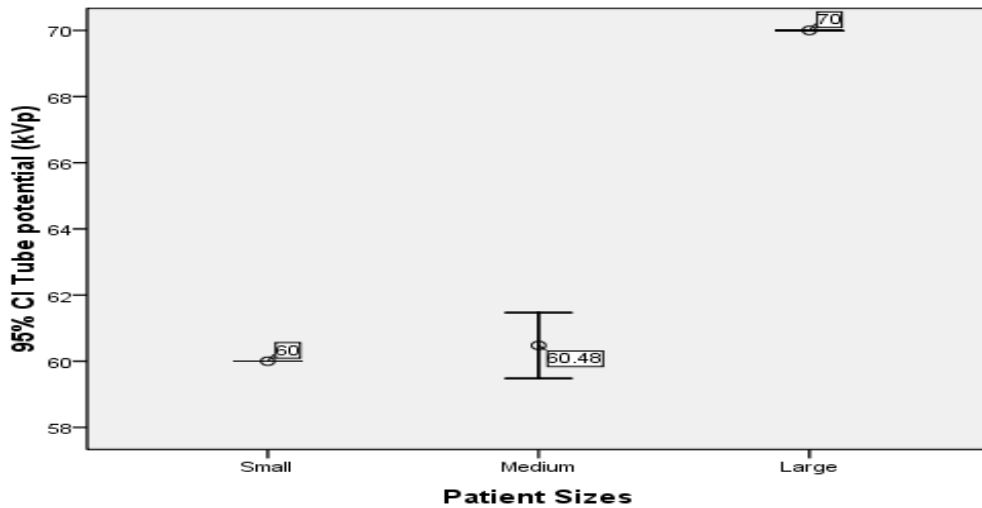


Figure 5.28 Error bar plot, 95% CI for kVp: PA chest exams for three patient categories. The figure showed the minimum and maximum ranges of tube voltage (kVp) employed for PA chest projection for patients above average (large), average (medium), and below average (small).

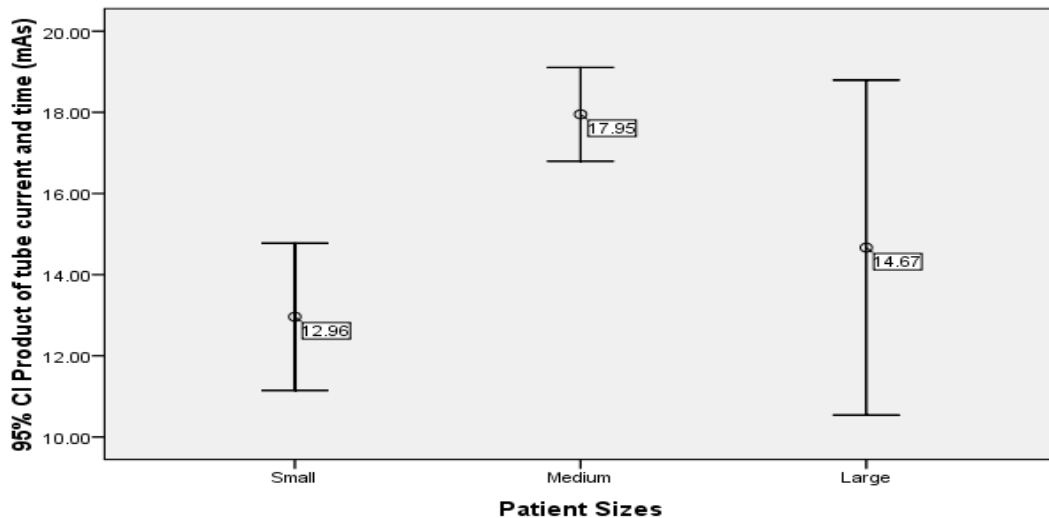


Figure 5.29 Error bar plot with 95% CI for mAs: PA chest for standard-sized patients. The figure demonstrated ranges of mAs employed during PA chest projection for patients below average, average and above average.

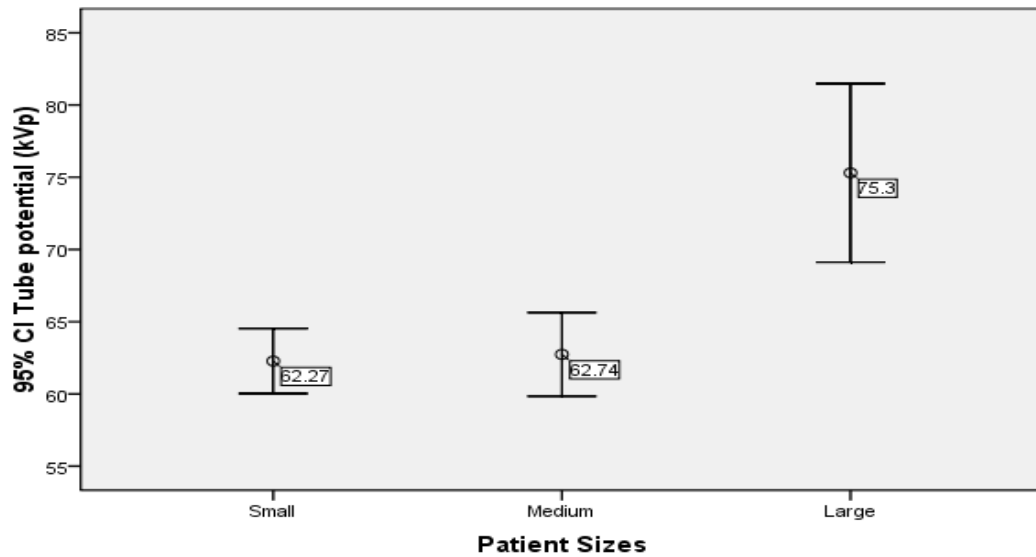


Figure 5.30 Error bar plot with 95% CI for kVp: AP lumbar spine exams for small, medium and large patients.

The figure highlighted a wider range of tube voltage (kVp) employed for AP lumbar spine projections for various sizes of patients.

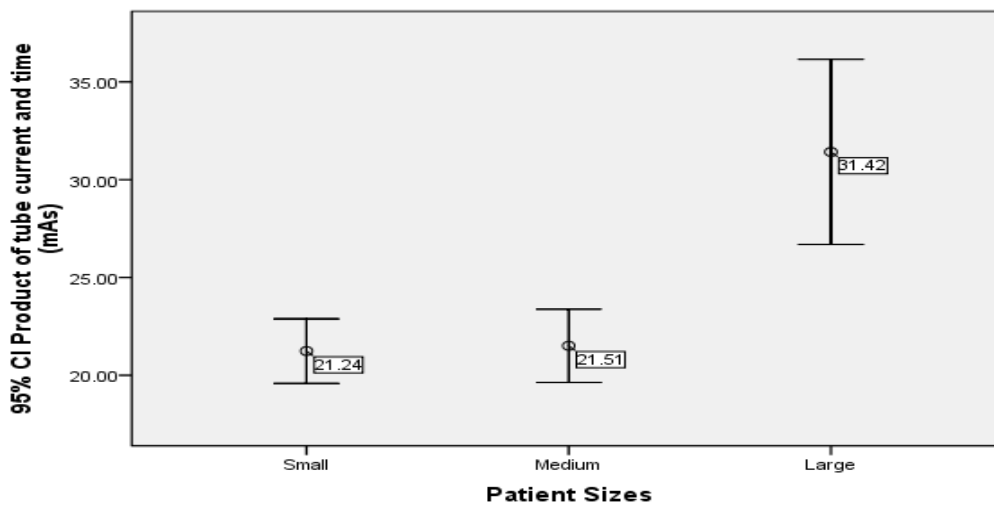


Figure 5.31 Error bar plot with 95% CI for mAs: AP lumbar spine exams for different sizes of patients.

The figure showed wide ranges of mAs employed for AP lumbar projection for small, medium and large patients in Room 2.

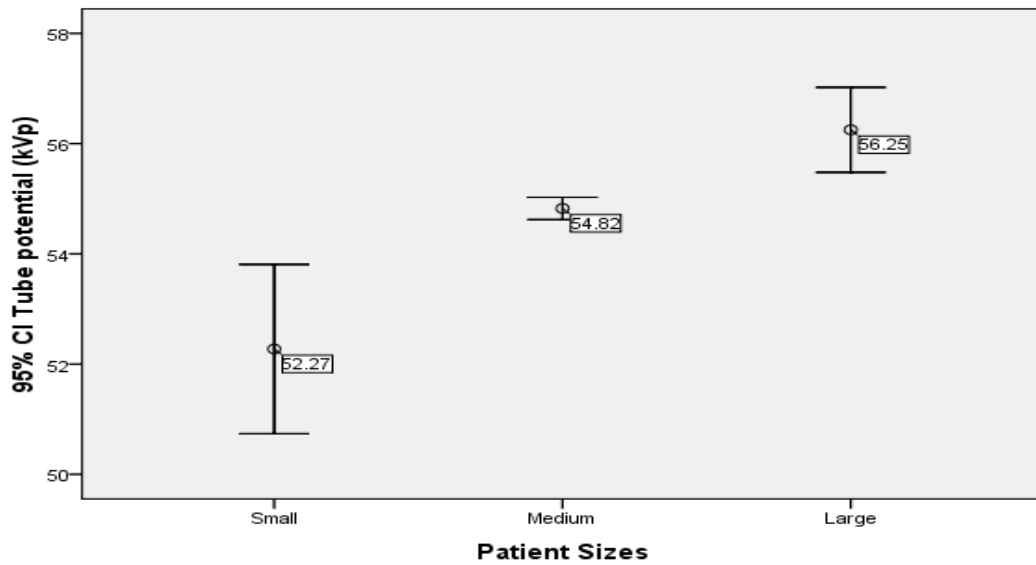


Figure 5.32 Error bar plot with 95% CI for kVp: AP knee exams for different patient sizes. The figure showed wide ranges of tube voltage (kVp) used for AP knee projection for small and large patients in Room 3.

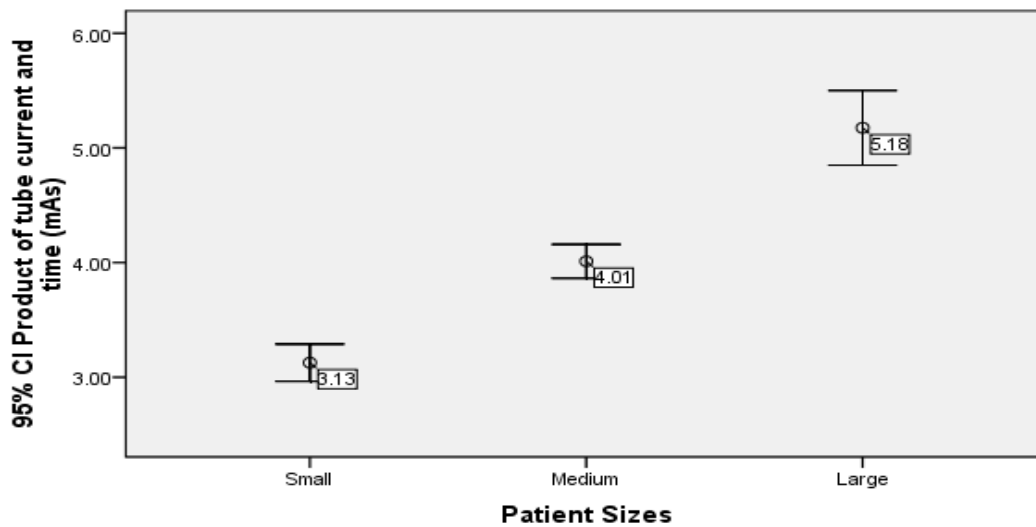


Figure 5.33 Error bar plot with 95% CI for mAs: AP knee exams for different-sized patients. The figure revealed wide ranges of mAs used for AP knee projection for large and small patients in Room3.

5.5 Summary

In this chapter, the results of Phase 1 study have been presented. The results presented include patient satisfaction survey comprising demographic details of the participants, waiting area of the imaging department, radiographer's attitude during service delivering, imaging services at the department and participants' overall satisfaction with the services. ANOVA results including tests of between-subjects effects (three-way analyses) and Post Hoc test were also presented. The results of reject film analysis as a quality indicator as well as individual and overall reject rates were also discussed. In addition, the results of diagnostic reference level (exposure parameters) determinants were presented in this chapter.

CHAPTER SIX

Phase 1 - Discussion

6.1 Introduction

In this chapter, the findings of Phase 1 were discussed. The findings involved the patient satisfaction survey, reject film analysis (a quality indicator and component of a quality assurance (QA) programme), and auditing of exposure factors for postero-anterior (PA) chest, antero-posterior (AP) lumbar spine, and AP knee projections. These projections were performed on categories of patients above average, average, and below average. The purpose of undertaking this study was to establish baseline data on the quality of service provision from the perspectives of patients and radiographers. As indicated in Chapter 4 and 5, the study was conducted in three selected imaging (X-ray) rooms in the study setting in the largest teaching hospital in Ghana. In these rooms, conventional screen-film combination was used, at the time of writing, to perform general radiography examinations.

6.2 Patient satisfaction survey

During a health service encounter, patients will be exposed to service attributes that help to affect an individual's perception and judgement of quality service delivery, hence satisfaction (Anderson & Mittal 2000). Patient satisfaction has been described in the literature as the extent to which general health care needs and expectations of the health service users are met (Andaleeb et al. 2007). The survey method was chosen and utilized to determine the attributes or variables the participants considered in rating their satisfaction with the radiographic service delivery.

6.2.1 Demographic characteristics of the participants

Ghana's current total population, according to the Ghana Statistical Service (GSS) report on 2010 census, stands at approximately 25 million with the males constituting 48.8% and the females 51.2% (GSS 2012). Meanwhile, the study demonstrated large differences among the participants' demographic characteristics such that of the ninety participants involved in the study, 43.3% (n=39) were found to be males and 56.7% (n=51) were

females. The findings were similar to the 2010 Population and Housing Census distribution by gender whereby males constituted 48.8% and females 51.2% of the total population (GSS 2012). Regarding the age of the participants, the study showed that most of them (74.4%, n=67) were below the age of 60 years (Figure 5.2 p.118). According to 2010 Population and Housing Census report, Ghana has a ‘youthful population constituting a large proportion of children under 15 years and a small proportion of elderly people aging 65 years and older’ (GSS 2012: p. 3). Although the study demonstrated that the respondents were proportionately younger than 60 years, the findings do not suggest that the younger population used the imaging facility more than the older ones. Rather it may mean that during the period of the study, younger population used the imaging facility more than the elderly population.

Although the study established the levels of education attained by the participants, it did not demonstrate any link between the participants’ current occupational status as indicated in Figures 5.3 p. 118 and 5.4 p. 119, respectively. However, the study demonstrated that most of the participants were literate as their educational status spread across different levels (Figure 5.3, p.118) and this showed some similarities with the 2010 Population and Housing Census which indicated that a large proportion (67.1%) of the Ghanaian population (from 11 years and older) were capable of reading and writing in the English language (GSS 2012).

In Ghana, patients with diverse ethnic, cultural and religious backgrounds have been seeking radiographic services in the imaging (X-ray) departments as highlighted by the study (Figure 5.5 p. 119); and irrespective of their demographic status, the radiographers have a duty not to discriminate against their gender, ethnicity, age, disability, religious affiliations, economic or social and health status (Ramlaul & Vosper 2013; Beyer & Diedericks 2010). In addition, a patients’ charter launched by the Ghana Health Service (GHS) in 2002 encouraged health professionals to protect patients against discrimination for accessing quality health services based on their culture, ethnicity, language, religion, gender, age, or any form of illness or disability (GHS 2002).

6.2.2 The patient perspective: Locating the department

Sometimes the environments of healthcare facilities could be regarded as intimidating places for patients, particularly, for those who visit the department for the first time. For instance, if patients could locate the correct healthcare department with minimum confusion, it would make things easier for them and reduce anxiety in the course of seeking health services. The fact that some facilities or departments may have different or new names (other than a particular name that the patients know them to be, or the referring clinicians mention to them) may cause a lot of anxiety for them (Tsai et al. 2007). For instance, if a patient has been referred for radiographs in the radiography department whose name was changed to other names like Imaging Department or Diagnostic Radiology, it may create a lot of anxious moments for the patient trying to locate the place. On the contrary, patients may not experience this situation in health facilities where a patient-centred policy is well established with departments and other sites distinguished by their name, colour and a symbol to help patients and other users find their way around, as opposed by the situation in the study setting (Reiling 2006). The study however established that majority of the respondents (67.8% n=61) easily accessed the department, and 32.2% (n= 29) of them had difficulty in locating the department and were therefore escorted or led by someone to the study setting (Figure 5.21, p. 127). This situation could influence the respondents' overall satisfaction with the services they received.

6.2.3 Waiting area and waiting time at the imaging department

Waiting for service provision is a pervasive and often unavoidable experience for patients in the healthcare facilities, including X-ray departments, and it appeared to be a strong determinant of patients' overall satisfaction with the service provision (Table 5.4, p. 134) (Becker & Douglas 2008; Pruyn & Smidts 1998). Concerns have been consistently raised about patients' waiting time in healthcare facilities (Syed et al. 2013; Anderson et al. 2007) and this variable kept emerging in patient satisfaction studies (Becker & Douglas 2008). Thus, the waiting time serves as one of the variables for measuring patients' satisfaction with the health care service delivery.

Long waiting times in healthcare facilities all over the world have been widely noted. Although the participants were not asked exactly how long they waited for their turn, their subjective opinions of the length of time they waited were sought. It was found that the majority of the participants (58.9%, n=53) were satisfied whereas 41.1% (n=37) noted the time waited was either quite long or very long (Figure 5.7, p. 120). In determining the relationship between the time waited by the participants and the overall satisfaction, the study revealed a strong relationship existed between the participants' overall satisfaction with the service and the time waited and this had an effective or significant value of $F(4, 85) = 5.508, p < .0001$ (Table 5.2, p. 132). By performing tests of comparison to determine the influence (effects) of each factor on participants' overall satisfaction, the findings confirmed the length of the respondents' waiting time as having a strong significant influence on the patients' overall satisfaction with the service delivery, with its measured (equivalent) effective values of $F(26, 63) = 3.522, p < .021, \text{partial } \eta^2 = 0.592$. This finding therefore means that the variable (waiting time) has largely contributed to the participants' overall satisfaction with the service delivery. This suggests therefore that patients' waiting time in healthcare departments is an important indicator of patient satisfaction and one of the key factors that weighed against patients' overall satisfaction with healthcare services (Onwuzu et al. 2014; Syed et al. 2013).

The current findings demonstrated that the factor was important and had mostly contributed to the participants' overall satisfaction with the service delivery. Again, a study by Michael et al. (2013) reported a strong relationship existed between patient satisfaction and wait times in healthcare facilities. However, Onwuzu et al. (2014) reported that lengthy patient waiting times had been identified in the literature as the major cause of patients' dissatisfaction with health care services. It was noted that health care service providers or practices that are continually working to minimise patients' waiting times could expect to see significant improvement in the overall satisfaction of their patients with the service delivery (Michael et al. 2013).

In assessing the participants' impression about the waiting area, it was established that majority of them were highly impressed about the area and few of the participants were of the view that the waiting area was in a poor state (Figure 5.26, p. 130). With regard to the comfort of the participants at the waiting area, the study showed most of the participants were very comfortable, while few declared they were not comfortable (Figure 5.9, p. 121). In today's healthcare departments or institutions, patient-centeredness has been placed high on the agenda by health providers such that facilities in the patients' waiting environments are being improved in order to maintain patients' comfort which is an important driver of patient satisfaction with health services (Ehrlich & Coakes 2013; Hunt 2009; Becker & Douglas 2008; Oermann 2003). The current study also revealed that the majority of the participants (68.9%, n=62) or (24.4%, n=22) viewed the state of cleanliness of the waiting area as either good or very good while 6.7% (n=7) of the patients indicated cleanliness was poor (Figure 5.10, p. 122).

Having performed ANOVA tests to determine the significant effects that each of the three individual variables regarding the waiting area (impression, comfort and cleanliness) had on the overall satisfaction of service delivery, the study showed that a highly significant difference existed between participants' impression about the waiting area and overall satisfaction with the service delivery with the effective corresponding value of $F(4, 85) = 4.589, p < .002$ (Table 5.2, p.132). This suggests that the variable largely influenced the participants' overall satisfaction with the service delivery in the study setting. The study also showed a strong statistical significant difference existed between the participants' comfort in the waiting area and their overall satisfaction with the service (Table 5.2, p.132). Again, a significant difference between cleanliness of the waiting area and the participants' overall satisfaction with the service delivery was revealed by the study (Table 5.2, p.132). These findings demonstrated patients' concern about their comfort at the waiting area, as well as cleanliness of the area which could largely influence their overall satisfaction with the radiographic service delivery. The current findings were similar to the study by Kagashe and Rwebangila (2011) where the general environment for health care service provision largely influenced the overall satisfaction of the patients.

In addition, comparison tests were performed by combining the three variables (impression, comfort, and cleanliness) together with the view of establishing the variables that contributed to the participants' overall satisfaction with the service delivery. The study confirmed the participants' comfort in the waiting area largely contributed to the overall satisfaction with the service delivery (Table 5.6, p.137). The findings suggest that, in practice, the healthcare professionals should ensure and value the comfort of patients within service delivery environments, as the variable largely contributed to the patients' overall satisfaction with the service delivery. Meanwhile, a study by Torpie (2014) on customer service and patient care identified interpersonal and communication skills as factors that ensure a patient's safety, comfort and care, and these variables have been identified to generate or influence patient's satisfaction. In other words, a professional's interpersonal and communication skills provide patients with comfort and therefore contribute to the patient's overall satisfaction with the care services (Gerard et al. 2015; Torpie 2014).). Aldebasi and Ahmed (2011) also argued that the level or degree of patients' overall satisfaction with the healthcare service delivery could be used as a means of assessing the quality of service provided by the health practitioner to meet the patients' health needs. A study by Tsai et al. (2007) noted that physical environment of healthcare services and patients' waiting area have a significant impact on satisfaction with care services. The current findings however revealed that cleanliness contributed less significantly to the patients' overall satisfaction with the service delivery (Table 5.6, p.137), and this was considered to be investigated further in Phase 2.

6.2.4 Participant's experience in the examination room

The study evaluated the participants' views in order to determine their experiences with the radiographer while undergoing the X-ray examinations, namely chest, skull, shoulder, pelvis/hips, knee, cervical, thoracic spacing, femur and 'other'. It was revealed that majority of the respondents (51.1%, n=46) indicated the radiographer's attitude towards the patients was generally very good, while a small proportion (7.8%, n=7) of them viewed the attitude of the radiographer as unprofessional (Figure 5.11, p.122). Ehrlich & Coakes (2013) described attitude as a state of mind, an opinion, or a feeling often revealed by a body

position, tone of voice, or other non-verbal signals which carry along some form of expression of respect. In their study about the attitudes of radiographers toward patients in public hospitals, Beyer and Diedericks (2010) noted that there was lack of research that demonstrated the views of patients about unprofessional and unethical attitudes and behaviours of radiographers. Meanwhile, the findings of the current study, regarding radiographers' attitudes and behaviours, are similar to the findings by the study of Beyer and Diedericks (2010). The study also revealed that the radiographers explained the examination to most of the participants prior to the start of the procedure while a minority of the participants (16.7%, n=15) indicated the examination was not explained to them at all (Figure 5.12, p.123). In radiography, explanation of an examination to patients before the starting of the investigation helps patients understand investigation processes, allay fears from the patients and enable them to co-operate with the radiographer during the entire examination process (Ramlaul & Vosper 2013). The study also revealed that most of the participants who received explanation before the procedure was undertaken were happy with the procedure due to the clear explanation; however, few of them (16.7%, n=15) stated they were not clear with the explanations they received (Figure 5.12, p.123). However, radiographers have a professional duty to ensure they elicit confidence from their patients by providing them with clear and/or accurate explanations and instructions at the appropriate time and at a level that the patients can understand (Beyer & Diedericks 2010; SCoR 2007).

Further, radiographers have been encouraged to provide their patients with relevant and accurate information that they deem patients grasp and thus understand, irrespective of the patients' condition (SCoR 2007). Meanwhile, effective communication between patients and health service providers has become imperative in radiographic service delivery. On the contrary, language differences are a barrier to effective communication and ineffective communication during radiographic procedures has many ramifications such as poor quality radiographs, inconclusive examinations, and patients' delays among others (Chingarande et al. 2013). However, repetition of X-ray exposures could increase radiation doses to the patients as well as the examination costs (Chingarande et al. 2013).

In a multicultural environment or country such as Ghana (GSS 2012; Asante & Gyimah-Boadi 2004), a radiographer's body language such as postures, facial expressions, gestures and eye contacts could make the patient feel comfortable or uncomfortable and therefore draw either positive or possibly offensive (such as abuses, violence attacks) conclusions about the radiographer (Ramlaul & Vosper 2013). Multicultural or diverse cultural backgrounds and cultural differences (GSS 2012; Asante & Gyimah-Boadi 2004; Thomas 2001) are often associated with different languages with its implications of language barriers which may cause communication challenges between health practitioners and patients; however, the findings showed that most of the participants (84.4%, n=76) were very comfortable with the medium of communication used by radiographers (Figure 5.19, p.126). Communication is an essential tool in radiography service delivery in that radiographers are expected to continuously and clearly interact with patients by instructing and establishing rapport with them (Antwi et al. 2014; Ramlaul & Vosper 2013; Halkett et al. 2010). However, language differences among patients in Ghana often caused patients to respond differently to radiographers' instructions during examinations and this mainly resulted in delays due to repetition of examinations (Chingarande et al. 2013). Meanwhile, radiographers have a marked impact on the way patients deal with their health status because they can be one of the health professional groups that patients most often see; therefore they are encouraged to develop effective communication skills so as to provide patients with the information they require (Halkett et al. 2010). Good and clear communication is a major part of any medical practice and of patient-centred care, in particular, which helps in minimising patients' complaints and relates to high level of patients' comfort with the service delivery (Reynolds 2009). However, the findings established no significant difference between communication and the patients' overall satisfaction with service delivery; this suggests that communication contributed less significantly to the patients' overall satisfaction with the care service delivered.

Although Reeves & Decker (2012) argued that radiographers are image focused rather than patient-centred, in contrast, the study showed most of the patients (91.1%, n=82) were satisfied with the caring concern of the radiographers while few of them (8.9%, n=8) were

dissatisfied with the radiographer's caring concern (Figure 5.13, p.123). The findings also established that majority of the participants (92.2%, n=83) were satisfied with the radiographers' friendly and/or helpful nature; while few of the patients (7.8% n=7) were dissatisfied with the friendly posture by the radiographer (Figure 5.14, p.124). These findings were similar to the findings in the study by Beyer & Diedericks (2010). However, having compared responses to appropriate questions on the questionnaire, it was not clear if these few participants were the same patients who were dissatisfied with the radiographers over their unprofessional and/or unethical manner and this is one of the limitations of using structured questionnaire as a tool (De Vaus 2002).

The study further revealed that the variables (patients' impression, radiographers' attitude, and caring) strongly contributed to the participants' overall satisfaction with the care delivered (Table 5.2, p.132). The findings therefore suggested that radiographers' attitude and caring towards their patients during discharging of their routine duties play a vital role in service delivery to patients (Beyer & Diedericks 2010). In contrast, the study showed that the explanation of the examination provided to the patients by the radiographer has no influence on the participants' satisfaction with the service (Table 5.2, p.132). This outcome however did not suggest that explanation of the examinations or procedures was not important in the radiographic practice. Therefore, radiographers are expected to exercise ethical duties by treating their patients with dignity and respect, maintaining their privacy and confidentiality at all times, as well as handling them (patients) with positive attitudes so as to develop a positive rapport with them (Ramlaul & Vosper 2013; Beyer & Diedericks 2010). The findings established that expectations of a majority (73.3%; n= 66) of the participants regarding the care delivered by the radiographers were largely met (Figure 5.20, p.127) and this strongly influenced the patients' overall satisfaction with the service they received (Table 5.3, p.133).

6.2.5 Participants' overall satisfaction

According to Atinga et al. (2011), participants' overall satisfaction with health service delivery is mostly dependent on a personal or individual point of judgement with the value or the specific services received. The study showed that the majority (94.4%, n=85) of the participants rated their overall satisfaction with the services provided in accordance with the value they placed on the services (Figure 5.25, p.129). Although a minority of the participants (5.6%, n=5) were dissatisfied with the service delivery, the dissatisfaction could have serious ramifications in that patients could resolve not to seek healthcare services from the particular healthcare institution which, in effect, might affect the revenue realisation and lead to inability to provide services effectively for the future (Andaleeb et al. 2007). It is noted that patient satisfaction with health service delivery is based on the level of contentment with the service that was experienced (Andaleeb et al. 2007). Even though studies have argued that patients' satisfaction with health services determines the quality of services delivered to them (Alrubaiee & Alkaa'ida 2011; Badri et al. 2008; Dagger et al. 2007; Pakdil & Harwood 2005; Thi et al. 2002); the researcher would not entirely agree with the arguments because patient's satisfaction, to a large extent, depends on different kinds of variables (such as patients' comfort, waiting time, waiting environment, ease of locating health facility) and, also, the value an individual patient places on the services offered them (Atinga et al. 2011).

6.3 Service perspectives: Reject film analysis as a quality indicator

In every radiography department, it is not uncommon to encounter patients having to undergo repeat X-ray examinations after their initial radiographs are rejected due to inadequate diagnostic information. The goal of performing radiographic examinations is to demonstrate the best diagnostic information by delivering the least ionizing radiation dose to the patients (Jabbari et al. 2012). Poor quality radiographs may occur due to some common causes such as patient motion, positioning and exposure errors, darkroom, equipment and mechanical faults, radiographic film fogging and so on which may result in exposure of patients to unnecessary radiation through the repeat of radiographic

examinations (Jabbari et al. 2012; WHO 2001). Reject film analysis (RFA) is a QC component of QA and was therefore chosen in order to identify the possible causes and reasons for rejecting and repeating the examinations in the selected rooms and to help proffer solutions to ameliorate the problems.

As mentioned in Chapter 4 Section 4.7.3, the study assessed the main causes or reasons for rejecting and/or repeating X-ray examinations which included over- and under-exposure of films, position errors, centring error, patient motion, darkroom and cassette fogs, static films, artefacts, mechanical (equipment fault), and other causes (WHO 2001).

After two weeks of the study on reject analysis, the study showed that a total of 1093 films were used during the study period in the three imaging rooms, out of which 159 films were rejected, and that constituted overall reject rate of 14.55% (Table 5.12, p.143). However, the reject rate was far higher than the recent recommended rate of 5.0% by the WHO (Usha et al. 2013). In addition, the rate was significantly higher than the 3.1% reported in Ethiopia (Teferi et al. 2010), 7.6% in Belgium (Lau et al. 2004), and 10.6% in the UK (Clark & Hogg 2003). The study also showed the individual reject rates of all the causes for rejection or repetition of radiographs (Table 5.12, p.143). The rejection due to exposures was consistent with the previous studies by Lau et al. (2004) in which it was reported that exposure and patient positioning errors were the main reasons for repeat of examinations. In Ghana, studies by Owusu-Banahene et al. (2014) and Ofori et al (2013) also revealed exposure and positioning errors as the main causes of repetition of radiographs. Further, a study by Jabbari et al. (2012) in Iran also showed exposure and positioning errors as the main reasons for repetition of radiographs. Thus, exposure errors in the current study were consistent with the literature and this would largely contribute to the unwanted radiation dose to the patients. However, patient motion recorded a high percentage reject rate of 23.90% in the current study (Table 5.12, p.143) as compared to 6.2% reported in the study by Lau et al. (2004) and this contributed to the current overall reject rate of 14.55%.

Although studies in Ghana by Owusu-Banahene et al. (2014) and Ofori et al. (2013) showed overall film reject rates of 14.1% and 14.6%, respectively, which were largely above the recommended rates, the researcher was cautious about making a comparison with the current rate because the methods and dimensions (causes) involved in determining the reject rates, and the duration of observation or data collection could have influences of their own. For instance, Ofori et al. (2013) used ten different hospitals as well as individual radiographic projections in determining the reject rate. However, three to four years after the reject rates of 14.1% and 14.6% were obtained by the Ghanaian studies (Owusu-Banahene et al. 2014; Ofori et al. 2013), no corrective or remedial measures were implemented to minimise the causes of the rejects and/or repeats of the exposures in order to bring down this very high rate. It is worth noting that both authors determined the reject rates by using film/screen combination systems.

Meanwhile, the total rejected films of 159 in the current study comprised various sizes of films such as 35 x 43 cm films; 35x35 cm films; 30x40 cm films and so on (See Table 6.1 below). These reject/repeat films have major cost implications on the running of the department as well as radiation dose effects to both the patients and radiographers.

Table 6.1: Cost Analysis of rejected films

Film size (cm)	Number of rejected films	Cost of film /size/ packet (100) (GH¢)	Cost of a film / packet/100 (GH¢)	Cost of films rejected (GH¢)	Cost in pounds (£)
35 x 43	27	650	6.50	175.50	44.66
35 x 35	39	650	6.50	253.50	64.50
30 x 40	14	630	6.30	88.20	22.44
24 x 30	33	580	5.80	191.40	48.70
18 x 43	17	520	5.20	88.40	22.49
18 x 24	29	400	4.00	116.00	29.52
Total	159			913.00	156.23

The cost analysis of film rejects performed in Ghana Cedis (GH¢) (Table 6.1, p.159) revealed that a total of GH¢ 913.00 (£156.23, £1.00 = GH¢ 5.84) was estimated to be the cost of the rejected films in all the three X-ray rooms within the two- weeks period. This is approximately GH¢ 23,738.00 (52/2 x 913.00) (£4,064.73) per annum of the cost of rejected films excluding the costs of other consumables such as processing chemicals, disinfectants, envelopes for radiographs, etc. Thus, an amount of GH¢ 913.00 (£156.23) was a loss of revenue to the department in two weeks as a result of reject/repeat of radiographic examinations in the three imaging rooms. This loss to the department is substantial, especially, in a developing country like Ghana where resources are largely limited. The loss therefore impacts largely on the management and/or the cost of running the imaging department. There is therefore the need to ensure the reject rate is brought down in the department.

In addition, repeats of the X-ray investigations do not only incur costs of consumable (X-ray films and processing chemicals) wastages but also waste of the radiographer's time, increasing cost of electricity and reduction in patient throughput in the examination room and/or the department. Repetition of X-ray investigations also increases the radiographer's work, patient's waiting and radiographer's time as well as congestion at the waiting room as a result of a prolonged time in repeating the exposure and for that matter occupational stress (Ashong et al. 2015; Jabbari et al. 2012; Eze et al. 2008). Repetition of radiographs as a result of insufficient diagnostic information can cause low patient throughput in the department and a particular imaging room involved as well as additional costs of electricity and its contribution to backlog at the time when there is constant power outage. Further, repeats can affect the X-ray equipment tube-head regarding wear and tear which may therefore affect the lifespan of the equipment and its accessories. Thus, if work is quantified in monetary terms, the cost of repeats is high.

The findings of the study however showed that the main causes of repetitions of radiographs were due to patient motion (23.90%), dark or overexposed film (21.38%), and light or underexposed film (20.13%). Other reasons highlighted by the study for repeating

X-ray examinations include: position error (9.43%), artefacts (9.43%), darkroom fog (8.81%) and mechanical or equipment error (4.40%). The rest of the causes demonstrated were cassette fog (1.89%) and centring error (0.63%) (Table 5.12, p.143).

Reject analysis therefore becomes a simple but a powerful tool to provide information that may help monitor and remedy challenges that arise during the provision of radiographic services. In addition, the observance of radiographic protocols and radiation safety of patients may minimise unnecessary rejects/repeats and therefore ensures cost efficiency in the imaging departments.

6.4 Diagnostic Reference Levels

The widespread use of X-rays in diagnosis and management of patients (which has led to increased exposure of patients to ionizing radiation) has widely been reported in the literature (Usha et al. 2013; Zewdeneh et al. 2008; Monfared et al. 2007). The use of X-rays for medical diagnostic purposes has both benefits and adverse effects as it causes ionization of body tissues. However, the International Commission on Radiological Protection (ICRP) recommended the conservative philosophy of justification and optimisation through the measurement of DRLs to minimise the potential overexposure of patients and decrease overall population burden (ICRP 1996). It is noted that the DRLs have estimated values for typical diagnostic radiographic examinations for adults and are used to help manage the radiation dose to patients so that the dose is commensurate with the clinical purposes (ICRP 1996). Meanwhile, at the time of undertaking this research, no particular study has been conducted in the area of diagnostic reference levels in Ghana. Indeed, radiographic examinations involving exposure to ionising radiation needs be tailored to the patient's diagnostic requirements so as to justify on the basis of the net benefits to the patient (Eze et al. 2008; Mihić et al. 2008; ICRP 1991).

This part of the study was conducted in order to determine DRLs for the most frequent projections of plain radiographic examinations (PA chest, AP lumbar spine and knee) and to establish a standard for adult patients of each group (above average, average and below

average) used in the procedures at the study setting in Accra. As the number of plain diagnostic radiography examinations performed is increasing, it is expected that the ionising radiation dose to the patients would also increase (Wallace 2010). It is therefore imperative to establish DRLs in the imaging setting to ensure standard exposures are administered to all patients of equal sizes.

The study was carried out for two weeks. The exposure parameter data of tube potential in kilovolts (kVp) and milliamperere seconds (mAs) were collected during this period for the selected radiographic projections. These projections were selected because a survey in the department revealed that they were the most frequent radiographic cases performed in the three chosen radiography rooms. At the end of the two weeks' study period, the radiation dose of forty projections were recorded on patients in each room (Table 5.13, p.144).

With regard to PA chest projections for an adult patient above average, the study showed that an average kVp value used was 70.0 and the mAs was 15.0 (Figures 5.28, p.145 and 5.29, p.145). In their study of 'Diagnostic reference levels for the most radiological examinations carried out in Brazil', Freitas and Yoshimura (2009) used 54-125 kVp for adult PA chest. The parameter values obtained in this study are not very different from those used by Freitas and Yoshimura (2009). These values were used to achieve the expected image quality of diagnostic value commensurate with the clinical purpose of the examination (Brink & Miller 2015). The values could be interpreted as being the lowest exposure parameters possible, which produced the required image quality necessary for obtaining the desired diagnostic information (Freitas & Yoshimura 2009). Thus, these DRLs are expected not to be exceeded for standard procedures for good and normal practices regarding diagnostic and technical performance for adult PA chest projection (Freitas & Yoshimura 2009). However, it is important to emphasise that the exposure factors are adapted to conventional radiography systems at the time of the study other than digital equipment presently being installed in the study setting.

Regarding PA chest projection for average adult patient, the study established that 62.0 and 18.0 were used as kVp and mAs values, respectively, to achieve the expected image of diagnostic value (Figures 5.28 p. 145 & 5.29 p.145). The study also showed that the factors of 60.0 and 13.0 were used as kVp and mAs, respectively, for PA chest for adult patients below average to achieve the maximum image quality consistent with the clinical purpose of the examination. The above exposure parameter values which achieved the required image for diagnostic purposes have now been established as reference points (DRLs) for future chest examinations for the different standard-sized adult patients. In practice, these findings or values are not fixed but they serve as guides for the radiographers (practitioners) to ensure they do not exceed these exposure factors for chest radiographs for standard-sized patients in order to produce images of adequate diagnostic information that is required for the clinical purpose of the investigation, and to avoid exposing the patients to unnecessary ionising radiations.

Table 6.2 Projections and expected DRL values

Patient body type	Projection	Expected kVp	Expected mAs	Projection	Expected kVp	Expected mAs
Above average	AP Lumbar	75.0	32.0	AP Knee	56.0	5.0
Average	√	63.0	22.0	√	55.0	4.0
Below average	√	62.0	21.0	√	52.0	3.0

Table 6.2 presents the findings of the study on applicable DRLs values for AP lumbar and knee projections for various standard-sized patients to achieve the image of adequate diagnostic information, using film/screen combination systems.

Dose area product (DAP) was not assessed or measured in this study because DAP meter or equipment was unavailable in the study setting. However, the findings established exposure

factors of 75.0 kVp and 32.0 mAs that were employed for a patient above average for AP lumbar projections to produce a required image quality of diagnostic value that was consistent with the clinical purpose of the investigation. These parameters are not very different from the values for AP lumbar projections ranged from 52 to 90 kVp and 20 to 250 mAs in the study by Freitas & Yoshimura (2009). Again, with regard to an average (medium) size of patient for AP lumbar projection, the findings showed that the DRLs values of 63.0 kVp and 22.0 mAs were employed necessary to achieve a required quality of image with diagnostic value commensurate with the clinical purpose of the examination. Further, the findings suggest that for patients below average undergoing AP lumbar projections, the DRLs values of 62.0 kVp and 21.0 mAs were sufficient to produce expected quality radiographs of diagnostic value consistent with the clinical reasons of the investigation. Again, these values are not very different from the findings by Freitas & Yoshimura (2009). In practice, these values are to be used to manage patient radiation doses and to optimise the image quality in the study setting.

In the same vein, exposure settings applicable for patients above average undergoing AP knee projection should be 56.0 kVp and 5.0 mAs to be able to produce the image quality of diagnostic value commensurate with the clinical purposes of the examination and to avoid unnecessary ionising radiation to the patients (Table 6.2 p.164). Again, exposure values of 55.0 kVp and 4.0 mAs are adequate for average patients that require AP knee projections. These factors are applicable for this category of patients to enable the production of image quality of adequate diagnostic information to achieve the clinical purpose of the investigation. With regard to AP views of knee for patients below average (small), the findings showed that exposure values of 52.0 kVp and 3.0 mAs are sufficient to achieve the image of adequate diagnostic value commensurate of the clinical reasons for the investigation (Table 6.2, p.164).

As the DRLs are used judiciously as a means for imaging professionals to compare their radiation dose data to benchmarks derived from aggregated dose data already established on a local, regional or national level (ICRP 2007), the current values should serve as

benchmarks for the radiographers at the study setting since this study is the first of the kind within the setting. Presently, there is no surveillance of the increasing ionising radiation dose to the population from diagnostic imaging procedures.

6.5 Links between Phase 1 & Phase 2

Following the overall overview of the methods represented in figure 4.2 under section 4.4 (Chapter 4, p.81) of this thesis, the discussion in this chapter has completed the quantitative study under the Phase 1 of the thesis. Based on the discussion of the findings and baseline data on quality issues, the subjective study under the Phase 2 was designed in order to explore and explain the views of the radiographers, managers and patients regarding quality of radiographic service delivery in the study setting. The study in this Phase would lead to the development of the overall strategy of quality framework for radiographic service delivery in imaging (X-ray) departments in Ghana, and help provide recommendations for the implementation of the quality strategy.

6.6 Summary

The findings of Phase 1 were discussed and the discussions focused on patients' satisfaction survey and participants' demographic characteristics. The discussion also focused on the patients' perspectives with reference to locating of the imaging department, waiting area and the waiting time. In addition, patients' experience with the imaging procedure in the imaging room, interaction with the radiographer and the participants' overall satisfaction with the imaging service delivery in the department were discussed.

Again, the discussion focussed on the service perspectives with reference to the reject film analysis (RFA) as a quality indicator as well as the cost implications regarding managing, running and/or maintenance of the diagnostic radiography department in the study setting. Further, other implications such as low patient throughput, additional exposures or increased radiation doses to the patients. The cost of electricity due to unnecessary repeats and the wear and tear or lifespan of the X-ray tube as well as the equipment and its

accessories were presented.

In addition, discussion on the diagnostic reference levels (DRLs) for the projections of PA chest, AP lumbar spine and AP knee, for three different categories of patients, was presented in this chapter with the view of establishing DRL values for future benchmarking by the imaging professionals in the study setting.

Finally, the link between Phase 1 and Phase 2 was also presented in the chapter.

CHAPTER SEVEN

FINDINGS – Phase 2

7.1 Introduction

This chapter presents the findings of Phase 2 based on the analysis of the textual data generated through interviews. The qualitative data collection was undertaken with a clear aim; to help explain and explore the findings established in Phase 1 in a greater depth. The findings have been presented in relation to the interview questions. Three different groups comprising a total of 15 participants were involved in the interviews; namely radiographers, patients and managers. The groups consisted of six each of radiographers and patients, and three managers of the study setting. The specific questions asked during the interviews varied according to the interview schedules for individual groups (Appendices XI, XII & XIII).

Although the qualitative Phase of the study had a smaller number of participants (n=15), this is not unusual in qualitative studies. The data was not only to explain and explore the quantitative findings but to add depth and richness to the data; importantly, the aim was to give the participants a voice to describe their experiences and understandings of quality of radiographic service delivery (Hennink et al. 2011). The findings were related to how the participants described and responded to the issues related to quality of service delivery. The findings were therefore structured according to the research questions (with references made to other research participant categories) involved in the study for their full understanding of quality of radiographic service delivery. For instance, the responses by the radiographers to the interview question related to ‘factors they thought contributed to good service delivery to clients/patients’ were structured accordingly. Thus, while one respondent focused on equipment and workforce motivation, another dwelled on professional attitudes and behaviours towards patients.

There are two fundamental approaches to analysing qualitative data: the deductive and inductive approaches (Spencer et al. 2004). While the deductive approach involves the use

of a structured or predetermined framework to analyse the data, the inductive approach involves analysing the data with little or no predetermined theory, structure or framework and uses the actual data itself to develop the structure of analysis (Burnard et al. 2008). Although the inductive approach is time-consuming it is however comprehensive; and it is established to be the most suitable approach where little or nothing is known about the study phenomenon (Burnard et al. 2008; Braun & Clarke 2006). The researcher therefore adopted the inductive method, which is commensurate with the previously chosen methodology, to analyse the textual data generated through the interviews. Thus, the researcher intended to derive or develop the codes, themes and concepts from the data rather than using a predetermined framework. There are a number of benefits to this which could be stated here; for example, being guided by the data, allowing the voices to be heard in order to create new knowledge and supporting the creation of a framework of quality unique to this situation. The following sections discussed the analytic tasks undertaken by the researcher in analysing the data generated through the three interviews.

7.1.1 Making decisions about the analysis

The approach to the analysis was influenced by the theoretical and methodological perspectives. Barbour (2014) argued that whether the researcher decides to perform manual or computer -assisted-software analysis of the textual data, the conceptual journey is the same.

The researcher used the manual qualitative data analysis method to analyse the interview data generated. In addition, the textual data generated was not too large for the manual method to cope with. Further, the NVivo software may help in the handling of data but not do the thinking for the researcher (Burnard et al. 2008). Again, the researcher had challenges with limited NVivo software package coupled with frequent power interruptions in Ghana which made it very difficult to undertake the necessary trainings on the software package. The researcher therefore chose to analyse the transcripts manually using thematic analysis approach.

7.1.2 Thematic analysis

The process of thematic content analysis is often very similar to all types of qualitative data analysis in that the process involved the analysis of the transcripts by identifying and analysing themes and categories that emerged from the data and gathering together examples of those themes from the data (Burnard et al. 2008; Braun & Clarke 2006). According to Guest et al. (2012), thematic analysis focuses on identifying and describing both implicit and explicit ideas within the data. In other words, the process involved discovering themes in the interview transcripts and then the researcher attempted to verify, confirm and qualify them by searching through the data and repeating the process to identify further themes and categories (Burnard et al. 2008). For example, statements related to 'patient care' category were searched for and confirmed through the entire data. Thematic content analysis however lends itself to the flexible use by researchers.

In thematic analysis, reliability plays a greater role than with word-based analyses since more interpretation is placed on defining the data codes as well as applying the codes to chunks of text (Guest et al. 2012). For instance, 'occupational stress' was applied to '*The pressure at the department is so much so the time that radiographers are supposed to take to make sure all is in place before they expose, is now reduced to the barest minimum; people even forget to give instructions.*' Thematic method has, as one of its strengths, the ability to provide a systematic and transparent approach for organising and summarising the findings from a chunk of diverse body of data (Braun & Clarke 2006). Braun & Clarke (2006) argued that thematic analysis does not require the detailed theoretical and technological knowledge of approaches such as grounded theory and discourse analysis, and therefore it can offer a more accessible form of analysis. Given the choice of qualitative analysis approach, thematic analysis was considered as a suitable approach to utilise in analysing the textual data generated through interviewing of the study participants. The thematic analysis was performed through six stages, including data preparation and familiarisation, generating preliminary codes, searching for themes, reviewing the themes, defining and naming the themes and producing the report (Braun & Clarke 2006). The details of the analytical process is represented in table 7.1 below.

Table 7.1: Stages of thematic analysis

Stage	Description of the processes
1. Data preparation and familiarisation:	Verbatim transcribing of data, reading and re-reading the data, immersing in or knowing the data and noting down initial ideas.
2. Generating initial codes:	Coding the necessary issues or chunks of data in a systematic fashion across the whole data set, while collating the data relevant to each code.
3. Searching for themes:	Collating the codes, identifying patterns into potential themes and gathering all data relevant to each potential theme.
4. Reviewing the themes:	Checking the themes that work in relation to the coded extracts and the whole textual data and then generating a thematic ‘map’ of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story that the analysis tells; generating clear definitions and names for each theme.
6. Writing the report:	The final chance for the analysis. Selection of appropriate, compelling extract examples, final analysis of selected extracts, relating the analysis back to research question and literature to produce a report of the analysis.

Adapted from Braun & Clarke (2006)

7.2 Stage 1: Data preparation and familiarisation

The contextual explanatory stage involved individual interviews of 15 participants, including six (6) each of patients and radiographers, and three (3) managers (Please see Table 7.2 below). All the interviews were conducted in English language and digitally recorded. The interviews were transcribed verbatim by the researcher in preparation for the data analysis. The researcher ensured that all identifiers were removed from the data in

order to preserve participant anonymity (Hennink et al. 2011). Each transcript was labelled with a filename to make sense for the data source and the project.

Table 7.2. Category of interview participants

Participant category	Codes	Number
Radiographers	Rad	6
Managers	Man	3
Patients	Pat	6
Total		15

The initial stage of the analysis involved familiarisation with the data corpus which began with the process of transcribing the interviews. The familiarisation process afforded the researcher the opportunity to immerse himself in the data in order to become familiar with the depth and breadth of the contents (Polit & Beck 2012; Hennink et al. 2011; Braun & Clarke 2006). This stage thus aimed to enable the researcher to achieve immersion in the raw data in order to draw out key recurring ideas, words or language and recurrent themes (Pope et al. 2000).

Though laborious, transcribing of the data in full was useful for screening the data and indicating early the main issues and themes that emerged. Barbour (2014) argued that verbatim transcription of interviews is a useful resource that allows the researcher to return to the data at a later stage to perform further analysis. Polit and Beck (2012) noted that researchers should ensure that transcriptions are accurate and validly reflect what the participants said. As indicated earlier, the entire interviews were conducted in English language and the researcher paid particular attention to all punctuations or pauses, dialects, emphases and the tones which were represented as closely as possible to how they were conveyed in the interviews (Barbour 2014). This was done to ensure that the datasets were true with the original accounts and the meanings the transcripts conveyed were not

significantly altered. As a result of that the researcher continuously checked the interview transcripts against the original recording for accuracy.

Each transcript was then anonymised to protect the identity of the participant. This was achieved by replacing the participant's name with pseudo acronym and by changing any information that would readily identify the participant, such as names, place of work and area of residence. During this stage, the researcher began marking ideas for coding during the subsequent stages (Polit & Beck 2012; Braun & Clarke 2006).

7.2.1 Stage 2: Generating preliminary codes

The main data analysis approach employed in analysing the transcription was thematic content analysis. During the transcription, the researcher carefully paid particular attention to punctuations, emphases and tones which might significantly alter the meaning of a statement (Barbour 2014; Holloway & Wheeler 2010). For example, punctuations were considered in this response; '*Most [of] the equipment are breaking down because of unscheduled power-cut; and they are having quite a toll on us. We had new equipment but [...] because of these unscheduled power outages the equipment [is] breaking down, every now and then*' Rad1. In order to ensure validity and trustworthiness of the data, the researcher ensured that transcription errors were eliminated by cross-checking the transcripts for accuracy and representation of original statements (Polit & Beck 2012).

The purpose of the data analysis in this situation was to ensure comprehensive and relational ideas of the narrators (participants) (Barbour 2014). It was in that regard that the textual data generated was expected to explore and explain the findings established in Phase 1 and to ensure the inclusion of all relevant issues and ideas in achieving the overarching aim of the thesis.

7.2.2 Coding, categorising and concepts

The coding process enabled the researcher to generate codes from the textual data, and it was the initial stage which proceeded towards the development of categories, themes or

major constructs (Holloway & Wheeler 2010). The researcher read and re-read through the 15 interview transcripts step by step to enable him to become familiar with the overall breadth, depth and content of the transcripts. This process also enabled the researcher to identify the themes and categories which were centred on particular phrases, or types of experiences of the interviewees (Pope et al. 2006). For example, ‘...*power is the main engine* [...]; *the service we rendered is by power so frequent power outages is seriously horrible...*’ Rad3 [Power outages]. According to Polit and Beck (2012), the researcher needs to undertake a careful reading of the data in order to identify underlying concepts and clusters of concepts to be able to develop a high-quality category scheme. However, the level of categories may vary with the level of detail or specificity.

Grouping of contents at specific levels of meaning and interpretation could be achieved in many different ways: such as responses, descriptions or explanations that are similar; issues that have cause-effect relationships; words that relate hierarchically or through webs of meaning and explanations of like events (Guest et al. 2012). Holloway and Wheeler (2010) asserted that many researchers use *in vivo* codes (words or phrases used by narrators) which prevents researchers from imposing their own framework and ideas on the data since the coding starts with the participants' own words. The researcher refined the codes generated through this process by making linkages between ideas. For example, there are linkages between ‘*Equipment breakdowns*’ (one of the key themes), ‘*power outages*’ and ‘*departmental management*’ which are other major themes. Given the need for rigour and trustworthiness for qualitative data, the researcher ensured to keep the methods of the data analysis as transparent as possible in order to increase the strength of the findings (Polit & Beck 2012).

Then, the next stage involved the analysis of individual interview transcripts. Each transcript was analysed line by line with the extraction of related texts to each other of the study topic (quality of service delivery). The majority of the interview data was related to the participants’ experiences, feelings, thoughts and views about quality or efficiency of radiographic service delivery in the study setting. The researcher kept moving back and

forward through the transcripts, using different highlighters (different coloured pens), systematically to produce initial coding categories to reflect closely the questions included in the interview schedules.

The data were analysed separately at the initial stages of the analysis according to the categories of the participants such as radiographers, managers and patients' interviews. The researcher considered this approach to give a clear understanding of the participants and to afford a systematic management of the data generated. The intention was to link the findings from the different groupings to each other and such linkages were identified in the presentation of the findings. The data from each group was managed and codes were manually assigned to segments of the transcripts and the initial codes that were similar to the terms used in the text or transcript were grouped.

The researcher then identified all the data relevant to each category or segment, closely examined them and compared them to other segments for similarities and dissimilarities in order to determine the meanings that those phenomena carried (Polit & Beck 2012; Pope et al. 2000). Thus the important concepts that emerged from close examination of the data were given a label that formed the basis for the category (Polit & Beck 2012). This process required a coherent and systematic approach with the key point of its inclusiveness in that the entire aspects of the data were considered very important in this process rather than reducing the data to a few numerical codes (Pope et al. 2000).

7.2.3 Stage 3: Searching for themes

At this stage, the researcher identified a long list of different codes across the entire data. This stage was regarded as important because the researcher became so familiar with the entire data sets and therefore saw the reasons to collapse or redefine some of the initial codes. The researcher refocused the analysis on a broader scope but a smaller number of themes and sorted the different codes into potential themes by collapsing or collating all the relevant coded data extracts within the previously identified themes (Burnard et al. 2008; Braun & Clarke 2006).

Again, the researcher analysed the codes by considering how they might combine to form an overarching theme. The relationships between these categories were considered in view of the whole dataset in order to develop a conceptual understanding of the issues that emerged from the data (Hennink et al. 2011). The researcher achieved this by utilising visual representations (Please see Table 7.3 below) to help sort the different codes into categories (Braun & Clark 2006). The researcher also thought of the relationships between the major (main overriding) themes and subsidiary or sub-themes within them (Polit & Beck 2012; Burnard & Clarke 2008; Braun et al. 2006).

Table 7.3: Major and subsidiary themes

	Major themes	Subsidiary themes	
1	Equipment breakdowns	preventive maintenance/repairs; QA/QC; service/ maintenance culture/ contract agreement	accessories/ lift system; quality standard
2	Power outages	standby generator; power fluctuation	
3	Occupational stress	workload increase; practice errors; speed & efficiency;	standard challenges; reject/ repeat
4	Patient care	patient-centred measures; dignity & respect; satisfaction/ comfort	
5	Professionalism	professional development/ CPD; rewards & motivation; professional attitude; supervision	communication; practice standards/ protocols; professional-patient relationship;
6	Departmental management	appointment scheduling system; procurement procedures; waiting time	patient complaints/ emotional stress

7.2.4 Stage 4: Reviewing the themes

This stage started after the researcher had generated a set of themes and the process involved the refinement of the main themes. The researcher then realised that some of the candidate themes were not really themes in that there were not enough data to allow them

to stand alone. Further, some of the themes collapsed into each other to form one theme while others were also broken down into separate and sub themes (Braun et al. 2006). The researcher further reviewed and refined the themes by reading all the collated extracts for each theme and this was to consider whether the themes formed a coherent pattern (Hennink et al. 2011; Braun et al. 2006). In order to ensure that the candidate thematic map appropriately reflected or captured the evidence in the textual data, the researcher read over the whole set of the data again. It has been argued that when the refinements are no longer generating or adding anything substantial, the process of back and forth reading should stop (Hennink et al. 2011; Burnard et al. 2008; Braun & Clarke 2006). Thus, at the end of the reviewing stage a clearly fair idea was established of what the different themes were, how they fitted together and the overarching story they told about the data.

7.2.5 Stage 5: Defining and naming the themes

The researcher, at this stage, devised and represented a thematic map of the data for the final refinement. Then, the researcher was determined to identify what each theme was about and what aspect of the data each theme captured. In order to identify the story that each theme told, the researcher went back to the dataset to collate data extracts for each theme to organise them into a coherent and internally consistent report, with accompanying narrative in relation to the research questions (Burnard et al. 2008; Braun & Clarke 2006). In doing so, each theme was considered in relation to other themes as well as subsidiary themes. Thus, the eventual final themes and subsidiary (sub-) themes resulted from the process of repeated refinement of the initial themes. The key themes and subsidiary themes were cross-checked with my supervisor and Director of Studies who suggested as to how the themes should link with one another so as to provide the understanding of the narrations as well as the real findings.

7.2.6 Stage 6: Writing the report

The step gave the researcher an opportunity to explore the significance of the relevant themes and subsidiary themes that finally emerged from the textual data. The researcher was expected to return to the research question(s) and the theoretical framework

underpinning these questions and then discuss them with the support of the literature (Bradley et al. 2007; Braun & Clarke 2006; Attride-Sterling 2001). Thus, a concise, coherent and logical discussion was gradually built from within and across the themes and subsidiary themes that emerged from the data with the identifiable extracts, phrases and statements from the data in support of the themes (Burnard et al. 2008; Braun & Clarke 2006).

7.3 Quality of service

After thoroughly going through the above stages, six major (main) themes were identified, with some having subsidiary themes (Please see Table 7.3 on p 193 above). All of the data were accounted for under these major and subsidiary themes:

- Equipment breakdowns
- Power / electricity outages
- Occupational stress
- Patient care
- Professionalism
- Departmental management

These major themes were collated and ordered in a manner to provide an understanding of the experiences of quality of service delivery from perspectives of radiographers, managers and patients. More issues related to quality service delivery were captured or covered in broader themes relating to the data. All the themes and subsidiary themes were used in producing the thematic map which is represented in figure 7.1 below.

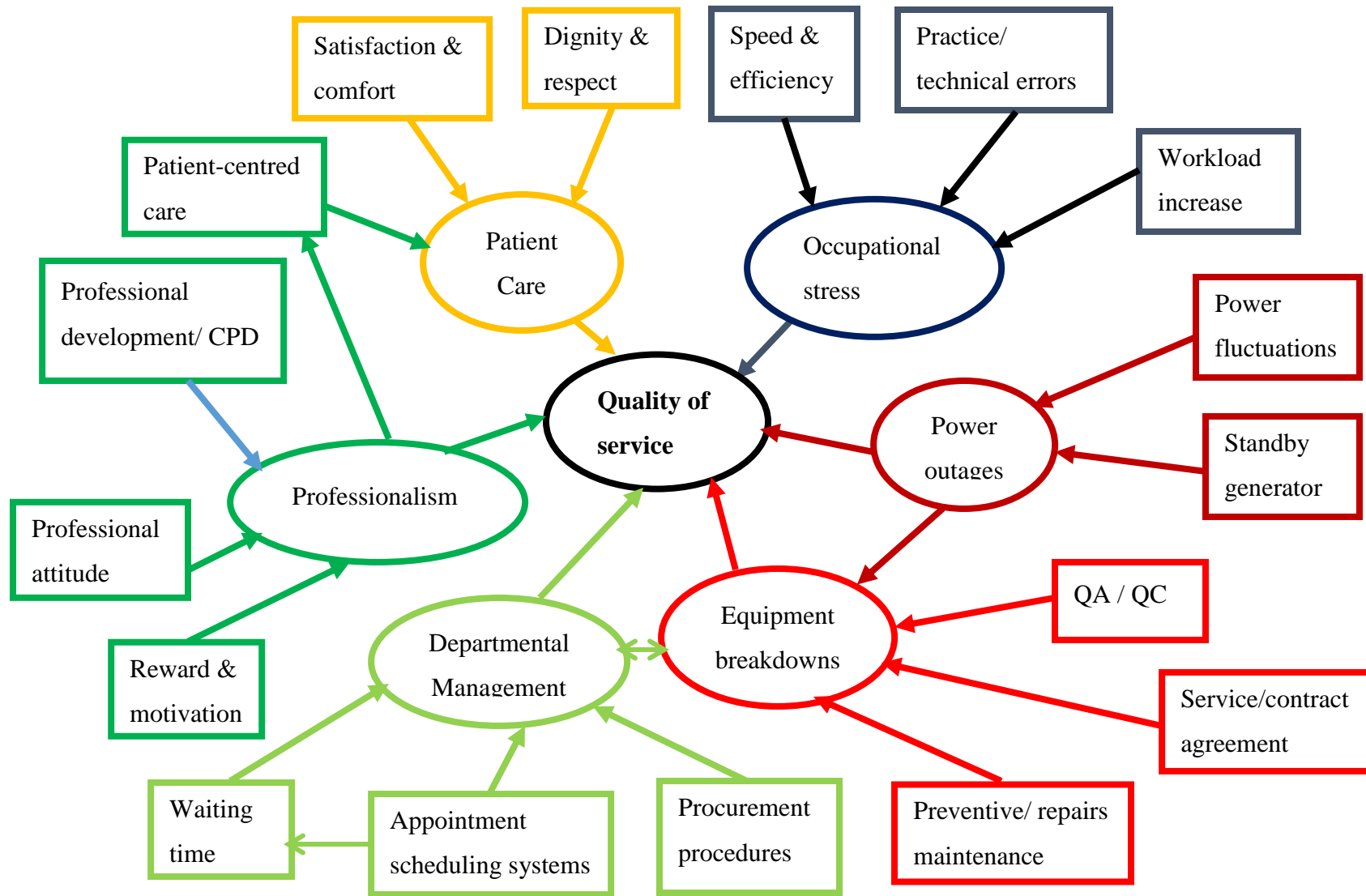


Figure 7.1: Quality Framework themes, showing six main themes & 17 subthemes

The figure 7.1 above represented a map of the key themes and the corresponding subthemes that were captured in relation with the data generated. The key (major) themes captured were six, and these included equipment breakdowns, power outages, occupational stress, patient care, professionalism, and departmental management. In addition, each of the main themes had subthemes.

The equipment breakdowns had three subthemes, namely; preventive/repairs maintenance, service/contract agreement, and quality assurance (QA) / quality control (QC) programmes. For power outages, the subthemes were standby generator plants and power fluctuations. Occupational stress had three subthemes, namely; workload increase, practice/technical errors, and speed and efficiency. Patient care had two sub themes, which included dignity and respect, and satisfaction and comfort as well as a link to patient-centred care. The professionalism had three subthemes as well as a link to additional subtheme; these included professional development/ CPD, professional attitude, and motivation & reward, as well as a linkage to patient-centred care. The subthemes for departmental management were three, namely; waiting time, appointment scheduling system, and procurement procedures. Meanwhile, the thematic map helps to visualise the relationship or linkage between the main themes and the subthemes captured from the data in relation to quality of radiographic service delivery.

7.3.1 Equipment breakdowns

The use of imaging (X-ray) equipment in health service provision has been identified to offer many benefits which have largely enhanced the efforts of radiographers to diagnose and treat different kinds of illnesses. The X-ray equipment emerged from the data as one of the six major themes. The imaging equipment has become an important component of health services delivery in both developed and developing countries. This suggested therefore that no quality health care services were delivered to patients without recourse to diagnostic imaging equipment. However, the challenges of poor imaging equipment performance in the developing countries (Ghana included) have been widely recognised in X-ray departments. Thus, the frequent breakdowns and/or malfunctioning of the imaging equipment in the study setting, coupled with lack of preventive maintenance (repairs), were mainly identified as the major challenges affecting the efficiency of imaging service

delivery to patients in the department. The persistent poor performance of the X-ray equipment, as a result of malfunctions and breakdowns, was identified as one of the challenges that was hampering the delivery of quality services to the patients in the imaging department at the study setting. These challenges were corroborated by some of the respondents who expressed that:

'... frequent equipment breakdowns; they are terrible and they cause so much toll on us; as we speak now the equipment that is for emergency and trauma cases is down so we are forced to relocate to another unit which [...] is not easy for the patients;... [Rad1].

'...the patient will be given an appointment to come to the department [...] and only to be told that the equipment is down so they should go and come back another day; ...because of breakdown of equipment there is pressure on other equipment...' [Rad1].

The equipment breakdowns were not without an association with the malfunctioning of the lift systems in the department. These numerous challenges were reported to have a big toll on both the radiography workforce and the patients. The situation was acknowledged by some of the respondents that:

'...we have a lot of limitations, equipment breaking down, inaccessibility of the lift system, when the equipment down stairs are down and they are supposed to go up for services upstairs, the lifts are down,...' [Rad1].

In addition, the frequent equipment breakdowns were blamed on the absence of preventive maintenance programmes (repairs), quality assurance/control (QA/QC) programmes, as well as lack of maintenance culture or contract agreement for equipment in the imaging departments. Thus, with regard to QA/QC programmes as well as maintenance culture (contract agreement), some of the respondents expressed that:

'...even lack of adequate quality assurance practices such that we don't even have the tools to see if we have what we are setting on our machines [...] and even if they are there the [...] staff are not knowledgeable and how to use it...' [Man1].

'There are no maintenance contracts signed after the initial installation of these equipment we are seeing...' [Man1].

'...I don't remember the last time proper QA measures were taken in the room that I'm working now [...]. When we started every month periodic QA team would come assess the equipment, a collimation, they make sure everything is in order so that at the end of the day you know [...] the output; but previously they were checking output every [...] three months every now and then but now those things are not in place any more ...' [Rad1].

'...we are not doing very well; and the reason [...] is a lot of things boil down to this equipment managing thing, management thing so we don't even get enough time to put down the machine to do certain basic check on the machine, they are always working' [Man1].

'In terms of QC in this facility, I think is a concept that had been held poorly. I am yet to see any serious quality assurance or quality control measures being put in place to ensure quality. [...] But in terms of constant or continuous quality assurance, to me my perspective is it is non-existence' [Rad6].

'...the equipment has a certain limitation but you are forced [...] to use the equipment. [...] like a collimator light is not [...] functioning but you don't have any choice [...] you are forced to improvise to provide certain services...' [Man1].

Again, planned preventive maintenance and/or maintenance contract agreement as well as maintenance culture as a whole were identified as lacking in the department. This means that after installation and warranty periods the X-ray machines have been operating continuously without regular or planned servicing unless the equipment totally breaks down. As this happens, the management would then contact the biomedical engineering department stationed within the hospital. In view of this situation some of the respondents expressed their observations that:

'...our equipment are going down one after the other, there are no maintenance contracts signed after the initial installation of these equipment we are seeing; ...' [Man1].

'...also the authorities making sure that equipment are in good shape, in good conditions, those which are not under contract making sure they are under contract so that there PMS

(planned maintenance services) carried on equipment from time to time, we don't have to wait till they break down, ...' [Man2].

'...to make sure that this contract [...] arrangement thing is finalized so that we don't have this maintenance problem where something very small happens and we can't repair it even if there is a bulb goggles off nobody wants to touch the machine because there is no contract agreement arrangement...' [Man1].

In addition, challenges of quality assurance (QA) and quality control (QC) measures in the diagnostic imaging department were noted by the participants. Thus, the respondents expressed that:

'...and then even lack of adequate QA practices such that we don't even have the tools to see if we have what we are setting on our machines [...], exposure factors if the kV you are setting is the real kV you are obtaining, but the equipment (the tools) are not there and even if they are there ...how to use it so at least they all go to affect quality' [Man1].

'... QA most of the time at this department is suspect; is not up to the standard that it should be and [...] I don't remember the last time proper QA measures were taken in the room that I'm working now ...' [Rad1].

7.3.2 Power outages

Radiographic service delivery is much technology dependent which is dependent upon high quality or stable power (electricity) supply to operate safely. The disturbances in the quality of power supply could potentially affect the functioning of the imaging equipment and also interrupt delivery of patient care services in the imaging facilities. Meanwhile, at the time of writing, the continuous power outages were a major and worrying concern for all institutions, industries, professionals, the government, and Ghanaians in general. It was in this regard that some of the participants observed that the persistent and unscheduled power outages had taken a big toll on the professionals as well as the work schedules, the equipment functioning and the department as a whole. Thus some of the participants expressed that: *'Most of the equipment are breaking down because of unscheduled power-cut and they are having quite a big toll on us'* [Rad1].

'...power is the main engine; everything we do, the service we render is by power so frequent power outage is seriously horrible to the extent that you may have an emergency situation [...] which is an urgent one [and] power goes off [...] so power is a very big challenge' [Rad3].

'...when we are having very frequent power outages, most of the times we are left redundant; we are unable to provide services to our patients because we don't have light or the light is not stable so we can't do anything' [Rad4].

'...the effect of the power outages is a factor in the sense that it ends up adding up to the waiting time of the client'. [Rad3].

'... it affects all the other equipment [...] if this happens and takes a little longer because we are not enjoying power [...] for some time until the light comes on, it delays work and [...] at the end of the day the equipment may not even come on smoothly' [Man1].

'...the most important challenge is the electricity. Many examinations would have to repeat because power went off in the course of the examination and so the film would get stuck in the processor.' [Rad4].

'...the current power outages affect the equipment and [...] the time we could have used to attend to five patients maybe you would be able to attend to two patients whereas in the morning you came with the expectation that you would be able to attend to all the five; [...] so it delays them' [Man2].

Considering the effects of power outages or interruptions on the smooth operation of imaging equipment in the department, the concern was that the management should have ensured that the department was powered by the standby generator plants anytime the power outages occurred. This could prevent an interruption of the imaging service delivery to the patients. Meanwhile, some of the units or machine rooms in study setting were not connected (hooked) onto the standby generator plants. In addition, challenges of operating

the existing generators were identified. These concerns were thus shared by some of the respondents that:

'...procedures are being carried out, power goes out and everything would have to come to a standstill, so it's one of the major, major issues. I think that [...] for a facility like this we need a standby generator to help us with the power problem' [Rad4].

'...the electricity situation, we don't have standby generator so anytime power fluctuates the equipment goes off, films get stuck in the processor' [Rad5].

Again, another participant noted:

'...you are working on the patient and all of a sudden the light goes off and there is no standby generator to repower [the equipment] so patient is kept on the couch hoping that it would come for the next five [...] minutes and it never...' [Rad6].

'...you have injected the contrast media and you need to have [the] examination done and then light goes off. [...] if this thing happens and takes a little longer because we are not enjoying from the main sub-station there, main radiology would be down for some time until the light comes on so it delays work and so many things...' [Man1].

Although the imaging department has a standby generator or plant, some of the participants observed that the bureaucracy by the financial section of the hospital had been the cause of long delays in releasing funds to the engineering department to buy diesel to fuel the generator. Some of the participants stated that:

'...standby generator which is supposed to come on as soon as the power goes off, [...] at times they would tell [you] there is no diesel; then you have to go through long process to get money to get the [...] diesel to the equipment (generator/plant)...' [Man2].

7.3.3 Occupational stress

The concept of occupational or workplace stress may be described as the physical and emotional outcomes that occur when there is disparity between the demands of the job and the amount of control the worker has in meeting those demands. Thus, occupational stress occurs when challenges and demands of work become excessive, the pressures of the workplace exceed the professional's ability to handle them. Many professionals (including

health professionals) experience some form of workplace stress in one way or the other due to increased workload, staff shortage, overtime, and other work-related challenges. In line with this, the participants expressed their experiences in their quest to provide quality of service to patients. Thus, some of the respondents said:

'The pressure at the department is so much so the time that radiographers are supposed to take to make sure all is in place before they expose [...] is reduced to the barest minimum. People even forget to give instructions' [Rad1].

'...there is pressure because once there is pressure on you the radiographer [...] you are forced to sometimes not to answer certain questions because there is no time to be answering them or sometimes questions that are not supposed to kind of generate any emotional stress tend to, because you are already tired' [Rad5].

Another participant also said that:

'Already, our place is choked, so the workload increase will worsen the problem; [...]. Most at times because of workload we are not even smiling; we are angry so the patient complain [...] and we won't even take our time and put yourself in his shoes but you flare up' [Rad1].

'...sometimes when workload is high we often sometimes don't follow the normal trends, [...] instead of collimating properly we are in hurry to [...] have it done quickly and so doing we tend to rather cut. So the workload also contributes somehow to getting some of the films rejected and repeating them again' [Rad2].

Also, some of the participants observed that workload increase could result in the workplace stress as well as high reject level in the department. The respondents therefore asserted:

'In our department we may talk about the workload; sometimes it's too alarming...' [Rad3].

'... workload would affect because as a human being when you are being overstretched you may think at a particular time you are doing the right thing meanwhile [you are] going

astray so the workload [...] should be looked at such that maybe in a shift or day you say this number of cases should be handled [...] and [...] managed to reduce the workload; then the reject level would also come down because the person would also have [...] that strength, mental strength to deliver the best...’ [Rad3].

‘...once workload increases you have more pressure on us; the patient throughput is [high], [...] because we are also doing manual [...] there is greater chance of human error because we are doing more human error comes in more and so you have all kinds of problems’ [Rad4].

‘...our place is choked so the workload, [...] you will be forced to do things in a hurry and in that way repeat will be increased and [...] the images coming out will not be the best because you are so tired...’ [Rad1].

Speed and efficiency concept also evolved from the data and many of the participants described the attribute in many ways; some described it as doing the right thing and getting the right results. In line with that, some of the respondents noted:

‘...speed and efficiency, basically, mean to do the right thing within the shortest possible time and get the right results. [...] and efficiency should give you a very good outcome so you do the right thing within the stipulated time with the correct results’ [Rad3].

‘Speed and efficiency, for me, is ensuring we have an increase patient throughput but also ensuring that we are doing what we do well so that we are seeing more patients in a shorter time and also ensuring that we are giving them the maximum you know of our effort....’ [Rad4].

7.3.4 Patient Care

Participants considered the provision of quality care very significant and necessary in meeting the health needs and expectations of the healthcare users. Some of the participants indicated that the department lacked so many things that should help them provide the patients with the comfort of care they expect, irrespective of their cultural, ethnic, religious, political, and socio-economic backgrounds. Some of the participants thus expressed that:

'...there are so many things we lack, that should go a long way to provide comfort of the barest minimum of care for the patient. [...] now the care [that] we use to take to image our patients are no more available' [Rad1].

'...we've been doing our best as we can even though the circumstances around don't seem to encourage it but due [to] the exposure that some of us have had from the past, we try to make use of the little facility we have to give our patients the best in terms of diagnostic care' [Rad6].

'...the patient comes and expects to be handled as soon as possible, handle with care and handling with care and getting the result immediately to the doctor.' [Rad6].

'...patients or the clients receive the best of our services in terms of diagnosis which could inform the medical practitioner in handling them or giving them the best of treatment' [Rad6].

Also, some of the participants were concerned with the patients' dignity and respect as well as satisfaction and comfort. They therefore expressed their views that:

'When it comes to satisfying the patient in terms of appointment system and [...] comfort when they come to the department I don't think it's very high, I think it's low ...' [Man3].

'...our clients are the most important people when it comes to the hospital setting. So they should be treated with the utmost respect and dignity; and the, we are supposed [to] provide them with the barest minimum of comfort [...]. 'So we should [...] provide the service that will provide the little smile or the little comfort that will help them to get hope, thinking that they have the best of services' [Rad1].

'...constant reminders of some of these things and the fact that the patients are the most important people at this department will bring us back to the proper practice where we will give the patients the utmost respect and the dignity that they need as patients'[Rad1].

'There was one time I suggested to the department that patients come and when they sit down long delays without understanding what's happening they get frustrated and so we should get PA (public address) system and communicate to them...' [Rad2].

'...again maintaining a good relationship with them, talking to them so every once a while you go out there and interact with the patients and tell them what the situation is, try to calm them ...' [Rad4].

'...when, for example I go to the front desk and when I hear them shouting on the patients I call them and say, have you ever been to the bank and heard a cashier and another cashier chatting to the hearing of the customers?' [Man2].

Also, the attribute of dignity and respect as well as satisfaction emanated from the data and was recognised one of the important factors that contribute to patients' care. Further, patients become valued and respected whenever their dignity is observed by health care service providers. In line with this, some of the participants expressed that:

'...when he asked me to dress he left the place so I was alone, nobody was there; so after undressing and putting on the gown he provided me, he asked me whether I finished. [...] He then said I should come so he escorted me to the bed for the X-ray...' [Pat1].

'...if things should go on like this we should always be happy; [...] I like the way they treated me, if it would always go by this then it would be okay' [Pat1].

'...so constant reminders of some of these things and the fact that the patients are the most important people at this department will bring us back to proper practice where we will give the patients the utmost respect and the dignity that they need as patients' [Rad1].

'...so far I can say that your services have been very good. I haven't met any obstacles from them or rudeness from any of your staff [...]. The service is very good. It's been okay'. I am okay with the services'. [Pat1].

7.3.5 Professionalism

The attribute of professionalism was identified by the respondents and was regarded as professionals with characteristic thinking and behaviour who have competence and expertise of someone with professional training. However, the participants recognised the unprofessional behaviour that some of the healthcare professionals have been exhibiting towards the healthcare consumers. Although some of the respondents believed that healthcare users were very important people for healthcare institutions, however they noted that some of the health professionals displayed bad behaviour towards the patients. In view of this, some of the participants expressed that:

'As I said, we are also not patience enough to [for] them and we also flare up and created bad scene' [Rad1].

Professional development was identified as one of the subthemes of professionalism and was considered very significant in the field of professional practice of radiographers. The radiographers are expected to move alongside developments in their field and shape the changes by using their expertise. In line with these, some of the participants also expressed their opinions about the professional development and/or CPD as very important in their life as professionals to upgrade and update their skills and knowledge in order to maintain and improve their professional competency. Thus, some of the participants noted:

'...how is the professional like? Is he still the same in terms of knowledge for over ten years [...] doing the same things [...] or ten years of advancing oneself?' Rad6

'...after [initial] employment there was no in-service training, no upgrading of knowledge so errors are bound to bring about repetitions.' [Rad6].

'...we have this on-going CPD workshops to upgrade our knowledge to [...] be abreast with the current practices...' [Man1].

'...re-training, constant clinical update, provision of journals; getting to know the new trends in imaging modalities and all those things will help a lot. [...] I think constantly training and clinical orientations will be in place to reduce some of these things...' [Rad1].

'...continuous professional development or in-service training for personnel is also very important to prevent some of [...] rejects' [Rad6].

'...I think the department itself too is not helping because there are people who are willing to kind of go and acquire knowledge but then the department could not allow it because they tell you their staff strength is very small and you want to leave ...' [Rad5].

'...I would say some people don't upgrade themselves quite regularly so in this case you see that the person is lacking in certain skills' [Man1].

In addition, professional attitude evolved as a subtheme of professional development and was identified as an important factor in the practice of radiography and maintenance of the profession's status as a respected and caring profession. The professional attitudes of the radiographers and its demonstration towards the patients provides them with the opportunity to respect and trust the professionals. In line with this, the professionals sometimes adopted varying strategies that would enable them to cope with every situation in order to ensure that services were delivered to the patients. Regarding the attitudes of the professionals, some of the participants expressed their views that:

'The other thing would be personnel, how well we treat the patients in terms of our attitudes towards the patients, how we communicate effectively, explain procedures to patients for them to understand and even if there [are] challenges, how best we get across to patients are also some of the factors that also affect the patients' [Rad2].

'...the patients complain that he's kept too long and we won't even take our time and put yourself in his shoes but flare up and create bad scene' [Rad3].

'...so one of the approaches I do is if I hear too I don't hear; I just keep mute over it' [Rad3].

'...I would say in our system here they say "when the pressure wants to pressure you, you pressure the pressure back" meaning if the patient wants to make life hell to you, you push the pressure back unto the patient...' [Rad6].

Again, patient-centred care was emanated as a subtheme of professionalism and also linked with the patient care and was identified as one of the essential factors that help in promoting quality of care services to the patients. In this regard, the participants noted:

'...some patients would roam, roam in the department several times without knowing that the examination is done here because we don't have the needed or indications at the [...] department to tell them...' [Rad2].

'...at times when the equipment breaks down too we [...] actively go and explain to patients that well, we are expecting to have this number of cases at this time but because we have issue with the equipment ...' [Rad2].

'...delaying patients or having them waiting for long period of time is not the best, is not the best so I particularly don't feel happy about it and I wish that the department could do something about it to...' [Rad3].

'Things [signposts] should be put in place to ease the patients' access to such places [various imaging rooms] if the need arises' [Rad1].

'...we are just doing our best and trying to make sure we give our patients what we feel is the best within the constraints' [Rad5].

Further, reward and motivation emerged as one of the subthemes of professionalism and was regarded as one of the attributes that demonstrate recognition of the professionals and also encouraged them to deliver the best of care services to the patients. With regard to this, some of the participants expected rewarding and/or motivating systems to be established in the department by the managers. Hence, some of them expressed that: *'..., remuneration action, to ensure that those ones working also are very comfortable just having to depend on the salary these days it's a real challenge and considering the number of patients you see every day and all the things you have to go through sometimes it's just not worth it [...]; it seems that you are doing much, much, much more than you are earning...' [Rad5].*

'...I think the most important one is the staff offering those services should be motivated enough, they should be encouraged to do that; ...' [Rad1].

'...quality of service would be enhanced through this frequent education among members, [...] and then motivation; we've now set up [...] awards at the department but one is at the end of the year that staff are awarded because of their work output...' [Man2].

'...renumeration action trying to ensure that those ones working also are very comfortable; just having to depend on the salary these days it's a real challenge and considering the number of patients you see every day [...] it just not worth it; it seems that you are doing much, much more than you are earning...' [Rad4].

7.3.6 Departmental management

This construct emanated from the data as one of the major themes that was considered as very important in organising and steering the day to day activities of the imaging department. In view of assessing the issues concerning the management of the department, it was revealed that the department had been experiencing some management challenges which, many times, had been making it difficult for smooth running of the facility and delivering of efficient imaging services to the patients who came to seek services in the department. It was in this instance that some of the participants noted:

'...when you come to our department we have different modalities we use, sometimes some of them fail to work; [...] the department and the management are not doing anything about it...' [Rad2].

'Right now we are in a situation where envelopes are almost finished [...] and then, even lack of adequate quality assurance practices such that we don't even have the tools...' [Man1].

In addition, appointment scheduling system evolved as one of the subthemes of departmental management and was identified as one of the factors utilised to regulate the number of patients that presented at the department at a particular time. This was to spread out the X-ray cases in order to reduce congestion at the patients' waiting areas in the department. Also, workload increases were identified as the main causes of lengthy patient waiting time in the department. This challenging situations have been causing

dissatisfaction among patients towards service delivery and providers. However, some of the participants indicated that although the appointment scheduling system was introduced in the department previously it failed to work as expected. Some of the respondents thus indicated that: *'...the appointment system is lacking. [...] it had been tried in this department before, that people would be given specific time but you realised that they all want to come very early, thinking that when you come early you would be seen, [...] so it has defeated that purpose'* [Man3].

'...in the morning we [...] won't get everybody coming so one is given appointment time, so you give them appointment which is [...] spread over a period; some come at eight [...] that's what we do [to] spread them [...] so some out of ignorance, even when you asked them to come at eleven, they may come at eight o'clock and such a person may complain, so that's the appointment system' [Man2].

However, one of the manager-respondents noted that it would take a long time to resolve the appointment issue. With regard to patient waiting time, some of the participants expressed their observations that:

'...they waste much time at the unit; that they've been here for so long, they haven't been attended to; ...that's their complaints. Time has been the biggest issue; [...] they waste a lot of time, the waiting time before they are attended to ...' [Rad3].

'... we have been piling all the examinations on one and so those patients tend to stay for very long time, very long time and so it becomes a very big problem for us' [Rad2].

'...but they tend to spend so much time before even it gets to their turn so some people are not happy about it' [Rad2].

'So most of their complaints are the waiting time is so long; and the fact that the place is inaccessibility'. [Rad3].

Again, procurement procedure emanated from the data as one of the subthemes of departmental management which was considered important in the delivering of imaging

services to the patients. In view of this, some of the participants suggested that the chief radiographer should be involved in the process as a technical expert prior to procuring consumables and other working tools, for him to contribute his expertise in order to avoid unmatched consumables, especially processing chemicals and X-ray films. In line with this, some of the respondents noted:

'Someone like the chief radiographer needs to be consulted; his expertise is required in that aspect. 'What do you think about this film? Do you think if we buy it would help the unit or help the department function well? [...] they just bring you the films, use it whether you like it or not...' [Rad6].

In addition, it was revealed that the department sometimes ran out of the consumables and it was very embarrassing not to get inputs to work with. In view of this, some of the participants noted:

'...consumables and accessories because sometimes we do a case and [...] you don't even get an envelope to put in what you have done and it's very embarrassing issuing a film to a patient without any envelope; ...' [Man1].

'If I need gloves they should be there, if I need all the things I need they should be there so that I would be able to work in that manner and get good results'. [Rad2].

'...procurement procedures,[...] because sometimes you need basic things to use to, kind of, give the best of service delivery to the patient and then those things are not there, it tells you financial challenges, ...' [Rad5].

7.4 Summary

In this chapter, the analysis and findings of Phase 2 study were discussed. The qualitative data generated through the three interviews were analysed using a thematic content analysis approach which was influenced by the theoretical and methodological perspectives. The thematic content analysis approach, which is often similar to all types of qualitative data analysis process, was discussed in this chapter.

The individual interviews of 15 participants were prepared by the researcher who transcribed the data verbatim and also familiarised himself with the data by reading and re-reading the data, immersing in or knowing the data and noting down initial ideas.

The data analysis process was carried out through six stages including data preparation and familiarisation; generating the preliminary codes; coding, categorising and concepts; searching for themes; reviewing the themes; defining and naming the themes; and writing the final report.

Having thoroughly gone through the six stages, six main themes were identified, with some having sub-themes. These main themes, which accounted for all the data were collated and ordered in a manner to provide the understanding of the quality of service delivery from perspectives of the participants. The main themes included equipment breakdown, electricity/power outages, care, occupational stress, departmental management, and professionalism. All the themes and the sub-themes were used to produce a thematic mapping.

The themes were then reported with the quotes in order to provide the actual meanings of what the themes represented. The themes will thoroughly be discussed in the discussion chapter.

Chapter Eight

Discussion

“The body is not a self, as such, but it becomes a self only when it has developed a mind within the context of social experiences.”

(Mead 1934: 50)

8.1 Introduction

This chapter presents an integrated discussion of the key findings and/or themes that emanated from both Phase 1 and 2 studies of this thesis. The discussion highlights the linkages of the findings to the quality of service delivery. The chapter is divided into sections with the discussion of each section focused on the themes; namely equipment, power outages, care, departmental management, occupational stress, and professionalism. In addition, the subsidiary themes were also discussed. The chapter also presents a discussion of the conceptual development of quality of service delivery to fulfil the needs of patients.

8.2 Discussion of main findings

This section presents comprehensive and holistic discussions of Phase 1 and Phase 2 studies with emphasis on the key and subsidiary themes that evolved from Phase 2 study. The discussions seek to explore the linkages in the main findings and the relationships with the broader literature. The discussion aims to give a wider spectrum to the findings described in the previous chapter. In the Phase 2 study, some of the themes that emanated from the perspective of one participant group were corroborated with the perspectives of other participant groups. For instance, findings from radiographers were supported by the manager and patient groups. The truth is that quality health care services cannot be delivered to patients without recourse to diagnostic imaging equipment. The use of the imaging equipment in diagnostic radiography is very important, requiring accuracy, efficiency and safe management of patients for their health needs (Hossain et al. 2012).

Many of the findings that emerged from both phases of the study (Phase 1&2) were regarded as key attributes or factors responsible for delivering health care services (either efficient or inefficient) in many healthcare institutions in developing countries all over the world, particularly Ghana (Davino 2011). The factors identified might reflect or hinder the

ability of service providers to deliver the services to meet the patients' health needs and expectations (Kagashe & Kwebangila 2011); these attributes included frequent (X-ray) equipment breakdowns, unscheduled power outages, occupational stress, care, professionalism, and departmental management. The discussions will be presented holistically with regard to the six major and sub-themes that emerged from this study as well as the entire thesis. The study showed aspects of the findings that were consistent with the wider literature as well as aspects that were unique to the Ghanaian context. The finding of the X-ray equipment as one of the key themes, with its impact on quality of service delivery to patients, will be extensively discussed. In addition, other key and sub-themes emanated from the study will be discussed holistically in relation to the quality of radiographic service delivery.

8.2.1 Equipment breakdowns

The study demonstrated, to a greater extent, that the reliance on the X-ray equipment in the modern health service delivery cannot be overemphasised. The imaging equipment emerged from the data as a valuable technological asset to be reckoned with in the healthcare environment, particularly in diagnostic radiography. Medical imaging is indispensable in patient-centred care and its utilisation in health service delivery has increased significantly in recent years. Therefore, the potential benefits arising from the utilisation of medical imaging in developing countries (Ghana included) have been widely discussed (Mohd-Nor 2011).

The health care delivery systems worldwide, nowadays, have been largely technology dependent and rarely do medical interventions take place without recourse to imaging equipment and its accessories (Hayre 2016). It was in this respect that the frequent breakdowns of the equipment in the study setting were of great concern to the radiographers as well as the patients. This was acknowledged by some respondents that: '*... the patient will be given an appointment to come to the department [...] only to [be] told that the equipment is down so they should go and come back another day ...*' [Rad1].

It is noted that the imaging technology offers lots of benefits and largely enhances the ability of imaging professionals (radiographers/radiologists) to prevent, diagnose and treat

diseases. However, as the equipment breakdown occurs, imaging service delivery to the patient would be affected and the patient would become dissatisfied with the facility because his/her health needs and expectations are unmet (Andaleeb et al. 2007). This situation may also result in revenue loss to the facility. In effect, the continuous breakdowns of the X-ray equipment in the department would continue to pose adverse effects to the efficiency, quality of service delivery, and safety of the patients who seek services in the setting. This situation of malfunctioning of the X-ray equipment in imaging departments in Ghana, and in the study setting in particular, would continue to create wide gaps in the provision of critically needed health services and could cause delays in patient treatment (Filkins et al. 2015). The frequent poor performance of the imaging equipment, as a result of malfunctioning and breakdowns was due to multi-faceted systemic failures, such as unreliable and/or fluctuations in electricity supply (frequent power outages), and lack of maintenance culture (Lustick & Zaman 2011). This situation was supported by some of the participants that: *'...I should say frequent equipment breakdowns, they are terrible and they cause so much toll on us; [...] now the equipment that is for emergency and trauma cases is down ...'* [Rad1].

'...our equipment is going down one after the other. [...] to be frank with you, we have serious case with our equipment...' [Man1].

These issues of systemic failures were of major concerns to the radiographers, managers of the imaging department and the hospital at large, referring clinicians, patients and other imaging service users in the study setting. Moreover, there has been an increasing pressure on health institutions to improve upon the quality of health service delivery to meet the increasing patient health needs, and imaging equipment offers many benefits in that regard (Keller & Walker 2004; Drain 2001).

Further, it was noted that the breakdowns and/or malfunctioning of the X-ray equipment in the department kept disrupting the appointment systems in that patients who were scheduled by an appointment to come for the investigation in the department were forced to take another appointment date for their investigation. As this happened, the re-scheduling of the patients would result in the delay of diagnoses and treatments of the patients. Again,

the re-booking of the patients added yet more of patients to the existing number of patients already booked and thereby increased the workload pressure in that particular examination room as well as on the equipment. As the workload increased in the imaging environment patient waiting time invariably prolonged as revealed in the survey where 41.1% (37/90) of the participants noted that waiting time was either quite long or very long (Figure 5.7 p.120).

Many reasons were identified as being behind the frequent breakdowns of the imaging equipment in the imaging departments in Ghana, particularly in the study setting. Poor maintenance culture, inadequate funds for maintenance and timely replacement of malfunctioning parts, lack of availability of spare parts and proactive plans for equipment maintenance as well as poor equipment procurement procedures, usually adopted by authorities from the Ministry of Health (MOH) were established (Hossain et al. 2012). For instance, one of the respondents noted: *'...the people who install the machine would tell you that you don't have any arrangement with them so just [...] after the one year warranty there's been no [...] servicing ...'* [Man1].

Although there is a biomedical equipment management organisation for maintenance and training of electro-medical equipment specialists in place in the hospital, it appeared the organisation had not been periodically proactive as regards servicing, repairs and maintenance of the imaging equipment in the department. Even though the respondents did not give any reason in the data generated concerning this, the researcher went back to one of the managers to ascertain the fact about the maintenance contract agreement for the machines. It was noted that no such agreement contract was entered into with the vendors at the time of procurement and installation of the machines; and for some time now, the lead-personnel for the procurement process kept shifting the maintenance issues onto the vendors that they refused to sign the agreement contracts. As the manager's outfit pressed on to establish why the contract agreements were not signed, there was an attempt to personalise the issue from the higher authority in the hospital and the manager had stopped pursuing the issue for fear of victimisation, which could challenge his position. This issue of poor performance of the imaging equipment appeared to have impacted negatively on the efficiency and quality of imaging service delivery to the patients in the department.

8.2.1.1 Quality assurance and/or control programmes

Quality assurance has been recognised in diagnostic radiography as the overall planned and systematic management measures that are put in place to ensure provision of adequate and consistently high quality diagnostic radiographs (images) with minimum exposure of the patients (Ramlaul & Hogg 2010; Kodak 2005; WHO 2001). The QA programmes therefore covered broader dimensions of quality activities of the actual performance of the imaging equipment and attempted to modify, when necessary, the performance challenges in the light of the results measured in order to ensure the attainment of quality (Ramlaul & Hogg 2010).

The issues of quality assurance (QA) and/or control (QC) programmes emanated from the data as sub-themes that were identified as very important measures in diagnostic imaging departments to help avoid unnecessary breakdowns of the X-ray equipment and its accessories. It was identified that lack of regular QA measures in the department was the major cause of the breakdowns of X-ray equipment and its accessories which were the main challenges affecting quality of radiographic service delivery to their patients. This was acknowledged by one of the respondents:

'...we have challenges so QA [...] at this department [...] is not up to the standard it should be and [...] I don't remember the last time proper QA measures were taken in the room that I'm working now [...]. [...] previously they were checking output [...] every three months [...] but now those things are not in place any more ...' [Rad1].

The respondents however could not give any reasons as to why and how QA and QC programmes or measures were no longer practised in the department. Meanwhile, X-ray equipment breakdowns were many times attributed to lack of regular QA and/or QC measures (Sungita et al. 2006; WHO 2001). However, it is established that appropriate, well maintained X-ray equipment and its accessories form the basis for quality performance and operational efficiency of the equipment, safety of patients and good radiographic practice (Korir et al. 2013; WHO 2001). As such, the imaging equipment in the study setting was expected to operate at optimum performance at all times. This implied that the challenges of the frequent equipment breakdowns in the study setting could be minimised,

if not entirely prevented, when QC and QA tests were regularly performed on the equipment and its accessories (Korir et al. 2013; Sungita et al. 2006).

Moreover, lack of basic QC and QA kits in the department also emerged from the data, and that was one of the main concerns for the respondents who argued that there was the need for additional training on the QA equipment (kits), as and when it was available, to enable them to update their skills in order to use them accurately when they were provided. This assertion was acknowledged by one of the respondents that: *'...lack of adequate QA practices such that we don't even have the tools to see if we have what we are setting [exposure factors] on our machines [...], if the kV you are setting is the real kV you are obtaining, but the equipment [the tools] are not there and even if they are there [...] how to use it; so at least they all go to affect quality'*. [Man1]

Although it is noted that QC tests are established in diagnostic radiography to ensure reliable performance and reproducible quality outcomes from the X-ray machines and its accessories (Samei & Ravin 2008; Boone 2002), the study showed that the QC issues were poorly managed in the study setting. This was acknowledged by one of the respondents that: *'In terms of QC in this facility I think is a concept that had been held poorly'*. [Rad6]

The radiographers were expected to undertake basic QC tests, such as light beam alignment checks, timer accuracy, and tube leakage tests on the X-ray equipment in the department (Ebisawa et al. 2009; Sungita et al. 2006). In Ghana, medical physicists from the Radiation Protection Board of the Ghana Atomic Energy Agency (GAEA) have been responsible for performing the necessary periodic QA audits on the imaging equipment; however, it appeared some of the radiographers at the setting were not too sure of who does what because they kept using both QA and QC procedures or processes interchangeably. For instance, one of the respondents expressed: *'I am yet to see any serious QA or QC measures being put in place to ensure quality. It is something which is not common. [...] But in terms of constant or continuous quality assurance, to me my perspective is, it is non-existence'*. [Rad6].

There is therefore the need to educate the radiographers on the differences between QA and QC processes in order to ensure that they regularly practise QC as fundamental requirements for total quality management in the department (Ramlaul & Hogg 2010; Sungita et al. 2006). Again, unavailability of the QC kits and/or measures in the department might have eroded the benefits of checking or reducing radiation doses to patients and achieving early diagnoses for them (Begum et al. 2011; Sungita et al. 2006). In addition, adequate guidelines for QC and QA are yet to be fully established in Ghana as legal requirements for X-ray equipment to ensure delivering quality service to the patients (Korir et al. 2013; International Atomic Energy Agency 2007). Again, the dearth of data on QA and QC procedures for imaging equipment in Ghana meant that information was unavailable on framework for QC tests and QA procedures in the diagnostic imaging facilities (Korir et al. 2013). Even though Ofori (2011) conducted a study on the status of QA and QC measures in some selected facilities, five years after this study, these measures were yet to be put in place in the study setting. However, previous research on quality issues in the study setting suggests that little has changed. There is therefore the need to establish regulatory standards for imaging equipment performance tests within the imaging environments in Ghana to ensure that QA and QC processes are mandatory (Korir et al. 2013).

8.2.1.2 Preventive maintenance/repairs and contract agreement

Also, preventive maintenance (PM)/ (repairs) and contract agreement (maintenance culture) emerged from the data as another sub-theme and important programmes that ensured smooth functioning of the imaging equipment in the diagnostic X-ray departments. The respondents revealed that lack of these programmes was perceived as the major cause of frequent X-ray equipment breakdowns in the study setting. This was supported by one of the respondents: *'There are no maintenance contracts signed after the initial installation of these equipment [...] how to improve upon the situation but it's not improving because the contract is not been signed by anybody so [...] the people who installed the machine will tell you that you don't have any arrangement with them...'* [Man1].

It was however not clear why servicing contract arrangements post warranty were not entered into with the equipment vendors as well as the engineers who installed the

equipment in the setting. In addition, lack of preventive maintenance (PM) arrangements (measures) in the imaging department emerged in the study. Although there was the need for planned maintenance services in place to avoid total breakdown of the equipment and its accessories, the study rather revealed non-existence of routine PM in the department. One of the participants supported this assertion that: *'...to make sure that this contract [...] arrangement thing is finalised so that we don't have this maintenance problem where something very small happens and we can't repair it [...], nobody wants to touch the machine because there is no contract agreement arrangement ...'* [Man1].

However, PM plans (measures) for imaging departments are meant to minimize the financial risks of total breakdown of the imaging equipment and its accessories; and a well-maintained and optimally functioning imaging equipment is essential in delivering quality diagnostic services to both patients and referring clinicians. PM measures should be established in imaging departments, during and post warranty, to ensure that the imaging equipment and the accessories offset the challenges of frequent equipment breakdowns and high maintenance costs as well as excessive waste that the department may incur (McClelland 2004). Although the managers might feel the need to minimise the financial risks of the imaging equipment breakdowns, the PM and maintenance contracts received little attention in the department (Wright 2012). Virtually no such measures (plans) were in place in the study setting.

This assertion was revealed by one of the managers when the researcher attempted to ascertain and confirm the issues concerning the PM arrangements for the equipment in the department. The manager emphasised that the Ministry of Health (MOH-agent of the government) had the oversight responsibilities for the procurement and installations of X-ray machines in the setting, as well as responsible for PM and maintenance contracts for the equipment, during and post warranty period, in Ghana. This suggested that the MOH was unable to sign or enter into contract maintenance or contract agreements with the machine vendors at the period of acceptance of the equipment and ancillary accessories after the installations. Meanwhile, it is suggested that manufacturers' warranties should cover service contracts for newly purchased equipment for a period of time after purchasing and installation so that the equipment would be regularly maintained and/or serviced by the

specialist service engineers (personnel) of the equipment suppliers. This was to offset the risks of expensive part replacement from the budget into a fixed cost solution (Sungita et al. 2006).

Additionally, 18 years after the study by Schandorf & Tetteh (1998) in Ghana, the situation remained virtually unchanged in that there were no institutional performance checks being carried out following major repairs of malfunctioning equipment nor routine checks at regular intervals to ensure the consistent performance of the equipment. What usually happened was that after any major repairs was performed on any equipment, that particular equipment would be in continuous use without any planned checks until the breakdown occurred again. The challenge of absence or lack of planned routine performance checks on the equipment was largely attributed to non-availability of funds for payments.

Specialists such as service engineers and medical physicists, who should have performed service works by maintaining the equipment, were not readily available in Ghana. Although the equipment vendors sometimes conducted brief trainings for some engineers after installation of the equipment, these usual one week post-installation trainings were not enough for the engineers to fully understand the intricacies of maintaining the new technology. It was noted that the lack of PM strategies for the equipment in the department was of high concern to the radiographers as it helped in the normal operation of the equipment and, hence, reduced the total operational cost of the departmental management. Meanwhile, undertaking regular PM measures could influence the daily quality of service delivery to patients. It was noted that the diagnostic imaging service delivery should be guided by quality, safety, and appropriateness with the aim of maximising the benefits and minimising the risks (Lau & Ng 2014). It was also believed that the PM and QC strategies for the X-ray equipment in the department help in the smooth operation of the equipment and, hence, reduce the total operational cost of the departmental management.

8.2.2 Power outages

The phrase ‘power outages’ evolved from the Phase 2 data as one of key major themes that provided challenges that continued to impinge the delivery of radiographic services to the patients in the study setting. The unscheduled power outages were identified as one of the

major causes of the frequent breakdowns or malfunctioning of the imaging equipment in the study setting. The situation was so frequent and challenging that it had debilitated effects on the practice as well as efficiency of the radiographic service delivering to the patients. This assertion was corroborated by some of the participants that: *'Most of the equipment are breaking down because of unscheduled power cut and they are having quite a toll on us'*. [Rad1].

'...power is the main engine of everything we do; the service we rendered is by power so frequent power outage is serious to the extent that you may have an emergency situation [...], you are rendering the service which is an urgent one and power goes off, [...] all that you have done comes to a loss or you can't get your results at the end so power is a very big challenge ...' [Rad3].

The current situation was so alarming that the X-ray equipment and its ancillary accessories could hardly be operational without regular supply of stable power in the imaging department. Electricity supply is a key factor in the developing countries (including Ghana) which greatly affects the functionality and lifespan of the X-ray equipment (X-ray machines). The growing demands for uninterrupted power supply by companies and industries in Ghana extend to the health sector which largely depends upon electricity to operate safely (Klinger et al. 2012). Despite the considerable impact that power outages have on health service delivery, very little has been published to date in peer reviewed literature concerning this issue. However, the impact on health service delivery is varied and far reaching and this is supported by the existing literature (Sungita et al. 2006).

Electricity was recognised by the UK Department of Health (DH) as the most vital of all services because without it most technology (imaging equipment included) would not properly function (DH 2014). As at the time of writing, severe electricity (power) challenges had hit the entire country (Ghana) such that every sector of the economy was badly affected; the healthcare sector was not spared. The situation assumed an alarming proportion such that certain areas or communities could be without electricity for over five or more days, while others even experienced the outages for two or more weeks. The situation therefore resulted in delays in the delivery of the expected services to patients and, so, resulted in prolonged patient waiting time and impacted adversely on the service

delivery thereby causing a lot of emotional stress to both patients and the professionals (Mardiah & Basri 2013). This situation was acknowledged by one of the respondents that: *'...the effect of power outages is a factor in the sense that it ends up adding up to the waiting time of the client'* [Rad3].

In Phase 1 (survey) of this thesis, it was found that the length of patients' waiting time significantly influenced their overall satisfaction with the service delivery (Section 6.2.3 151). Moreover, the frequent unscheduled power outages prolonged patient waiting time in the department because as the power interruptions occurred it often took some times for it to be restored. Also, the situation in the study setting might cause 'darkroom fogging', 'artefacts' or 'mechanical faults' as shown by the reject analysis (Phase1 Section 5.3) in this thesis. Such challenging issues of power outages were corroborated by another respondent: *'Many, many examinations would have to be repeated because power went off in the course of the examination and so the film [...] stuck in the processor. And by the time power comes back, that film is useless; we have to repeat and so those are the things that hinder the quality'*. [Rad4]

As the radiographers continued to experience this situation, the reject rate invariably increased with its effects of subjecting the patients to extra exposures as well as increase in the costs of the rejected films in the department. Also, it was identified that power outages affected utility services including water supply to healthcare facilities in the affected areas in Ghana (study setting included). The power interruptions also caused increased workload as a result of re-booking (rescheduling) of the patients who were previously booked for the procedures.

8.2.2.1 Power fluctuation and standby generators

The power fluctuations and standby generators emerged from the data as subthemes of the power challenges in the study setting. As indicated earlier, quality of power (electricity) supply to imaging departments is of paramount priority to all managers of imaging facilities. This implies that uninterrupted power supply to X-ray departments is an acceptable norm to imaging department managers. However, the study revealed that there was frequent power instability or fluctuation in the imaging department and this constrained

the delivery of imaging services to the patients. This was supported by one of participants that: *'... a lot also depends on one other challenge, the electricity situation [...] so anytime power fluctuates the equipment goes off, films get stuck in the processor, so we have to do a repeat ...'* [Rad4].

As the department was still using manual processing, whenever power fluctuations occurred during the period of practice, the exposed films got stuck in the processing chemicals and the radiographers had to wait until the power was restored. Anytime this happened, the films became either fogged or scratched, therefore warranting subjecting the patients to extra exposures as a result of repeating the procedure as shown by the reject analysis data in Phase 1 study (Table 5.12, p.143).

The interruption in the power supply in Ghana was due to insufficient power generation and distribution by the companies involved, and this resulted in fluctuations in the supply system from the national grid. Ghana has experienced severe crises in power supply since 2013 which progressively became worst in 2014 and beyond; which is seriously affecting the smooth operation of medical equipment in the healthcare institutions or facilities, particularly, in the imaging departments. This situation of unreliable power supply continued to affect the lifespan of the X-ray equipment in the imaging facilities due to frequent breakdowns. This therefore necessitated procurement and installation of expensive back-up (standby) generator plants in order to continue to deliver the required services to the patients (Lustick & Zaman 2011). Although, the hospital management procured and installed two automated standby generator plants for the imaging department, managers of the department further required additional funds to fuel the plants in order to run them (Lustick & Zaman 2011). Despite both plants being automated, one was made to be on standby and was manually operated (switched on) by the engineers whilst the other one automatically triggered whenever there was power strip or failure from the national electricity grid. This automatic mechanism connected the department and, for that matter, the equipment in the facility. The generator plant that was manually operated was then reserved in the event of any breakdown or servicing of the other plant.

With regard to fuelling of the generator plants, it was noted that the department was facing serious financial challenges. The cost of fuelling the two generator plants had always been problematic during these periods of frequent power outages such that it had a big financial burden on the department and for that matter on the departmental budgets. For instance, the monthly fuelling costs for the department during the extreme periods of power outages approximately amounted to GH¢ 2,621.00 (Ghana Cedis) [£476.55]. The department therefore spent GH¢ 31,452.00 (£5,718.60) for fuelling the generator plants in a year and this impacted largely on the smooth running of the department. Sometimes the managers were compelled to source for extra funds from the main hospital to buy fuel in order to run the standby generators. Whenever the managers were unable to source funds for fuel for the generators, the situation could adversely impact on the imaging service delivery. Again, when the managers were unable to provide funds for fuelling of the generator plants, the situation remained unresolved and this affected quality of service delivery to the patients as well as loss of revenue to the department. This difficult situation affected the smooth running of the department and/or made operation of the imaging equipment very challenging, if not problematic. On the contrary, whenever power restoration was delayed or took a longer period than expected, the radiographers had no alternative but rescheduled the patients for another time. Thus, the respondents considered electricity to be the most vital lifeline for the functioning of the X-ray equipment in the imaging department. This was acknowledged by a respondent: '*... power outages most of the times we are left redundant, we are unable to provide services to our patients because we don't have light or the light is not stable so we can't do anything, ...*' [Rad4].

The effects of these occurrences in the imaging environment could influence dissatisfaction among the patients who seek radiographic services in the department. The survey study in this thesis showed that the dissatisfaction could have serious ramifications whereby the patients might resolve not to seek the services in the facility and this might affect revenue realisation by the department with its effect of inability to provide effective services in the future (Andaleeb et al. 2007).

8.2.3 Occupational stress

The emergence of occupational stress from the data as one of the main themes demonstrated that the radiographers have been experiencing some levels of work-related stress in the study setting. The study showed that the radiographers were exposed to so much pressure as a result of increased workload and malfunctioning of the X-ray equipment, coupled with frequent unscheduled power outages. The study further revealed that the imaging department was identified as a stressful environment in recent times due to increased number of patient attendances, and this could not afford the radiographers enough time to adhere to appropriate practice techniques or standards before exposures were made. This assertion was narrated by one of the respondents that: *'The pressure at the department is so much so that the time that radiographers are supposed to take to make sure all is in place before they expose, now is reduced to the barest minimum'* [Rad1].

This suggested that the radiographers were under pressure to maintain patient throughput in the department and this could be very stressful for them because they were experiencing many challenges such as equipment breakdowns and power instability in the department. This situation could also lead to emotional distancing from the patient which might further exacerbate accusations of lack of care. Although pressure was recognised as not necessarily a negative phenomenon because it engineered individuals to perform a task, it however caused performance to decline when the pressure exceeded optimum and allowed negative stress effects to occur (Verrier & Harvey 2010). Stress is an interference or disturbance of an individual's wellbeing physically and mentally, usually caused by physical and emotional stimuli thereby triggering a response by different organs and the system as a whole to cope with the situation (Ugwu et al. 2011; Akpa & Afoke 2005). Many healthcare professionals (radiographers included) experience workplace stress due to workforce shortage, an increased workload, and other work-related challenges. Stress (psychological and physical state) thus results when the resources are insufficient to cope with the demands and pressures of a situation of individuals (Jennings 2008; Michie 2002). It was recognised that Ghanaian radiographers were severely affected by occupational stress which they sustained during working procedures or professional practices (Ashong et al. 2015). For the fact that they were stressed by work-related situations, the radiographers were unable to communicate well with their patients. This situation was acknowledged by

one of the participants that: *'Most at times because of workload we are not even smiling; we are angry so [when a] patient complains that he's kept too long [...] you flare up...'* [Rad1].

The experiences of the work-related stress by the radiographers in the imaging environment sometimes compelled them to relate poorly or unprofessionally with their patients. Again, in the event of attempting to overcome or reduce the level of the pressure that they experienced within the department, some of the radiographers were unable to perform simple techniques during practice. In line with this, one of the participants noted that: *'People even forget to give instructions.'* [Rad1]

The inability of the radiographers, in this situation, to give instructions to patients during practice had the potential for making errors and, for that matter, subjecting the patients to the risk of unnecessary radiation exposures. The additional exposures might happen when the radiographers need to repeat the exposures as a result of the errors caused, which might eventually increase unnecessary radiation to the patients (Usha et al. 2013; Zewdenh et al. 2008). Meanwhile, errors of this kind largely resulted in an overall reject/repeat rate of 1.37% that was established as resulting from positioning errors in the department in Phase1 study of this thesis (Table 5.12, p.143). It was identified that the variables such as insomnia, depression, cardiovascular disease and anxiety have the potential to lead to occupational stress (Ashong et al. 2015). The occupational stress experienced by the radiographers might cause psycho-physiological responses, mood disturbances, burnout or physical and mental effects (Sarid et al. 2010) which might therefore adversely affect the efficiency or quality of service delivery to the patients (Assibi et al. 2013; Michie 2002). Again, occupational stress related disorders included boredom, loss of interest in the practice, lack of focus and hindrance of alertness which were also potentials of causing practical errors and repetitions of examination and might eventually impact on quality of service delivery to patients (Assibi et al. 2013; Michie 2002).

In addition, it was recognised that healthcare environments where conditions were rife for stress would adversely impact on the practitioner's wellbeing which could eventually contribute to negative health behaviours (Fillion et al. 2007). For example, one of the participants noted: *'...the equipment has a certain limitation but you are forced to [...] use*

it. Ideally, certain things you shouldn't even do you are forced to do it because you don't have any choice. ' [Man1].

Thus, the radiographers practising in the setting were prone to developing continuous stress due to the conditions prevailing in the setting; some of which were related to equipment breakdowns, rampant unscheduled power outages, increased workloads, lack of professional development programmes, shortage of consumables, and management challenges (Ashong et al. 2015; Fillion et al. 2007).

8.2.3.1 Workload increase and practice/technical errors

Workload increase and practice errors emerged from the data as subthemes and were identified as some of the causes of increased pressure among the radiographers in the department. The respondents indicated that the pressure they experienced greatly resulted in errors that occurred during practice. One of the participants noted that: *'...with workload increase, there's bound to be more pressure and when the pressure increases, the pressure sort of brings about mistakes ...'* [Rad6].

Again, persistent and excessive workload in the imaging departments could cause psychological and emotional effects to the service providers (Sarid et al. 2010) and that might potentially affect the patients' safety as the effects could cause the radiographers to make practice or technical errors by setting inaccurate exposure parameters and/or failing to instruct patients prior to making exposures. As these mistakes continue to unfold as a result of increased workload pressure, reject rates would increase in the setting as in Phase1 study of this thesis, with its implications of subjecting patients to additional exposures (Table 5.12, p.143). This assertion was acknowledged by one the participants that: *'...when workload is high we often sometimes don't follow the normal trends, [...] instead of collimating properly, we are in hurry to get [...] it done quickly, and so doing we tend to rather cut'* [Rad2].

Although work-related pressures were identified to be experienced by the radiographers on one level, the pressures motivated and them to perform at their best. This situation was revealed by one of the respondents: *'...I think that we've been doing our best to solve the*

situation but still the workload [...] doesn't give [us] the chance to deliver that that gives them that prompt, that timely response they expect'. [Rad3]

In Ghana, while the demand for imaging services was steadily increasing, the professional workforce was not relatively sufficient to meet the increasing demands due to the government's policy of freezing employments. It was therefore recognised that while the volume and complexity of work were increasing in the department, the radiography workforce was not sufficient to meet this increasing demand (Lau 2007); hence, the acknowledgement by one of the respondents that: *'...we have a shortfall of human [...] resource. A lot of our people have gone on retirement without replacement. We've also made it known to the authorities [about] our human resource shortage [...] they would tell you that there is embargo on the recruitment of people into the public system [...]' [Man1].*

This workload/workforce imbalance was one of the factors which mainly caused departmental pressures and potentially threatened the quality of service delivery and patient safety (Lau 2007). In spite of the increased workload coupled with persistent adverse conditions, such as workforce attritions (shortages), rampant unscheduled power outages, shortages of consumables, and frequent equipment breakdowns in the department, the study revealed that the radiographers continued to deliver imaging services to the patients. One of the participants thus noted: *'Already our place is choked so the workload increase will worsen the problem, because we will be forced to reduce the time taken to assess, properly assess a patient well and position him well before we do the exposure; but if, say you have a backlog of about 20 patients waiting for them to be attended to, you will be forced to do things in a hurry and in that way repeat will be increased...' [Rad1].*

As this happened, patient waiting time increased and quality of service delivery or efficiency was compromised (Syed et al. 2011).

Also, it was established that the radiographers had been providing additional clinical training and tutorials to radiography students who had been sent there on rotations and placements and these persistent workload increases mostly resulted in stress and health risks to the radiographers (Ashong et al. 2015; Michie 2002). However, the adverse

experiences as a result of excessive workload in the practice of radiography could have the potential not only to lead to deter students from continuing with the training but could also influence the radiographers to feel less committed to their work because their experiences could induce exhaustion, depression and anxiety (Ashong et al. 2015; Ugwu et al. 2007). For example, one of the participants noted: *'...once the technician [radiographer] is tired, you know, brain fatigue, there is basic, basic errors the technician would be making and [...] because you want to reduce patient waiting time and they are many, you would be forced to kind of do some improvises...'* [Rad5].

The wider implications of increased workloads could not be ignored because it was recognised that an organisational culture that imposed excessive workloads on employees, which eventually resulted in high pressures, could impact on efficiency and quality of service delivery (Verrier & Harvey 2010).

8.2.3.2 Speed & efficiency

The concept of 'speed and efficiency' was intended to describe the actual performance and realities of the role of the radiographer with regard to the imaging service delivery to patients, particularly as it differed from the roles of other health care professionals (Reeves 1999). This concept however emerged during Phase 2 of this study in a negative way, which identified pressure at the imaging environment as one of the challenges that the radiographers encountered; and in an attempt to overcome the excess pressure they (radiographers) rather ended up making clinical or practice errors. This was supported by some of the participants that: *'The pressure at the department is so much so the time radiographers are supposed to take to make sure [that] all is in place before they exposed [...] is reduced to the barest minimum.'* [Rad1]

The concept was however intended to describe the actual performance and realities of the role of the radiographer as regards the imaging service delivery to patients, particularly as it differed from the roles of other health care professionals (Reeves 1999). However, it was suggested that whenever the imaging departments were busy, speed and efficiency appeared to be more important than good communication skills (Booth 2008). This was

acknowledged by a respondent that: '*... doing the right thing within the shortest possible time and get the right results ...*' [Rad3].

However, whenever the errors occurred the radiographers had no options but to repeat the procedures and, even though they were ethically and professionally obliged to employ 'as low as reasonably achievable' (ALARA) principles to minimise the ionising radiation to their patients, the latter would be subjected to unnecessary radiation exposures when there was the need to repeat the procedures (Adeyemi in Ramlaul & Vosper 2013; Jabbari et al. 2012; Holmberg et al. 2010; Clark & Hogg 2003). As this situation persisted among the radiographers in the setting, high reject rates are bound to be attained (Table 5.12, p.143).

Even though the study setting was recognised as one of the busiest in the hospital, it continued to face unfavourable conditions such as workforce shortages, frequent power outages and imaging equipment breakdowns. These conditions however placed the radiographers under tremendous time pressures to deliver imaging services with improved efficiency to more patients (Gupta & Denton 2008). The radiographers felt under pressure to get the cases done in the available time and as a result they appeared to be constantly wavering the quality of care services and attention that their patients expected. Despite the radiographers being faced with these time pressures within the environment, they were determined to keep the department running smoothly and to deliver efficient services (Booth 2008). This assertion was thus supported by one of the respondents: '*...ensuring we have an increase patient throughput but also ensuring that we are doing what we have to do well so that we are seeing more patients in a shorter time and ensuring that we are giving them the maximum [...] of our effort...*' [Rad4].

Although there was the need to reduce the time pressures by performing the procedures at a "faster" rate, it was however important that the radiographers demonstrated professional competence by ensuring efficiency of the work output and, for that matter, patient throughput in the imaging environment (Ramlaul & Vosper 2013; Syed et al. 2013). Meanwhile, to the radiographers, efficiency was about performing as many cases as possible (Reeves 1999) and this actually influenced the way they interacted with their patients as they felt the need to work as quickly as possible. This was evident as one of the

respondents noted: *'Most at times because of workload we are not even smiling; we are angry so the patients complain that they kept too long and we won't even take our time and put [ourselves] in their shoes but we flare up and say, so what and all that'*. [Rad1]

Although the respondents largely agreed that there was the need to improve the service delivering to the patients, they were also of the views that there was the need for an effective appointment scheduling system in the department to ensure checks and balances in order to minimize pressure challenges that might arise out of increased workloads (Mardiah & Basri 2013).

8.2.4 Patient care

Care provision for the patients emanated from the data as one of the major themes and demonstrated a concern for maintaining the patient as the central focus of care in the study setting. Meanwhile, the concept reflected an area that the radiographers did not fare too well with the study setting. The radiographers' inability to properly care for their patients as expected was attributed to the unfavourable conditions prevailing in the department. This implied that the conditions at the imaging environment hindered the radiographers' ability to achieve the expected quality of care for the patients. This assertion was corroborated by one of the participants: *'...there are so many things we lack [...] to provide comfort of [...] care for the patient'*. [...] *now the care we use to take to image our patients [is] no more available'*. [Rad1]

Although it was established that the radiography workforce lacked inputs that would help them deliver the expected care to their patients, they however ensured good relationship was maintained between them and their patients. The workforce realised the good relationship is a factor that would help them to achieve comfort for the patients so that they cooperate with them. This was acknowledged by one of the respondents: *'...the relationship between us and our patients is the most important contributing factor to the quality of our service in that we [...] try to relate well with our patients...'* [Rad4]

Moreover, the findings of the survey established that majority (78.9%, n=71/90) of the patients indicated that their overall comfort with the service delivery was either good and/or very good, while 7.8% (n=7/90) of the respondents demonstrated that their overall comfort

with the services delivered to them was bad (Figure 5.23, p.128). Meanwhile, this finding strongly influenced participants' overall satisfaction with the imaging services they received in the study setting, with the effect value of $F(4, 85) = 10.478$; $p < 0.000$ (Table 5.3, p.133).

Caring for patients is understood to be an essential and a fundamental part of radiographic practice and it is alternatively described as being a humanistic aspect of health services (Bolderston et al. 2010). The humanistic aspect of the services was what one of the respondents expressed: '*...most of the times [we] come to them [patients] and present the situation on the ground to them as to the reasons why [...] they are waiting for a longer time to get their services [...]. [...] I think that is the main way of communicating it to our patients; ...*' [Man1].

This demonstrated how communication played a vital and fundamental role in radiography practice in that the patients in the imaging departments have the right to be made aware of the reality in the department concerning the radiographic service delivery and their (patients) health needs (Ramlaul & Vosper 2013). It is noted that effective communication enables building rapport with the patients by actively listening and responding to their verbal and non-verbal cues while tailoring information to meet their needs (Halkett et al. 2011). Again, when professionals communicate effectively and tailor the information that the patients need, it is likely the anxiety levels of the patients will reduce and their satisfaction with the service may increase.

Although the radiographers practised under constrained conditions (workload pressures and frequent power outages coupled with equipment breakdowns) in the department, they were obliged to demonstrate their professional knowledge to avoid any negligence in connection with the care delivery to the patients (Beyer & Diedericks 2010). This was acknowledged by some of the participants: '*...we've been doing our best as we can even though the circumstances around don't seem to encourage it but due [to] the exposure that some of us have had from the past, we try to make use of the little facility we have to give our patients the best in terms of diagnostic care*'. [Rad6]

Despite the numerous challenges that the radiographers encountered in the study setting, they managed to deliver the services that meet the needs and expectations of their patients; some of whom declared their satisfaction with the services. The satisfaction was expressed by one of the participants: '*...so far I can say that your services have been very good. [...] They treated me well and comported themselves well.*' [Pat1].

The expression reflected the participant's experiences with the services as well as his satisfaction with the care he received at the study setting. Again, the survey findings showed that the care needs and expectations of a majority (73.3%, n=66/90) of the patients were largely met and 23.3% (n=21/90) of the participants were not too content or satisfied with services they received; while a proportion of 3.3% (n=3/90) of the patients indicated their expectations were not realised (Figure 5.20, p.127). In addition, the respondent's expression confirmed the survey findings of this thesis whereby a majority (83.4%, n=75/90) of the respondents described their overall satisfaction with the services as either good or very good (Figure 5.25, p.129). Moreover, the participants' overall satisfaction with the service provision was based on the overall level of contentment with the service they experienced (Atinga et al. 2011; Badri et al. 2008; Andaleeb et al. 2007). Thus, the findings strongly contributed to the patients' overall satisfaction with the services that they received in that the patients were largely satisfied with the imaging services delivered to them with the effect value of $F(4, 85) = 6.232, p < .000$ (Table 5.3, p.133).

Although the diagnostic radiographers generally have brief care engagements with their patients, they managed to tailor the care for their patients towards the production of images (Reeves & Decker 2012; Strudwick et al. 2011; Gordon & Nelson 2006; Reeves 1999). This assertion was supported by one of the respondents: '*...patients [...] receive the best of our services in terms of diagnosis which could inform the medical practitioner in handling them or giving them the best of treatment.*' [Rad6].

Nonetheless, the quality of care delivered to the patients depended on the collaboration and understanding that existed among the imaging workforce, as well as the cooperation by the patients which, in effect, affected the work flow (Mosadeghrad 2014). Again, it is appropriate to emphasise that the care delivery process in the imaging department

commences during the preparatory stage before the actual engagement with the patients for the image production, even though the radiographers' meeting with the patients has generally been brief (Brask & Birkelund 2014). This means that the radiographers start the care processes by explaining the procedures to patients, listening to their concerns, responding as well as providing emotional support to ensure that the patients' health needs and expectations are met, irrespective of their diverse care needs or cultural status (Bolderston et al. 2010; Hunt 2009). In addition, the radiographers provided supportive care by giving information, such as patient education to deal with side effects management.

8.2.4.1 Patient satisfaction & comfort

This concept (patient satisfaction and comfort) emerged from the data as one of the sub-themes of patient care and which has been one of the major concerns in the diagnostic imaging departments. The concept has been regarded as an essential attribute that was largely used as an indicator for measuring quality in the health service delivery (Syed et al. 2013; Sajid & Baig 2007). Although the determinants of patient satisfaction vary, depending on the individual's health needs and expectations, the concept had always been regarded as a prime indicator for quality assessment within health care facilities such as the imaging departments (Syed et al. 2013). In addition, it is noted that quality of health service delivery has largely been anchored on patients' satisfaction with the service. Meanwhile, the survey of this thesis established that 94.4% (n=85/90) of the respondents were highly satisfied with the radiographic services they received at the setting while the findings also highlighted that 5.6% (n=5/90) of the respondents were not satisfied with the service delivered to them and so described their satisfaction as either bad or very bad (Figure 5.25, p.129). It is noted that patients largely expressed their experiences with the services that were provided to them whenever the services met their health needs and demands (Jain et al. 2016). In line with this, one of the participants expressed: *'It's okay, if things should go on like this we should always be happy [...]. I like the way they treated me; if it would always go by this, then it would be okay'* [Pat1].

It was also noted that patient satisfaction was identified as one of the important factors that determined the quality of services that patients received (Sajid & Baig 2007; Jenkinson et al. 2002). Moreover, the findings from the patient satisfaction survey established that most of the patients were comfortable as well as satisfied with the radiographic services that

were delivered to them at the study setting (Figures 5.23, p.128 & 5.25, p.129). Again, the survey findings established that 41.1% (n=37/90) of the patients indicated that the waiting time before their turn to receive the needed services was too long (Figure 5.7, p.120); thus, these patients would not feel too comfortable while waiting for their turn and, for that matter, not satisfied with the services delivered to them. This assertion was acknowledged by one of the participants: '*...they [patients] tend to spend so much time before even it gets to their turn so some people are not happy about it*' [Rad2].

Again, the satisfaction survey findings of this thesis showed that the participants' waiting time, cleanliness of waiting area, attitude and caring concern of the radiographer, patient's impression about the radiographer, patient's overall comfort and impression about the service delivery strongly contributed to the patient's overall satisfaction with the services (Mardiah & Basri 2013; Syed et al. 2013) (Table 5.4, p.134). Meanwhile, the findings about the patients' comfort during radiographic service delivering at the study setting was acknowledged by one of the respondents: '*...we try to make them [patient] feel very comfortable and so they cooperate with us...*' [Rad4].

In the practice of radiography, patient's comfort and cooperation are very important factors that help in achieving quality images. Ideally, delivery of quality care to patients in the diagnostic imaging departments could be achieved through many ways and from different perspectives.

8.2.4.2 Dignity & respect

The attribute (dignity and respect) emerged from the data as one of the subthemes of 'care' that the participants identified as very important for the patients who seek radiographic services in their department. The patients were recognised as valuable clients in the diagnostic departments and they deserved to be treated with respect and dignity. This was acknowledged by some of the respondents: '*...our clients are the most important people when it comes to the hospital setting, so they should be treated with the utmost respect and dignity...*' [Rad1].

Dignity was identified as a vital component that highlighted the attributes of respect, privacy, empathy and shared humanity within the caring professions and radiographers have been urged to have a clear understanding of dignity and respect for their patients (Society and College of Radiographers 2013; Griffin-Heslin 2005). The radiographers thus have the ethical duties to ensure the dignity, respect, privacy and confidentiality for patients during practice (Society and College of Radiographers 2013). One of the respondents corroborated this: *'...constant reminders of some of these things and the fact that the patients are the most important people at this department will bring us back to the proper practice where we will give the patients the utmost respect and the dignity that they need as patients'*. [Rad1]

Moreover, the findings of the satisfaction survey of this thesis showed that most of the patients (76.7%, n=69/90) were satisfied with the level of the privacy that the radiographers provided them during the examination, while a proportion of 18.9% (n=17/90) of the patients were somewhat satisfied with the level of privacy given them by the radiographers during the procedure. The findings also showed that 4.4% (n=4/90) of the participants indicated that they were not provided any level of privacy they deserved during the investigation (Figure 5.16, p.125). Maintenance of dignity is morally important; therefore making patients feel respected or valued as a person goes a long way to impact positively on the care services they receive and, for that matter, influence their satisfaction with the services (Dickert & Kass 2009).

In addition, the study showed that the radiographers explained the procedures to the patients and ensured that the patients clearly understood the parts of their body that would be exposed. This thus revealed how some of the radiographers demonstrated their professional skills and knowledge by ensuring that the patients did not change in front of colleague staff unless there was a need for assistance; hence the patients were treated with the necessary dignity and respect they deserved as their rights whenever they were in the changing rooms (Whiting 2010). This level of treatment was corroborated by one of the respondents: *'...when he asked me to change, he left the place so I was alone and nobody was there so after undressing and putting on the gown he provided me, he asked me whether I finished'* [Pat1].

This demonstrated some level of dignity and respect that the radiographers accorded their patients in the department; however, this practice should be encouraged among the rest of the radiography workforce regardless of the condition of their patients. This was also established by the patient satisfaction survey in the Phase 1 of this thesis where the patients indicated that the radiographers accorded them with some level of dignity and respect in the dressing rooms within the imaging environment (Figure 5.16, p.125).

In order to value patients' dignity and respect, it was noted that the radiographers actively communicated and explained to their patients as to what was happening within the imaging environment, particularly regarding individual requests or cases, issues about the status of the equipment (in case there was a breakdown), as well as reasons for appointment schedules. This assertion was supported by one of the respondents: '*...we are careful we actively go and explain to [the] patients that we are expecting to have done this number of cases at this time but because we have [an] issue with the equipment; so we also explain appointment system or procedure*' [Rad2].

The radiographers were advised to ensure they addressed patients' values, beliefs, concerns, preferences, and also to recognise the respect and dignity of their patients (Bolderson et al. 2010; Griffin-Heslin 2005). However, the study revealed that many respondents indicated that they were comfortable with the treatment as well as satisfied with the services they received.

8.2.4.3 Patient-centred & practice standards

These attributes emanated from the data as subsidiary themes that could have influence on the radiographers' professional practices and care delivery to patients. Health sector initiatives highlighted the need for healthcare institutions to consider the cultural frameworks of patients which have been consistent with patient-centred care that focused on safety, timely, efficient, effective and equitable care as well as the diversity of individual patients (Ehrlich & Coakes 2013; Hunt 2009; Stewart 2001). The patient-centred approach can provide opportunities for the radiographers to develop and promote partnerships with patients of diverse backgrounds and engage their cultural values and perspectives so as to

identify values, needs and expectations regarding their health and social care (Ramlaul & Vosper 2013). Even though the radiographers considered the patients as very important people in the department, they largely adopted practice-focused strategy more rather than patient-centred approach (Hunt 2009; Booth 2008); thus the radiographers were much more concerned with the images rather than the patients in the department. This assertion was acknowledged by one of the respondents: '*...when patients are waiting unnecessarily, you would feel it yourself and know it shouldn't be the case...*' [Man1].

Despite the satisfaction survey findings of this thesis having established that most of the patients (92.3%, n=83/90) were satisfied with the radiographers' friendly and/or helpful relationship that was exhibited towards them during the service delivery, 7.8% (n=7/90) of the patients were dissatisfied with the radiographers' relationship with them (Figure 5.14, p.124). It was also noted that some of the radiographers decided not to engage the patients, particularly when they complained about the delay of service provision processes and, for that matter, prolonged waiting time which was identified as one of the factors of patients' complaint and dissatisfaction with health service delivery (Kagashe & Rwebangila 2011; Ofili & Ofovwe 2005). This attitude towards the patients was supported by one of the respondents: '*...sometimes they become very aggressive; [...] they show a lot of violence. [...] They attack you verbally seriously and say a lot of things; if you don't have heart you may end up saying something else. [...] sometimes you have to just practise "deaf and dumb" strategies as if you don't hear or if you hear don't complain...*' [Rad3].

This showed that patient-centred concept was not really practised or considered by the radiographers within the department. It was argued that radiographers' primary concerns are not about care for the patients; rather, their main concerns focus on providing imaging services to the patients (Reeves & Decker 2012). Thus, radiography was regarded as more of a distanced profession than other allied health professions such as nursing and physiotherapy (Reeves & Decker 2012). Indeed, this presupposed that patient-centred concept was lacking in the radiography practice in general.

In addition, the study established that there were no practice standards or protocols within the department to ensure uniqueness in the radiography practice. It is however noted that radiographers base their practice on local protocols or guidelines which may specify the

projections to be produced in order to present conditions and/or referrers (Snaith 2016). Even though the referring clinician may indicate (specify) the projection, the actual technique would rarely be outlined and could lead to variations at local, regional, national and international level (Snaith 2016). This suggests that practice standards in the study setting should conform to the local standards in that the technical strategy or choice of parameters by the practitioners might have insignificant variation at a particular time and/or in a machine room. As indicated earlier, the study revealed lack of local practice standards and this was corroborated by one of the respondents: *'The system is such that people [radiographers] practise what they know and what they feel is the best, [...]. We don't have a well-defined one...'* [Rad2].

On the contrary, another participant indicated that there were standards in the imaging department; however, they were not known or written standards. In support of that, the participant noted: *'Standards are there but I don't know. [...] every unit whoever [is] in charge I think take the final decision on the standard or quality of whatever goes out, so generally there is a standard; is only that they are not a written standard available but we all know that there is a standard ...'* [Rad3]

This clearly showed that the radiographers actually confused the departmental 'protocols' with 'practice standards'. Practice standards are for a particular profession and serve as a guide for appropriate practice and established general criteria to determine compliance (American Society of Radiologic Technologist 2015). Practice standards may be used to develop job descriptions and practice parameters and are different from protocols.

8.2.5 Professionalism & professional attitudes

According to Merriam-Webster (2012), professionalism constituted a set of attitudes and behaviours believed to be appropriate to a particular occupation or profession, such as radiography. In line with this description, one of the respondents queried: *'...the personnel who is delivering the service, how is he qualified, motivated, mentally ready or prepared [professionally] to deliver that service ...?'* [Rad3].

Therefore, the concept of professionalism may be described as a multi-dimensional attribute, which encompassed a series of principled values, behaviours and attitudes which were integrated within a professional practice. Meanwhile, the radiographers at the department were expected to demonstrate professional attitudes by ensuring that their practice complied with the regulations of the safe use of the ionising radiation which was a key aspect of the role of radiographers and might influence their attitudes, beliefs and values regarding patient exposure to the ionising radiation (Strudwick 2016; Cornett 2006). It was also noted that the knowledge base of professionals contributed to their professional culture and ways of practice (Strudwick 2016); thus, the diagnostic radiographers have been encouraged to employ the knowledge and understanding of the use of ionising radiation as regards the dangers associated with it.

Although the study clearly showed that the radiographers practised under constrained conditions within the department with its consequent time pressures, they were expected to demonstrate professional attitudes, skills, knowledge, and behaviours that reflected a multi-faceted strategy to practice standards, professional body regulations, legal framework and principles that underpinned effective clinical practices (Strudwick 2016; Ehrlich & Coakes 2013; Ramlaul & Vosper 2013; Beyer & Diederick 2010; Cornett 2006; Hammer 2000).

In addition, it was expected that the radiographers behaved in a manner that demonstrated traits of professional image which is an important key for providing high quality, efficient, and safe care services to their patients, even in difficult and emotive environments or situations (Ramlaul & Vosper 2013; Booth 2008). Therefore, the significance of personal values and attitudes in determining the emergence of professionalism in practice cannot be ignored. Even though the radiographers were expected to demonstrate in a manner that justified their professional integrity and credibility towards their patients and other imaging service users, some of them rather exhibited unprofessional behaviours while delivering services to the patients (Beyer & Diedericks 2010). The unprofessional manner that some of the radiographers behaved towards their patients was revealed by one of the respondents: *'...they are agitated and said we kept too long and [...] we are also not patience enough to them and we also flare up...'* [Rad1].

These situations usually arose when the patients complained about their experiences in the department, particularly, about lack of sufficient sitting spaces and lengthy waiting times at the waiting area. Thus, in an attempt to respond to the complaints, the radiographers reacted by showing unprofessional attitudes and behaviours towards their patients. The study clearly demonstrated, therefore, that the radiographers performed their imaging responsibilities under intense unfavourable conditions, such as unscheduled power outages, frequent equipment breakdowns, shortage of workforce and consumables, and increased workloads resulting in persistent time pressures and, consequently, stress (Whiting 2010; Cornett 2006).

In an attempt to recount their professional attitudes towards their patients during service delivering, one of the respondents expressed that: *'...how well we treat the patients in terms of our attitudes towards them, how we communicate effectively, [how we] explain procedures to [the] patients for them to understand, and even if there are challenges, how best we get across to them are also some of the factors that also affect the patients'* [Rad2].

Communication plays a vital role in the practice of radiography profession in that it is central and fundamental in achieving high quality of imaging services to patients in the diagnostic imaging department (Kyei et al. 2015; Ramlaul & Vosper 2013). Arguably, the radiographers make use of the human knowledge and skills to help save lives and improve health status of patients; hence, attitudes and behaviours of the radiographers should play critical roles in the service delivery to the patients as well as the use of ionising radiation within the department (Korir et al. 2013; Beyer & Diedericks 2010). Moreover, the radiographers encountered patients with varying health problems and diverse cultural backgrounds in their practice environments and, as such, they needed to handle them in an ethical and professional manner (Ehrlich & Coakes 2013; Ramlaul & Vosper 2013; Beyer & Diederick 2010).

Professional attitudes are revealed by nonverbal behaviours and tone of voice by health professionals as well as the choice of words (Ehrlich & Coakes 2013). Thus, the radiographers were encouraged to remain sensitive to the physical and emotional needs of

all manner of patients through good interaction, patient care skills and professional conduct in order to ensure that they demonstrate these attributes (Ehrlich & Coakes 2013).

8.2.5.1 Professional development/CPD

Professional development or continuing professional development (CPD) emerged from the data as one of the subthemes of the professionalism concept. The radiographers have been under increasing pressure to ensure continuous growth of professional knowledge through research with the intention of upgrading their professional knowledge and skills in order to improve the care services to the patients (Sim & Radloff 2009). In addition, it had become necessary and mandatory in many countries that all allied health professionals (AHPs) (radiographers included) should participate in the CPD activities in order to update and/or upgrade their knowledge and skills in the changing imaging processes and procedures so as to be able to improve the service delivery to patients and to remain in the AHP Council's register. This was made possible after the passing of the AHPs Bill (Act 857 2013) into the Legislation Instrument in 2013 which gave birth to the establishment of the AHPs Council (AHPs 2013). Thus, the radiographers in Ghana were requested to undertake the ongoing CPD or lifelong professional learning activities in order to improve their skills and knowledge professionally and to maintain the clinical or practice competence so as to be retained in the professional register (AHP 2013; Gawugah et al. 2011; Sim & Radloff 2009; SCoR 2008). Moreover, the participation would not only provide the radiographers with professional and personal growth but would also benefit the patients with able radiographers to deliver efficient and quality services in this ever changing and dynamic radiography profession. In line with this, one of the participants expressed his views that: '*...they [management] must ensure that we are upgrading ourselves constantly because our profession is a dynamic one in terms of technological advancement so [...] we need to be updated each time*' [Rad6].

Again, the respondents noted: '*...after employment, there was no in-service training, no upgrading of knowledge so [...] errors are bound to bring about repetitions. [...] continuous professional development or in-service training for personnel is also very important to prevent some of these rejects*' [Rad6].

This means that there was lack of opportunities for the radiographers in the department to engage in the professional development activities in order to update their knowledge and skills to enable them to employ evidence based practice in delivering the expected services to their patients. Radiography has become a dynamic profession and as such it has become necessary for the radiographers to continuously update and/or upgrade their knowledge and skills about the current technological developments and the use of ionising radiation, its influence on the professional culture and how to communicate it to other professional groups as well as the patients (Strudwick 2016). The radiographers were of the view that the repetition of radiographs in the department were due to lack of CPD activities among them and that the repetition could be reduced by engaging in CPD or lifelong learning activities (Gawugah et al. 2011; Sim & Radloff 2009; Sim et al. 2003). Due to rapid technological developments in today's health system, the radiographers need to improve their professional knowledge and skills by involving themselves in CPD and/or lifelong learning activities in order to assume responsibilities beyond their current prescribed roles and to be able to deliver improved services to their patients (Gawugah et al. 2011; Sim & Radloff 2009; SCoR 2008; Sim et al. 2003). Meanwhile, some of the radiographers who have been given such role opportunities elsewhere in the country have been performing them very well. The study also identified low morale among the radiography workforce as a result of lack of promotions and CPD attendances (activities) in the department and this continued to affect their professional status adversely.

The introduction of the degree programme in radiography over a decade ago in the then School of Allied Health Sciences (now School of Biomedical and Allied Health Sciences), University of Ghana, created awareness of the importance of research activities among the radiographers in Ghana. Research generally provides the legitimacy for professional practice and thus forms part of the important criteria of professionalism because of the introduction of evidence-based practice into the clinical practice (Ahonen & Liikanen 2010; Hafslund et al. 2008). Nonetheless, the level of research activities among the radiographers in the department remained relatively low due to the paucity of research activities. In Ghana, the introduction of an ultrasonography programme for radiographers at the Master of Science (MSc) level, four years ago, in the School of Biomedical and Allied Health Sciences provided an opportunity for the radiographers to develop their skills in

order to expand their professional scope or roles. Moreover, the current CPD participation rate and the level of role expansion could be used to determine the extent of professionalism in terms of radiographers' willingness to assume increased responsibilities as health professionals. However, the medical dominance and the roles of the radiologists in some of the imaging departments made it impossible for many sonographers to practise their new roles in the departments where radiologists were available. In addition, the study established lack of regular in-service training for the radiographers to update themselves with the changing imaging processes and procedures. This assertion was revealed by one of the staff respondents: *'I would say some people don't upgrade themselves quite regularly so in this case, you see that the person is lacking certain skills'* [Man1].

8.2.5.2 Motivation and rewards

The concept of motivation evolved from the data as one of the subthemes of professionalism and is regarded as an important factor in the life of all categories of professionals, particularly healthcare professionals. The concept could be described as the means or factors that are responsible for an individual's consistency, direction and persistence of effort towards achieving a set goal (Lambrou et al. 2010; Gunderman & Willing 2002). However, the study established that there were no incentive measures in the imaging department to boost the morale of the radiography workforce and this thus resulted in low morale level among the workforce in the department. This revelation was expressed by one of the respondents that: *'...remuneration action trying to ensure that those working are also very comfortable; just having to depend on the salary these days it's a real challenge and considering the number of patients you see every day [...] it's just not worth it; it seems that you are doing much, much more than you are earning...'* [Rad4].

In most cases, motivation stemmed from a goal or a need that must be attained (fulfilled) and, in effect, this might lead to specific attitudes and behaviours. Thus, achieving the goals could result in some kind of reward which might either be intrinsic or extrinsic (Lambrou et al. 2010). While the intrinsic motivation incentives stemmed from within an individual (for example pleasure derived from challenge at work) and focused mainly on a task (duty) well performed (Grafham et al. 2004), the extrinsic motivation incentives, on the contrary, were concerned with the rewards that were given by another person as a result of satisfaction

with achievement of goals (Campbell et al. 2012). Thus, in the study the radiography workforce was concerned with the extrinsic type of motivation in that they wished the departmental management regularly motivated them with some incentives or rewards. It is however noted that the extrinsic motivational incentives have been regarded as more important because they allowed for job satisfaction which is a vital determinant of health professional motivation, retention and performance (Munyewende et al. 2014; Campbell et al. 2012).

On the other hand, it is noted that motivated professionals are highly satisfied with their work and job satisfaction has been identified as one of the factors that influences quality of health service delivery to patients and therefore improves the functioning of the health systems in low- and middle –income countries, such as Ghana (Mosadeghrad 2014; Munyewende et al. 2014; Chaulangain & Khadka 2012). In addition, the factors that influence quality service delivery to patients also determine the growth and success of a department (Gunderman & Willing 2002). This suggests that the imaging department would flourish with quality services to its patients when the radiography staff are motivated for performance. The concern of low level of motivation among the radiographers within the department was expressed by one of the participants who questioned the styles of the management: *'How do they [management] ensure that the necessary motivation [is] given to [the] staff so that they feel motivated to give off their best ...?'* [Rad6].

This suggested that most of the participants expected their managers to strive to motivate them in the department for them to deliver services that met the patients' health needs and expectation. Meanwhile, there are various organisational factors that influence motivation and its benefit of job satisfaction; some of these factors included financial rewards (pay), conducive working environment, managerial leadership, policies within the practising environment, job security and identity, personal and professional development, and opportunities for promotion (Mosadeghrad 2014). The issue of financial rewards was one of the major challenges and concerns among the radiography workforce and this was acknowledged by one of the respondents: *'...when you come to work [and] the pocket is empty, [...] psychologically it affects the way you handle patients or output of the day.'*

There isn't motivation; our expected allowances are not coming forth; [...] so all these are de-motivators [demotivating factors...]' [Rad6].

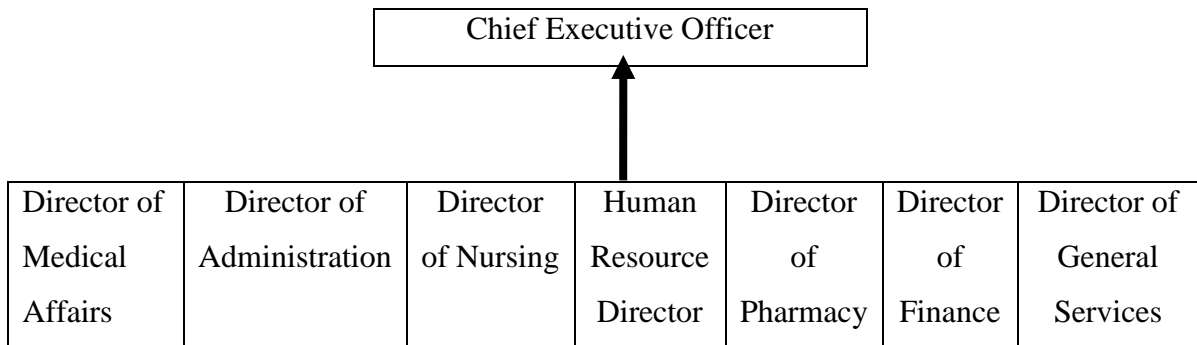
Although motivation may mean far more than financial compensation or rewards, it was however regarded as one of the factors that encouraged people, particularly healthcare professionals who approached their work from a professional perspective, like radiographers (Gunderman & Willing 2002). Again, the concept was regarded as an incentive package for better performance as well as doing the right thing (Adzei & Atinga 2012; Adams & Hicks 2000). Motivation, therefore, could not be ignored because it played an integral role in many of the compelling critical challenges that the imaging environment was faced with (Lambrou et al. 2010). The departmental challenges, such as lack of consumables, frequent power outages and equipment breakdowns, caused a lot of frustration and de-motivation to the radiographers and, eventually, affected efficiency (quality) of service delivery to the patients (Agyepong et al. 2004; Gunderman & Willing 2002). Therefore, the leaders or managers of imaging departments have been expected to use their expertise to identify opportunities (such as staff development, regular promotion, delegation of responsibility, recognition for work well done, etc) in order to recognise the radiography workforce for a job well performed. By doing so the low morale among the radiographers would reduce and so enhance work performance and service delivery. In addition, management role was identified as a vital motivational factor such that health managers who possess adequate supervisory and leadership skills would more likely induce a high level of motivation in their subordinates (Adzei & Atinga 2012). Meanwhile, the study revealed that the managers of the department were unable to motivate the radiographers to enable them to deliver the expected care services to their patients. This assertion was expressed by one of the participants: *'...I think the [management] itself too is not helping because there are people who are willing to kind of go and acquire knowledge but then the department [management] could not allow it because they tell you their staff strength is very small...'* [Rad5].

8.2.6 Management

The hospital of the study setting comprised of different departments. In this hospital, two different management levels existed; namely, managers who are responsible for overall

management roles of the wellbeing of the hospital as a whole, and managers of the various departments in the hospital. The hospital management team consisted of the chief executive officer (CEO), administrators, and the directors as shown in Table 8.1 below. These individuals constituted a ‘board of directors’ who performed the hospital management roles and steered the affairs of the entire hospital. On the contrary, the departmental managers were referred to as the leaders or heads of the departments. Although these heads or leaders also selected their teams to oversee the running of their departments, the hospital managers had the mandate to ensure that the overall policy and systems of the entire hospital were implemented by the heads of every department (Parand et al. 2014).

Table 8.1: The Hospital Administrative positions



8.2.6.1 Departmental management

The departmental management evolved from the data as one of the major themes that was considered as very important in managing or steering the affairs of the imaging department. In this department, the management team comprised of a radiologist, chief radiographer and a financial controller or administrator. Apart from the financial administrator who had a non-healthcare background, the other two managers were from clinical or healthcare background. Whilst the radiologist played dual roles of overall manager (Head) and clinical consultant of the department, the chief radiographer played a frontline supervisory or technical role of organising the radiography workforce (radiographers & assistants) and the required working tools such as consumables. In addition to organising the radiography team, the chief radiographer also had the responsibility of ensuring continuous functioning of the imaging equipment and their accessories, as well as radiation protection issues in the department. In addition, there were leaders in charge of various units or machine rooms

who had a responsibility to oversee the imaging processes and progress of service delivery in their units and then reported to the radiography manager (chief radiographer). The financial controller or administrator had been responsible for the financial performance of the department, in terms of revenue generation and financial disbursement or expenditure in the department. Meanwhile, it was noted that management had been faced with challenges for some time now regarding frequent equipment breakdowns and power outages. This situation was acknowledged by one of the respondents that: *'...currently we have a fluoroscopy machine which is lying there and the cassette tray is not working [...] and management are [is] not doing anything about it and so we are only relying on one [fluoroscopy machine] which sometimes we have overloaded'* [Rad2].

Nonetheless, the challenges that the managers were facing in the department, such as workforce and consumable shortages, invariably affected the delivery of services to the patients. It was also noted that the managers had challenges of constrained human resources, and this was corroborated: *'...the human aspect too, we have always been reminding authorities about the need to add more radiographers...'* [Man1].

The study identified attrition in the staff strength in the department due to non-replacement of retired radiographers and those who left the department for jobs in either private or other imaging facilities for another job and better remuneration. The non-recruitment of new staff was as a result of the government's current policy of freezing vacancies. This situation put so much pressure on both the management and the workforce. Again, the financial challenges facing the department continued to have adverse effects on the imaging service providers as well as the service delivering processes. For example, one of the respondents commented: *'...procurement procedures because sometimes you need basic things to use to kind of give off your best of service delivery to the patients and then those things are not there; it tells you financial challenges...'* [Rad5].

This situation had the tendency to negatively impact on the efficiency of the delivery of imaging services to the patients in the department. Again, as this situation continued it would create low morale among the radiographers in the department as well as dissatisfaction among the patients. Moreover, an effective management of a health care

organisation was identified as an important enabler that could help in achieving greater efficiency and quality of service delivery in health service departments (Mosadeghrad 2014; Parand 2014). The non-replacement of the retired workforce and/or those who left the department had been largely blamed on the government's general policy of freezing recruitment in the public healthcare institutions; however, some of the respondents were of the opinion that the management should have embarked on staff recruitment and retention exercise in order to help augment the staff strength in the department. This situation was acknowledged by some of the respondents that: '*...if they could even employ more staff because as it is now one person is manning [in charge of] a room [...] so if we could employ more people I think it may help*' [Rad5].

Meanwhile, it is noted that managers of healthcare departments (imaging departments included) have an obligation to ensure that improved quality and efficient services as well as patient safety are delivered to the patients within the health institutions (Parand et al. 2014). Again, it is noted that quality of care delivery could improve by supportive leadership, proper planning, education and training, and effective management of resources, including the professionals and processes (Mosadeghrad 2014). Supportive leadership was therefore regarded as critical elements for successful implementation of quality improvement and could also help achieve organisational goals and change (Glickman et al. 2007). Even though the respondents agreed that there was the need for departmental goals with regard to quality of service standards, management was unable to set up goals, let alone arranged regular meetings to discuss and propagate such goals to the radiographers.

There was a suggestion that the workforce planning and new appointments should be the responsibilities or contributions of both consultant radiologists and radiographers who were in the roles of imaging services managers (Royal College of Radiologists and the Society and College of Radiographers 2012). Even though the study showed that the departmental managers were in continuous discussion with the hospital management regarding the staff shortage in the department, it appeared as if no effort was being made at all. For example, one of the respondents noted: '*...looking at [the] manpower, so how many people are available to do the work?*' [Man3].

It was however established that healthcare managers were recognised as those in a prime position to implement policies, systems, procedures and changes in an organisation (Brandley et al. 2006). In any case, effective human resource management encouraged workforce satisfaction, commitment and loyalty which have a significant impact on patient satisfaction with the care service delivery (Mosadeghrad & Ferdosi 2013).

8.2.6.1.1 Appointment scheduling systems & waiting time

The concepts of the appointment scheduling systems and waiting time evolved from the data as subthemes of the departmental management and were identified as important determinants for realising good health outcomes and patient satisfaction (Onwuzu et al. 2014; Mardiah & Basri 2013; Gupta & Denton 2008). In the diagnostic imaging department, appointment systems were utilised to schedule patients to access special imaging services, such as barium studies, hysterosalpingography (HSG), ultrasonography, and various contrast study investigations. In addition to using the appointment scheduling for accessing special radiographic examinations, the radiographers also provided imaging services to unscheduled patients in the department. This group of unscheduled encounters (cases) included walk-in and urgent or emergency cases.

Meanwhile, it was noted that a well-designed appointment systems helped in delivering timely and convenient health care services to all manner of patients (Gupta & Denton 2008). Moreover, the study demonstrated that the appointment systems being utilised in the department were ineffective in that when patients were not using the specific time given them in the appointments. This ineffectiveness of the appointment systems in the department was indicated by one of the respondents: *'That is the appointment you see; that's the appointment system is lacking. It had been tried in this department before, that people [patients] would be given specific time but you realised that all want to come very early thinking that when you come early, you would be seen...'* [Man3].

This situation suggested that there would be patient overcrowding at the waiting area because patients scheduled for different appointment times also decided to come earlier than indicated in their appointments. Although the appointment scheduling system existed in the department it appeared the scheduling system was not clearly communicated to the

patients; hence the ineffectiveness of the system. In addition, there was no specific appointment system in place for walk-in cases as it was for 'special' examinations, such as contrast studies. However, the lead radiographers in various machine rooms are allowed to use their discretion to give appointments to patients of this category. They carried out this when the receptionists presented the patients' request forms to them. Most of these patients would prefer their X-ray examinations were performed immediately after their referring clinicians requested for the investigations; even though their next date to visit the clinician clinic was in a month's period or more. So the radiographers utilised the appointment scheduling system to spread the cases in order to reduce patient overcrowding at the waiting areas as well as patient waiting times, and this policy is allowed in the study setting. It was in this vein that a participant indicated: '*There is no system in place so, actually, it's that kind of first come first serve ...*' [Rad2].

Even though it was established that the appointment system is used to reduce congestion at the patient waiting areas by avoiding workload/workforce imbalances and, also, to help minimise patient waiting time in imaging departments (Onwuzu et al. 2014; Mardiah & Basri 2013), the opposite effect rather occurred in the study setting. Again, the appointment scheduling is regarded as a vital key to ensuring practice excellence as well as achieving quality service delivery (Mardiah & Basri 2013); however, the staff respondents were unable to indicate what should be done to make the appointment systems effective in the department. The study showed that the department's managers were responsible for the appointment scheduling process and, as such, they assigned staff to give the appointments to the patients.

However, it was established in many countries that a health workforce shortage was characterised by inadequate productivity, suboptimal recruitment, poor staff retention and management (Munyewende et al. 2014). Even though the radiographers were challenged to develop roles and to achieve their potentials in order to provide timely imaging services to patients and thereby reduce patient waiting times, the prevailing challenges in the imaging department rather continued to demotivate the former to pursue the role development agenda (Field & Snaith 2013). With regard to the shortage of the radiographers in the department, one of the respondents corroborated the assertion and said that: '*...we have a*

shortfall of human, [...], the human resource. A lot of our people have gone on retirement without replacement. [...] there is embargo on the recruiting into the public system [...]. Human resource system should be improved in order to reduce or ease patient waiting time' [Man1].

Meanwhile, the amount of time that the patients spent at the waiting area in the department played a very important role in determining patient satisfaction with the quality of service delivery (Naidu 2009; Drain 2001). Thus, it was noted that the overall patient satisfaction with health care services was determined, to a greater extent, by the length of time patients spent with the health service providers (Anderson et al. 2007). This therefore showed that the patient waiting time before they received health services was one of the factors that weighed against patient satisfaction with imaging service delivery.

8.2.6.1.2 Procurement procedures

The concept of procurement procedures emerged from the data as one of the subthemes of the departmental management and was identified as one of the biggest challenges that the management was grappling with. It was noted that many times, consumables such as X-ray films, processing chemicals, envelopes, contrast agents, normal saline, rubber gloves etc. were either in short supply or not of quality in the department. This challenging situation was acknowledged by one of the respondents that: '*...sometimes [...] we are not getting chemical combinations well; sometimes too, shortages*' [Rad2].

This situation had the potential to impact largely on the smooth delivering and efficiency of the imaging services to the patients in the department. Again, this challenging situation could affect the morale of the radiographers and its eventual influence on patient's satisfaction with the service delivery.

It was noted that procuring of these consumables was usually undertaken by the procurement team or officers responsible for procurement issues for every department in the entire hospital. The study however showed that managers of the department had challenges with the procurement procedures in that, many times, poor quality of consumables were procured for the department. This situation was acknowledged by one of

the respondents that: *'...sometimes, consumables are not the real ideal situations as we should have it'* [Man1].

The study revealed that these situations arose after the procurement officers obtained approval from the managers of the department to purchase the prescribed and quality type of the consumables for the department. Moreover, the managers sometimes insisted that the procurement officers brought samples of the required items together with their price quotations prior to procuring them. After the managers were satisfied with the quality and price quotations of all item types and gave approval for the procurement of the required items, the officers sometimes would manoeuvre and procure items of inferior quality to the central medical store of the hospital. In addition, some of the consumables procured, such as X-ray films, had their expiry dates so close and they purchased them in large quantities. This assertion was confirmed by one of the participants who noted: *'Procurement [officers] went for films which were almost expired and they came in volumes [large quantities] which couldn't be used before their expiring dates and yet had been procured so we needed to use them, [...] and yet the quality was very bad'* [Rad6].

As this happened, the quality of the radiographic imaging was compromised as a result of poor quality of the consumables.

It was noted that, although the department had a yearly procurement plan depending on the consumption pattern of the department, the consumables were procured quarterly for the department. It was also established that the department had a threshold of the stock in the hospital's central medical store and whenever the stock was running out, the central medical storekeeper either notified the managers through the department's storekeeper or directly alerted the procurement officers responsible for the imaging department. Whenever this happened, the technical expertise of the chief radiographer (manager responsible) would not be sought prior to procuring of the consumables because the yearly procurement plan was already with them. The officers only referred to the quarterly consignments and placed order for the items without seeking technical advice from the department. In this instance, the quality of the items was compromised and this affected both the service delivery and image quality.

With regard to processing chemicals, it is technically advisable that the same brand of developer and fixer should be procured and/or used. For instance, if the developer was of Agfa Company brand, the fixer should be of the same company brand. The developer should not be of Agfa brand while the fixer was of Kodak or Fuji brand. Regarding this practice, the concerns of some of the respondents was that the manager responsible for the technical groups (chief radiographer) should always be contacted by the procurement officers for his technical contribution towards the purchasing of the required consumables. This was supported by one of the respondents that: '*...I think [the] procurement [officers] should contact the technical personnel (the chief radiographer) when going for purchasing of those [consumables] in terms of films and chemicals*' [Rad6].

The suggestion was in the right direction because it was noted that processing chemicals of the same brand are compatible; thus, radiographic processing chemicals of the same manufacturers are used together in order to achieve quality of the radiographic image or film. Again, with regard to the expired films, the radiographers were compelled to increase the exposure parameters in order to compensate for the background fogging of the films. In this case, some of the films produced were overexposed and were therefore repeated; thus, both patients and the radiographers were subjected to additional radiation doses as well as prolonged waiting time (Korir et al. 2013).

8.3 Quality framework in radiographic service delivery

The overarching aim of this thesis is to develop a quality framework for radiographic service delivery in the imaging facilities in Ghana. In line with the aim and the findings identified and demonstrated in this thesis regarding quality of service delivery in the study setting, a framework of quality, involving a broad array of constructs thought of to promote and improve quality, has been developed (Figure 8.1 below).

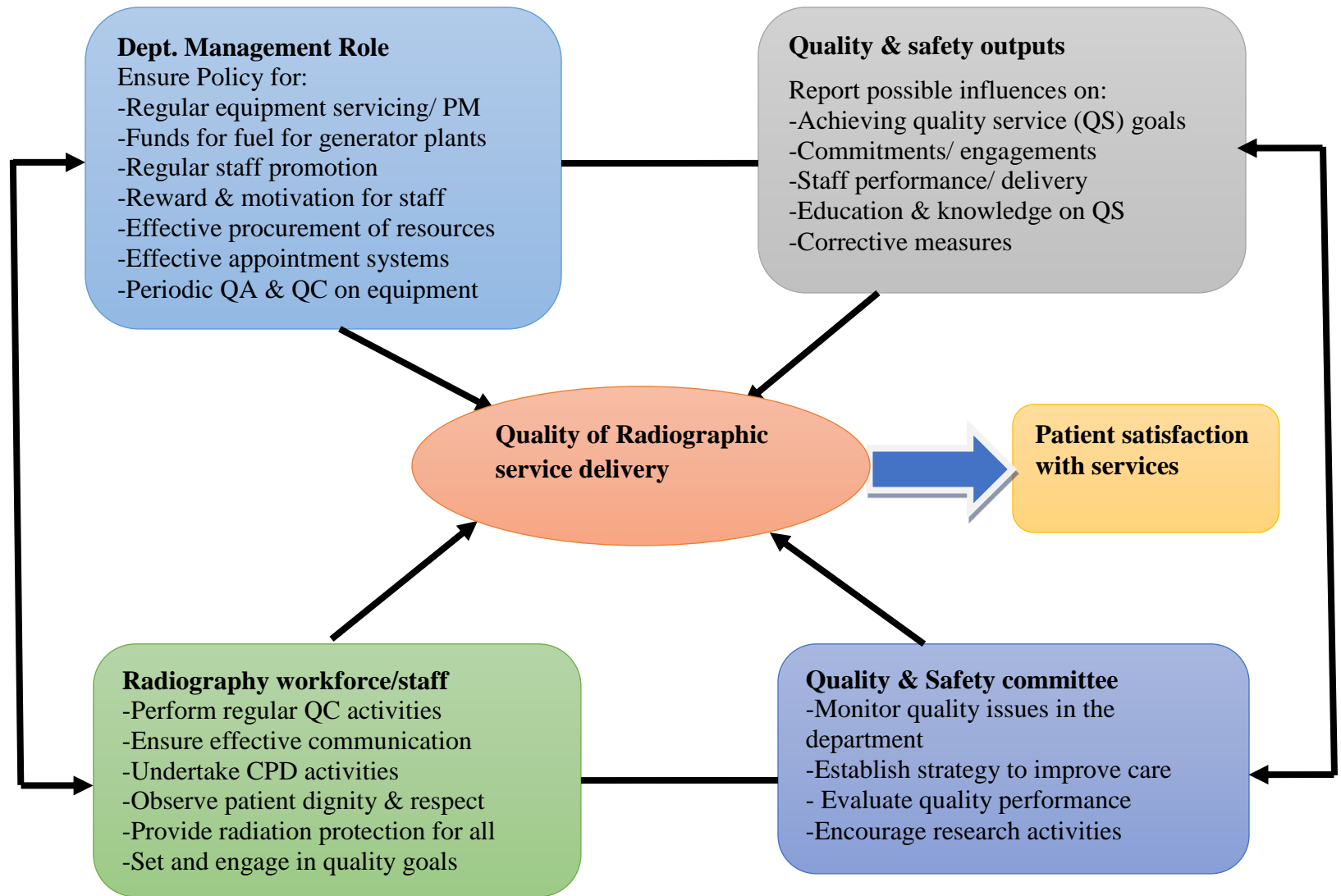


Figure 8.1: Conceptual Framework of quality of radiographic service delivery

8.4 Summary

This chapter provided a discussion on the key findings in relation to the wider literature and linked to the impacts upon efficiency and quality of service delivery. The discussion mainly focused on the challenges of frequent imaging (X-ray) equipment breakdowns and its effects on efficiency of imaging service delivery in the imaging department. QA and QC programmes, as well as PM (repairs) and contract agreements in relation to the imaging equipment wellbeing were also discussed. Power outages and/or fluctuations and standby generators were well elaborated on with regard to their potential negative impact on quality of imaging services to patients. Occupational stress, identified as a result of workforce/workload imbalances, was also discussed extensively with its practice or technical errors during the delivery of the required services to the patients. Again, ‘speed and efficiency’ was discussed as a concept that was adopted in busy imaging departments to overcome the pressures and to ensure efficiency of the imaging services to the patients. The chapter also highlighted the efficiency of care that the radiographers provided to their patients despite the challenges of the frequent power outages and imaging equipment breakdowns. It was also stressed on the need for the imaging workforce to ensure that patients’ right for dignity and respect is observed during service delivery. Patient-centred approach and effective practice standards were also discussed even though it was observed that radiographers are more concerned with imaging- or practice-focused rather than patient-centred; particularly, the diagnostic radiographers who generally have brief periods with their patients. Again, professionalism, professional attitudes, professional development and/or lifelong learning were emphasised and the imaging workforce were encouraged to ensure they continuously update their knowledge and skills by engaging in continuing professional development activities. Workforce motivation and rewards were also elaborated on. Effective leadership and management were recognised as vital to efficient service delivery. Again, effective managing of patient waiting time was recognised as one of the major causes of the patients’ satisfaction with imaging service delivery. Lengthy patient waiting times in the imaging department could be overcome if appointment scheduling systems were to be adopted and better communicated to the patients. The challenges of procuring consumables in the department were also discussed. Finally, the overarching quality framework of radiographic service delivery in Ghana was developed.

Chapter Nine

Reflexive Accounts

“We do not ‘store’ experience as data, like a computer: we ‘story’ it.”

(Winter 1988: 235)

9.1 Introduction

In this chapter, the researcher focused the discussion mainly on the influence and decisions that informed the qualitative phase (Phase 2) of the study. Reflexive accounts in a qualitative research refers to the generalised practice in which researchers strive to make their influence on the research process explicit to themselves and their audiences or readers on the basis that the researcher plays an active part in the setting, relationships and analysis of the data (Holloway & Wheeler 2010; Lambert et al. 2010; Cohen & Crabtree 2008; Kingdon 2005). Qualitative studies, ethnographic in particular, require reflective reflexivity to clearly state the criteria used during the collection, analysis and interpretation of data (Denscombe 2010; Holloway & Wheeler 2010; Finlay 2002). This reflexive account is therefore intended to help the reader to understand why decisions were reached in the way they were, and to identify the role of the researcher in the research process. Finlay (2002) noted that reflexivity is a process where researchers engage in explicit, self-aware analysis of their own role. It is therefore a conscious attempt by the researcher to acknowledge his own involvement or role in the study.

This reflexive account acknowledges the researcher’s potential influence on the study and the respondents’ narratives that were generated and analysed using the actions, values and beliefs that the researcher brought to the research process (Gentles et al. 2014; Lambert et al. 2010). Researchers may generally try to ensure that they contribute a body of non-contaminated, valid and reliable knowledge; however, any form of bias may occur in every aspect of research processes because they play an active part in the setting, relationships and analysis of the data (Holloway & Wheeler 2010; Lambert et al. 2010; Pannucci & Wilkins 2010; Cohen & Crabtree 2008). Indeed, the researcher was part of the data in that he was present, interacted with the respondents and generated the data; so, he had some influence on the data (Holloway & Wheeler 2010). Therefore, it is necessary for him to be reflexive, identify his involvement in the study and thus inform the reader who may make decisions as to the impact the researcher had on the research project.

Reflexive account is an important concept because it is directed at the greatest underlying threat to the accuracy of qualitative research outcomes – that is, the social interaction component of the interviewer-interviewee relationship. According to Pannucci & Wilkins (2010), any form of bias may occur in every aspect of research processes and validity of the data may not be pure because the researcher has been part of the research process; particularly, in the planning or designing, sampling, data collection, analysis and publication phases. Researchers are expected to recognise the interactions that take place in their own thought processes or actions and between the researched, the choices and decisions made regarding methodology and throughout the research processes (Holloway & Wheeler 2010; Lambert et al. 2010). Researchers therefore use reflexivity within the research process as a way of demonstrating integrity of the process and which is related to how their own identity, values, perceptions and behaviours, alongside those of their respondents might indeed influence the collection and analysis of data (Lambert et al. 2010; Parahoo 2006; Finlay 2002). In other words, researchers are required to be reflexive to evaluate how intersubjective elements influence data collection and analysis. Indeed, the researcher influenced the study prior to data collection; shaped the direction and the context and identified the important features that might influence the research topic. The researcher was part of, and not divorced from, the phenomenon under study and, in the study process, was constantly shaping the main research tool. Therefore, this reflexive narrative clarifies why this study was undertaken and how the researcher drew upon his encounters during the research process as the realities of the study began to unfold. The narrative is presented in a way that both the researcher and reader would understand the phenomenon studied as regards the interpretation of the researcher's qualities (Barbour 2014; Holloway & Wheeler 2010).

9.2 Professional educationalist

As a professional (diagnostic radiographer) in academia, the researcher's University identity provided him with a recognition as a researcher. Indeed, the researcher wielded (brought) some values into the research project as a professional tutor. Thus the researcher explored personal feelings and experiences with the participants that might influence the study and this understanding was integrated into the research in order to promote objectivity (Creswell 2009). The researcher's recognition as a diagnostic radiographer

enabled the interactions with the respondents (radiographers, managers and patients) as formal discussions in a congenial atmosphere. This was so because the researcher and respondents played mutually exclusive roles whereby the researcher contributed the thinking that went into the project while the participants contributed the contents to the study (Creswell 2009). However, the researcher's personal experiences as a health professional (diagnostic radiographer) afforded him broader views about the patient's experiences as well as the radiographers' feelings regarding quality of service delivery in the study setting. Thus, thinking in this way allowed the researcher to draw conclusions from the findings of the study.

The understanding of the researcher's own experiences and thoughts concerning radiographic service delivery enhanced his awareness, knowledge and sensitivity to many of the challenges, decisions and issues encountered as a professional and practising radiographer. The researcher is presently an academic staff member in the University of Ghana and also a researcher in higher education; so has a wide range of work demands (tasks) and roles. Therefore, due to previous experiences working in the study setting and closely with patients and currently with other colleague educationists, the researcher might have brought certain biases to this study. The introduction of the biases might have stemmed from the point that the researcher prepared (designed) the interview schedules with the researcher's focus on the research aims and which might have eventually shaped the direction of the thesis (Pannucci & Wilkins 2010). Even though every effort was made to ensure objectivity, there might certainly occur some biases during data collection and analysis as well as interpretation of findings (Pannucci & Wilkins 2010). Again, the biases might have shaped the way the researcher viewed and understood the data he generated and how he interpreted his thoughts.

9.3 Challenging situations and experiences

The researcher came into the Phase 2 study with quantitative background and the biggest challenge was how to adapt to the qualitative research process. Additional challenges that the researcher experienced was how to perform the coding process or technique and then make sense of the textual data generated. The other qualitative research processes that the researcher found challenging included writing up and presentation of the findings; in

particular, putting the participants' thoughts, feelings, and perceptions into perspective within the context of the phenomenon under study. It is worth noting that the researcher did not find these processes easy adapting as a first time user of qualitative methods; however, he was able to learn the processes with determination. Again, the researcher realised he needed unbiased mind or thoughts while making sense of the data. Then the most challenging moments dawned when the researcher was to construct the knowledge by combining the findings from both phases (Phases 1&2) in the main discussion of this thesis to make it holistic. The researcher would contend that he had acquired some knowledge to be able to undertake qualitative studies without much challenge; particularly, designing interview schedules and conducting qualitative interviews, analysing qualitative data and presenting qualitative findings.

In addition to the above challenges, Ghana was hit by severe electricity (energy) crisis in 2015 which coincided with the interview data collection period (Graphic Corporation 2015). The situation was so bad that it affected all facets of the economy including healthcare institutions, schools, industries, and other organisations. Thus, the study setting was not an exception. The energy crisis situation became so alarming that the Electricity Company of Ghana had no option but to arrange and announce load shedding exercise. This situation was so severe that some communities could be without power for two weeks or more; and this largely impinged on the progress of the study. Although the researcher would charge the battery of his laptop to the fullest, using it continuously for six to eight hours without electricity (power) always run the battery down or low; compelling him to switch off his laptop before it goes off by itself. The power situation in the country also badly affected the information technology (internet service providers) companies and/or institutions. For some time now, the power situation in the country has rendered the performance of IT service providers very poor. When it comes to internet services, sometimes the signal intensity would indicate high but it would not allow message composition. On the other hand, when the system allowed for message composition, it often happen that the system would not allow for sending or saving of the messages. Sometimes too, the researcher received an important message which he needed to access and respond to but it became problematic because the system would not allow access. Again, the situation became so difficult that the researcher experienced so many problems

whenever he tried to retrieve important articles and/or literature to support the discussion of the findings. These challenging experiences largely affected action (workplan) plans for the thesis in that the researcher was unable to meet the initial deadline for submission; thus, he was compelled to request for extension of the submission date.

As if the above challenges were not enough, the researcher has always been pulled into academic works or assignments (teaching and examining students) any time he returned from SHU to discuss the progress of his research project. These experiences of combining the academic work and the research activities also affected the study timeframe largely. However, with all these challenging experiences the researcher was determined to work harder to meet the submission deadline.

9.4 Knowledge acquisition through the study

The researcher would like to recognise his learning in this section and the knowledge he acquired or gained by undertaking this study. The journey on this study route, approximately four years ago, explicitly reminded him of moments of anxiety and a feeling of uncertainty at the time. These mixed feelings became worse when his chosen topic was modified and it became apparent that he needed a mixed methods research design for the study and to enable him to write proposal for the research. The initial research proposal was returned simply because it did not fit the standards of doctoral level and there was the need for additional modification and clarification of the phenomenon under study to suit the standards for doctoral level of study. The researcher also came to realisation that studying at the doctoral level was a different ball game all together and so he needed to reorganise his thoughts by adapting to what the reality was at the doctoral level. At this time, the reality dawned on the researcher that he has limited knowledge about the constructs or dimensions of quality service and the direction of the research. Therefore, the researcher's anxiety and uncertainty grew with passing time and it took him quite some time to realise that he could make progress by exploring the phenomenon (under study) holistically. For some time, it became a bit difficult as the researcher had to manage his academic work and the study which he was determined to accomplish. Further, since the researcher was undertaking the study in his home country, sometimes serious family issues popped up and it was necessary for him to attend to them. For example, the researcher lost the younger

brother and the mother in the course of the study and he was compelled to participate in the funeral events. Again, there came a time for the researcher to relocate from his rented residence due to some challenges; thus, all these activities took a chunk of the researcher's learning times.

In spite of all the time consuming commitments and/or engagements, the researcher was determined to learn much about the research process so as to make up for the time lost. As indicated earlier, the researcher came from quantitative background and having to combine this with qualitative research methods seemed a daunting journey to embark on. However, having gone through the Phase 2 research process using the qualitative methods, the researcher realised that the methods are broad and there is much more to learn. He therefore felt that he has improved on the process of how to: prepare interview schedules, conduct and analyse interview data; identify and focus on a research question; identify ethical issues and map out strategies to deal with them; organise and present data and draw conclusions; produce a scholarly piece of work; and finally catalogue references.

The researcher then set realistic work-plans or targets to guide him but as time went by and frequent power disruptions were the order of the day coupled with IT challenges, the set targets were however affected and, as such, were rendered unrealistic. Thus at one point in time, the researcher felt that he was far behind the set study goals. Although discussing qualitative findings takes larger chunks of time because it requires in-depth thoughts, the researcher realised that his thoughts were clarified while writing. Despite pressure seems to be built on him during the process, the researcher truly enjoyed getting to the end of the journey. He therefore comforts himself with the saying that 'A long journey never surpass destination'. Hence, the journey of a thousand miles which began some years back is drawing near to the end.

9.5 Summary

Along the journey of the Phase 2 study, the researcher identified the decisions and/or assumptions he made about the study process. He discussed his challenges of coming from quantitative background and the difficulties of combining this method with qualitative research methods in this study. The researcher touched on the interview schedules for the three different groups of the participants, textual data analysis and what he did to address the issues as and when they arose. The various characteristics that he brought to the research project have been acknowledged as well. The researcher described and discussed the issues concerning the sample size, sampling strategies and the nature of the interviewing process. In addition, this chapter of reflexive accounts provided the researcher an opportunity to disclose his potential influence on the study and would allow the reader to make judgements about transparency, vigour and trustworthiness of the research process and the data it generated. The main challenging moments for the researcher was to keep an open thoughtful posture or mind as he spent most of his professional life in radiography. The researcher therefore ensured to maintain an open mind throughout and used his insight experiences gained. The journey through this Phase has really been a trying, frustrating, painful and enjoyable experience the researcher would never have missed.

Reflection on the findings, what had been thought and done in the Phase 2 study and the characteristics of the researcher have largely shaped his way of thinking. Thus, this enabled him to draw the conclusions from the findings

Chapter Ten

Conclusions, implications and recommendations

10.1 Introduction

In this chapter, the conclusions of the thesis based on the findings of the studies, implications for policy and practice and areas for further research are presented. This piece of work has provided some knowledge on the quality of radiographic services being delivered to patients in the study setting and the significance of the contribution it makes. This thesis is a piece of new information provided for the first time and it is the original project on the topic and involving the study setting; and adding knowledge on quality of radiographic service delivery in a way that has not previously been undertaken. The study aimed to develop an overarching conceptual framework of quality in radiographic service delivery that could fit the medico-socio-cultural context of Ghana and to promote activities that will provide the radiographers with additional knowledge about quality issues in the imaging services and patient care. This study also aimed to close the knowledge gap that may have existed in the professional movement towards the philosophy of advanced radiographic service provision by linking both theoretical and practical issues of quality in radiographic practice.

In line with the over-riding aim of the research, this thesis contains original work on:

- The understanding of quality of service by radiographers and managers in Ghana.
- The quality criteria/ protocols radiographers employ during imaging service delivery.
- The level of patients' satisfaction with the radiography services rendered them.
- The framework of quality. Even though literature on quality issues in health care is available, this study takes the concept of quality service delivery to an area of the diagnostic radiography profession. Therefore, developing the concept of quality was considered in depth and hence, its original contribution. It is expected that the framework development will impact on diagnostic radiographers because it is considered relevant and context appropriate and would help advance their professional practice. It would also add to existing knowledge and/or literature with regard to the international health professional stance.

With regard to the study design, this thesis makes an original contribution as it is the first to explore and explain quality of radiographic service provision in the study setting by involving patients, radiographers and managers of the department. Again, the research is the first to use the mixed methods strategy in the setting and has elicited rich information using semi-structured interview schedules in exploring the baseline data established in the first phase by the structured questionnaire tool and basic QA procedures. However, the strengths and limitations of this study are worth noting. As different data collection methods and sampling strategies were employed in each phase of the study, the discussion of limitations are done under the phases.

10.2 Limitations

Even though this study has been comprehensive and detailed, a number of limitations have been observed and these could impede generalisation to the global literature on quality in diagnostic radiography. As indicated earlier, different sample sizes and categories of participants were selected for the two phases. Again, though the study setting has been the largest facility in the country, in terms of different types of imaging modalities, the study was focused on (conducted in) this setting only. The setting was chosen because of its being the largest department situated in the biggest Teaching Hospital in the country. This could not be said to be representative of the Ghanaian medico-socio-cultural system. In addition, the sampling strategy employed in both phases varied as well as the methods of data collection in the two phases.

10.2.1 Phase 1

In the Phase 1 study of the thesis, participant and service perspectives were considered. In the participant perspective, patient satisfaction survey (questionnaire) was used to collect data from 90 participants who went through the radiographic procedures in the three selected machine rooms and voluntarily consented to participate in the study. The data collected therefore reflected the experiences of the study participants recruited in the sample and who went through the procedures in the three rooms in the department. These study participants were from diverse socio-cultural, ethnic, and religious backgrounds as well as different educational backgrounds. In addition, the age and gender differences could influence individual participant's level of satisfaction with the service they received.

However, the opportunity was not given to all service users to participate in the study. The participation was limited to 18 years and above, who are regarded as adults by law, to consent and participate in the study. Meanwhile, individual radiographers who provided the services, as well as the machine rooms where the services were provided could influence satisfaction level of the participants. Also, the researcher was not part of the data collection process whereby he would have an opportunity to probe further any response that the participants provided to any particular questionnaire item. It remained that a sample size larger than the participants recruited could establish a broader and better baseline data for Phase 2 design.

As regards the service perspectives, basic QA and QC procedures were employed whereby reject film analysis technique and diagnostic (dose) reference levels (DRLs) were used. It was established that the three rooms produced different or varying RFA findings which influenced the overall RFA of the three rooms in the study setting.

10.2.2 Phase 2

This phase was a qualitative study that aimed to further explore and explain the baseline data established in Phase 1 on issues regarding quality of service delivering within the study setting. Semi-structured interview schedules were used to generate data from the study participants. Every effort was made to sample the participants for this phase in an objective and representative way; thus, the procedure for selecting the interviewees ensured that participants from all the groups concerned with the quality services in the study setting were included in the study to facilitate as broad a perspective as possible. However, the selection of the three imaging rooms, based on the types of general radiographic cases that were performed in those rooms, may be considered a potential limitation. Even though it is noted that qualitative sample size has generally been small and linked closely to the research topic and also dependent upon participants' experiences (Holloway & Wheeler 2010), the sampling strategy was limited to the three selected rooms and this may be considered as the second limitation.

In addition, the initial design was to recruit participants in Phase 1 to participate in the second phase so that they could shed more light on their initial responses in the Phase 1

study. However, it turned out that the participants who were willing to be invited and, for that matter, gave their contact particulars, later declined their participation. This was mainly due to the time lapsed (about six months) between the data collection in Phase 1 and that of the Phase 2. Therefore, the limitation was identified as the length of time involved in the data collection to complete the two separate phases, particularly as the two phases were given equal weight or priority (Creswell & Plano-Clark 2011; Creswell et al. 2003). Moreover, the Phase 2 could not have been planned in detail without the completion of Phase 1 study (Creswell & Plano-Clark 2011). It was also observed that the researcher needed to develop skills to be able to cover both quantitative and qualitative approaches as expected (Denscombe 2010).

Finally, interviews with the patient participants in this phase of data collection were very brief because it was observed that the participants did not participate in the first phase and some of the probing questions focused on the responses in the first phase. This could have limited the richness of data generated. Moreover, while the study could not have demonstrated significant quantitative support for quality service provision as currently conceptualised, the mixing of the findings across quantitative and qualitative phases from this study has implications for broadening the conceptualisation of the quality phenomena. Meanwhile, this thesis advances the quality issues in radiography, particularly in the study setting and Ghana as a whole, to incorporate qualitative experiences of individuals in the professional practice.

10.3 The importance of quality framework in radiographic service provision in Ghana

The study has identified some constructs with regard to quality of service provision in diagnostic radiography practice in the study setting as well as in Ghana as a whole. The findings help in developing a unique framework of quality of radiographic service delivery to patients in Ghana. Even though the study focused on the study setting which is the largest imaging facility currently in the country, with many imaging modalities, it is believed that the constructs identified may cut across the imaging facilities in the country with insignificant variations. However, these constructs are suggestive rather than conclusive.

As indicated earlier, the quality framework developed involved a broad array of constructs that were thought to promote and improve quality in the delivery of diagnostic radiographic services to patients in Ghana. The framework identified the roles the departmental managers and radiography workforce (staff) should play in the quest of achieving total quality in diagnostic radiography departments. The following sections discussed the roles the managers and radiography workforce or staff would play in the implementation of the quality framework in view to achieve total quality issues in the imaging departments in Ghana.

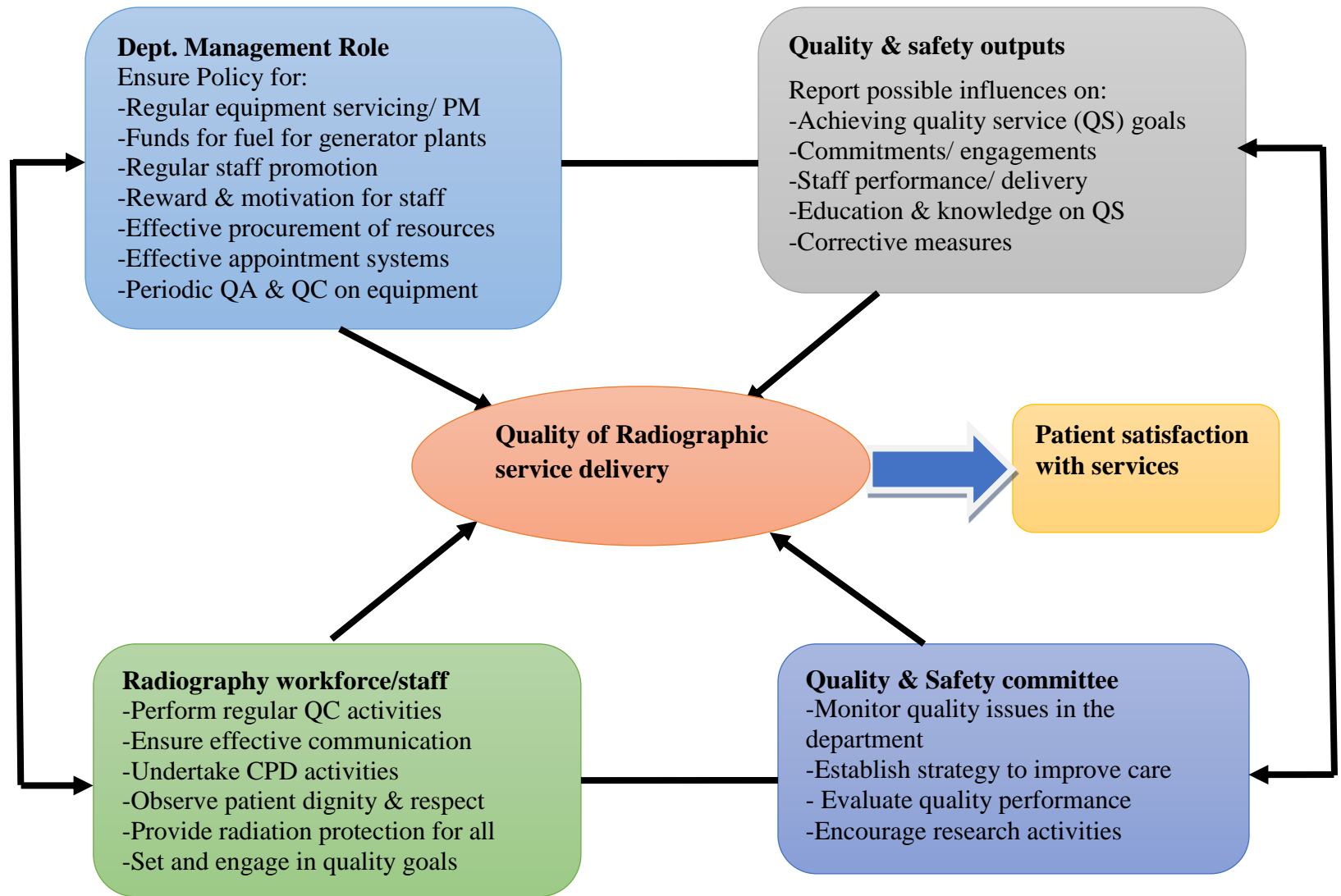


Figure: Implementing Conceptual Framework of quality of radiographic service delivery

10.3.1 Implementing the Conceptual Framework: Management roles

The departmental managers should ensure policy is enforced so that:

- Regular servicing of the imaging equipment as well as preventive maintenance is pursued consciously to ensure continuous functioning of the equipment.
- Funds to purchase fuel for standby generator plants (if any) are made available to ensure reliable power supply to keep the department running effectively in the event of power outages from the national grid. This is necessary because the managers do not have control over power supply from the electricity grid and radiography departments largely depend on quality of power supply to operate safely.
- Involve right people in procurement process to ensure purchasing of quality consumables, such as X-ray films, processing chemicals, X-ray envelopes for packaging radiographic images, contrasts (e.g. barium sulphate) for special imaging etc., to facilitate efficiency in the delivering of radiographic services to patients.
- Effective appointment systems to enable decongestion of patient waiting areas as well as minimise patient waiting time in the X-ray departments; and also to help facilitate delivering of timely and convenient health care services to all manner of patients.
- Periodic QA and QC activities to be performed on the equipment and to encourage radiographers to participate in basic QC activities to report malfunctioning of parts and accessories of imaging equipment for early maintenance services to be provided in order to prevent extensive and lengthy breakdown of the equipment.
- Identify and report staff's effectiveness in terms of performance in delivering or achieving quality services in the department.

Management should also establish a quality and safety committee in the department to involve chief radiographer, two radiographers and a quality oriented professional. The tasks for this committee would be to continue to:

- Provide scrutiny and challenge aspects of quality and safety practice (strategy, delivery, and audit) and provide appropriate reports or recommendations to management
- Monitor quality issues in the department and to establish strategies to promote and improve care and safety to patients, staff and colleagues and other service users.

- Evaluate quality performance of the established quality strategies and to report possible influences on achieving the set goals as well as commitments and/or engagements.
- Provide education and ensure efforts are put in place to encourage every staff member has some knowledge on quality service within the environment, particularly difference between QA and QC processes.
- Provide corrective measures to ensure easy service processes on every quality aspect in the facility.

10.3.2 Roles of radiography workforce in implementing the framework

The radiography workforce (staff) is also identified to play critical roles in achieving quality in the department; some of the roles identified in the concept include, to:

- Perform regular QC activities on all aspects of the equipment and accessories to ensure the systems function appropriately and safely in the delivery of quality services
- Ensure effective communication in the delivery of services to ensure patients, colleagues and other service users explicitly understand the messages being put across to avoid errors out of misunderstanding of instructions or messages to patients
- Undertake research and CPD activities to upgrade and/or update the existing knowledge and skills in order to progress professionally as well as to ensure evidence based practice in radiography to ensure quality services are delivered to patients who seek radiographic services.
- Observe patient dignity and respect which is a legal obligation for radiographers and the right of patient's values and confidentiality (SCoR 2013).
- Ensure adherence to basic principles of quality management and appropriate utilisation of quality tools.
- Provide radiation protection and safety environment for all manner of people, irrespective of their conditions or backgrounds.
- Set and engage in establishing quality goals in the department with the view to ensure continuous quality improvements and safety of patients in every aspect of imaging service delivery (Kruskal et al. 2011).

10.4 Areas for Further Research

The limitations identified in sections 10.2, 10.2.1 and 10.2.2 should inform further research in this area. The following areas are identified for future research:

- Further research is needed to focus on some form of longitudinal study to reproduce any one of the phases in a different setting in a different part of Ghana or in the present setting after a set period of time.
- Future studies could also involve more than one study setting in order to assess or compare the level of quality managements in the facilities involved.

The comprehensive approach in this study set a stage for future studies in Ghana and other countries that aim at addressing the challenges of quality of radiographic service delivery to patients and other service users.

10.5 Recommendations

The recommendations of this research focus on quality of radiographic service delivery, and developing a quality framework for managing quality issues in radiographic service provision in diagnostic radiography departments in Ghana. In view of this, the following recommendations are considered worth noting:

- There should be quality management policy in imaging departments in Ghana to ensure that quality challenges are addressed effectively in the departments.
- The management should make available suggestion boxes and other visible channels in order to pick relevant feedback from the patients and other users of the facility.
- Regular periodic QA audits by radiation physicists should be undertaken on the imaging equipment and accessories in the departments to prevent frequent and/or continuous malfunctioning of the equipment.
- Implement findings on exposure parameter values which achieved the required image of diagnostic quality as reference points (DRLs) for future chest cases for standard-sized patients.
- Install public address systems in patient waiting areas to ensure effective communication with patients.

- To ensure film reject rate is reduced from the current 14.55% to a level of about 6 to 10% in the department.
- Radiography department managers should recognise that effective and total quality management would provide patient satisfaction, safety and comfort in the departments.
- An audit instrument should be devised or designed based on the Framework
- Put in place measures to address practice error challenges to minimise patient exposure to additional ionising radiation thereby decrease patient waiting times.
- Enough sitting areas or spaces should be provided at the patient waiting areas to ensure comfort of the patients as they wait.
- Put mechanism in place to check staff attrition rate and ensure immediate replacement in the event of staff retirement.

While some of the challenges experienced by the radiography workforce at the setting can be addressed at the local level of the service provision, there are other challenges that require intervention at a higher policy level.

10.6 Conclusions

The study holds that the development of a quality framework would enhance quality of radiographic service delivery which is currently identified as inadequate in the study setting as well as in Ghana. The framework is a network (plane) or strategy of interlinked concepts that together provide a comprehensive understanding of the quality phenomena or issues in radiographic service delivery in Ghana (Jabareen 2009) study intended for the management of. At the time of this study, the researcher was not aware of any framework that guided overall quality issues in radiographic service provision in Ghana and this research has accomplished the task of bridging the quality gap existing in diagnostic radiography literature, particularly in Ghana. Again, the holistic approach to the study regarding the adoption of mixed methods strategy for this study provided a full understanding of quality issues in radiography department within the medico-socio-cultural context of Ghana.

The indication of independent variables (communication from the staff, human relation of staff, evidence of prolonged waiting time, lack of staff motivation and rewards, patient complains) by the study as against the dependent variable (patients' satisfaction) means that the managers of the study setting must take keen interest in them, so as to enhance quality of service delivery as well as patients' safety and satisfaction. As regards the evidence based practice that enables the use of research findings to inform practice and care of patients (Snaith 2016; Wilson et al. 2010), the current findings will be communicated to the radiographers through presentations at conferences, workshops and in-service trainings. The findings will also be disseminated to the radiography fraternity to fulfil the realisation of full potential for research evidence to improve practice, policy and decision making in healthcare settings (Wilson et al. 2010). Managers will be presented with copies of the findings and they will be encouraged to implement them as part of department's policy in view to improve quality of service provision in the department. In addition, portions of the thesis will be disseminated in the peer-reviewed journals to add to quality knowledge internationally.

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Appendices

Appendix I – Approval letter- School of Allied Health Sciences, University of Ghana

**SCHOOL OF ALLIED HEALTH SCIENCES
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA
ACADEMIC AFFAIRS**

**Phone: +233-0302-687974/5
Fax: +233-0302-688291**

**My Ref. No. SAHS/22026091
Your Ref. No.**



P. O .Box KB 143
Korle Bu
Accra
Ghana

4th August, 2014.

Mr. James N. K. Gawugah,
Dept. of Radiography,
SAHS,
Korle Bu.

Dear Mr. Gawugah,

ETHICS CLEARANCE

Ethics Identification Number: SAHS – ET./22026091/AA/2A/2012-2013.

Following a meeting of the Ethics and Protocol Review Committee of the School of Allied Health Sciences held on Monday 4th August, 2014, I write on behalf of the Committee to approve your research proposal as follows:

TITLE OF RESEARCH PROPOSAL: “Developing a Concept of Quality in Radiographic Service Delivery in Ghana”

This approval requires that you submit six-monthly review reports of the protocol to the Committee and a final full review to the Committee on completion of the research. The Committee may observe the procedures and records of the research during and after implementation.

Please note that any significant modification of the research must be submitted to the Committee for review and approval before its implementation.

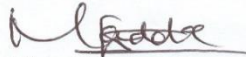
You are required to report all serious adverse events related to this research to the Committee within seven (7) days verbally and fourteen (14) days in writing.

As part of the review process, it is the Committee’s duty to review the ethical aspects of any manuscript that may be produced from this research. You will therefore, be required to furnish the Committee with any manuscript for publication.

Please always quote the ethical identification number in all future correspondence in relation to this protocol.

Thank you.

Yours sincerely,



Dr. Michael Mark Addae
(Chairman, Ethics and Protocol Review Committee)

cc Dean
 Co-ordinator, Dept. of Radiography
 Senior Assistant Registrar

Appendix II – Approval letter- Korle-Bu Teaching Hospital

In case of reply the number
And the date of this
Letter should be quoted

My Ref. No. KBTH/MD/63

Your Ref. No.



KORLE BU TEACHING HOSP
P.O. BOX 77
KORLE BU, ACCRA

Tel: +233 30-266-6766
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Email: Info@kbth.gov.gh
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10th July, 2013

THE HEAD
RADIOLOGY DEPT
KORLE BU

LETTER OF INTRODUCTION FOR RESEARCH PROJECT
MR JAMES N K GAWUGAH

This is to introduce to you the above named Radiographer and PhD Student of the Sheffield Hallam University in the United Kingdom.

He has expressed the desire to collect data for PhD Research Project on radiology services at the Casualty Unit of the Hospital.

Please accord him all the necessary assistance.

Thank you.

PROF AFUA A J HESSE
DIRECTOR OF MEDICAL AFFAIRS
FOR: CHIEF ADMINISTRATOR

**Sheffield
Hallam
University** | Centre for Health
and Social Care
Research

27 November 2013

PA/SH

James Gawugah
Sheffield Hallam University
Collegiate Crescent
Sheffield
S10 2BO

Dear James

This letter relates to your research proposal: **Developing a concept of quality in radiographic service delivery in Ghana**

This proposal was submitted to the Faculty Research Ethics Committee for ethics and scientific review. It has been reviewed by two independent reviewers and has been passed as satisfactory. The comments of the reviewers are enclosed. You will need to ensure you have all other necessary permission in place before proceeding, for example, from the Research Governance office of any sites outside the University where your research will take place. This letter can be used as evidence that the proposal has been reviewed ethically and scientifically within Sheffield Hallam University.

The documents reviewed were:

Gawugah - Review #1
Gawugah SHUREC1
GawugahbINDER 2
Review #2 Research Ethics-Reviewers feed back form SHUREC3

Good luck with your project.

Yours sincerely



Peter Allmark
Chair Faculty Research Ethics Committee
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Appendix IV - Patient Satisfaction Questionnaire – Phase 1

(A Structured Interview Schedule)

Please, kindly listen to the following questions and tell me what you think is appropriate.

A- About you.

1. Gender: Male Female

2. Age (in Years):

- 18-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71+

3. Educational status:

- Primary
- JHS
- SHS
- Graduate
- Post-graduate

4. Occupational status

- Unemployed
- Self- employed
- Tradesman
- Government service
- Trader
- Student
- Retired
- Other

Please specify

5. Ethnical (Tribal) status:

- Akan
- Ewe
- Ga
- Hausa
- Fante
- Other

Please specify

6. Religion

- Christian
- Muslim
- Traditional
- Other

Please specify

B - Waiting Area:

7. How long have you waited for your turn?

- Very long
- Quite long
- Went in immediately
- Good

8. Impression about the waiting area

- Very good Good Fairly good Poor

9. Comfort at the waiting area area

- Very comfortable
- Somewhat comfortable
- Not really comfortable
- Not at all

10. Cleanliness of the waiting

- Very good
- Good
- Bad
- Very bad

C- Examination Room with the professional

11. The attitude of the professional

- Very good
- Good
- Unprofessional

12. Examination explained to you

- Yes, very clear
- Yes, but not clear
- Not at all

13. Caring concern about the staff

- Very good
- Good
- Bad
- Very bad

14. Your impression about the staff

- Very friendly & helpful
- Friendly
- Unfriendly
- Very rude

15. What type of request (X-ray) has your Doctor ordered for?

- | | | | |
|------------------|-----------------------|----------------|-----------------------|
| Chest X-ray | <input type="radio"/> | Cervical spine | <input type="radio"/> |
| Skull X-ray | <input type="radio"/> | Thoracic spine | <input type="radio"/> |
| Shoulder X-ray | <input type="radio"/> | Lumbar spine | <input type="radio"/> |
| Pelvis/Hip X-ray | <input type="radio"/> | Femur | <input type="radio"/> |
| Knee X-ray | <input type="radio"/> | Other | <input type="radio"/> |

Please specify:

16. Were you given privacy in the exam room?

- Yes Somewhat No

17. Have you been informed as to how to collect your results?

- Yes No

18. Are you satisfied with the thoroughness of the exam?

- Yes, very satisfied Not really Not at all

19. Were you comfortable with the medium of communication (Language)?

- Yes, very comfortable
- Yes, somewhat comfortable
- Not comfortable at all

20. In your opinion, have you been provided with the necessary care you expect?

- Yes Somewhat No

D- Our Facility

21. Did you locate this unit easily?

- Yes, very easily Yes, with difficulty No, escorted by someone

22. Your view about time spent during the procedure?

- Too much time
- Average
- Not much time spent

23. Overall comfort

- Excellent
- Very good
- Good
- Bad
- Very bad

E- Your overall satisfaction with:

24. Our practice procedure

- Excellent
- Very Good
- Good
- Bad
- Very bad

25. Our service delivery

- Excellent
- Very Good
- Good
- Bad
- Very bad

26. How will you rate your overall impression about our service provision?

- Excellent
- Very good
- Good
- Bad
- Very bad

Thanks very much for your time and participation.



Sheffield Hallam University

PARTICIPANT INFORMATION SHEET

TITLE: Developing a concept of quality in radiographic service delivery in Ghana

You are being invited to participate in a research study to:

- develop a unique concept of quality of modern radiographic service provision for radiography practice in Ghana.
- explore the role the potential influence of service users' opinions have on the quality of radiographic service to patients.

Before you decide whether to take part in this study, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish.

Ask the investigator if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

“Why have I been asked to take part in this study?”

This department strives to provide quality, timely and expert care service to patients from all over Ghana. This is a PhD Student Research project with the main aim of assessing quality of radiological service delivery in the hospital and to identify the role the service users and providers play in promoting quality of service in Radiology Department. We cannot achieve this without your inputs or contributions as to what your health care expectations are. You are therefore voluntarily invited to participate in this research project.

What if I do not wish to take part?”

It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason.

What will happen to me if I take part?

You are assured that your participation in this research project will not cause you any medical or social risk. The information you will provide will be treated and kept as strictly confidential and any reports of the findings of this research work will not contain any identifying information about you. You are also reminded that your involvement in this research will be approximately twenty-five (25) minutes.

In this exercise, you will be requested to answer some few questions either by questionnaire or through interviews. The interview will be recorded for the purpose of this research project and again, your identity will remain strictly confidential and anonymous.

How long will the study last?

The whole study will last about four (4) years. However, you will be involved for approximately twenty-five (25) minutes on this occasion.

What if I change my mind during the study?

You are free to withdraw from the study at any time without needing to explain your decision for doing so. If you decide to withdraw your consent your data can be removed and not included in the analysis.

Are there possible disadvantages and risks of taking part?

Again, you are assured that your participation in this research project will not cause you any medical, moral or social risk. The only known inconvenience that your involvement may cause you is your precious time you will spend during the interview or answering of the questionnaire.

“What will happen to the information from the study?”

All information will be kept entirely confidential. Questionnaires/data sheets will be destroyed three years after the study. No individual will be identifiable in the report. You will be informed of the results of the study if you wish.

“What if I have further questions”?

You are free to contact the researcher through these Email addresses:

jgawugah@hotmail.com or b2026091@my.shu.ac.uk



Sheffield Hallam University

CONSENT FORM

TITLE: Developing a concept of quality in radiographic service delivery in Ghana

Please give your consent to participating in the study by answering the following questions

Have you read the information sheet about this study?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Have you been able to ask questions about this study?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Have you received answers to all your questions?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Have you received enough information about this study?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

Which investigator have you spoken to about this study?

Are you involved in any other studies?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
• If you are, how many?		<input type="checkbox"/>		

Do you understand that you are free to withdraw from this study:

• At any time?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
• Without giving a reason for withdrawing?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

Do you agree to take part in this study?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
------------------------------------------	-----	--------------------------	----	--------------------------

Your signature will certify that you have had adequate opportunity to discuss the study with the investigator and have voluntarily decided to take part in this study. Please keep your copy of this form and the information sheet together.

Signature of participant:Date:

Name (*Block Letters*):

Signature of investigator:

James N.K Gawugah

Appendix VII – Exposure parameter data sheet-adult PA chest- Phase 1

Quality assurance data sheet for adult PA Chest

Date	Exposure	kVp	mAs	Patient's Size			Projection
				Below average	average	Above average	
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						

Appendix VIII – Exposure parameter data sheet-adult AP lumbar spine- Phase 1

Quality assurance data sheet for adult AP lumbar spine

Date	Exposure	kVp	mAs	Patient's Size			Projection
				Below average	average	Above average	
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						

Appendix IX – Exposure parameter data collection sheet-adult AP knee-Phase 1

Quality assurance data sheet for adult AP knee

Date	Exposure	kVp	mAs	Patient's Size			Projection
				Below average	average	Above average	
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						

Appendix X – Reject film analysis worksheet-Phase 1

Reject Analysis: Film Use Worksheet

Time Period: From: -----To: -----Total Films used: -----

Reasons/ Categories	Number of Films in each category				Total Number	Percentage
Dark Film						
Light Film						
Positioning Error						
Centring Error						
Patient Motion						
Fog- Darkroom						
Fog- Cassette						
Static						
Artefact						
Mechanical						
Good Film						
Other						

Adapted from WHO Workbook for Radiographers (WHO 2001)

INTERVIEW SCHEDULE

Interview with Radiographers in Diagnostic Imaging Department in a Premier Hospital in Ghana on the quality of service delivery

The items in this interview are to elicit your views on the quality of services delivering in your department. I would be most grateful if you present your views frankly and honestly. This exercise is purely for academic purposes and the information you would provide would be treated as confidential.

Part 1 – General information

Name of Interviewee:

Date of interview:

Years of service:

Rank/Grade:

Part 2 – Questionnaire

Q1. What does the term ‘service quality’ mean to you?

Probe: What are views on the quality of service delivery to patients in general in the department?

Q2. What factors do you think contribute to good service delivery to clients/patients?

Q3. What are the key challenges for you in meeting patients’ expectation?

Probe: What key effects do you think the excessive electricity outages have on your service delivery?

Q4. In your experience, how are standards of quality monitored and enhanced in imaging service delivery?

Q5. What do understand by the practice of quality assurance?

Q6. What do you think are the main contributors to repetition of X-ray examinations in the department?

Probe: The level of the reject rate currently is 3x the WHO recommended rate, how can this be reduced?

Q7. How do you think workload increase will affect this?

Probe: What do you understand by the phrase ‘speed and efficiency’?

Q8. In your experience, what are the main complaints that patients have?

Q9. In your experience, how are patient complaints about waiting times handled?

Probe: How do you feel about patient waiting?

INTERVIEW SCHEDULE

Interview with Managers in Diagnostic Imaging Department in a Premier Hospital in Ghana on the quality of service delivery

The items in this interview are to elicit your views on the quality of services delivering in your department. I would be most grateful if you present your views frankly and honestly. This exercise is purely for academic purposes and the information you would provide would be treated as confidential.

Part 1 – General information

Name of Interviewee:

Date of interview:

Years of service:

Rank/Grade:

Part 2 – Questionnaire

Q1. Can you please tell me what you understand by the phrase ‘quality of service’?

Probe: What are views on the quality of service this department is providing to patients?

Q2. What do you think influences the quality of service this department provides to its patients?

Q3. Can you comment on patient waiting time?

Probe: How are patient complaints about waiting times handled?

Q4. What do you think are the key challenges the radiographers are facing in meeting patients’ expectations?

Probe: Can you please tell me how the current power outages are affecting the quality of service provision in the department?

Probe: What measures do you have in place to deal with the power outages?

Q5. What measures do you have in place to maximise quality of service delivery to patients in this department?

Q6. In your view or experience, how are standards of quality in radiographic service delivery monitored?

Probe: How are standards of quality services enhanced in the department?

INTERVIEW SCHEDULE

Interview with Patients in Diagnostic Imaging Department in a Premier Hospital in Ghana on the quality of service delivery

The items in this interview are to elicit your views on the quality of services delivering in your department. I would be most grateful if you present your views frankly and honestly. This exercise is purely for academic purposes and the information you would provide would be treated as confidential.

Part 1 – General information

Name of Interviewee:

Date of interview:

Part 2 – Questionnaire

Q1. Can you please tell me what your expectations were before you came for the X-ray?

Probe: Have you ever had an X-ray in another hospital and did it compare?

Q2. How do you see the quality of service offered you in this department, from the reception?

Probe: What did you feel?

Q3. Tell me about your experience during the examination, what did you feel was good about it?

Q4. What can you say about the radiographer who attended to you?

Probe: Can you tell me about the radiographer’s way of communication, caring? How did the radiographer treat your dignity and privacy in the X-ray room?

Q5. What can you say about the time that you have waited for your turn?

Probe: What do you think the department would have done better to improve quality service?

Q6. How satisfied were you with the service offered you?

Probe: What is your understanding of thoroughness of X-ray procedure?

Q7. Were you surprised by any aspect of the service you received?



PARTICIPANT INFORMATION SHEET FOR RADIOGRAPHERS/MANAGERS

TITLE: Developing a concept of quality in radiographic service delivery in Ghana

You are being invited to participate in a research study to:

-develop a unique concept of quality of modern radiographic service provision for radiography practice in Ghana

- explore the role of the potential influence service users' opinions have on the quality of radiological service to patients

Before you decide whether to take part in this study, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish.

Ask the investigator if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

“Why have I been asked me to take part in this study?”

I will enjoy the opportunity of having you voluntarily participate in this PhD research project. There is no doubt that you are one of the best Radiographers in terms of your professional knowledge and experience in this department. I am in high hope that it will benefit the project immensely from your professional experience and insights. You will have the opportunity to make a vast impact by contributing your views and/or opinions about the quality of radiological service delivery in this department to patients and talking about your role in promoting quality of service to the patients. I am in high hope that you will have convenient time to participate.

What if I do not wish to take part?”

It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason.

What will happen to me if I take part?

You are assured that your participation in this research project will not cause you any medical or social risk. The information you will provide will be treated and kept as strictly confidential and any reports of the findings of this research work will not contain any identifying information about you. Your involvement in this research will be approximately twenty-five (25) minutes.

In this exercise, you will be requested to answer some questions either by questionnaire or through interviews. The interview will be recorded for the purpose of this research project and again, your identity will remain strictly confidential and you will be anonymous.

How long will the study last?

The whole study will last for about four (4) years. However, you will be involved for approximately twenty to thirty (20-30) minutes. As soon as we are done with phase 1 in the next 3 months, we will continue with phase 2 and invitation will be extended to you to participate as well.

What if I change my mind during the study?

You are free to withdraw from the study at any time without needing to explain your decision for doing so. If you decide to withdraw your consent your data can be removed and not included in the analysis

Are there possible disadvantages and risks of taking part?

Again, you assured that your participation in this research project will not cause you any medical, moral or social risk. The only known inconvenience that your involvement may cause you is the time you will spend during completing various data collection sheets.

“What will happen to the information from the study?”

All information will be kept entirely confidential. Data sheets will be destroyed three years after the study ends. No individual will be identifiable in the report. You will be informed of the results of the study and be given a copy if you wish so.

“What if I have further questions?”

You are free to contact the researcher through these Email addresses:

jgawugah@hotmail.com or b2026091@my.shu.ac.uk



Sheffield Hallam University

CONSENT FORM

TITLE: Developing a concept of quality in radiographic service delivery in Ghana

Please give your consent to participating in the study by answering the following questions

Have you read the information sheet about this study?

Yes		No	
-----	--	----	--

Have you been able to ask questions about this study?

Yes		No	
-----	--	----	--

Have you received answers to all your questions?

Yes		No	
-----	--	----	--

Have you received enough information about this study?

Yes		No	
-----	--	----	--

Which investigator have you spoken to about this study?

Are you involved in any other studies?

Yes		No	
-----	--	----	--

If you are, how many?

--

Do you understand that you are free to withdraw from this study:

At any time?

Yes		No	
-----	--	----	--

- Without giving a reason for withdrawing?

Yes		No	
-----	--	----	--

Do you agree to take part in this study?

Yes		No	
-----	--	----	--

Your signature will certify that you have had adequate opportunity to discuss the study with the investigator and have voluntarily decided to take part in this study. Please keep your copy of this form and the information sheet together.

Signature of participant: Date:

Name (*Block Letters*):

Signature of investigator:

James N.K Gawugah



Sheffield Hallam University

Letter of Invitation

Dear

I take this opportunity to thank you for your participation in the Phase1 of the research project recently. If you can recall, I explained to you that the project is in two phases and you agreed to leave your contact particulars with me so as to get in touch with you when phase two is due. I wish to inform you that I am starting with the phase two of the study and I am happy to invite you to participate in the interview process.

This interview exercise aims to gather your opinions about the quality of diagnostic imaging service delivered to you in this imaging facility when you attended. This unit strives to provide quality, timely and expert care service to patients from all over Ghana. We cannot do this without your input or contribution as to what your expectations were, and if they were met. I invite you to feel free and express your opinions about the services you received from this facility.

PARTICIPANT INFORMATION SHEET

**TITLE: Developing a concept of quality in radiographic service delivery in
Ghana**

You are being invited to participate in a research study to:

- develop a unique concept of quality of modern radiographic service provision for radiography practice in Ghana.
- explore the imaging service users' opinions on quality of radiographic service provision.

Before you decide whether to take part in this study, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Talk to others about the study if you wish.

Ask the investigator if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

“Why have I been asked to take part in this study?”

This Department strives to provide quality, timely and expert care service to patients from all over Ghana. This is a PhD Research project with the main aim of assessing quality of radiological service delivery in the hospital and identifying the role the service users and providers play in promoting quality of service in the Radiology Department. We cannot achieve this without contribution as to what your health care expectations are. You are therefore invited to voluntarily participate in this research project.

What if I do not wish to take part?”

It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason.

What will happen to me if I take part?

You are assured that your participation in this research project will not cause you any medical or social risk. The information you will provide will be treated and kept as strictly confidential and any reports of the findings of this research work will not contain any identifying information about you.

In this exercise, you will be requested to answer some few questions in an interview. The interview will be recorded for the purpose of this research project and again, your identity will remain strictly confidential and anonymous.

How long will the study last?

The whole study will last about four (4) years. However, you will be involved for approximately 30 minutes in this one occasion.

What if I change my mind during the study?

You are free to withdraw from the study at any time without needing to explain your decision for doing so. If you decide to withdraw your consent your data can be removed and not included in the analysis.

Are there possible disadvantages and risks of taking part?

Again, you assured that your participation in this research project will not cause you any medical, moral or social risk. The only known inconvenience that your involvement may cause you is your precious time you will spend during the interview.

“What will happen to the information from the study?”

All information will be kept entirely confidential and secure. No individual will be identifiable in the report. You will be informed of the results of the study if you wish.

“What if I have further questions”?

You are free to contact the researcher through

Tel: +233-273290322/0244667077

Email: jgawugah@hotmail.com or b2026091@my.shu.ac.uk

Appendix XVII- Invitation letter for radiographers

Letter of Invitation (Radiographers)

Dear Colleague,

I am writing to you to ask you for your help with my PhD Student Research which aims at developing a concept of quality in radiographic service delivery in Ghana. I am by this letter inviting you to participate in this research project and contribute your opinion as an experienced radiographer. There is no doubt that you are one of the best Radiographers in terms of your professional knowledge, insights and vast experience. Your participation will benefit the project immensely as regards your contributions about the quality of radiological service delivery in imaging facilities and your role in promoting quality of service in Ghana.

Should you wish to participate, you will be interviewed about the service provision. The interview will take place in a safe venue at your convenient time and in a friendly atmosphere. The interview process will take approximately 30 minutes.

I would be most grateful if you accept to voluntarily participate in this research in order to help improve quality of diagnostic imaging services delivery and advance practice of radiography profession in Ghana.

A ‘Participant Information Sheet’ will be provided along with a ‘Consent Form’ for you to sign, in line with this research.

You can contact me through the following:

Telephone: 0244667077/ 0273290322

Email: jgawugah@hotmail.com / jgawuga@chs.edu.gh

Thank you.

Yours sincerely,

(James N.K. Gawugah)

Appendix XVIII – Literature Search documentation

Literature search & database selection

Over the period of August 2013 to December 2014, searches on quality of service literature were conducted from several databases including Emerald, ScienceDirect, Google Scholar, Sheffield Hallam Library Catalogues, Google.com, CINAHL, Scopus and PubMed. The search also generated quality of service articles from relevant peer-reviewed journals. The searches yielded over 90,000 hits. Cross-referencing of citations from journal articles was also utilised to generate additional relevant journal articles. Other relevant articles linked up to the articles already generated were also used.

Documents: the combination of keywords retrieved the maximum records in the Emerald Database.

Search engine or Keywords /Concepts	Search limits	Hits	Relevance
Quality service and satisfaction	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	964	27
Quality in healthcare /quality of service in healthcare	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	2,082	98
Delivering service quality	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	687	17
Service quality definitions	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	1,276	13
Healthcare service quality concepts	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	6,892	99
Healthcare delivery dimensions	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	3052	102
Healthcare service in developing countries	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	6549	85
Healthcare delivery in Ghana	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	188	28
healthcare service quality measurement	Publication: 1990 – 2014 Source: Peer-Reviewed Journals	7974	85
Quality of radiological services	Publication: 1990 – 2014	258	22

and patient satisfaction	Source: Peer-Reviewed Journals		
Patients' perception of quality of X-ray services	Publication: 1990 – 2014	382	33
	Source: Peer-Reviewed Journals		
Patients' experience with quality of X-ray services	Publication: 1990 – 2014	668	24
	Source: Peer-Reviewed Journals		
Delivering quality healthcare service	Publication: 1990 – 2014	9,682	46
	Source: Peer-Reviewed Journals		
Impacts of health service user involvement	Publication: 1990 – 2014	35,912	36
	Source: Peer-Reviewed Journals		
Health service user involvement	Publication: 1990 – 2014	51,569	26
	Source: Peer-Reviewed Journals		
Patient-centred care concept	Publication: 1990 – 2014	7,421	48
	Source: Peer-Reviewed Journals		
Patient-centred care in radiography	Publication: 1990 – 2014	105	11
	Source: Peer-Reviewed Journals		
Quality assurance in diagnostic radiography	Publication: 1990 – 2014	31	6
	Source: Peer-Reviewed Journals		
QA in diagnostic radiology	Publication: 1990 – 2014	27	5
	Source: Peer-Reviewed Journals		
QC & diagnostic radiography /radiology	Publication: 1990 – 2014	0	0
	Source: Peer-Reviewed Journals		
DRLs & radiation protection	Publication: 1990 – 2014	277	2
	Source: Peer-Reviewed Journals		
Reject film analysis & radiography	Publication: 1990 – 2014	20	1
	Source: Peer-Reviewed Journals		
Radiographic rejection-repeat analysis	Publication: 1990 – 2014	16	1
	Source: Peer-Reviewed Journals		

Inclusion and Exclusion Criteria

The retrieved articles were assessed for relevance on the bases of the inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none">• Literature dating 1990-2014• Full-length, peer-reviewed, open-access articles• All study designs• Grey literature• Policy documents on health• Quality management Textbooks• Case studies and case reviews	<ul style="list-style-type: none">• Literature older than 1990• Non-English language literature• Duplicate studies• Non-relevant literature• Abstracts

Appendix XIX – Scatter plots showing relationships between variables

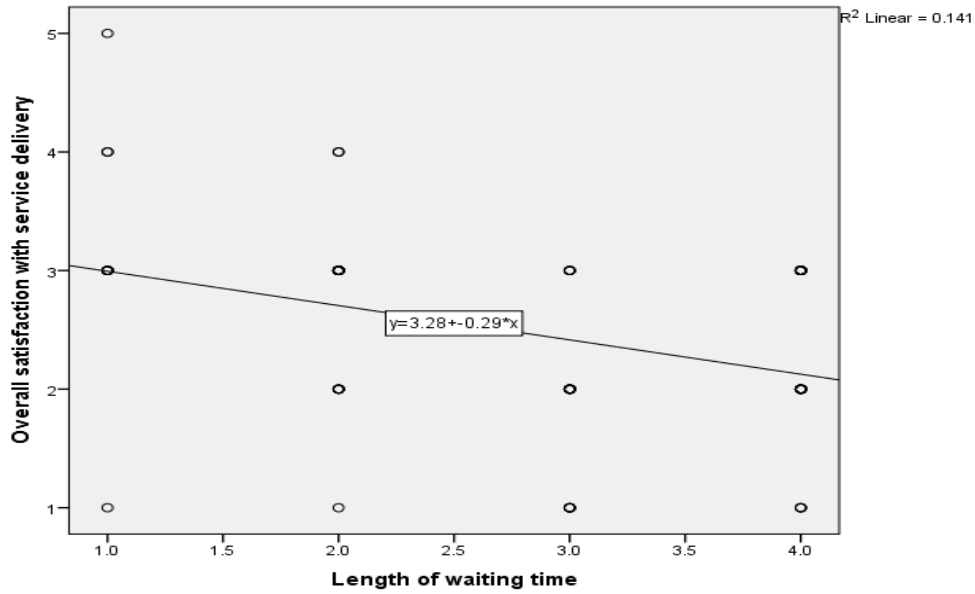


Figure 5.27: There is strong negative correlation between participant’s length of waiting time and overall satisfaction with service delivery; with Correlation coefficient of 0.141

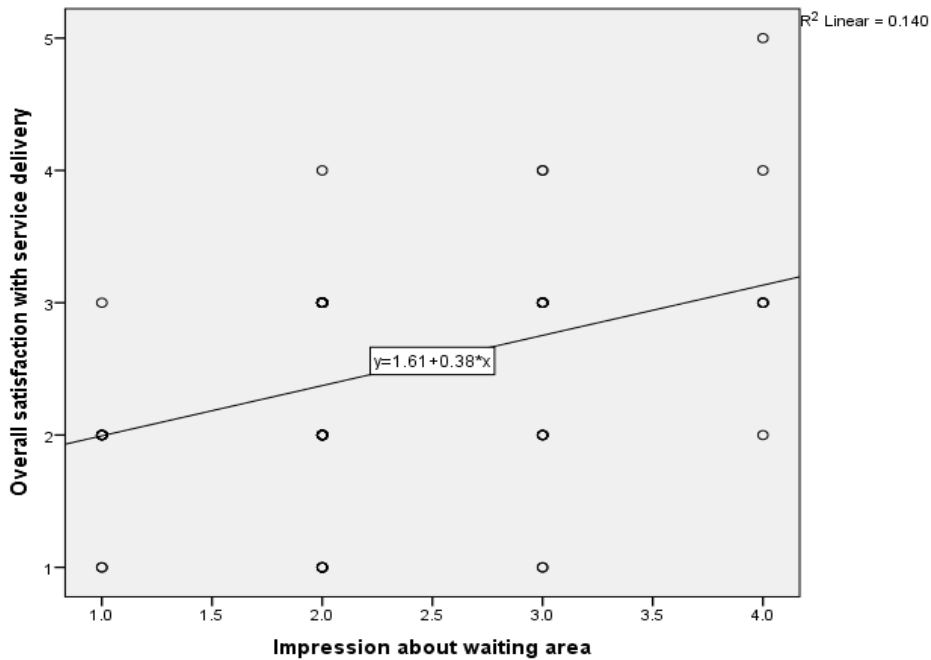


Figure 5.28: There is strong positive correlation between impression about waiting area and overall satisfaction with service delivery; with Correlation coefficient of 0.140

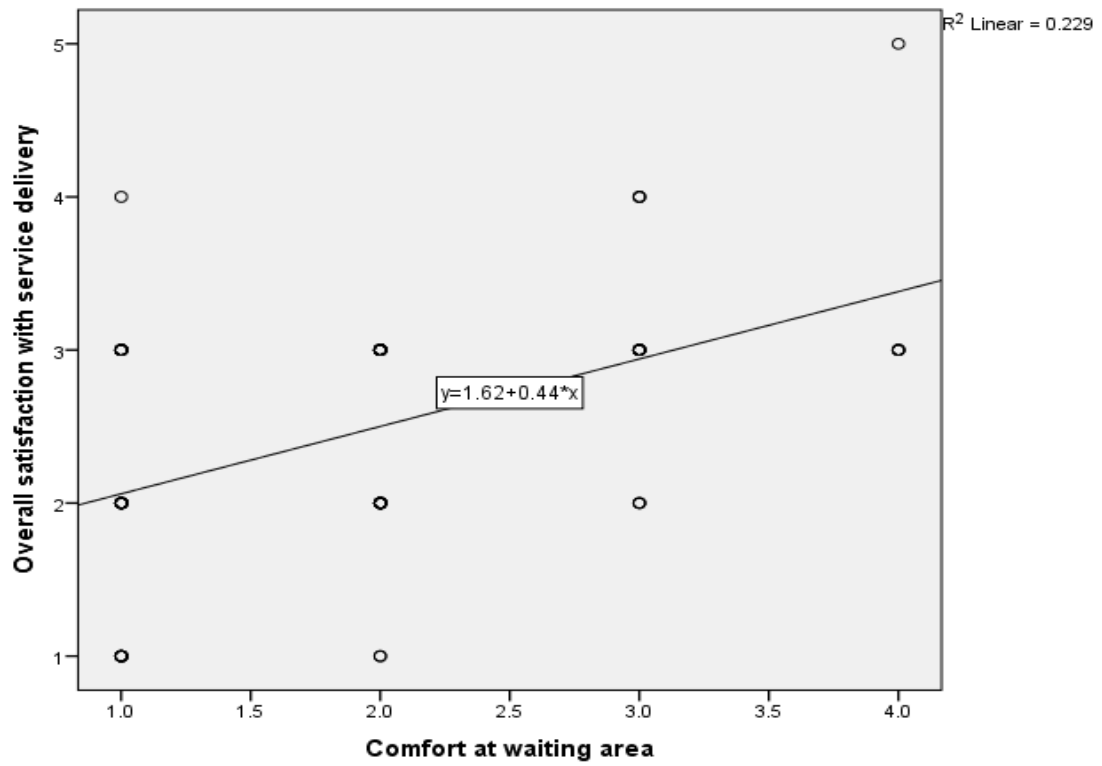


Figure 5.29: The figure showed strong positive correlation between participant’s comfort at waiting area and overall satisfaction with service delivery; Correlation coefficient of 0.229